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Systems and software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: User needs report

Ingénierie des systèmes et du logiciel — Exigences de qualité et évaluation du produit logiciel (SQuaRE) — Format industriel commun (CIF) pour l'utilisabilité: Rapport sur les besoins de l'usager

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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.org
Web www.iso.org

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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.

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 25064 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

Introduction

The human-centred design approach of ISO 9241-210 is well established and focuses on making systems usable. Usability can be achieved by applying human-centred design and testing throughout the lifecycle. In order to enable a human-centred approach to be adopted, it is important that all the relevant types of information related to usability are identified and communicated. This identification and communication enables the usability of a system to be designed and tested.

This International Standard provides a framework and consistent terminology for reporting on the assessment of user needs. Specifying user needs in a consistent manner will assist those developing and acquiring interactive systems. It describes a set of user needs report content elements as part of a human-centred approach to design of interactive systems. A user needs report is intended to assist developers in determining user requirements for a system, product, or service.

The Common Industry Format (CIF) for Usability family of International Standards is described in ISO/IEC TR 25060 and is part of the SQuaRE series (ISO/IEC 25000 – ISO/IEC 25099) of standards on systems and software product quality requirements and evaluation.

CIF standards are planned for the following information items:

- Context of use description (25063)
- User needs report (25064)
- User requirements specification (25065)
- User interaction specification (2506X)
- User interface specification (2506X)
- Usability evaluation report (25066)
- Field data report (2506X)

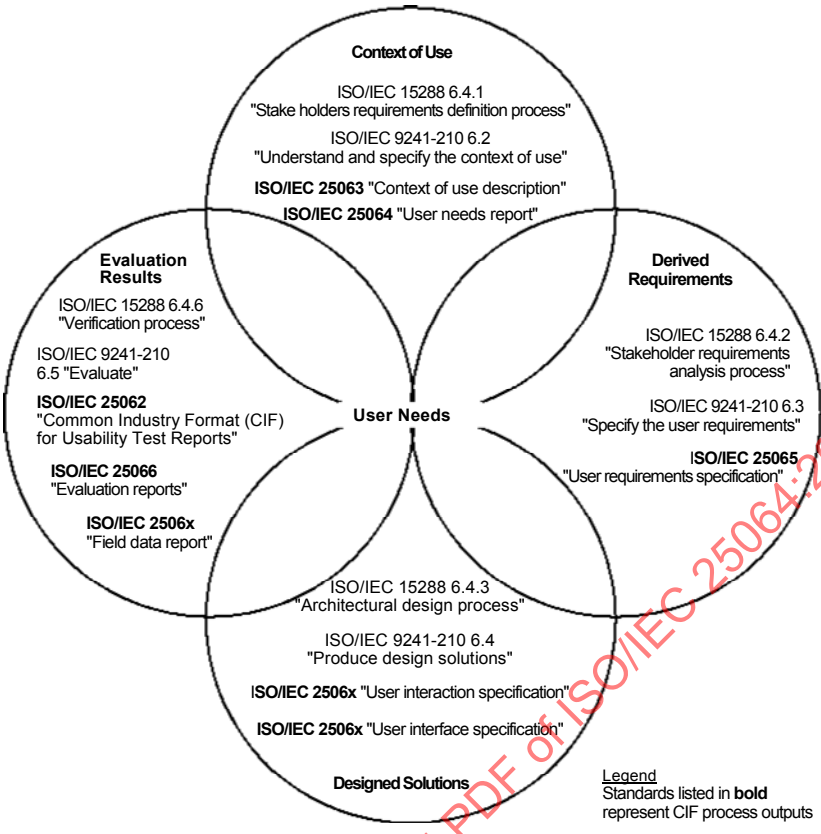

Figure 1 — Relationship of CIF documents to user centred design in ISO 924-210 and system lifecycle processes in ISO/IEC 15288

Figure 1 illustrates the interdependence of these information items with the human-centred design activities described in ISO 9241-210 as well as the corresponding System Life Cycle processes described in ISO/IEC 15288. The figure depicts the activities as a set of intersecting circles. The circles overlap to represent that 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.

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), which is an intermediate deliverable that links the Context of Use Description (ISO/IEC 25063) that contains Information about the users, their tasks and the organizational and physical environment, to the user requirements. These items are developed during the Stakeholders Requirements Definition Process described in ISO/IEC 15288.

The “Produce design 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 15288 and produces the information items “User Interaction Specification” and the “User Interface Specification”.

