Ageing, Adaption and Accessibility:

Time for the Inclusive Revolution!

Editors: Anna Mieczakowski and John Clarkson

Designing Our Tomorrow

UNIVERSITY OF CAMBRIDGE
Engineering Design Centre

sponsored by BT

Ageing, Adaption and Accessibility:

Time for the Inclusive Revolution!

Editors: Anna Mieczakowski and John Clarkson

Designing Our Tomorrow

Cover design and layout by:
Kent House
1 Euston Square
40 Melton Street
London
NW1 2FD
Email: info@kenthouse.com
Web: http://www.kenthouse.com/

Printed and bound by:
Wood Mitchell Printers Limited
Festival Park
Stoke-on-Trent
ST1 5TH
Email: sales@wood-mitchell.co.uk
Website: http://www.wood-mitchell.co.uk

First published in 2012 by:
Engineering Design Centre
University of Cambridge
Trumpington Street
Cambridge
CB2 1PZ
UK
Email: edc-enquiries@eng.cam.ac.uk
Web: http://www-edc.eng.cam.ac.uk/

ISBN 978-0-9545243-8-8

Foreword

Gavin Patterson
Chief Executive Officer – BT Retail

At BT we aim to enable all our customers, whether one of our 10 million consumer customers or our 1 million SME (small-to-medium-sized enterprise) business customers, access to communications solutions regardless of whether they have a disability. We are proud of our long history in this space which includes the creation in the 1930s of larger dials and flashing lights on home phones, the development of the first NHS hearing aid in 1948 and our now iconic BT Big Button phone which dates back to the 1990s. Communication devices and technology, however, are changing and advancing at an ever increasing pace. They are allowing us to remain economically active and productive in our jobs and stay connected to friends and family across the world anytime, anywhere.

The experts interviewed for this book have given all who are involved in developing technology food for thought. It sets out the opportunities, challenges and impacts that communication solutions present to users, to help ensure that what we develop in the future does not end up excluding people whose lives we actually set out to improve.

BT began its journey towards the adoption of inclusive design in 2005 and we have been working with the Engineering Design Centre (EDC at the University of Cambridge ever since. As BT's corporate responsibility sponsor, I am passionate about making sure that everyone is included in today's society. Not only is this the right thing to do, but it also enables individuals to contribute fully to their community, allows organisations to retain skilled employees and benefits UK plc, which gains a productive and independent ageing population.

BT is also working with the University of Cambridge to create a toolkit that brings inclusive and sustainable design together. *Designing Our Tomorrow* considers usability, return on investment, the sustainable use of materials and efficient energy use. We plan to publish the toolkit in Summer 2013 and this will be a further step in helping businesses to develop products that people want, at an affordable price for the consumer and the environment.

On behalf of BT I would like to thank all the experts who have freely shared their perspectives and the team at Cambridge for their sterling work pulling together such a stimulating document. I hope you enjoy reading it and the insights act as a spur to ensure we consider those who have the most to gain from technology that is accessible and inclusively designed and we all contribute to the inclusive revolution.

sponsored by BT

Preface

Anna Mieczakowski and John Clarkson
Engineering Design Centre, University of Cambridge

Information and Communication Technology (ICT) is becoming increasingly central to many people's lives, making it possible to be connected in any place at any time, be unceasingly and instantly informed, and benefit from greater economic and educational opportunities. With all the benefits afforded by these new-found capabilities, however, come potential drawbacks. A plethora of new PCs, laptops, tablets, smartphones, Bluetooth, the internet, Wi-Fi (the list goes on) expect us to know or be able to guess, what, where and when to connect, click, double-click, tap, flick, scroll, in order to realise these benefits, and to have the physical and cognitive capability to do all these things.

One of the groups most affected by this increase in high-demand technology is older people. They do not understand and use technology in the same way that younger generations do, because they grew up in the simpler electro-mechanical era and embedded that particular model of the world in their minds. Any consequential difficulty in familiarising themselves with modern ICT and effectively applying it to their needs can also be exacerbated by age-related changes in vision, motor control and cognitive functioning. Such challenges lead to digital exclusion.

Much has been written about this topic over the years, usually by academics from the area of inclusive product design. The issue is complex and it is fair to say that no one researcher has the whole picture. It is difficult to understand and adequately address the issue of digital exclusion among the older generation without looking across disciplines and at industry's and government's understanding, motivation and efforts toward resolving this important problem. To do otherwise is to risk misunderstanding the true impact that ICT has and could have on people's lives across all generations.

In this European year of *Active Ageing and Solidarity between Generations*

and as the British government is moving forward with its *Digital by Default* initiative as part of a wider objective to make ICT accessible to as many people as possible by 2015, the Engineering Design Centre (EDC) at the University of Cambridge collaborated with BT to produce a book of thought pieces to address, and where appropriate redress, these important and long-standing issues.

"Ageing, Adaption and Accessibility: Time for the Inclusive Revolution!" brings together opinions and insights from twenty one prominent thought leaders from government, industry and academia regarding the problems, opportunities and strategies for combating digital exclusion among senior citizens. The contributing experts were selected as individuals, rather than representatives of organisations, to provide the broadest possible range of perspectives. They are renowned in their respective fields and their opinions are formed not only from their own work, but also from the contributions of others in their area. Their views were elicited through conversations conducted by the editors of this book who then drafted the thought pieces to be edited and approved by the experts.

We hope that this unique collection of thought pieces will give you a broader perspective on ageing, people's adaption to the ever changing world of technology and insights into better ways of designing digital devices and services for the older population.

Acknowledgements

This work would never have come to life without the commitment, encouragement and tireless support of: Gavin Patterson, Chief Executive Officer BT Retail; John Petter, Managing Director of BT's Consumer business; Liz Williams, General Manager for Sustainable Business; and Fiona Miller, BT Consumer Affairs.

We are grateful to Jeff Patmore from Pembroke College in Cambridge for his help with the initial stage of this work.

We would also like to thank the twenty one thought leaders from industry, government and academia who contributed their views to this book and who continue to work to include older people in mainstream Communication and Information Technology (ICT).

Contents

Chapter 1:
Including seniors in the overall business and political agenda p01
Karin Bendixen,
Design for Alle.dk, Denmark

Chapter 2:
Making the web work for everyone p04
Matt Brittin,
Google, UK

Chapter 3:
Making the neighbours jealous p07
Roger Coleman,
Royal College of Art, UK

Chapter 4:
Call to arms to fill the 'know-do' gap in ICT p11
Gerald Craddock,
Centre for Excellence in Universal Design, Ireland

Chapter 5:
The power of design and designers p14
Hua Dong,
Brunel University, UK

Chapter 6:
The role of motivation, supported learning and self-efficacy p17
Onny Eikhaug,
Norwegian Design Council, Norway

Chapter 7:
ICT, older users and economic viability: Moving beyond 'special' to mass customisation p20
Valerie Fletcher,
Institute for Human Centered Design, US

Chapter 8:
ICT for today's population, not the population from the last century p23
Sally Greengross,
House of Lords, UK

Chapter 9:
The art of simplicity p26
Ian Hosking,
University of Cambridge, UK

Chapter 10:
ICT, confidence and well-being p30
Felicia Huppert,
University of Cambridge, UK

Chapter 11:
The power of connecting and staying active p33
Bonnie Kearney,
Microsoft, US

Chapter 12:
The importance of being earnest about user testing p35
Nigel Lewis,
AbilityNet, UK

Chapter 13:
Taking ICT down a notch and delivering it into the hands of the excluded masses p38
Helen Milner,
UK Online Centres, UK

Chapter 14:
Putting older people at the heart of every ICT development p41
Johan Molenbroek,
Delft Technical University,
The Netherlands

Chapter 15:
Technology is older people phobic, not vice versa p44
Alan Newell,
University of Dundee, UK

Chapter 16:
If inclusive design is good for everyone, why don't we have it? p48
Donald Norman,
The Nielsen Norman Group, US

Chapter 17:
Designing for digital grandparents: How inclusion can be implicit yet inspire innovation p51
Graham Pullin,
University of Dundee, UK

Chapter 18:
Time to end the 'Stone Age' of inaccessible ICT p55
Marjan Sedmak,
AGE Platform Europe, Slovenia

Chapter 19:
Lessons learnt from the government going digital p58
Felicity Singleton,
Government Digital Service, UK

Chapter 20:
Technological speed vs. accessible and responsible design p62
Heinz Wolff,
Brunel University, UK

Chapter 21:
Focussing on what we could do, not what we are not doing p65
Tom Wright,
Age UK, UK

Postscript p69

Index of experts p70

Chapter 1:

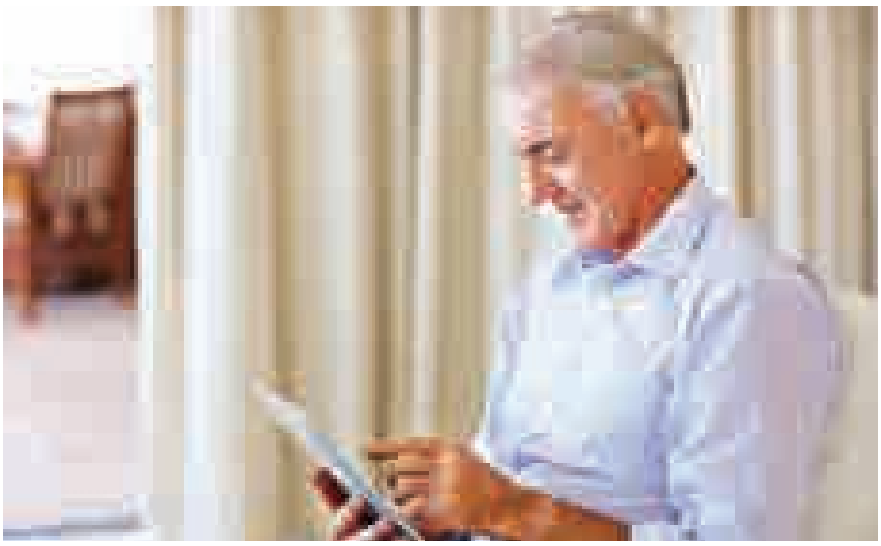
Including seniors in the overall business and political agenda

Karin Bendixen
Design for Alle.dk

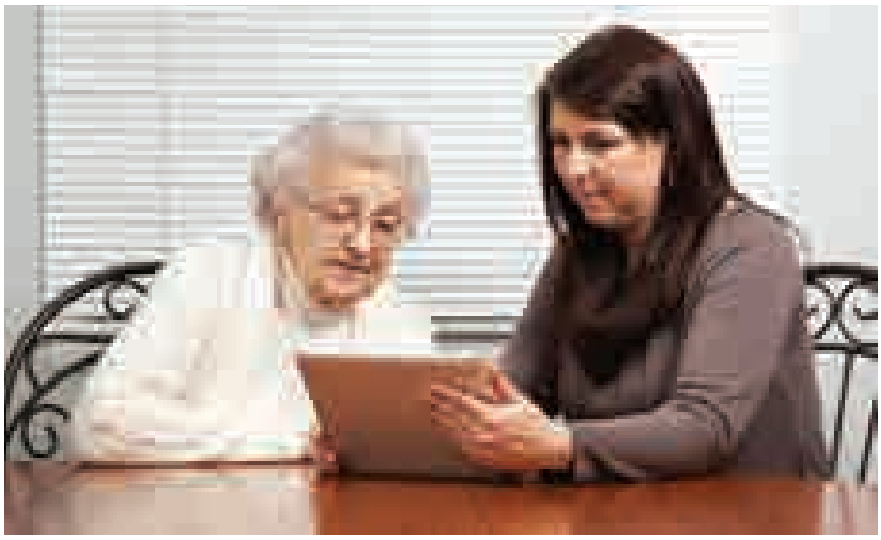
Karin Bendixen has dedicated most of her career to communicating issues on equal opportunities and *Design for All* in her homeland of Denmark and internationally. She is the owner of a design and public relations consultancy, Bexcom, and the founder and president of the Danish independent national network, *Design for Alle.dk*. Over the years she has been involved with various user-driven projects in design, architecture, products, policies, strategies and campaigns.

With an increasing push from the United Nations' *Convention on the Rights of Persons with Disabilities* to consider diversity in the population, there has been a growing adoption of the ethos and principles of user-centred design across the governments and industries of the member countries. However, Bendixen warns that *Universal Design, Design for All* or *Inclusive Design* should not be regarded as a 'special' disability-related field, but rather be seen as an integral part of socially responsible and sustainable development in the world. To achieve this, she stresses, it is important to account for the needs of people at all points of the age and ability spectrums in the political and industrial realms at national and international levels. She also advises that, rather than treat older people as a burden, we need to consider them as one of society's strengths and work collectively to enhance their quality of life, the social economy and business potential.

The truth, says Bendixen, is that ageing populations do not consider themselves as old, nor do they want



Ageing populations do not consider themselves as old, nor do they want to be regarded and stigmatised as such by the rest of society.



to be regarded and stigmatised as such by the rest of society. Tragically, the media has played a major role in creating and perpetuating a negative ageist image by showing complicated stories about people with disabilities and elderly people.

Information and Communication Technology (ICT) doubtless plays a very important role in the life of senior citizens in Denmark and internationally, a significant number of whom have now effectively embraced mobile telephony and the internet. According to Statistics Denmark from 2011, three out of four people above the age of 65 use a mobile phone for calls and text messages, while 40% of seniors use the internet on daily basis. There are two dominating cohorts among older ICT adopters: (1) those who adopted digital technology because they are curious and want to stay in contact with friends and family; and (2) those who are 'forced' to use it to get in touch with the public sector. Further efforts should primarily focus around the latter group.

Bendixen views digital participation as a prerequisite for a well-functioning democracy and, therefore, she thinks it is vital that authorities devote substantial resources to the provision of accessible technological solutions, as well as longer-term research to develop older user-friendly ICT interfaces in the future. For example, since 2010, the European Union has run a number of projects focussed on enhancing the technological skills of senior citizens. One such project led to the development of *Ageforce.dk*, an internet-based social network for individuals above the age of 50. In three years since its conception, this social portal has attracted more than 7,000 older members and 300 specific groups of interest. Apart from happy and confident older users, there are also socio-economic benefits of increased digital participation among the seniors. In particular, as indicated by Statistics Denmark, Danish citizens aged 65 to 74 have more disposable income than any other age group, and this is also true of many other countries.

An underlying issue, however, is that most of the ageing population struggles when they are required to fill out an online form or transfer a particular payment because: (1) they have little experience in doing it; and (2) they have not been included in the target user group for which the online products and services were designed. There is, of course, a growing international effort to make the public, particularly senior citizens which form a large segment of the non-digital population, digital by 2015. For example, many European countries, including Denmark and the UK, are now focussing on creating digital inclusion in the area of communication with authorities, transforming citizen interaction from manual paperwork to digital resources. The most important thing to ensure in this initiative, Bendixen points out, is that older people are motivated to use digital equipment and services in the first place, and then learn and continue to use them in a supportive environment.

The biggest problem with the currently largely inaccessible ICT, she observes, is that it frightens older individuals to the point that many of them prefer to be left behind than to

learn the foreign technology that they have never encountered before. What it really comes down to, according to Bendixen, is the need for clear articulation of benefits to encourage technology use, supported learning and ongoing use, and eradication of ignorance in design.

There is, however, a proverbial "light at the end of the tunnel" in that the multitude of competing technological devices and platforms brings potential inclusivity benefits. For example, any contemporary website or document has to be accessible to and optimised for a wide range of rival browsers, tablets and smartphones. Another advantage is that technologists are increasingly waking up to the idea that inclusively designed ICT is likely to contribute to a profitable business. Specifically, accessible computers such as the Danish DukaPC, which automatically downloads 12 items – internet, email, news, weather, TV guide, games, Facebook, word processor, photos, video phone, music and movie player – have shown to be a hit with senior users and a commercial success for its creators.

In addition, case studies such as the OXO Good Grips household products make it clear that design tuned to the characteristics of seniors and disabled people can be also easier and more pleasurable for everyone else to use. Nonetheless, as wonderful as the OXO and similar products are, Bendixen challenges the common tendency to justify good design by advertising to the world that it was optimised for older and disabled people. She believes that inclusive products should be self-evident and exist for the benefit of every person who wants to engage with them. It would be interesting if we could achieve the same success in the ICT as is evident with OXO.

Bendixen has one specific concern about the inclusion of the most appropriate users at the right stages of the design process. Until designers learn how to select and recruit such users for their design projects, rather than just tick the 'include users' box by speaking to their grandparents or a friend with impairment, the problem with inaccessible and unusable technology will remain. To help overcome this obstacle, there is a wealth of advice in the form of specific support tools and methods that designers can easily call upon. One example of such materials is the Cambridge Inclusive Design Toolkit, containing a set of easy to use tools for designers to evaluate step-by-step their product or service. Another is the handbook, *30 Methods of Innovation*, published by the Danish Enterprise and Construction Authority. The latter contains descriptions of the most effective methods and tools derived from surveys and projects carried out in collaboration with the Danish Government's program for user-driven innovation in 2007.

Nevertheless, it is crucial that a user-centred design approach is first incorporated within a company's overall business strategy to ensure that users' needs and wants are not just an afterthought. The next step is the production of guidelines, tuned to this overall strategy, to ensure that everyone in the company understands and follows the overarching aim and, more importantly, knows what to do to make it happen.

Bendixen concludes by stating that she would encourage increased inclusion of different users and interdisciplinary work to support people in leading an independent, dignified and enjoyable life for as long as possible.

It [Information and Communication Technology] frightens older individuals to the point that many of them prefer to be left behind than to learn the foreign technology that they have never encountered before.

Chapter 2:

Making the web work for everyone

Matt Brittin
Google

Matt Brittin is a Managing Director of Google in the UK and Ireland. His mission is to help people and organisations across Northern and Central Europe get the most out of the internet by making Google's products easy to use, fit for purpose and cost effective. In 2010, he was chosen as Wired Magazine's *Most Influential Person in the Digital World*.

At the beginning of our conversation, Brittin explains that, rather than focus on a specific demographic, Google tries to bring the benefits of technology to all echelons of society in a way that is simple and easy to use. One of the best-known for-all pieces of technology is the Google search, a simple white webpage with a box in the middle of it for typing in a key word to search a given thing. In its pursuit to be accessible, even upon misspelling this search engine will deduce the mistake and suggest a correct alternative.

The ubiquity of Information and Communication Technology (ICT) makes it easy for anybody to send significant amounts of various types of information to others quickly and at almost zero cost by only pressing a few buttons. Brittin counters the widely held belief that ICT is mainly and most effectively used by the younger population by stating that products such as YouTube are hugely popular with retired people. He gives the example of a retired user, known by the pseudonym of *geriatric1927*, who, apart from being one of the early stars of YouTube in the UK, is

well-known for publishing videos of himself candidly discussing the highs and lows of being an older person.

It is important not only to optimise products and services for accessible and enjoyable use, but also to collect feedback post-use to learn more about and further improve the user experience. For instance, Google tested the colour of blue links on its webpages by trying out 40 different shades of blue to determine whether there was a particular shade of blue that would help people read faster and click quicker. It is well documented that if one can build in intuitive user experience on first use and continue to do so for future uses, Brittin explains, people will have a greater incentive to come back to utilise that particular product or service.

Along with a number of other leading technologists, Google supported the *Race Online 2012* campaign, which aimed to bring the benefits of ICT to those people in the UK who were not online. Brittin advocates that there are substantial social and economic benefits that individuals can gain from being online. For instance, through the use of the internet, people can save money on goods and services, and have better access to education, job opportunities and useful advice on lifestyle and health.

Getting people online and effectively supporting them while online requires provision of accessible information that clearly articulates the benefits and opportunities. By speaking to users in different stages of ICT adoption about their needs, capabilities, preferences and perceived barriers, Google launched a set of very simple booklets explaining why being online is helpful and how to get online. In addition, as an extension to this programme, Google helped over 200,000 small-to-medium-sized businesses appreciate the advantages and opportunities of having an online presence.

