“User Sensitive Inclusive Design”

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ABSTRACT

The concept of Universal Usability is an important one, and requires researchers and designers to consider all potential user groups of systems, including minority groups such as people with disabilities. Unlike ethnic minorities and economically disadvantaged people, however, including people with disabilities may have a major impacts on the design of the interfaces and functionality of systems. This paper will thus discuss the extension of User Centred Design into the development of a new paradigm: “User Sensitive Inclusive Design” which enables designers to include people with disabilities within the potential user group in an effective and efficient way.

Keywords

User Centred Design, Universal Design, Disability.

Universal Usability.

A number of initiatives have been launched to promote a consideration of people with disabilities within the user group in product development teams with titles including: “Universal Design”, “Design for All, “Accessible Design”, and “Inclusive Design”[6,7,19,20]. Newell [10,] also proposed the concept of "Ordinary and Extra-ordinary human-machine interaction, which focussed on the relationship between the functionality of users and the environment in which they may operate. This drew the parallel between "ordinary" people operating in an "extraordinary" environment (e.g. high work load, adverse noise or lighting conditions), and an "extra-ordinary (disabled) person operating in a ordinary environment. It made the point that the characteristics of both the environment and the users’ functionality can change substantially from minute to minute, from day to day, and there are very long term changes due, for example, to ageing and physical changes in the physical environment and social situation [11,13]. Newell said that designers need to be explicitly aware of these concepts and understand how they can be used to the greatest benefit of everyone, including people who are either temporarily or permanently disabled. He also noted that designing with Universal Usability in mind has more advantages than simply increased market share [12].

Interest in this theme is growing rapidly and, for example, the National Science Foundation mounted a workshop with the theme of “Every Citizen Interfaces to the National Information Infrastructure” [3], which laid out a research strategy for the Science and Engineering Community in the USA, and, in November 2000, ACM’s special interest group on Computer Human Interaction hosted a Conference on Universal Usability in Washington DC, at which methodologies were considered to increase the accessibility of software and systems to disabled and disadvantaged people [14].

User Centred Design

The User Centred Design methodology [5,15,16,17] is designed to enable developers focus on the users as the heart of the design process. It should be possible to involve people with disabilities within the normal part of such design process, and this would additionally give disabled people the dignity of being treated in a similar way as any other users of products. Currently, however, there tends to be (possibly artificial) distinctions between:

- Mainstream design (which often seems to be exclusively for able-bodied people),
- The design of systems exclusively for people with disabilities (sometimes called “orphan” products) and
- The so-called design for all/universal design approach.

In addition there are specific challenges when people with disabilities are part of the formal user group within a product development environment [1,2,18]. These include:

Published in:

JIM 2001 Interaction Homme/Machine & Assistance (4/5/6 July, France 2001) pp.18-20.

- It may be difficult to get informed consent from some users,
- The users may not be able to communicate their thoughts, or even may be "incompetent" in a legal sense,
- The user may not be the purchaser of the final product,
- Payments may conflict with benefit rules,
- Users with disabilities may have very specialised and little known requirements,
- Different user groups may provide very conflicting requirements for a product,

Many of these characteristics do exist in mainstream design, but there can be difficult ethical problems when involving users with disabilities in the design process [1]. In addition, the involvement of clinicians may also be needed when users with disabilities are involved.

Involvement Of Disabled Users In Dundee's Research

At Dundee, users with disabilities have a substantial involvement in the research [2,4], and they have made a tremendous contribution both to the to the research and to the commercial products that have grown from this research. There are two major ways in which users are involved in research at Dundee:

- As disabled consultants on the research team, where they act essentially as "test pilots" for prototype systems [8,9], and
- By the traditional user centred design methodology of having: user panels, formal case studies, and there are also many individual users who assess and evaluate the prototypes produced as part of the research.

The contribution made by clinicians is also vital to this research, and these are full members of the research team. Dundee's Applied Computing Department is one of the few Computing Departments which has employed speech therapists, nurses, special education teachers, linguists and psychologists.

User Sensitive Inclusive Design

The "Design for All" / "Universal Design" movement has been very valuable in raising the profile of disabled users of products, and has laid down some important principles. In its full sense, however, except for a very limited range of products, "design for all" is a very difficult, if not often impossible task, and the use of term has some inherent dangers. Providing access to people with certain types of disability can make the product significantly more difficult to use by people without disabilities, and often impossible to use by people with a different type of disability. Also the need for accessibility for certain groups of disabled people might not be required by the very nature of a product.

There are some important distinctions between traditional User Centred Design with able-bodied users, and UCD when the user group either contains, or is exclusively made up of, people with disabilities. These include:

- Much greater variety of user characteristics and functionality,
- The difficulty in finding and recruiting "representative users",
- Possible conflict of interest between accessibility for people with different types of disability,
- Conflicts between accessibility, and ease of use for less disabled people ("temporary able-bodied"), e.g. floor texture can assist blind people but may cause problems for wheel chair users,
- Situations where "design for all" is certainly not appropriate (e.g. blind drivers of motor cars),
- The need to specify exactly the characteristics and functionality of the user group,
- Provision for accessibility via the provision of additional components

Thus some significant differences must be introduced into the User Centred Design Paradigm, if users with disabilities are to be included. In order to ensure that these differences are fully recognised by the field, it would be appropriate if the new methodologies which must be developed were entitled "User Sensitive Inclusive Design" [14]. The use of the term "inclusive" rather than "universal" reflects the view that "inclusivity" is a more achievable, and in many situations, appropriate goal than "universal design" or "design for all". "Sensitive" replaces "centred" to underline the extra levels of difficulty involved when the range of functionality and characteristics of the user groups can be so great that it is impossible in any meaningful way to produce a small representative sample of the user group, nor often to design a product that truly is accessible by all potential users.

