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## **THE CHALLENGES IN UNIVERSAL DESIGN**

*Tom Vavik and Rama Gheerawo*

### **CONTEXT AND BACKGROUND**

We all have different capabilities and abilities, and these can be influenced by a number of factors including age, gender, lifestyle, genetic heritage and personal aspiration. However, the designed world around us does not generally take account of this wide diversity. Designers often find it easier to design for themselves, to their own aesthetic values and to their own likes and dislikes, and this often leads to design exclusion (Moggridge, 2001). This exclusion can be primarily based on our ability and this can be divided into three main categories: sensory, cognitive and motor. Sensory capabilities include vision, hearing and touch; cognitive capabilities can be divided into thinking, recognizing, processing and communication; and motor capabilities comprise locomotion, reach, stretch and dexterity (Clarkson et al. 2007). In addition, other aspects such as the surrounding environment can also affect personal ability as the rise in asthma and allergies in reaction to increasing pollution demonstrates. Psycho-social competency and other facets of neuroscience also influence our individual abilities and preferences.

However, our capability does not remain at the same level throughout life. We will all experience disability whether it is temporary, as in a broken arm, or permanent, as part of the natural ageing process. New knowledge and strategies in design are therefore required to improve the quality of life through better usability, independence and access for people with a range of abilities. Central to this is direct understand-

ing of the end users' needs and experiences and the development of systematic ways of working that result in user friendly solutions. Designers need to leave their studios and actually meet the people they are designing for. They have to empathize with their lifestyles, understand the issues important to them, gain insights from what they say and interpret this into new design concepts. This should significantly improve what designers have to offer and better the physical, mental, environmental and emotional aspects of any design.

Universal design is the development of an approach that addresses these concerns. It is design thinking that makes the products, services, communication and built environments we create more usable by a greater number of people with little or no rise in cost. This implies that a design should be usable by all people to the greatest extent possible, regardless of age, ability or circumstance and without the need for adaptation or specialized design. Universal design therefore strives to benefit everyone, not only people with disabilities.

### **THE BENEFITS OF UNIVERSAL DESIGN**

The concepts behind Universal Design are sometimes known by other names in different parts of the world. In the UK, this approach is termed Inclusive Design and within the EU the term Design for All is prevalent. Design for Accessibility is sometimes used in information and communication technology (ICT). These names reflect similar sets of ideals, although different cultural, historical and political factors in different parts of the world have affected the precise way in which these ideals have been interpreted and expressed by designers.

Universal Design will be one of the strongest design trends in the 21st century and there are a number of reasons such as:

- Demographic change due to the dramatic rise in numbers

of older people across the globe, seen in its most radical form in Japan and northern Europe, but also evident in China, India and other developing countries. People are living longer today and life expectancy is increasing. In many countries, the over 65's outnumber the under-25's.

- The increasing number of older people is an untapped market potential. Older people hold most of the financial assets in developed countries despite products and services being marketed to younger age groups (Myerson, 2001).
- An increase in the number of people living with disabilities. There are many reasons for this such as: the multiple minor impairments that come with age; illnesses brought on by environmental and lifestyle changes; and the unexplained rise in conditions such as autism, with medical advances resulting in increased survival rates and the increased visibility of handicapped children.
- Legislation fuelled by the disability rights movement. The rights of older and disabled people are multiplying and there is an increasing number of new laws and regulations that affect different areas of society.
- Understanding users can bring inventiveness to the design process and challenge designers to seek new, creative solutions. Working with end users can bring inspiration to the design process as well as providing rich information for the design brief. This technique of close engagement with select users that is prevalent in Universal Design moves the designer from proposing solutions that are self-generated to working with the user in a space that is relevant and beneficial to both their needs. This way of thinking becomes a source for creativity and innovation.
- Universal Design can open up new markets for business by future-proofing products for new consumer groups. Industry needs to make an early response to the growing number of older consumers and disabled users and one of the most robust and 'upstream' ways of doing this is by re-

evaluating the design offer they present. Universal design techniques and methods can engender ways of visualizing new design directions and testing them with potential markets to ensure suitability and take-up.