Getting older people online, in particular, can help alleviate some of the problems inherent in older age, such as loneliness or physical immobility. Moreover, upon retirement older people generally have more time to dedicate to their hobbies (e.g. photography, education and travel) and ICT provides immense opportunities for cultivating those interests. Brittin also observes that once older people overcome the initial set-up hurdle, they keenly and actively use ICT: "I have seen countless situations, both personally and through my business life, of older people where their children or grandchildren set them up with broadband access and a computer and suddenly they are off and they are conversing and they are emailing".

One global concern that Brittin has over technological adoption is that even before trying out the technology a lot of people expect it to be complicated. There is a certain generational factor in this as many older people grew up with easily breakable technology and, as a result, they have a great concern that all technology is going to break, or worse, that they will break it. This is where the concept of intuitive design, finely tuned to people's needs, is critical. As a direct response to these technology-related fears, Google has recently launched the Chromebook, a very simple computer centred around a browser, that when opened takes the user directly to the internet without the need to set things up first.

Getting people online and effectively supporting them while online requires provision of accessible information that clearly articulates the benefits and opportunities.

Being at the very forefront of technological advancement, Brittin openly admits that a large proportion of the computing sector has been very poor at thinking about inclusivity. One problem is that, despite a recent push from Apple and Amazon to make technology easier and more pleasurable to use, there are still a number of devices which demand significant user effort. He also acknowledges that for a short time in the past Google tried to put too many 'necessary' features into the initial layers of its products. However, over time the company realised that a better user experience would be achieved if basic features were available in the first layers of the device, whereas more elaborate ones were placed in subsequent layers for utilisation by more experienced users.

There is clear change in society as the result of ICT. The number of 'net citizens' in the world is exploding, with over 2.3 billion users connecting to the internet via computers and with a further 2.7 billion predicted to go online via mobile devices by the end of the decade. Certainly, for a while technology lagged behind what people needed and wanted to do, according to Brittin, but he also expects that contemporary technology will progressively become easier and more convenient to use. Today's touch-screen phones and tablets, for example, allow people to carry the entire internet in a pocket that can be used to 'help out' in both foreseen and unforeseen situations.

With the fast advancement and benefits of modern technology come perceived social drawbacks, however. The problem, says Brittin, is that many from the population at large now feel that ICT has disrupted their work/life balance. While awareness of use is the first step in finding a solution, it is important to note that the positives of technology use – the choice, ubiquity of information, social connectedness, economic and democratic opportunities – vastly outweigh the negatives.

Brittin ultimately believes that technological change is inevitable, but sub-optimally thought-out and designed ICT is certainly NOT. As technological advancement accelerates, the escalating uptake of ICT encourages an even faster pace of development and innovation. Yet, the economies of scale bring down the cost of devices and where technologists increasingly focus on designing for good user experience, there is particular hope that future devices will be simpler to use by everyone, not least the ageing population.

Technological change is inevitable, but sub-optimally thought-out and designed Information and Communication Technology is certainly NOT.

Chapter 3:

Making the neighbours jealous

Roger Coleman
Royal College of Art

Roger Coleman is the undisputed godfather of *Inclusive Design* in the UK. He is Professor Emeritus of *Inclusive Design* at the Royal College of Art and a member of the advisory board of the Helen Hamlyn Centre, which he co-founded and then co-directed from 1999 to 2006.

Using this unique opportunity to learn more about the very beginnings of inclusive design in the UK, we asked Coleman to explain why, where, when and how this virtuous approach started. We were told a beautifully ordinary tale which began with a somewhat utopian idea.

As unemployment was spreading due to loss of industry through the East End of London and elsewhere in the UK in the 1970s, the concept of 'socially useful production' that would develop goods and services benefiting ordinary people, and create work, was gaining momentum within the Greater London Council (GLC). The goal was to find out what people really needed and subsequently look at ways of innovating and developing jobs and services for them. It was at that point that Coleman was tasked with the job of producing powerful exemplars of designs that would support daily activities and at the same time would 'make neighbours jealous'. One of those examples was a kitchen designed in tune with the capabilities, needs and aspirations of a wheelchair user. The result was a design of which the neighbours were indeed jealous; achieved by making the usability elements of the design visually appealing through careful choice of materials, finishes and fine detailing. This particular design started the phone ringing.

As Coleman's ambition was "to do something in life to make the world a better place", he subsequently set up a number of projects that looked at design through the lens of a user. "I was just doing what seemed to

make sense; I did not realise it was quite as innovative as it was", he humbly explains. Eventually, the GLC and with it the whole 'socially useful production' programme was axed. However, a position at the Royal College of Art promptly appeared, providing a perfect environment for the concept of inclusive design to flourish. The goal was to get the wider world to see the importance of working with users all the time, including disabled and older people, in order to finally eradicate the negative stereotypes about them. Accordingly, in 1994 Coleman wrote a paper in the International Ergonomics Association Conference setting out *The Case for Inclusive Design*, through which he demonstrated that inclusive design could contribute to increasing the marketplace and inclusion of all from society at large. Inclusive design is a powerful concept, muses Coleman, because it can be linked with important ideas in industry or government such as quality: "If quality is a road, inclusive design is the gradient of a journey that can be moved upwards or downwards".

The most critical barrier that needs to be broken down for the creation of more inclusive Information and Communication Technology (ICT) for everyone, he explains, is the stigma surrounding older users. Why do we reject different groups of people and see them as other, as not ourselves, as separate to us, including older and disabled people, when diversity in the population is actually part of a natural order of things and should be embraced and celebrated? A truth, says Coleman, that the 2012 Olympic Games brought home to millions.

We can no longer afford technology that is aimed solely at younger and able users, because we no longer live in the little social groups of 40 or 50 people, dominated by young people, that are our genetic heritage and still prompt our suspicions of people who are in any way different from ourselves and our social groupings. As life expectancy rises and modern medicine has increased the survival rate of those with significant injuries, illnesses and birth defects, so more interest and effort has to be put into designing useful and desirable goods and services that include as many people as reasonably possible.

A separate but related issue is that of constrained autonomy and time in the work of designers to create inclusive technology, as a result of corporate aims of the organisations for which they work. It is not that designers are incapable of getting it right, Coleman observes, but rather that they are not encouraged, supported or required to do so. The larger problem is that business is driven by shareholders who want profit. As a result, businesses are run on a very short-term basis by business leaders whose survival depends on what they can return to the shareholders, or what they can appear to return to the shareholders, rather than long-term vision and a deeper understanding of the context in which modern businesses have to operate.

It is consequently very tricky for designers in a pressured commercial environment to spend some thoughtful time gaining good understanding of what a given piece of technology needs to do in order to accommodate a wide

There needs to be a solid co-design co-research network of excellence with shared responsibility, consisting of real users, research specialists, production specialists and designers.

range of capabilities and needs. In order to do that work right, there needs to be a solid co-design co-research network of excellence with shared responsibility, consisting of real users, research specialists, production specialists and designers. Exemplary work is better nurtured in an unconstrained environment where knowledge is openly shared and where boundaries of understanding are unceasingly pushed. For example, the Japanese manufacturers, such as Toyota, Toto and Sekisue, are very innovative through their research labs, where they work with a lot of users and gradually build a solid, reusable system of knowledge. It is undoubtedly a big challenge to develop the necessary research and knowledge base and expertise to design exciting technology properly around real problems. However, there is no other way to create the products that are needed for maintaining independence in later life and ultimately improving the sustainability of the modern world.

To government: the future has to be about social cohesion, which can make the country a more wholesome place. Take example from the positive changes brought about by the London 2012 Paralympic Games.

What can be done to help people distinguish between good and bad design? Interestingly, the ubiquity of internet-based technologies appears to be alleviating some of the problems with poorly thought-out products. In particular, companies can no longer easily control how their products are perceived because the internet has helped potential buyers become intelligent purchasers by reviewing evaluations of good and bad products by other users prior to buying anything. There are also proprietary systems such as *MeaningMine* for searching the internet for conversations about different things that can help companies quickly find out what people are saying about their latest products and redress shortcomings in their offerings.

Coleman argues that in many senses older users are more adaptable to ICT and definitely less technology-averse than they are being given credit for. As people get older, he says, they start to have a better idea of what is and is not useful to them. They tend to gravitate toward things that fit in with their lives and find ways of using technology to do what they want it to do. In reality, their communication needs are not radically different to those of younger users, but understanding the subtle differences and the capability changes that come with age is central. At the same time, it must be acknowledged that older users are not a homogeneous group as naturally some of them find smartphones and computers useful and use them for a whole range of things, whereas others do not. In addition, it is wrong to assume that all older people who grew up in the analogue era do not immediately see the benefits that digital technology has to offer and find it difficult to understand. On the contrary, a growing number of older people, like Coleman who is close to 70 now, have used computers most of their lives and so are very comfortable with what we still consider 'new' technology. The overriding factor for older people is simply seeing how these products and services 'fit' into their lives. It is important that technologists think hard about these human and emotional factors and that, rather than seeing older people as a static force in relation to dynamic younger people, they acknowledge them as also moving and shifting, and a crucial component of future markets.

To business: a successful and sustainable future is about empowerment in your company. Time to move away from a renaissance court model to a modern democratic model, listen to your people and start to see the world through the eyes of all your potential customers.

Coleman points out that people are shaped by the world around them and it is through design that the world ends up being the way it is. It can ultimately be made a better, more inclusive place by a more responsible approach to design in business, government and education, and collective efforts by all three. It is also important to be agile in working with users to identify and recognise their capabilities, needs and attitudes.

At the end, Coleman offers four pieces of advice to four distinct groups that have the power to influence the design of a better future:

- To government: the future has to be about social cohesion, which can make the country a more wholesome place. Take example from the positive changes brought about by the London 2012 Paralympic Games.
- To business: a successful and sustainable future is about empowerment in your company. Time to move away from a renaissance court model to a modern democratic model, listen to your people and start to see the world through the eyes of all your potential customers.
- To designers: you need to have ambition that goes beyond yourself. Do not sit and wait to be asked because you have a big role to play in designing a more inclusive world.
- To educators: inspire young people to become part of the big ambition of creating a more inclusive future and teach them that design is a really powerful way of doing that.

References:

Coleman, R. (1994) "The Case for Inclusive Design: An Overview". Proceedings of the 12th Triennial Congress, International Ergonomics Association and the Human Factors Association of Canada.

To designers: you need to have ambition that goes beyond yourself. Do not sit and wait to be asked because you have a big role to play in designing a more inclusive world.

To educators: inspire young people to become part of the big ambition of creating a more inclusive future and teach them that design is a really powerful way of doing that.

Chapter 4:

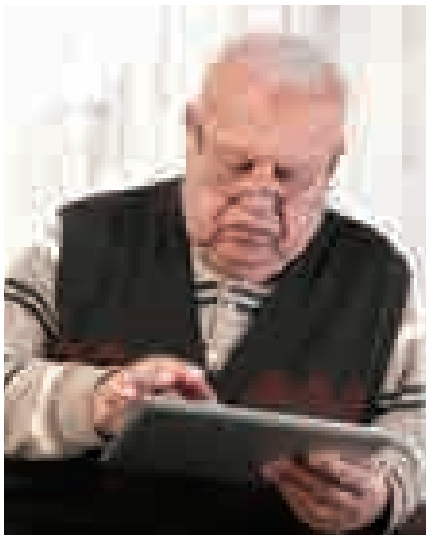
Call to arms to fill the 'know-do' gap in ICT

Gerald Craddock
Centre for Excellence in Universal Design

Gerald Craddock is Chief Officer of the Centre for Excellence in Universal Design at the National Disability Authority in the Republic of Ireland, which specialises in three important topic areas: product services, Information and Communication Technologies and the built environment.

Universally designed products and services open up wider markets for competitive companies, while also supporting an inclusive society.

The centre's work focuses on standards, development, awareness, education and training in universal design for accessibility and usability at national, European and international levels. Centre for Excellence in Universal Design is unique in being a statutory body established and funded by the Irish government. Central to the development of universal design is the concept of the 'know-do' gap, referring to the chasm between existing inclusion knowledge and its practical application. A central part of Craddock's and his team's work is bridging this gap through a



collaborative inclusive process of engagement.

The remit of Craddock's centre is to demonstrate to public and private organisations that universal design is a 'win-win' for all. Universally designed products and services open up wider markets for competitive companies, while also supporting an inclusive society. Craddock considers it vital that informed users, government and academia work with major Information and Communication Technology (ICT) companies to produce more powerful exemplars of universally designed technology. Statistics show that we have a growing older population that are increasingly technology savvy.

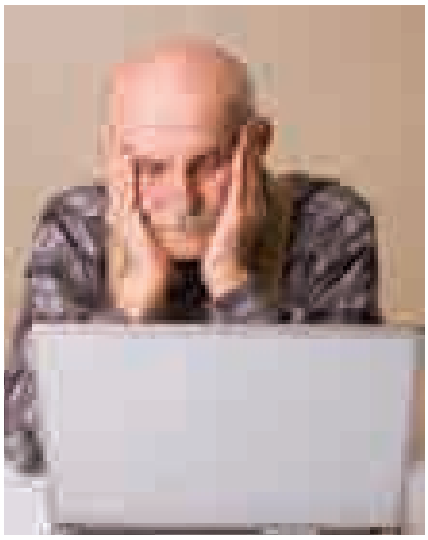
The ICT sector is a global industry, Craddock stresses, but unless it engages with end users, government and academic collaborators, its inclusion efforts will remain largely invisible and technological improvements will be insignificant. Therefore, it is crucial to raise awareness about universal design and strategically create champions in organisations who will promote it and push it towards acceptance. It is also essential that government and organisations, both private and public, acknowledge that populations are growing older and are becoming less able, and subsequently base their future business on a long-term strategy that embraces both universal design and the sustainable society. Research has shown categorically that companies can increase their market share by embracing the concepts of universal design.

Although there is an increasing awareness of our rapidly changing demographic, Craddock observes, designers appear to rarely have the 'eureka moment' and make the connection between people's varying needs, capabilities and attitudes, and design technological devices to accommodate them. This is largely a result of a slow uptake of the concept, philosophy and process of universal design in the public and private sectors. A related ongoing issue is that 'users' are typically equated with young and agile urbanites, rather than the wider age spectrum. The problem, he believes, is the lack of collaborative thinking by organisations from an internal perspective, coupled with limited engagement with the end users of their products and services. Despite that many organisations are aware of demographic ageing and the importance of making informed, socially responsible longer-term design decisions, it takes the whole team to convert them into effective action. For example, if practitioners do not talk to designers and vice versa, it is unlikely that universal design features will be incorporated in their products and services.

He recommends that all organisations always ask one fundamental question – who are we designing for? – and be open to the possibility that by making a few subtle changes to their current designs they could substantially increase their customer base. It is also important to involve the marketing team and show them that by looking beyond 'tomorrow' at a larger and more varied consumer profile could significantly boost their company's profitability. Encorporating informed users and observing their preferences at the design stage could lead to more creative and novel devices and services.

Craddock argues that a major obstacle in adoption of ICT by older generations is that senior users are erroneously perceived as a homogeneous group. In Ireland, for example, old is now classified as an individual over the age of 50. "I am over 50 and my use of technology is very different to, say, my mother-in-law who is in her eighties and actually uses a mobile phone and the internet for a variety of things, including booking flights, golf games and playing bridge", says Craddock. The larger problem, he notes, is that we are still at the very early stages of defining what we mean by older people, exacerbated by a significant lack of thoroughly-researched user information at national and international levels. Designers greatly underestimate the use of technology by older individuals and are failing to

The Information and Communication Technology sector is a global industry, but unless it engages with end users, government and academic collaborators, its inclusion efforts will remain largely invisible and technological improvements will be insignificant.



realise the use of ICT and its benefits for this cohort in the home and work environments. It is surprising, and somewhat tragic, how many companies are not seeing the market potential, observes Craddock.

A related but separate issue is that we are still failing to clearly demonstrate how the use of ICT could be beneficial to older individuals in their home and work environments.

Despite great advances by the technological sector in making today's smartphones and tablets more accessible than their previous counterparts, Craddock is puzzled over the private sector's tendency to dismiss the need for user testing. For example, Steve Jobs prided himself that Apple did not perform user observations to test and gather user feedback on any of their designs. Interestingly, however, the company has always recruited avid users of technology whose mission is to evaluate the ease of use and utility of their designed devices. The same is true of the OXO Good Grips home appliances, where employees regularly try out new utensils and investigate if they are comfortable and usable to use. Craddock acknowledges, however, that this approach works effectively only in situations where the company consists of diverse users and regards them as an integral part of the testing procedure. Though, generally this is not the case and, in fact, many industries are far removed from even testing their products themselves.

With ICT being a global commodity, significant resources are required to gather user information that would have impact on the design of more universal technology in the future. Yet, in spite of extensive proprietary user information being gathered on daily basis by many international companies, this data is rarely shared with academic research centres. A further problem is that a large proportion of the ICT sector is comprised of small-to-medium-sized enterprises that do not have an internal research capability to gather important user data to develop accessible and usable technology. As a result, Craddock suggests that there is a need for an international inter-organisational collaboration to gather such data and use it to develop user-centred frameworks, procedures and tools that would support the design of inclusive technology. For that to come about, however, collaboration is required at both a national and international level between research centres that can gather and synthesise the data, and make it available to all companies in order to develop and produce better, more inclusive products and services.

Craddock asserts that there needs to be both a lot more talk and a lot more action about people's changing needs, capabilities and attitudes in order to ultimately design better and more inclusive ICT for all generations.

We are still at the very early stages of defining what we mean by older people, exacerbated by a significant lack of thoroughly-researched user information at national and international levels.

The good news is that the Cambridge Inclusive Design Toolkit and other such resources are laying out a solid foundation for industry and government to better understand and incorporate inclusion. However, much work is yet to be done on benchmarking universal design to clearly indicate why, how, what, where and when to do it.

Overall, he advises government, industry and academia to join forces and work across disciplines to raise awareness about the importance of universal design. It is also vital to continue professional development from first stage education upwards and throughout all professional and social levels in order to bridge the existing 'know-do' gap.

Chapter 5:

The power of design and designers

Hua Dong
Brunel University

Hua Dong is a Senior Lecturer in Design at Brunel University, a Professor by special appointment at Tongji University and one of the pioneers of the inclusive approach to design in the UK and China. She has been researching *Inclusive Design* for over ten years with a particular focus on how designers work.

Many companies focus on getting people online, but very few provide them with the ongoing support they need to stay online.

"Everything in this world is designed; the question is: how well?", says Dong. Unfortunately, much of today's Information and Communication Technology (ICT) is poorly thought-out and, therefore, inadequately tuned to the needs of older users. One should not despair, however. Design approaches, such as inclusive design, have the potential to create more accessible and desirable products and services for a wide and varied range of users.

A lot of attention in inclusive design is expended on understanding end users, muses Dong. However, it is equally important to focus on designers as they principally decide how products will look and function. A long-standing problem in industry is that, even though the users are the centre of the design discourse, they are little understood by designers who, in turn, tend to design for one specific demographic: the young and able-bodied. For example, when Zhang Bo, the designer of *The Great Hall of the People* built in Beijing in the 1950s, recently visited his building as a wheelchair user, he said: "The greatest pity I have is I can no longer access my building". Like many of today's technologists, he did not account for the fact that human abilities and needs change in different life stages.

Inclusive design has traditionally focussed on 'old versus young' and 'disabled versus able-bodied' users, and this is largely reflected

It is particularly essential for this [older user] group to be reassured that if something breaks they can always call upon help and speak to a human who will fix it and explain why things have gone wrong.

in how industry today segments its target markets. Dong notes that it is still important to focus on these disparate ranges of age and capability, but it is not enough: attention should be also paid to people across these spectrums and levels of task knowledge required during technology adoption and use. Furthermore, it is vital to motivate users by providing them with a challenge not only to keep them physically and mentally active, but also to better prepare them for the future. Although few studies exist on the topic of active training of multi-senses for better utilisation in the future when one or more of the senses malfunction, Dong asserts that active usage habits need to be increasingly reinforced in design.

