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Using the Common Industry Format to Document the Context of Use

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Abstract. The ISO/IEC 25063 standard provides a Common Industry Format for documenting the context of use. It defines the context of use as the "users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a system, product or service is used", and specifies what should be included in a description of the context of use. This paper explains the importance of identifying the context of use as part of the human centred design process, provides an outline of the information that needs to be included in a description of the context of use, and explains how the scope of the context of use needs to be identified and how multiple contexts of use can be differentiated.

Keywords: Standards, context of use, usability, common industry format

1. Introduction

ISO 9241-210 emphasises the importance of understanding and specifying the context of use as part of the human-centred design process. The characteristics of the users, tasks and organizational, technical and physical environment define the context in which the system is used. The objective of ISO/IEC 25063 "Common Industry Format for Usability: Context of Use Description", is to explain the various roles of context of use descriptions in systems development, and to specify in detail the information that needs to be identified. This will provide a source of guidance for people responsible for documenting the context of use, and could also be used to specify the information about context of use that should be provided as part of a contract for systems development. ISO/IEC 25063 is currently being finalized, with publication expected in late 2013 or early 2014.

2. What is the context of use?

The phrase "context of use" has been used in a general sense in HCI for many years [15], and is currently defined by the Interaction Design Foundation as "the actual conditions under which a given artefact/software product is used, or will be used in a normal day to day working situation" [2].

In ISO 9241-11, developed at the same time as the MUSiC method [1,14], "context of use" has a more precise meaning: the characteristics of the users, tasks and the physical, social and organizational environments in which a product, system or service is used. As this includes all the factors that influence the usability (effectiveness, efficiency and satisfaction) when a product is used, this definition provides a more rigorous framework than traditional approaches to user and task analysis that may, for example, overlook the influence of the technical, physical and social environment. The definition also explicitly includes the characteristics of the user that will influence usability.

In a design situation, the characteristics of the product will determine the usability in a given context of use. For an existing product, the characteristics of the context of use determine the usability of the product.

The most recent version of the ISO definition of context of use is in ISO/IEC 25063: "the users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a system, product or service is used".

3. Context of use in systems development

As usability depends on the context of use, detailed knowledge about the context of use is an essential prerequisite for requirements definition, design and evaluation. In the early stages of product conception, information about the context of use complements information about user needs. Many user requirements can be derived directly from the context of use, as the system needs to be usable in all the intended contexts of use. Requirements identified from the context of use could for example include the need to use terminology that is familiar to the identified user groups, to support commonly occurring task flows, and for the interface to be usable in unusual physical environments.

During design and development, the context of use description will become more detailed as more information is obtained and design decisions are taken. It may be necessary to identify and describe the context of use for some or all of following situations (which are explained in more detail in ISO/IEC 25063):

- **Initial high-level description of the context of use.** This information can provide an initial basis for identifying user needs (and could for example include lists of user groups and their tasks).

More **detailed descriptions of the context of use** are needed to support particular stages of the design and development process:

- **Current context of use.** Information about the currently existing context of use can be used to identify needs, problems and constraints that might otherwise be overlooked, but which design of the future system should take account of.
- **Intended context of use.** Defining the intended context of use provides a basis for designing the new product or system by describing the types of users who are

intended to use it, the tasks that are to be undertaken and the environment(s) in which it is intended to be used.

- **Context of use specified as part of user requirements.** The context of use should be included as part of a user requirements specification to clearly identify the conditions under which the requirements apply and the contexts in which the system needs to be usable.
- **Intended context of use of the implemented system.** This documents how and when the implemented system is intended to be used. The context in which the implemented product or system has been designed to be used may differ from the context that was originally intended (for example as a result of compromises made during design and development).
- **Context of use of the deployed system.** The context of use of the system after deployment can be identified through follow-up evaluation, and includes any new ways the system is actually being used (for example by unanticipated types of users for new tasks in different environments).

Two other applications of context of use descriptions are:

- **Context of use used for evaluation.** To obtain valid results, it is important that the context of use that is used for the evaluation is so far as possible a realistic representation of the actual or intended context of use, using users with similar skills and abilities carrying out typical tasks in a representative environment. Documenting the context of use to be used for evaluation helps plan a realistic evaluation and subsequently provides evidence that the results are valid.
- **Context of use information included in a product description.** To help potential purchasers or users of a product or system, the product description should include a description of the intended context of use of the product.

