

# Ergonomics and Design for All: an IEA international round table

During the first day of the Human Factors NL conference on ergonomics, organized by the Dutch organization Human Factors NL (Amersfoort, 24 and 25 November 2016), a round table discussion on Ergonomics and Design for All took place, chaired by the IEA TC Ergonomics in Design for All. This event was co-hosted by the Federation of European Ergonomics Societies (FEES) and the Centre for Registration of European Ergonomists (CREE). The round table discussion consisted of various expert talks on different aspects of the Design for All concepts ranging from applications in the built environment to the health care sector. This article presents in a nutshell their contributions.

## Building a common base of understanding

**Isabella T. Steffan** studio Steffan-Design and research, Milano, introduced the topic: 'Key words for Design for all are diversity, interaction, participation'

The ergonomic approach and in particular the User/ Person Centred Design approach, that places the human being at the centre of the creative process, assumes the evaluation of the specificity of the environmental conditions in which the interaction between man and system occurs. What causes a situation of handicap? The lack of ability is a handicap only if the project has not taken it into account.

The EU definition of DfA of 3 December 2001 states: "Design for All means designing, developing and marketing mainstream products, services, systems and environments to be accessible and usable by as broad a range of users as possible." This can be achieved in three ways:

1. by designing products, services and applications that are readily usable by most potential users without any modifications,
2. by designing products that are easily adaptable to different users (e.g. by adapting their user interfaces), and
3. by standardising interfaces of products to be compatible with specialised equipment (e.g. technological aids for disabled persons)."

Design for all has been developed in the latter part of the 20th century as an approach to design which is essentially inclusive of wider human requirements rather than following the maxim of 'designing for the average user'. The approach has been elaborated and promoted in Europe through research and development in the fields of architecture and the built environment (e.g. adaptable housing), industrial design of everyday products for older people, and more recently in Information and Communication Technologies (ICTs) for disabled and elderly people."

The International Ergonomics Association (IEA), is the coalition of the Federated Societies. There are 27 Technical Committees set up as ad-hoc committees which serve as a platform to exchange up-to-date information on and discuss a particular field of ergonomics. Several years ago, Isabella T. Steffan proposed to IEA to establish a TC on the topic 'Design for All', which was founded in March 2006, as the IEA TC EinDfA (Ergonomics in Design for All). Its goal is to promote ergonomics in the process of Design for All, which is sometimes also referred to as Universal Design or Inclusive Design. Isabelle Steffan (Italy) was appointed chair of this TC, the co-chair is Ken Sagawa (Japan). One of the many activities to promote this crossing and strategic field of applied ergonomics and to share knowledge and opinions within the community of ergonomists, was the round table discussion during the congress on ergonomics organized by Human Factors NL in collaboration with the FEES and CREE.

**Alexander Rosemann**, Professor for Building Lighting at the Department of the Built Environment of Eindhoven University of Technology, focused his introduction on the topic on lighting aspects.

Carrying out tasks requires visual performance which itself influences not only the task performance but also our cognitive and motor performance. The visual performance depends on factors such as size of the visual tasks and the (colour) contrast.

There are standards providing recommendations for lighting. The European standard EN 12464-1 recommends performance values such as the maintained illuminance, the uniformity of illuminance, the maximum Unified Glare Rating (UGR) and colour rendering properties. The standard also supports the daylight harvesting, i.e. the use of daylight in buildings. These recommendations are often applied in the lighting design process. Once all quantifiable recommendations are met, the lighting design is regarded complete. But the main goal for good lighting design is to provide lighting serving the needs of the user: human centric lighting. This requires smart lighting solutions. The goal of lighting design for all is to provide good quality lighting for all users when they need it where they need it.

#### **Policy application for accessibility and participatory tools**

What are methods and tools in design, development and evaluation? Standards are very important to address designers, decision makers, and ergonomists.

**Jan Doornbusch**, Member of the Dutch Human Factors NL, described the CEN-CENELEC Guide 6 and how it can address ergonomists involved in standardisation. Changed attitudes in society allowed establishing a guideline for designers in 2002: the Guide 6. The objective of this guideline is the accessibility of public spaces for older people and people with disabilities. The Guide 6 consists of 7 tables, each dealing with another focus, for example information, packaging, user interfaces, buildings, etc. and focuses on sensory, physical, cognitive abilities and allergy in combination with 'factors to consider' like alternative format, layout, colour, loudness, surface temperature, etc. Ergonomists who apply this Guide 6 will make a valuable contribution in design processes and their result for people with disabilities.

