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Universal design and standardisation – can user participation be standardized?

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Abstract. The background for this presentation is the adaptation of a new national standard for user participation in ICT in Norway in December 2013. The standard provides requirements for including user participation as a part of the different stages of the development process of ICT services and products. The article sets the content of the standard into a larger context of user participation theories, presents the role of standardisation as a tool for the objective of universal design both on national and European level, and presents some ideas about the practical use of a standard for user participation in the development processes in the field of ICT products and services, but also in other fields where inclusion of users' interests and viewpoints is relevant.

Keywords. standardisation, user participation, universal design, ICT

Introduction

The scope of this presentation is how standardisation can be a tool for universal design, and in particular how standardized rules for including user participation in a development process of goods and services in the field of information and communication technology (ICT) can contribute to ensuring that mainstream products are usable for all. The paper will present the basic theory of user participation as a democratic principle, briefly describe the history behind the development of methods for user participation, how standards are used as a tool for universal design and finally the main content of the new standard.

Standards are guidelines for how to implement for instance universal design in various fields, for instance the built environment, outdoor areas, ICT or transport. They may include a description of a product and requirements necessary to ensure it is universally designed and thus usable for all; or a process to ensure that the quality of universal design is achieved. Standards Norway launches four standards in late 2013 in the field of universal design. The topics are: making requirements for accessible formats for electronic documents; accessibility to self-service automats; accessible services and the topic for this paper, requirements to ensure user participation in development and production processes of ICT.

1. Definition of universal design

Universal design is a tool for creating a barrier-free society for all, and to combat discrimination in the shape of barriers against accessibility. In this connection it is important to have an overview of the population affected by indirect discrimination through society-made barriers – not only disabled persons like wheelchair users, but also persons with children prams, elderly people etc. Universal design is to everyone's benefit.

It is also relevant to differ between "universal design" – that is a design of built environment, outdoor areas, work places, means of transport etc. which everyone can use – and "accessibility" which is a less ambitious term and may be limited to measures taken for limited groups, for instance placing rails on a stairway for wheelchair users[1].

In Norwegian policy, the term of universal design is used increasingly, both in legislation, white books, reports and other policy documents. Also in standardisation, this is a term more and more frequently used and included in standards in different areas.

2. The notion of user participation

The idea of involving users in the testing out of products and services is not new, however a systematic approach to involving users also in the early stages of the value chain can be said to be of more recent date. There are several systematic reviews of the benefits of using user participation in for instance research and development[2]. However experience shows that user participation is not always understood by those responsible for projects because users are not given the opportunities to participate in them in a meaningful way, thus the participation of service users and beneficiaries is more symbolic than real.

Among the advantages of user participation that have been pointed out by the successful practitioners of user participation in various projects, a few can be pointed out:

- If users are involved this will also be a means of empowering them
- User participation yields an opportunity for users to learn new skills and confidence building
- Research can be shaped according to the needs and views of the market
- If well integrated in a project users can follow the progress of e.g. the research, address problems and provide useful feedback to the project
- User participation helps improving insights into the experience of the users, which is for instance useful when considering the potential impacts of approaches and techniques on beneficiaries. This also strengthens the competitiveness of the producers.

[1] The Norwegian Ministry of the Environment: *Universal design. Clarification of the concept*. The Norwegian Ministry of the Environment, Oslo 2007

[2] See for instance http://www.biglotteryfund.org.uk/about-big

Other experiences[3] point to the necessity of clarifying the roles and responsibilities of the users taking part in the project; and to understand the resources and support that might be necessary in order to ensure that users be able to participate in a full and efficient way.

The article "User participation in software development projects" by Ramanath Subramanyam, Fei Lee Weisstein and M.S. Krishnan from 2010 showed that while "developer satisfaction is imperative for systems development success, dissatisfied developers would adversely affect the quality of software as well as the productivity of development teams"[4]. The authors examined the relative effectiveness of user participation by empirically examining the perceived software project performance (for example, satisfaction) from both user and developer perspectives simultaneously. They concluded that user participation generates higher levels of both developer and user satisfaction with the final products as well as reducing what they called the perception gap between users and developers on project performance.