- The need to develop sustainable approaches through equity and participation. Sustainability has three aspects: environmental, economic and social. All three need to be addressed to form a complete environmental solution. A Universal Design approach is a powerful tool in achieving social sustainability.

Above all, Universal Design is about good design, not manufacturing ‘special needs’ solutions. Older and disabled people do not want to be seen as victims requiring assistive products and services and will not buy design concepts that are marketed this way. Successful Universal Design concepts that have been sold to the mainstream markets are inclusive of people with varied needs rather than exclusively for them. They enable rather than stigmatize.

“In recent years there has been a shift in attitude, away from treating disabled and older people as special cases requiring special design solutions, and towards integrating them in the mainstream of everyday life through a more inclusive approach to the design of buildings, public spaces and, more recently, products and services. This is important for social equality but is also a significant opportunity for business growth through new products and services.” (Coleman, R. 2006)

## **HUMAN RIGHTS AND MILESTONES**

Universal Design, like most socially-centered pieces of thinking, has been politically charged since its inception and remains so today. At its heart is a fundamental human right that has been fought over, argued about, defined and redefined since language first enabled conversation and communication enabled civilization. Freedom and choice,

the ideological right of every human being, sit at the centre of this approach and ‘the affordance of equal rights, access, goods and services’ becomes the typical modern day phrasing that still enshrines this thinking.

War and medical invention have also played a role. Throughout history, wounded soldiers have been left to die on the battlefield and people with disabilities were viewed with suspicion or pity at best and hidden away from society. The two World Wars of the last century changed all that. As global tragedies that affected all of humanity, they produced the largest number of disabled veterans that the world ever knew and the invention of penicillin and advances in surgery meant that they could survive horrific injuries that previously would have killed them. Disability was no longer hidden – the veterans gave it visibility in society.

Two further events in recent history accelerated the founding of disability rights. The first was the Black Civil Rights movement and the second was the Vietnam war. In 1955, when Rosa Parks, an African American lady, refused to give up her seat as dictated by Mississippi law, this sparked the Bus Boycott where African Americans refused to take the bus until the law was changed. The bus companies suffered heavy financial losses and relented. This small victory is often credited as a significant turning point in the struggle for human rights which subsequently developed into a powerful political movement. In 1964, the American Civil Rights Act was signed promising “full and equal enjoyment ... of goods and services”. Although aimed at racial discrimination, the Civil Rights Movement provided a blueprint for the Disability Rights struggle that followed.

The Vietnam War and the use of helicopters in war zones as airborne ambulances meant that wounded soldiers were evacuated to field hospitals in record time. Again, medical improvements ensured a higher rate of survival and rehabilitation. The world once again faced disability through large

numbers of young veteran soldiers who were outraged at the second class treatment they were receiving. Marches on Washington, large rallies and vocal campaigners such as Ron Kovic brought human rights violation on the basis of ability back into social consciousness.

As well as the political dramas that drove the movement, designers, architects and ergonomists also played a quieter, but no less significant role in shaping Universal Design focus and people-centered design approaches. Henry Dreyfuss, a celebrated industrial designer in the US, promoted the philosophy that design should not just be about style, it should benefit people. He contributed much to ergonomics and human factors and his 'Measure of Man' published in 1960 became a defining book in ergonomics and relating design to people. Five years earlier, in 1955, he wrote an iconic autobiography, itself entitled 'Designing for People'. Selwyn Goldsmith, a British architect, was designing with wheelchair users in mind as early as 1963 when he published extensive ergonomic guidelines on designing buildings to include disabled people. Victor Papanek, an Austrian born industrial designer living in the US, once again challenged the style-led approach prevalent in design through his landmark book of 1971, 'Design for the Real World'. He wrote "design has become the most powerful tool with which man shapes his tools and environments (and, by extension, society and himself)." His approach focused on social and ecological considerations and continues to have resonance today.