Furthermore, she states that one of the key barriers to older users' adoption and use of ICT is that its advantages and usefulness are not properly communicated to them. Today's older people grew up in the simpler mechanical era and, unless effort is put into introducing them to digital technology and explaining its benefits, they will not be motivated to explore and effectively utilise it in their lives. It is high time that technologists realised that people are increasingly becoming intelligent buyers and, therefore, 'technology for technology's sake', without the ability to tune into the needs and capabilities of different users, is no longer an attractive offering, if it ever were.

Another anxiety that inhibits seniors from using technology is the fear of breaking equipment or doing something wrong when using it. Many companies focus on getting older people online, Dong explains, but very few provide them with the ongoing support they need to stay online. It is particularly essential for this group to be reassured that if something breaks they can always call upon help and speak to a human who will fix it and explain why things have gone wrong.

Dong has one specific concern at the moment. While many distinct efforts are presently under way to combat the problem of the digital divide, getting everyone online can only be a short-term solution because technologies are likely to change in the future and people's knowledge will always be shaped by the devices used in their formative years. Hence the digital divide will remain. Good design and usage infrastructure, finely tuned to the characteristics of different users, is critical for individual, industry and government well-being as we move into an era dominated and enhanced by technology.

Inappropriate design is a further deterrent contributing to a limited uptake of ICT by many older users. A lot of digital equipment, typically laden with a variety of small buttons, fiddly controls and unnecessarily complicated interfaces, is targeted at young, able buyers who have grown up using it. For digital devices to be taken up by older users, it is important that they are easy and pleasurable to use, inherently motivating and visually appealing. For example, a recent study by Dong and her team, which focussed on improvement of the intuitiveness of the Age UK website that helps older users with mobility problems remain independent, showed that enhanced accessibility and usability could increase user satisfaction and profits by 20%.

Furthermore, technology providers need to understand that the marketing of 'specialised' products aimed at the 'frail elderly' is not going to get them anywhere. Older users do not like to buy equipment that advertises to the word: "I am old and feeble", says Dong. They want products that reflect their lifestyles and help them cultivate their interests.

Dong further claims that technology is currently advancing so fast that not nearly enough attention is given to potential older consumers. There are, of course, examples of companies which promote inclusive design strategies relating to the older market: BT, Barclays Bank and Panasonic, to name a few. However, the ongoing problem is that a lot of the already aware organisations are still failing on several accounts to think in an inclusive way for as big a market

A lot of digital equipment, typically laden with a variety of small buttons, fiddly controls and unnecessarily complicated interfaces, is targeted at young, able buyers who have grown up using it.

group as reasonably possible. Good intentions alone are not sufficient: it is vital that companies fully understand and effectively implement the inclusive design ethos that they aspire to. In addition, it is important that they focus on creating a healthy balance between profit and professional values.

Having spent a decade researching the major barriers to the uptake of inclusive design in industry, Dong offers three specific pieces of advice to companies which aspire to be inclusive in their offerings: "First, look at the previous success stories to realise that inclusive design is possible and provides a profitable business case. Second, rather than think about achieving 'inclusive design targets', focus more on making things easier for as wide a sector of customers as reasonably possible. Third, have a senior level champion who will inspire and adequately support the whole design team".

What about users' awareness? As with designers and decision makers, users also have to be better informed about the benefits of good design. The truth, says Dong, is that many older people do not see beyond the price tag. They often do not focus on the bigger picture, in that a slightly more expensive product that is made of higher quality materials and subsequently more ergonomic will actually serve their declining capabilities better, and be more cost effective in the long-term. Once again, the key is to clearly articulate the benefits that a product or service can offer and provide effective ongoing support. Fitting all these things into design is a challenging task, but certainly one that is worth pursuing.

Dong ultimately argues that better designed technology can increase the use of ICT tools and improve the independence and overall well-being of older people, as well as enhance the profitability of businesses. However, just relying on designers is not going to solve the problem. Positive change will only happen when all the elements work together and there is continuing education of designers, businesses and customers, coupled with continuing design exploration, creation and evaluation.

Good intentions alone are not sufficient: it is vital that companies fully understand and effectively implement the inclusivde design ethos that they aspire to.

Chapter 6:

The role of motivation, supported learning and self-efficacy

Onny Eikhaug
Norwegian Design Council

Onny Eikhaug is the Programme Leader for *Design for All* at the Norwegian Design Council. She is a business woman with an MBA, co-author and editor-in-chief of the book *Innovating with People: The Business of Inclusive Design*, and committed promoter of sustainable, people-focussed design.

Being a Norwegian national, she talks keenly about the strong government focus and commitment toward inclusive design in her homeland. Indeed Norway is one of the leading authorities in implementing the principles of inclusive design as a strategy for innovation and creation of a more sustainable society. "We have come quite far now and we have quite aggressive legislation to enforce inclusive design as a fundament for everything we do for the public and also private development", she explains. The Norwegian approach stems from the Nordic model of social governance driven by a strong sense and notion of equality toward diversity and inclusion within society. In addition, since 50+ year olds constitute about 80% of the purchasing power and wealth in the western world, it is almost a no-brainer that competitive advantage in today's world can be largely gained by targeting a wider range of customers.

Although the Norwegian Design Council has been very successful in promoting the uptake of people-centred design, Eikhaug stresses that the future of innovation in this space relies on a close collaboration with other people-focussed centres of excellence, as well as the government and commercial organisations, because no one centre has all the answers.

The huge potential of the internet allows people previously excluded from full participation in society finally to become integral and appreciated members of society. Eikhaug tells the story of a blind man who interacts with other people by taking photographs of different places and individuals that he encounters, and

Since 50+ year olds constitute about 80% of the purchasing power and wealth in the western world, it is almost a no-brainer that competitive advantage in today's world can be largely gained by targeting a wider range of customers.

posting them on Facebook. As time goes on and users adapt Information and Communication Technology (ICT) to their needs, it is likely we will see more technology playing the role of a barrier-crasher in all aspects of life.

She has one particular concern at the moment. Despite the great inclusive work on, for example, many household appliances and cars, and perhaps aside from the Apple i-products and services, it is still rare for ICT creators to accommodate the diverse needs and capabilities of the population at large in their designs. Why does this happen? Because there is still plenty of ignorance, prejudice and misconception in the technologists' understanding of their markets and target customers. Firstly, there is talk about mass market and the average customer, which is plainly wrong, bemoans Eikhaug. Secondly, a plethora of market research is gathered without a careful consideration of how to best design surveys, interviews and observations, what types of people to involve and how to best engage them without biasing the results.

The larger problem, she says, is that companies of all shapes and sizes really are not aware of who their customers are. It is a very simple question, but if you can really answer it, you will get so much farther and your solution will be so much better.

While she deems useful the use of design support tools such as personas and user journeys, she fundamentally believes that involving real people is always the best method. "You can never fully imagine what other people need because every person can provide a new insight that you would never have thought of yourself", she observes. But how to choose the most optimal lead users? Preparation is key, asserts Eikhaug. It is important to start any project with identification of the core objectives, followed by a definition of the main problem areas and challenges, and who the extreme lead users may be. For example, a hearing impaired person may not be as useful in informing the design of a physical product as a visually impaired child or a person with arthritis would.

Although designers increasingly want to design inclusively for an intuitive user experience, doing it properly from the onset is time consuming, goes beyond the allocated budget or is frequently constrained by the client's short-sighted brief. What is urgently needed is the education of design buyers (clients) because the most enlightened designers alone will be unlikely to convince their clients of the value of the inclusive approach. It is also important that knowledge and good multidisciplinary design examples are widely shared, because even the smallest proof or piece of documentation on real-life behaviour can speak a thousand words.

Regarding older users, Eikhaug points out that technology plays an important role in their lives: it helps them maintain social connectedness with family and friends, which, in turn, contributes to reduction of loneliness particularly common in later life, as well as cultivate different hobbies and simplify many of the daily living tasks. It should be borne in mind, however, that the ageing populations use modern technology in heterogeneous ways and many rely on it greatly once they have overcome the initial adoption hurdle. One should hence account for the large variety in age, capabilities and skills among senior users (e.g. the younger older, the newly retired and the very old).

Companies of all shapes and sizes really are not aware of who their customers are. It is a very simple question, but if you can really answer it, you will get so much farther and your solution will be so much better.

There is an ongoing challenge in teaching older people, who grew up in the analogue era, how to be fully-able digital citizens, however. Eikhaug strongly believes that free computer courses with young, digitally-able tutors and the availability of community computer centres can help alleviate some of these issues. In addition, including younger people in imparting digital knowledge to older generations can be incredibly beneficial to the very fabric of society. It is a 'win-win' situation, she advocates.

It is well documented that it is not necessarily that older people do not want the technology, but rather that they do not always know how to get started. There is unfortunately still an abundance of prejudice and preconceptions that older people want simple things, laments Eikhaug. She talks about a recent project with Samsung (carried out at the The Helen Hamlyn Centre of the Royal College of Art in London) concerned with the design of a more inclusive mobile phone for older users. One major problem that was uncovered was the lack of comprehension of technological language, such as MMS and SIM, among older individuals. In addition, it was found that a lot of features that older users wanted in a mobile phone were already there, but they had no idea how to access them due to multi-layer menu structures. Case studies such as this make it apparent that accessible and considerately laid-out technology provides opportunities for increased adoption and use by diverse types of users.

Another major concern that Eikhaug shares relates to the current restrictive employment framework set on achieving 100% productivity all the time and favouring younger workers. As a result, a lot of older people leave or are forced out of jobs, which is especially problematic in the new ageing society that can be only kept sustainable if people work longer. There is an urgent need for the development of new inclusive human resource policies, more flexible schemes of work and a working culture that values knowledge and experience, as well as human diversity.

Interestingly, there is a strong expectation that, since many persons between the age of 50 and 60 are now actively using technology, the problem with digital exclusion will be solved in a few decades' time. Nevertheless, for this hope to truly come about, good intrinsic motivation coupled with continuous learning and training have to be provided. Eikhaug's particular wish for the future is an increase in the development of intuitive and easy-to-adopt technology with no need for specialised equipment or complicated manuals that will eradicate the fear of stigmatisation and mistakes. She also acknowledges that as useful as technology may be, it should never attempt to replace human contact, especially in healthcare and social services.

Eikhaug concludes that awareness of the problem with modern technology is the first step in finding a solution and it is important that users are put at the heart of any product or service development.

Preparation is key. It is important to start any project with identification of the core objectives, followed by a definition of the main problem areas and challenges, and who the extreme lead users may be.

References:

Norwegian Design Council (2010) "Innovating with People: The Business of Inclusive Design".

Too little mainstream technology gives older people a sense of confidence and control of their environment that they want.

Chapter 7:

ICT, older users and economic viability: Moving beyond 'special' to mass customisation

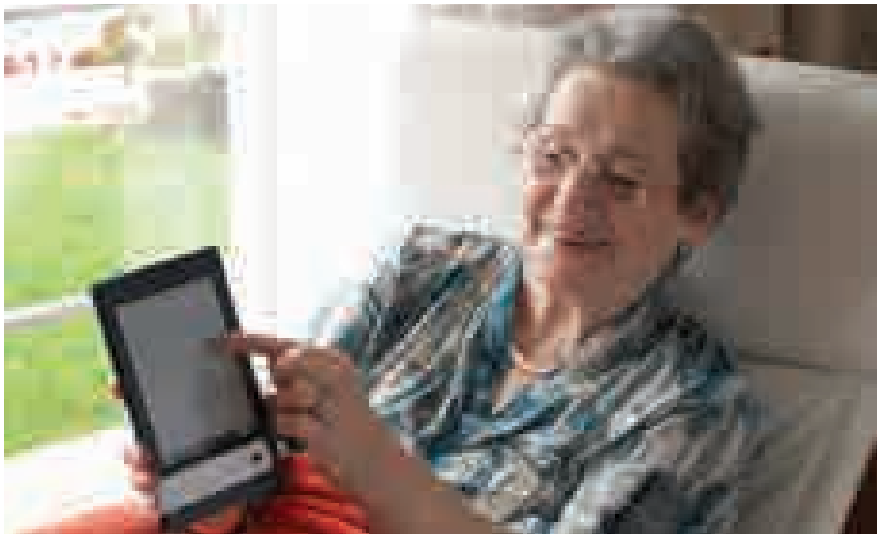
Valerie Fletcher
Institute for Human Centered Design

Valerie Fletcher is Executive Director of the Institute for Human Centered Design, an international educational and design not-for-profit organisation based in Boston, USA. She is a Special Advisor on *Inclusive Design* to the governments of France and Singapore, the Open Society Institute and the United Nation's Department of Economic and Social Affairs. In 2005, she received the *Women in Design* award by The Boston Society of Architects.

Being an expert in user-centred design, Fletcher is on a mission to enlighten and inspire people in the US and globally about the importance of accommodating the diversity in the population in mainstream Information and Communication Technology (ICT) products and services. Through her work, she challenges the common tendency to equate inclusive design with accessibility and the deep-seated attitude that it is disconnected from economic success. It is important to reframe these issues, she says, and get people to recognise the strong pecuniary case for inclusive design, as well as the extraordinary opportunity that engaging with real people provides. She also believes that we need to promote the conceptual underpinning of environmental sustainability and social sustainability that incorporates inclusive design: the value of diversity, the inevitability of interdependence, the importance of data/science to drive decision-making, and ensure that no decision is without long-term consequences.

Over the last couple of years, Fletcher has devoted a significant amount of time to delving into the world of entrepreneurship and innovation and working on expressing the

The more intuitive a product is, the better the appreciation, the better the willingness to use it, and, with rare exceptions, this is true for all the echelons of society and across all age groups.



inclusive ideas in a way that would better appeal to business. As a result of these efforts and those of other inclusion champions, there is a rising commitment in industry to ensure that product development is accompanied by a considerable amount of testing with real heterogeneous users. Those who primarily get it, she explains, are a combination of the big companies' in-house design teams and consultancies. Tragically, however, there is still a plethora of businesses, even high-calibre organisations, which retain the attitudinal barrier that there is no economic impetus in inclusion and that "people who have functional limitations are fundamentally different".

Interestingly, she has found that encouraging conferences and expos with students, designers and business leaders have been a major asset in broader acceptance of inclusive design concepts by all groups concerned. It is vital for these stakeholders, she argues, to think about building long-term success and capacity that actually is not a fleeting fancy in the market and does not provide for a narrow customer base only. In addition, Fletcher has realised that students and young practitioners are particularly quick to understand the ethos of inclusive design and are typically the driving force in practising it. There is a great deal of receptivity and the potential of influencing career-long adoption in these two groups, she muses, because they see that design shapes the quality of life while delivering a meaningful career, and can ultimately enhance social sustainability.

This imparting of knowledge has been two-sided, however, as Fletcher has also learnt the importance of making a persuasive business pitch that illuminates the spending power of older consumers and what the characteristics of successful products are.

Regarding the older people versus ICT debate, Fletcher says that too little mainstream technology gives older people a sense of confidence and control of their environment that they want. Unfortunately, there is still an overabundance of old habits that provide technological solutions targeted at older users that are too 'special' and often stigmatising in appearance, and with evidence of too little attention paid to the ageing cohorts and their very different relationship to technology. Another of the long-standing challenges is that too much of technology that people have been exposed to is over-engineered. There are simply too many complex features that are not comfortable or particularly valuable to use because the learning commitment required is too extensive. The more intuitive a product is, the better the appreciation, the better the willingness to use it, and, with rare exceptions, this is true for all the

echelons of society and across all age groups.

Fletcher asserts that the focus needs to be on the usage evidence, which essentially shows that the proportion of people who love 'feature creep' constitutes a very small part of the spectrum. Older people and many young individuals prefer simplicity and intuitive-use products that are manageable and designed around their lives. The truth, Fletcher explains, is that most people do not want to be overwhelmed every six months with a never-ending learning curve.

In addition, a lot of technology specifically designed to 'assist' the lives of the ageing population have been stigmatising, ugly, expensive and often financially inviable. Fletcher argues that the smart money is on building the generic product that can work for everyone, even if it is through tailoring. For example, Apple has done very well with building a platform for apps that allows accessibility to be easily incorporated across the full spectrum of age and ability.

One much-debated concern that Fletcher has at the moment is the high number of design consultancies, among them many high-calibre ones, taking on development of products for older and impaired people without the willingness to learn the needs, abilities and aspirations of their targeted demographic. "They [design consultancies] hang up their coloured stickies all over and line up corridors full of test users – typically able-bodied people from 25-55 – but they consistently fail to see the bigger picture". They do not understand it because they have had too few opportunities to have direct interaction with atypical users. This behaviour starts very early at university where surrogates for 'real users' are the other students and it ultimately becomes a habit of finding people like oneself, instead of bringing in people whose life experience is fundamentally different from the typical designer.

Another largely unaware group are the clients. The reality, Fletcher says, is that if the client demands inclusive design, any attitudinal barriers in the design organisation will be quickly forgotten. A related deterrent is that, although clients are quite interested in user research, they often do not know how to differentiate between quality evidence versus research that is really more of a marketing pitch. Therefore, it is imperative to urgently educate clients about the key role that inclusivity plays and provide them with solid evidence-based data on the diverse needs and capabilities of the population at large.

On the whole, Fletcher feels that much work is yet to be done to design intuitive, motivating and satisfying ICT for older people. She has a great trust, however, in the power of agile practitioners and businesses as the group which will mostly contribute to the design and delivery of more inclusive technology. As the appetite and expectation of mass customisation in all of our technology becomes the norm, she suspects it will help to mainstream inclusive design.

They [design consultancies] hang up their coloured stickies all over and line up corridors full of test users – typically able-bodied people from 25-55 – but they consistently fail to see the bigger picture.

Chapter 8:

ICT for today's population, not the population from the last century

Sally Greengross
House of Lords

Baroness Sally Greengross has had a distinguished career in supporting people from all walks of life. Notably, she has been an independent member of the House of Lords since 2000 and Chair of four All-Party Parliamentary Groups: Dementia; Corporate Social Responsibility; Intergenerational Futures: Old & Young Together; and Continence Care, and Co-Chair of Ageing & Older People. She also heads up The International Longevity Centre think-tank, which looks at demographic change and its impact across the whole life-course.

Greengross is without a doubt a fighter for those who are disadvantaged in some way in our society. She expresses a particular worry that any product or service aimed at older users immediately puts them in a box labelled 'frail and nearly there'. Unfortunately, being old is still largely stigmatised in our society, laments Greengross. Why do we stigmatise older people in the modern era, especially given that the world's population is ageing at an unprecedented rate? Because in modern society anything connected with dying is not very popular. Wisdom, knowledge and history are no longer valuable traits because the rapid pace of technological advancement has transformed that particular value system by favouring youth, energy and short-term gains.

If Greengross had a motto regarding the under-appreciation and stigmatisation of older people, it would be: "We have to forget about age and look at who our population

Why do we stigmatise older people in the modern era, especially given that the world's population is ageing at an unprecedented rate?

are". Older people must be full citizens and be recognised, welcomed and celebrated in our society, rather than be seen and treated as a special case. There is an urgent need for a more egalitarian society where everyone is entitled to a happy, equal and supported life. Conceivably there is something to be learnt in the UK from the Scandinavian model of society.

While she agrees that charitable organisations such as Age UK are clearly very important, she does not agree with singling out the older population in the general consciousness. The real purpose behind technology of all sorts is to serve the needs and wants of all people, and to accomplish its true aspiration, modern Information and Communication Technology (ICT) must not be discriminatory. It is high time that modern inventions stopped perpetuating fear among less experienced users by imposing steep learning curves and dictating to press this button or tap that icon, and started being understandable and useful to all.

Any change in law immediately leads to changes in behaviour. The change in attitudes takes much longer to come about, however. What can be done to inspire a change in attitudes? "Government intervention and a big awareness campaign", muses Greengross. The UK has a number of world-leading advertising agencies and TV producers. "Why not use them and make thinking about life-course changes popular?", she proposes. They could raise awareness in much the same way that the widely advertised London Olympics and Paralympics Games made sport popular. The message has to be positive, however.

