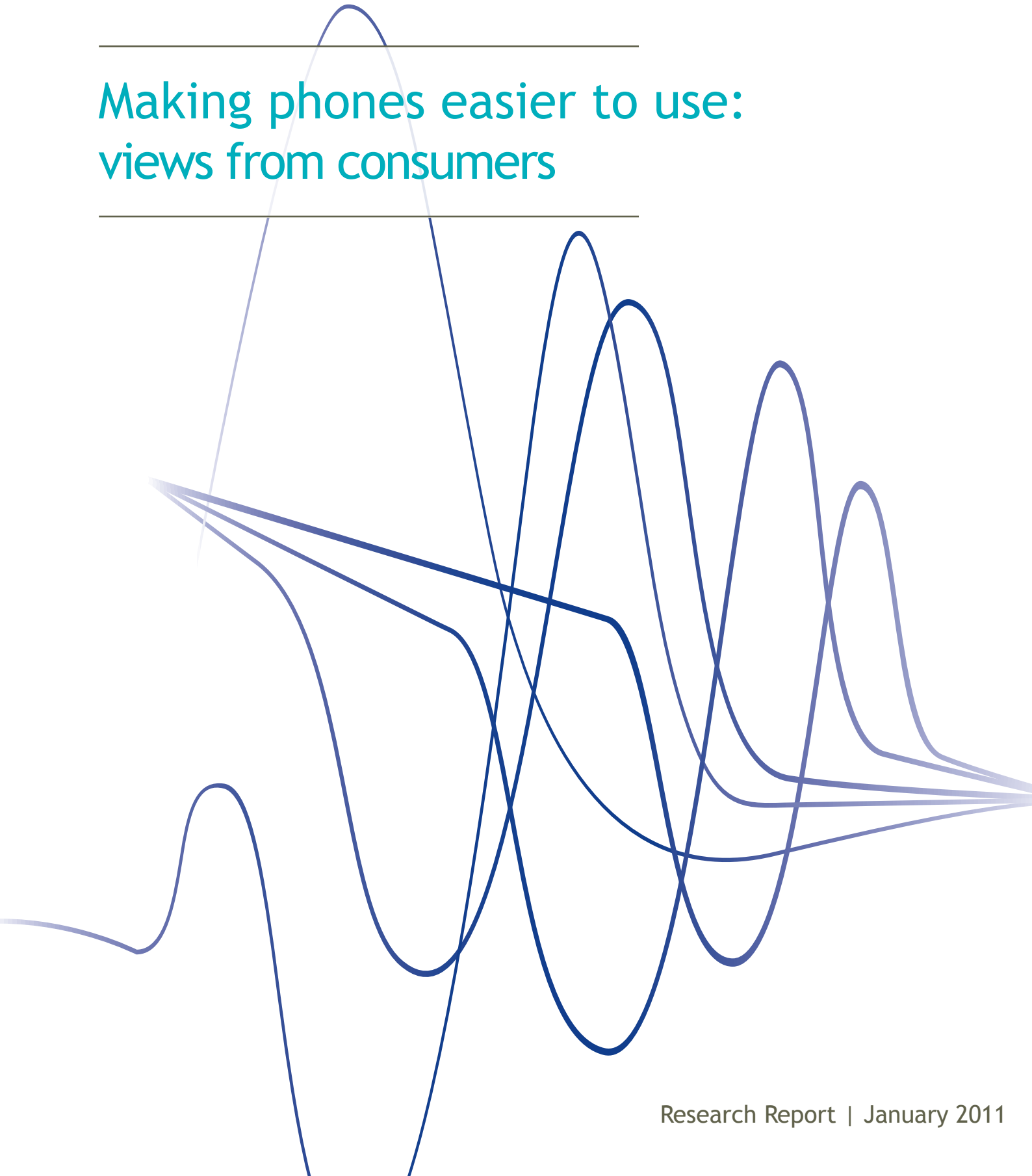
COMMUNICATIONS CONSUMER PANEL

Making phones easier to use: views from consumers



Research Report | January 2011

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About the Panel

The Communications Consumer Panel is an independent panel of experts established under the Communications Act 2003. Its role is to influence Ofcom, Government, the EU and service and equipment providers, so that the communications interests of consumers and citizens are protected and promoted.

The Panel pays particular attention to the needs of older people and people with disabilities, to the needs of people in rural areas and people on low incomes, and to the needs of small businesses, which face many of the same problems as individual consumers.

The Consumer Panel is made up of part-time members with a balance of expertise in consumer issues in the communications sector. There are members representing the interests of consumers in Scotland, Wales, Northern Ireland and England.

Consumer Panel Members are appointed by Ofcom, subject to approval by the relevant Secretaries of State. They are appointed in accordance with Nolan principles and are eligible for re-appointment. The Consumer Panel is assisted by a small advisory team.

1. Executive summary

Usability of mobile phones is generally thought of as an issue for older and disabled users. But the Panel has always thought that easier to use mobile phones would benefit everyone and research for this report shows that this assumption was right; all users appreciate phones that are easy to use.

The purpose of this report is to identify the changes that can be made to the design and function of mobile phones that will make them easier to use, and therefore more appealing to mainstream users, while at the same time increasing the numbers of older and disabled users able to use them.

This is important because while for most users an easier to use mobile phone is generally a nice-to-have, for many older and disabled users a usable phone is crucial for enabling them to use mobile services at all. At the moment many older and disabled people have trouble using mobile phones and levels of mobile take up are substantially lower among these groups. This places them at a significant disadvantage in a society increasingly reliant on mobile services.

The report is based on research and user trials conducted by Ricability, an independent consumer research charity, into consumers' use of mobile phones and their views on what would make them easier to use, backed up by analysis of the existing research literature and discussions with key stakeholders.

Because we believe that usability is a mainstream issue the focus of this report is on the mainstream mobile phone market. However, there is also a range of more specialist handsets and adaptive software and equipment specifically designed to meet the needs of older and/or disabled users. Our research suggests that at the moment these specialist products are not always meeting those needs as effectively as they could. Therefore, where appropriate, the report also looks at where improvements could be made to the availability and design of more specialist mobile phone products.

Key findings

1. **A number of simple improvements could benefit all users.** The research identified a number of improvements that could be made to mobile handsets that would benefit all users, demonstrating that improving usability can have benefits for mainstream users while at the same time widening access for older and disabled users.
2. **Increased facility to customise could greatly increase usability for a wide range of users**, including older and disabled users.
3. **Older and disabled people often do not have the information they need to choose a phone that meets their needs**, or know where to get that information.

Other findings are that:

4. Attitudes towards the importance of usability differ according to age, disability, and the perceived importance of mobile phones to the user.
5. There is a usability ladder. Changes that improve usability for disabled and older users do not all benefit mainstream users. Some changes help everybody, some changes make no difference to mainstream users, and some changes reduce the usability or desirability of a phone for mainstream users.
6. The wide variety of needs and preferences means it is unlikely that any single phone will meet the needs of all users.
7. Usability depends on a range of factors and the way in which those factors interact. It is therefore difficult to provide a blueprint that will guarantee usability and doing so could stifle innovation.
8. Familiarity is a crucial factor in how usable a phone is for its users. Consumers, particularly older and disabled consumers, are more likely to be able to operate a phone if they are already familiar with the layout and menu structure.
9. Many older and disabled consumers feel alienated by the retail environment. Retailers were seen as geared towards the young and technically proficient and were perceived as being unlikely to have the time or inclination to explain the basics to the uninitiated.

