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Systems and software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for Usability: User requirements specification

Ingénierie des systèmes et du logiciel — Exigences et évaluation de la qualité des systèmes et logiciels (SQuaRE) — Format industriel commun pour la facilité d'utilisation: Spécification des exigences de l'utilisateur

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared jointly by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction* and Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Specifying user requirements in a consistent manner will assist those developing and acquiring interactive systems that are usable. The term "user requirements" is used in this document to refer to user-system interaction requirements (that specify the required interaction to achieve intended outcomes) and use-related quality requirements (expressed in terms of effectiveness, efficiency and satisfaction). It describes a set of content elements for user requirements specifications as part of a human-centred approach to design of an interactive system. A common industry format for a user requirements specification is intended to assist human-centred design teams in specifying user requirements for an interactive system.

The Common Industry Format (CIF) for usability is described in ISO/IEC TR 25060 and is part of the SQuaRE series (ISO/IEC 25000–ISO/IEC 2509x) on systems and software product quality requirements and evaluation.

Usability as used in the CIF standards refers to effectiveness, efficiency, and satisfaction as defined in ISO 9241-11, where it is defined as an outcome of use, rather than as a product quality which is an alternate use of the term also provided in ISO/IEC 25010.

CIF standards published or planned for include the following information items:

— usability test reports (see ISO/IEC 25062);

— context of use description (see ISO/IEC 25063);

— user needs report (see ISO/IEC 25064);

— user requirements specification (this document);

— usability evaluation report (see ISO/IEC 25066);

The CIF standards are part of the "Extension Division" of the ISO/IEC 25000 SQuaRE series. Table 1 presents an overview of the structure and the contents of the SQuaRE series.

Table 1 — Organization of the SQuaRE series

SQuaRE architecture and sub-projects		
ISO/IEC 2503x: Quality requirement division	ISO/IEC 2501x: Quality model division	ISO/IEC 2504x: Quality evaluation division
	ISO/IEC 2500x: Quality management division	
	ISO/IEC 2502x: Quality measurement	
ISO/IEC 2505x–ISO/IEC 2509x: SQuaRE extension division		
— ISO/IEC 25051–2505x: Requirements for quality of Ready to Use Software Product (RUSP) division		
— ISO/IEC 2506x: Common Industry Format (CIF) for Usability division		
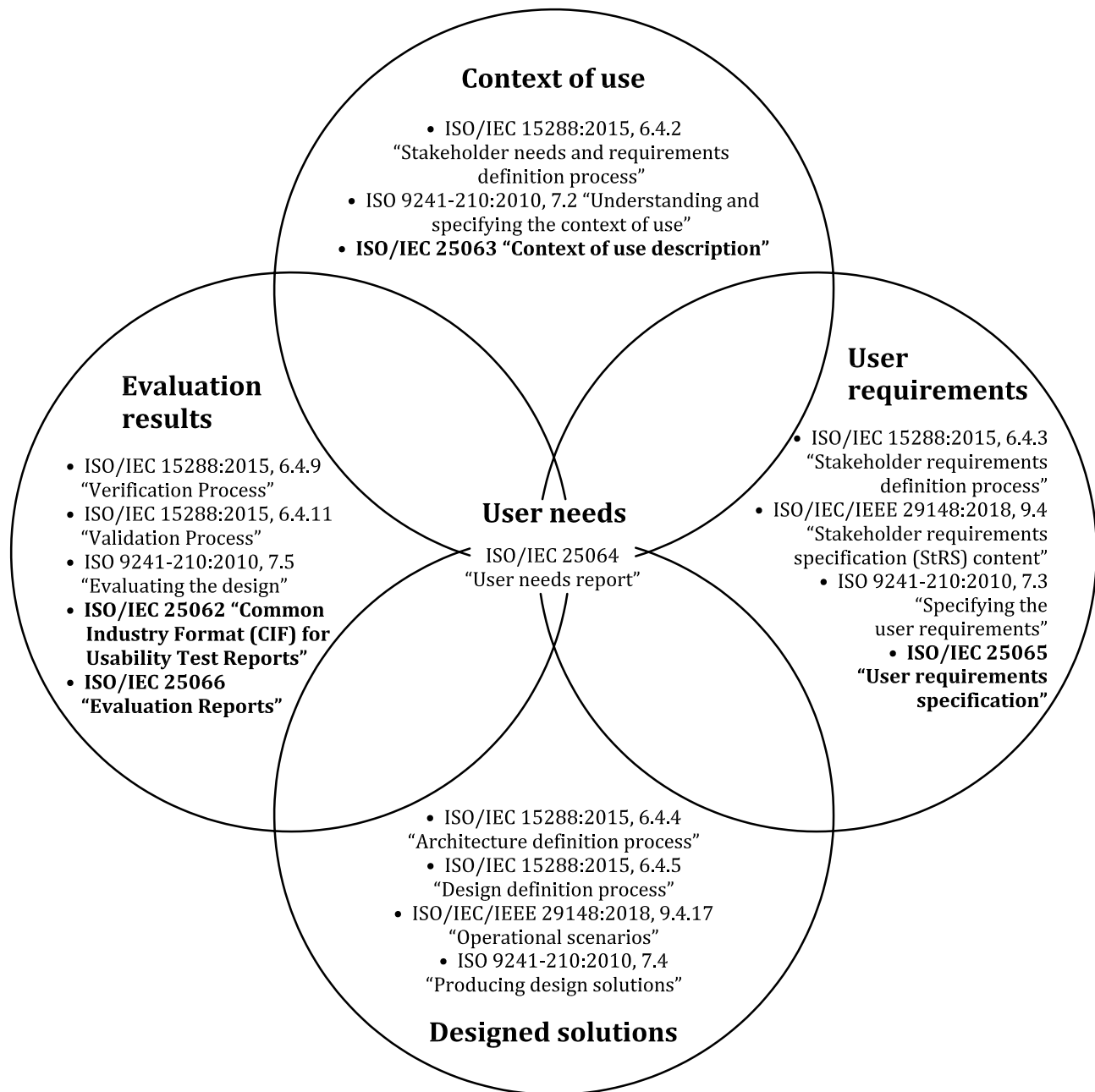
Figure 1 — Relationship of CIF documents to human-centred design in ISO 9241-210 and system lifecycle processes in ISO/IEC/IEEE 15288