**Harald Weber**, Deputy Director of the Institute of Technology and Labour (ITA) of the Technical University of Kaiserslautern, Germany, confirmed that Design for All aims at delivering products, services and environments accessible and usable to the widest possible range of users. In order to safeguard functional but particularly non-functional quality attributes -

such as usability -, user involvement is essential throughout design and development, but also in evaluation. User involvement, however, is considered expensive, time-consuming and complicated. It is therefore often reduced to a minimum. But experience highlights that the need to rework/adapt products, services or environments later in the design process or once they are already on the market to make them fit to the user groups is more expensive, than addressing them earlier in design and development. Hence, the users to be involved need to be representative for the wide spectrum that Design for All caters to. Typical methods and tools for user involvement are mostly designed for able-bodied users. Obviously, the involvement of users, which in itself is already considered an expensive and time-consuming phase in design and development, becomes more complicated when taking users with disability into full consideration. But without involving these groups equally, their needs are - again - not fully taken into consideration, and hence designers are at risk to perpetuate the exclusion of users with disabilities due to insufficiently designed participation methods, tools and processes.

#### **The role of Ergonomics/Human Factors in the design innovation process towards Design for All.**

**Hidde van der Ploeg**, Associate Professor at the Department of Public and Occupational Health, VU University Medical Centre Amsterdam, introduced a typical issue for Ergonomists, related to work and health. Sedentary behaviour is defined by the Sedentary Behaviour Research Network as activities that are done sitting or reclining and cost  $\leq 1.5$  times the basal metabolic rate. Sedentary behaviour is distinctly different from physical inactivity. Systematic reviews of epidemiological studies show that sedentary behaviour is negatively associated with a range health outcomes, including type 2 diabetes and cardiovascular disease. Individuals are strongly recommended to comply with WHO physical activity recommendations, but in addition individuals who sit a lot are also encouraged to reduce the time they spend sitting down. As meeting physical activity recommendations is already challenging for many people, replacing large portions of sedentary behaviour with moderate to vigorous intensity physical activity does not seem feasible for most people. Alternating sitting, standing and other light intensity activity as well as moderate to vigorous intensity physical activity throughout the day seems to be the solution to reducing sedentary behaviour and its detrimental effects on health. However, people who are wheelchair bound are at risk more than others. Strategies to reduce sitting time are needed and might be challenging for certain job types such as pilots and truck drivers, and also for people with low mobility such as wheelchair bound individuals.



**Richard H.M. Goossens**, Coordinator Healthcare Program, Head of Department Industrial Design, Delft University of Technology Faculty of Industrial Design Engineering argued that ergonomics is an important part in the design of products and services in healthcare, and the patient journey gives the designer the broad scope that is needed and must be kept throughout the design process. When innovating for healthcare the designer has to take into account that healthcare is a complex environment with different actors and interdependences. An actor can be seen as a person or a product or a product-service system that contributes to the health and wellbeing of a person. Since all of these actors contribute in some way, it is important for innovators to have a broad overview of the problem, in which all the contributors to healthcare are mapped and taken into account. A good way to do that is look at different phases of the disease and then monitor all the actors that are met during that phase. In all these phases the patient will meet informal caregivers, general practitioner, orthopaedic surgeons, nurses, anaesthetist, radiologists, and physiotherapists. And all these points of contact are opportunities for innovations.

### Conclusions

The round table discussion on the topic "Design for All" was considered a huge success. With its 70 participants, the round table discussion reached a good audience and also allowed for interesting exchange of thoughts and discussions. The participants came from many different countries which show that the topic of Design for All is relevant to many within the IEA.

The round table provided design-related topics within a broad range of application domains ranging from the built environment via product design to the health sector. It does not only address products but also services and procedures. This issue has been recognized by international standardization organizations and found its way into recommendations such as the CEN-CENELEC Guide 6.

Having a standard in place has been an important and huge step towards to goal of implementing the principles of Design for All. But this step marked the beginning of a journey and not its end. There are many challenges lying ahead of us such as:

- Ensure the broad application of standards such as the CEN-CENELEC Guide 6 and related European mandates.
- Continue to provide guidance and direction to relevant stakeholders
- Identify further application domains for Design for All
- Collaboration in Public Private Partnerships to develop solutions following the Design for All approach
- Support knowledge generation and transfer.

Design for All is a concept in the field of ergonomics that support human centered design. As new technologies make it to the market faster than ever, it is even more important to implement them in such a way that all can benefit from it. The range of topics and the active participation of the audience during the round table discussion on Design for All have shown that this topic has the attention it deserves. This left no doubt that the ultimate goal of the IEA TC EinDfA must be to establish 'Design for All' as a generally accepted and applied methodology in the process of designing for products, services and processes.

### References

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