This analysis highlights a number of areas in which stakeholders could make improvements that would increase usability for all users, including older and disabled users. Areas where improvements can be delivered are:

- Implementing basic hardware and software improvements that will increase usability. The starting point should be those areas that would improve usability for all users. E.g. ensuring phones provide feedback to indicate when a key has been pressed, have backlit key labels to make the numbers/letters/symbols on the keys easier to see, and that the phone size and shape allows one-handed use.
- Maximising the opportunities offered by customisation, with pre-set options that can then be further refined.
- Testing the usability of phones with consumers, including older and disabled consumers, in a way that takes account of their particular needs. Given the wide range of different needs and the complexity of ensuring that different features work well together, testing phones during and after the development process, including with older and disabled users, will be an important way of ensuring usability for a wide range of potential users.
- Ensuring the sales and post-sales environment more effectively meets the needs of older and disabled people through a combination of better product availability, information and support.

- Finding creative ways of providing mentoring and advice that would help people develop the confidence and skills to use the equipment.

A number of different stakeholders have a role in making these improvements happen, including:

- Manufacturers, including manufacturers of specialist as well as mainstream phones;
- Retailers, including retail outlets of mobile network operators and independents;
- Mobile network operators; and
- Voluntary and third sector organisations.

Recommendations

The Panel has a number of recommendations for each of these stakeholder groups:

Manufacturers, operators, retailers and voluntary and third sector organisations should:

- Work together to provide consumers with better information about the usability of current and future mobile phones, particularly those features most likely to meet the needs of older and disabled consumers. This could include the development of an industry-wide, consumer-facing labelling system that lets consumers know at a glance whether a handset is likely to meet their particular needs. As part of developing this system participants should explore whether it would be proportionate to include independent testing of handsets, which could increase consumer trust.

Manufacturers of specialist and mainstream phones should:

- Work together to develop shared research and guidelines on developing basic usability features. These would be a useful starting point for embedding best practice throughout the industry.
- Use these guidelines to get the basics right across all phones, with an initial focus on those features identified as increasing usability for all users, followed by those which help disabled and older users while making no difference to mainstream users.
- Build in usability from the start, ensuring that features designed for older and disabled people work across the range of functions and applications available on the phone.
- Increase the facility to customise their phones.
- Create pre-set options on their phones, with some of those most likely to be beneficial to older and disabled people available pre-loaded.
- Involve users, including older and disabled users, in the development process, testing phones with these groups.

- Sign up to the Global Accessibility Reporting Initiative (GARI) and work together to develop it further. GARI aims to encourage manufacturers to provide comparative information about the accessibility features of the phones they make. It has considerable potential for improving the information available to consumers, although more work is needed from manufacturers and others before it fulfils that potential.
- Ensure that all phones come with instructions that are easy to follow and written in plain English.

Manufacturers of 'specialist' phones should:

- Investigate new retail channels, for instance well known pharmacy chains, where their target audiences are less likely to feel intimidated.

Retailers, including third party and mobile network operators, should:

- Stock a wider range of phones, including specialist models.
- Provide sales and support staff with better information and training about the likely needs of older and disabled users and the phones and features available to meet those needs.
- Provide consumers with information about the different phones and features available that will meet the needs of older and disabled consumers, both in-store and on their websites.
- Offer instructions and demonstrations that are geared to the needs of older and disabled people.

Mobile network operators should:

- Include older people among the audience segments they use for selecting and marketing phones, if they do not already do so.
- Request high levels of usability from manufacturers and back this up with the phones that they stock.
- Encourage manufacturers to use and develop the GARI database.
- Offer specialist phones on their pay-as-you-go or contract options.
- Provide third sector and voluntary organisations with regularly updated information about what services and features they offer for older and disabled users.

Voluntary and third sector organisations should:

- Push for the take-up and development of the GARI database.
- Work with manufacturers to source suitable volunteers for testing of mobile phones.
- Publicise information about what phones and features are available for their client groups.

- Consider providing or encouraging ongoing, peer-led mentoring and support for those of their clients who wish to learn to use technology, including mobile phones. This will, of course, depend on resources.

During the development of this report the Panel has engaged extensively with representatives from manufacturers, retailers, mobile network operators and voluntary and third sector organisations. Their input has helped us to develop, refine and secure buy-in to the recommendations. This has helped to create a platform for the recommendations to be implemented.

In 2010 the Government announced that, as part of its review of the consumer representation landscape, it would be considering the future of a number of consumer bodies, including the Panel. It has also announced that it is currently minded to incorporate many of the current functions of the Panel into a new consumer body, rather than continuing with the Panel in its current form. We will therefore be looking to a number of other bodies to take forward the recommendations set out in this report, including:

- The eAccessibility Forum
- The Mobile Manufacturers' Forum
- Ofcom

The e-Accessibility Forum is an initiative led by the Department for Business, Innovation and Skills (BIS). It brings together Government, industry and the voluntary sector to explore and understand issues surrounding e-accessibility so better and more inclusive services can be developed, enabling users and industry to benefit from sharing best practice across all sectors. BIS has agreed to share the findings of this report and help bring together key players to develop the recommendations set out in this report.

The Mobile Manufacturer's Forum (MMF) is an international association of telecommunications equipment manufacturers with an interest in mobile or wireless communications. As part of their work on increasing usability the MMF developed the Global Accessibility Reporting Initiative (GARI). GARI continues to be developed and refined and, in our remaining time as the Panel, we will be encouraging the MMF to incorporate the recommendations for further developing GARI included in this report, as well as to encourage their members to adopt the other recommendations for manufacturers.

Under the Communications Act, Ofcom has a duty to promote the development and availability of easy to use consumer equipment. We will be working with Ofcom to examine how they might bring together manufacturers, mobile operators, retailers and voluntary and third sector organisations to progress the recommendations set out in this report.

About the research

The research included a literature review, interviews with manufacturers, operators and third sector organisations, user trials and focus groups. The user trials focused on basic tasks, including turning the phone on and off, making a call and sending a text. The skills used for these tasks are those required for all kinds of use, including more advanced uses like internet access. If a consumer is not able to perform these tasks easily, they will be barred from many of the opportunities that mobile phones can offer. However, the focus groups also included discussion to gauge users' attitudes to more advanced mobile phone use.

The user trials included people of a wide range of ages with and without disabilities. This included people who were partially sighted and who had dexterity impairments. Deaf and hearing impaired users were not included in the user trials as the challenges faced by these users are too multi-dimensional to be explored usefully in a short user trial and generally require some degree of technical testing. However, the literature review and discussions with stakeholders included a particular focus on the needs of this group and this information was incorporated into the report.

2. About this report

The Panel's view is that everyone should have access to communications equipment that meets their needs. However, we know that at the moment many older and disabled people have trouble using mainstream communications equipment. This places them at a significant disadvantage in a society increasingly reliant on this equipment.

Traditionally this has been seen as a niche issue, to be addressed primarily through provision of specialist equipment. The Panel believes this approach is too narrow.