## **MILESTONES FROM THE USA**

The term Universal Design was introduced in the United States by the architect Ronald L. Mace. He was the founder of the Centre for Universal Design at North Carolina State University and a protagonist in design for varying capability. In 1985, he explained universal design in an article in *Designers West*. This is the first documented use of the term. Mace formulated the concept of universal design as "the design of

products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design". Before that, in the 1970s, the US designer Patricia Moore had carried out an innovative age-simulation experiment by dressing up as an 80 year old woman and travelling across the country (Moore, 1985). She was routinely ignored and abused, and on occasion even attacked. Her approach was ridiculed by designers and social scientists alike for lack of rigour, but has since come to be recognized as a 'pathfinding' approach in creating designer empathy.

As a result of the demands from disability groups, the US Federal Government came up with legislation changes as early as the 1960's. Here follow some of the most important legal regulations (UDEO, 2008):

1968: The Architectural Barriers Act. US Congress passes the first law requiring accessibility for people with disabilities in federal buildings. The Act requires all buildings designed, constructed, altered, or leased with federal funds to be made accessible.

1973: Section 504 of the Rehabilitation Act becomes law. It prohibits discrimination against people with disabilities in programs that receive federal funding. This Act makes it illegal to discriminate on the basis of disability and applies to federal agencies, public universities, federal contractors, and any other institution or activity receiving federal funds.

1988: The Fair Housing Amendments Act. People with disabilities and children are added to the 1968 civil rights law that prohibits racial discrimination in housing. It establishes guidelines for universal design in new multifamily housing.

1990: The Americans with Disabilities Act (ADA). This is the most comprehensive civil rights legislation for people with disabilities. The law establishes that the lack of access to programs, employment and facilities is discrimination, in public

and private settings. Access to places of public accommodation, services, public transportation and telecommunications is ensured by this law.

1995: Principles of Universal Design. The Center for Universal Design develops the first edition of performance criteria with a group of US experts.

1996: The Telecommunications Act. The law mandates that telecommunications services and equipment and customer premises equipment be “designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable.” It applies to all types of telecommunications devices and services, from telephones to television programming to computers.

1997: A group of architects, product designers, engineers and environmental design researchers works out seven principles of universal design as a guide for a wide range of design disciplines including environments, products and communications. The principles are broader than those of accessible design and are: 1) Equitable use. 2) Flexibility in use. 3) Simple and intuitive use. 4) Perceptible information. 5) Tolerance for error. 6) Low physical effort. 7) Size and space for approach and use. Each principle is given a definition and guidelines are worked out (CUD, 2008).

## **UK AND EU MILESTONES**

The UK and EU have followed a path that is based less on legislation changes and political decisions than the US. Early milestones were based on rehabilitation needs and designed approaches instead. Because of this, disability legislation post-dates the American equivalents but the UK and EU have worked hard to catch up. At the time of writing, some European legislation now leads the world.

1948: Sir Ludwig Guttmann, a German neurologist at the

rehabilitation hospital in Stoke Mandeville, England, organizes a sporting competition involving World War II veterans with spinal cord injuries to help with rehabilitation. This becomes the Stoke Mandeville Games held in the same year as the 1948 Olympics in London. Games are held annually.

1952: The Netherlands join the Stoke Mandeville Games creating the first international competition for disabled people.

1960: The 9th Stoke Mandeville Games are held in Italy after the Olympics. This is considered to be the point at which the Paralympics were established.

1963: Architect Selwyn Goldsmith creates building guidelines for people with disabilities.

1968: The International Commission on Technology and Accessibility and Rehabilitation International run a competition to design the International Symbol for Accessibility. An entry by Danish student Susanne Kofoed is accepted in 1969 with minor modifications. A head is added to her iconic blue and white line drawing of a wheelchair user. The symbol is now used internationally.

1976: The United Nations launches its international year for disabled persons.

