
**Software engineering — Product
evaluation —**
Part 6:
Documentation of evaluation modules

*Ingénierie du logiciel — Évaluation du produit —
Partie 6: Documentation des modules d'évaluation*
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14598 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14598-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software engineering*.

ISO/IEC 14598-6 is intended for use in conjunction with ISO/IEC 9126-1 (in preparation) which will replace ISO/IEC 9126:1991.

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ISO/IEC 14598 consists of the following parts, under the general title *Software engineering — Product evaluation*:

- *Part 1: General overview*
- *Part 2: Planning and management*
- *Part 3: Process for developers*
- *Part 4: Process for acquirers*
- *Part 5: Process for evaluators*
- *Part 6: Documentation of evaluation modules*

Annexes A, B, C and D of this part of ISO/IEC 14598 are for information only.

Introduction

Software product evaluation depends on a set of evaluation techniques and metrics that provide information about the quality characteristics of the software. Many metrics and associated methods for using the measurement results can be used for specific software product evaluation. ISO/IEC 9126-2 and ISO/IEC 9126-3 provide example metrics that correspond to one sub-characteristic. It is difficult to use these metrics consistently in an organisation. It may be necessary to develop new metrics for specific use. Therefore, it is necessary that a supporting function (see 14598-2) in the organisation specifies each metric for correct and consistent use within the organisation. The format for documenting a metric and associated methods, as well as guides for their use, should be standardised. The concept of an evaluation module provides a solution to this need.

An evaluation module specifies the evaluation methods applicable for evaluating a quality characteristic and identifies the evidence it needs. It also defines the elementary evaluation procedure and the format for reporting the measurements resulting from the application of the techniques.

A consistent way of documenting evaluation modules has a number of advantages:

- It provides a common reference in the description of the theoretical basis of evaluation modules.
- It identifies a minimal set of requirements for documenting and developing evaluation modules.
- It provides a necessary tool in collecting and cataloguing the large number of evaluation modules anticipated.

Evaluation modules provide a flexible and structured approach to making metrics applicable for evaluating intermediate and completed products. The use of evaluation modules produced according to this part of ISO/IEC 14598 helps to ensure that software product evaluations can be repeatable, reproducible and objective.

The format for documenting an evaluation module takes into account the following:

- It will be applied within the context of the evaluation of software products.
- The format supports the need for developing new metrics with respect to state of the art.
- The format provides a precise definition of metrics and their application.
- It provides the information needed for those who will use them for an evaluation.

Annex A provides guidance for the development process for new evaluation modules.

Annexes B, C and D are examples of evaluation modules.

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Software engineering — Product evaluation —

Part 6: Documentation of evaluation modules

1 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 multipart standards.

This part of ISO/IEC 14598 is intended to be used by experts in evaluation technology such as testing laboratories, research institutes and others when producing new evaluation modules.

2 Conformance

The documentation of an evaluation module conforms to this part of ISO/IEC 14598 if it meets the requirements of clause 6 (format for documentation of an evaluation module).

3 Normative references

<https://standards.iteh.ai/catalog/standards/sist/468b0a07-cf05-4bb8-9623-64c3c2080cc/iso-iec-14598-6-2001>

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14598. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 14598 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 9126-1, *Software engineering — Product quality — Part 1: Quality model*.

ISO/IEC 12207, *Information technology — Software life cycle processes*.

ISO/IEC 14598-1, *Information technology — Software product evaluation — Part 1: General overview*.

ISO/IEC 14598-2, *Product evaluation — Part 2: Planning and management*.

ISO/IEC 14598-3, *Product evaluation — Part 3: Process for developers*.

ISO/IEC 14598-4, *Software engineering — Product evaluation — Part 4: Process for acquirers*.

ISO/IEC 14598-5, *Information technology — Software product evaluation — Part 5: Process for evaluators*.

4 Terms and definitions

For the purposes of this part of ISO/IEC 14598, the following terms and definitions apply.

4.1 evaluation module

a package of evaluation technology for measuring software quality characteristics, sub-characteristics or attributes

NOTE The package includes.