Our hypothesis is that usability is a mainstream issue, and that easier to use equipment would benefit everyone, not just older and disabled people. In the mobile phone market, this hypothesis seemed to be supported by existing research. For instance, research conducted in 2009 with mobile users in the US and Europe found that the single most important factor for phone users when choosing a new mobile phone is its ease of use, beating other factors like screen size, 'coolness', and the range of accessories.[1]

We commissioned Ricability to help us test this hypothesis further, conducting research to explore how far improvements in the usability of equipment for older and disabled customers would benefit all users, and how these improvements can best be delivered.

In particular, we asked Ricability to explore the following questions:

- Are there any products or features that are consistently rated as more usable by all, or a majority, of users or do different groups of users prefer different products or features?
- If there are features that improve usability for all, or a majority of, users are these easily replicable across different products?
- Are there additional functions or features that are required to make products usable for older and disabled people beyond those identified by all users? If so, what are these?
- There are a number of handsets that are marketed as accessible. How do these compare with mainstream models for:
    - The particular target groups for those products?
    - All users?

To answer these questions Ricability conducted:

[1] For more details of the research see http://www.3g.co.uk/PR/May2009/Ease_of_Use_Tops-Buying_Criteria_for_Mobile_Phones.html [Accessed 16/12/2010].

- A literature review;
- Interviews and discussions with manufacturers, network operators, retailers and organisations representing consumers, including older and disabled consumers;
- User trials with consumers between the ages of 18 and 75, including both disabled and non-disabled users; and
- Focus groups with participants from the trials.

The user trials included people of a wide range of ages with and without disabilities. This included people who were partially sighted and who had dexterity impairments. Deaf and hearing impaired users were not included in the user trials as the challenges faced by these users are too multi-dimensional to be explored usefully in a short user trial and generally require some degree of technical testing. However, the literature review and discussions with stakeholders included a particular focus on the needs of this group and this information was incorporated into the report.

The research also benefited from the advice and guidance of our advisory group, who were generous with information and provided many useful insights. Members of the advisory group were:

- Jon Barrow, Which?
- Kevin Taylor, RNID
- Ian Hosking, Engineering Design Centre, University of Cambridge
- Gretel Jones, Age UK, Consumer Affairs
- Shaun Lehmann, RNIB
- Michael Milligan, Mobile Manufacturers' Forum (MMF)
- Jack Rowley, GSM Association

Finally, we also shared the report with a range of stakeholders, including representatives from manufacturers, mobile operators, retailers and the voluntary sector. These stakeholders provided valuable input and feedback, helping to shape and improve the final report.

The research focused on basic tasks, including turning the phone on and off, making a call and sending a text. The Panel is aware that many consumers use their phone for a far wider range of tasks and activities, with the emergence of smartphones driving growth in the capabilities and opportunities offered by mobiles. In particular, the growth in internet access and applications designed to facilitate internet use is changing the way mobile phones are used and perceived. The focus on basic tasks was chosen because these represent the essential skills required for all kinds of use, including more advanced uses like internet access. If a consumer is not able to perform these tasks easily, they will be barred from many of the opportunities that mobile phones can offer.

However, we were mindful of the potential opportunities for older and disabled people that the increased capabilities of mobile phones can bring. These opportunities were explored through the literature review and during the discussion groups.

More details about the methodology can be found in the appendices.

A note on terminology

Throughout this report we have predominantly used the term usability. The international standard, ISO 9241-11, defines usability as 'The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.' We broadly follow this definition but with a focus on the 'design for all' approach, which stresses the design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible without the need for special adaptation or specialised design. We do also, where relevant, look at some products or services that involve special adaptation or specialised design. When discussing these we use the term accessibility rather than usability.

3. Opportunities and challenges

Usability will become increasingly important in the mobile phone market as more and more consumers use and rely on mobiles, and as the way they use their mobiles expands to include email, internet access and other more advanced features.

Usability will also become more important as the population ages. With the older population becoming larger many more consumers are likely to find traditional mobile phones harder to use.

This section looks at how trends in mobile phone take-up and use, demographic change and legislative developments are likely to affect the mobile phone market.

3.1 The opportunity

The opportunity for operators to expand market share through offering more usable mobile phones is potentially significant. This section sets out the trends behind that opportunity, in particular the coming together of demographic change and market conditions.

3.1.1 A large and growing market

Taken together older and disabled people are a substantial market. In 2009 19% of 16-64 year olds in the UK were disabled and 16% of the UK population were aged 65 and over. This is a total of 16.9 million people, or 27% of the UK population.[2]

The older section of this market is growing. Over the 25 years between 1984 and 2009 the number of people aged 65 and over in the UK increased by 20% to 10.1 million, 16% of the population. The number of people aged 85 and over more than doubled over the same period to 1.4 million, just over 2% of the population, while the percentage aged under 16 fell from 21% of the population (11.9 million) to 19% (11.5 million).

[2] Data from the 2009 Annual Population Survey, available at https://www.nomisweb.co.uk/Default.asp [accessed 27/09/10] and from the 2009 population estimate, available at http://www.statistics.gov.uk/cci/nugget.asp?id=6 [accessed 16/12/10].

Population ageing will continue for the next few decades. By 2034 the number of people aged 85 and over is projected to be 2.5 times larger than in 2009, reaching 3.5 million and accounting for 5% of the total population. The population aged 65 and over will account for 23% of the total population in 2034, while the proportion of the population aged between 16 and 64 is due to fall from 65% to 59%[3].

Many of these older people will have age-related disabilities or impairments that will make using mainstream equipment, including mobile phones, difficult. As increasing numbers of baby-boomers become older consumers the appetite among this group for well designed products that meet their changing needs without compromising on style and function is also likely to grow.

3.1.2 An under-consuming market?

In comparison to the rest of the population this is a market that is currently under-consuming mobile services. Overall mobile phone take-up is growing. According to Ofcom's Consumer Experience Research Report (2009) there were over 75 million active mobile connections in the UK at the end of 2008, equivalent to 126 connections for every 100 people. In part this is due to multiple device ownership; for example, people having one mobile for personal use and one for work use, or one mobile phone connection and one mobile broadband connection. It is also connected to the trend for having multiple pre-pay SIM cards, allowing people to take advantage of different tariffs and special offers from different providers.

Even taking into account this tendency towards multiple accounts the penetration of mobile is considerable. Ninety-three per cent of households had access to at least one mobile phone in 2009, with homes now significantly more likely to have a mobile than a fixed line. Individual mobile ownership is also high, with 89% of adults owning a mobile phone that they use at least once a month, up from 62% in 2000 (Ofcom, 2009).

However, mobile phone use is not spread evenly across the population. Older adults are less likely to use a mobile phone: 71% of those aged 65-74 and 54% of those aged 75 and over said they personally used a mobile phone in 2009, compared to 96% of 15-24 year olds, 98% of 25-44 year olds and 91% of 45-64 year olds (Ofcom, 2009).

Disabled people are also less likely to use mobiles. Ofcom's analysis is split into users with visual impairments, hearing impairments and mobility impairments. In 2009 71% of adults with a visual impairment, 53% with a hearing impairment and 71% with a mobility impairment used mobile phone services. This compares to a

[3] Data from UK National Statistics, available at http://www.statistics.gov.uk/hub/population/ageing/older-people/index.html [accessed 22/09/2010]

population average of 89%. Disabled users were also more likely to report having difficulties using a mobile phone: 35% of adults with a visual impairment, 41% with a hearing impairment and 33% with a mobility impairment report having difficulties using mobile phones, compared to a population average of 14% (Ofcom, 2009).

