Design for All – from Idea to Practise

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Abstract. Design for all (DfA) is on the agenda of research for more than 10 years. It is to be seen as a complement to concepts like assistive technology and barrier free accessibility in a continuum of solutions. After several national policy actions around the globe, recently on international policy level, in the "UN Convention on the Rights of Persons with Disabilities", reference has been given to Universal Design, a concept closely related to DfA. However, the level of take up of DfA in the design processes of industries and services stays behind the expectations. The idea has obviously been welcomed as a good one, but the implementation shows slow progress. The current development consists of threats and challenges towards a successful implementation of DfA and the market opportunities connected. "What are the key elements, what are the actions needed, which could be the next steps" are the kind of questions to be answered in order to conclude with a DfA roadmap and reflected in this paper.

Keywords: Design for all, Universal Design, Inclusive Design, Design-for-all-process, European 3-strategies approach, variety of user requirements, continuum of solutions.

1 Introduction

Barrier-free accessibility has been considered as an important issue (not only) by organisations of people with disability. Different actions have been undertaken to address and overcome the very many barriers. Design philosophies such as barrier-free design, accessible design, Design-for-all, universal design, inclusive design, have been developed for tackling access issues in a meaningful way. However, accessibility or universal accessibility based on the traditional understanding of disability is giving only the starting point for Design-for-all. Instead of disability and age, Design-for-all fosters diversity, and instead of special social action it fosters mainstreaming. It is the intention of Design-for-all to reflect a new concept for design which attempts to accommodate the broadest possible range of human abilities, requirements and preferences in the design of all products and environments. Thus, it promotes a design perspective that eliminates the need for "special features" and fosters individualisation and end-user acceptability [6]. The goal is to consider the requirements of all users in the design process and to develop a solution which is

suitable for all users. At the same time, one would fulfil the requirements of each individual and reach the largest market possible. Design for all, therefore includes both, a social and a market component [2,4,17].

As an important issue the interdependence of user, environment, and time - in other words situations, circumstances and conditions - is added or at least made obvious from the perspective of universal design [28]. Besides the diversity of the users, the Design-for-all needs to reflect the broadest range of situations and circumstances, i.e. environments and temporarily changing conditions of use. In the context of the eEurope initiative Design-for-all consists of three principal strategies [13]: Design of products, services and applications, which are either demonstrably suitable for most of the potential users without any modifications or which are easily adaptable to different users (e.g., by incorporating adaptable or customisable user interfaces); or which have standardized interfaces, capable of being accessed by specialised user interaction devices. Design-for-all is here seen as an important complement to Assistive Technology. The basic idea of Design-for-all is to produce products and services in a way that as many as possible can use it directly or with the help of assistive technology.

The Design-for-all strategies are of particular value for information society technologies, which change at very high speed. Most of the all citizens are among the users; and these products and services can help to overcome traditional barriers of everyday life. With the origins in accessibility of the built environment and research actions in assistive technology [3,19,20,22], Design-for-all has meanwhile been adopted as a concept for the information societies around the globe. Stakeholders in the field are encouraged by administrations and governments on national and international level to develop, disseminate and employ the concept of Design-for-all. It is now important to convince the potential players to take up the concept for implementation according to their responsibilities: politicians, administrators, company leaders, developers, engineers, designers, educators, and association leaders constitute only examples of the group.

2   Design-for-All Implementation and Management

The Design-for-all concept is available for a notable period of time, but the market penetration is still rather low. Most design considerations are still based on a standard user and a business concept targeting specific user groups. There is low awareness about the business potential of DfA products. Design-for-all is accepted as a good idea on a general level, but it often fails to step over into the strategies and design considerations leading to products and services. Obviously, a goal oriented management is required from the conceptualisation of Design-for-all to its implementation in products and services in different areas.

Recent policy strategies combine voluntary and mandatory actions. Governments have funded research projects, support actions [8,9], elaboration of standards, award schemes, monitoring procedures, benchmarking and enacting of legislation [14,15,16]. That has led to action plans, the creation of national and international networks [11,15,23,25,26, etc.], and arrangement of symposia and conferences. The regulation of public procurement with respect to accessibility requirements has been a

measure e.g. in the USA [27]. In the EU a procurement toolkit [10] is under development, which will involve criteria on accessibility in the application and selection process. The EU has launched also a number of mandates to the European standardisation organisations CEN, CENELEC and ETSI with respect to accessibility requirements and Design-for-all [16]. As Design-for-all is seen more as a business case, mandatory action to enforce Design-for-all seems not appropriate. However, mandatory action on accessibility requirements (as a social action) can enforce Design-for-all solutions as a market reaction and business strategy [e.g. 1,28]. And here the users as a market force have a particular role with their own purchase power. It is expected that in the ageing markets (accessible) Design-for-all products will have a competitive advantage. It is therefore most convincing if user organisations like ANEC, organisations of older people and organisations of people with disabilities campaign for Design-for-all.

