

# SQuaRE

## Software Product Quality Requirements and Evaluation

Introduction

Scope

SQuaRE New Architecture

Relation between current series and SQuaRE

2001-01-27

Revision of WG6 N474

Revision Based on Discussion at the SC7/WG6 Prague Meeting

ISO/IEC JTC1/SC7/WG6

Convener Motoei AZUMA

SQuaRE



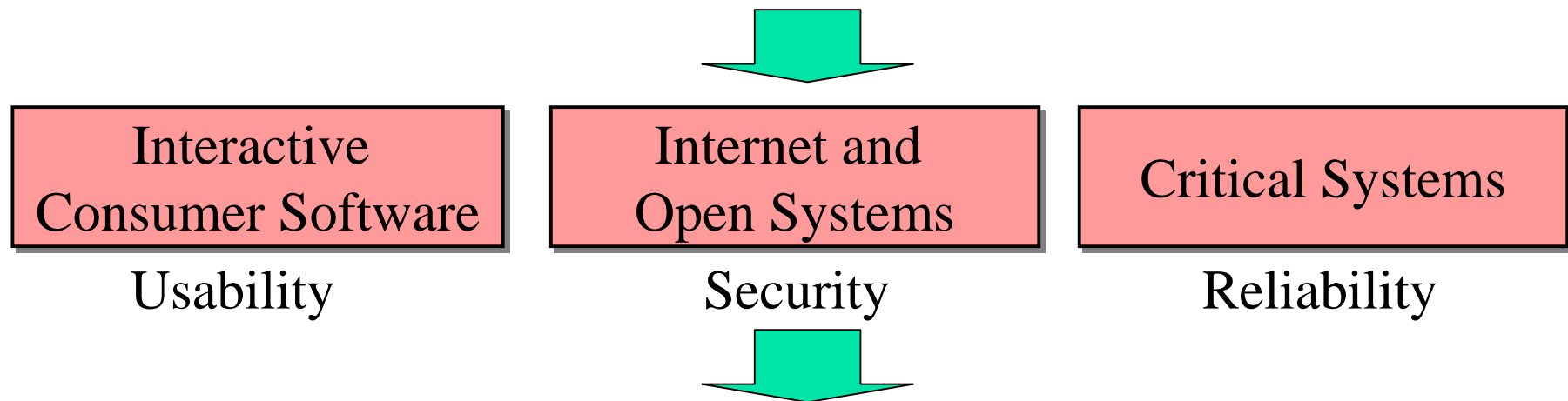
## SQuaRE : INTRODUCTION

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- Initial plan of Project 07.13 (ISO/IEC 9126 and 14598 Series) will be accomplished soon.
- Some inconsistency in the series and, therefore, needs for the new architecture were identified.
- The need for the unique name identifying IS and TR of 9126 and 14598 series was identified.
- This document specifies overview and plan of the next generation of 9126 and 14598 Series as SQuaRE.
- This document was originally created at the WG6 Kanazawa meeting in 1999, and revised at the WG6 Madrid meeting.
- The proposal was approved at JTC1/SC7 Madrid plenary meeting.
- It was then re-revised at WG6 Prague meeting.

# BACKGROUND

- Advance in Information Technologies
- Rapid growth of Internet Application
- Diverse needs on software quality



**Software quality requirements shall be stated and evaluated using quality model and metrics.**



## SQuaRE : Background and Purposes

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- Requirements for a product quality shall be defined using quality model and metrics.
- Quality models and metrics shall be standardized.
- Products' quality shall be evaluated based on quality model using metrics against quality requirements.
- SQuaRE is aiming to provide integrated and comprehensive set of international standards and technical reports on software product quality.
- SQuaRE includes international standards and technical reports on quality model and metrics, as well as quality requirements and evaluation.