In a saturated market this lower level of take-up among older and disabled consumers could indicate that this is a segment in which there remains potential for growth.

3.2 The challenge

While increasing the usability of mobile phones sounds straightforward, there are a number of factors that have proved challenging. These include lower mobile take-up among older and disabled users, lower propensity to use smartphones and a preference for pay-as-you go rather than contracts. Also, while collectively older users in particular make up a large and growing market, many in this group do not have high levels of disposable income.

3.2.1 Trends in the mobile market

There are a number of key trends in the current mobile market. One of the biggest is the growth in smartphones. According to Ofcom's Communications Market Report (2010) in May 2010 26.5% of UK mobile phone users claimed to have a smartphone, more than double the number of two years before. Growth has been particularly strong over the past year, growing by 81% between May 2009 and 2010. This growth looks set to increase; in June 2010, nearly three-quarters of handsets sold with pay-monthly mobile contracts were smartphones.

The growth in smartphone ownership is related to two other trends in the market:

- The growth in people accessing the internet via their mobile phones; and
- The trend towards increasing contract length.

In the two years to March 2010, the number of people in the UK accessing the internet on their mobile more than doubled, with around 28% of UK adults with a mobile phone reporting that they visited at least one site on their mobile in March 2010. Much of this growth is generated by smartphones, particularly the iPhone. Despite accounting for a relatively small percentage of all mobile handsets Apple mobile devices generated around 59% of all mobile internet page requests in May 2010 (Ofcom, 2010).

Contracts are also getting longer. Before 2005, most pay-monthly mobile connections were sold as 12-month contracts; in 2006 there was a shift towards 18-month contracts; and in 2009-10 there has been a shift towards offering 24-month contracts as standard. In Q2 2010 around 80% of all new pay-monthly contracts sold

with handsets were for two years. This compares to less than one in three the year before, and less than one in thirty in Q2 2007. This is partly driven by mobile companies seeking to lock consumers in for longer, but is also related to the cost of the mobile handset, with mobile operators recouping the cost of more expensive smartphones over a longer period, making these handsets more affordable for consumers (Ofcom, 2010).

Another ongoing trend in the UK market is the gradual migration of consumers from pre-pay (pay as-you-go) to pay monthly packages. In 2009 41% of mobile connections were pay monthly. During the year the number of pay monthly subscriptions grew by over 3.1 million, significantly faster than pre-pay subscriptions, which increased by 455,000. This increase is likely to have been driven by both the desire to spread the costs of more expensive handsets and the increasing availability of monthly contracts offering a sizeable number of minutes and/or text messages at £15 or less a month.

This focus on smartphones, longer contracts and pay monthly contracts is not necessarily aligned with the behaviour of older people. Those older people who use mobiles are more likely to use pre-pay than sign up to a contract (Ofcom, 2009). Older people are much less likely to have smartphones than their younger counterparts and less likely to access the internet on their phones[4]. Just 12% of users aged 65-74 had a smartphone and the number of users among the 75 and over age group was statistically insignificant. This was compared to 45% of users aged 25-44, the group most likely to use smartphones. Similarly, 56% of mobile internet users are under 35, and just 10% are over 55 (Ofcom, 2009). This data is not available for disabled users, but it is possible that the trends are similar.

The risk is that older people, and possibly also disabled people, become peripheral to the market and that their needs get neglected.

3.2.2 Income levels of older and disabled consumers

The other challenge is the extent to which older and disabled people, while a large group, represent a viable market. When we look at levels of disposable income among these groups there are some indications that lower levels of disposable income might make them a less attractive market, particularly for an industry focused on high-cost handsets.

[4] Those older people who do have smartphones often make very good use of them, as the ILC report *The Fictions, Facts and Future of Older People and Technology* illustrates. Available at: http://www.ilcuk.org.uk/files/pdf_pdf_118.pdf [Accessed 20/12/2010].

Data from the Expenditure and Food Survey published by Age UK[5] shows that in 2007 gross household weekly average income peaked for households headed by someone aged 30 to 49, for whom it averaged £842 a week, and fell gradually among older cohorts. The average weekly income of the oldest households in 2007 (75 or older) was around £300, or just under £16,000 a year. This is mitigated, to a degree, by the fact that household sizes also change with age, and older households tend to have fewer members. Taking this into account, Age UK estimate that on average, income was actually greatest on a per-person basis for those in households headed by someone aged between 50 and 64 (£321). However, it still averaged over £100 per week less among the oldest households (aged 75 and over), the lowest per-person income of all age groups.

Analysis of the income distribution by the Department for Work and Pensions (DWP)[6] shows that in 2008/09 individuals in families containing one or more disabled people were more likely to live in low-income households than those in families with no disabled person if they were not in receipt of disability benefits. Disabled individuals were also more likely to live in low-income households than non-disabled individuals.[7]

However, it is important to remember that there is considerable variation within both these groups. According to the DWP analysis 0.9 million people over the age of 65 were in the top disposable household income quintile in 2008/09, as were 0.6 million disabled working-age adults.

Analysis of expenditure rather than income also points to some of the complexity behind these figures. According to Age UK[8]the 50–64 age group are likely to have the highest average 'excess income'. This declines in the upper age groups but

[5] Data available in *The Golden Economy – the consumer marketplace in an ageing society*. Conducted by ILC-UK on behalf of Age UK. Available at http://www.ilcuk.org.uk/record.jsp?type=publication&ID=80 [accessed 17/12/10].

[6] Data available in *Households below average income: an analysis of the income distribution,* published by the DWP. Available at http://research.dwp.gov.uk/asd/hbai/hbai_2009/pdf_files/full_hbai10.pdf [accessed 17/12/10].

[7] Disability in these figures is defined as having any long-standing illness, disability or impairment that leads to a substantial difficulty with one or more areas of the individual's life. Everyone classified as disabled under this definition would also be classified as disabled under the Disability Discrimination Act (DDA). However, some individuals classified as disabled under the DDA would not be captured by this definition. These figures do not take into account any additional costs that may be incurred due to the illness or disability in question. This means that the position in the income distribution of these groups may be somewhat upwardly biased.

[8] Data from *The Golden Economy, as above*.

even among the oldest group, the over-75s, average weekly excess income is higher than for the under-30s.

4. The legislative context

Currently, neither UK nor European law requires manufacturers to make mobile phones accessible to disabled users. The Disability Discrimination Act in the UK does not cover manufactured goods and is therefore not applicable to the mobile phone market.

There are a number of other relevant legislative developments, some of which may have some impact, although it seems unlikely that any will mandate accessibility in the mobile phone market. These include: the proposed Equal Treatment Directive; the revision of the Radio and Telecommunications Terminal Equipment (R&TTE) Directive; the transposition of the new regulatory framework for electronic communications (the Telecoms Package) into UK law; the development of accessibility standards and the mainstreaming of "Design for All" in the development of standards; and the 21st Century Communications and Video Accessibility Act in the United States.