1979: Ergonomi Design Gruppen is formed in Sweden by a group of designers including John Grieves and Maria Benkzton who believes in a people-centered approach. The group is formed by the merging of two existing companies, Ergonomi founded in 1969 and Design Gruppen in 1971. Their approach is user-orientated and socially inclusive and continues to be a central part of their philosophy today.

1986: The Helen Hamlyn Foundation organizes the New Design For Old exhibition in London, a pathfinding exhibition that challenges leading designers to create design concepts for older people.

1995: The UK Disability Discrimination Act 1995 is passed by parliament making it unlawful to discriminate against people in respect of their disabilities in relation to employment, the provision of goods and services, education and transport. It is a civil rights law as opposed to being a constitutional or criminal law.

1999: The Helen Hamlyn Centre is founded at the Royal College of Art in London, UK to advance the practice of inclusive design, working with students, professional designers, academia and industry. It is one of the few centers in Europe that focuses exclusively on inclusive design.

2000: The UK Department of Trade and Industry, part of the UK government, defines inclusive design as 'a process whereby designers ensure that their products and services address the needs of the widest possible audience'. This is part of their Foresight Programme and presents inclusive design as a potentially important driver of change.

2004 - The UK Disability Discrimination Act is modified as follows: service providers may have to make other 'reasonable adjustments' in relation to the physical features of their premises to overcome physical barriers to access.

2005: BSI British Standards publish a new standard, 'BS7000-6: Guide to managing inclusive design'. It provides a comprehensive framework to help all enterprises, public sector and not-for profit organizations to introduce a professional approach to inclusive design.

2006: The United Nations agrees on the Convention on the Rights of Persons with Disabilities. This is the first human rights treaty of the 21st century, aimed at increasing and upholding the rights of the estimated 650 million disabled people across the world.

## **SUMMARY OF CONTENTS**

The contributions in this book are divided into three sections Architecture, Product Design and Services. Each one is summarized in the following pages.

### PART 2. ARCHITECTURE

In his chapter, Paradigm for the 21st century: The challenge for implementing universal design, Preiser refers to The Universal Design Handbook (Preiser and Ostroff 2001). This handbook gives standards and guidelines and “evidences increasing acceptance of and activity in universal design, in Europe and North America, and especially in Japan”. He gives us three main strategies for implementing and organizing universal design: A short-term one by carrying out evaluations of existing facilities; a medium-term strategy by carrying out programming projects for future facilities by incorporating universal design criteria from the start, and by integrating them with existing standard building performance criteria; and a long term one by bringing “universal design into curricula of planning and design schools as a required subject matter”. Furthermore, Preiser discusses the Seven Principles of Universal Design and argues that they are relative concepts and that the principles “may be perceived differently over time by those who interact with the same environment, facility or building, such as: owners; occupants; management; maintenance personnel; and passersby or visitors”. In his contribution he puts emphasis on evaluation based on a consumer feedback-driven and post-occupancy evaluation process. Based on user needs he then presents three levels of building performance criteria and a process model for universal design evaluation (UDE). As a strategy for UDE he concludes with a fusion of performance and universal design criteria “moving from primarily subjective, experience-based evaluations to more objective evaluations”.

Christophersen presents in his chapter, Development, Pro-

motion and Execution of Universally Designed Housing in Norway, an overview of the last forty years. He explains two main reasons for the relatively slow progress in this field: the process of “altering the mindset of the general public and the local and central decision makers” and: the involvement of a conservative industry, heavy technology and installations of a permanent nature. As a solution to this challenge he suggests “a simultaneous bottom-up/top-down approach” that gives “opportunities for top level policy-making and for conveying the needs of the users to the industry in a way that makes it possible to develop cost effective solutions”. Christophersen states that “moderately increased levels of usability and accessibility can be achieved at a small and often negligible extra cost”. He claims that what is lacking is “an approach towards creating efficient, rational and practicable performance criteria for Universal Design”. Without precise performance criteria it will be problematic to put the requirements into practice. Following the ‘learning by doing principle’ he ends up presenting a series of illustrated examples of universal designed solutions in different projects completed across Norway.