In addition, since the likes of Bill Gates and David Beckham are fast approaching what our society considers older age, they could become good champions of a change in attitudes toward ageing. Most people may not listen to the Prime Minister or other such institutions, but they are considerably more likely to listen to a celebrity or a royal. For example, the conference on design that Prince Philip, Duke of Edinburgh, headed a decade ago was so highly regarded in the government, industry and academic circles that it inspired many significant changes in how the needs of the population are accounted for in design.

Furthermore, as a matter of priority, it is important to teach children in early education about the key role that user-centred design plays in the lives of individuals and societal well-being. It is also essential that the value of authentic, practical and supported education is acknowledged as it will ultimately influence the design of a better tomorrow for all. Of course the industry must work together with government and academia to sew this change in the very fabric of society.

Greengross believes that many designers are fully cognisant of the importance of inclusive design and are more than capable of coming up with an inclusive solution when required. Unfortunately, for various reasons, including short time scales and finite budgets, designers are often not asked to do so by their bosses and clients, nor they are given appropriate support to do it on their own initiative. Britain is a land of well-respected investors and designers, observes Greengross, but the country's innovative skills are currently largely underutilised. "We need to celebrate the fact that design is having an impact on both our present and future, and encourage companies and other countries to take it up".

As the world population ages, Greengross sees the need to increase the inclusivity of today's ICT. Nobody is quite as sure as they used to be about what happens on 'the other side', she says, so we want to stay around here as long as possible. However, for this to happen, we have to make life with the population we have now, not the population we had in the last century. For instance, over the last few years Greengross has been a passionate advocate of the importance of design in helping people with dementia have a decent quality of life. This condition, diagnosed in 750,000 Britons, is the great health challenge of the 21st century, but remains largely untreatable and ultimately fatal. Unfortunately, the design investment into dementia lags far behind its

We have to forget about age and look at who our population are.

future impact on our society, and this is just one of many conditions that affects Britain on a daily basis.

Clearly technology can transform things. However, for it to be better utilised in everyday life, the needs of all people must be first well understood. Design approaches such as inclusive design are very important because, whether it be through better designed daily living products or built environments, they help overcome many problems particularly common in older age, such as human isolation, confusion or forgetfulness, without putting a big "I am frail and old" label on its users. For example, the OXO Good Grips products are hugely popular because they are usable to people across different ages and ranges of capability, and are also very visually appealing.

To combat technological problems, it is also important to bring older and younger populations together. The Prime Minister, David Cameron, is already talking about 'Big Society' where people from different generations and all walks of life form local groups of support. Older generations, for example, can tell younger generations how to set up and run a business, whereas younger people can teach older people how to play computer games or set up an email account.

Greengross concludes with saying that technology has the potential to improve the collective worldwide well-being. She thinks that we are on the right track, but have to work together to advance more quickly to our ultimate goal: a better, more fulfilled and enjoyable life for the whole population.

We need to celebrate the fact that design is having an impact on both our present and future, and encourage companies and other countries to take it up.

Chapter 9:

The art of simplicity

Ian Hosking
University of Cambridge

Ian Hosking is a Senior Research Associate in the Engineering Design Centre at the University of Cambridge. He has over 20 years of experience of working in industry with a focus on the effective application of technology through understanding people's needs. He has a great passion for making things easy to use: "It is obvious that things should be easy to use, but it is not always obvious how to make them easy to use".

It is obvious that things should be easy to use, but it is not always obvious how to make them easy to use.

Since Hosking is no stranger to both the demands of the commercial world and the aspirations of academia to put users at the heart of product and service development, we asked him how effective the dissemination of knowledge between these two currently is. There is good and bad news, he says. The good news is that the problem has shifted more to how you do inclusivity, rather than the fact that you need to do it in the first place. However, the bad news is that far too little rigour is put into understanding user needs, particularly during the requirement capture and evaluation phases of the design process. Why does it happen? At one level it is probably because of an underlying lack of awareness of the issue within industry. It is often all too easy to dive into creating something, rather than step back and actually understand who the users and the stakeholders are. Another issue, Hosking muses, may be apprehension related to the risk and cost impact of doing things differently.

There is no denying the fact that the population at large is very diverse. Therefore, saying that younger

people are technological and older people are not is no longer meaningful, if it ever were. Neither it is meaningful to view older people as an entirely homogenous group, Hosking explains, because the older age group is so diverse it is little better than saying: "We are targeting people". When trying to design for good experience by senior users, it is important to precisely pinpoint which particular sub-segments of this group are the key target. For instance, one sub-segment can be people who really struggle with the basic features of a mobile phone, whereas another sub-segment may be people who do not and would like a smartphone, but cannot quite use it. Once the target sub-segments are identified, it is vital to perform iterative prototyping and testing before serious effort is committed to development.

Experience shows that a lot of older users do not want products that scream: "I am old". They want to be an integral part of contemporary society. Accordingly, Hosking asserts that we can no longer be unaware of their requirements because a lot of them struggle or are frustrated with Information and Communication Technology (ICT) for lots of reasons, including sensory decline, cognitive issues or things just getting harder as one gets older. For example, Hosking tells the story of a lady who was convinced by her children that she should have a PC, but greatly struggled with it to the point that she was afraid to enter the room where the computer was placed. In the end her children took the computer away and she started using the room again.

Hosking says that he has seen a lot of older people use their technology in a very restricted way. For instance, one hearing aid user that he encountered had a good understanding of how to put his mobile phone in a speakerphone mode, but could not work out how to use the volume controls. As a result, this person always had the speakerphone on and had to constantly take his hearing aid out because it was too loud. It was a working solution, Hosking observes, and this particular user conformed to what was familiar, rather than explore the unfamiliar that would ultimately be more useful to him.

In addition, Hosking talks about numerous older users who write down very specific instructions for how to use a given device. For example, one user noted the menu structure for sending a text message. Another user wrote out the full instructions for making a phone call on a mobile phone, which included very specific steps such as turning it on, remembering to dial the area code and turning it off. Moreover, many other older individuals told Hosking that they use mobile phones only in an emergency and, given an abundance of negative media stories, they are generally anxious to use ICT because they fear that their bank account details and overall identity may be stolen.

Case studies such as these make it clear that poorly planned technology, rather than be a force for good, creates a lot of anxiety and frustration, dampens willingness to explore and leads to restricted usage. As a consequence, it gets harder to

The good news is that the problem has shifted more to how you do inclusivity, rather than the fact that you need to do it in the first place. However, the bad news is that far too little rigour is put into understanding user needs, particularly during the requirement capture and evaluation phases of the design process.

muster motivation and master the rapidly advancing suite of ICT. To cope, many people resort to using older versions of computer software because they can do what they need without having to go through another steep learning curve. However, there is an increasing compatibility problem because up-to-date virus protection, for example, may only work on the latest version of the operating system.

The problem is that unless technologists see or experience the difficulties that users face, they are unlikely to change the way in which they develop their devices and systems. The truth, Hosking explains, is that in general virtually anybody will have a problem with any product. How to bring about positive change, however? It is clearly challenging because the need for differentiation and new sellable features on the business side counters the need for consistency and familiarity on the user side. It is a balancing act, but technologists have to learn how to do that trade-off. One possible approach is to have two interface options, one old and one new, to allow enough time for a seamless transition. Another option is to layer the user interface with progressively more advanced modes, where the initial layers contain simple, consistent and familiar features and subsequent layers have more sophisticated, additional ones.

In the new economic climate, the short-term perspective on the changing demographics and their needs is becoming a central issue in the development of modern ICT. Many companies are not yet reacting to this change because they are preoccupied with quarterly reporting, which often obstructs them from seeing a longer-term impact. In addition, many organisations view inclusion as an extra overhead, rather than an investment in reducing cost downstream and avoiding mistakes, reducing support costs and improving brand perception. Hosking points out that people who are 70 today could easily live for another 10-20 years and they are unlikely to want to keep changing their phones and computers. Therefore, it is important to have a long-term view of addressing this market, with the potential for strong customer loyalty. This is also a growing opportunity as the population ages. It is estimated that more than a third of children born in 2012 will live to be 100 years old.

Another concern that Hosking has at the moment is that designers often do not see inclusivity problems and reflect on them because they have not been made aware or trained to see the issues. A further difficulty is that they have the benefit of deep domain knowledge and, as a result, they frequently cannot envisage what it is like to be a novice user. What it really comes down to, according to Hosking, is the need for increasing education of designers, business leaders and clients to look more critically at and reflect more deeply on their products and services.

Ultimately, the cliché is that companies need to have an in-depth understanding of their users.

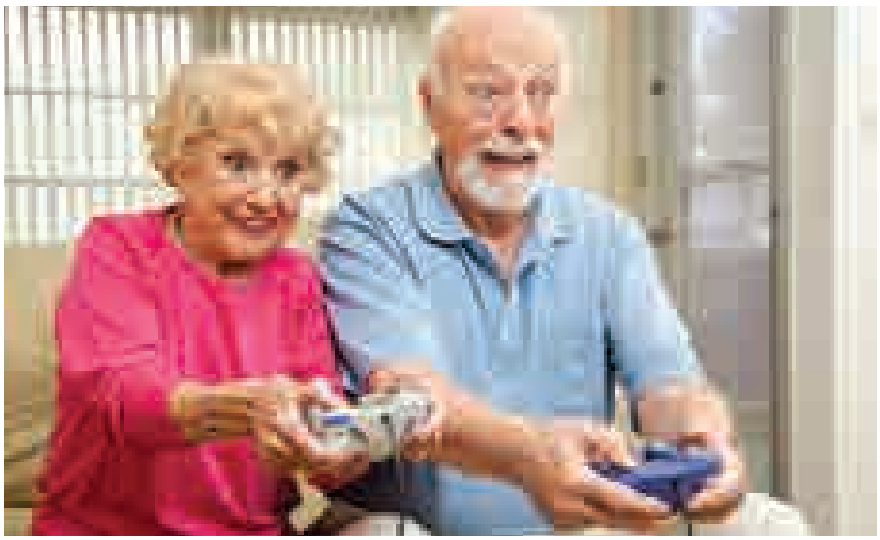
Saying that younger people are technological and older people are not is no longer meaningful, if it ever were. Neither it is meaningful to view older people as an entirely homogenous group, because the older age group is so diverse it is little better than saying: "We are targeting people".

Poorly planned technology, rather than be a force for good, creates a lot of anxiety and frustration, dampens willingness to explore and leads to restricted usage.

Hosking agrees, however, that it takes time, effort and discipline to thoroughly understand what users need and want, and to then quantify that across a whole market. To become more inclusive, companies require high-level buy-in, long-term strategy, skilled people and access to support tools and resources such as the Cambridge Inclusive Design Toolkit. For example, by using the Toolkit's *Explore-Create-Evaluate Framework* and the *Exclusion Audit*, a simple grid-based approach to systematically evaluating a product step-by-step, organisations such as Nestlé and Emporia have considerably improved the inclusivity of their offering. Most notably, even with the right vision and the will to do it, tangible change comes down to well-targeted initiatives backed up by skilled people who follow it through and make things happen.

Lastly, Hosking says that it is important to: "Forget what you know about your product and look at it afresh as if you are a first time user, suddenly you may see it in a whole new light. 'Forgetting what you know' is part of the 'art of simplicity'". In due course, practising this and designing inclusively will result in more effective products and services, cheaper running costs long-term, fewer support calls and happier customers.

Forget what you know about your product and look at it afresh as if you are a first time user, suddenly you may see it in a whole new light.



Chapter 10:

ICT, confidence and well-being

Felicia Huppert
University of Cambridge

Felicia Huppert is Professor Emeritus at the University of Cambridge in the Department of Psychology and Director of the University's Well-being Institute. She specialises in the causes of well-being and techniques for enhancing it. In 2008, she was the lead expert on well-being for the UK Government's Foresight Project on *Mental Capital and Wellbeing*, which identified five ways to well-being: *Connect, Be Active, Take Notice, Keep Learning* and *Give*.

Confidence underpins much of how we behave in the real world and is particularly relevant to the use of Information and Communication Technology by older people.

Huppert explains that well-being is the combination of feeling good and functioning effectively. However, well-being is not simply feeling happy all the time because it is also appropriate to feel negative or painful emotions, e.g. sadness, anxiety, anger, in the face of experiences such as loss, disappointment or injustice. The concept of feeling good incorporates such emotions as happiness, contentment, interest and affection. The concept of functioning effectively involves the development of one's potential through having a sense of purpose and control over one's life, an attitude of confidence and optimism, and experiencing positive relationships.

Among these components of well-being, confidence underpins much of how we behave in the real world and is particularly relevant to the use of Information and Communication Technology (ICT) by older people. More specifically, older people's competence with modern technology is often high, but their confidence in their own abilities is frequently very low. There are two reasons for this. The first relates to the fear

of having to deal with something that is unfamiliar; moreover, older people are generally risk-averse and technology requires a certain amount of risk-taking, especially for inexperienced users. The second and arguably more significant reason – one that needs to be seriously challenged – is the prevalence of ageist stereotypes, which characterise ageing populations as incapable of learning novel things.

Huppert cites evidence that the stereotypes of ageing (e.g. terms such as 'needy', 'senile', 'inactive') impinge on the ability and confidence of older people in a very negative way. Not only do such stereotypes interfere with people's motivation, enjoyment and flourishing in the latter part of life, but they also have a detrimental impact on people's health, well-being and longevity. The ageist stereotypes exist despite the fact that people are now living lives which are longer, healthier and more productive. In particular, average life expectancy in the UK is now around 80, yet the average retirement age is 61. This means that people are likely to spend about a quarter of their life in retirement and, thus, being 'old' in their own and others' eyes. Regrettably, society's structures and attitudes, Huppert explains, are not keeping abreast of the new reality of ageing. It is important that we challenge peoples' views of the old and of ageing by questioning these stereotypes.

The stereotypes of ageing (e.g. terms such as 'needy', 'senile', 'inactive') impinge on the ability and confidence of older people in a very negative way.

A corpus of solid studies shows that stereotypes have a direct link to health and well-being. For example, Becca Levy and her colleagues (Levy *et al.*, 2000) found that older people who were subliminally exposed in an experimental situation to negative stereotypes about ageing (e.g. terms such as 'senile', 'decrepit' and 'needy' as opposed to 'wise', 'sage' and 'experienced') displayed a more negative response to stress, decreased confidence and impaired cognitive function. In addition, Levy *et al.* (2002) found that older individuals with more positive self-perceptions of ageing behaved as though they were 23 years younger and lived 7.5 years longer than those with less positive self-perceptions of ageing. In comparison, low blood pressure, low cholesterol, not smoking and taking regular exercise only adds about one or two years of life expectancy. What these studies collectively indicate is that holding positive views of ageing has a beneficial impact on the well-being of all people.

Huppert asserts that carefully thought-out advertising could play a significant role in changing older people's perception and attitude toward technology, and in the process also positively influence their health and well-being. For example, the media could do more in the way of using TV mini-dramas or soaps to show older users who initially were very sceptical about a certain piece of technology getting competent with it over time and starting to really benefit from it.

Moreover, since videogames (both online and offline) offer a uniquely powerful means of engaging people, and in a major UK study 42% of regular gamers were over 50 years (UK National Gamers Survey, 2009), Huppert suggests that video games designed to be attractive to older people could be used to alleviate some of the problems with technology adoption. She references the work of Jane McGonigal (2011), who has created videogames which demonstrably enhance social relationships, teamwork and problem solving, all of which can lead to increased well-being. Interestingly, in order to engage, excite and connect people with reduced intellectual abilities, Johnson and colleagues (2012) are currently developing a new gaming system called *Stomp*, which could simplify access to and usage of gaming technologies. The findings of this latter work have the potential also to inform the design of more inclusive ICT for the ageing population.

It is undeniable that people become less able physically and to some extent mentally as they get older. The perception of declining functioning, compounded with the very fast pace of life and change in modern society, has resulted in a largely distorted portrayal of the technological abilities of the older population. This depiction, Huppert says, is a result of an unjust comparison of technological competence of older

When well designed, Information and Communication Technology can help people both feel good and function effectively, and thereby contribute to the five ways to well-being: *Connect, Be Active, Take Notice, Keep Learning* and *Give.*

people with those who are several decades younger. In comparison, the aptitude of a 30-year-old is rarely contrasted with the technological ability of a 10-year-old; very young children are often better at using ICT because they are less risk-averse and have fewer inhibitions than people who are even a few years older than them.

Huppert laments that there is an arms race whereby manufacturers offer increasingly sophisticated engineered products; if one product has ten functions, the next needs 12 or more. Yet, she points out, if those manufacturers bothered to consult real users at the start of the design process they would realise that most people, particularly older people, actually prefer fewer functions. She also notes that a majority of older people find certain types of technological innovation unnecessary. For instance, is it absolutely necessary to be connected 24/7 to mobile phones and computers? Older people like freedom and balance in life and, as long as they are not technophobic, they are happy to make technology the servant rather than the master. Consequently, Huppert urges companies to consider early on the diverse characteristics of their potential customers and the percentage of people that would be included, or excluded, from usage of certain products and services.

On the whole, Huppert believes that eradication of negative stereotypes about older people is critical for individual and societal well-being as we move into an era dominated by ICT. She notes that confidence in one's technological abilities plays a critical role in increasing well-being, overall health and life expectancy. When well designed, ICT can help people both feel good and function effectively, and thereby contribute to the five ways to well-being: *Connect, Be Active, Take Notice, Keep Learning* and *Give*.

Carefully thought-out advertising could play a significant role in changing older people's perception and attitude toward technology and in the process also positively influence their health and well-being.

References:

Foresight's Mental Capital and Wellbeing Report (2008) "Mental Capital and Wellbeing: Making the Most of Ourselves in the 21st Century". UK Government Office for Science.

Levy, B. R., Ashman, O. and Dror, I. (2000) "To Be or Not to Be: The Effects of Aging Stereotypes on the Will to Live". OMEGA, Vol. 40(3), pp. 409-420.

Levy, B. R., Slade, M. D., Kunkel, S. R. and Kasl, S. V. (2002) "Longevity Increased by Positive Self-Perceptions of Aging". Journal of Personality and Social Psychology, Vol. 83, pp. 261-270.

Johnson, D., Wyeth, P. and Sweetser, P. (in press, accepted for publication on 7 July, 2012) "Creating Good Lives through Videogames". In Huppert, F. A. and Cooper, C. (Eds.) "Interventions and Policies to Enhance Wellbeing". London: Wiley.

McGonigal, J. (2011) "Reality is Broken: Why Games Make Us Better and How They Can Change the World". London: Vintage.

UK National Gamers Survey (2009). GamesIndustry International.

Chapter 11:

The power of connecting and staying active

Bonnie Kearney
Microsoft

The strongest motivator for older people to persevere and get engaged with Information and Communication Technology is the desire to stay connected, build relationships and share information with friends and family.

Bonnie Kearney is a Director of Marketing, Accessibility and Ageing at Microsoft. She has worked for Microsoft for over 17 years and is passionate about building awareness for technology that improves the lives of people of all ages and abilities.

Kearney is inspired by the transformational power of Information and Communication Technology (ICT) on older and disabled people's lives and their inclusion in mainstream society. It enables them, she says, to reconnect to the world by pushing through isolation that can potentially engulf them.

According to Kearney, there are three main ways technology helps older individuals: (1) it keeps them connected with family, friends and community; (2) it allows them to stay fit and healthy and helps them manage their personal health information; and (3) it helps them live independently so they can stay in their own homes longer as they age.

To address these and show how different technologies can enhance the quality of life for seniors, Microsoft has undertaken several projects with a variety of public and private sector partners. Recent projects include: (1) the *eSeniors Program* in Miami, which offers seniors free computer training; (2) the *Virtual Senior Center* in New York, a public-private partnership that uses technology to link homebound seniors to activities at their local senior centres and to provide better access to community services; and (3) the *Exergamers Wellness Club*, a health-and-wellness program at local senior centres that uses two Microsoft products, Kinect for Xbox 360 and HealthVault, to help seniors get in shape, increase their social interaction and manage their personal health information online. Apart from these projects, Microsoft provides

individuals with guidance for making the computer easier to see, including information about the latest accessibility settings in software, such as magnifiers and speech recognition, as well as protecting one's information and reputation online.