The “Evaluate” 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 being developed, and can produce various types of evaluation report, and usability data such as that described in ISO/IEC 25062 can support the ISO/IEC 15288 validation process that 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 needs report

1 Scope

This International Standard describes the Common Industry Format (CIF) for reporting user needs. This specifies the contents and provides a sample format of user needs reports. Specification of management needs, as well as other stakeholder needs, is considered to the extent that they directly impact on user needs. The purpose of the User Needs Report and the intended users of the information are identified, as well as the relationship of user needs to other outputs of human-centred design. The audience of this standard includes all users stated in the scope of ISO/IEC 25000. Annex B of ISO/IEC 25000 describes the users of the information item "user needs report" in detail. Annex A of this International Standard provides a list of typical users of a User Needs Report.

User Needs Reports include:

- documentation of information collected from various sources relevant to user needs
- the consolidated user needs based on the analysis of the collected information

The User Needs Report is applicable to software and hardware systems, products or services (excluding generic products, such as a display screen or keyboard). User Needs Reports are relevant for existing and new products, services and systems, although the extent to which use needs are reported depends upon the type of system, product, or service involved. It can also contribute to determining, verifying, changing and elaborating the context of use. The content elements 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 JTC1/SC7 process standards.

This International Standard does not prescribe any kind of method, lifecycle or process. To ensure that these content elements can be used within the broadest range of process models and used in combination with other information items, the descriptions use the classifications in ISO/IEC 15289 and ISO/IEC 15504-6.

NOTE The content elements documenting user needs can be integrated in any process models. For the purpose of establishing process models, ISO/IEC 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 lifecycle management. ISO/IEC 15504-5 and 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 TR 18529 and ISO TS 18152 respectively.

2 Conformance

A user needs report conforms to this International Standard if it contains all of the required information elements specified in clause 6.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document, (including any amendments) applies.

ISO/IEC 25063[1], *Systems and software engineering — Systems and software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for Usability: Context of use description*

4 Terms and definitions

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

4.1
accessibility
extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use

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

[SOURCE: ISO 26800:2011, 2.1]

4.2
action
user behaviour that a system accepts as a request for a particular operation

[SOURCE: ISO/IEC TR 11580:2007]

4.3
context of use
users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

[SOURCE: ISO 9241-11:1998]

4.4
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

[SOURCE: ISO 9241-110:2006]

4.5
effectiveness
accuracy and completeness with which users achieve specified goals

[SOURCE: ISO 9241-11:1998]

4.6
efficiency
resources expended in relation to the accuracy and completeness with which users achieve goals

[SOURCE: ISO 9241-11:1998]

[1] To be published.

4.7
goal
intended outcome

[SOURCE: ISO 9241-11:1998]

4.8
information item
separately identifiable body of information that is produced, stored, and delivered for human use

Note 1 to entry: "information product" is a synonym.

Note 2 to entry: An information item can be produced in several versions during a project life cycle.

[SOURCE: ISO/IEC/IEEE 15289:2011]

4.9
performance deficiency
difference between the required (or desired) level of performance and the actual performance

Note 1 to entry: Deficiency data is only obtainable in environments where specific performance requirements exist

Note 2 to entry: Performance refers to effectiveness and efficiency in the definition of usability

Note 3 to entry: Performance deficiencies can include deficiencies in measured customer satisfaction

4.10
product
part of the equipment (hardware, software and materials) for which usability is to be specified or evaluated

[SOURCE: ISO 9241-11:1998]

4.11
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 could include user needs reports.

[SOURCE: ISO/IEC 24765:2010]

4.12
satisfaction
freedom from discomfort, and positive attitudes towards the use of the product

[SOURCE: ISO 9241-11:1998]

4.13
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

[SOURCE: ISO/IEC 15288:2008]

4.14
system
combination of interacting elements organized to achieve one or more stated purposes

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

Note 2 to entry: 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.

[SOURCE: ISO/IEC 15288:2008, 4.31]

4.15
task
activities required to achieve a goal

[SOURCE: ISO 9241-11:1998]

Note 1 to entry: 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.

4.16
usability
extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use

[SOURCE: ISO 9241-210:2010]

Note 1 to entry: This definition of usability is similar to that used to define quality in use in ISO/IEC 9126-1:2001.

4.17
user
person who interacts with a system, product or service

Note 1 to entry: A person who uses an output or service provided by a system, such as a bank customer who receives a paper or electronic statement, visits a branch, or carries out telephone banking using a call centre, is considered to be a user.