In addition, researchers need to consider how best to promulgate the concepts behind Universal Usability and the results of User Sensitive Inclusive research. User Sensitive Inclusive Design needs to be an attitude of mind rather than simply mechanistically applying a set of "design for all" guidelines. This offers a further challenge to the community, and Newell has suggested a narrative approach to this challenge, as being more likely to influence designers than adding to the current extensive and very useful sets of guidelines that already exist [14].

Conclusion

The development of the concept of, and a methodology for, User Sensitive Inclusive Design will facilitate researchers in the field to develop better specialised equipment, and also provide mainstream engineers with an effective and efficient way of including people with disabilities within the potential user groups for their projects. If we can do both of these, we will have achieved a great deal towards providing appropriate technological support for people with disabilities in the future.

References

1. Alm N. (1994). "Ethical Issues in AAC research" in "Methodological Issues in Research in Augmentative and Alternative Communication" eds Brodin,J & Ajessibm E.B. (eds) Proc. Third ISAAC Research Symposium. Jonkoping, Universty Press, Sweden pp 98-104
2. Balandin S. & Raghavendra, P (1999). " Challenging Oppression: Augmented Communicators' involvement in AAC Research" in Augmentative and Alternative Communication, new directions in research and practice" ed. Loncke, F.T., Clibbens,J., Arvidson, H.H. & Lloyd, L.L. Whurr, London.pp262-277
3. Beirmann, A.W. (1997). "More than Screen Deep - "Towards an Every-Citizen Interface to the National Information Infrastructure", Computer Science and Telecommunications Board, National Research Council, National Academy Press, Washington D.C. 1997
4. Gregor P & Newell A.F. (1999) The application of computing technology to interpersonal communication at the University of Dundee's Department of Applied Computing, Technology and Disability, 10 (1999) pp 107-113
5. Helander, M., Landauer, T.K. and Prabhu, P.,(1997). (eds), Handbook of Human-Computer Interaction, Elsevier Sci. BV, (ISBN 0 444 81862 6) pp 813-824.
6. Hypponen, H., (1999). The Handbook on Inclusive Design for Telematics Applications, Siltasaarenkatu 18A, 00531 Helsinki, Finland.
7. ISO 13407:1999(E). Human-centred design processes for interactive systems, International Organisation for Standards.
8. McGregor A., & Alm N., (1992). Thoughts of a non-speaking member of an AAC research team. Paper delivered to the Sixth International Conference, International Society for Augmentative and Alternative Communication. Philadelphia. Abstract published in Augmentative and Alternative Communication. August 1992.
9. McGregor, A., (1995). A voice for the future. Proceedings of the European Conference on the Advancement of Rehabilitation Technology (ECART '95). 10-13 October 1995, Lisbon. Lisbon, Portugal : National Secretariat of Rehabilitation. pp 127-129.
10. Newell, A.F., (1995), Extra-ordinary Human Computer Operation, in "Extra-ordinary Human-Computer Interactions" by A. D. N. Edwards (Ed.), Cambridge University Press 1995
11. Newell, A.F. & Gregor, P., (1997). Human computer interfaces for people with disabilities, in Handbook of Human-Computer Interaction, Helander, M., Landauer, T.K. and Prabhu, P. (eds), Elsevier Science BV, (ISBN 0 444 81862 6) pp 813-824.
12. Newell, A.F., (1998). Assistive Technology Research and Techological Development. In Improving the Quality of Life for the European Citizen, eds Placencia Porrero, I, & Ballabio E. Assistive Technology Research Series, Vol 4, IOS Press, Amsterdam, pp xlvii – liii.
13. Newell, A.F. & Cairns, A.Y., (1993). Designing for extra-ordinary users, Ergonomics in Design, Oct 1993, 10-16
14. Newell A.F. & Gregor P., (2000) "User Sensitive Inclusive Design – in search of a new paradigm, Proc A.C.M. Conference on Universal Usability, Washington, DC Nov. 2000, pp39-44,
15. Nielsen, J., Usability Engineering, (1993). London Academic Press
16. Preece, J., (1994). A guide to usability – human factors in computing, Addison Wesley & Open University.
17. Shneiderman, B., (1992). Designing the user interface: strategies for effective human-computer interaction. Addison-Wesley Reading, Massachusetts 1992.
18. Sleeman, K.D., (1998). Disability's New Paradigm, Implications for Assistive Technology and Universal Design. In Improving the Quality of Life for the European Citizen, eds Placencia Porrero, I, & Ballabio E. Assistive Technology Research Series, Vol 4, IOS Press, Amsterdam, pp xx – xxiv.
19. Stephanidis, C., (2001) User Interfaces for All. Lawrence Erlbaum Assoc. London.
20. Websites focussed on Universal Design include: http://www.design.ncsu.edu/cud/ud/ud.html, http://www.stakes.fi/include http://www.trace.wisc.edu, http://www.w3.org/WAI.