4. Content of a context of use description

ISO/IEC 25063 specifies the particular items that are required and recommended for inclusion in different types of context of use descriptions. The items in the standard were derived from those previously described in ISO 9241-11 and ISO 20282-1, and they were refined through discussion in the working group (that includes experts in ergonomics, usability and software quality) taking account of feedback received on draft versions of the standard. The items are summarized below.

Subject of the context of use description

- The system, product, service or concept for which the context of use is being described.
- The purpose of the system, product, service or concept.
- A summary of any preconditions and/or constraints that affect the design of the interactive system.

User groups and stakeholders

- Each distinctly different user group.
- Other stakeholders who could have an impact on the use of the system, product or service.
- The relationship between each relevant user group and the system, product or service in terms of key goals and constraints.
- The characteristics of each user group.
- If the actual or intended users will include people whose physical or psychological characteristics are at the extremes of the normal range, these characteristics should be included in the description of context of use description.

User characteristics that could affect usability

- Demographics such as such as age, gender or education.
- Psychological and social characteristics such as cognitive abilities, cultural background, language, literacy, knowledge and skills, motivation and attitude.
- Physical and sensory characteristics such as body dimensions, handedness and visual and auditory abilities.

Goals and responsibilities of the user group and the organization (in which the user group works)

- A list of the goals of the different user groups described as intended outcomes that people are trying to accomplish (including personal goals when relevant).
- Any goals defined by the organization that provides and/or develops the interactive system that are likely to affect usability.
- Any responsibilities that are judged to be likely to affect usability.

Tasks of the users

- For each task, the characteristics that are likely to affect usability, which could include the goal of carrying out the task, the task result or outcome, whether there is discretion in how to carry out the task, the duration and frequency, and the complexity.
- Tasks will usually need to be analysed and described. While task analysis is logically part of a context of use description, it is usually documented separately.

Technical, social and physical environment(s)

- The technical and technological environment that could for example include tools, equipment, hardware configuration, input device(s), network connection, and assistive technologies.
- The social and organizational environment that could for example include availability of assistance, responsibilities, group dynamics, time pressures, and interruptions.

- The physical environment that could for example include the time, location, workplace, lighting and temperature.

Problems

- The description of an existing context of use can include any identified problems that are observed or reported, which can help identify user needs and potential improvements.

5. What should be included in a context of use description?

To decide what to include in a detailed context of use description, the following decisions need to be made:

a) What is the focus of the context of use?
b) What is the scope of the context of use?
c) How many different contexts of use are there?
d) Which characteristics of the context of use should be described?

5.1 What is the focus of the context of use?

The context of use represents the users, tasks and environments for which a system, product or service will be used. The system, product or service is the focus of design or evaluation in predefined contexts of use.

The boundary between the system, product or service and the technical environment depends on the scope of what is being designed or evaluated. This is represented by Equipment that could be part of the System, Product or Service. For example, if designing software for a digital alarm, the product is the software, and the hardware is part of the technical environment, but if designing the whole alarm, both the hardware and software are part of the product.

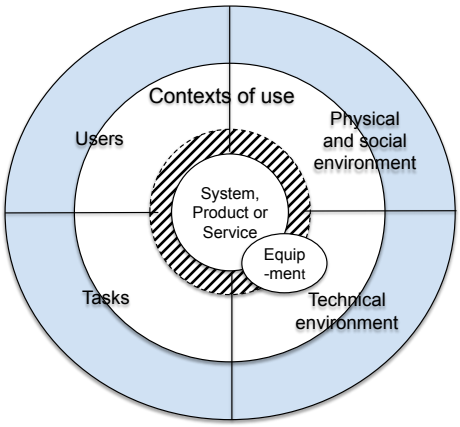

Fig. 1. Scope of the Context of Use

Figure 1 shows four categories of the context of use that can influence the usability of a system, product or service: Users, Tasks, a Physical and social environment, and a Technical and technological environment (including Equipment).

Although the context of use is most commonly used with the focus on designing or evaluating a system, product or service, any element can be the focus. For example when employing staff to operate an existing system, the focus could be on evaluating whether the staff have (or could acquire) the skills needed to operate the product in specific contexts of use.