[SOURCE: ISO 26800:2011]

4.18
user experience
person's perceptions and responses that result from the use and/or anticipated use of a product, system or service

Note 1 to entry: 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 to entry: 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 to entry: 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 established so as to assess aspects of user experience.

[SOURCE: ISO 9241-210: 2010]

4.19
user need
prerequisite identified as necessary for a user, or a set of users, to achieve an intended outcome, implied or stated within a specific context of use

EXAMPLE 1 A presenter (user) needs to know how much time is left (prerequisite) in order to complete the presentation in time (intended outcome) 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 (intended outcome) 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 considering the context of use, user priorities, tradeoffs with other system requirements and constraints

4.20
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 to entry: 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 to entry: 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 to entry: In software-engineering terms, user requirements comprise both “functional” and “non-functional” requirements based on user needs and capabilities.

[SOURCE: ISO/IEC TR 25060:2010]

4.21
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

[SOURCE: ISO 9241-110:2006]

5 Purposes of a User Needs Report

5.1 General

An effective human-centred approach relies on explicit human factors data. Collection, analysis and reporting of user needs are essential activities to enable this data to be generated. User Needs Reports provide information on the needs identified, the intended user groups, the source(s) of those needs and the methods used to obtain the information. In addition, User Needs Reports provide information on the syntheses and consolidation of user needs across different user groups and types of needs. User Needs Reports support effective communication among the target users of the report (e.g., designers, developers, evaluators) to obtain a common understanding of the user needs. User needs provide the basis for developing user requirements as well as the validation and elaboration of context of use information. In addition, user needs information can be used for “audit trail” purposes throughout the development process to ensure that the originally stated user needs are being satisfied.

User needs information is critical to designing any kind of system, product or service, both organizational and consumer. User Needs Reports are particularly relevant for systems, products or services with a large number of diverse users and multiple designers and developers. In such cases, a formal report helps to ensure that all designers and developers are working from the same information base. In less complex applications or products, with few designers and developers, a formal User Needs Report might not be necessary. However, it is still important to collect, document and make the relevant information content available to the designers and developers. Annex A provides a list of typical users of a User Needs Report.

NOTE The list of users in Annex A is representative of typical users. However, other types of users can also find the User Needs Report useful.

5.2 User Needs Reports for existing products, services and systems

For a product, service or system that currently exists, the purpose of a User Needs Report is to identify the needs of users based on their use of and experience (i.e., user experience) with the product, service or system. Such needs assessments are often used to determine what modifications are necessary and, in some cases, to determine whether a new product, service or system is required to replace the current one.

5.3 User Needs Reports for new products, services and systems

If a product, service or system is new, the purpose of a User Needs Report is to identify potential user needs for the new product, service or system. This type of user needs assessment is typically based on the identified context of use (e.g., types of users, tasks, and environment) envisioned for the product, service or system. This context of use could be an initial high-level description of the assumed context of use or an initial context of use (see ISO/IEC DIS 25063). User needs assessments are sometimes done in terms of needs for potential new features instead of needs related to the entire product.

5.4 User Needs Reports for determining, verifying, changing and elaborating context of use

A User Needs Reports could also be used for initially determining the context of use for a new (or modified) product, service or system. In such cases, information would be collected from potential user groups concerning their goals (or responsibilities) tasks and environment and associated needs. This information could then be consolidated and used to produce a context of use description. User Needs Reports also are very useful in verifying, changing and elaborating a current context of use description, an initial high-level context of use description, or intended context of use description.

5.5 Relationship to other CIF information items

An initial Context of Use Description is used to provide information for determining the relevant population and content areas to be sampled in the needs assessment. However, in cases where a Context of Use Description has not been produced prior to the needs assessment, information relevant to context of use can be produced as part of the needs assessment. If a Context of Use Description has been prepared, information concerning population descriptions, responsibilities and activities documented in the User Needs Report provides information relevant to the verification, change and elaboration of the context of use. If evaluation reports (e.g. ISO/IEC 25062) related to the scope of the needs assessment have been prepared, needs related information from such reports would be incorporated in the User Needs Report. The User Need Report is a critical input into specifying User Requirements. Consolidated user needs are the basis for analysing and determining which needs will become user requirements.

6 Content of a User Needs Report

6.1 Content elements

Content elements specified below cover the range of content that can be included in a User Needs Report. The appropriateness of some content elements depends on the type of system, product, or service involved. Content elements can be obtained from various sources, e.g., analysis of the context of use, users, subject matter experts, managers, etc. If content elements are not derived directly from users, they should be confirmed by the relevant users. The order of presentation of the content elements is based on a logical sequence of providing the data.