As the world has shifted toward digital communications, it is natural for some demographics to embrace the new devices and technologies more readily. However, Kearney observes that despite gaps in computing knowledge or experience, the strongest motivator for older people to persevere and get engaged with ICT is the desire to stay connected, build relationships and share information with friends and family. Ultimately it is not about technology for its own sake, she argues, but about the potential impact and relevance that ICT has to influence older people's quality of life. Inclusively designed ICT with clear customer benefits better motivates older people to try and use a given device or service as a result of their desire to maintain their independence and achieve positive overall well-being.

Kearney stresses that it is vital to include older adults and people with disabilities during the design and test process of any technology or service from the onset. The good news is that there is an increasing realisation that inclusive technology can be used to help older adults stay happy and healthy, but there needs to be a more systematic approach to design in industry and government, as well as more collaboration between those who develop hardware, software and data services.

Kearney disagrees with the assumption that the mismatch in technical competency for seniors will eventually disappear when all adults grow into usage of digital devices. She believes that the successful adoption of ICT relies largely on how effectively it is tuned to people's needs and abilities, and how well its actual benefits are communicated to older individuals. Unfortunately, many digital inventions do not account for age-induced changes and levels of technological competence, nor do they clearly articulate the benefits that they can bring to the lives of seniors. For example, despite the widespread availability of personalisation features and accessibility settings in software and hardware, such as magnifiers and speech recognition programmes, a large number of users, and not just older people, do not know about their existence or relevance.

She believes that both industry and government are fully aware of the rapidly rising older demographic because "you cannot go a day without reading about the global ageing phenomena", but realisation alone is not sufficient to change current design practices. There also needs to be an adequate application of that realisation. Unfortunately, software engineers and designers tend to focus on younger technology users. Designers' and engineers' empathy toward and appreciation of age-induced sensory, physical and mental declines in ability may be lacking because themselves they are typically in their 20s, 30s or 40s, and able-bodied. The good news, however, is that the Cambridge Inclusive Design Toolkit and other such resources are helping technology creators better understand and design for age-related impairments in vision, hearing, dexterity and cognitive functioning.

Kearney recommends that organisations have accessibility professionals who are embedded in the software and hardware product cycle and who collaborate with and educate designers and developers. In addition, putting corporate accessibility standards and guidelines in place helps to promote the inclusion agenda. However, she points out: "It is one thing to tick off a box, following some guidelines. It is quite another thing to truly incorporate that aspiration and deliver technology products that can be used and are adopted by an older adult with a functional limitation or an older adult who has never used technology". Technology organisations and governments are getting better at the good practice, but still have some way to go to make their offering accessible to more people. "Building products that are significant and relevant to a broader audience, including people with disabilities and the ageing population", Kearney concludes, "is good design AND it is good business".

Building products that are significant and relevant to a broader audience (...) is good design AND it is good business.

Chapter 12:

The importance of being earnest about user testing

Nigel Lewis
AbilityNet

Nigel Lewis is Chief Executive Officer of AbilityNet, a pan-disability charity assisting individuals' needs for choosing, setting up, adjusting and using Information and Communication Technology in a better way. His focus is around how to make technology more accessible, either to individuals or to encourage organisations to deliver accessible technology.

Lewis argues that, as a number of older people acquire a disability or a health condition with age, the standard 'out of the box' technology will likely be challenging to many of them. A related difficulty is that assistive technology can often be hugely expensive. Sadly, a lot of users are unaware that they can make their own accessible devices by acquiring base technology and then mounting free assistive software on it to adapt it to their specific capabilities and needs. The accessible technology market place, he suggests, really ought to wake up to the fact that people are not going to keep spending 800 pounds on a screen reader. Moreover, Microsoft, for example, has a readily available suite of accessibility features for adjusting font sizes, screen resolution, colours, mouse pointers and sticky keys, however, these tools are often unknown to heterogeneous users. Ultimately education about different technological possibilities and how to best utilise them is critical for individuals and society as we move into an Information and Communication Technology (ICT) era.

He talks ardently on the importance of doing user testing from the outset and throughout every product or service development, with people who have diverse and mixed ranges of sensory, physical and cognitive capabilities. One way of doing this might be to early on ask users to evaluate a story board of a given product, and then properly user test a high-fidelity prototype of it during the design cycle to ensure that the produced artefact actually works as envisaged and ultimately meets the real needs.

One particular worry that Lewis has at the moment is that all too often he sees commercial organisations calling for help with accessibility accreditation when it is very late to do anything about it. There are obviously a number of companies that subscribe to and methodically practise the ethos of user-centred design. However, the larger problem is that for every perceptive company, there are hundreds or thousands of others that are uninformed, or choose not to take inclusivity on board.

A separate but related issue is that of a mistaken assumption among many commercial and government organisations that a product is only properly user-tested if it has passed through the hands of 200 or so people. As a result, many companies decide to opt out of user testing altogether on the grounds that it will attract significant cost, time and resource effort. Lewis challenges this untrue and impractical view by saying that successful user testing can be conducted with six or ten people, provided that they have a good breadth of abilities. He adds that it is actually poor practice to focus on one specific target audience.

Clearly ICT can be a powerful daily living tool, but Lewis worries that not nearly enough is done to produce intuitive and usable devices for the wider population. One problem is the lack of awareness and understanding of what needs to be done. It is often the case, he explains, that designers do not maliciously create inaccessible and unusable products, but rather that they are not thinking about making an inclusive one in the first place. It is, therefore, imperative to educate and inform designers and marketers that good product design is not only about the function and aesthetics, although these two are clearly very important, but also about utility, usability, enjoyment and self-efficacy. Another problem is that of competing commercial needs: "We need to do this [inclusion], but we are under high pressure to get this product to market, because we have told the shareholders or Christmas is coming".

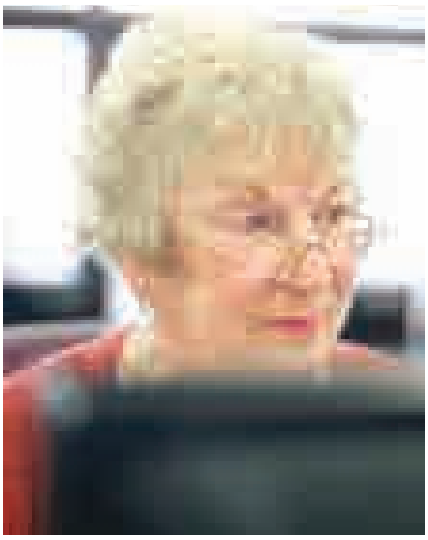
These challenges have been known for some time. However, there are still too many people, especially at a senior level, who do not appreciate or understand the need. It does not affect them, nor it is a risk or a business need that they have ever seen, so why should they bother about it? They are yet to make that leap, muses Lewis.

Furthermore, unlike the green agenda which has existed in the public perception for many years, but has finally reached a tipping point, Lewis believes that inclusive, user-responsible design is still far-off from hitting that tipping point. The situation is, however, gradually improving as inclusion is increasingly getting more 'air time'. Nonetheless, it is not yet seen as an issue where everybody is saying: "I know about that, I understand that and we must do something about it". Moreover, he notes that inclusion is even more crucial to the government because it cannot leave anybody out, whereas a commercial company could make the decision to focus on a certain area of the market.

What we have to do, Lewis passionately states, is to convince

A mistaken assumption among many commercial and government organisations [is] that a product is only properly user-tested if it has passed through the hands of 200 or so people (...) Successful user testing can be conducted with six or ten people, provided that they have a good breadth of abilities.

It is critical to educate people that inclusion does not cost an awful lot more and that there are substantial long-term financial benefits to be had from increased usability, as well as cost reduction in terms of ongoing support and maintenance.



people that inclusion is not an afterthought and that it actually has a massive bearing on effective and enjoyable experience of every user, not just a niche market. At the same time, it is critical to educate people that inclusion does not cost an awful lot more and that there are substantial long-term financial benefits to be had from increased usability, as well as cost reduction in terms of ongoing support and maintenance. Lastly, with legislation such as the Equality Act 2010 now firmly in force, it is illegal to exclude many from the population at large from ICT usage.

Lewis's particular hope for the future is for the big ICT manufacturers like Apple, Google and Microsoft to join forces and coordinate their activities in order to provide users with a more intuitive, usable and enjoyable experience. They really ought to address the overarching problem of disparate devices that force users to learn multiple operating systems with varied menu structures and impede transfer of items from one computing platform to another. A further deterrent is that end users are compelled to spend their time, as well as money, on extensive sustained interaction of upgrades, plug-ins and unsolicited messages. On a more positive note, however, the presently changing landscape of technology brought about by multifunction platforms that encourage or enable user-alteration of needed apps has the potential to relieve some of the burdens and drawbacks of inaccessible and unusable ICT.

In general, Lewis thinks that much of existing technology has been developed with little understanding of what people actually want or need. He argues that the big challenge ahead is to make inclusion mainstream, an every day occurrence that is part of everyone's agenda. Ultimately, there is a lot of technology out there and it will continue to develop, thus we urgently need to solve the issue of awareness and acceptance.

Chapter 13:

Taking ICT down a notch and delivering it into the hands of the excluded masses

Helen Milner
UK Online Centres

Helen Milner is Chief Executive Officer of Online Centres Foundation, a social enterprise that supports communities in tackling social and digital exclusion. She has over 20 years of experience of working in the e-learning industry and is a passionate advocate of the benefits that 'digital by default' service delivery can provide.

Milner is most certainly an incredible social campaigner. Since 2010, she has helped over one million Britons enrich their lives by being online, among them 300,000 people over the age of 65. She wants to ensure that older people are aware of both the fantastic opportunities that the internet can provide for them and the potential dangers of incautious use. It is vital they know, she explains, that in some of the emails they will receive, people may not be who they say they are. That means they should be careful when providing personal or financial details over the internet. The issue is that it is often an irrational fear of the perceived 'dangers' of being online that stops older people embracing its benefits. She tells the story of an older woman who, as a result of negative media stories, was convinced that her identity would be stolen if she went online. It is important to explain to inexperienced people, Milner points out, that the only identity or information that could be stolen from them is that which they voluntarily put out there.

The overriding observation that she shares is that inherent motivation and self-efficacy play a significant role in the successful adoption and use of Information and Communication Technology (ICT) by all users, regardless of whether they are young, middle-aged or old. Milner argues that there are two overarching user groups among older people who are not yet effectively utilising ICT in their lives:

The internet is usually talked about in a particularly unfriendly way (...) How can someone who grew up in an analogue era begin to make sense of this digital jargon?

(1) those that have never used the internet; and (2) those that have tried it, but have been unable to use it. While negative usage experiences might put people off, they are actually more likely to try again – given the right support – than those entrenched in non-use. The bigger issue for Milner is the former group. As more and more people get online, she says, those left behind are put at a further disadvantage because they feel foolish, technologically-ignorant and unworthy – thus intensifying the vicious circle of exclusion.

Another key barrier for older people is, of course, cost. There are many who typically want the internet and are not afraid to use it, but they are unable to afford it. This too creates a self-fulfilling prophecy of disadvantage, with those excluded from the online world by cost also excluded from the monetary savings it can provide: from bargain online deals to the easy comparison of prices for key services.

Milner believes that the 'magic' ingredient in ensuring a wider internet participation among the ageing population and individuals from disadvantaged backgrounds is essentially about a two-pronged empowerment: easy and free access to ICT equipment, plus a supportive network of people. She points out that many older users, due to their assumed technological incompetence, often need guidance from someone who is very patient, friendly and understanding to reassure them and show them the basics. Often, she argues, family and friends are not in the best position to do this. For some it is a lack of time and patience and the tendency to take over and do things on behalf of older people, rather than helping them to do things for themselves. Other savvy individuals lose sight of the 'basics' in their excitement to show off their favourite applications and programmes or forget that their everyday language is naturally peppered by techno-speak and brands. Supporting older people takes a great deal of thought, patience and repetition.

The apprehension of ICT incompetence so common among the ageing population is generated by a number of factors. One problem is that, although older people are often able to perform familiar tasks and skills up to a very advanced age, learning new skills and changing familiar routines becomes more difficult as they age. Also with age, the ability to focus and divide attention tends to decrease. In addition, having been exposed to breakable and unreliable technology in the past, older users are often wary about interacting with the modern devices inappropriately and, as a consequence, have a more restrained approach to discovering the correct action sequences and problem solving in general. Another concern is that, despite being ever present in our society, the internet is usually talked about in a particularly unfriendly way. Just as relatives can struggle to explain a simple start-up procedure without going into *icons*, *browser* brands or *homepages*, there is a tendency in media to use inaccessible technological terms like *RAM*, *megahertz*, *4G* or *superfast broadband*. How can someone who grew up in an analogue era, Milner asks, begin to make sense of this digital jargon?

Interestingly, it is another fear – that of missing out – that typically drives many older users to ICT adoption. They hear about modern technology in the media, she muses, and they have assumed that it is not for them. However, it is now getting to such a scale that they cannot use commercial services or cannot communicate with their grandchildren without being online. The opportunity to see a far-flung loved one on Skype, the chance to follow the www. preview at the end of *Coronation Street*, the possibility of tracing a family tree – those are things that send older people into online life.

Furthermore, Milner argues that, despite that corporate social responsibility is a very virtuous approach in a range of industries, the need for intuitive ICT for as many people as reasonably possible could be probably better positioned under the banner of commercial opportunity. Ultimately, it is important that business organisations and government acknowledge that if they talk about their products and services in a friendlier and more accessible way, they will not only provide better service to their current market, but they will also broaden their offering to people from outside their target group. In addition, the challenge of developing inclusive products and services is almost greater for government because a commercial organisation does not have to be inclusive to everybody, but government is obliged to include all citizens.

Milner also worries that a majority of companies do inclusion work as a bolt-on. For example, there are some great accessibility settings on common software, including magnifiers and speech recognition programmes, but they are too often packaged in a very unfriendly language, which obscures easy and obvious access to these tools by heterogeneous users.

One much-debated concern that Milner has is over the way in which a large amount of user testing is carried out. She asserts that a lot of organisations do inadequate user testing by only engaging with young and technology-adept individuals and they typically do so at the end of the design process, resulting in devices that do not meet the needs of their targeted users. The truth, she says, is that technologists live in a world where everybody is online and is cognisant of technical words like *tool* or *operating system*. Consequently, their common attitude is: "The problem is not with us [technology creators] but those strange six million people out there who for some reason need special support and help".

Milner recommends that designers and decision makers, who usually mix with people like themselves in London and other big cities, 'get out' more and meet individuals who are unlike themselves, in the heart of local communities across the country. If you live in some corporate or ivory tower, or some other wonderful bubble of which existence you are not even aware, she observes, you are unlikely to understand the breadth and cross-section of society at large.

In conclusion, Milner says that we need to take ICT down a notch and clearly articulate its functionality and the benefits that it can provide in order to deliver it into the hands of the currently excluded masses. In addition, adopting the inclusivity approach has the potential to increase usability regardless of age and capability, reduce retro-fitting and operational costs, and widen the market for existing or potential products.

It is important that business organisations and government acknowledge that if they talk about their products and services in a friendlier and more accessible way, they will not only provide better service to their current market, but they will also broaden their offering to people from outside their target group.

Chapter 14:

Putting older people at the heart of every ICT development

Johan Molenbroek
Delft Technical University

Johan Molenbroek is an Associate Professor of Human Factors at Delft Technical University in the Netherlands. His work spans four overarching topic areas: business, engineering, human factors and aesthetics. He has been teaching *Inclusive Design* for over 34 years at what is the world's largest design school, consisting of 250 staff and some 2,000 students.

You have to put users at the heart of everything that your organisation does and always road test your designs with your target users.

There is really no end to Molenbroek's design talents: he has been designing inclusive car navigation systems, train stations, toilets, furniture, playgrounds and sport activity centres. He undoubtedly is an avid promoter of the application of good, enjoyable design to the benefit of society and this belief underpins all that he does.

If he had a motto, it would be: "You have to put users at the heart of everything that your organisation does and always road test your designs with your target users".

Molenbroek concedes that it is challenging to develop Information and Communication Technology (ICT) that offers seamless communication to both younger and older people. He is optimistic about the future, however, and gives the example of a recent project, which focussed on creation of intuitive communication between two user groups, one old and one young, using technology that each of these cohorts grew up with. Interestingly, in this project older individuals used a paper-based notebook to jot down a message which, upon closing of the notebook, uploaded itself to the younger users' Facebook page, and vice versa. Molenbroek thinks that it is a powerful idea to develop technologies that tap into disparate groups' 'models of the world' and help those two 'worlds' come together. He also endorses local community schemes where the younger generations help to teach the older

generations how to send a text message or how to set up and use an email account.

He stresses the significance of understanding the capabilities, needs and attitudes of different target user groups because the misinterpretation of those can lead to acutely negative consequences, especially in the context of novel technology. Molenbroek reminisces the mistake that the Dutch government made in 2008, when roughly half of the over 65s sector were not online, by introducing a social service that distributed a number of essential forms for individuals to fill out by email. As a consequence, a significant section of the older population was unable to access and utilise this service because they have never been on the internet, nor have they had an email account. The last four years, however, have seen substantial effort put into including digitally disenfranchised user groups in ICT usage. Molenbroek has a particular hope that the number of those who are excluded will continue to be downsized in the coming years, by collaborative efforts of government, industry and academia. For this to come about, more effort and rigor needs to be put into involving heterogeneous older individuals during every ICT product or service development. He acknowledges, however, that it can be challenging, especially for small-to-medium-sized enterprises as they have fewer resources, to recruit a good sample of senior users who want to be involved in requirements capture and testing phases of design, and are capable of giving good, meaningful feedback. Consequently, he recommends that companies collaborate with academia and government to build up a large, sharable and reusable database of keen test panelists (by offering incentives whenever possible), and call upon the opinions of those individuals at early stages of the design process.

Furthermore, Molenbroek laments that there are a number of 'specialised' mobile phones on the market that under-appreciate the abilities of senior citizens and, thus, have a poor uptake among this group. Older people, he muses, do not want to be stigmatised in their limitation; just as any other user group, they want to be part of the overall user community and have their abilities embraced and aptly engaged. He references the work of Malcolm Gladwell on *The Tipping Point*, suggesting that human behaviour is sensitive to and strongly influenced by its environment. The Nordic walking sticks, for instance, are now very popular in the senior sector of population, yet only a few years ago the acceptance of a cane usage was fairly low among the older cohort because they were targeted at those with 'special' needs and the 'old'. Now, however, it is trendy to use walking sticks because everyone else has them and they give the perception of activeness and fitness. Molenbroek also argues that older generations are reluctant to accept innovation if it does not clearly articulate what the benefits are and is far removed from the product interactions that they are familiar with.

Regarding ICT, he observes that hope now lies in smartphones as they are increasingly popular among the aged because, through a multifunctional platform that enables user-alteration of needed apps, they allow people to tailor the phone's functions and behaviour to their specific needs. However, older people's inability to easily penetrate the depth of much of the information inside many of today's ICT devices (e.g. online banking devices and services) continues to be a hugely overwhelming drawback.

Companies [need to] collaborate with academia and government to build up a large, sharable and reusable database of keen test panelists (by offering incentives whenever possible), and call upon the opinions of those individuals at early stages of the design process.

Another deterrent is that technology is moving very fast, leaving little time for reflection and mastering of different functions inherent in much of ICT. Although, digital equipment, such as iPhones and iPads, is more accessible and usable than many other devices on the market, Molenbroek points out that the number of typing errors with

those devices is much greater than when individuals use a laptop with a standard keyboard. The youngsters have fast learnt that mistyping is not much of an issue in their social media messages, he observes, but older people want to produce more formal texts with no errors. As a result, they often resent technology that increases the chance of making errors.

Asked to provide an example of technology that is accessible to a wide and varied range of users, Molenbroek chooses not one, but two such products. The first product is the satellite-driven navigator TomTom as it tunes in to the needs and abilities of different types of people. The second one is an e-bike, presently encompassing 50% of the market of Dutch bikes. Why is this particular bike so popular? Because, apart from being visually appealing, it contains a Global Positioning System (GPS), allowing users to set their target destination, know where they are or where to turn next, and it provides electrically-powered assistance for pedalling, making it possible to cycle on any terrain. In addition, this bike is not dissimilar in its look and form to the bikes that were produced in the past, thus allowing older people to easy understand its function and behaviour.

