This joint Australian/New Zealand standard was prepared by joint Technical Committee IT-015, Software and Systems Engineering. It was approved on behalf of the Council of Standards Australia on 9 June 2015 and on behalf of the Council of Standards New Zealand on 11 June 2015.

This standard was published on 30 June 2015.

The following are represented on Committee IT-015:

Australian Computer Society
Australian Society for Technical Communication, NSW
Charles Sturt University
Department of Defence
Griffith University
Institute of IT Professionals New Zealand
La Trobe University
National Association of Testing Authorities Australia
National ICT Australia
NEHTA
New Zealand Organisation for Quality
NSW Business Chamber
Quantitative Enterprise Software Performance
Systems Engineering Society of Australia
University of Technology

Keeping standards up to date

Standards are living documents which reflect progress in science, technology, and systems. To maintain their currency, all standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current standard, which should include any amendments which may have been published since the standard was purchased.

Detailed information about joint Australian/New Zealand standards can be found by visiting the standards webshop in Australia at www.saiglobal.com.au or Standards New Zealand’s website at www.standards.co.nz.

Alternatively, Standards Australia publishes an annual printed catalogue with full details of all current standards. For more frequent listings or notification of revisions, amendments, and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national standards organisation.

We also welcome suggestions for improvement in our standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the title page.

This standard was issued in draft form for comment as DR AS/NZS ISO/IEC/IEEE 29119.1:2015.
Australian/New Zealand Standard

Software and systems engineering—Software testing

Part 1: Concepts and definitions


COPYRIGHT

© Standards Australia Limited/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

ISBN (Print) 978-1-77551-952-2
ISBN (PDF) 978-1-77551-953-9
PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee IT-015, Software and Systems Engineering.

The objective of this Standard is to specify definitions and concepts in software testing. It provides definitions of testing terms and discussion of concepts key to the understanding of the ISO/IEC/IEEE 29119 series of software testing international Standards.

This Standard is identical with, and has been reproduced from ISO/IEC/IEEE 29119-1:2013, Software and systems engineering—Software testing, Part 1: Concepts and definitions.

As this Standard is reproduced from an International Standard, the following applies:

(a) In the source text ‘this part of ISO/IEC/IEEE 29119’ should read ‘this Australian/New Zealand Standard’.

(b) A full point substitutes for a comma when referring to a decimal marker.

Attention is called to the possibility that implementation of this Standard may require the use of subject matter covered by patent rights. By publication of this Standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. ISO/IEEE is not responsible for identifying essential patents or patent claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance or a Patent Statement and Licensing Declaration Form, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this Standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from ISO or the IEEE Standards Association.

The term ‘informative’ has been used in this Standard to define the application of the annexes to which it applies. An ‘informative’ annex is only for information and guidance.
# CONTENTS

1 Scope .................................................................................................................................................. 1

2 Conformance ...................................................................................................................................... 1

3 Normative references ......................................................................................................................... 1

4 Terms and definitions .......................................................................................................................... 1

5 Software Testing Concepts ................................................................................................................ 12

5.1 Introduction to Software Testing .................................................................................................. 12

5.1.1 The Role of Testing in Verification and Validation ................................................................. 14

5.1.2 Exhaustive Testing ..................................................................................................................... 14

5.1.3 Testing as a Heuristic .................................................................................................................. 14

5.2 Software Testing in an Organizational and Project Context ........................................................ 14

5.2.1 The Test Process ....................................................................................................................... 17

5.3 Generic Testing Processes in the Software Life cycle ................................................................. 19

5.3.1 Development Project Sub-processes and their Results ............................................................. 20

5.3.2 On-going Maintenance and its Results .................................................................................... 21

5.3.3 Support Processes for the Software Development Life Cycle ................................................... 22

5.4 Risk-based Testing ........................................................................................................................ 24

5.4.1 Using Risk-Based Testing in the Organizational Test Process ................................................... 25

5.4.2 Using Risk-Based Testing in the Test Management processes .................................................. 25

5.4.3 Using Risk-Based Testing in the Dynamic Testing processes ................................................... 25

5.5 Test Sub-process ............................................................................................................................. 26

5.5.1 Test Objectives ........................................................................................................................ 26

5.5.2 Test Item.................................................................................................................................... 27

5.5.3 Testing of Quality Characteristics ............................................................................................. 27