The next author, Asmervik, takes up the pedagogic challenge of universal design in his chapter, Teaching universal design to students of architecture. He claims “that prestigious architecture and architects do not pay enough attention to the needs of users” and he forces students to devote attention to the needs and requirements of different user groups. “Industrial designers are already quite familiar with this way of thinking .... Architects and landscape architects have a strong tradition based on the idea that the individuals’ “signature projects” are the real objective of their activity”, he writes. As a pedagogic method he goes through seven famous architectural projects around the world and comments on and criticizes the universal design aspects of these. Furthermore, he presents assignments and exercises for students. By outlining tasks and asking questions he puts emphasis on solutions, attitudes, strategies and processes

concerning universal design when applied to the field of architecture.

In the last chapter in part 1, *Architecture for the Senses*, Ryhl takes as a starting point the concept of accessibility. In the context of architecture accessibility traditionally means accommodating physical disabilities and generally ensures everyone of physical access to a given space. She introduces a new design concept: sensory accessibility as a parallel and complement to existing concepts. Sensory accessibility “ensures that everyone can stay in the space and be able to participate, enjoy and experience”. Her research is based on interviews and 1:1 testing in existing housing with people living with a sensory disability. Ryhl describes and explains the importance of designing for all of our five senses - vision, hearing, touch, smell and the kinesthetic sense of balance. Within each of these categories she gives valuable advice and guidelines as to how to create good architecture that is highly appealing. The conclusion is that the end user should experience sensory accessibility in addition to physical accessibility.

### PART 3. PRODUCT DESIGN

In his chapter, *Designing a more Inclusive World*, Clarkson introduces the basic elements of good business practice. His emphasis is on “understanding the real user and business needs at the start of the design process and correctly translating these needs into an appropriate requirements specification”. To demonstrate the potency of this approach, he points out several successful design companies that have followed this strategy.

He then gives us the drivers behind Inclusive Design: the importance of independent living for an ageing population and the fact that our capability varies continuously throughout life. “Inclusive design places the responsibility with product designers to ensure that the capability levels required to use a product are as low as possible”. Clarkson presents a “waterfall” model for an inclusive design process in four steps: discover,

translate, create and develop. To understand and measure user capabilities, seven capabilities are described and categorised.

The next section of his chapter provides some examples of user capability loss and the challenges these might pose to effective use of products and services. Sensory, cognitive and motion capability losses are described and examples of problems in daily life are given.

To counteract these problems Clarkson emphasizes the following approach: involving the user in the design process and using design tools such as physical and software simulators. “A particularly effective approach is to combine the use of user trials, expert assessment and exclusion audits to review a new product”.

The next author, Eikhaug, argues in her chapter, Design for All, a commercial perspective, that product development processes based on Design for All principles are a strategic tool for innovation and business development. She claims that one of the challenges for companies and businesses is to have a wider perspective when considering design. Aesthetic, functional or emotional needs are not enough. “Attention has to be focused on the role design can play in promoting sustainability, enabling human rights and creating social inclusion.” Eikhaug states that a Design for All approach helps “to identify new potential products, services or innovations and thereby capture a larger market with inclusive solutions”.

Regarding legislation, in all markets, both nationally and internationally, a “more stringent legislation is being introduced to support Design for All and accessibility”. This new legislation involves challenges but can also be seen as bringing “opportunities for innovations and creating competitive advantages”.

As a strategy for better design she emphasizes a user-centered design process and presents three case studies based

on this. Eikhaug points out new trends in inclusive marketing and advertising and ends her chapter with four criteria to introduce a Design for All strategy into a company's core practice.