4.1 The Equal Treatment Directive

The proposed Equal Treatment Directive, currently being discussed by the European Commission, will provide for protection from discrimination on grounds of age, disability, sexual orientation and religion or belief beyond the workplace.

The original drafting of the Directive was interpreted by some as covering manufactured goods. However, the most recent set of amendments, published on March 15 2010, say that: "This Directive shall not apply to the design and manufacture of goods". The new version says simply that member states should take into account "measures to ensure accessibility for persons with disabilities. [and] promote the research and development of universally designed goods, promote their availability and use, and promote universal design in the development of standards and guidelines." Details of what forms such action should take are not specified.

4.2 The R&TTE Directive

The R&TTE Directive is currently being revised. This Directive establishes the regulatory framework for the placing on the market, free circulation and putting in

service of radio and telecommunications terminal equipment within the EU. It contains a provision that allows the Commission to decide, on a case by case basis, that apparatus within certain equipment classes or of particular types shall support certain features in order to facilitate its use by users with a disability. However, this provision has never been used and there are some indications that it may be dropped from the revised Directive.

4.3 The Revised Telecoms Package

The Electronic Communications Framework, otherwise known as the Telecoms Package, is the regulatory framework that applies to all transmission networks and services for electronic communications including: telecommunications (fixed and mobile); e-mail; access to the internet; and broadcasting. A revised Framework was agreed by the European Parliament and Council of Ministers on 4 November 2009, after two years of discussion during the legislative process. The new rules will now need to be transposed into national laws of the 27 Member States by May 2011.

Included in the revised package are provisions that update and strengthen legislation and guidance on e-accessibility and the rights of users with disabilities. The primary focus is on the provision of services rather than equipment, but Article 23(a) states that "In order to be able to adopt and implement specific arrangements for disabled end-users, Member States shall encourage the availability of terminal equipment offering the necessary services and functions."

The Department for Business, Innovation and Skills is currently consulting on the transposition of the Framework into UK law. It says in its consultation document that it considers that the existing duty on Ofcom to promote easily usable apparatus under Section 10 of the Communications Act 2003 provides a sufficient statutory basis for implementation of this provision. It also notes that it intends to use the eAccessibility Forum, set up by Government, as the primary means of encouraging manufacturers to produce better and more affordable equipment. The Forum brings together Government, industry and voluntary sector organisations to explore and understand issues of e-accessibility and develop and share best practice across all sectors.

There is also provision in new article 21.3 for regulators to oblige communications providers to "regularly inform disabled subscribers of details of products and services designed for them." Ofcom are currently considering how best to implement this. There is potential to strengthen the requirement in General Condition 15.8 in which communications providers are required to publicise services mandated by Ofcom, so that they are also required to publicise services and tariffs that are particularly suitable for disabled users, including mobile

handsets. The Panel will be encouraging Ofcom to consider this option when they consult on their proposals during 2011.

4.4 The development of accessibility standards

The European Commission is running a programme of work looking into how to embed accessibility, and in particular the 'design for all' principle, into its standardisation process. 'Design for all' encourages manufacturers and service providers to design products that are either: accessible to nearly all potential users without modification; easy to adapt according to different needs; or use standardised interfaces that can be simply accessed using assistive technology.

Standardisation work will take place to coincide with a planned new European Disability Strategy for 2010-2020. It will include the implementation in 2010 of a new Standardisation Mandate that will require the relevant standards bodies to include 'Design for All' in relevant standardisation initiatives. As yet however, there are no specific accessibility standards for mobile phones.

4.5 The 21st Century Communications and Video Accessibility Act

While not directly relevant to the UK market, the 21st Century Communications and Video Accessibility Act, signed into law in the United States by President Obama in October 2010, is also of interest. The Act requires smartphones, television programs and other communications technologies to be accessible to people with vision or hearing loss. Of particular interest for the mobile phone market is the fact that it mandates that web browsers, text messaging, and e-mail on smart phones should be fully accessible and that internet-enabled mobile phones should be hearing aid-compatible. There are technical differences in the mobile systems used in the US and UK, so not all devices will cross the Atlantic. However, it is to be hoped that at least some of the innovation in products and services this legislation is likely to produce is reflected in what is on offer to disabled consumers in the UK.

5. Current measures to increase usability

There are a number of existing initiatives and adaptations available to increase the usability of mobile phones. These include: the provision of information about features available on mainstream handsets that may be useful for some older or disabled users; adaptive equipment, software and applications that can be used with mainstream handsets; and specialist phones designed to meet the particular needs of older or disabled users. These are dealt with in turn below.

5.1 Provision of information

Providing information to consumers allows them to identify which mobile phones might best suit their needs and compare different types of provision and functionality.

The most significant information initiative currently available is the Global Accessibility Reporting Initiative (GARI). This was set up by the Mobile Manufacturers Forum (MMF) and launched on 1st October 2008. It aims to encourage manufacturers to provide comparative information about the accessibility features of the phones they make. It currently lists 95 attributes for each phone provided by manufacturers on a self assessment principle. These cover a broad range of information, from whether a handset is compatible with hearing aids to whether it has 'easy to press keys'. Information is available on-line only, but GARI's website allows fast searches on any combination of features.

The system has great potential for alerting consumers to the range of accessibility options available and allowing them to choose a handset with the features that work for them. However, our analysis suggests that there are a number of improvements that could be made. These are:

- Increasing the precision of some criteria, where possible. The GARI database allows users to search a range of criteria and features that might be of interest to users. In many cases these were determined by combining existing regulatory reporting requirements from different countries. However, many of those requirements are imprecise. For example 'easy to press keys' is a broad definition and no parameters or guidance are given. As a result every manufacturer on the database claims that all of their phones have this feature, making it difficult to compare different handsets. The MMF is currently working

to address the issue with the relevant bodies who are the source of these criteria. This is to be welcomed, as tighter definitions or descriptions would help users to make more meaningful comparisons across different handsets.

- Considering including some kind of external feedback or verification. At the moment, while the information provided is valuable, there is no independent verification of the claims by the manufacturers. This has considerable benefits, not least being relatively low-cost and efficient to administer. However, combined with the wide definitions noted above this may increase the likelihood that manufacturers will give themselves the benefit of the doubt when assessing their phones. Combining the database with either some kind of external assessment on selected handsets, or incorporating user reviews or feedback, would help provide a richer data source for users of the system.
- Increasing manufacturer participation. To date it is possible to search phones from Alcatel, Motorola, Nokia and Samsung. In addition, Apple and LG have recently joined the project adn will be adding information on their products shortly. This represents a considerable proportion of the market but is not comprehensive, so consumers are not able to search and compare products across the whole market. We would strongly encourage other manufacturers to participate.
- Considering ways to make the information available in retail outlets. While many consumers will do their research online before purchase, older people in particular are less likely to have internet access and less likely to be confident internet users. While the system was designed as an online resource, it would be useful to explore ways of making this information available in retail outlets. This would increase the likelihood that key groups of consumers would encounter this information, and that it would be available at the point of purchase where they could also benefit from the ability to see and touch potentially suitable handsets.
- Separating information on the mobile phone's 'telecoil' coupling ability from information about the phone's RF emissions. In the United States the FCC requirements on hearing aid compatibility separate out these functions. This helps the consumer to make an informed purchasing choice. The mobile phone's telecoil coupling ability is given a 'T' rating. A high 'T' rating (between 1 and 4) indicates that the phone is more likely to be compatible with a hearing aid (on the 'T' setting). The mobile phones RF emission is given an 'M' rating. A high 'M' rating indicates that a hearing aid is less likely to suffer interference (although this also depends on the RF immunity of the hearing aid). Including these features would have considerable benefits for hearing impaired users.
- Including the ability to search for compatibility with inductive loopsets and for Bluetooth enabled phones. Using a mobile phone can create buzzing, humming or squealing sounds in a hearing aid. The problems can be overcome by using an

inductive neck loop or ear hook[9]. These can be connected to a mobile phone through a wired connection or through Bluetooth. This means that the phone can be used without holding it to the ear, thereby reducing interference. GARI allows a search for hearing aid compatible phones, which have a maximum interference threshold, but not compatibility with inductive neck loops and ear hooks or Bluetooth functionality. The latter would also help those users with Bluetooth hearing aids, which can be connected directly to a mobile phone without the use of a loopset[10].