5.2 What is the scope of the context of use?

It is important to decide the specific types of users, tasks and environments that are within the actual or intended contexts of use. In Figure 1, the outer shaded area represents the users, tasks and environments that are not part of the context in which the product is being or is expected to be used. The inner part is those contexts of use in which the product is used, or is intended to be used.

5.3 How many different contexts of use are there?

For how many different combinations of users, tasks and environments is the product or system being used, or intended to be used?

A context of use description can be of one instance of a context of use, or could include a range of contexts of use in which the product, system or service is used, or in which it is intended to be used. Different contexts of use are differentiated by subsets of user groups, tasks or types of environment that are known or judged to be likely to result in significant differences in usability. The overall context of use of interest will then be composed of a set of potential contexts of used defined by all the relevant permutations of the subsets.

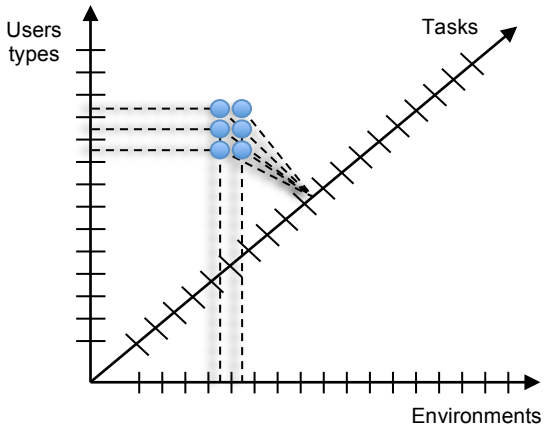

Fig. 2. Different Contexts of Use

This is illustrated in Figure 2 where from all the potential users, tasks and environments, three different user types carrying out a task in two different environments define six different intended contexts of use.

Usability may be different in each context of use. ISO/IEC WD 25022 describes context completeness (originally defined in ISO/IEC 25010) as the extent to which a product or system can be used with the required levels of effectiveness, efficiency and satisfaction (and freedom from risk) in each of the specified contexts of use. This quality characteristic is intended to be used to highlight the need to specify the required level of usability in each context of use included in a user requirements specification, and subsequently to provide a profile of the extent to which requirements have been met when evaluating the actual usability achieved in each context of use.

5.4 Which characteristics of the context of use should be described?

A detailed description of the context of use should identify all the attributes that will have a significant impact on usability, but descriptions of the context of use can become very long and complex if every characteristic of every attribute is described in detail. Only those characteristics of the context of use that are judged to be likely to affect usability need to be included, although it may also be useful to describe any other variations in characteristics that could potentially also affect usability. So for example when selecting participants to evaluate a product, previous experience of using the product, or another product with the same interaction style, may have a much bigger influence on usability than conventional demographics such as age, gender or education level.

Some user characteristics can be identified in different ways: either by describing the specific psychological, social, physical and sensory characteristics, or by identifying groups with specific tasks, job roles or demographics that are associated with particular characteristics.

Characteristics that will not affect usability need not be included (for example the temperature in an office environment that is within normal ranges). Making the judgement of which characteristics are likely to affect usability requires some expertise, and to conform to ISO/IEC 25063, an explanation of the basis for the judgement has to be provided.

6. Conclusions

The description of the context of use provides common information that is needed to help maintain a human-centred design focus within a project. It is intended for use in conjunction with the other information that is to be produced relating to human centred design. The description of the context of use is intended to be used as part of system-level documentation resulting from development processes.

Inadequate knowledge about the context of use can result in the development of products, systems or services that do not meet user needs, and evaluation results that

do not represent how a system will actually be used. The lack of a shared understanding of the context of use in development teams is a common failing in systems development ([14]). The ISO/IEC 25063 standard is intended to highlight the importance of describing the context of use, and to help ensure that appropriate information is included in descriptions of a context of use.

Additional Common Industry Format standards are planned for documenting other deliverables in user centred design:

- User needs report (ISO/IEC 25064)
- User requirements specification
- User interaction specification
- User interface specification
- Usability evaluation report (ISO/IEC 25066 under development)
- Field data report

These will complement the existing ISO/IEC 25062 Common Industry Format for Usability Test Reports.

If you would like to contribute to development of the Common Industry Format standards, or to comment on drafts, you can either do this via your national standards body [3], or if you are a member of one of the ISO TC159/SC4 liaison organisations [4] such as UXPA [16] you can participate through the liaison organisation.

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