Figure 1 illustrates the interdependence of these CIF documents with the outputs of human-centred design activities described in ISO 9241-210 as well as the corresponding system lifecycle processes described in ISO/IEC/IEEE 15288. Standards listed in bold represent CIF process outputs. The figure depicts the outputs of the activities as a set of intersecting circles. The circles overlap to represent that:

— human-centred design aims at satisfying user needs; and

— the activities are not separate, but rather, overlapping in time and scope; and

— the outcome of each activity provides the input to one or more other activities.

As each human-centred design activity can provide input to any other, there is no starting point, no endpoint, or linear process intended.

The human-centred design approach of ISO 9241-210 focuses on ensuring that systems are usable. Human-centred design is enabled by the identification and communication of all of the relevant types of information

NOTE   ISO 9241-220 broadens the objectives of human-centred design to human-centred quality: usability, accessibility, user experience and avoidance of harm from use. Human-centred quality can be achieved by applying human-centred design throughout the lifecycle.

Human-centred design relies on user needs that are first identified based on the context of use analysis. User needs are documented in the user needs report (ISO/IEC 25064). The user needs report is an intermediate deliverable that links the context of use description (ISO/IEC 25063) containing information about the users, their tasks and the organizational and physical environment, to the user requirements. User requirements are, in turn, documented in the user requirements specification (ISO 25065). These information items are developed as part of the stakeholders requirements definition process described in ISO/IEC 15288.

The "designed solutions" activity focuses on designing user interaction that meets user requirements. This activity takes place during the architectural design, implementation, and integration processes described in ISO/IEC/IEEE 15288 and produces the information items "user interaction specification" and the "user interface specification".

The "evaluation results" activity starts at the earliest stages in the project, evaluating design concepts to obtain a better understanding of the user needs. Design solutions can be evaluated multiple times as the interactive system is developed and can produce various types of evaluation reports. Usability data, such as that described in ISO/IEC 25062, can support the ISO/IEC/IEEE 15288 validation process, which confirms that the system complies with the stakeholders requirements.

Systems and software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for Usability: User requirements specification

1 Scope

This document provides a framework and consistent terminology for specifying user requirements. It specifies the common industry format (CIF) for a user requirement specification including the content elements and the format for stating those requirements.

NOTE 1   A user requirements specification is the formal documentation of a set of user requirements, which aids in the development and evaluation of usable interactive systems.

In this document, user requirements refers to:

a) user-system interaction requirements for achieving intended outcomes (including requirements for system outputs and their attributes);

b) use-related quality requirements that specify the quality criteria associated with the outcomes of users interacting with the interactive system and can be used as criteria for system acceptance.

NOTE 2   ISO/IEC 25030 introduces the concept of quality requirements. The use-related quality requirements in this document are a particular type of quality requirement.

The content elements of a user requirements specification are intended to be used as part of documentation resulting from the activities specified in ISO 9241-210, and from human centred design processes, such as those in ISO 9241-220.

This document is intended to be used by requirements engineers, business analysts, product managers, product owners, and people acquiring systems from third parties.

The CIF series of standards addresses usability-related information (as described in ISO 9241-11 and ISO/IEC TR 25060).

NOTE 3   In addition to usability, user requirements can include other perspectives, such as human-centred quality introduced in ISO 9241-220, and other quality perspectives presented in ISO/IEC 25010, ISO/IEC TS 25011, and ISO/IEC 25030.

NOTE 4   While this document was developed for interactive systems, the guidance can also be applied in other domains.

This document does not prescribe any kind of method, lifecycle or process. The content elements of a user requirements specification can be used in iterative development which includes the elaboration and evolution of requirements (e.g. as in agile development).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms related to user requirements

3.1.1
requirement
condition or capability that must be met or possessed by a system, system component, product, or service to satisfy an agreement, standard, specification, or other formally imposed documents

Note 1 to entry: Formally imposed documents can include User needs reports.

Note 2 to entry: This definition is used in this document because it explicitly differentiates between user needs and user requirements which the ISO/IEC/IEEE 12207 definition does not explicitly differentiate.

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3431/2, modified — The Notes to entry have been added.]

3.1.2
quality requirement
requirement (3.1.1) for quality properties or attributes of a product, data or service that satisfy needs which ensue from the purpose for which that product, data or service is to be used

[SOURCE: ISO/IEC DIS 25030:2018, 4.16, modified — Note 1 to entry has been deleted.]

3.1.3
user
person who interacts with a system, product or service

Note 1 to entry: Users of a system, product or service include people who operate the system, people who make use of the output of the system and people who support the system (including providing maintenance and training).

Note 2 to entry: This term corresponds to the definition "direct user" that is found in ISO/IEC 25010.