- evaluation methods and techniques
- inputs to the evaluation
- data to be measured and collected
- supporting procedures and tools

4.2 evaluation technology (technology used for evaluation)

the techniques, tools, metrics, measures and other technical information used for evaluation [ISO/IEC 14598-2]

5 The evaluation module concept

Evaluation of software products can be a comprehensive task. Different aspects of quality characteristics and sub-characteristics may require different evaluation techniques to be applied and different data to be collected. In order to manage this complexity, an evaluation should be structured into manageable units. Each of these units can cover one or more quality aspects. However, each unit should be focused on the evaluation of one specific quality aspect applying a specific evaluation technique. The information necessary for conducting one of these evaluations should be collected and packaged for future use. Such a package is called an evaluation module.

The benefit of using a standardized format of an evaluation module is that

- it supports the development of evaluation modules since it provides a table of contents which makes visible what information is necessary for an evaluation and how this information is handled (principles, metrics, tools, ...)
- it supports the use of evaluation modules since information will be available in a homogenous way
- it supports the reuse of evaluation modules since it facilitates the establishment and maintenance of libraries of evaluation modules
- it supports standardization of evaluation modules since the format is compliant with standards requirements

An evaluation module collects all information necessary to perform an evaluation of a specific aspect of a quality characteristic applying a specific evaluation technique. It clarifies which specific aspect of a software quality characteristic is being measured. The procedure for making the measurement is defined as well as the preconditions and accuracy of the measurement.

Evaluation modules provide the link between evaluation techniques, metrics and measures. When parts 3, 4 or 5 of ISO/IEC 14598 recommend the application of an evaluation technique, an appropriate evaluation module can be selected from an evaluation module library (see ISO/IEC 14598-2).

The documentation of an evaluation module has six parts EM0 - EM5 serving different purposes, and an optional annex EMA.

EM0 provides formal information about the evaluation module and gives an introduction to the evaluation technique described in the evaluation module.

EM1 defines the scope of applicability of the evaluation module.

EM2 provides relevant references.

EM3 includes the definitions needed for the evaluation module.

EM4 specifies the input products required for the evaluation and defines the data to be collected and measures to be calculated.

EM5 contains information about how to interpret measurement results.

The optional annex EMA includes the detailed procedure for applying the evaluation module. Although EMA is optional it is suggested that it be included.

NOTE The format for the documentation of an evaluation module complies with the formal requirements of a standard as described in ISO Directives Part 3. This facilitates standardization of evaluation modules.

6 Format for documentation of an evaluation module

The documentation of an evaluation module shall be formatted according to 6.1, 6.2, 6.3, 6.4, 6.5, 6.6 and 6.7.

6.1 EM0 : Foreword and introduction

6.1.1 Foreword

This clause shall provide information about [ISO/IEC 14598-6:2001](https://standards.iteh.ai/catalog/standards/sist/468b0a07-cf05-4bb8-9623-e4c35c208bcc/iso-iec-14598-6-2001)
 — preparation, approval, contributions and changes,

— relationship to other standards or other documents.

6.1.2 Introduction

This clause should introduce the principles, background and technical rationale underlying the evaluation module.

NOTE A formal description of evaluation method is provided in 6.2.3.

6.2 EM1 : Scope

6.2.1 Characteristics

This clause shall identify the characteristics, sub-characteristics or attributes that the evaluation module can evaluate.

NOTE The evaluation module may contribute to one or more characteristics or sub-characteristics.

The quality model describing the characteristics, sub-characteristics or attributes shall be identified. The model in ISO/IEC 9126-1 should be used, unless there is a particular reason to use another model.

6.2.2 Level of evaluation

This clause shall describe the level of the evaluation defined by the evaluation module. Evaluation levels are related to the importance of the characteristic, sub-characteristics or attribute evaluated. The level should be

described taking into account the assumed usage of the software and the environment of the software product (for example, safety conditions, security constraints, economic risks, and application constraints).

The level defines the depth or thoroughness of the evaluation in terms of the evaluation techniques to be applied and evaluation results to be achieved. Different evaluation levels give different levels of confidence in the quality of the software product.

NOTE Levels can be formulated as A, B, C, or D as described in ISO/IEC 14598-5. Software integrity levels are described in ISO/IEC 15026.

6.2.3 Techniques

This clause shall describe the evaluation techniques applied by the evaluation module. The relevant theory, models or heuristics underlying the evaluation shall be included or adequately referenced.

NOTE Examples of evaluation techniques are reliability growth models, benchmark testing, static analysis of code.

6.2.4 Applicability

This clause shall identify the scope of application of the evaluation module.