Rønneberg Næss and Øritsland, in their chapter Inclusive, mainstream products, ask the question "Do people want to use inclusive products?". Their issue is not usability and utility but the emotions and values that people connect with when using products. They look at how to achieve dignity and enjoyment and how to create an attractive identity when designing assistive products. A strategy based on communication theory is presented and they "propose that affordances, denotations and connotations may be applied as levels of analysis and ideation". The authors quantify and describe the kind of meaning generated at each of the three levels as follows:

*Affordances before meaning* – what is it possible to use it for?

*Denotative meaning* of product – what is it, what do you do with it?

*Connotative meaning* of product – what does this product say about you in different social contexts? How will your using it be interpreted?"

"By analysing activities and products at these three levels, a creative process can explore alternative or supplementary product functions and principle structures", they argue. In the last part of the chapter they explain their theory through practical examples and suggest two approaches for inclusive design. The first is an approach that secretly and discreetly adapts mainstream products and the second is a styling approach where desirable values and features are added to assistive products.

In the chapter The Small Design Changes that Make a Big Difference – a Case study in Packaging Design from the

Norwegian Company Jordan, Støren Berg presents a well documented and illustrated study where she describes a concrete and practical example of a design for all approach in seven steps. The strategy consists of three main elements: “1) involving users with disabilities as lead users, 2) providing a tool for design decisions accounting for all aspects of design, and 3) a workshop procedure to integrate the Design for All approach with the existing project process at the company”. Users with arthritis, visually impaired users, older people, children and users without capability loss were invited into the design process at different stages. A design for all criteria tool was developed and used “to create a common understanding and common language for the user experience aspects of the packaging”. Støren Berg states that “it was possible to improve the packaging in the most critical area, even with the tight constraints of technology, logistics, unit cost, and contradictory design requirements”. One of the experiences from this project is that a Design for All approach is about “balancing, compromising and bridging conflicting requirements”.

#### PART 4. SERVICES

Skeide Fuglerud presents in her chapter, Universal design in ICT services, “arguments for universal design in information and communication technology (ICT) services and discusses the importance of integrating universal design activities into the development process”. She describes the difference between ICT products and ICT services and states that “an ICT service involves a service provider each time it is used” and that services “often have both internal users (working for the service provider) and external users (other service providers and customers)”. She argues that developing ICT services involves many stakeholders and considerations and that universal design activities should be integrated into the overall project’s life cycle as well as the software development process.

An internationally important policy goal is referred to as

e-inclusion and to achieve this products and services have to be designed to be accessible to as broad a range of people as possible. This includes also people placed in “impairing environments”. Furthermore, she argues that the trend in the western world towards e-Government and towards a self-service society will escalate the challenges concerning accessibility and disabling conditions. On the other hand she claims that “the possibilities of making universally designed ICT solutions have never been better” and she gives us arguments for her view. Multimodal interaction is one strategy. “There is a fundamental connection between multimodal interface design and universal accessibility”, she argues. A list of examples where users in constraining situations or contexts and impaired users may produce the same or similar requirements for a system is presented. In the last half of her chapter Skeide Fuglerud gives us instructions and advice on how to incorporate a universal design approach into a design process, based on her own experience. It is crucial for success to have “commitment and support from the service or project owner, the management and personal commitment and individual leadership”.

Someone in the design team must therefore have the responsibility, the mandate and authority for the universal design focus in the project, she argues. In the design process you have to “plan for iterations, user involvement and changing requirements”. “Tasks and users are equally important” is her experience. “You have to do a thorough job of end user research” and “based on personas one can create different scenarios and narratives as a starting point in the design process”. In the evaluation process use of accessibility tools, heuristic evaluation and user tests is recommended.