The content elements are:

— Subject of the user needs report (6.1)

— Initial indicators of the needs for system/product/service or improvement (6.2)

— User responsibilities and goals (6.3)

— Source data on which user needs are based (6.4)

— Identified and reported user needs (6.4.2)

— Identified and reported management and other stakeholder needs (6.4.3)

— Performance deficiencies/problems/potential improvements (if identified) (6.4.4)

— Consolidated user needs (6.5)

— Recommendations relevant for the developers of the user requirements (if appropriate) (6.6)

— Data collection methods/procedures (6.7)

— Supporting information (6.8)

— System/Product/Service description, objectives, constraints (6.8.1)

— Data collection instruments (6.8.2)

— Data summaries (6.8.3)

The order chosen for communicating elements to specific audiences may differ from that presented in this International Standard. Annex B provides a sample format for a formal User Needs Report.

NOTE User Needs Reports can include references to information contained in other sources.

6.2 Initial indicators of the needs for system/product/service or improvement

If information existed, prior to the user needs assessment, related to the needs for the system, product or service or potential improvements on an existing system, product or service, such information shall be provided.

NOTE Such information can often be found in customer surveys, trouble reports, etc.

6.3 User responsibilities and goals

The following information related to intended users shall be provided for each user group, either identified in the Context of Use Description, if it exists, or identified from other sources:

— Current or anticipated responsibilities and/or goals related to the context of use

— Outputs (e.g., results of a process) produced or anticipated to be produced

NOTE 1 User groups might be based on job titles, use situations (in the case of consumer products), occupations, etc. See ISO/IEC DIS 25063 for information on describing user groups and goals

NOTE 2 Secondary users (e.g., supervisors, maintenance personnel) also could be included in a needs assessment.

6.4 Source data on which user needs are based

6.4.1 General

User needs can be based on information obtained through various sources, including:

- Analysis of the context of use
- Identified user needs (from users, subject matter experts, etc.)
- Management needs and other stakeholders that impact on user needs

- Identified performance deficiencies, problems and potential improvements

6.4.2 Identified and reported user needs

6.4.2.1 General

User needs can be identified and reported by various methods. Identified needs are reported and summarized based on user groups and user responsibilities or goals to allow comparisons of needs across user groups. User needs information should be obtained from users whenever possible.

NOTE Identified and reported user needs are analysed on the basis of similarity, relevancy, importance and context of use and are refined into “consolidated needs” as described in 6.5.

6.4.2.2 Content elements of each user needs statement

Each user needs statement shall include

— the user or the set of users that it relates to

— the intended outcome to be achieved, implied or stated

— the prerequisite (need) identified as necessary to achieve the intended outcome

— the specific context of use in which it applies

EXAMPLE 1 An employee (user) needs to know how to obtain an access code (need) in order to log onto their work application (intended outcome) using the company computer system (context of use).

EXAMPLE 2 A tax preparer (user) needs to have copies of their income statements (need), in order to prepare their taxes (intended outcome) using the tax preparation system (context of use).

NOTE 1 When documenting a user needs statement, it can be helpful to provide a unique identifier and the date when it was documented.

The quality attributes of the needs statement:

The user needs statement shall be independent of any proposed solution for that need.

EXAMPLE 3 "A presenter needs to have an alarm clock in order to complete the presentation in time" would be a bad example because it provides a specific solution.

Each user needs statement shall contain at least one need (prerequisite) but only one intended outcome.

NOTE 2 The same need (prerequisite) could be necessary for different intended outcomes and several different prerequisites maybe necessary for the same intended outcome.

The prerequisite (need) identified as necessary shall specifically and completely addresses the intended outcome

EXAMPLE 4 "The waiter needs to know which dishes the allergy sufferer likes, in order to select a dish that will not cause an allergic reaction" would be a bad example because it does not specifically address the allergic reaction.

The needs statement should include any identified qualifications and factors related to achieving it.

EXAMPLE 5 To reach a destination (outcome), *when part of* the route is closed (qualification), the vehicle operator needs alternative choices (need) to the same destination based on decision making factors, such as, shortest distance, least estimated time by time of day, familiarity with alternative route (arterial, highway, thruway, freeway, toll road).

6.4.2.3 Additional content to be provided with each need statement

6.4.2.3.1 Information to be provided

For each user needs statement the following information shall be provided

- Source of need (see 6.4.2.3.2)
- User responsibilities or goals related to need (see 6.4.2.3.3)

If any of the following information is available, it shall be included:

- Rationale for need (see 6.4.2.3.4)
- Type of need (see 6.4.2.3.5)
- Frequency of occurrence (see 6.4.2.3.6)
- Quality attributes (see 6.4.2.3.7)

6.4.2.3.2 Source of need

Sources of needs include: user reported, expert derived, subject matter expert derived, or previous information source.

