

Putting Software Testing Terminology to the Test

M.A.Sc. Seminar

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- The Need for Standardized Terminology
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The Need for Standardized Terminology

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 - Force
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 - Phalange

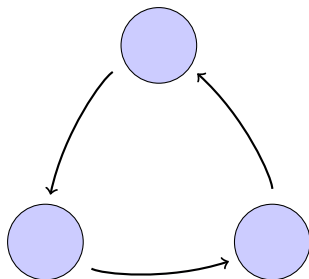
The Need for Standardized Terminology

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If software engineering holds code to high standards of clarity, consistency, and robustness, the same should apply to its supporting literature!

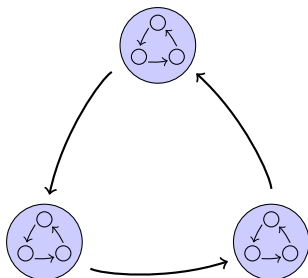
Interorganizational

Schools, companies, etc.



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Intraorganizational

Kaner et al. (2011, p. 7) say
“complete testing” could require the
tester to:

- discover “every bug”,
- exhaust the time allocated,
- implement every planned test,
- ...

The Lack of Standardized Terminology

“The Problem”

- Unfortunately, a search for a systematic, rigorous, and complete taxonomy for software testing revealed that the existing ones are inadequate:
 - Tebes et al. (2020) focus on *parts* of the testing process (e.g., test goal, testable entity),
 - Souza et al. (2017) prioritize organizing testing approaches over defining them, and
 - Unterkalmsteiner et al. (2014) focus on the “information linkage or transfer” (p. A:6) between requirements engineering and software testing.

Unstandardized Standards

“The Problem” (cont.)

- Tours “guide[] testers through the paths of an application” by following a structure that is:
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- Load testing is “conducted to evaluate the behaviour of a test item under anticipated conditions of varying load” (ISO/IEC and IEEE, 2022, p. 5; 2017, p. 253), such as:
 - loads “between anticipated conditions of low, typical, and peak usage” (2022, p. 5)

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 - loads “between anticipated conditions of low, typical, and peak usage” (2022, p. 5)
 - loads that are as large as possible (Patton, 2006, p. 86)

Unstandardized Standards

“The Problem” (cont.)

- Alpha testing is the “first stage of testing before a product is considered ready for commercial or operational use” (ISO/IEC and IEEE, 2017, p. 17) performed by:
 - “users within the organization developing the software” (p. 17)

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“Okay testing team, we want to conduct alpha testing on our product. What’s our timeline? Budget? Sample size?”

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Research Question 3

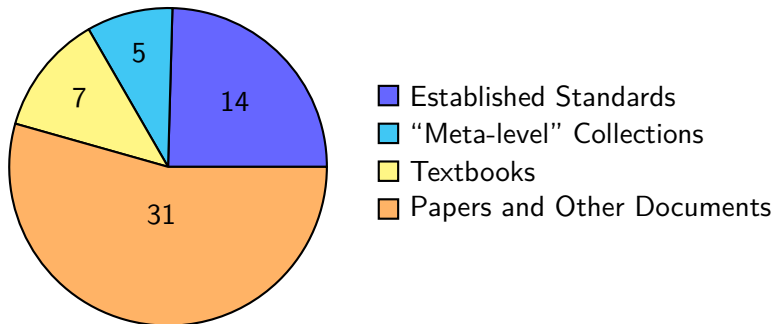
Is it possible to resolve/reduce any of these discrepancies systematically?

Research Question 1

What testing approaches does the literature describe?

Literature Review Time!

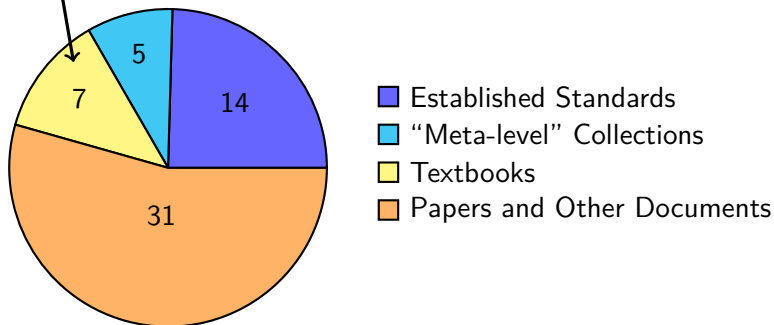
Methodology: Sources



Summary of how many sources comprise each source category.