In his chapter, Design for All in ICT, Mellors presents a three level model for adopting the Design for All approach when designing Information and Communications Technology (ICT) products. On the base level he puts mainstream designed products for all that can be used by a broad range

of users. The next level he describes as products “providing connection for assistive devices”. The top level of the model consists of one-off, specially designed products for very disabled users. Furthermore he argues that the ISO/IEC Guide 71 is a valuable introduction for identifying abilities and disabilities among users “to have direct impact on the successful use of ICT products and services”. To follow up legal regulations in this field he recommends ISO/IEC 13407: Human-centered design processes for interactive systems and ETSI EG 202 116: Human Factors; Guidelines for ICT products and services ”Design for All”. Mellors claims that Design for All must in practice remain Design for Most. Moreover, he states that two complementary approaches are needed to enable disabled and elderly people to lead full and independent lives; the Design for All approach and the Assistive Technology (AT) approach. In the last part of the chapter, he goes into how “to enable an assistive device to be used in conjunction with other ICT equipment”. Mellors ends up with a description of technical solutions and examples of how information can be exchanged with assistive devices and services. He concludes that “for assistive devices to become affordable and effective, the significant players in each field need to agree on a set of protocols to be used in the communication between assistive devices and relevant ICT devices”.

Hestnes, Brooks & Heiestad describe the proposal and testing of a communication service concept that assists blind and visually impaired people. In the paper Use of Mobile Video telephony by Blind People: Increasing independence and spontaneity for day-to-day life, they write that “videotelephony for blind persons may sound like a contradiction in terms”. “However, using two-way audio and one-way video from a blind or visually impaired person to a service operator, a new and important communication service may have been born”, they claim. The operators act as guides and with the videophone the visually impaired persons can “obtain information” from their surroundings.

The authors conducted focus group studies “to identify initial user and technical requirements”, longitudinal observation “studies of leisure- and business use to identify specific needs”, “user tests performed on five identified situations”, “tests on technical quality reduction” and field trials with 3G mobile handsets. They classified three main situations when the video call was used: “To verify information or objects when found”, “to search for information or objects” and “to observe a situation, object or environment”. The five most relevant situations identified and tested were: “Mini-bank; Shopping; At a bus stop; Finding something lost on the ground and Being lost”. The visually impaired participants were interviewed and the following main communication goals were expressed: Greater freedom and independence; Spontaneity; Improved safety and Efficiency. 6 of 9 participants answered yes to the question whether a mobile call service had helped make their lives simpler. The test results were used “to develop guidelines for industry on user quality of experience”.

## **CONCLUSIONS**

The contributions in this book look at theory, methodology and practice in Universal Design from different angles. Although divided according to the different design disciplines of Architecture, Product Design and ICT Services, they importantly bring voices from business, education and design consultancy into the discussion. These are important communities to include as the success of Universal Design relies on moving it forward from ideology towards practice, and demonstrating its relevance to each of these communities becomes critical in enabling this.

However disparate the backgrounds of the authors in this book, a common theme in all their work is the championing of user engagement and the relevance of a people-centred design approach. This is the central premise of Universal Design. Designers have to get out of their studios and design

for the real world around them. Working closely with users encourages empathic bonding between designer and user, creating a space where they can both act as equals to address the problem in hand. Bonding with the user helps the designer understand lifestyle and aspirational factors that are all too often overlooked, moving beyond ergonomic problem solving into an area of creative thinking and user-facilitated innovation.

Benefits of a Universal Design approach go beyond moral principles or a doctrine of social betterment. It is also about bettering design, improving business and attracting underserved consumer groups. Understanding users can bring inventiveness to the design process and open up new markets for business by future-proofing products for new consumer groups. Industry needs to make an early response to the growing number of older and disabled consumers and one of the most robust and 'upstream' ways of doing this is by re-evaluating the design offer they currently present. Universal Design techniques and methods can engender ways of visualizing new design directions and testing them in potential markets to ensure suitability and take-up.

Universal Design will become increasingly important in the future. It is one of the strongest trends in design and it is happening now. It is directly engaged with the concept of social sustainability and inclusion, ideas that have growing importance in the political arena and in the corporate world. Most importantly it can also act as a catalyst for designers to innovate and as a framework for inspired creation. It is hoped that these pages will contribute to the history and practice of Universal Design and play a role in envisioning a brighter future.

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