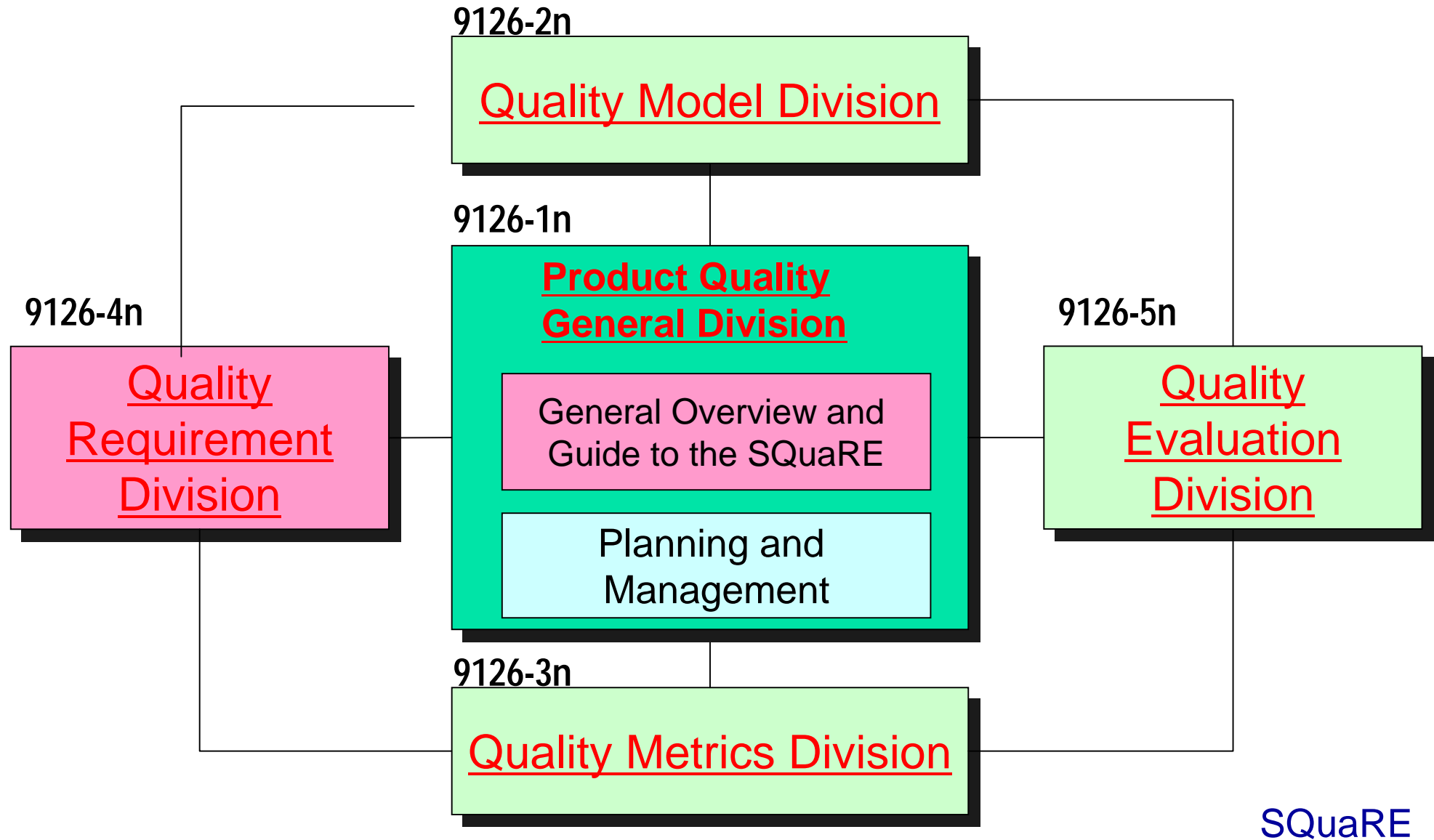


## SQuaRE: SCOPE

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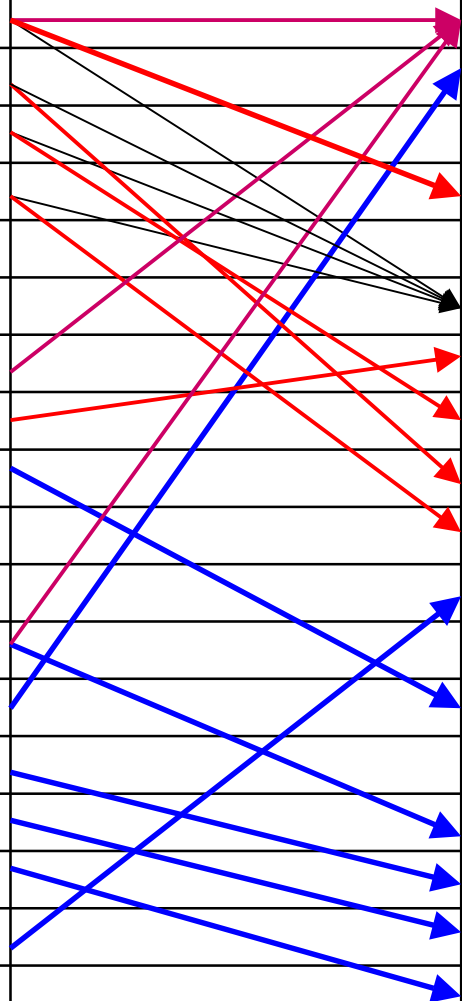
- SQuaRE is a set of international standards and technical reports on software product quality.
- SQuaRE **consists of the following four plus one division.**
  - Quality requirements, Quality evaluation, Quality models and Quality metrics, as well as the umbrella division.
- SQuaRE **includes:**
  - Definitions of terms, reference models and the general guide,
  - Requirements (shall) and recommendations (should), and
  - Individual guides to the use of the series.
- **Intended users** of SQuaRE include, but are not limited to, software developers, acquirers, independent evaluators, and their managers.
- SQuaRE **replaces** current ISO/IEC 9126 series and 14598 series

# SQuaRE: Architecture



# Relations Between Current Series and SQuaRE

CURENT		SQuaRE
<b>9126: Product Quality</b>		<b>9126-1n: Software Product Quality Division</b>
-1: Quality Model		-10: General Overview and Guide (NP)
-2: External Metrics		-11: <i>Planning and Management</i>
-3: Internal Metrics		<b>9126-2n: Quality Model Division</b>
-4: Quality in Use Metrics		-20: Quality Model and Guide (Rev)
		<b>9126-3n: Quality Metrics Division</b>
<b>New Proposal</b>		-30: General Requirements and Guide (NP)
Guides to use 9126 & 14598		-31: Base Metrics (NP)
Elementally (Design) Metrics		-32: <i>Internal Metrics</i>
Quality Requirements		-33: <i>External Metrics</i>
		-34: <i>Quality in Use Metrics</i>
<b>14598: Product Evaluation</b>		-35: <i>Documentation of Evaluation Module</i>
-1: General Overview		<b>9126-4n: Quality Requirements Division</b>
-2: Planning and Management		-40: Quality Requirements and Guide (NP)
-3: Proc for Developers		<b>9126-5n: Quality Evaluation Division</b>
-4: Proc for Acquirers		-50: Quality Evaluation Overview and Guide
-5: Proc for Evaluators		-51: <i>Proc for Developers</i>
-6: Doc of Evaluation Modules		-52: <i>Proc for Acquirers</i>
		-53: <i>Proc for Evaluators</i>





# SQuaRE - 1n: Software Product Quality Division

## 9126 - 1n: Software Product Quality

### 9126-10: General Overview and Guide to the SQuaRE

#### Single Volume 3 sub-parts:

- Umbrella document, which consists of normative part and informative part,
- SQuaRE architecture model, terminology from 14598-1, and
- Overview from 9126-1.

### 9126-11: Planning and Management

Current 14598-2