5.5.4 Test Basis ................................................................................................................................... 28

5.5.5 Retesting and Regression Testing ............................................................................................... 29

5.5.6 Test Design Techniques ............................................................................................................. 29

5.6 Test Practices .................................................................................................................................. 30

5.6.1 Introduction ............................................................................................................................... 30

5.6.2 Requirements-Based Testing .................................................................................................... 31

5.6.3 Model-Based Testing .................................................................................................................. 31

5.6.4 Mathematical-Based Testing ...................................................................................................... 32

5.6.5 Experience-Based Testing .......................................................................................................... 32

5.6.6 Scripted and Unscripted Testing ............................................................................................... 33

5.7 Automation in Testing ..................................................................................................................... 34

5.8 Defect Management ........................................................................................................................ 34

Annex A (informative) The Role of Testing in Verification and Validation ........................................... 35

Annex B (informative) Metrics and Measures ......................................................................................... 36

B.1 Metrics and Measures ..................................................................................................................... 36

Annex C (informative) Testing in Different Life Cycle Models .............................................................. 37

C.1 Overview ....................................................................................................................................... 37

C.2 Agile Development and Testing ..................................................................................................... 37

C.2.1 Agile Development Principles .................................................................................................. 37

C.2.2 Test Management in Agile Development .................................................................................. 38

C.2.3 Test Sub-processes in Agile Development ............................................................................... 39

C.3 Sequential Development and Testing ............................................................................................ 40

C.3.1 Sequential Development Principles ........................................................................................ 40
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.3.2</td>
<td>Test Management in Sequential Development</td>
<td>40</td>
</tr>
<tr>
<td>C.3.3</td>
<td>Test Sub-processes in Sequential Development</td>
<td>41</td>
</tr>
<tr>
<td>C.4</td>
<td>Evolutionary Development and Testing</td>
<td>41</td>
</tr>
<tr>
<td>C.4.1</td>
<td>Evolutionary Development Principles</td>
<td>41</td>
</tr>
<tr>
<td>C.4.2</td>
<td>Test Management in Evolutionary Development</td>
<td>42</td>
</tr>
<tr>
<td>C.4.3</td>
<td>Test Sub-processes in Evolutionary Development</td>
<td>42</td>
</tr>
<tr>
<td>D</td>
<td>Detailed Test Sub-process Examples</td>
<td>44</td>
</tr>
<tr>
<td>D.1</td>
<td>Overview</td>
<td>44</td>
</tr>
<tr>
<td>D.2</td>
<td>Acceptance Test Sub-process</td>
<td>45</td>
</tr>
<tr>
<td>D.3</td>
<td>Detailed Design Test Sub-process</td>
<td>45</td>
</tr>
<tr>
<td>D.4</td>
<td>Integration Test Sub-process</td>
<td>46</td>
</tr>
<tr>
<td>D.5</td>
<td>Performance Test Sub-process</td>
<td>48</td>
</tr>
<tr>
<td>D.6</td>
<td>Regression Test Sub-process</td>
<td>49</td>
</tr>
<tr>
<td>D.7</td>
<td>Retest Test Sub-process</td>
<td>51</td>
</tr>
<tr>
<td>D.8</td>
<td>Story Set Test Sub-process</td>
<td>51</td>
</tr>
<tr>
<td>D.9</td>
<td>Story Test Sub-process</td>
<td>51</td>
</tr>
<tr>
<td>D.10</td>
<td>System Test Sub-process</td>
<td>52</td>
</tr>
<tr>
<td>D.11</td>
<td>Component Test Sub-process</td>
<td>53</td>
</tr>
<tr>
<td>E</td>
<td>Roles and Responsibilities in Testing</td>
<td>54</td>
</tr>
<tr>
<td>E.1</td>
<td>Testing Roles</td>
<td>54</td>
</tr>
<tr>
<td>E.2</td>
<td>Communication in Testing</td>
<td>54</td>
</tr>
<tr>
<td>E.3</td>
<td>Independence in Testing</td>
<td>54</td>
</tr>
<tr>
<td>Bibliography</td>
<td></td>
<td>56</td>
</tr>
</tbody>
</table>
INTRODUCTION

The purpose of the ISO/IEC/IEEE 29119 series of software testing standards is to define an internationally-agreed set of standards for software testing that can be used by any organization when performing any form of software testing.