In addition to the GARI initiative mobile operators also provide information about the features and services they provide that are likely to be useful to older or disabled customers. The way in which they do this varies. Some are focused on providing information to assist with purchasing or upgrade decisions. For instance O2's in-store catalogue *Shop* identifies what they consider to be the best three phones for users with sight, hearing and dexterity impairments and their online site allows visitors to list phones with the best accessibility features. 3 provide their store staff with information about the different functionality of the phones, including usability information, although it is at the discretion of the individual staff member how much detail they go into.

Some of this information is focused on providing ongoing assistance once customers have purchased a particular handset. For instance, O2 has the Apple iPhone forum, which allows members of the public and customer service staff to share information and hints and tips with each other, including information on usability.

However, this information is not always easy for consumers to find. For instance, only O2 and Virgin Mobile's sites have easily accessible information on usability (accessed via one click from the home page). Also, as at the time of publication only Orange stocks any phones designed specifically for older and disabled people (the Doro phone), and information about these specialist phones is generally not available through mainstream retailers.

Older people are also more likely than their younger counterparts to rely on instructions. However, many mobile phones are provided with fairly cursory printed instructions. Some are sold with no printed instructions at all, although

[9] A neck loop is a loop with a built-in microphone that hangs around the neck and plugs into the phone. It produces an inductive output which hearing aids will pick up when set to 'T'. This means the phone can be far enough away from the hearing aid to eliminate interference. Some neckloops require batteries; most do not. Bluetooth loopsets transmit the sound to and from the phone wirelessly. An ear hook is similar to a neck loop. It hangs over the ear and next to the hearing aid. When plugged into the mobile phone the ear hook transfers sound directly when on the T setting. Because they are close to the hearing aid sound is clearer. Some devices also have a built-in microphone allowing hands free operation.

[10] See http://www.crystalhearinguk.co.uk/Maps/bluetooth-hearing-aids.htm for an example of information on Bluetooth enabled hearing aids [Accessed 10 January 2010].

may come with instructions that can be downloaded from the internet. Instructions tend not to be geared towards the needs of less experienced users.

5.2 Adaptive equipment, software and applications

A number of developments are providing opportunities for hearing impaired users in particular. For instance, Orange has recently launched HD Voice, aimed at improving the audio clarity of calls, which will be of particular interest to hard of hearing mobile phone users. Orange claim that HD Voice:

> 'offers a proven improvement in the sound quality of traditional mobile voice calls. The service eliminates the distance between friends, relatives and colleagues to make callers voices sound like they do when communicating face to face. Reducing the background noise, hisses and crackles of normal mobile calls, HD Voice also excels in noisy environments [and]… gives louder, clearer, sharper mobile calls.'[11]

There is no extra charge for the service but for the system to work both parties (the caller and the called) need to have an HD enabled phone and be within the range of a 3G signal. At the time of the launch four HD phones were available[12], although more were expected to be launched in future.

Bluetooth also provides opportunities. Bluetooth allows wireless connectivity between a mobile phone and a Bluetooth hearing aid, and Bluetooth connectively between a mobile phone and a Bluetooth neck loop/ear hook is an option for hearing aids that don't have Bluetooth. Bluetooth keyboards can also facilitate text input for those with a motor or vision difficulty, and can greatly increase the speed of text input on touch-screen phones.

There is also a range of adaptive software for mobile phones. This includes: programs that convert text to speech, for instance reading aloud menus or other information displayed on the screen; software that magnifies text; and voice control.

The type of adaptive software that a phone can use is dependent on the operating system that the phone uses. Some operating systems offer more possibilities than others and some 'open' systems allow for the possibility of applications by third parties. Smartphones generally have the most sophisticated operating systems and therefore facilitate the widest range of adaptive technologies. However, the

[11] http://newsroom.orange.co.uk/2010/09/01/crystal-clear-calling-as-orange-revolutionises-uk-mobile-phone-calls-with-the-launch-of-high-definition-voice/

[12] Nokia 5230, Nokia X6, Nokia E5 and Samsung Omnia

success of the adaptive technologies depends on accessibility being built in to the operating system from the start. Otherwise there is a danger that the adaptive technology is not properly integrated into the rest of the system.

Most phones, including smartphones, do not come with a suite of accessibility features as standard. There are some exceptions, including Apple's iPhones' 3GS and 4. These have advanced accessibility features for partially sighted people, which come as standard. They feature *Voiceover* (text to speech) and *Zoom* (which magnifies text). It is not yet possible to use both applications simultaneously, although Apple is working towards this for future models. There are also some Blackberry and Google Android models that come with accessibility features, but this is not the case for all models.

Screen reading software to enable compatible phones to become more accessible can be purchased from licensed retailers. These include TALKS and ZOOMS by Nuance, and Mobile Speak by Code Factory. Mobile Speak and TALKS are similar to voiceover and TALKS works in conjunction with ZOOMS. ZOOMS can enlarge text up to 16 times and scroll it while the text is spoken. Adding TALKS Premium to a compatible phone may cost in the region of £150 from a specialist company. Adding ZOOMS will cost an additional £150.

Vodafone currently offers TALKS Standard Edition free when purchasing a compatible phone on either a contract or pay-as-you-go basis from Vodafone. Customers selecting this option are able to choose from a range of phones using the Symbian 60 operating system, including those with tactile buttons which are favoured by most blind or partially sighted people. TALKS Premium upgrades can be purchased separately if required. Vodafone Spain, in partnership with Code Factory, has developed Vodafone Speak, an alternative screen reading software package. Vodafone are currently considering launching this in the UK.

Most new phones (particularly smartphones) also have the capacity to provide customisable display options such as text size, background colour and backlighting level, and allow users to assign audible, visual and vibration alerts to particular functions, including keyboard clicks or assigning an image to incoming calls, for instance a picture of the caller. The degree of customization varies between model and manufacturer. Table 1 below shows which types of adaptive software are supported by each of the main operating systems currently in use.