## 9126-10: General Overview and Guide to the SQuaRE

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- Document Type: Standard (New Part)
- Action: New subproject proposal
- Purpose and justification of the new part proposal:
  - Present umbrella document for the whole SQuaRE
  - Guide users (help navigating) through the series
  - Save users effort for using series
- Major contents and scope:
  - SQuaRE architecture model, terminology and overview
  - Intended users and associated parts of the series
  - Reference Models



## 9126-10: General Overview and Guide to the SQuaRE (2/2)

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- Input for the work:
  - ISO/IEC 9126-1
  - ISO/IEC 14598-1
  - WG6 Kanazawa 11r
  - WD of the existing guide
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor:
  - Danilo Scalet, Witold Suryn



## 9126-11: Planning and Management

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- Document Type: Standard (Revision of ISO/IEC 14598-2)
- Action: Minor editorial revision
- Purpose and justification of the revision:
  - Provide details about the planning and management requirements.
  - Make consistent with other parts in the SQuaRE.
- Major contents and scope:
  - Requirements, recommendations and guidelines for a supporting function, which is responsible for acquiring, standardizing transferring and managing technologies in the area of SQuaRE.
- Input for the work:
  - ISO/IEC 14598-2
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor: (Tom Ipoly)



# SQuaRE - 2n: Quality Model Division

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9126 - 2n: Quality Model

Single volume 2 sub-parts document Transfer metrics requirement  
(Normative reference)

9126-20: Quality Model

Current 9126-1 minus generic explanations and quality metrics. [Guide to Use of the quality model included](#)



## 9126-20: Quality Model and Guide

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- Document Type: Standard (Revision of ISO/IEC 9126-1)
- Action: Major editorial revision
- Purpose and justification of the revision:
  - Describe a model for software product quality: internal quality, external quality and quality in use
  - Guide users to apply the model to the specific product
- Major contents and scope:
  - Characteristics and sub-characteristics for internal and external quality
  - Characteristics for quality in use.
  - Guide to use the model.