6.4.2.3.3 User responsibilities or goals related to the need

User responsibilities are those obligations a user has with respect to their job or other endeavour (e.g. processing schedule change requests), while goals are intended outcomes. If possible, responsibilities and goals should be specified in a manner consistent with the Context of Use Description (see ISO/IEC DIS 25063).

6.4.2.3.4 Rationale for the need

Rationale for the need is a statement about the user's or other source's rationale (i.e. reason) for the need. Whenever possible, the rationale for the need should be related to context of use information.

6.4.2.3.5 Type of need

6.4.2.3.5.1 Identifying and reporting

Since the type of need is very useful in the analysis and consolidation of needs, it is important to identify and report the type of need associated with the need statement whenever possible. The following subclauses provide common types of needs that should be used, as appropriate.

6.4.2.3.5.2 Informational needs

Informational needs concern specific information that is important to accomplishing a job function or user goal (either currently available or desired in the future).

EXAMPLE When driving a rental car in a foreign country without cash in local currency (context of use), the car driver (user) needs to know which routes don't involve cash-based toll booths (need) in order to get to the destination without having to obtain local cash (outcome).

6.4.2.3.5.3 Processing needs

Processing needs concern specific processes (e.g., computational methods) needed by users to accomplish their functions or goals.

EXAMPLE To compare user satisfaction scores across software packages (outcome) to be evaluated for purchase (context of use), the assessor (user) needs all scores to be calculated using the same statistical rule (need).

NOTE Users will sometimes state processing needs in terms of capabilities needed.

6.4.2.3.5.4 Enjoyment needs

Enjoyment needs concern the need for a product, system or service to be enjoyable (e.g., engaging, challenging, and satisfying). Enjoyment needs are often relevant to consumer products.

6.4.2.3.5.5 Environmental needs

Environment needs relate to the physical and/or social environment in which the system, product, or service will operate.

EXAMPLE During daily blood-based measurements taken at the patient's bed in the hospital (context of use) the nurse (user) needs to have a secure space for placing the measurement instrument while taking the measurement (prerequisite) such that it can be re-used for the next patient afterwards without risk of contamination (intended outcome).

NOTE In the case of a system, environment might include the computing and network environment which could also relate to the need for compatibility with other products or systems.

6.4.2.3.5.6 Other types of identified needs

If need of types other than those listed above are identified, the type of need should be stated (e.g., interoperability needs, training needs, resource needs, support needs).

6.4.2.3.6 Frequency of occurrence

Frequency of occurrence is the frequency with which the need is expected or known to occur.

EXAMPLE User states that they need to know the amount of traffic on their website on a weekly basis.

6.4.2.3.7 Quality attributes

Quality attributes should be included as part of the user needs statement as identified in the context of use. Quality attributes include accuracy, timeliness and completeness of the intended outcome.

NOTE 1 These can also include relevant usability objectives for achieving goals in terms of effectiveness (e.g., success rate and accuracy in achieving intended outputs), efficiency (e.g., total time) and satisfaction (e.g., measured by a questionnaire) should be listed if available.

NOTE 2 For more information on quality categories, see ISO/IEC 25010.

6.4.2.4 Requirements on the elements of a user needs statement

— The user needs statement shall be independent of any proposed solution for that need.

— Each user needs statement shall contain at least one need (prerequisite) but only one intended outcome.
Note: The same need (prerequisite) could be necessary for different intended outcomes and several different prerequisites maybe necessary for the same intended outcome.

— Each need identified as necessary shall specifically address the intended outcome.

6.4.3 Identified and reported management and other stakeholder needs that impact on user needs

6.4.3.1 General

If the users are within an organization and immediate managers of users have needs that directly impact on user needs, these needs shall be identified and described in terms of their impact on users. Managers have their own needs for system data and performance. If the system or manual version of the system is currently in operation, management's views concerning the current performance and the "gap" between current performance and management's goals is particularly important. The needs of other important stakeholders (such as senior management or regulators) that have direct impact on the users' context and/or needs should also be included in the needs assessment.