Another study by Sari Kujala[5] at the Helsinki University of Technology from 2003 concluded after an extensive review of research projects and literature studies that "user involvement is clearly useful and it has positive effects on both system effects and user satisfaction". Furthermore, the result of field studies and qualitative research suggest that developers experience that they get more accurate user requirements by involving users. The benefits of prototyping and iterative usability evaluation are clearly demonstrated, but it is more difficult to prove empirically the cost-effectiveness of user involvement in gathering user needs before a prototype exists". Especially, the early and continuous involvement of users is important during the whole process of development. However Kujala also points out that there is a lack of a clear definition of user participation which has been understood as anything from "focusing on users" to "consulting end-users" to "participation of users". The level of user participation can then be defined as being somewhere on the continuum from informative, through consultative to participative levels.

Involvement of users, or customers, to give feedback on products is of course an important part of quality management systems, like in the standard ISO 9001[6]. Here the topic of the determination of requirements related to the topic is raised as part of the customer –related processes. However, this discusses communication with customers, design and development planning, specifications made by, or not made by the customers but necessary for use, as well as monitoring and improvement, but not issues relating accessibility.

In Norway the organisations of disabled people, like the Norwegian Federation of organisations of disabled people, FFO, develop their own material to train members to take part in projects or established consultancy groups under the auspices of for instance hospitals. In their handbook for user representatives they define user participation as "when a user or a user representative enters into dialogue with politicians and/or service providers and offers his or her competence and/or the

[3] See for instance Application Solution Providers (ASP): User involvement. http://aspdd.com/news/development/user-involvement/ 2009

[4] Ramanath Subramanyam, Fei Lee Weisstein and M.S. Krishnan: *User participation in software development projects*. Communication of the ACM magazine, Volume 53 Issue 3, March 2010 http://dl.acm.org/citation.cfm?id=1666420.1666455

[5] Sari Kujala: *User involvement: a review of the benefits and challenges*. Behaviour and information technology 2003, vol.22, No 1, 1-16

[6] NS-EN ISO 9001: *Quality management systems – Requirements*, Standards Norway 2008

experience of others – to solve various societal tasks"[7]. They also quote from the Report to the Storting N 34 (1996-97) "Results and experiences from the Government action plans for disabled people and the way forward": "User participation means that those who are affected by a decision, or are beneficiaries of services, have influence on decision-making processes and the design of services".

Both these definitions are dealing with individual as well as organisation-based user participation. The organisations also have an interesting discussion on who "the users" really are. The term "user" is not a denominator for individual persons (very often a disabled person), but related to needing or using public or private services. They then define a user as a person who has, because of his or her disability, a special need for services or adaptation from public or private service and facility providers.

The history behind this understanding is to distance themselves from the negative associations connected with the terms of patients, clients and likewise. Still the term patient is often used about people using health services in legislation. The organisations divide user participation into three levels:

- User perspective
- Dialogue
- User control

User perspective is understood as the cases where authorities or services providers try to see things from the perspective of users, for instance "developing health services with prime focus on the patient". Such a perspective does not, however, give users an automatic right to state their interests. At this level "user perspective" can be an indirect type of user participation.

Dialogue means that two parts discuss matters with each other and listen to each other's viewpoints. This may also imply various degrees of real influence for users but the basic principle is that the users have their say, even if indirectly. User surveys are typical examples – either the user simply fills out forms and sends them or they are invited to develop the questionnaires or even interpret them. Another type of dialogue is hearings.

User control means that the users are the final decision makers, for instance user control of services. In Norway several user controlled centres of excellence have been established for disabled people. An evaluation in the late 90s concluded that this was something that should be used increasingly both on individual level (user controlled personal assistance) and on organisational level like the centres of excellence. However, the centres of excellence are today parts of the public services and users are part of their boards, rather than ultimate decision-makers. On the other hand the system of user controlled personal assistance on individual level has flourished and the present Norwegian government has pledged to establish this as a legal right[8].