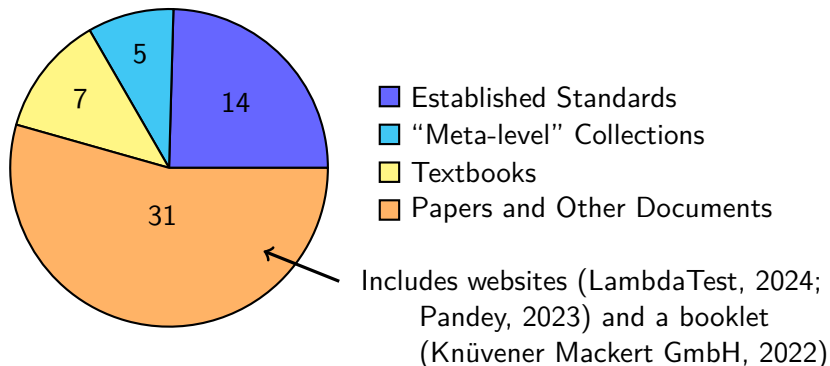
Methodology: Sources

Textbooks trusted at McMaster were our ad hoc starting points
(Patton, 2006; Peters and Pedrycz, 2000; van Vliet, 2000)

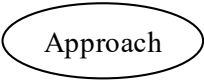


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Methodology: Sources



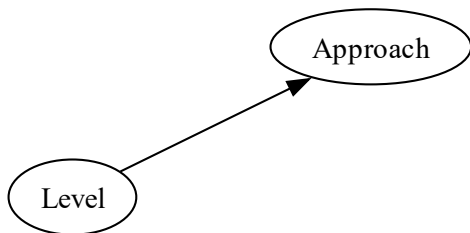
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Approach

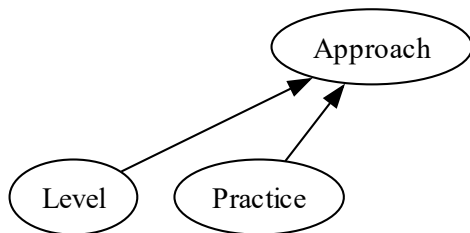
Approach: a “high-level test implementation choice” (ISO/IEC and IEEE, 2022, p. 10) used to “pick the particular test case values” (2017, p. 465)

Methodology: Categories

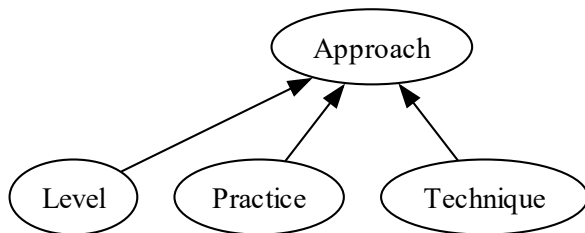


Level: a stage of testing with “particular objectives and ... risks”, each performed in sequence (ISO/IEC and IEEE, 2022, p. 12; 2021, p. 6)

Methodology: Categories

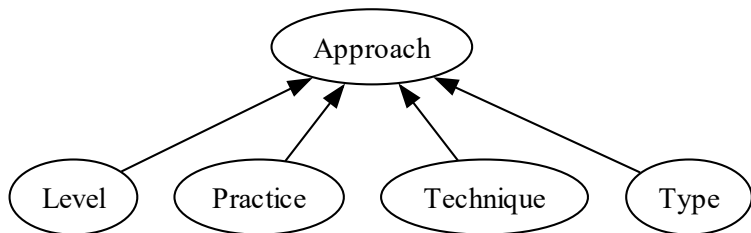


Practice: a “conceptual framework that can be applied to . . . [a] test process to facilitate testing” (ISO/IEC and IEEE, 2022, p. 14; 2017, p. 471)



Technique: a “defined” and “systematic” (ISO/IEC and IEEE, 2017, p. 464) “procedure used to create or select a test model, identify test coverage items, and derive corresponding test cases” (2022, p. 11)

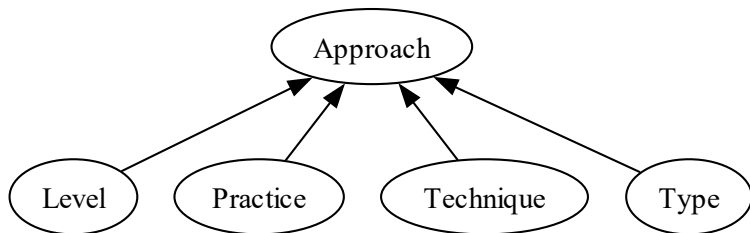
Methodology: Categories



Type: “Testing that is focused on specific quality characteristics” (ISO/IEC and IEEE, 2022, p. 15; 2021, p. 7; 2017, p. 473)

