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**Systems and software engineering —  
Systems and software product Quality  
Requirements and Evaluation  
(SQuaRE) — Common Industry Format  
(CIF) for usability: General framework for  
usability-related information**

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*Ingénierie des systèmes et du logiciel — Exigences de qualité et  
évaluation des systèmes et du logiciel (SQuaRE) — Format industriel  
commun (CIF) pour l'utilisabilité: Cadre général pour les informations  
relatives à l'utilisabilité*

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Published in Switzerland

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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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

ISO/IEC TR 25060, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

## Introduction

The purpose of this Technical Report is to define a framework and consistent terminology for the specification and evaluation of the usability of an interactive system. Specifying and evaluating usability will assist those developing and acquiring interactive systems. It describes a framework that defines a set of information items as part of a human-centred approach to the design of an interactive system. The framework is intended to assist in documenting and communicating usability-related information through the system development life cycle.

The human-centred design approach of ISO 9241-210<sup>1)</sup> is well established and focuses specifically on making systems usable. Usability can be achieved by applying human-centred design and testing throughout the life cycle. In order to enable a human-centred design approach to be adopted, it is important that all the relevant usability information items are identified and documented. This identification and documentation enables the usability of a system to be designed and tested.

This framework forms the basis for a family of International Standards that will provide a Common Industry Format (CIF) for specific information items to be used as part of a human-centred approach to design of interactive systems. ISO/IEC 25062, which standardizes the types of information that are documented when providing a detailed report of the results of measuring effectiveness, efficiency and satisfaction, is the first specific International Standard in this family.

The CIF for usability family is part of the SQuaRE series of International Standards (ISO/IEC 25000 to ISO/IEC 25099) on software product quality requirements and evaluation. The scope of the CIF family covers systems rather than just software, so is broader than that of the current SQuaRE series. The CIF family of International Standards uses definitions (reproduced in Clause 2) that are consistent with ISO 9241, as this is the terminology that is normally used for this subject matter. In some cases these definitions differ from those in ISO/IEC 25000. <https://standards.iteh.ai/catalog/standards/sist/e1e40eae-a354-4675-9179-01da067975a6/iso-iec-tr-25060-2010>

To ensure that these information items can be used within the broadest range of process models and can be used in combination with other information items, the descriptions are given in the format defined in ISO/IEC 15289 and ISO/IEC TR 15504-6.

The information items for documenting usability-related information can be integrated in any process models. For the purpose of establishing process models, ISO/IEC TR 24774 and ISO/IEC 15504-2 specify the format and conformance requirements for process models, respectively. In addition, ISO/IEC 15289 defines the types and content of information items developed and used in process models for system and software life cycle management. ISO/IEC 15504-5 and ISO/IEC TR 15504-6 define work products, including information items, for the purpose of process capability assessment. Process models and associated information items for human-centred design of interactive systems are contained in ISO 9241-210 and ISO/PAS 18152, respectively.

While this Technical Report focuses on information items needed as the basis for design and development of interactive systems, the data contained in the information items can support post-development activities such as (product) conformity assessment as defined in ISO/IEC 17000:2004.

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1) Previously ISO 13407.

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# Systems and software engineering — Systems and software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: General framework for usability-related information

## 1 Scope

This Technical Report describes a potential family of International Standards, named the Common Industry Formats (CIF), that document the specification and evaluation of the usability of interactive systems. It provides a general overview of the CIF framework and contents, definitions, and the relationship of the framework elements. The intended users of the framework are identified, as well as the situations in which the framework may be applied. The assumptions and constraints of the framework are also enumerated.

The framework content includes the following:

- consistent terminology and classification of specification, evaluation and reporting;
- a definition of the type and scope of formats and the high-level structure to be used for documenting required information and the results of evaluation.

This Technical Report is applicable to software and hardware products used for predefined tasks. The information items are intended to be used as part of system-level documentation resulting from development processes such as those in ISO 9241-210, and ISO/IEC JTC 1/SC 7 process standards.

This Technical Report focuses on documenting those elements needed for design and development of usable systems, rather than prescribing a specific process. It is intended to be used in conjunction with existing International Standards, including ISO 9241, ISO 20282, ISO/IEC 9126 and the SQuaRE series (ISO/IEC 25000 to ISO/IEC 25099).