Table 1: Accessibility features supported by different smartphone operating systems

Operating system	***Blackberry OS***	***Google Android***	***iOS***	***Symbian***	***Microsoft mobile***
Company	Research in Motion	Open Handset Alliance	Apple	Symbian Foundation	Microsoft
Used by	Blackberry	HTC, LG, Motorola, Samsung and others.	iPhone	Nokia, Sony Ericsson, Samsung, Siemens and others	Acer, HTC, Samsung and others
Source type	Proprietary	Open	Proprietary	Open	Proprietary
Q2 2009 Global smartphone market share	20.9%	2.8%*	13.7%	50.3%	9.0%
Accessibility features available**	Voice dialling Text to speech Display setting options Assignable audible, visible and vibrating alerts	Voice dialling Text to speech Zoom text Display setting options Assignable audible, visible and vibrating alerts	Voice dialling Text to speech Zoom text Display setting options Assignable audible, visible and vibrating alerts	Voice dialling Zoom text Display setting options Assignable audible, visible and vibrating alerts	Voice dialling Display setting options Assignable audible, visible and vibrating alerts

*Google Android is quickly increasing its market share

**Although the operating systems are capable of supporting these accessibility features they are not available 'out of the box' on all models.

Market share data source: Canalys: iPhone outsold all Windows Mobile phones in Q2 2009. Apple Insider. 21 August 2009

Internet enabled phones that allow instant messaging may also be beneficial for deaf users. Some people with more severe hearing impairments use SMS and other text services instead of voice. Phones that allow instant messaging provide the possibility of text communication that is closer to a voice conversation in style than an exchange of SMS text. It is also possible that more modern phones with

larger screens and better image definition may be beneficial to hearing impaired users who are able to lip read. While many 3G phones allow two-way video conversations the picture size, quality and current frame refreshment rate generally make them unsuitable for lip-reading or signing. However, recent advertisements from one manufacturer show their Smartphone being used for signing (a desk holder allowing a signer to use both hands is available as an optional accessory)[13]. Furthermore, Total Conversation, which is the combination of video, Real Time Text and voice carry over, has now been shown to work as part of The REACH112 Project which is being funded by the European Commission and in which RNID is one of the UK partners[14]. While signing is still likely to be difficult on many mobile phones these developments are encouraging.

The rise in mobile applications, particularly for 'open' platforms, has also opened up the market to independent developers and led to the development of usability 'apps', which offer a range of opportunities. For instance, applications listed on Wireless Review's Accessible Apps corner include an application that turns an iPhone into a hearing aid, one that allows you to shake an iPhone a specified number of times to dial a pre-programmed number (useful for visually impaired users), and one that turns the camera on compatible Nokia phones into a tool for magnifying text and images.[15] There is also a new application for the iPhone, *Sign 4 me*, which provides a translator and instructions in American Sign Language using an avatar.[16]

Changes in mobile technology have therefore created real opportunities for increasing usability. The greater computing power means that it is possible to do more sophisticated things, and therefore run more sophisticated accessibility adaptations. The opportunity to create apps for a range of platforms has lowered the barriers of entry for developers, encouraging innovation that could have a big impact on disabled users. The possibilities of customisation mean that one phone can meet a wide variety of different needs much more easily, and at a much lower cost. These opportunities are likely to increase as mobile phones increase in sophistication and computing power.

However, while the growth of smartphones, and the accessibility options they provide, is encouraging, they still only make up a relatively small proportion of the mobile market (Ofcom, 2010) and as we saw in section 3.2, they have not yet caught on among the majority of older users.

[13] See http://www.nokiaaccessibility.com/hearing.html [Accessed 21/12/2010].
[14] Further information can be found at www.reach112.co.uk.
[15] See http://www.mywirelessreview.com/accessible-apps-corner/?searchterm=accessible-apps for more details on accessible apps.
[16] http://itunes.apple.com/app/sign-4-me-a-signed-english/id312882992?mt=8

This means that at the moment, adaptive software is provided with or is available for a limited, although growing, number of phones, and is currently restricted to the high end of the market. Generally the price bracket for these phones for a pay-as-you-go user can be anything from £80 to £600.

There are also a number of problems with this kind of software. These can include difficulty in reading magnified text when screen sizes are too small or scrolling is difficult and accessibility applications that are not compatible with all elements of the phone. For instance, some text to speech or magnification applications will work across the majority of the phone but will not work for certain parts of the menu structure or are not compatible with apps that have been downloaded onto the phone.

5.3 Specialist handsets

There are a number of specialist handsets on the market designed to meet the particular needs of older and disabled people. These are generally produced and supplied by specialist manufacturers, although as we note above, one specialist phone, the DoroPhoneEasy 410gsm, is now available from Orange.

Recent research from International Consumer Research and Testing (ICRT) found that not all specialist mobile phones are successful in meeting the needs of older and disabled people[17]. ICRT carried out an assessment of 21 mobile phones, 18 of which had been designed for older or disabled people. The remaining three were mainstream models included for comparison. All the phones were available in Europe, although not all are sold in the UK.

Most of these phones had characteristics that suited older and disabled people. Positive features identified included: clear displays that used large characters on a contrasting background; louder than usual ring tones; clearly written instruction manuals in large print; clearly labelled keys; an emergency key that was easy to identify and difficult to set off by mistake; and desktop charging cradles that avoided the need to use a small plug.

However, the report was critical of the general standard of the phones. Nearly half of those tested were judged to be unsuitable for older people, and by implication would be even less suitable for people with severe impairments. Criticisms were wide ranging. Examples included:

- User manuals that were confusing or hard to understand;
- Non-existent or poor labelling on keys on the side of the phone;

[17] ICRT, January 2010, Comparative test on 21 mobile phones for the elderly. Muller-BBM report no. M83 306/2. We are grateful to ICRT for permission to use this information.

- Battery covers that could not be opened;
- Small and faint key labelling;
- Poor font design or font resolution;
- Small display screen or small font size;
- Keys set too close together;
- Emergency keys that were not labelled or easy to trigger accidentally;
- Ring tones that were too quiet; and
- Highlighting that made text hard to read.

At the heart of many of these problems was the way that the accessibility features worked together. In some cases it appeared as though accessibility features had been included without consideration for how these would work with other features on the phone. For instance, in one case an option to display text in very large font was not useful because the text could not be scrolled.

The report pointed out that making phones accessible involved more than making changes to a few features. A combination of characteristics that work well together is needed if the phone is to be easy to use. This highlights the importance of building in usability from the start across the whole phone.

6. Research findings

The primary research for this report was done in two phases:

- User trials with consumers between the ages of 18 and 81, including both disabled and non-disabled users; and
- Focus groups with participants from the trials.

The user trials were designed to look at the relative ease of basic mobile phone tasks: turning on the phone; making a call; sending texts; editing a contact's number; attaching the charger; locking and unlocking the phone; turning the phone on and off; and removing the battery.

The discussion groups were designed to cover attitudes to and experience of usability in detail. They also looked at attitudes to more complex tasks, including accessing the internet, as well as attitudes to and experience of choosing and purchasing a phone.

The findings reflect both the user trials and the discussion groups. Key findings are:

1. **A number of simple improvements could benefit all users.** The research identified a number of improvements that could be made to mobile handsets that would benefit all users, demonstrating that improving usability can have benefits for mainstream users while at the same time widening access for older and disabled users.
2. **Increased facility to customise could greatly increase usability for a wide range of users,** including older and disabled users.
3. **Older and disabled people often do not have the information they need to choose a phone that meets their needs**, or know where to get that information.