Umbrella organisations of branches of industries have started activities for their members related to accessibility and ageing creating working groups, workshops, providing guidelines, reacting on governmental initiatives, perform education and training of staff. An example of a commercially oriented initiative of companies in Japan has been started in 1999 to support the production and marketing of "Kyoyohin" products. Kyoyohin and Kyoyo services are designed to be used by as many people as possible, including the elderly and those with disabilities. It is strongly market oriented and considers the benefits for the companies in a growing market of Kyoyohin products.

Several companies have already decided to adopt Design-for-all (or universal design including accessibility) as part of the company policy. Typically such adoption starts with a general high level decision leading to a statement in the overall strategy of the company, to make products for as many people as possible including the idea of diversity and more specifically people with disabilities and of higher age [e.g. 21,24]. For an actual implementation it needs to be enforced within the company through education, design guidelines, change of procedures and change of quality definitions and control. It is very important to establish a Design-for-all management in order to give Design-for-all requirements serious weight among other lines of the company policy.

Another approach to support all people on brand level is to put different options into different devices or services. If e.g. a company produces mobile phones not necessarily each and every product needs to have a functional range suitable for all. Instead, at least one phone out of a product family should cover a specific functional range, where all phones together cover the functional range for all. This strategy is not Design-for-all in a strict sense, but a feasible solution if considered seriously.

It is indeed rather complicated to transfer the Design-for-all design philosophy into concrete characteristics on a technical level in specific size, weight, or other technical data. Users are different from each other, the variety of situations and conditions of use is broad and technology is changing quickly. Therefore, on the product level itself, the Design-for-all management needs very much to focus on the diversity of user needs in a rapidly changing technical environment. In the following the focus on users is described as a continuous process in the product lifecycle.

3   Design-for-All as a Process

Figure 1 visualises the process of DfA in three major feedback loops. A product is commonly considered as the result of a development and design process, produced and sold. In case of Design-for-all user participation plays a key role [5]. The product characteristics need to be elaborated in a continuously controlled comparison of product intention and user requirements.
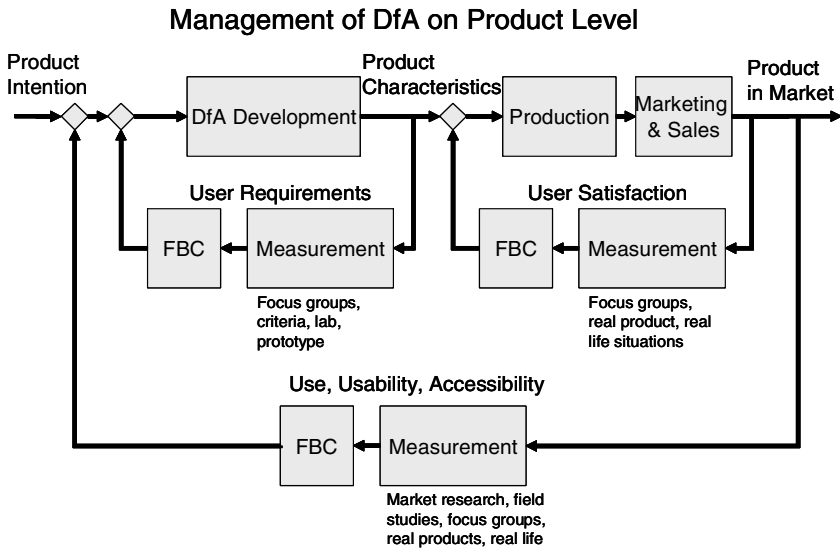

Fig. 1. Shows a cascaded feedback loop structuring the management of Desig-for-all on product level

Typical approaches to the measurement of user requirements are questionnaires, focus groups based on drafts of non-functional mock ups, user tests with prototypes in laboratory environments, etc. User feedback is also the main focus of the second loop. Here, the fully functional product is already existing and available. It is now possible to compare the satisfaction of users based on the use of the real product in a continuously controlled way with the product characteristics. The product on the market can be improved with each new production run, but basically without changing the product intention and characteristics. The measurements in the third loop are taken in the actual market environment on a larger scale. The use of the product, comparison with alternative products, product usability and accessibility are aspects of this measurement.