## 9126-20: Quality Model and Guide (2/2)

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- Input for the work:
  - ISO/IEC 9126-1, 14598-1
- Relationship to other standards:
  - Comprehensive part for the quality model
  - Describe reference of other standards
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor:
  - Nigel Bevan

# SQuaRE - 3n: Quality Metrics Division

## 9126 - 3n: Quality Metrics

From 9126-1 and 9126-2,-3,4 common parts

9126-30: Metrics Reference Model and Guide

9126-31: Base Metrics

New

9126-32: Internal Metrics

Current 9126-3

9126-33: External Metrics

Current 9126-2

9126-34: Quality in Use Metrics

Current 9126-4

9126-35: Documentation of Evaluation Modules

Current 14598-6



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## 9126-30: Metrics Reference Model and Guide

- Document Type: Standard (New Part)
- Action: New subproject proposal
- Purpose and justification of the new part proposal:
  - Give general information of the quality metrics as an umbrella document of the metrics part
  - Make the common part of the current 9126-2, -3 and -4 independent.
  - Guide users to apply the metrics to the specific product.
- Major contents and scope:
  - Introductory explanation, reference model and definitions that are common to a set of base metrics, internal metrics, external metrics and quality in use metrics.
  - General requirements (shall) for use of metrics.
  - Guidance to users for selecting or developing, and applying metrics and measures from the International Technical Reports.
  - This International standard can be applied to any kind of software for any application.



## 9126-30: Metrics Reference Model and Guide (2/2)

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- Input for the work:
  - Reference: ISO/IEC 9126-1, 14598-1
- Relationship to other standards:
  - Describe reference of other standards and technical reports, especially 9126-10, 20, 31, 32, 33 and 34
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor:
  - Vipula Godamune, Atsushi Yamada



## 9126-31: Base Metrics

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- Document Type: Standard (New Part)
- Action: New subproject proposal
- Purpose and justification of the new part proposal:
  - Describe a set of base metrics using which a value that composes internal quality, external quality or quality in use can be generated.
  - List those metrics that cannot be included in the other part of metrics by its nature.
- Major contents and scope:
  - Definitions and specifications of a set of recommended base metrics, which are intended to be used during the whole software development lifecycle.
  - Base metrics are specific by their nature and form the common denominator for several software characteristic or sub-characteristic within the series (listed in 9126-1).
  - This set of metrics can be used not for the quality evaluation only, but also for the prediction of other software engineering characteristics (e.g. development effort, minimal coding and testing time).



## 9126-31: Base Metrics (2/2)

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- Input for the work:
  - ISO/IEC 9126-1, -2, -3, -4
  - ISO/IEC 14598-1
- Relationship to other standards:
  - Describe reference of other standards and technical reports as umbrella of the metrics part.
  - It is intended to be used with the 9126-20 quality model, 9126-32 internal metrics, -33 external metrics and -34 quality in use metrics
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor:
  - Jiri Vanicek, Ota Novotony, Renate Sitte



## 9126-32: Internal Metrics

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- Document Type: Standard (Revision of ISO/IEC 9126-3)
- Action: Major editorial revision
- Purpose and justification of the revision:
  - Describe a set of metrics for measuring internal attributes of the software product.
  - Users can use or modify the metrics to apply metrics to the specific product.
- Major contents and scope:
  - This IS defines internal metrics for **quantitatively measuring** internal software quality in terms of **characteristics and sub-characteristics** defined in ISO/IEC 9126-1
  - An explanation of how to use internal metrics
  - A basic set of metrics for each sub-characteristic
  - Guide and examples of how to use internal metrics during the software product life cycle