[SOURCE: ISO 9241-11:2018, 3.1.7, modified — Note 2 to entry has been added]

3.1.4
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

Note 1 to entry: Stakeholders can include: users, purchasers, systems owners or managers and people who are indirectly affected by the operation of a system, product or service.

Note 2 to entry: Different stakeholders can have different needs, requirements or expectations.

[SOURCE: ISO/IEC/IEEE 15288:2015, 4.1.44, modified — The Example has been removed, Note 1 to entry has been replaced and Note 2 to entry has been added.]

3.1.5
user group
subset of intended *users* (3.1.2) who are differentiated from other intended users by characteristics of the users, *tasks* (3.1.7) or environments that can influence *usability* (3.3.1)

[SOURCE: ISO 9241-11:2018, 3.1.8]

3.1.6
context of use
combination of *users* ([3.1.2](#)), *goals* ([3.1.6](#)) and *tasks* ([3.1.7](#)), resources, and environment

Note 1 to entry: The "environment" in a context of use includes the technical, physical, social, cultural and organizational environments.

Note 2 to entry: This can apply to an existing context of use or an intended context of use.

[SOURCE: ISO 9241-11:2018, 3.1.15, modified — Note 2 to entry has been added]

3.1.7
goal
intended outcome

[SOURCE: ISO 9241-11:2018, 3.1.10]

3.1.8
task
set of activities undertaken to achieve a specific *goal* ([3.1.6](#))

Note 1 to entry: These activities can be physical, perceptual and/or cognitive.

Note 2 to entry: While goals are independent of the means used to achieve them, tasks describe particular means of achieving goals.

[SOURCE: ISO 9241-11:2018, 3.1.11]

3.1.9
user need
prerequisite identified as necessary for a *user* ([3.1.2](#)), or a set of users, to achieve an intended outcome, implied or stated within a specific *context of use* ([3.1.5](#))

EXAMPLE 1   A presenter (user) needs to know how much time is left (prerequisite) in order to complete the presentation in time (goal) during a presentation with a fixed time limit (context of use).

EXAMPLE 2   An account manager (user) needs to know the number of invoices received and their amounts (prerequisite), in order to complete the daily accounting log (goal) as part of monitoring the cash flow (context of use).

Note 1 to entry: A user need is independent of any proposed solution for that need.

Note 2 to entry: User needs are identified based on various approaches including interviews with users, observations, surveys, evaluations, expert analysis, etc.

Note 3 to entry: User needs often represent gaps (or discrepancies) between what should be and what is.

Note 4 to entry: User needs are transformed into *user requirements* ([3.1.10](#)) considering the context of use, user priorities, trade-offs with other system requirements and constraints.

[SOURCE: ISO/IEC 25064:2013, 4.19, modified — The expression "intended outcome" has been changed to "goal" in Examples 1 and 2.]

3.1.10
user requirements
set of requirements ([3.1.1](#)) for use that provide the basis for design and evaluation of *interactive systems* ([3.2.1](#)) to meet identified *user needs* ([3.1.8](#))

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

Note 2 to entry: User requirements are not requirements on the users.

3

Note 3 to entry: User requirements include *user-system interaction requirements* (3.1.11) and *use-related quality requirements* (3.1.12).

Note 4 to entry: In software engineering terms, user requirements include both "functional" and "non-functional" requirements derived from user needs and capabilities.

[SOURCE: ISO 9241-220:2019, 3.46]

3.1.11
user-system interaction requirements
user requirements (3.1.10) that specify interactions (including: recognizing information, making inputs, making selections, and receiving outputs) required by the users to achieve the *goals* (3.1.7)

3.1.12
use-related quality requirements
user requirements (3.1.10) that specify the intended outcomes of use of the interactive system and associated quality criteria

3.2   Terms related to interactive systems

3.2.1
interactive system
combination of hardware and/or software and/or services and/or people that *users* (3.1.2) interact with in order to achieve specific goals

Note 1 to entry: This includes, where appropriate, packaging, user documentation, on-line and human help, support and training.

Note 2 to entry: This definition emphasizes that the user interacts with the system. An interactive system provides feedback to user input and initiates further actions within the system or by other systems as required.

[SOURCE: ISO 9241-11:2018, 3.1.5, modified — Note 2 to entry has been added.]

3.2.2
user interface
set of all the components of an *interactive system* (3.2.1) (software or hardware) that provide information and controls for the *user* (3.1.2) to accomplish specific *tasks* (3.1.7) with the *interactive system* (3.2.1)

[SOURCE: ISO 9241-220:2019, 3.43]

3.2.3
user-system interaction
exchange of information between a user and an interactive system via the user interface to complete the intended task

[SOURCE: ISO/IEC TR 25060:2010, 2.22, modified — The term has been modified from "user interaction" to "user-system interaction". The Notes to entry have been removed.]

3.2.4
user interface design guidance
design guidance
principle, *requirement* (3.1.1), recommendation or established convention for designing the user interaction and/or the user interface

Note 1 to entry: Specific requirements, recommendations or established conventions are also referred to as "user interface guidelines".

Note 2 to entry: Principles, requirements and recommendations are published in various sources including the ISO 9241 series and apply across user interface platforms.

Note 3 to entry: "Established conventions" include rules published by suppliers of the user interface platforms such as "Windows" or "Mac OS".

Note 4 to entry: User interface design guidance is sometimes referred to as user interface requirements.

[SOURCE: ISO 9241-220:2019, 3.44]

3.25
action
user (3.1.2) behaviour that a system accepts as a request for a particular operation

[SOURCE: ISO/IEC TR 11580:2007, 2.3]

3.2.6
constraint
externally imposed limitation on system *requirements* (3.1.1), design, or implementation or on the process used to develop or modify a system

Note 1 to entry: A constraint is a factor that is imposed on the solution by force or compulsion and can limit or modify the design changes.