NOTE 1 For example, the evaluation module may be applicable to a particular programming language, or to the class of all imperative languages.

It shall be described where in the software life cycle the evaluation module can be used. If it is intended to be used in a specific software life cycle process, this should be identified.

NOTE 2 Software life cycle processes are described in ISO/IEC 12207.

6.3 EM2 : References

[ISO/IEC 14598-6:2001](https://standards.iteh.ai/catalog/standards/sist/468b0a07-cf05-4bb8-9623-155000000000/iso-iec-14598-6-2001)

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This clause shall provide references to normative and technical documents. If the evaluation module depends on the result of other evaluation modules, then these shall be mentioned here.

6.4 EM3 : Terms and definitions

This clause shall define technical terms used in the evaluation module. Alternatively, references to sources in which definitions can be found shall be made.

6.5 EM4 : Inputs and metrics

6.5.1 Input for the evaluation

This clause shall identify the inputs required for the evaluation. These shall be classified as product component, product information, supporting information and product in use information.

NOTE 1 Information classified as product component includes software requirements specification, software design description, program description, source code, executable code, and user documentation.

NOTE 2 Information classified as product information includes software requirements review report, software design review report, program review report, unit test report, and user documentation review report.

NOTE 3 Information classified as supporting information includes quality assurance plan, configuration management plan, program test plan, and description of programming language and compiler. Supporting information is not evaluated but only used as background information necessary for conducting the evaluation.

NOTE 4 Information classified as product in use information includes testing report and operation report describing the behavior of the system. System includes any associated hardware, software and users.

6.5.2 Data elements

This clause shall specify which data elements are to be extracted from the inputs.

NOTE 1 Examples of data elements are: Number of lines of code containing comments; frequency distribution of sentence length in the user-manual; number of words in each help message; number of failures observed per hour of operation; number of tokens of specified types found in each module by a specified lexical scan.

NOTE 2 In general, the data elements are the material from which measures are computed. But in some cases, the raw data may itself constitute metrics.

6.5.3 Metrics and measures

This clause shall describe how the measures are calculated from the data elements using metrics.

If the metrics are to be combined to obtain 'higher-order' metrics, then the dependency shall be made explicit.

All assumptions and preconditions to be satisfied before measuring shall be stated.

6.6 EM5 : Interpretation of results

6.6.1 Mapping of measures

This clause shall specify the meaning of the measures, that is, the interpretation of the results of the measurement. This includes the evaluation scale onto which the values obtained by the defined metrics are to be mapped. If the mapping is non-trivial then the details of the algorithms (functions) needed to make the mappings shall be defined or references shall be made to their sources. If several measures are obtained for a single characteristic, sub-characteristics or attribute, then the clause shall describe how they can be combined into a rating for the characteristic, sub-characteristics or attribute.

The accuracy of the measure shall be specified.

6.6.2 Reporting

This clause shall describe the contents of the report providing the result of applying the evaluation module. In some cases, visualization of obtained values is important and should be encouraged.

6.7 EMA : Application procedure

NOTE The inclusion of EMA is optional but, if included, it shall have the following contents.

6.7.1 Definition of Technical Terms Used

This clause shall define technical terms that are not defined in 6.4, but used in part EMA of the evaluation module, or referenced sources.

6.7.2 Resources Required

This clause shall specify the resources required when applying the evaluation module. This should include: Software tools required (any software tools required should be identified and both generic tool types and proprietary tools should be referenced); hardware/software needed; test-harness or other equipment; skills and qualifications (any special skills and qualifications (for example, certification) required by the evaluator or the evaluating organization should be identified); effort of application (the effort required for typical application of the evaluation module should be estimated and, if this effort depends on attributes of the product (for example, number of lines of code), an estimating algorithm should be given); and any other resources required.

6.7.3 Evaluation instructions

This clause shall describe full details of the procedure to be followed. This should include the selection of evidence (for example, sampling of code), the generation and recording of raw data, counting rules, algorithms for computing metrics from raw data, the recording of results, and requirements for the retention of working and final documentation. In particular, the steps to be taken to ensure traceability and repeatability of results should be highlighted. The described procedure should be compliant with ISO Guide 25.

6.7.4 Documentation

This clause shall outline the internal documentation resulting from the usage of the evaluation module. The outlined report should be compliant with ISO Guide 25.

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