6.4.3.2 Content elements

Each identified need of immediate management and other stakeholders shall include the following content specified in the sub-clauses below:

— Needs statement (the manager/stakeholder or the set of managers/stakeholders that it relates to, the intended outcome to be achieved, implied or stated, the prerequisite (need) identified as necessary to achieve the intended outcome, the prerequisite (need) identified as necessary to achieve the intended outcome, the specific context of use in which it applies and any identified qualifications and factors related to achieving it) (see 6.4.2.2)

For each manager/stakeholder needs statement the following information shall be provided

— Source of need (see 6.4.2.3.2)

— Organizational responsibilities or goals related to need (see 6.4.3.3)

If any of the following information is available, it shall be included

— Rationale for need (see 6.4.2.3.4)

— Impact on user needs, if identified (6.4.3.4)

— Type of need (see 6.4.3.5)

— Frequency of occurrence (see 6.4.2.3.6)

— Quality attributes (see 6.4.2.3.7)

6.4.3.3 Organizational responsibilities or goals related to need

Organizational responsibilities are those requirements that a particular manager, organization, or stakeholder group, has for their job (e.g. approving schedule change requests) while goals are intended outcomes. If possible, responsibilities and goals should be specified in a manner consistent with the Context of Use Description (see ISO/IEC 25063).

6.4.3.4 Impact on user needs

Impact on user needs is the manager's/stakeholder's views on the impact of their specific needs on relevant user needs. Impacts should be tied to quality attributes whenever possible.

6.4.3.5 Type of need

6.4.3.5.1 General

Since the type of need is very useful in the analysis and consolidation of needs, it is important to identify and report the type of need associated with the need statement whenever possible. The following subclauses provide common types of needs that should be used, when appropriate.

6.4.3.5.2 Output needs

Output need relate to the need for specific outputs (e.g., result of a process) produced or anticipated to be produced.

EXAMPLE In order to plan trip times for truck deliveries, a truck dispatch supervisor needs a record kept of all stops made by a truck in route to each customer facility.

6.4.3.5.3 Procedural needs

Procedural needs are those needs related to specific procedures needed by managers/stakeholders to accomplish their responsibilities or goals.

EXAMPLE In order to reassign schedules, a truck dispatch supervisor needs to be informed by each driver of any planned deviations in the prepared route.

6.4.3.5.4 Other needs

For any other types of needs not listed above, the type of need should be stated.

6.4.4 Identified performance deficiencies/problems/potential improvements

6.4.4.1 General

Any identified deficiencies, problems, and potential improvements that have an impact on user needs shall be reported. The following subclauses provide content elements that should be used.

Deficiencies in performance are based on measured (or reported) deviations from performance requirements and problems are based on reported difficulties with using a system, product or service. However, potential improvements are more subjective in nature and are based on anticipated results. In many cases potential improvements reported by users relate to user satisfaction problems with the current system, product or service. Information concerning deficiencies is particularly relevant in organizations where performance requirements are important. Deficiencies, problems and potential improvement information could come from various existing sources or be obtained during a needs assessment. Also data related to deficiencies and problems could come from evaluation studies such as a usability test report (for example ISO/IEC 25062).

NOTE Performance requirements could be expressed in terms of performance of the whole system, or various components, including the human component.

6.4.4.2 Performance deficiencies

The term “performance deficiency”, as used in this standard, applies only to performance deficiencies which are defined as the difference between the required (or desired) level of performance and the actual performance. Performance deficiencies could be reported by subject matter experts, supervisors, trouble reports, alarms, etc.

NOTE 1 Performance can include performance of the system, performance of the human and customer satisfaction.

NOTE 2 Performance deficiency data is only obtainable in environments where specific performance requirements exist. Typical performance requirements include quantity, quality and timeliness.

NOTE 3 The actual deficiency could be caused by various factors such as system or environmental factors.

Information related to performance deficiencies should include:

— Condition under which deficiency occurred

EXAMPLE On-line and telephone conversations with customers concerning problem with software application

— Who produced the deficient output (user group, not the individual user)

EXAMPLE Customer Service Representatives

— Description of the output (including its characteristics, e.g., format, media)

EXAMPLE Verbally and in print (if requested) proposed solutions for customers problems with software

— Requirement for the output (including quality, timeliness, customer satisfaction, etc.)

EXAMPLE Solution must be correct, provided within 10 minutes, and customers must be satisfied (rating at least 5 on a 7 point scale)

— Deviation from the performance requirement (e.g., missing data, incorrectness of information, response time deviation)

EXAMPLE Solutions are incorrect 20% of the time, provided in over 10 minutes 40% of the time and customer satisfaction averages 4 on the 7 point scale

— Source of identified deficiency (subject matter experts, supervisor, trouble reports, etc.)