[SOURCE: ISO/IEC/IEEE 29148:2018, 3.1.7, modified — In Note 1 to entry, "may" has been changed to "can".]

3.3 Terms related to the concept of usability

3.3.1
usability
extent to which a system, product or service can be used by specified *users* (3.1.2) to achieve specified *goals* (3.1.6) with *effectiveness* (3.3.3), *efficiency* (3.3.4) and *satisfaction* (3.3.5) in a specified *context of use* (3.1.5)

Note 1 to entry: The "specified" users, goals and context of use refer to the particular combination of users, goals and context of use for which usability is being considered.

Note 2 to entry: The word "usability" is also used as a qualifier to refer to the design knowledge, competencies, activities and design attributes that contribute to usability, such as usability expertise, usability professional, usability engineering, usability method, usability evaluation, usability heuristic.

[SOURCE: ISO 9241-11:2018, 3.1.1]

3.3.2
effectiveness
accuracy and completeness with which *users* (3.1.2) achieve specified *goals* (3.1.6)

[SOURCE: ISO 9241-11:2018, 3.1.12]

3.3.3
efficiency
resources used in relation to the results achieved

Note 1 to entry: Typical resources include time, human effort, costs and materials.

[SOURCE: ISO 9241-11:2018, 3.1.13]

3.3.4
satisfaction
extent to which the user's physical, cognitive and emotional responses that result from the use of a system, product or service meet the user's needs and expectations

Note 1 to entry: Satisfaction includes the extent to which the user experience that results from actual use meets the user's needs and expectations.

Note 2 to entry: Anticipated use can influence satisfaction with actual use.

[SOURCE: ISO 9241-11:2018, 3.1.14]

3.3.5
accessibility
extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of *user needs* (3.1.8), characteristics and capabilities to achieve identified *goals* (3.1.6) in identified *contexts of use* (3.1.5)

Note 1 to entry: Context of use includes direct use or use supported by assistive technologies.

[SOURCE: ISO 9241-112:2017, 3.15]

3.3.6
system
combination of interacting elements organized to achieve one or more stated purposes

Note 1 to entry: A system is sometimes considered as a product or as the services it provides.

Note 2 to entry: A complete system includes all of the associated equipment, facilities, material, computer programs, firmware, technical documentation, services and personnel required for operations and support to the degree necessary for self-sufficient use in its intended environment.

Note 3 to entry: A system can be composed of a product, service, built environment or combination thereof, and people.

[SOURCE: ISO 9241-11:2018, 3.1.4]

3.3.7
product
item that is made or created by a person or machine

[SOURCE: ISO 9241-11:2018, 3.1.2]

3.3.8
service
means of delivering value for the customer by facilitating results the customer wants to achieve

Note 1 to entry: Services can include both human-system interactions (e.g. accessing a word processor through the web) and human-human interactions (e.g. a citizen interacting with a clerk at the post office counter).

Note 2 to entry: The "customer" is a user, and does not necessarily have a financial relationship.

[SOURCE: ISO 9241-11:2018, 3.1.6]

4   Conformance

A user requirements specification conforms to this document if it contains all user requirements identified for the interactive system and meets the requirements on the content elements specified in Clause 6.

NOTE 1   A user requirements specification does not have to be separated from other specifications.

NOTE 2   User requirements can be documented in various media, including: paper, electronic documents, and requirements management systems.

5   User requirements specification

5.1   General

A user requirements specification provides a basis for designing and evaluating the interaction with user interfaces of interactive systems. It can also serve as one of the sources for specifying system requirements. The CIF for user requirements, as specified in this document, provides a format for specifying a set of user requirements and the necessary related information.

5.2 Relationship between user requirements specification and stakeholder requirements specification

A user requirements specification can be part of a stakeholder requirement specification or a separate entity. A stakeholder requirements specification typically includes: legal/regulatory requirements, market requirements and business requirements.

NOTE 1   Stakeholder requirements specifications are described in ISO/IEC/IEEE 29148.

According to ISO/IEC/IEEE 15288:2015, 6.4.2.1, stakeholder requirements "express the intended interaction the system will have with its operational environment and that are the reference against which each resulting operational capability is validated".

According to ISO/IEC/IEEE 15288:2015, 6.4.3.1, stakeholder requirements feed into system requirements for the technical solution, which "specify, from the supplier's perspective, what characteristics, attributes, and functional and performance requirements the system is to possess, in order to satisfy stakeholder requirements".

NOTE 2   Stakeholder requirements specifications (StRS) and system requirements specifications (SRS) are detailed in ISO/IEC/IEEE 29148.

5.3 Types of user requirements

5.3.1 General

User requirements are requirements for use that provide the basis for design and evaluation of interactive systems to meet identified user needs. User requirements can be met by various system designs. User requirements do not prescribe a specific system solution, they prescribe the outcomes to be achieved. User requirements are not requirements on the users.

NOTE   A user requirement can be expressed as "With the system, the user shall be able to... ", while a system requirement can be expressed as "The system shall...".

User requirements for interactive systems are of two types:

a)   user-system interaction requirements;

b)   use-related quality requirements.

Subclause 6.6 give guidance on phrasing both types of user requirements.

5.3.2 User-system interaction requirements

User-system interaction requirements specify the required interactions to achieve the intended outcomes of use, expressed in terms of what the users are enabled to do.