Molenbroek has demonstrated that testing with heterogeneous users must be the top priority during development of every customer product or service. He agrees, however, that sometimes it can be taxing to find trial participants with extreme, or unusual, conditions or disabilities and recommends recruitment of specialised community organisations as an intermediary in finding such individuals. There is also an urgent need for a joint effort by industry, government and academia to create a large, sharable and reusable database of keen test panelists of different ages and abilities.

References:

Gladwell, M. (2002) "The Tipping Point: How Little Things Can Make a Big Difference". London: Abacus.

Older generations are reluctant to accept innovation if it does not clearly articulate what the benefits are and is far removed from the product interactions that they are familiar with.

Chapter 15:

Technology is older people phobic, not vice versa

Alan Newell
University of Dundee

Alan Newell is Emeritus Professor at the School of Computing at the University of Dundee. He has been researching and designing computer systems to assist older and disabled people for over 40 years. Much of this influential work is encapsulated in his book *Design and the Digital Divide: Insights from 40 Years in Computer Support for Older and Disabled People*. His current research focuses on the technical challenges that older people have with modern technology and the use of professional theatre to raise awareness of, and facilitate discussion on, these issues.

One of the main differences between young and old users is that the young cohort is prepared to put in a lot of effort to try and use a given piece of technology because it will last them for a considerable amount of time. Older people, however, are not likely to expend nearly as much effort for something that is only going to serve them for a few years.

We start our conversation with Newell by asking him about the origins of negative stereotypes about older people. "Younger people are trying to keep their advantage, aren't they?", he jokingly answers. There are a number of older users who embrace technology, he explains, but we often choose to shape our views based on those who are technology-averse.

One of the main differences between young and old users is that the young cohort is prepared to put in a lot of effort to try and use a given piece of technology because it will last them for a considerable amount of time. Older people, however, are not likely to expend nearly as much effort for something that is only going to serve them for a few years. It is a fact of life! To realise the potential of technology to enrich and support the lives of older users, their needs and wants should be recognised and considered from the beginning of any technological development.

Most Information and Communication Technology (ICT) demands a high-level of knowledge from the user. Today's older people spent their 'formative years' using mechanical technology and, thus, may not be relaxed and comfortable with digital devices. Tragically, many older people frequently blame themselves when they cannot use contemporary ICT. One big inhibiting factor with current interfaces is that they contain too many options crowded into a single screen together with multi-layered menu structures. To counteract some of these problems, Newell and his colleagues worked on a project that included the development of a simple email system specifically for older people. The goal was to make it simple-to-use, intuitive and understandable. It achieved this by tapping into people's prior knowledge and providing instructions and supportive feedback to the users. The project team started with evaluation of one of the most widely used email systems and found that it contained 273 different functions on the home page. Given the famous work of George Miller on memory highlighting our capacity to hold between five and nine temporary items of information at a time, Newell argues that even an agile technology-savvy user is likely to be confused when confronted by 273 items, let alone an inexperienced user. Unsurprisingly, the more functionality there is in a given application, the more difficult it is to learn how to use it, or to teach people to use it, especially when age is a factor.

The more functionality there is in a given application, the more difficult it is to learn how to use it, or to teach people to use it, especially when age is a factor.

Furthermore, the mobile phone industry is now perceived as being largely saturated. The truth, however, is that a lot of older people either do not have a mobile phone, or only use them in an emergency. There are a large number of older people who are not online. The challenge does not just lie with getting older people online, but also with sustaining their technology usage. A related issue is that older individuals want a reason for doing something and the things that encourage them mostly in the ICT world are, for example, genealogy sites and ability to email or Facebook their children and grandchildren. There are some very useful market opportunities, but they are currently largely underutilised. Newell also points out that when older people do manage to have a successful interaction with computers, their attitude towards them becomes more positive and open. Therefore, to combat technological alienation, it is important to design ICT that will embrace people's diversity, tune into individuals' needs and aspirations, support the acquisition of a positive initial experience, appeal visually and provide ongoing support.

The most significant problem, Newell says, is that the technologists' approach plays on five myths about older people. First is that older people are technophobic and hence there is no point in designing technology for them. Second is that all older people are poor, despite statistics which indicate that over 50s control 80% of the wealth in the country. The third myth is that when current young generations grow up, they will not have any trouble with future technology. This particular claim rests on two assumptions: (1) that the characteristics of today's young and middle-aged people will not change with age; and (2) that there will be no significant changes to technology as we now know it. Both these assumptions are very implausible: (a) because sensory, motor and cognitive abilities decline with age in most people; and (b) there is no historical precedent for technology to remain static. Many of today's older people were very familiar with their generation's technology, but find it difficult to cope with modern technologies. Newell tells the story of an 80-year-old man who was a skilled radar operator during the Second World War and could easily assemble and reassemble radios, but cannot cope with contemporary ICT. The fourth myth is that older people have no aesthetic sense and that they are only concerned with what they 'need' to survive. Most of the community alarm systems, for instance, could so easily be mounted in a beautiful pendant or in a designer watch, but they usually come in an ugly and stigmatising plastic box that many users refuse to wear. Finally, the fifth commonly-held misconception is that the only thing that matters in technology usage is choice. For choice to be reasonable, Newell explains, it has to be informed choice. However, digitally disadvantaged people often have no idea how or what to choose.

Technology companies tend to measure success in terms of the new functionality that is being offered and they also overestimate the challenges and costs of considering the needs of digitally disenfranchised groups. Newell asserts that "'Everybody' is a very poor design brief" and that more needs to be done by industry to better identify all the relevant sub-segments of people who constitute their customer base. It is also important to focus on good examples showing how companies have become profitable because they developed products targeted at older people.

A great amount of modern ICT has been designed by, and for, young, male and technology-savvy individuals. Newell counters the idea that designers deliberately design high-demand products. The challenge, he says, is that most of the people that designers work with are young and often their major reward is their colleagues saying "Wow" about their work. If you are surrounded by similar sorts of people, he further maintains, it is very difficult to get yourself in the mindset of thinking about heterogeneous users. However, if designers are told: "If you design for a group of older people: a) You will realise the diversity; and b) You will produce something that has got a chance of being used by almost everybody, this will encourage them to start to think: "I must learn about the characteristics of this group of people" ".

Most design support guidelines focus on telling designers what the characteristics of older people are, but do not actually introduce them as people. Consequently, the abundance of A-to-Z guides is frequently treated as tick boxes by designers. Once designers meet real users, they start to see the effects that their products have on people and that realisation frequently prompts them to want to do something about it. Newell, therefore, recommends more interaction with older users, in order to learn more about their abilities, needs and aspirations. During any interaction, however, it is important to be careful about how senior users are spoken to and what they are asked to do in order to not to dampen their confidence in technology. In addition, he suggests

'Everybody' is a very poor design brief and more needs to be done by industry to better identify all the relevant sub-segments of people who constitute their customer base.

Once designers meet real users, they start to see the effects that their products have on people and that realisation frequently prompts them to want to do something about it.

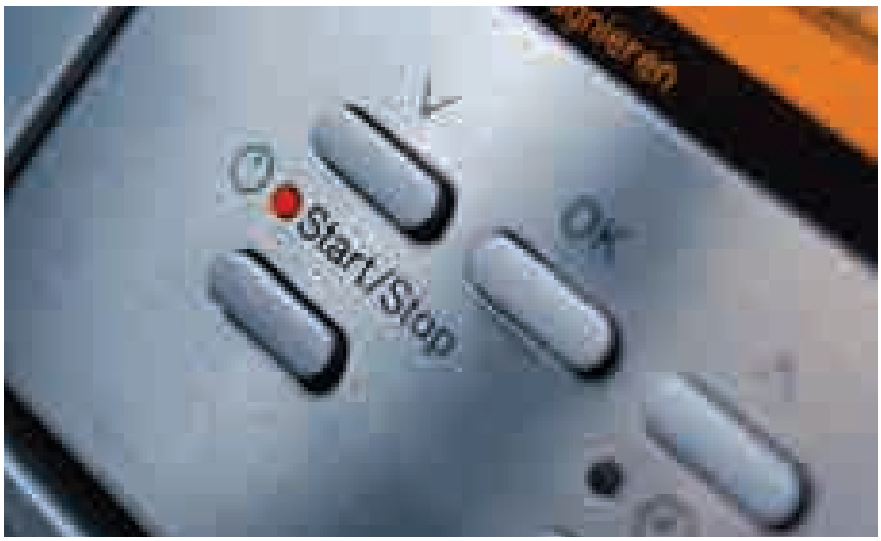
that any meetings with older users should contain incentives other than payments that may affect their state pension/benefit rules, and a significant time period should be allowed for socialising between older participants and designers/researchers.

Newell argues that digital technology clearly has enormous potential for older people. However, inappropriate interface design continues to be a fundamental barrier to digital inclusion by this group. It is vital that industry takes on board the message that knowledge about users is key to solving this long-standing problem and that they should be designing systems with both older and younger people in mind.

References:

Miller, G. A. (1956) "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information". The Psychological Review, Vol. 63, pp. 81-97.

Newell, A. F. (2011) "Design and the Digital Divide: Insights from 40 Years in Computer Support for Older and Disabled People". California: Morgan & Claypool Publishers.



Chapter 16:

If inclusive design is good for everyone, why don't we have it?

Donald Norman
The Nielsen Norman Group

* *Special thanks to Dr Nathan Crilly for his help with creating this thought piece.*

Donald Norman wears many hats: he is a distinguished academic in the fields of cognitive science and the design of enjoyable, understandable products, a co-founder of the consulting agency, the Nielsen Norman Group, former vice-President of Apple and the author of books and columns, including the well-known *The Design of Everyday Things*.

The state of modern technology is disgraceful.

The state of modern technology is disgraceful, says Norman. The interior of new automobiles looks like the cockpit of a jet airplane. Trying to figure out how to control the home TV set has become a nightmare. Computers have always been a challenge, with this one device trying to do everything. As for the new, so-called 'smart' mobile telephones and tablets: of course they are wonderful, but how are you supposed to know what to do? Tap with one finger or two, or is it three? Swipe your fingers up or down, or maybe left or right. Use one finger for this, two for that, and three, or is it four, to do that other thing. At least the pilot of a jet aircraft receives several years of instruction: what are the rest of us to do?

You ask about older users? It is horrible for everyone. In fact, that is what the field of inclusive design is about. If we design things for older users, for people with poor vision, hearing, coordination or any disability, we make it better for everyone. Everyone has problems. Being old is not a problem; having poor vision is, but it should not be. Having poor hearing can be a problem, but it should not be. The reason older people have difficulties is that they very sensibly get tired of all the nonsense that people are forced to go through to use modern technology. Younger people have not given up yet. They grew up with

confusing things, so they are used to it. Well, their time will come.

The rules of good design are well-known. It is quite possible to design technology that provides good value, does the job required of it and is both pleasurable and understandable. The problem is that most things are designed by 'back-end' developers who have little understanding of real people and rarely collaborate with 'front-end' experts.

A few years ago, things were a lot better. Designers in the major computer companies did pay attention to their designs. Computers were getting easier to use. However, suddenly a new group of people arrived on the scene, throwing out all the old technology, even the good stuff. It used to be possible to figure out how to work things simply by exploring the possibilities. No longer is this the case: now technology is controlled by mysterious gestures. Half the time, it is wonderful. The other half, it is horrible.

One problem with modern mobile phones and home entertainment systems is that nobody is in charge. With the phone, we have the people who design the phones at companies such as Nokia, Samsung and Apple. We have companies that design the software inside the phones at companies like Microsoft and Google; Apple is the rare company that does both. Then we have the phone service providers, such as Orange, T-Mobile and BT. The three different parts of the puzzle do not necessarily get along: in fact, each one wants to control your phone. Not to mention the people who write the applications. Do they work together? No, they do not.

The same is true for home entertainment systems. Each piece of equipment is often made by a different company, each one coming with a different remote control. The service provider is the cable or satellite company that connects the signals to your home. Do not confuse them with the broadcasters who decide what you are going to watch. Once again, these three different parts of the economy do not like one another: they fight. It is the user who suffers!

The way most of us cope: we memorise the basic operations we want to do and ignore the rest. When we get lost or confused, we have learned to give up. Our biggest coping strategy is to turn the equipment off and on again: start over. Even the most technically astute do this. "When in doubt", they say, "just reboot and start over".

Even more interestingly, most homes have three very different services: telephone, television and internet. Why are these separate? The answer is, by historical accident as each of them originated separately. Different companies grew up to provide telephone services, television services and internet services. Despite appearances, they are actually all the same: they are data, or as technologists like to say, "they are all just bits". So what we ought to have is just one service to the home: internet data service. Anyone who has ever made a video call on a computer has already merged the three services: the voice and video signals were all transmitted through the internet, no phone line or cable TV required. If everything used the internet's data format, it would support our email and internet browsing, our television watching, our messaging, and both our fixed and mobile telephone services. It would be a lot easier and a lot less expensive. 'Cheaper' is why we will not get it: the service providers would get less money. Worse still, many would go out of business because they really are not needed any more. Who suffers so that service providers can get rich? We do: we pay more money and in return get services that are more complicated, frustrating and confusing.

Now the common perception is that younger people are better than older users at keeping up with the technological learning curve. Some of the popular arguments for this supposition include: peer-pressure to 'be cool', the fashion to express one's emerging identity through social networking sites, or fewer professional and societal responsibilities and hence more

It is important to have the designers, engineers and marketing people all work together in concert for all three groups have a common goal: to serve customers' needs.

energy for technological exploration. However, this assumption could not be farther from the truth: not all younger people are keen and up-to-date technology followers. Lots of young people are just as clueless about these new technologies as older folks. How do they cope? The way most of us cope: we memorise the basic operations we want to do and ignore the rest. When we get lost or confused, we have learned to give up. Our biggest coping strategy is to turn the equipment off and on again: start over. Even the most technically astute do this. "When in doubt", they say, "just reboot and start over".

Technology has a great potential to serve and enrich the lives of both younger and older people. However, for this to happen, these groups must be first well understood. In many cases, poorly designed technology is not a result of limited understanding or ability among designers and developers, but a lack of company structure that would promote inclusive design. Companies need the right people to advocate and implement the principles of inclusive design and an adequate organisation of the product development process to make it work. It is also important to have the designers, engineers and marketing people all work together in concert for all three groups have a common goal: to serve customers' needs. By working together they stand a better chance of convincing the board that user-centred design needs to be prioritised. Alas, this requires significant change in attitudes.

Technology has the power to enhance people's ability to live better, richer and more enjoyable lives. It can improve the well-being of societies and countries. However, for this to come about, a good understanding of the task, a realistic awareness of the diversity in people's ages and capabilities, an open mind, a supporting organisational structure and more coordination between different technology providers are needed.

Now, how can we bring about the changes required to get better technology? Through revolution!

That may sound rather extreme, but sometimes, just as with oppressive political regimes, revolution is the only way to make serious changes. People of the world, the time for revolution is now: insist on understandable technology! Refuse to buy anything any more until it is designed for people, everyday people!

References:

Norman, D. A. (2002)
"The Design of Everyday Things".
London: Basic Books."

People of the world, the time for revolution is now: insist on understandable technology! Refuse to buy anything any more until it is designed for people, everyday people!

Social Sewing (courtesy of Mike Vanis)

Chapter 17:

Designing for digital grandparents: How inclusion can be implicit yet inspire innovation

Graham Pullin
University of Dundee

Graham Pullin is a leading digital interaction designer and the author of *Design Meets Disability*, a book advocating a radical blurring of boundaries between so-called design for disability, inclusive design and mainstream design. He worked as a senior interaction designer and studio head at the design and innovation consultancy IDEO and is currently the Course Director of Digital Interaction Design at the University of Dundee, where he researches the role of interaction design in exploring more expressive communication for people without speech.

Teaching on the interaction design and product design courses at the University of Dundee – collectively known as the 'Social Digital' programme – Pullin enlightens future generations of designers on issues of inclusion and provokes a much-needed, and at times provocative and catalytic, debate on design thinking in general. One of his projects, *Objects for Grandpeople* run collaboratively with Microsoft Research, involves undergraduates designing simple digital products, each tuned to the needs of one particular ageing user: usually one of the student's own grandparents. This brief, he admits, runs counter to the way that most people teach inclusive design because it focuses on a single person. However, when students present their own work to the whole class, having each delved deeply into their grandparent's motivations and routines, the message of diversity in the older population is implicit. This message is less abstract for being so grounded in personal experiences and relationships, and as a result

To better appeal to users across different age groups, inclusive Information and Communication Technology needs to recognise a diversity of attitudes within any age group – and also to embody the design qualities that a mainstream market demands.

more inspiring. And the design responses have been innovative and thought-provoking.

For example, *Storymaker, Storyteller* was Neil Dawson's response to his grandfather, Donald's, cross-cultural experiences as a teacher in Iran in the 1970s. He still has hundreds of slides that he photographed there, but is conscious that their stories are untold and will be forgotten when he is gone. In this concept, Donald would have an object called a *Storymaker*, a device very like a mechanical hand-held slide viewer, but with a recording facility so that he can narrate each slide. This is paired with Neil's *Storyteller*, a networked digital projector with audio to hear Donald's voiceovers. Microsoft's Principal Researcher, Bill Buxton, commented that: "It bridges the generations of people, but actually I think it was just as elegant how it bridged the generations of technologies: [your grandfather] speaks in the technology of his day and you view in the technology of your day and it's seamless – that's elegant and I've not seen that before".

The response to a similar brief the following year was if anything more unexpected and more poetic.

Mike Vanis and another team of fellow students considered Mike's grandmother Despina who, when she was younger, used to rent an atelier with a group of other seamstresses in Athens. Now in their 80s, each sews alone in their own home, as travel is too difficult. They miss the company to the extent that they are all considering giving up sewing.

Social Sewing connects the group's sewing tables through the internet. Each of the women is represented in the sewing rooms of her friends by a miniature ceramic sewing machine that mirrors the activity of her own: when she presses the pedal, its needle moves up and down. The actual sounds of the sewing machines are heard over loudspeakers, an ambient awareness of the communal activity of sewing. As Mike recalls from his grandmother's reminiscences "sometimes they just concentrated on their work and the rumbling rhythmic sound of their sewing machines was just enough social interaction for them".

Pullin's own reflections on *Social Sewing* also relate to his personal research into augmented communication for people without speech, which considers the social role of communication and expression. "One of the strengths of *Social Sewing* is its lightness of touch. Whilst there is also an intercom in the shelves, so the women can talk, this is not the main function. The specificity of Despina's virtual atelier illuminates a more universal truth: that social interaction does not imply direct messaging. This is a level of subtlety that can get lost by adopting too literal a definition of 'user', or using a technology-centred term like 'Information and Communication Technology' (ICT) for that matter". He goes on to quote the designer Charles Eames who, when asked whether design implies the idea of products that are necessarily useful, responded: "Yes – even though the use might be very subtle".

In terms of the ageing population and the demands of ICT, Pullin states that there can be surprising resonances between older people's needs, capabilities and attitudes and those of younger people. In particular, there is a landscape of technological competence among the older generations: some of them struggle to use the controls for a digital TV that has evolved into something more complex than they were previously used to, whereas others have embraced online shopping. To better appeal to users across different age groups, inclusive ICT needs to recognise a diversity of attitudes within any age group – and also to embody the design qualities that a mainstream market demands.

Pullin is somewhat optimistic about the growing emphasis on inclusion. He asserts that many companies are now moving from a focus on technology to a perspective of the service being offered (that actually

might involve some impressive technology in the background, but as a means to a profound end rather than a goal in itself).