4   Design-for-All and the Variety of User Requirements

The quality of the Design-for-all product comprises the quality of use of different users in a large variety of situations. In the three loops the feedback of user

experience and user opinion is very important. It is mandatory to consider different abilities of the users as proposed in the "product design ideas browser" [http:// trace. wisc.edu/docs/browser/]. Lists of criteria for different disabilities and application domains can help to get an understanding of potential problems. Experts in usability, psychology, disability might help to identify requirements, too. However, it always needs to be accompanied by interaction with the users themselves. The immediate contact of users and staff in design/ development/ marketing provides deeper insight and is much more authentic than the statements of experts. The choice of environment scenarios is also a crucial task. Instead of concentrating on a fixed scenario like in a laboratory, variations of the conditions of use are required. In the end the Design-for-all product or service needs to be competitive in terms of quality of the solution and the market price. This consideration is taken up in the market orientation of the universal design and especially in the European "three strategies approach.

5   Design-for-All Awareness and Training

Technology has a great potential to support people with disabilities. In this respect, it means more than just to carry out daily tasks supported by technology without human assistance. Technology can empower self determination, decision making and can also facilitate participation in society and improve quality of life. Technology in the information society gains the special connotation of information, knowledge transfer, communication and remote action in eGovernment, eBusiness etc. The relevance of technology for the employability of people is particularly high. Without access to modern Information Society Technologies people become excluded from job opportunities. On the other hand the use of technology provides new job opportunities for people with disabilities [7,8]. Design-for-all provides solutions for direct access in the mainstream. Assistive technology as the modern concept of rehabilitation technology deals with products and services to enable people to use general premises and mainstream technology. Design for all and assistive technology are complementary elements in a continuum of solutions. Users need to select an appropriate combination of Design-for-all and special solutions to match their needs. The overall management issue of the policy level is to make sure that this continuum of solutions - either in the mainstream or as special solution - is provided for the users on good quality level and in an economical way. In the international and national contexts it is important to raise awareness about this potential of technology:

- the options need to be made available in the countries;
- the public awareness for the social and general benefit need to be increased;
- the (scarce) resources need to be spent optimally;
- the mainstream and special sectors shall be stimulated to more innovation in the field of Design-for-all and assistive technology;
- the academic education sector shall provide awareness and knowledge about the concept to students as the future key players.

Education can indeed make the difference. It is crucial to integrate Design-for-all in the curricula of economics, engineering, computer science, architecture, industrial design, rehabilitation science, social science etc. All the disciplines need to be educated for future joint efforts towards Design-for-all. A clear understanding of the idea, the methodology and the benefits of Design-for-all already at high school and university level, will create a knowledge transfer with the next work generation. It is up to the policy level to encourage schools, universities and other educational settings to take up Design-for-all in their courses. The support of networking, research, development of teaching material and its provision free of charge is a typical portfolio for public action.

Inside the companies the level of education on Design-for-all is a central factor for successful implementation. Awareness raising, further education and training of existing staff and selection of educated employees are the main roads to follow. Many companies run further education schemes inside the company. The education and training on Design-for-all shall be integrated in such schemes. It is of strategic importance to include the company's key players who represent the major driving force in the company development.

6   Conclusion

Design-for-all provides a high potential as well for company economics as for social economics. The current slow take up of the concept can be sped up by targeted management activities on different levels. Many of the current activities in Design-for-all are actually a result of legislation and regulation related to barrier free accessibility. Public procurement rules seem to be an important means in this respect. A second public driving force is the awareness about the demographic change connected with a change of the future markets. A third important public responsibility is the Design-for-all education at schools, high schools and universities. Activities like Design-for-all networking, Design-for-all information platforms, Design-for-all research engineering centres, Design-for-all award schemes, Design-for-all research, public procurement guidelines, etc. with public support provide a platform for further take up.

At the commercial and industrial level, strategies for accessibility connected with Design-for-all have led to significant improvements in some sectors and companies. Best practice starts by the take up of accessibility and Design-for-all in the company mission profile. The actual implementation follows through a detailed planning and introduction of Design-for-all processes at the different levels of the company. Education in Design-for-all comprises a core element of successful Design-for-all management.

The further development and uptake of Design-for-all will probably take more time and effort. The changing demography – ageing societies - around the globe will finally convince mainstream players to go for Design-for-all. It can be expected that those starting early will have a competitive advantage.

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