EXAMPLE Supervisor information and customer satisfaction surveys

— Method of measurement (e.g., errors, time measurements, satisfaction score)

EXAMPLE Errors (as reported by customer follow-ups and supervisor reviews, time measurements (collected by system) and satisfaction scores (from customer satisfaction surveys)

— Cause(s), penalties and value of solving (e.g., cost/benefit)

Example Causes: lack of sufficient information on system features and problem solutions available in database; Penalties: loss of business by unhappy customers

6.4.4.3 Problems

Problems can be identified by trouble reports, customer service representatives, user surveys, focus groups, etc. Any problems inferred from the results of surveys of user satisfaction and any deviations from required values for measures of user satisfaction should be included.

Information related to problems should include:

— Description of problem in terms of what is wrong or seems to be wrong (e.g., user cannot perform a particular activity, system crashes when user does x).

EXAMPLE System crashes when users enter incorrect code for purchase item.

— Source of identified problem (trouble reports, surveys, etc.)

EXAMPLE Trouble reports, customer service representatives reports

— Probable cause (judgement as to what might most likely caused the problem)

EXAMPLE Incorrect code error processing routine not functioning properly.

— Probable effect (positive and negative)

EXAMPLE Lost sales of items in online catalogue and decrease in customer satisfaction

— Value of resolving (e.g., cost/benefit)

EXAMPLE Cost of solving estimated to be 6 hrs. of programmer's time with a benefit of more sales and higher customer satisfaction.

6.4.4.4 Potential improvements

Suggestions for potential improvements can be reported by users, subject matter experts, managers or other stakeholders.

Information related to potential improvements should include:

— Description of potential improvement

EXAMPLE Vehicle navigation systems would be more efficient if they would allow reuse of modifications made by users to a favourite route so that the next time the route is selected the system provides the option to use the modified route.

— How identified

EXAMPLE User comments during interviews.

— Probable effect (positive and negative)

EXAMPLE Positive effect estimated to be shorter user time for computing favourite routes. Negative effect estimated to be increased storage capacity requirements in device.

— Degree of Improvement anticipated

EXAMPLE 75 % decrease in user time required to pre-computed favourite routes

— Value of providing (e.g., cost/benefit)

EXAMPLE Cost expected to include 20 hrs. of programming time and 1 GB additional memory. Benefit expected to be 10 % increase in sales of Vehicle Navigation System.

NOTE Potential improvements listed by users could duplicate needs statements that are expressed during needs assessments.

6.4.4.5 Deficiency/problem/improvement analysis

An analysis of the deficiencies, problems and potential improvements reported by users and stakeholders in terms of cause(s), effects, value of solving (or providing) and possible solutions should be provided.

NOTE To estimate the value of solving a deficiency or implementing an improvement, it is necessary to determine the cost of the deficiency or improvement in terms of its effect on quality, response time, cost, etc. In addition, Return On Investment (ROI) or Risk Management (avoiding errors) can be used in the evaluation.

6.5 Consolidated user needs

The identified user needs described in 6.4.2, as well as the impact of the user needs added or modified on the basis of the impact of management/other stakeholder needs described in 6.4.3 on user needs and any needs based on the analysis of deficiencies, problems and improvements identified in 6.4.4 shall be analyzed and

combined into consolidated user needs.This consolidation is based on the analysis of the needs in relation to the stated context of use and the similarity and importance of the various identified needs. Consolidation should also include the analysis and synthesis of user goals.

Data summary tables are typically used to determine similarity and importance of needs stated by various types of users as well as conflicts between needs within and across user groups. Needs are also evaluated in terms of the feasibility of meeting the needs in terms of available or planned resources (including hardware and software capabilities). While identified user needs are specifically based on information collected from (or about) users, some of these will not be included as consolidated needs or could be modified as part of the consolidation (because they could be unrealistic, impossible to meet, or out of context, etc). The list of consolidated needs should be accompanied by a list of those needs that have been eliminated or modified for audit purposes.

NOTE Consolidated user needs are input to “Elicit stakeholder requirements” in ISO/IEC 15288.