Despite advocating a broader perspective, however, Pullin believes that the best ICT products are not necessarily the ones that offer all things to all people. Designers sometimes make a distinction between 'platforms' that support open-ended functionality and 'appliances' that are dedicated to one purpose, but optimised to play this one role very well. PCs are good examples of platforms, whereas radios of appliances. There is a received wisdom that platforms are inherently more inclusive, since they can support a variety of different modes of interaction. Yet, their very complexity can make them unapproachable, especially to people who might be intimidated by overtly digital technology – which will include many older people. Nonetheless, at the scale of individual apps, simple offerings can match individual needs, capabilities and attitudes. To underline this, Pullin's Digital Interaction Design students have designed *Apps for Grandpeople* in recent years.

Pullin believes that one cannot achieve simplicity without making compromises. Simplicity is difficult, he says, because it is a harder brief to justify, given many industry's tendency to correlate a larger number of features with sophistication and increased value. It also somehow runs counter to a notion of user-centred design as accommodating everybody's needs. But simple products that can seem quite niche at first may end up being widely adopted and somehow also appropriated by a breadth of the population.

Inclusion also needs to be at the heart of the brief, not treated as a separate issue. To create more inclusive products and services, it is important to devote effort to a richer understanding of multi-faceted human factors, such as culture, temperament, education, values, attitudes and priorities, which ultimately also affect the uptake and use of ICT. In addition, attention should be given not only to the immediate interaction with a product, but also the context within which it will sit and the content that it will deliver.

To create more inclusive products and services, it is important to devote effort to a richer understanding of multi-faceted human factors, such as culture, temperament, education, values, attitudes and priorities, which ultimately also affect the uptake and use of Information and Communication Technology.

Vodafone Simply (courtesy of IDEO / Nicolas Zurcher)

Furthermore, Pullin stresses that the significance of technological advance is not in technology per se, although it is clearly very important in making things happen, but in the content and communication that people get from using it. He references Tom Standage's book, *The Victorian Internet*, which draws parallels between the telegraph and the internet and illuminates a history not of the technological development of the telegraph, but of its public appropriation and social impact. Step changes in adoption are

not triggered by the latest operating system, Pullin explains, but by activity that is meaningful in the context of everyday life – such as the ability to Skype with the grandchildren.

To illustrate the role of simplicity within the complexity of service design, and cultural inclusion within inclusive design, Pullin tells the story of a project that he led while working for IDEO in 2004. Vodafone's brief was to create from scratch a mobile phone for a large underserved market of people aged 35-54 who paid for their own service, rather than had work-related phones. User research confirmed that many were intimidated by expensive, feature-rich phones. But design ethnography also revealed another insight: that many users found the function to silence the ringer of their phone inaccessible – even to the extent of not even realising that their phone *could* be silenced. Typically this feature was buried deep in a menu obscurely called 'profiles'. At the same time, etiquette and responsible social behaviour were important within this group, as a result of which many users kept their phones switched off, rather than risk them ringing inappropriately and embarrassingly in a public place. Having their phones switched off, of course, also led to a resulting loss of revenue for Vodafone because of unanswered calls and unchecked voicemails. Although age-related impairment was an issue amongst this age group, more often it was cultural sensitivities and technological unfamiliarity that were rendering their phones unusable.

The product, subsequently launched as 'Simply', embodied appropriately inclusive principles. Details included a physical switch on the outside of the phone that switched the ringer to silent (a feature that is present on today's Apple *iPhones*). Not only was this easy to use, but a glance down at the switch in a bag or the feel of the switch in a pocket could also reassure the owner that the phone was indeed silenced.

Despite an arguably inclusive design, however, the phones were not a commercial success and were eventually withdrawn. Pullin's understanding is that this market failure had as much to do with the way the product was subsequently marketed than the way it had been designed. In the days before mobile phones were sold in supermarkets (a proposal that had been dismissed), this handset was only available from dedicated mobile phone shops – a retail environment that its target users were known not to frequent. The overall service was, therefore, not inclusive, which reinforces the need to look beyond the product itself to the wider offering.

In conclusion, Pullin acknowledges that designing for inclusive experience is doubtless a very challenging activity. It is vital, however, to think about inclusion of any product as part of a wider experience. He also deems it important for designers to become more aware that people create their own mental models of technologies and that how these models evolve through life will impact individuals' ability to adopt and appropriate new technologies in turn.

Step changes in adoption are not triggered by the latest operating system, but by activity that is meaningful in the context of everyday life – such as the ability to Skype with the grandchildren.

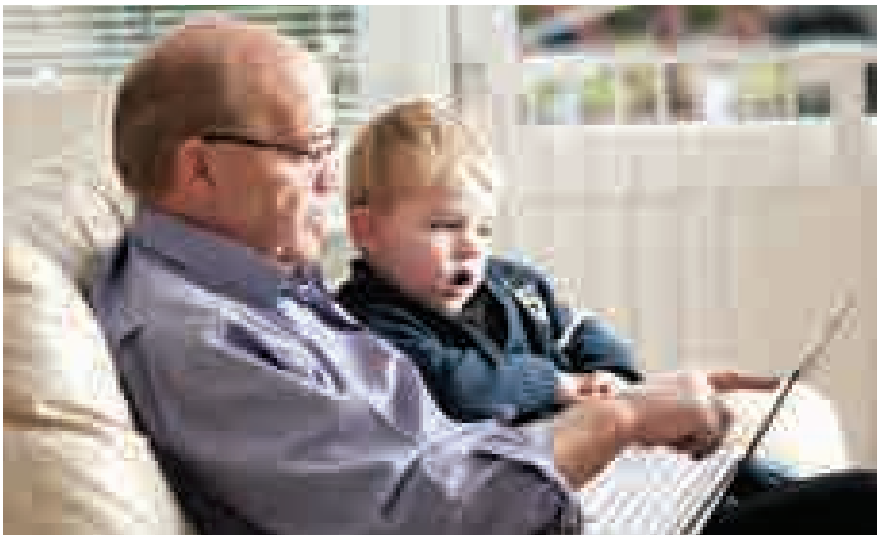
References:

Pullin, G. (2009) "Design Meets Disability". Cambridge, MA: The MIT Press.

Pullin, G., J. Rogers, R. Banks, T. Regan, Napier, A. and Duplock, P. (2011) "Social Digital Objects for Grandparents", Include 2011 Conference, Royal College of Art, London, April 18-20, Available online at: http://research.microsoft.com/pubs/152548/Social%20digital%20objects%20for%20Grandparents%20-%20Pullin%20Banks.pdf

Standage, T. (1998) "The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-line Pioneers". London: Weidenfeld & Nicolson.

IDEO (2005) "Simply for Vodafone: A Mobile Phone for the Rest of Us". Available online at: http://www.ideo.com/work/simply/



Chapter 18:

Time to end the 'Stone Age' of inaccessible ICT

Marjan Sedmak
AGE Platform Europe

The current business philosophy and practice, by and large, lags behind the needs of modern society in which older people are the most rapidly growing market.

Marjan Sedmak is the President of AGE Platform Europe, a network of about 165 organisations aimed at voicing and promoting the interests of the 30 million people aged 50+ in the European Union and raising awareness on the issues that concern them most.

In the 2012 *European Year of Active Ageing and Solidarity between Generations*, we asked Sedmak about the origin of this important programme. He says that the European Union has been reacting to the alarming demographic trends in the older stratum of the population since 2006, but it was not until 2008 that the idea of embracing this fact and dedicating a full year to improving the lives of older people was first conceived. The overarching goal set for the year 2012 was to put substantial effort into building an inclusive and robust European social model that is fair to all generations. As we near the end of 2012, Sedmak states that great progress has been made in realising and fulfilling the needs and aspirations of the older generations, but much good work is still to be done, especially given that after 2050 they will likely constitute one third of the European population.

Sedmak argues that all people, young and old, technology-adept and technology-averse, are equally important members of society. However, to give them the respect and recognition that they all deserve, it is vital that every technological solution accounts for the aptitudes and preferences of the whole spectrum of age and capability. Unfortunately, the current reality is such that the ageing populations are frequently wrongfully treated as a burden in the public perception and, as a consequence, given very little thought by technology creators.

The truth, he says, is that older people do a lot of work for the society as a whole, whether it be through volunteering or caring for

A significant drawback of the current business model is that it releases half-finished products and expects customers to accept the constant need for system updates to improve the other half (...) over time 'on-the-job'.

grandchildren, and the benefits that they provide largely outweigh the expenses that they incur. For example, if grandparents did not bring children to kindergartens or schools in the morning, he muses, half of the population would be late for work, or would be unable to go to work altogether.

The design of Information and Communication Technology (ICT) should be conceived in a way that is accessible and intuitive to as many diverse users as reasonably possible. Alas, the current business philosophy and practice, by and large, lags behind the needs of modern society in which older people are the most rapidly growing market. The market economy will ultimately have to adopt its offering to the needs and capabilities of this changing user group. In many ways, it is no longer a question of if or even when, but of how little time do we have left to change before we fall into customer discontentment and stay behind the competition? Most certainly, we need to act NOW. Sedmak urges that now is the last alarm to optimise ICT for better accessibility and usability because the ubiquity of ICT is increasingly helping people become intelligent buyers and demand higher-quality devices.

Certainly the goal of any commercial organisation is to produce to sell and to compete for customers with other industrialists, typically on the basis of better quality, value or price. A significant drawback of the current business model, however, is that it releases half-finished products and expects customers to accept the constant need for system updates to improve the other half of the product over time 'on-the-job'. In this supposedly innovative approach, the group that loses the most, and actually the biggest mistake, are the customers. For a long time the consumers were simply not organised to present their side of the story and fight against this unmerited business model. If you are not organised, Sedmak explains, you are the weakest part in the system. Conversely, the time has now come to eradicate the user oppression and seriously consider the voice of the senior customers.

There are really two ways forward for technologists: (1) they can either create a product that 'fits all', which is a hugely complex and largely impracticable activity; or (2) they can design a platform-based product with easily adjustable features. Sedmak strongly recommends an increase in devices that can be easily adapted to the diverse needs of individual users, in order to produce both profitable and socially responsible products. He talks about the iPad and apps as one of the best examples of ICT devices that allow users to actively tailor its functions and behaviour.

In response to the assertion that the future older population, having grown up with modern ICT, will have no trouble with new technology, Sedmak counters that it is a very implausible scenario because neither people's capabilities, nor technology will remain static. He stresses that the problem lies with the technology, not the people. The larger issue, he says, is that for a long time we lived in a stable technological society where people had plenty of time to become cognisant of technological devices and effectively utilise them in daily lives. However, the fast pace of technological advancement has sped up the adoption cycle, allowing little time for adjustment and reflection, especially among the less agile echelons of society.

Experience shows that some older users may be slower at learning to use and using ICT than their younger counterparts, however, many others might be at least as agile as the later generations. It is, therefore, essential to acknowledge that the ageing population is in no way a homogeneous group, but also is as wide and varied as the other generations. Furthermore, since life expectancy increases by eight hours daily, it is likely that we will have even more diverse sub-segments of technological competence among the ageing population in the future.

One big concern that Sedmak shares is related to what he calls 'the vicious

The ageing population is in no way a homogeneous group, but also is as wide and varied as the other generations. Since life expectancy increases by eight hours daily, it is likely that we will have even more diverse sub-segments of technological competence among the ageing population in the future.

circle of exclusion'. In particular, he believes that user exclusion leads to considerable fears among the population and unconfronted fears breed even more exclusion. He asserts that there is no place for exclusion in a modern, innovative society and he urges the triple helix of government, industry and academia to combine forces and eradicate it and its destructive effects from the very fabric of society.

Sedmak stresses that intrinsic motivation plays a vital role in technology adoption by older generations and is, therefore, an effective weapon for combating exclusion. He tells the story of a widowed 90-year-old man who lived in the same city as his children and grandchildren, but later remarried and moved to another country. This man never used the internet prior to his move, but he learnt to set up and use email and video chat systems to be able to regularly communicate with his family. In the end, he was able to effectively utilise ICT in his daily life.

In addition, Sedmak describes the joy older people can get from being able to master the use of a given piece of technology. He explains that, like a chain reaction, a feeling of victory that "I can do it" further stimulates seniors to conquer new knowledge. In the world filled with ageist stereotypes, it also makes them feel that they are not as old as everybody says they are. Sedmak moreover points out that ICT can actively help combat the problem with isolation in older age.

Overall, Sedmak notes that, although the two core cogs in the older users-technology wheel are currently largely misaligned, it is important to allow them to evolve in chorus in the future to enable them to better fit and move together in the overall mechanism of societal well-being.

Chapter 19:

Lessons learnt from the government going digital

Felicity Singleton
Government Digital Service

Felicity Singleton is Head of Digital Policy at the Government Digital Service, part of the Cabinet Office in the UK. Her responsibility includes rolling-out the digital inclusion agenda across Government and ensuring that, as the Government increases digital provision, no one is excluded from services by lack of access to the internet.

Singleton tells us that a key turning point for Government in embracing the digital inclusion agenda, and forming the Government Digital Service, whose role would be to deliver that agenda, was the *Directgov 2010 and Beyond: Revolution Not Evolution* report that the UK's Digital Champion, Martha Lane Fox, presented to the Minister of the Cabinet Office, Francis Maude, in October 2010, calling for radical improvement of Government internet services. That report established a principle for Government of delivering its services digitally by default and, as part of that, a clear commitment was made to reduce digital exclusion through the provision of 'assisted digital' access to new and improved digital services.

It is becoming increasingly more difficult to reach the over 75s and severely disabled people because they need significantly more support and intervention, leading to a risk that they will be progressively more disenfranchised.

Finding the individual point of interest or motivation to use the internet is key to first encouraging new users to get online and begin to access the benefits of doing so.

Interestingly, the new, more accessible and highly efficient GOV.UK domain, that is the amalgamation of the former Directgov and Business Link websites and soon also hundreds of other departmental sites, was officially launched into the public domain on the morning of 17 October 2012. The new domain, according to Singleton, demonstrates that the Government is very concerned about the importance of delivering digital services that are easily accessible and work for the needs and capabilities of the wide and varied population at large.

There are three key principles for digital services that this work has allowed the Government Digital Service to demonstrate, Singleton says. First, is the importance of developing services that are simple but effective for users. Focus on design has been key to this; it led to the establishment of a set of design principles that provide a simple, consistent and attractive interface design across Government. Users should only have to learn how to use Government services once, notes Singleton, and then be able to apply that across all services to use them quickly and intuitively. And that helps new or nervous internet users to learn how to use a Government service and use the knowledge gained across a wider range of services more easily.

The second principle has been to ensure that services are quick and simple for users to access. Research and testing has shown that most web users access information via search, not navigation within a website, but that Government sites have traditionally still been structured around systems that work for website writers, not those who want to use them. Attempts to cover all possible information requests have meant that the most frequently requested queries are lost in complex structures, making it hard for users to get results, particularly those who are inexperienced on the web. As a result, Government has taken a Google-style approach to making its new portal as intuitive, clear and easily navigable as reasonably possible, both in terms of design, but also by building it around search, and focussing on surfacing results quickly and simply in a manner that reflects how people search for information. The site offers a number of quick answers to key search results (such as when the next bank holiday is or when the clocks change) and aims to provide users with the answers they are looking for quickly and clearly. Singleton highlights the importance of this in encouraging new internet users to access the site and to ensure they are not disheartened by complex results or a poor interface.

The third principle demonstrated by GOV.UK is the necessity of creating an iterative, user-tested product or service that can meet the needs of its users. User need is the number one priority, Singleton explains, and so there needs to be a strong focus on understanding people's abilities, wants and contexts of use in designing the site, and always testing the designed artefact against these important criteria. While working on the GOV.UK domain, Singleton notes that the design team used the so-called 'needotron', a system for calculating top user needs that informed all development. Frequent testing throughout the development process ensured that design that did not work was promptly highlighted and could be quickly changed without incurring extra costs. She also highlights that this iteration will continue post-launch so that no new needs are ignored and that they are responded to effectively. This testing and iteration also ensures the site is accessible to those who may be new to the web or who may need to build up their web skills.

Since its launch, GOV.UK has received positive feedback from users on its design and utility, which demonstrates the progress being made by the Government in improving its digital offerings. But, despite these important efforts and a 2.1 million decrease in the number of those who are digitally disenfranchised in the UK since 2010, Singleton shares a much-debated concern about those who are still not online, including 6 million older people of whom an overwhelming majority are individuals over the age of 75. In addition, people with some form of disability constitute about

20% of this group. She worries that, whilst the work of organisations such as *Race Online 2012* and UK Online Centres has led to many more people getting online, this has often been the younger or easier to reach individuals. The larger problem is that it is becoming increasingly more difficult to reach the over 75s and severely disabled people because they need significantly more support and intervention, leading to a risk that they will be progressively more disenfranchised.

Singleton flags that research shows that the most significant barriers in battling digital exclusion are not necessarily around the high costs of and restricted access to Information and Communication Technology (ICT), but around motivation and skills. The former barriers still have to be addressed, she insists, but unless we tackle the inherent motivation issues we will never get everyone on the internet. It is a bit like taking a horse to water, but not being able to force it to drink, she muses. Interestingly, a significant corpus of evidence shows that once users get online and understand the benefits that are to be gained from using the internet, many of the adoption issues fall away. She references the work of Amanda Derrick and her team at *Connect Digitally*, a Central-Local Government partnership focussed on getting people to apply online, for example, for school places or free school meals. The results of this work consistently show that when people understand the benefits of doing their school application online and are motivated to do so, they will find ways to do it, such as using proxy access via a friend or workplace if they do not have ICT in their own home. Finding the individual point of interest or motivation to use the internet is key to first encouraging new users to get online and begin to access the benefits of doing so.

Singleton also points out that ICT exclusion among many older people is often a result of an "It is not for me" attitude and a related but separate issue of technophobia. In particular, there is a lot of fear, she says, associated with being seen or exposed as technologically incompetent amid the older generations. However, despite the initial difficulty with getting older people to use ICT, once they get online they are just as able to benefit from it and the opportunities it opens up as any other age group. They may not necessarily be as agile at navigating through the world of the internet and immediately starting Facebook or Twitter accounts, but they are not radically different in how they utilise online services from the younger generations. However, in encouraging these individuals to get online, Singleton emphasises the need not only to encourage take up, but also to provide support for sustained use and informing people about the latest technological innovations that can potentially benefit their lives.

Tragically, many of those most likely to be digitally excluded are also from groups who are the heaviest users of Government services. A major challenge for Government is, therefore, its ability to build digital services that work better than offline services and can be accessed by all users. Government is working with organisations in the digital inclusion space to raise awareness of the benefits of being online and drive the motivation that is needed. The work of Martha Lane Fox and her partners, for example, has played a positive role in achieving this goal. But for Government, notes Singleton, the current focus is on building services that everyone wants and can use, as well as providing the right support for those who cannot independently access them online.

Current Government digital services have often been limited in their effectiveness by the scarcity of the right people and skills in the right places to build, test and iterate them. Many services have been designed, built and launched without sufficient user testing and iteration, often making them hard to use, out of date and expensive to amend. Government really needs to 'reboot' its attitude and start thinking: "What is the user need? How do I design my product to meet that user need?" and then "How do I develop it, test it, build it and then, if something does not work, iterate it?" It is, therefore, vital to get the relevant expertise into Government to design services in the way private sector companies now do and to think about

how to embed inclusion into the design from the start.

Overall, Singleton states that to be successful in the long term, inclusion has to be embedded in all that an organisation is doing. She acknowledges, however, that keeping people motivated about inclusive design in the face of cost, time and other organisational constraints can be a challenge, and so she highlights the benefits to both public and private organisations of getting some quick wins to show the potential benefits of the approach, as has been done with GOV.UK. But long-term Singleton is optimistic that Government is learning the lessons of past mistakes and taking a new approach to digital, which has inclusion at its heart.

Government really needs to 'reboot' its attitude and start thinking: "What is the user need? How do I design my product to meet that user need?" and then "How do I develop it, test it, build it and then, if something does not work, iterate it?"

References:

Fox, M. L. (2010) "Directgov 2010 and Beyond: Revolution Not Evolution". Letter from Martha Lane Fox to Francis Maude. Cabinet Office.

Chapter 20:

Technological speed vs. accessible and responsible design

Heinz Wolff
Brunel University

Becoming digital because the rest of the world is digital is not the best way forward for older people.