5.3.3 Use-related quality requirements

Use-related quality requirements specify the intended outcomes of use of the interactive system and associated quality criteria in terms of the effectiveness, efficiency, satisfaction or other types of qualities to be achieved when using the interactive system.

NOTE 1   Use-related quality requirements can exist for the whole system, for any goal, task or sub-task. User-system interaction requirements typically exist at the lowest level of tasks or sub-tasks.

NOTE 2   Use-related quality requirements can be used as criteria for systems acceptance.

NOTE 3   Use-related quality requirements, described in this document, relate to usability. Use-related quality requirements can also relate to: accessibility, avoidance of harm from use, and other aspects of use (see ISO 9241-11, ISO 9241-220 and ISO/IEC 25010).

6 Content elements of a user requirements specification

6.1 Overview on the content elements

A user requirements specification for interacting with the user interface of an interactive system shall include the content elements specified below:

a) identification of the interactive system for which user requirements are specified (see 6.2);

b) constraints on design (see 6.3);

c) (a reference to) the context of use for the interactive system (see 6.4);

d) goals and the tasks to be supported (see 6.5);

e) user requirements (see 6.6):

    1) user-system interaction requirements;

    2) use-related quality requirements;

f) user interface design guidance to be applied (if identified) (see 6.7).

This order of presentation of the content elements is based on a logical sequence of providing the data. The order chosen for communicating elements to specific audiences can differ from that presented in this document.

NOTE   Annex A contains an example of a structured set of user requirements.

6.2 Interactive system for which a set of user requirements are specified

6.2.1 Identification of interactive system

The specific interactive system (including version, if applicable) shall be identified as part of a user requirements specification.

NOTE   It is important that this identification has sufficient precision to distinguish it from any other interactive systems.

The type of interactive system under consideration should be stated.

EXAMPLE   Smartphone, microwave oven, customer relationship management system.

6.2.2 Predecessors or previous versions of the interactive system (if applicable)

Any predecessors or previous versions of the interactive system should be identified in the user requirements specification.

Available previous specifications of user requirements should be identified and referenced.

6.3 Constraints on design

Any constraints in terms of factors known to limit the freedom of design and implementation of solutions to satisfy the user requirements and the interactive system to be developed shall be stated as part of a user requirements specification.

NOTE   Constraints are externally imposed limitations on system requirements, design, or implementation or on the process used to develop or modify a system.

Constraints can include:

a) technical constraints, e.g. the development platform is fixed and does not allow touch interaction;

b) budget constraints, e.g. the budget shall not exceed the overall amount of 250 000 in the local currency;

c) time constraints, e.g. the system shall be available for use no later than six months after the project has started;

d) legal constraints, e.g., the interactive system needs to be registered as a medical device;

e) environmental constraints, e.g. (1) use will take place in extreme weather conditions or (2) use will take place in sterile environments;

f) social and organizational values and norms, e.g. the organization encourages the maximization of employee discretion in their work.

6.4 Context of use for which the user requirements apply

The description of the intended context of use for the interactive system shall be referenced by, or included within, the user requirements specification.

NOTE 1   Defining the contexts of use in which the interactive system is required to achieve usability makes the scope of the user requirements explicit.

The context of use includes:

a) the intended user population and user groups and the characteristics of the users in each user group;

b) the goals and sub goals (intended objective and subjective outcomes that are to be achieved);

c) tasks (activities carried out to achieve goals);

d) the resources that are needed for use;

  1) reusable resources (such as equipment, information and support services);

  2) expendable resources such as available time, human effort, financial resources, and materials.

e) the environment(s) in which the interactive system will be used;

  1) the technical environment (including issues such as access to furniture, control devices, energy and connectivity);

  2) the physical environment (including the spatial, thermal, acoustic and visual conditions, geographical features, weather conditions, and time of day);

  3) the social, cultural and organizational environment (including other people, the organizational structures, the language, work practices, use in isolation or as part of a group, and privacy).

NOTE 2   For more information about context of use, see ISO 9241-11:2018 and ISO/IEC 25063. ISO/IEC 25063 is based on ISO 9241-11:1998 and details of some attributes of the context of use differ.

6.5 Goals and tasks to be supported

Goals and tasks identified to be supported by the interactive system are used to structure the user requirements (see 6.6.3) and shall be stated as part of a user requirements specification.

NOTE 1   It is possible that not all relevant tasks are identified and stated in the user requirements specification.

Goals are the intended outcome(s) of use. They include the overall goals of use of the interactive systems, and sub-goals of use. Goals are independent of the means used to achieve them. Goals focus on

what is to be achieved without necessarily specifying criteria (such as levels of effectiveness, efficiency or satisfaction).

Tasks consist of one or more activities undertaken to achieve a goal. Different combinations of activities can provide different ways of achieving the same goal and can lead to different levels of usability.

NOTE 1   Tasks of users are not the same as organizational procedures that describe how information and resources are interchanged within and across departments within an organization. Organizational procedures include the users' tasks. Tasks are described in terms of the activities undertaken by users to achieve an intended outcome.

Goals and tasks can be decomposed into sub-goals and subtasks that can include intermediate outcomes.

NOTE 2   Sub-goals and intermediate outcomes are also identified as part of the context of use.

NOTE 3   The goals and tasks to be supported are based on goals and tasks identified in the context of use but can be modified based on identified user needs.