Finally, the organisations also focus on user participation as a democratic right – pointing out that there are two vital aspects of democracy, the rule of the people by their elected representatives but also the importance that at any time it must be possible to have debates on important issues in society and political decisions. In such debates

[7] Norwegian Federation of Organisations of Disabled People: *Handbook for participant users from organisations of disabled people*. Oslo 2000 (Funksjonshemmedes Fellesorganisasjon: *Håndbok for brukerrepresentanter fra funksjonshemmedes organisasjoner*. Oslo 2000)

[8] Political platform for a Government of the Conservative and the Progress Parties. Sundvolden October 7th 2013. (Politisk plattform for en regjering utgått av Høyre og Fremskrittspartiet, Sundvollen 7. oktober 2013).

the affected parts must be heard, and a precondition for this is that everyone should have information of the issues concerned and the possibility of affecting the results or outcome of the issues at stake. The quality of democracy thus depends on the degree of participation from those affected.

2.1. The Fortune project

The FORTUNE project[9] was a European project carried out in 1997 with four European countries participating. The FORTUNE project had the objective of developing a concept for user participation in R&D, based on the concept of true partnership. The users were representatives of organisations of disabled people in Germany, Norway, Spain and Netherlands, to ensure support and strengthen their participation. A curriculum to train users was developed and study materials were elaborated. Disabled users were then trained and introduced to on-going R&D projects, to evaluate the validity of the concept[10].

The concept of the FORTUNE project described the characteristics of the ideal model of user participation as agreed in the FORTUNE project. It was a guideline on how to set up user involvement and can further serve as a reference model for comparison with real situations. Criteria and possible indicators were added to support this assessment.

Key principles of the FORTUNE concept were to have a basis in equal partnership, being indicated by the users' area of responsibility in R&D projects to establish their role and status in the project concerned; that users are to be appointed by, and representing organisations of disabled people; that user representatives receive equal pay according to their contribution and that all materials, buildings and other necessary equipment for participating in projects are fully accessible for all.

3. What is standardisation?

A standard can be defined as a description of important characteristics of for instance goods or services as well as working processes (including testing). A standard is also a proposal for selecting alternatives, but does not exclude other possible solutions.

As a method for standardisation there are normally several distinct stages, beginning with the definition of a new standard, which may be made by existing technical committees, national or European public authorities or others, defining a clear need for standards in the relevant field, and that the objective is clearly defined. Secondly, the project proposal must be accepted and the necessary resource found to finance the work, thirdly the standard itself has to be developed by the standardisation committee concerned. When the committee through a consensus-based procedure has decided the draft standard is ready for a public hearing, it is publicly presented in a two-months hearing procedure whereupon the committee evaluates the comments and includes the relevant inputs in the draft standard. After this procedure the standard is adopted and published, unless a second hearing is deemed necessary.

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[9] http://www.fernuni-hagen.de/FTB/fortune/new.htm

[10] Forschungsinstitut Technologie und Behinderung: *The Fortune curriculum on user training*, Wetter 1997 (http://www.fernuni-hagen.de/FTB/downloadables/curricul.pdf)

4. What is standardisation in the field of universal design?

The most well-known guidelines for standardisation committees on how to include accessibility requirements in standards is the ISO/IEC Guide 71/CEN CENELEC Guide 6, which provides advice to committees on different levels. It describes a process where requirements of elderly and/or disabled people are taken into consideration when developing standards, descriptions of bodily functions and human abilities and the practical consequences of disabilities and includes tables that bring together in a systematic way which issues are to be taken into consideration in the various points of a standard. This is in order to provide for all categories of disabilities. Finally it provides a list of sources where additional and detailed information can be found. The Guidelines are currently up for revision.

Standardisation in the field of accessibility and universal design contribute to achieve that the main solutions should be functional and accessible for all. It will thus reduce the need for special solutions, even if the need for such will never disappear completely. The principle should be that mainstream products should be as accessible as possible without special technical add-ons being necessary for persons with special needs to utilize them. The relationship between mainstream product and assistive technology can be illustrated as in Figure 1:

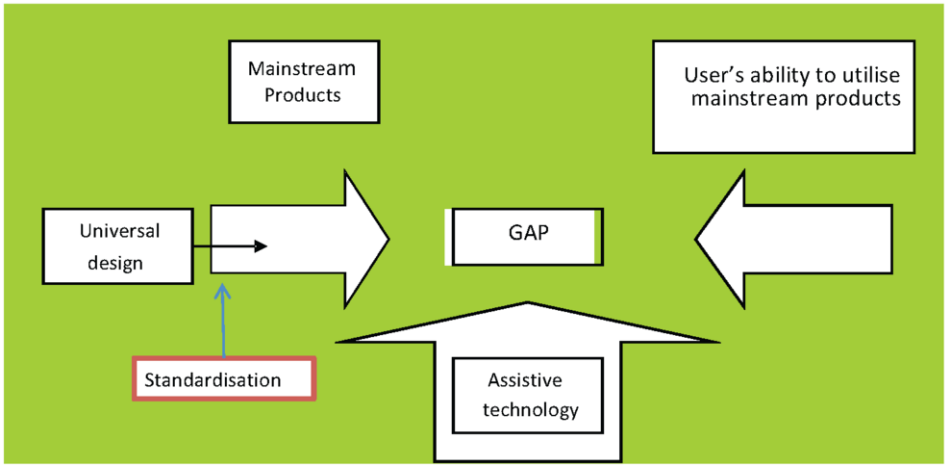

Figure 1. The relationship between mainstream products and the users' ability to make use of them, assistive technology and universal design (Rudolph Brynn).

5. Introducing Design for All (DfA) in mainstream standardisation

On a European level the European Commission is active in using standardisation as a tool to achieve accessibility. Briefly this is through issuing mandates to the European standardisation bodies. The most important mandates today are the Mandate M376 on universal design of ICT, which will result in a European standard EN ETSI 301 549 on universal design of ICT for public procurement in 2014; the Mandate M420 on

universal design of buildings for public procurement and the Mandate M473 on including universal design in mainstream standardisation where relevant.

Standards Norway was voted to manage the secretariat for the CEN BT WG 213, Strategic Advisory Group Accessibility (SAGA) which is to implement the EU Mandate M473 asking the ESOs to include a Design for All perspective in standardisation. The work is planned to result in a new methodology and practical tools to facilitate the inclusion of DfA in relevant standardisation activities. Also, a standard addressing how to implement a DfA approach into the development and production processes of goods manufacturing and services provisions will be developed.

The Commission has also emphasized accessibility as one of the key strategic objects for standardisation in their Annual Union Work Plan for Standardisation 2013.

6. The development of a standard for user participation - methodology

The Norwegian Standard NS 11040 Universal design – user participation and ICT is to be adopted in December 2013[11]. The standard provides requirements for including user participation as a part of the different stages of the development process of ICT services and products. Why the need for a standard on user participation in ICT?

Access to the Internet and to Information Society technology is of increasing importance to the European Union (EU). Lack of access to Web solutions and to receiving information means social exclusion, missing important educational and job opportunities and even having difficulties in exercising your democratic rights. There are more than 50 million persons with disabilities in the EU and European Economic Area (EEA) Member States today, and to this number may also be added elderly people who face various challenges in using the Internet and ICT related technologies.

Methodological approaches to end-user participation in ICT design, as well as in other areas are not in itself new, but to develop a formal standard to have a systematic set of process requirements is a new approach. Normal methods for user participation includes creativity processes, from describing and formulating a problem, acceptance of all individuals taking part in the process, openness and inclusiveness and the various techniques of "playing" with concepts and elements, like brainstorming, creative problem solving; task analysis (in the field of standardisation, the development of a mandate), observation of functions and problems being encountered by end-users; using questionnaires, interviews or group discussions or focus groups/user panels; trials and usability testing and other evaluation methods.

Having this in view the standardisation committee decided to develop a process-based standard (see point 8) based on a human-centered development process[12]. A model for the development process was established, involving planning and organizing a human-centered development process; understanding and specifying the context of use; specifying the user requirements; producing design solutions to meet the user requirements; evaluating the design solutions against the requirements and developing an ICT solution which meets the user requirements.