Professor Heinz Wolff has many strings to his bow: he is one of Britain's leading scientists, the undisputed father of bioengineering, philosopher, inventor, television and radio personality and avid promoter of the application of technology to the benefit of society.

Our conversation with Wolff starts boldly: "We are now at the edge of the human revolution! The purpose of today's innovation is not about 'how to condense water in the Sahara so as to make the Sahara bloom', which would be quite a useful thing to do, but how to increase the already extremely high-speed of computational processing". The big problem is that the high-level of technological competence that we now have largely exceeds our biological ability to deal with it. There is a bit more to it than this.

Our industry, including sales and advertising, can give employment only if a new product with some additional properties, which can be promoted as desirable, can be introduced every few months. To include a technological improvement, like speed, is relatively easy and cheap to introduce.

There are two ways forward, Wolff muses, we can either sit back and let the machines do the work, or we can take active steps to limit how fast computing and information transmission can go. The latter could involve building in a cooling off period to give people the time to reflect upon their current technology use and how they could better utilise it in their daily lives in the future. Asked how this proposition could be achieved, by recalling the outbreak of the Second World War through which he lived, Wolff argues that it is possible to impose major changes quite quickly if the crisis is made sufficiently credible to the people who are going to be affected by those changes in society. For instance, women suddenly went to the factories to work on lathes and

drilling machines, a concept that was unheard of before.

Clearly today's Information and Communication Technology (ICT) can be a powerful daily living tool, but Wolff worries that not nearly enough is done to justify why 'digital' is almost always equated with 'good' by the government and technologists. He thinks that becoming digital because the rest of the world is digital is not the best way forward for older people. The thing that needs to be reinvented, and definitely something that technology could support, is people talking to people and ways to combat loneliness in older age.

Wolff admits that his motivation toward inventing gadgets for the benefit of society changed some years ago when he realised that they could never fully improve the lives of people in older age in quite the same way that the invention of incentives for changing the attitude of people toward care for the aged would. Since this important realisation, he has been working passionately on the *care4care* programme aimed at providing support for older people through mutual exchange where care provided to an older person by a young member of the local community will earn that member care credits for own future use, or to support a relative or friend. The success of this programme, according to Wolff, is entirely dependant on whether the next generation is as keen or even keener to make a provision for their own old age, which the state can no longer afford.

Every step of technological evolution, typically manifesting itself with yet another gadget every six months, comes with an ever-increasing suite of features, but these are not features that one could not do without. The larger problem, Wolff explains, is that technologists are usually ahead of the application and, rather than solve a need, they actually create the need. However, most of the things they invent are toys: "the iPhone is a toy", he fearlessly states.

It is important that industry focuses more on problem solving, instead of entirely on design, because the former is a more general application that is present both at the beginning of the invention process, where the understanding of the system is key, and the process of making things which actually fit into the society at the time. That said, he points out that attractive design plays a big role in the saleability of a given product or service: "You can have a product which works perfectly well, but because it is not 'attractive' it could not sell. It is like a totally balanced meal that one would not want to eat because it did not taste right".

According to Wolff, a majority of older users react negatively to new technology on the whole. This largely occurs because one's ability to adapt to novelty (also referred to as one's 'fluid cognition') decreases with age in most people, subject perhaps to an individual's life experience or genes. Interestingly, however, older age brings about an increase in people's ability to use specific skills, acquired knowledge and experience (also referred to as one's 'crystalline cognition') to bear on their tasks.

One critical barrier that needs to be broken down for more targeted use of technology by older populations in the future, however, is the fear of breaking devices, especially expensive items like computers, coupled with resistance to change and the deep-seated assumption that to use computers one has to firstly fully understand how they work. One of Wolff's recent ventures, *The Care Companion*, tried to combat the fears of older users by introducing a keyboard-free computer operated by either a barcode scanner or touch-screen that can carry out a wide range of functions, from home shopping to contacting the GP. This was in response to a finding

One critical barrier that needs to be broken down for more targeted use of technology by older populations in the future is the fear of breaking devices, especially expensive items like computers, coupled with resistance to change and the deep-seated assumption that to use computers one has to firstly fully understand how they work.

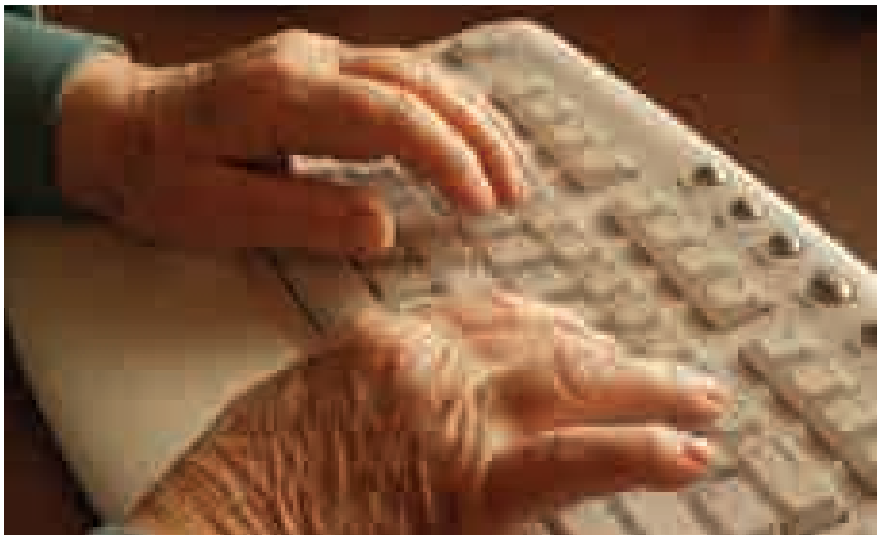
that older users were not afraid of computers per se, but of keyboards because they thought that 'fasulty typing cab' [sic] break a computer.

Why is there so much fright surrounding uptake of technological innovations? It is a natural human tendency to fear something that is new and unfamiliar, notes Wolff. Asked to elaborate, he explains that perhaps the fear of new things is due to a degree of conservatism, which historically has suited human survival when people's life expectation was 45 and the changes external to one's life were significantly less important in shorter-lived societies than they are now.

To combat the fear associated with ICT adoption by the ageing population, Wolff recommends technologists to improve the function of devices by making the change invisible or minimally apparent and to use familiar metaphors in order to make the usage experience less frightening. For instance, the idea of 'pigeon holes' into which one can sort things can be used to help people understand how computer memory works, because the latter is actually just another way of arranging 'pigeon holes'. The key is to work from an analogy which can be easily visualised and widely understood to something which is more complicated. It is also important to give users a choice to invoke or reject computer upgrades and fully support them if they select the latter.

In general, Wolff thinks the way that technology has developed often shows a misunderstanding of what people actually need or want. Clearly technology can be a powerful daily living tool, but more has to be done to better understand the requirements and aspirations of those in older age.

To combat the fear associated with Information and Communication Technology adoption by the ageing population, technologists could improve the function of devices by making the change invisible or minimally apparent and to use familiar metaphors in order to make the usage experience less frightening.



Chapter 21:

Focussing on what we could do, not what we are not doing

Tom Wright
Age UK

Tom Wright is the Chief Executive for Age UK, one of Britain's largest not-for-profit enterprises and charities serving seven million older and retired people across financial, retail and policy services. Age UK is the founder of the *Engage Business Network* aimed at promoting accessible, ergonomic design in products and services for older people.

Wright starts our conversation with challenging the way that ageing is perceived in the modern era. He believes that, rather than define age by the numbers, it is more accurate to describe it as a life-long development comprised of a number of life stages. The truth, says Wright, is that ageing affects all of us on daily basis and is influenced to a large extent by a number of factors: age, gender, ethnic and cultural background, socio-economic settings, health status, personality, among others.

Much of today's Information and Communication Technology (ICT) is over complicated and excludes a majority of older people, who form a large part of the market and are responsible for £300 billion pounds of annual spending in the UK. According to the Office for National Statistics (ONS) research, nearly eight million Britons, and among them 5.4 million older people, have never been on the internet. As a result, Age UK, along with the BBC, Talk Talk, Lloyds Banking Group, EE, E-ON, BIG Lottery UK and the Post Office, co-founded *Go On*, a charitable partnership aimed at "bring[ing] the benefits of the internet to every individual and every organisation in every community across the UK". *Go On* is a continuation of the *Race Online 2012* government initiative aiming to get 95% of those who have not yet been on the net online by 2015. It tries to abolish the popular misconception among many government and

industry organisations that putting all the important resources on the internet will incentivise everyone to go online. Wright points out that this will never work unless an adequate support infrastructure is provided to assist people with a wide range of capabilities and economic circumstances to gain access to and learn to use the internet.

To support older people in becoming net citizens, and in particular to help them overcome the initial fear of stepping onto 'unknown territory', in many of its local centres throughout Britain, Age UK provides a team of ICT ambassadors and training rooms for anyone interested in learning to use the internet and various computer software. The training is typically done by older volunteers who have greater patience and understanding of the need to avoid using jargon and can relate by experience to those they are supporting. In addition, Age UK helps individuals with limited funds acquire and set up personal computers by promoting refurbished laptops with modern software for a reduced amount of money and by negotiating reduced broadband offers to the senior group. Age UK also accepts recycled computers for resale, but they are not available to individuals, and the money made from resale contributes to supporting the training offered by the organisation. Laptops are mostly popular, says Wright, because many older people do not want a traditional PC that is non-portable, visually unattractive and requires add-on equipment such as camera or microphone.

One of the major things that needs to be addressed for older people, according to Wright, is the provision of a sense of safety on the internet because one of the barriers is fear, regularly intensified by negative media stories. Another major barrier is limited information on what technology can offer to the ageing population. "If an older person has never been on the internet, then how can this person know what it is, what it is for and whether the negative media stories are true?"

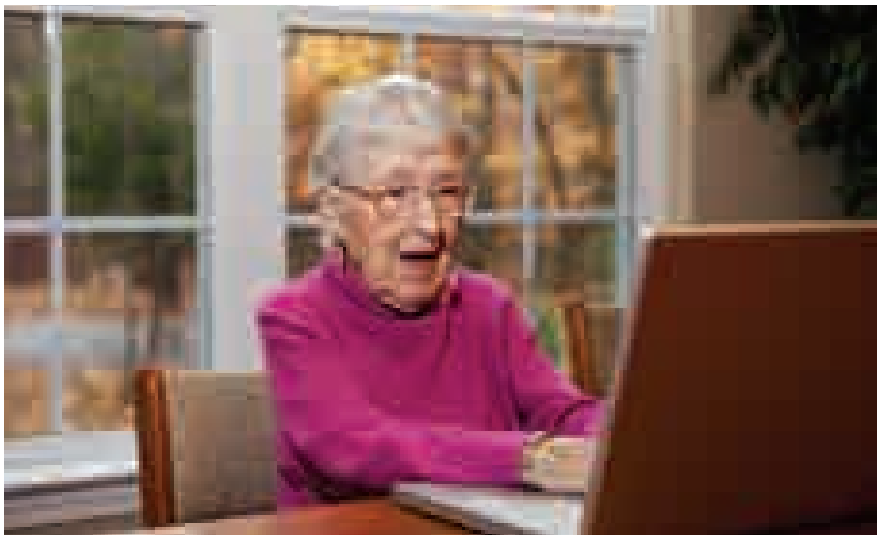
A further key deterrent to ICT adoption is the current business models for selling broadband packages, which are usually bundled with unlimited download allowance and cost in the range of £17 a month. Wright argues that many older people will not get through their unrestricted download package by making a few calls on Skype or sending some emails and, therefore, they do not want to pay high monthly subscription costs for low usage. At the same time, the pay-as-you-go model is not a good solution, both because it is largely inaccessible and it penalises people for not spending a certain amount of money by a given point each month.

Wright also challenges the design of modern telephony compelling people to go online and use the Interactive Voice Response (IVR) technology, which makes the user press up to 15 or so different buttons before they can speak to a human voice. The problem, Wright explains, is that technology providers are not thinking about real users and their actual needs and changing capabilities. Most technologists use whatever everyone else in industry is using, regardless of whether it is inclusively designed or not. If they just cared to look at videos of, for example, how people with limited dexterity open cans and bottles, they would be horrified how short-sighted some of their products are. To compensate for this ineffectiveness and to counteract the problems with inaccessible and unusable products, Age UK sells about 60 daily living aids, including adaptations for medical packaging and seat belts, through popular high-street retail outlets.

Much of today's Information and Communication Technology is over complicated and excludes a majority of older people, who form a large part of the market and are responsible for £300 billion pounds of annual spending in the UK.

Why do companies frequently fail to design with older people in mind? "It is partly societal. Society places a premium on youth, newness and modernity. So designers tend to overcomplicate things. A good

If an older person has never been on the internet, then how can this person know what it is, what it is for and whether the negative media stories are true?



simple ergonomic design, perhaps, is often not seen as challenging or interesting enough in technical terms". Furthermore, many design teams consist of young and able-bodied people who do not tend to naturally focus on the older population. Wright has one particular recommendation for designers: "Think of your parents or your grandparents if you are providing a service or running a business that appeals to a wider spectrum; just whatever you do road test it first amongst older customers".

Although designers often struggle with understanding age-related changes in people, the scale of change in later life stages is now too large to be ignored. For example, cognitive conditions such as dementia and mild cognitive decline now affect a large proportion of the population at large.

Interestingly, Age UK has commissioned arguably the biggest piece of research in the world looking at cognitive change, *The Disconnected Mind*, in order to better understand the reasons for cognitive decline in older people.

This longitudinal study has closely looked at the white matter of the brain, because one of the key causes of cognitive decline is the fragmentation of the myelin, a form of fat surrounding nerve fibers in the white matter. The flaking of the myelin results in fewer signal transmissions and without intact and healthy connections people's thinking is slower and mental functions are impaired. It was discovered that changes in cognitive capability across the life-course are only partly inherited (24%), but mostly result from one's environment and lifestyle (76%) – giving us opportunity to modify the risk of decline. In essence, factors throughout our lives such as high blood pressure, obesity, diabetes and especially lack of exercise, influence the state of well-being of cognitive functioning.

Organisations which are properly addressing this increasing age-related and individual need problem are gaining economic advantage. Apple products, for instance, are currently very popular because they are more intuitive and designed around the individual.

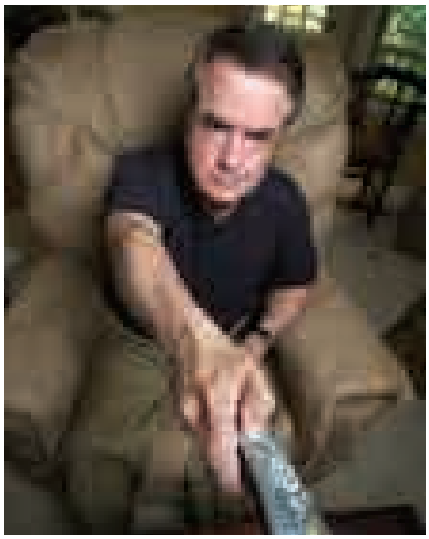
Fiddly devices and poorly laid out interfaces are only part of the problem, however. The other part is the lack of a human interface in the sales and aftercare. In general, a majority of older people almost always choose a supplier that can provide a good backup service, simple demonstration and empathetic customer service. What technology providers often forget, muses Wright, is that the

Fiddly devices and poorly laid out interfaces are only part of the problem, however. The other part is the lack of a human interface in the sales and aftercare.

human interface is still a critical part of that approach.

The centre of attention needs to be on the core things: "There is an over focus on superfast broadband before we have even got standard broadband. Superfast broadband might be important in business districts of the country, but not in most of rural Britain, many areas of which still do not have broadband access and the supporting infrastructure". Some very simple things can be done to better utilise access to standard broadband, even in the more remote areas of the country. For example, a localised Wi-Fi broadcasting hub could be put on church spires in villages to provide a Wi-Fi network that people could feed off.

In general, Wright thinks that the use of ICT can greatly benefit older users, but only if it is offered to them in an accessible manner. However, for this to come about, government and business organisations need to work together to challenge the current perceptions of older age and drive the development of intuitive and people-friendly products and services. It is also important that they focus on what they could do, not what they are not doing.



It is important that they [government and technologists] focus on what they could do, not what they are not doing.

Postscript

Anna Mieczakowski and John Clarkson
Engineering Design Centre, University of Cambridge

Anna Mieczakowski

John Clarkson

Accessible and easily adaptable Information and Communication Technology (ICT) can be achieved by having technology creators step out of their corporate or ivory tower and join forces with government and academia to create more mindful and motivating technology for real people with naturally diverse needs, capabilities and attitudes.

The twenty one thought pieces in this book provide a broad range of views on ageing, adaption and accessibility in the modern digital world. However, with regard to the provision of ICT, they are united in promoting change and a move towards greater inclusion. The consensus is that we are on the right track, as the focus shifts more towards how to provide inclusive ICT, rather than to convince people that it has to be done it in the first place. However, more effort is required to understand older people and their changing abilities and needs, and to appropriately test proposed solutions before they are released.

Change is inevitable, ironically because the ubiquity of ICT is helping older people become intelligent purchasers and increasingly demand accessible technology. There is a strong case for more inclusive products that are not only functional, but also attractive to many more potential users, finally abolishing negative ageist stereotypes. Wider internet use among the ageing population and all the other user groups is essentially about empowerment: providing easy access to ICT equipment, as well as a supportive network of people to encourage and sustain participation. Better access to ICT can be achieved by using familiar analogies and metaphors, basing technology around multifunction platforms that enable user-alteration of needed apps, layering the user interface with progressively more advanced modes, and increasing visibility of existing accessibility features settings on common software, such as magnifiers and speech recognition.

Ultimately, it is through good design that the world can be made more inclusive and enjoyable for older people. A more responsible approach to the delivery of ICT by business, government and education could bring about significant change. We have the right tools and our designers are capable of designing for us all, but they need to be given a chance and adequate support to do so. Awareness of this challenge and education at all levels are key to *Designing Our Tomorrow* as we move into an era dominated and enhanced by ICT.

We hope that you have found the thoughts, opinions and insights in this book interesting and useful. Finally, we are always interested in hearing about the ICT experiences of people from all generations. If you have a story to share, please send it to us at **edc-insights@eng.cam.ac.uk**.

Index of experts

B
Bendixen, Karin, p01
Brittin, Matt, p04

C
Coleman, Roger, p07
Craddock, Gerald, p11

D
Dong, Hua, p14

E
Eikhaug, Onny, p17

F
Fletcher, Valerie, p20

G
Greengross, Sally, p23

H
Hosking, Ian, p26
Huppert, Felicia, p30

K
Kearney, Bonnie, p33

L
Lewis, Nigel, p35

M
Milner, Helen, p38
Molenbroek, Johan, p41

N
Newell, Alan, p44
Norman, Donald, p48

P
Pullin, Graham, p51

S
Sedmak, Marjan, p55
Singleton, Felicity, p58

W
Wolff, Heinz, p62
Wright, Tom, p65

Ageing, Adaption and Accessibility:

Time for the Inclusive Revolution!

Editors: Anna Mieczakowski and John Clarkson

Modern Information and Communication Technology (ICT) has, in the last few years, enriched the lives of many individuals and society as a whole. With all the benefits afforded by this new-found capability, however, come challenges for the ageing population. Why do we continue to digitally disfranchise older people in the modern era, especially given that the world's population is ageing at an unprecedented rate and there is an increasing focus on the sustainability agenda?

The Engineering Design Centre (EDC) at the University of Cambridge, in partnership with BT, produced a book of thought pieces investigating these questions. Importantly, this work was aimed at stimulating a debate based on research and practice that has been taking place in many industrial studios, government chambers and academic centres.

More information about this research project can be found at:
http://www-edc.eng.cam.ac.uk/insights

Engineering Design Centre
University of Cambridge
Trumpington Street
Cambridge
CB2 1PZ
UK

ISBN 978-0-9545243-8-8

UNIVERSITY OF CAMBRIDGE
Engineering Design Centre

sponsored by BT