## 9126-32: Internal Metrics(2/2)

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- Input for the work:
  - ISO/IEC 9126-3, 14598-1
- Relationship to other standards:
  - It is intended to be used together with ISO/IEC 9126-1.
- Intended users:
  - People responsible for analyzing requirements and evaluating product quality during testing
  - All users of SQuaRE series
- Editor and co-editor:
  - Yukio Tanitsu, Vipula Godamune



## 9126-33: External Metrics

- Document Type: Standard (Revision of 9126-2)
- Action: Major technical revision
- Purpose and justification of the revision:
  - Describe a model for software product quality: internal quality, external quality and quality in use
  - Guide users to apply the model to the specific product
- Major contents and scope:
  - Defines **external metrics** for quantitatively measuring external software quality in terms of **characteristics** and **sub-characteristics** defined in ISO/IEC 9126-1, and is intended to be used together with ISO/IEC 9126-1.
  - A basic set of metrics for each sub-characteristic
  - An explanation of how to use external metrics
  - Guide and an example of how to use metrics during the software product life cycle



## 9126-33: External Metrics(2/2)

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- Input for the work:
  - ISO/IEC 9126-1, -2
  - ISO/IEC 14598-1
- Relationship to other standards:
  - It is intended to be used together with ISO/IEC 9126-1.
- Intended users:
  - All users of SQuaRE series
  - People responsible for analyzing requirements and evaluating product quality during testing
  - Testing laboratories
- Editor and co-editor:
  - Atsushi Yamada, Vipula Godamune





## 9126-34: Quality in Use Metrics

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- Document Type: Standard (Revision of ISO/IEC 9126-4)
- Action: Major technical revision
- Purpose and justification of the revision:
  - To publish as an international standard
  - Guide users to apply the model to the specific product
- Major contents and scope:
  - **Quality in Use** metrics for the characteristics defined in ISO/IEC 9126-20, and is intended to be used together with ISO/IEC 9126-31, -32 and -33.
  - Guide to use the QIU metrics



## 9126-34: Quality in Use Metrics(2/2)

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- Input for the work:
  - ISO/IEC 9126-1, -4
  - 14598-1
- Relationship to other standards:
  - It is intended to be used together with ISO/IEC 9126-1.
- Intended users:
  - All users of SQuaRE series
  - People responsible for analyzing requirements and evaluating product quality after delivery
- Editor and co-editor:
  - Nigel Bevan, Witold Suryn



## 9126-35: Documentation of Evaluation Module

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- Document Type: Standard (Revision of ISO/IEC 14598-6)
- Action: Minor editorial revision
- Purpose and justification of the revision:
  - Current 14598-6 is a part of 14598 product evaluation. However, it defines how to specify a metric and how to use it. Therefore, it is necessary that this part be a sub-part of new metrics part.
- Major contents and scope:
  - This part of ISO/IEC 14598 defines the structure and content of the documentation to be used to describe an Evaluation Module.
  - **Evaluation modules** are intended to be used within the context of the ISO/IEC 9126 and the ISO/IEC 14598 series of standards.



## 9126-35: Documentation of Evaluation Module(2/2)

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- Input for the work:
  - ISO/IEC 14598-6
  - ISO/IEC 9126-2, -3 and -4 common part
- Relationship to other standards:
  - Metrics examples as informative annex of 9126-32 ~ -34 use the form that is defined in this part.
- Intended users:
  - This part of SQuaRE is intended to be used by experts in evaluation technology such as testing laboratories, research institutes and others when producing new evaluation modules.
- Editor and co-editor:
  - Jorgen Bough



# SQuaRE - 4n: Quality Requirement Division

9126 - 4n: Quality Requirement

Single volume standard and guides

9126-40: Quality Requirement

— Concepts and general guide to Quality Requirements. Requirements for Quality Requirements

— Quality in Use Requirement

— External Quality Requirement

— Internal Quality Requirement

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This is not a part of SQuaRE!!



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## 9126-40: Quality Requirement

- Document Type: Standard (New)
- Action: New subproject proposal
- Purpose, justification:
  - Examples of use of the quality requirement defined in this part of SQuaRE are to:
    - validate the completeness of a requirements definition;
    - identify software requirements from a view of quality;
    - identify software design objectives;
    - identify software testing objectives;
    - identify quality assurance criteria;
    - identify acceptance criteria for a completed software product.
- Major contents and scope:
  - This part of ISO/IEC 9126-40 enables software product quality to be specified as **quality requirement**.
  - The requirement to **be tracked, validated and managed** with evaluation from different perspectives by those associated with acquisition, requirements analysis, development, use, evaluation, support, maintenance, quality assurance and audit of software.
  - Guide to use the model and metrics for requirement definition.