Each consolidated need shall include the following elements (see 6.4 for explanations of elements):

- Needs statement (as specified in 6.4.2.2)
- Source(s) of need (6.4.2.3.1)
- Source of need (see 6.4.2.4)
- User responsibilities or goals related to need (6.4.2.3.3)
- Organizational responsibilities or goals related to need, if appropriate (see 6.4.3.3)

The following information shall be provided, if identified or reported

- Rationale for inclusion (including resolution of conflicting needs) (6.4.2.3.4)
- Type of need (see 6.4.2.3.5)
- Frequency of occurrence (see 6.4.2.3.6)
- Quality attributes (see 6.4.2.3.7)

6.6 Recommendations (if appropriate)

Recommendation based on the consolidated needs and associated analysis should be provided if appropriate. Such recommendations should include any recommendation for implementation of the various consolidated needs that could be relevant for the developers of the user requirements. In addition, the recommendations should include any changes recommended to the context of use implied by the user needs analysis.

NOTE 1 For organizational environments, it is particularly important to provide recommendations concerning reconciling managers’ needs with subordinate users’ needs

NOTE 2 Recommended changes in the context of use could be due to more detailed data on user populations, goals, outputs, environments, etc.

6.7 Data collection methods/procedures

6.7.1 Content

A description shall be provided of the methods and procedures used to collect data including a description of the actual population sampled to collect data.

NOTE 1 Needs assessment methods can include document analysis, expert analysis, interviews, surveys, critical incident assessments, questionnaires, and rating scales.

NOTE 2 The selection of assessment methods and the amount of data collected depends on the scope of the project, the availability of information sources, and the resources of the needs assessment team.

6.7.2 Selection of participants for user needs assessment

The users are generally selected on the basis of the Context of Use Description, and the sample of such users should be as representative as possible. All groups within the scope of the intended context of use shall be identified and information relating to each group shall be provided.

In identifying the participants within the user population to be used in the assessment (e. g. identifying the target population), it is important to obtain as much information as possible on the number of different types of users, organizations and locations that will be using, or are using, the system, product or service. Information concerning user needs should be based on the intended context of use, as opposed to the current context of use. For example, users and support personnel to be represented in the user needs for a system, product or service might include:

- Expert users
- Subject matter experts (where appropriate)
- Regular users
- Infrequent users
- Novice users (with limited experience)
- Support personnel
- Supervisors of the above populations (where appropriate)

6.7.3 Description of user needs assessment participants

The relevant characteristics of the users involved in the user needs assessment shall be identified. The population description should wherever possible make use the user description categories described in ISO/IEC 25063. The characteristics of different types of users should be defined, for example, with different levels of experience or physical capability. Also, the characteristics described should include people (such as older users) whose physical or psychological characteristics (body dimensions, strength, biomechanical abilities, visual abilities, auditory abilities, knowledge, experience, or literacy) are at the extremes of the range in the intended user population.

NOTE This description could reference data in the annexes, or context of use description, related to population summary data.

The description of the user needs assessment participants should also include:

- The job titles of the participating intended user population and their general job responsibilities, if appropriate. If the product is a consumer product, or use situations for the product should be listed.
- The user's previous experience stated in terms of:
  - relevant technology use (e.g., computer platforms)
  - brand, product or application subject area experience and proficiency (including typical length of job experience and self-ratings as to proficiency, if appropriate)
  - relevant training courses (if appropriate)

- experience based stereotypes and habituated activities (if appropriate)

- A statement of the skills that users already possess that are relevant for using the product or system. If possible, these statements_should be quantified. Relevant skills might include typing, manual dexterity, information processing, problem solving, etc.

- The current or expected frequency of use of the product, application or system. Such statements might include information describing frequency of use of the product, system or service within the range of usage represented by following categories:

  - Regular users – users that make routine use of the system, product or service on a regular basis.

  - Infrequent users – users that make occasional use of the product, application or system, but spend most of the day doing something else. Examples would be a salesperson checking the status of an order, a manager varying some budget parameters to make a decision, or people using a tax program to prepare their taxes once a year.

- Use pressures include time pressures and high penalties for the occurrence of errors.

NOTE 1 These pressures can be a source of stress and lead to long term inefficiencies in the operation of a system or service

NOTE 2 Often such pressures are based on the importance of meeting job standards in obtaining successful ratings by supervisors.

6.7.4 Methods and procedures

The specific methods and procedures used to collect data from the user needs assessment participants shall be described in enough detail to replicate the assessment with a different population.

NOTE This description could reference data in the annexes related to specific data collection instruments and instructions.

6.8 Supporting information

6.8.1 System/Product/Service description, objectives, constraints

The following information shall be provided:

- Description of system, product or service

- The user population for which the system, product, or service is intended

- System/product/service objectives and constraints.

- Assistive technologies that are supported, or intended to be supported by the system, product or service.

- Brief description of the physical and social environment(s) in which the system, product or service is intended to be used.

- The type of user activities that is supported (or intended to be supported) by the system, product or service.