Methodology: Graph Notation

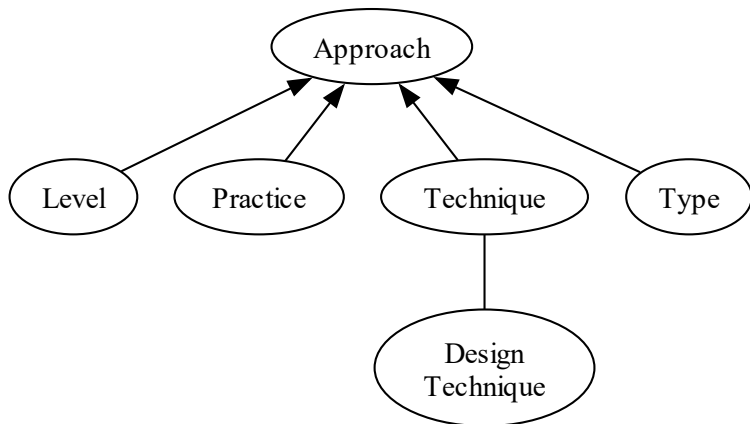
Relations



Arrows point from a *child* node to a *parent* node.

Methodology: Graph Notation

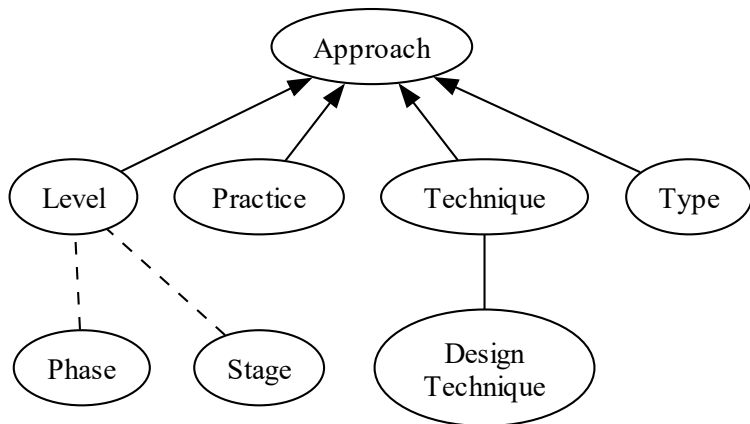
Relations



Lines without arrowheads connect *synonyms*.

Methodology: Graph Notation

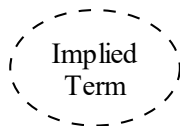
Relations



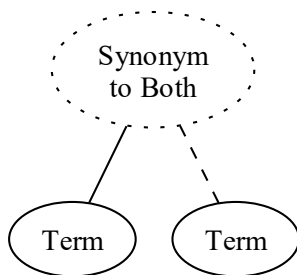
Dashed lines indicate a relationship is *implied*.

Methodology: Graph Notation

Terms

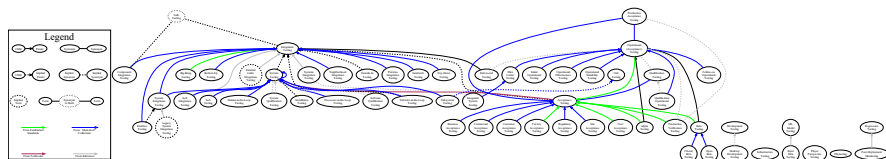


Dashed outlines indicate a term is *implied*.

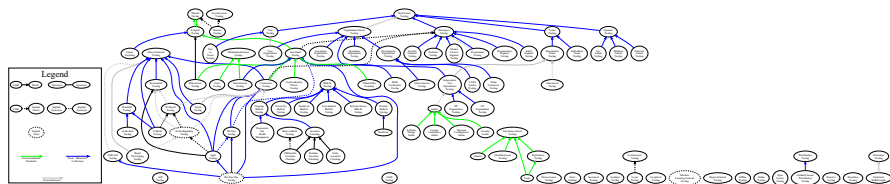


Dotted outlines indicate a term is a *synonym* to more than one term.