## 9126-40: Quality Requirement (2/2)

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- Input for the work:
  - Reference: ISO/IEC 9126-1,14598-1
- Relationship to other standards:
  - Quality model, quality in use metrics and external metrics
- Intended users:
  - All users of SQuaRE series
- Editor and co-editor:
  - Jorgen Boegh, Mike Gayle





# SQuaRE - 5n: Quality Evaluation Division

## 9126 - 5n: Quality Evaluation

[9126-50: Evaluation Process Overview](#)

Modified 14598-1

[9126-51: Developers Process](#)

Minor change

[9126-52: Acquirers Process](#)

Minor change

[9126-53: Evaluators Process](#)

Minor change



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## 9126-50: Evaluation Process Overview

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- Document Type: Standard (Revision of ISO/IEC 14598-1)
- Action: Major editorial revision
- Purpose and justification for the revision:
  - Umbrella document of the evaluation process subpart.
  - Describe the generic evaluation process.
  - Guide users to apply the quality model and metrics to the specific product evaluation.
- Major contents and scope:
  - This part introduces the other parts of 9126-5n series.
  - This part contains general requirements for specification and evaluation of software quality and clarifies the general concepts.
  - This part provides a framework for evaluating the quality of all types of software product and states the requirements for methods of software product measurement and evaluation.



## 9126-50: Evaluation Process Overview(2/2)

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- Input for the work:
  - ISO/IEC 9126-1,14598-1
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - All users of SQuaRE series
  - ISO/IEC 9126-50 is intended for use by developers, acquirers and independent evaluators, particularly those responsible for software product evaluation.
- Editor and co-editor:
  - Nigel Bevan



## 9126-51: Developers Process

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- Document Type: Standard (Revision of ISO/IEC 14598-3)
- Action: Minor editorial change
- Purpose and justification for the revision:
  - In order to keep consistency in the SQuaRE.
  - Guide users to apply the generic evaluation process to the specific product evaluation.
- Major contents and scope:
  - This part provides requirements and recommendations for the practical implementation of software product evaluation when the evaluation is conducted in parallel with the development and carried out by the developer.



## 9126-51: Developers Process(2/2)

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- Input for the work:
  - ISO/IEC 14598-3
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - All users of SQuaRE series
  - A project manager to clarify quality requirements
  - A software designer
  - A quality assurance / control / audit responsible
  - A maintainer
  - A software acquirer as part of an agreement with a developer when acquiring software
- Editor and co-editor:
  - Jorgen Boegh



## 9126-52: Acquirers Process

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- Document Type: Standard (Revision of ISO/IEC 14598-4)
- Action: Minor editorial revision
- Purpose and justification for the revision:
  - In order to keep consistency in the SQuaRE.
  - Guide users to apply the generic evaluation process to the specific product evaluation.
- Major contents and scope:
  - This part contains requirements, recommendations and guidelines for the systematic measurement, assessment and evaluation of software product quality during acquisition of “off-the-shelf” software products, custom software products, or modifications to existing software products.



## 9126-52: Acquirers Process(2/2)

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- Input for the work:
  - ISO/IEC 14598-4
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - Project managers, system engineers, development and maintenance software engineering staff and end users who plan to acquire software products, and also suppliers who provide such products
  - All users of SQuaRE series
- Editor and co-editor:
  - (John Harautz)





## 9126-53: Evaluators Process

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- Document Type: Standard (Revision of ISO/IEC 14598-5)
- Action: Minor revision
- Purpose and justification for the revision:
  - In order to keep consistency in the SQuaRE.
  - Guide users to apply the generic evaluation process to the specific product evaluation.
- Major contents and scope:
  - This part provides requirements and recommendations for the practical implementation of software product evaluation, when several parties need to understand, accept and trust evaluation results.
  - In particular, it may be used to apply the concepts described in ISO/IEC 9126-1n.



## 9126-53: Evaluators Process(2/2)

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- Input for the work:
  - 14598-5
- Relationship to other standards:
  - Describe reference of other standards
- Intended users:
  - This international standard may be used by
    - testing laboratory evaluators
    - software suppliers
    - software acquirers
    - software users
    - certification bodies
  - All users of SQuaRE series
- Editor and co-editor:
  - (Philippe Robert)