EXAMPLE

Goal:	To arrive at a specific location at a given time
Task:	Travel from current location to destination using public transport.
User group(s):	Citizen travelling by public transport
Pre-condition(s):	Various alternative forms of public transport are available to the citizen
Subgoals/Subtasks:	1. Identify available means of transport to destination, for example bus or underground
	2. Identify duration and necessary transfers for each alternative means of transport
	3. Identify costs for each means of transport
	4. Identify at which location each means of transport can be boarded
	5. Decide on means of transport
	6. Purchase ticket
	7. Board the means of transport
	8. Transfer where necessary
	9. Disembark at the desired location

NOTE 4   There are different approaches to structuring goals and/or tasks which can be used. However, it is important that goals and tasks are structured in a consistent manner that is suitable for the reader of the user requirements specification.

6.6   User requirements

6.6.1   Stating user requirements

6.6.1.1   Taking the perspective of use

User requirements shall be described from the perspective of outcomes of use, rather than the perspective of the system.

NOTE 1   Describing user requirements from the perspective of outcomes of use enables validation that users are able to do what is needed and that they experience the system in the intended ways.

NOTE 2   An intended outcome of use can be achieved during interaction or after the interaction has stopped.

EXAMPLE   An outcome is achieved after use when one arrives at the intended destination, having driven by car. An outcome is achieved during use when the driver enjoys driving the car.

6.6.1.2   Specifying each user-system interaction requirement

User-system interaction requirements relate to specific outcomes to be achieved when completing a task.

User-system interaction requirements shall be stated to include the following elements:

a) if there is more than one user group, the user group(s) that the user requirement applies to;

b) the goal(s) or task(s) that the user requirement applies to;

c) an outcome of use, expressed in terms of what the users are enabled to do, for example:

   1) to be able **to recognize** specific information in the interactive system (e.g. departure times of trains);

   2) to be able **to input** a physical entity (e.g. coins) or information (e.g. user's age);

   3) to be able **to select** a physical entity or information (e.g. destination);

   4) to be able **to receive** (take away) output of a physical entity (e.g. the printed ticket) or information from the interactive system (e.g. a receipt by e-mail);

d) relevant condition(s) under which the user requirement applies.

NOTE 1   Within the user requirements statement, the terms "recognize", "select" and "input" can be replaced by the terms that are the most suitable to describe the intended outcome.

1) **<to recognize>** addresses required information and can be substituted by other verbs, for example: "to see", "to read", "to hear", "to retrieve" or "to perceive" by other means (e.g. vibration), etc.

2) **<to select>** addresses required choices and can be substituted by other verbs, for example: "to choose which other individuals or organizations have access to specific information", "to reserve an available flight", "to confirm reception of a letter", "to change the pick-up time for a rental car", etc.

3) **<to input>** addresses required information and/or resources that the user shall be able to input and can be substituted by other verbs, for example: "to enter", "to submit", "to place", "to put in (in)to the interactive system". In the case of hardware, this can also include "to place" (e.g. 3 pizza plates into the dish washer).

4) **<to receive>** addresses a system output that the user shall be able to take away and can be substituted by other verbs, for example: "to share", "to take out", "to print" or "to export", etc.

The following syntax may be used to phrase user-system interaction requirements:

<unique identifier>: With the <interactive system> the <user group> shall be able to <achieve outcome> under <condition(s)> (if applicable)

NOTE 2   In this syntax, the goal or task can be identified in the <identifier> (see 6.6.3).

NOTE 3   The order of the phrasing of elements in the requirement depends on the grammatical structure of the language in which it is presented. For example, to set the context for the requirement, English or Japanese phrasing usually has the conditions at the start of a sentence.

EXAMPLE   A user requirement for the task of stabilizing a patient during an emergency is worded "UR 7.3: With the monitor the emergency room doctor shall be able to recognize if the heart rate of the patient is rising, remaining stable or decreasing during an emergency", rather than "The system shall display the heart rate of the patient".

NOTE 4   The <Conditions> under which a user requirement applies can include any components of the context of use, e.g. a specific location, order in which things are done, dependencies on other components of the context of use.

6.6.1.3   Specifying each use-related quality requirement

Use-related quality requirements can apply to all contexts of use or to specific aspects of the context of use of the system, such as achieving specific outcomes or carrying out specific tasks.

Statements of use-related quality requirements shall include the following elements:

a) if there is more than one user group, the user group(s) that the user requirement applies to;

b) the goal(s) or task(s) that the user requirement applies to;

c) an outcome of use, in terms of a component of usability (or other outcomes of use):

   1) effectiveness (e.g. set the alarm correctly);

   2) efficiency (e.g. time taken to set the alarm); or

   3) satisfaction (e.g. user feels secure that he will wake up as intended);

d) the criterion/criteria associated with the outcome (e.g. 95 % of users are able to set alarm within 5 sec);

e) if applicable, the condition(s) (including other relevant aspects of the context of use) under which the use-related quality requirement applies.

Each outcome should be stated in a separate use-related quality requirement. The following syntax may be used to phrase use-related quality requirements:

<unique identifier>: With the <interactive system> the <user group> shall <be able to/be satisfied with> <achieve outcome with criterion/criteria> under <condition(s)> (if applicable)

NOTE 1   Within use-related quality requirement statements that address effectiveness or efficiency, the expression "be able to" is used to precede the intended outcome.

NOTE 2   Within use-related quality requirement statements that address satisfaction, the expression "be satisfied with" can be replaced by the terms that are the most suitable to precede the intended outcome.

NOTE 3   In this syntax, the goal or task can be identified in the <identifier> (see 6.6.3).

NOTE 4   The order of the phrasing of elements in the requirement depends on the grammatical structure of the language in which it is presented. For example, to set the context for the requirement, English or Japanese phrasing usually has the conditions at the start of a sentence.