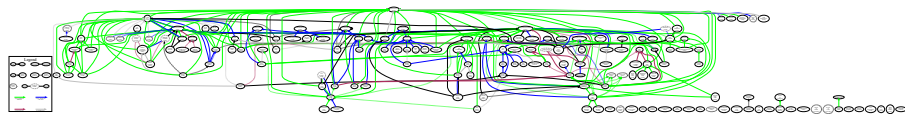
Graph of Test Levels



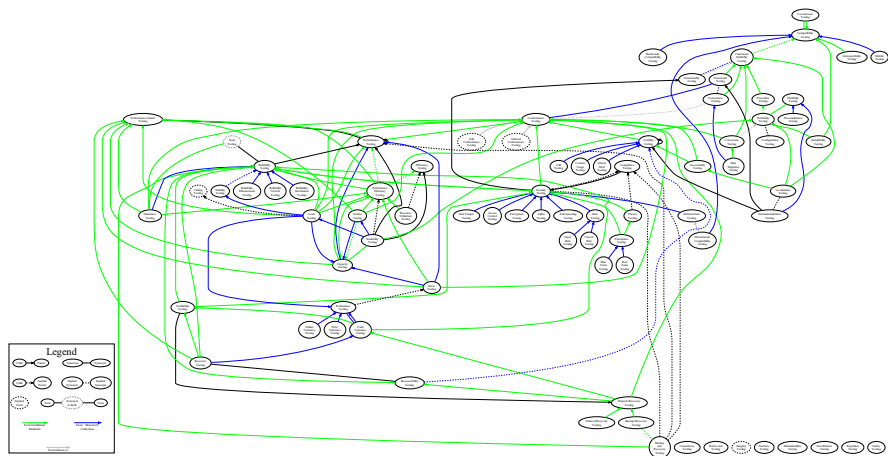
Graph of Test Practices



Graph of Test Techniques

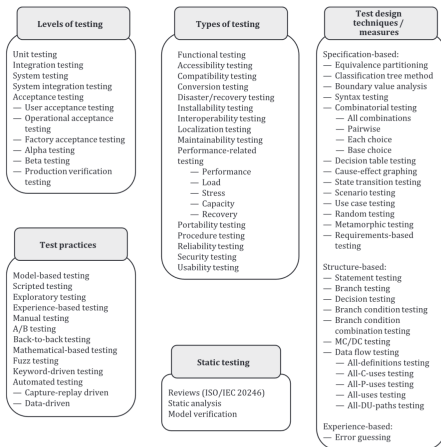


Graph of Test Types



Methodology: Graph Notation

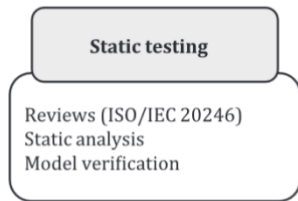
Static Testing



Example test approach choices (ISO/IEC and IEEE, 2022, Fig. 2).

Methodology: Graph Notation

Static Testing

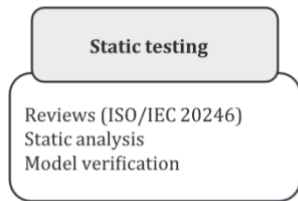


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Methodology: Graph Notation

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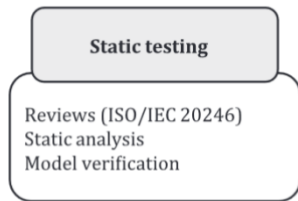


- While our focus is on dynamic testing, we include static testing in our research for completeness

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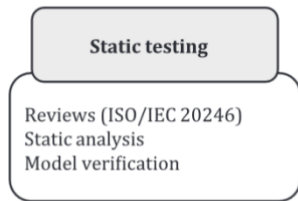
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- Static testing *is* quite distinct from dynamic testing, but this does not necessarily make it an orthogonal category

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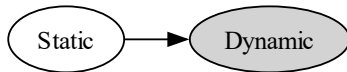
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- Static testing *is* quite distinct from dynamic testing, but this does not necessarily make it an orthogonal category
- When considering static testing in isolation, terms with gray backgrounds are related *dynamic approaches*



Methodology: Procedure

Approaches

- A row is created for each test approach, such as the following which is based on (ISO/IEC and IEEE, 2022)

Name	Category	Definition	Parent(s)	Synonym(s)
A/B Testing	Practice (p. 22)	Testing “that allows testers to determine which of two systems or components performs better” (p. 1)	Statistical Testing (pp. 1, 35), ...	Split-Run Testing (pp. 1, 35)

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- This information is gathered from sources by looking for
 - Glossaries
 - Testing-related terms
 - Terms described *by* other approaches
 - Terms that *imply* other approaches

- It seems that the existence of a software quality implies the existence of a test type associated with it

Methodology: Procedure

Other Information

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- Some test approaches use shared or complicated terminology

Methodology: Procedure

Other Information

- It seems that the existence of a software quality implies the existence of a test type associated with it
- Some test approaches use shared or complicated terminology
- For each of these, we record its
 - Name
 - Definition
 - Precedence for a related test type (only for qualities)
 - Synonym(s)

Acknowledgment

- Dr. Smith and Dr. Carette have been great supervisors in the past and have, both then and now, provided me with valuable guidance and feedback
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- The past and current Drasil team have created a truly amazing framework!

Thank you!
Questions?

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