This Technical Report does not prescribe any kind of method, life cycle or process.

## 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 2.1 accessibility

⟨interactive system⟩ usability of a product, service, environment or facility by people with the widest range of capabilities

[ISO 9241-171:2008]

### 2.2 action

user behaviour that a system accepts as a request for a particular operation

[ISO/IEC TR 11580:2007]

**2.3**

**context of use**

users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

[ISO 9241-11:1998]

**2.4**

**dialogue**

interaction between a user and an interactive system as a sequence of user actions (inputs) and system responses (outputs) in order to achieve a goal

[ISO 9241-110:2006]

**2.5**

**effectiveness**

accuracy and completeness with which users achieve specified goals

[ISO 9241-11:1998]

**2.6**

**efficiency**

resources expended in relation to the accuracy and completeness with which users achieve goals

[ISO 9241-11:1998]

**2.7**

**goal**

intended outcome

[ISO 9241-11:1998]

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**2.8**

**information architecture**

⟨human-centred⟩ structure of an information space and the semantics for accessing required task objects, system objects and other information

NOTE The appropriate combination of organization, labelling, navigation schemes and retrieval mechanisms within an information space will facilitate task completion and efficient access to content.

**2.9**

**product**

part of the equipment (hardware, software and materials) for which usability is to be specified or evaluated

[ISO 9241-11:1998]

**2.10**

**satisfaction**

freedom from discomfort, and positive attitudes towards the use of the product

[ISO 9241-11:1998]



**2.11****stakeholder**

individual or organization having a right, share, claim, or interest in a system or in its possession of characteristics that meet their needs and expectations

[ISO/IEC 15288:2008]

**2.12****system**

combination of interacting elements organized to achieve one or more stated purposes

NOTE 1 A system may be considered as a product or as the services it provides.

NOTE 2 In practice, the interpretation of its meaning is frequently clarified by the use of an associative noun, e.g. aircraft system. Alternatively, the word system may be substituted simply by a context-dependent synonym, e.g. aircraft, though this may then obscure a system principles perspective.

[ISO/IEC 15288:2002, 4.17]

**2.13****task**

activities required to achieve a goal

[ISO 9241-11:1998]

NOTE The term “task” is used here, as in ISO 9241-11, in its widest sense, rather than in reference to the specifics of use of the dialogue system.

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**2.14****usability**

extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use

[ISO 9241-11:1998]

NOTE The definition of usability in this Technical Report is similar to that used to define “quality in use” in ISO/IEC 9126-1:2001.

**2.15****usability objective**

stated level of usability expressed in terms of effectiveness, efficiency and satisfaction in a specified context of use which can be verified

NOTE Usability objectives can be stated as user requirements, in which case the level to be achieved is a usability requirement, or they can be stated as desired “target levels” depending on their use in design and evaluation.

**2.16****usability inspection**

evaluation based on the considered judgment of evaluators who examine the usability-related aspects of an interface with respect to specified criteria

NOTE 1 The inspectors can include usability specialists, developers, end users or other types of professionals.

NOTE 2 The evaluative criteria can include good practice and/or documented principles, guidelines, requirements or standards.

NOTE 3 The evaluation can be conducted with or without the help of referenced documents.

NOTE 4 Usability inspection is the generic term for several methods, including but not limited to heuristic evaluation, cognitive walkthroughs, standards inspection, pluralistic walkthroughs, and consistency inspections.

**2.17**

**usability testing**

evaluation that involves representative users performing specific tasks with the system to enable the measurement of efficiency, effectiveness, and/or user satisfaction

**2.18**

**usability walkthrough**

usability evaluation in which one or more evaluators step through a scenario playing the role of a user and identifying usability problems associated with successful completion of the scenario

NOTE The evaluators can include usability specialists, developers, end users or other types of professionals.

**2.19**

**user**

person who interacts with the interactive system

[ISO 9241-110:2006]

**2.20**

**user experience**

person's perceptions and responses that result from the use and/or anticipated use of a product, system or service

NOTE 1 User experience includes all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours and accomplishments that occur before, during and after use.