NOTE 5   If the requirement applies across the whole user population, the term "users" can replace the name of the user group(s).

NOTE 6   Outcome can be specified across or within tasks to be supported with the interactive system.

NOTE 7   The criterion/criteria can be subjective or objective.

EXAMPLE 1   A use-related quality requirement addressing satisfaction is, "80 % of all potential users of the ticket machine shall prefer the use of the ticket machine to the use of the ticket counter".

EXAMPLE 2   A use-related quality requirement addressing effectiveness is, "With the ticket machine, 95 % of users shall be able to buy the cheapest ticket to a location within 30 seconds".

NOTE 8   <Conditions> under which a user requirement applies can include any components of the context of use, e.g. location, order in which things are done, dependencies on other components of the context of use.

6.6.2   Information to be provided with each user requirement

6.6.2.1   Unique identifier

Each user requirement shall have an identifier that uniquely identifies it as a user requirement and differentiates it from other requirements.

NOTE   Identifiers typically provide a reference to the task or location within a structure of goals and tasks. The structure of goals and tasks applies to the intended context of use.

EXAMPLE   UR 7.1.3 is "User requirement" No. 3 for supported sub-goal 1 within goal 7.

6.6.2.2   Information that the user requirement is based on

Wherever user needs have been identified leading to a user requirement, information about the user need(s) and associated context of use should be stated or referenced.

NOTE   ISO/IEC 25064 provides a common industry format for user needs reports.

EXAMPLE   Table 2 gives examples for user requirements with the identified user needs and context of use that they are based on.

Table 2 — Examples for user requirements in relation to the relevant part of the context of use and the identified user needs

Interactive system to be designed	Reference to the context of use	Identified user need(s)	Resulting user requirement(s)
Airline booking system	People who book flights often have the choice of various airports that are around the target destination. It is not always clear which flight goes to which airport.	The person booking a flight needs to know, which alternative flights are available from his home location to his target location, in order to choose a flight.	a) With the system, the user shall be able to input his home address and the target address (rather than the target airport) for his flight journey when booking a flight online. b) With the system the user shall be able to overview all flights from each airport close to his home destination to each airport close to the target destination.
Dish washer	In an office environment, employees frequently put dirty cups into the dish washer although the dish washer still contains clean cups remaining from the last completed wash.	The employee needs to know where there are clean dishes in order to avoid contaminating them.	With the system the user shall be able to see whether washed dishes are still in the machine, before placing dirty dishes in the dish washer.

Where other sources of information (e.g. test results, design guidance, human-factors data, customer complaints) have been identified leading to a user requirement, this information should be stated or referenced.

6.6.2.3   Additional information

6.6.2.3.1   Version history

If a user requirement has been modified after it was stated within the user requirements specification, the version history of the requirement shall be provided for each modified user requirement.

NOTE   Version history can include the rationale for the change.

6.6.2.3.2   Importance to the users

If appropriate, the importance to the users should be provided for each user requirement.

6.6.2.3.3   Status

If appropriate, the status of the requirement should be provided for each user requirement.

EXAMPLE   The status of a user requirement for a particular system include:

a)   new (not yet prioritized);

b)   modified (from a previous version of this user requirement);

c)   accepted/rejected/deferred;

d)   used as an acceptance criterion;

e)   implemented/not implemented.

6.6.2.3.4   Reference to related requirements

If applicable, references should be made to other requirements in order to see relevant dependencies and/or conflicts.

6.6.3   Structure for presenting the user requirements

User requirements shall be structured by the goals (the intended outcomes of use) and the tasks to be supported by the interactive system, not by potential components of the system.

NOTE 1   The following structure illustrates how user requirements can be structured based on tasks:

Goal

All tasks

— User requirement 1

— User requirement 2

— ...

— User requirement n

Task 1

— User requirement 1.1

— User requirement 1.2

— ...

— User requirement 1.n

   Subtask 1.1

   — User requirement 1.1.1

   — User requirement 1.1.2

   Subtask 1.2

   — User requirement 1.2.1

   — User requirement 1.2.2

   — User requirement 1.2.3

Task 2

— User requirement 2.1

   Subtask 2.1

   — User requirement 2.1.1

— User requirement 2.1.2

Subtask 2.2

— User requirement 2.2.1

NOTE 2   Annex A contains an example of a structured set of user requirements.

6.7   User interface design guidance to be applied

If required to be applied in conjunction with the user requirements specification, sources of user interface design guidance shall be stated.

NOTE   References that contain user interface design guidance include International standards (e.g. parts of the ISO 9241 series), manufacturer style guides, sector-specific standards and regulations.

Annex A
(informative)

Example of content elements from a user requirements specification

A.1 General

This annex provides examples of excerpts from the content elements of a user requirements specification to help illustrate Clause 6.

A.2 Identification of the interactive system for which user requirements are specified

System: Automated entry checking and authorisation kiosk for an immigration processing system, hereinafter referred to as an immigration kiosk.

A.3 Constraints on design

Constraints:

1) Only 20 kiosks have been authorized for each international airport in the country.

2) The given legal requirements to enter the country are the same whichever means of entry is being taken.

3) Users of the automated checking and authorization system have to have a valid passport or national identify card with biometric information (facial information).

4) Users of the automated checking and authorization system are not required to pre-register their biometric information.

A.4 Reference to the overall context of use for the interactive system

Reference: See document "Context of use for immigration processing, Version 7.4" available at <URL>

A.5 Goals and tasks to be supported

A.5.1 Organizational goals

For the automated entry checking and authorization at an immigration kiosk, a government desires to:

a) speed up flow of foreign nationals entering the country.

b) enhance the levels of detection of unentitled individuals trying to enter the country.