[11] Standards Norway: NS 11040 *Universal design – user participation and ICT*. Standards Norway 2013

[12] As described in NS EN ISO 9241-210:2010 *Ergonomics of human-system interaction – Part 210: Human-centered design for interactive systems* (ISO 9241-210:2010). ISO 2010

The early steps in such a process can be repeated as many times as is deemed necessary until the ICT solution is of satisfactory quality and meets the user requirements as established through the abovementioned methods. Participating users shall be involved in the process. The users shall be involved in several activities in each iteration, at least two activities is required. The standard recommends at least 2-3 iterations when developing new products, but acknowledges that this is determined by factors such as the type of ICT solution, whether it is a fully new solution or a new version of an existing one etc.

How to select participating users? The committee developed a principle for selection based on the role the participating users are to play in the process and aspects to take account for, like involvement from step 1 in the process described, how to achieve heterogeneousness and representativeness, how to safeguard the interests of those not participating and having full overview of roles, representation and competence of the participating users.

Roles includes participating on an individual or a system level, and the competences that the participating users represent in relevant areas, like in the use of assistive devices, in the relevant ICT solution, in the area of use or in degree and type of disability. Other areas like accessibility in the development process, ethics and privacy and equitable cooperation were also covered as part of the method.

7. What the standard is about

In the standard, user participation is defined as decision making processes and development of ICT solutions where the user (the person who uses the solution) has influence. The standard is thus about developing ICT solutions in a way that the process is carried out and adapted in such a way that as many as possible will be able to participate in an equal way. The target group for this standard includes developers, project leaders and service providers in the field of ICT, public authorities, people responsible for procurement, user organisations and others - but is also relevant for all others involved on a similar level in the development and procurement of goods and services where user involvement is relevant.

The notion of universal design signifies a stronger demand for equality than what is implied in the notion of accessibility for persons with disabilities. While accessibility for persons with disabilities can be achieved through special solutions, universal design requires that the main, or mainstream, solution shall fulfill the requirements of all users of the solution. Universal design of ICT shall not, however, exclude the use of assistive technology if that is the most adequate solution.

User participation is understood in the new standard as different degrees of participation of users or user representatives throughout the whole development process of an ICT solution. All types of beneficiaries from the ICT solution may be user participants, but in the standard we focus in particular on the interest requirements of persons with disabilities.

The standard presents requirement to user participation in order to achieve a relevant diversity of users. User participation is a necessary, but not adequate requirement to achieve universal design. It is also necessary to have knowledge of relevant accessibility standards in the field concerned. User participation is based on the competence of the users, which is deemed necessary to achieve good solutions.

User participation takes place in two levels:

- Individual level: individuals participate in the development process and represent only themselves
- System level: Representatives of user organisations or groups of users participate in various ways in the development process in order to represent the interests of these users
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- Individual level: individuals participate in the development process and represent only themselves
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The standard recommends that the users at the least participate on system level. They should have a good knowledge of the needs of the group they represent and it is also noted that users on individual level may represent a broader selection of competences, for instance beginners, non-users etc.

Users can also participate in different levels, like on an informative level, a consultative level or as co-decision-maker. Informative user participation means that the users provide the project with information; consultative participation that the users give advice and co-decision-maker level that they are part of the decision-making process for the project. It is also important to note that confidentiality is a part of user participation. The standard recommends that the users have a co-decision-making role it the project.

8. Use of the standard

The reactions from the public hearing of the new standard were very positive. The people commenting on the draft standard welcomed a systematic review of how to include user participation on a co-decision level in the whole development process, instead of just presenting future users with a more or less completed prototype for evaluation. Besides, user participation at an early stage of the development of goods and services ensures that there is less need for costly and time-consuming adaptations or even reconstruction of the products – just like universal design ensures that most people can use a product or a service without the need for special adaptations. As stated, the standard can be used beyond the ICT field, to ensure that other products as well are developed according to users' needs.

9. Conclusion

User participation is an important part of the work for equal participation in society at large, and the requirements affecting all states ratifying the UN Convention on the rights of persons with disabilities. However, in order to concretize the requirements a standard is necessary to make specific requirement to how to ensure user participation in all phases of a development process in order to ensure a solution that is usable for all concerned.

The best tool to achieve this will be a standard developed through a consensus-based process where all interested parties have had an opportunity to make inputs to the document and its requirements. Therefore it is our objective that the standard on user participation will contribute to make more use of the systematic process of user participation in future development processes and as a requirement from authorities responsible for procurement of ICT related products and services.

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Relevant websites

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