It is recognized that there are many different types of software, software organizations, and methodologies. Software domains include information technology (IT), personal computers (PC), embedded, mobile, and scientific and many other classifications. Software organizations range from small to large, co-located to world-wide, and commercial to public service-oriented. Software methodologies include object-oriented, traditional, data driven and agile. These and other factors influence software testing. This series of international standards can support testing in many different contexts.

This part of ISO/IEC/IEEE 29119 facilitates the use of the other ISO/IEC/IEEE 29119 Software Testing standards by introducing the vocabulary on which this series of international standards are built and provides examples of their application in practice. Part 1 is informative providing definitions, a description of the concepts of software testing and ways to apply the software testing process defined in this part of ISO/IEC/IEEE 29119 and guidance for the other parts.

Initially, general software testing concepts are discussed. The role of software testing in an organizational and project context is described. Software testing in a generic software life cycle is explained, introducing the way software test processes and sub-processes may be established for specific test items or with specific test objectives. It describes how software testing fits into different life cycle models. The use of different practices in test planning is demonstrated; as well as how automation can be used to support testing. The involvement of testing in defect management is also discussed. Annex A describes the role of testing within the larger scope of verification and validation. Annex B provides a brief introduction to metrics used to monitor and control testing. Annex C contains a set of examples showing how to apply the standard in different life cycle models. Annex D provides examples on detailed test sub-processes. Annex E provides additional information on the roles and responsibilities typically encountered in test groups and tester independence. Finally, the Bibliography is at the end of the document.

Note that Title Case is used throughout this part of ISO/IEC/IEEE 29119 to denote processes and documents that are specified in ISO/IEC/IEEE 29119-2 and ISO/IEC/IEEE 29119-3 (e.g. Test Planning Process, Test Plan), whereas lowercase letters are used for documents that form parts of other documents (e.g. the project test strategy is an element of the Project Test Plan).

The test process model that the ISO/IEC/IEEE 29119 series of software testing standards are based on is defined in detail in ISO/IEC/IEEE 29119-2 Test Processes. ISO/IEC/IEEE 29119-2 covers the software testing processes at the organizational level, test management level and for dynamic test levels. Testing is the primary approach to risk treatment in software development. This standard defines a risk-based approach to testing. Risk-based testing is a recommended approach to strategizing and managing testing that allows testing to be prioritized and focused.

Templates and examples of test documentation that are produced during the testing process are defined in ISO/IEC/IEEE 29119-3 Test Documentation. Software testing techniques that can be used during testing are defined in ISO/IEC/IEEE 29119-4 Test Techniques.

Together, this series of international standards aims to provide stakeholders with the ability to manage and perform software testing in any organization.
Software and systems engineering—Software testing

Part 1: Concepts and definitions

1 Scope

This part of ISO/IEC/IEEE 29119 specifies definitions and concepts in software testing. It provides definitions of testing terms and discussion of concepts key to the understanding of the ISO/IEC/IEEE 29119 series of software testing international standards.

2 Conformance

ISO/IEC/IEEE 29119-1 is informative and no conformance with it is required.

The ISO/IEC/IEEE 29119 software testing series of standards contain three standards where conformance may be claimed:

- test processes;
- test documentation;
- test techniques.


3 Normative references

This document does not require the use of any normative references. Standards useful for the implementation and interpretation of this part of ISO/IEC/IEEE 29119 are listed in the Bibliography.

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC/IEEE 24765 and the following apply.

NOTE The following terms and definitions are provided to assist with the understanding and readability of parts 1, 2, 3 and 4 of the ISO/IEC/IEEE 29119 Software Testing standards so some terms defined in ISO/IEC/IEEE 29119-1 will not be used in ISO/IEC/IEEE 29119-1 and will only be used in another standard in the ISO/IEC/IEEE 29119 series. Only terms critical to the understanding of these standards are included; this clause is not intended to provide a complete list of testing terms. The systems and software engineering Vocabulary ISO/IEC/IEEE 24765 should be referenced for terms not defined in this clause. This source is available at the following web site: http://www.computer.org/sevocab.

This is a free sample only.

Purchase the full publication here:
https://shop.standards.govt.nz/catalog/29119.1%3A2015%28AS%7CISO%7CIEC%7CIEEE%29/view

Or contact Standards New Zealand using one of the following methods.

Freephone: 0800 782 632 (New Zealand)
Phone: +64 3 943 4259
Email: enquiries@standards.govt.nz