A.5.2 Example of one goal and the decomposition and associated content elements

Interactive system for which user requirements are to be specified: an automated entry checking and authorization kiosk.

Table A.1 shows one potential task involved in achieving these. There are other potential tasks that are not included in this example.

Table A.1 — Example of a goal, task, associated preconditions and subtasks for a user group

Goal(s)	The traveller has entered the country.
Task	Complete the immigration process using the automated entry checking and authorization process.
User group(s) and their characteristics	Air passengers travelling to visit a foreign country for a limited period of time. Characteristics: Age range 16–90 with characteristics that include the 5th–95th percentiles for the relevant sensory, physical and cognitive abilities. People with disabilities are also included, for example, wheelchair users, blind users and users who are deaf.
Pre-condition(s)	The users: — are 16 years or older; — have arrived at the entry point of the foreign country; — have entitlement to enter the country by their nationality; — have all required documentation by the country to be visited; — have a valid passport; — have discovered that entry checking and authorization kiosks are available.
Sub-goals/Sub-tasks	1.1 Identify whether eligible to use the automated entry checking and authorization system. 1.2 Locate an available kiosk. 1.3 Identify which activities to be carried out. 1.4 Provide information contained in passport. 1.5 Get your face recognized correctly. 1.6 Receive confirmation that authorization was granted or that manual checking is required. 1.7 Proceed to country or to border protection officer.

A.6 User requirements structured by task and subtask

User requirements for the goal, task and subtasks identified in A.5 can be structured as follows:

a) User requirements that apply to all sub-tasks to be supported:

NOTE 1   This provides an example of structuring user requirements for a single task taken from the set of tasks to be supported. It does not include further attributes (as specified in 6.6.2) beyond the unique identifier and statement of each user requirement (to focus on the structuring and phrasing of the user requirements).

— U-QR1 With the immigration processing system, the average time that air passengers entering the country take to pass through immigration shall be half the average time taken currently.

— U-QR2 With the immigration processing system, arriving passengers shall experience screening at current levels of security and safety.

— UR-Q3 The immigration processing system shall be accessible to the widest possible range of users (including people in wheel chairs and persons with smaller stature).

b) User requirements by tasks to be supported for air passengers entering the country:

  1) User requirements for Task 1: Entering a foreign country via immigration using an automated entry checking and authorization kiosk

    U-QR1.1 95 % of all users shall be able to successfully complete the authorization process without assistance.

    U-QR1.2 When the user is in front of an available kiosk, the user shall be able to complete the authorization process in 2 minutes on average.

    i) Subtask 1.1 Identify whether eligible to use the automated entry checking and authorization system

      U-IR 1.1.1 With the system, the user shall be able to recognize that the automated entry checking and authorization kiosk is present, once having reached the immigration hall.

      U-QR 1.1.1 With the system, at least 95 % of eligible users shall recognize that they are eligible to use the automated system, once having reached the immigration hall.

    ii) Subtask 1.2 Locate an available kiosk

      U-IR 1.2.1 For each available kiosk, the user shall be able to recognize whether it is ready for use or not.

    iii) Subtask 1.3 Identify which activities to be carried out

      U-IR 1.3.1 With the system, the user shall be able to recognize which activity needs to be performed next.

    iv) Subtask 1.4 Provide information contained in passport

      U-IR 1.4.1 With the system, the user shall be able to recognize how to place the passport, so it can be read by the system.

      U-IR 1.4.2 With the system, the user shall be able to place the passport, so it can be read by the system.

      U-QR 1.4.1 95 % of users shall correctly insert their passport within 15 seconds.

    v) Subtask 1.5 Get your face recognized correctly

      U-IR 1.5.1 With the system, the user shall be able to recognize how to position himself to initiate the facial recognition.

      U-IR 1.5.2 With the system, the user shall be able to position himself to initiate the facial recognition.

      U-QR 1.5.3 With the system, 95 % of users shall correctly position themselves within 10 seconds

    vi) Subtask 1.6 Receive confirmation that authorization was granted or that manual checking is required

      U-IR 1.6.1 With the system, the user shall be able to receive record confirming that the process has been successfully completed or that manual checking is required.

      U-IR 1.6.2 If authorization is not granted by the system, the user shall be able to recognize what to do next.

U-IR 1.6.3 If authorization is granted, the user shall be able to recognize how to proceed to the country.

vii) Subtask 1.7 Proceed to country or to border protection officer

No further user requirements relating to the interactive system

c) User requirements for <title of task 2>

NOTE 2 There would be a section similar to A.6 b) 1) for each additional task.

A.7 Design guidance to be applied

Guidance to be applied to the design of the user interface and interactions for the immigration system:

1) ISO 9241-110, *Ergonomics of human-system interaction — Part 110: Dialogue principles*

2) ISO 9241-112, *Ergonomics of human-system interaction — Part 112: Principles for the presentation of information*

3) ISO 9241-143, *Ergonomics of human-system interaction — Part 143: Forms*

4) ISO 9241-171, *Ergonomics of human-system interaction — Part 171: Guidance on software accessibility*

5) ISO 9241-303, *Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays*

6) ISO 9241-400, *Ergonomics of human--system interaction — Part 400: Principles and requirements for physical input devices*

7) ISO 9241-500, *Ergonomics of human-system interaction — Part 500: Ergonomic Principles for the design and evaluation of use environments*

A.8 Recommendations for implementation

No recommendations for implementation were identified at this point in development.

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