NOTE 2 User experience is a consequence of: brand image, presentation, functionality, system performance, interactive behaviour, and assistive capabilities of the interactive system; the user's internal and physical state resulting from prior experiences, attitudes, skills and personality; and the context of use.

NOTE 3 Usability, when interpreted from the perspective of the users' personal goals, can include the kind of perceptual and emotional aspects typically associated with user experience. Usability criteria can be used to assess aspects of user experience.

[ISO 9241-210]

**2.21**

**user requirements**

usage requirements

requirements for use that provide the basis for design and evaluation of interactive systems to meet identified user needs

NOTE 1 User requirements are derived from user needs and capabilities in order to make use of the system in an effective, efficient, safe and satisfying manner.

NOTE 2 User requirements specify the extent to which user needs and capabilities are to be met when using the system. They are not requirements on the users.

NOTE 3 In software-engineering terms, user requirements comprise both "functional" and "non-functional" requirements based on user needs and capabilities.

**2.22**

**user interaction**

exchange of information between a user and an interactive system via the user interface to complete the intended task

NOTE 1 Adapted from ISO 11064-5:2008, 3.20.

NOTE 2 User interaction specifications focus on user interactions without considering implementation details.

**2.23****user interface**

all components of an interactive system (software or hardware) that provide information and controls for the user to accomplish specific tasks with the interactive system

[ISO 9241-110:2006]

**2.24****user interface element**

entity of the user interface that is presented to the user by the software

NOTE 1 User interface elements can be interactive or not.

NOTE 2 Both entities relevant to the task and entities of the user interface are regarded as user interface elements. Different user interface element types are text, graphics and controls. A user interface element may be a visual representation or an interaction mechanism for a task object (such as a letter, a sales order, electronic parts, or a wiring diagram) or a system object (such as a printer, hard disk, or network connection). It may be possible for the user to directly manipulate some of these user interface elements.

NOTE 3 User interface elements in a graphical user interface include such things as basic objects (such as window title bars, menu items, push buttons, image maps, and editable text fields) or containers (such as windows, grouping boxes, menu bars, menus, groups of mutually exclusive option buttons, and compound images that are made up of several smaller images). User interface elements in an audio user interface include such things as menus, menu items, messages, and action prompts.

NOTE 4 User interface elements are also referred to as “user interface objects”.

[ISO 9241-171:2008]

**2.25****user need**

factor or condition necessary for a user to achieve desired results within a specified context of use

NOTE 1 Factors and conditions include the presence of a specific quality, quantity, information, process or service as well as particular social, organizational and physical environments.

NOTE 2 User needs often represent gaps (or discrepancies) between what should be and what is.

**3 A general framework for usability-related information**

An effective human-centred design approach relies on explicit human factors data. This Technical Report defines the information items that are necessary for the specification, development and evaluation of the usability of interactive systems.

**3.1 Intended users and uses of usability-related information items**

The set of information items supports effective communication among the target users of the framework to obtain a common understanding of the usability of the product.

Usability-related information items are primarily intended for use by the following types of users (in alphabetical order):

- Business Analysts;
- Corporate purchasers (Procurers);
- Developers (any individuals designing and developing user interface and technical system);

- Managers (in terms of sponsors and project managers);
- Product managers;
- Requirements Developers;
- Suppliers;
- Usability and Accessibility Specialists.

Usability-related information items can also be of use for the following types of users (in alphabetical order):

- Editors of magazines;
- Marketing Specialists;
- Quality Managers;
- Retail Shop Owners;
- Union Representatives and staff councils.

### **3.2 Situations in which the information items apply**

Use of the framework to communicate usability information assists the intended users in accomplishing their tasks in various situations described below.

#### Acquisition situation:

- Issuing a specification as part of a purchasing project;
- Comparison across products;
- Responding to a tender;
- Creating a proposal in response to a Request for Proposals (RFP);
- Evaluating a proposal in response to a RFP;
- Competitive comparison across versions of one product;
- Conformance testing and certification of a product.

#### Development Situation:

Development situations vary according to the given situation, e.g. design from scratch, redesign, complexity, time constraints. Irrespective of the life cycle methodology, the following processes will occur:

- Analysis;
- Design;
- Implementation;
- Testing.