Other findings were that:

4. Attitudes towards the importance of usability differ according to age, disability, and the perceived importance of mobile phones to the user.
5. There is a usability ladder. Changes that improve usability for disabled and older users do not all benefit mainstream users. Some changes help everybody, some changes make no difference to mainstream users, and some changes reduce the usability or desirability of a phone for mainstream users.
6. The wide variety of needs and preferences means it is unlikely that any single phone will meet the needs of all users.

7. Usability depends on a range of factors and the way in which those factors interact. It is therefore difficult to provide a blueprint that will guarantee usability and doing so could stifle innovation.
8. Familiarity is a crucial factor in how usable a phone is for its users. Consumers, particularly older and disabled consumers, are more likely to be able to operate a phone if they are already familiar with the layout and menu structure.
9. Many older and disabled consumers feel alienated by the retail environment. Retailers were seen as geared towards the young and technically proficient and were perceived as being unlikely to have the time or inclination to explain the basics to the uninitiated.

6.1 Simple improvements that would benefit all users

There are a number of features which, if included in a mobile phone, would increase usability for all users. These are set out below. The importance placed on these features varied between the groups. However, there was general agreement that these features would be beneficial for the majority of users.

The features are ordered based on a qualitative assessment of importance from individuals participating in the focus groups, with the most important at the top.

- Feedback to indicate when a key has been pressed. This could be via a click detected by touch on phones with keypads, or audio and/or vibration on touch screen phones.
- Backlit key labels to make the numbers/letters/symbols on the keys easier to see, particularly in the dark.
- Keys on non-touch screen phones clearly distinguishable by touch to allow users to feel where one button ends and another begins. This can be done by, for instance, having a raised edge on keys or ensuring adequate space between the keys. The latter is beneficial to those who cannot easily see the keys and people with dexterity impairments as well as to those with larger hands.

> Can I identify the keys from each other? It's the physical arrangement of the keys.
> *Partially sighted female, 53*

- The option to display text in a clear sans serif font. A sans serif font is one without serifs, or strokes, at the end. Sans serif fonts are generally easier to read. Sans serif fonts are now extremely common across most mobile phones, but their importance to blind and partially sighted users makes it worth emphasising.
- A high resolution screen to increase readability and the recognition of images. Most modern phones already have good quality screens. Figure 1 below gives examples of high and low resolution screens.

Figure 1: screen resolution

Low resolution example

High resolution example

- Phone size and shape to allow one-handed use. Many partially sighted people use a magnifier to be able to effectively use their mobile phone. To do this the phone must be operable in one hand. Frequent users also like to be able to use their phone one handed to enable them to multitask.
- Large, logically organised display that presents information clearly and without clutter. This helps reduce the time required to search for options. Figure 2 below give examples of a cluttered screen and an uncluttered screen.

Figure 2: cluttered/uncluttered screens

Cluttered example

Uncluttered example

- No charger cover. A charger cover is included primarily for cosmetic reasons. Focus group participants did not feel strongly about the use of a cover to improve aesthetics. Not having one would make charging the phone easier, particularly for older and disabled users. These users could find socket covers difficult to see or prise open. Phones that had multiple sockets, or design

shapes that could be mistaken for sockets also made inserting the charger unnecessarily awkward.
- The option of a stylus for pressure sensitive touch screens.
- Gripping points on the phone back casing and battery itself to support easy sim card and battery removal. It was not always obvious how to open the casing. Even when participants knew how to do this gripping the back and the battery could be difficult. Designs often required the insertion of a fingernail. Many people from all three groups were unwilling to risk breaking their nails on the casing in order to perform the task.

In addition, information from the RNID[18] and from Tiresias[19], an initiative from the RNIB providing information on a range of accessibility requirements, suggests that for users with hearing impairments phones need to have ring tones that can be set to a high volume (preferably to at least 90 dB SPL) and have a sufficiently wide choice of tones to cater for different types of hearing loss. These should include high as well as low frequencies. Phones that accept downloadable tones are particularly flexible. This would also be beneficial to mainstream users, who would benefit from loud ringtones when in noisy environments and would be likely to welcome a wide choice of ringtones.

Information from RNID and Tiresias also suggests that deaf and hearing impaired users would benefit from phones that vibrate and provide a visual display when normally an audio alert would be used, for instance when an alarm has been set or to identify incoming calls and texts. This would also be useful for mainstream users at times when they need to use their phones discretely or are in noisy environments. Many phones already provide these functions.

A phone that addresses these basic issues is likely to be popular among users who do not have difficulties using standard mobile phones but who find some features irritating. It is also likely to improve usability for some of those users who do have problems, widening the pool of people who are able to benefit from mainstream mobile phones.

6.2 Customisation

The research found that a greater degree of customisation could improve usability for almost all users. This is particularly the case in those features that were identified as important by everyone, but where the limits of accessibility differ

[18] For details of information available from the RNID see http://www.rnid.org.uk/VirtualContent/101699/Mobile_phones_January_2010.pdf [accessed on 8th November 2010].
[19] For details of the information available from Tiresias see http://www.tiresias.org/research/guidelines/telecoms/mobile.htm [accessed on 8th November 2010].

depending on an individual's abilities or disabilities and what they use the phone for. Features that would benefit from a greater degree of customisation include:

- On-screen text size. Older and disabled users preferred text in larger sizes. Many of the phones tested provided some text in such sizes, but this was not done consistently across all attributes of the phone. Many phones were let down when, for example, menus, text messages, contact lists and phone numbers appeared in different sizes. Customisable text size that applied across the phone would considerably improve usability.
- Screen colour and contrast. For non-disabled people the use of colour was an aesthetic choice. However, for people with visual impairments high colour contrast between text or images and the background was essential. Certain colour combinations could also reduce visibility for this group. Allowing customisation of the colours of the background, text and images, and of the colour used for highlighting menus, would improve usability for this group.
- Backlighting and brightness. The ability to increase backlighting and brightness can make the text more visible and therefore easier to read. However, maintaining high levels of backlighting and brightness can run down the battery quickly, so users who are able to read the text easily without this may wish to set the backlighting and brightness at a lower level.
- Font characteristics including style and level of boldness. As noted above, bold font styles (styles that are sufficiently weighted) are easier to read than others. Also, fonts that are not sufficiently bold can be difficult to see against high contrast backgrounds.
- Choice of either icons or list-style menus. Some partially sighted participants could not recognise the icons displayed. Many participants preferred lists rather than icons. Even when text was too small to read, words could often still be identified by shape.
- Audio and tactile feedback. Different types of feedback, including audio and tactile feedback, will suit different users.
- Ring tone and ring volume. As noted above hearing impaired users benefit from being able to set different tones and increase the ring volume on their mobile handsets.

6.3 Access to information

Evidence from the focus groups suggests that many older and disabled people have limited knowledge about what usability features are available and do not know what to look for.

Several said they would use the internet for information if they were looking for a new phone. However, the searches they described would not go much further than identifying the main retailers. As we saw above, information on usability is not

always available or easy to find on their websites. Also only one mainstream retailer, Orange, stocks any phones designed specifically for older and disabled people (the Doro). Many older and disabled people would therefore be unlikely to come across information on the full range of specially designed phones.

An additional problem is that the older people in the focus groups often considered the difficulties they had as being their fault rather than being due to poor phone design. This meant they were unlikely to spend time seeking a more suitable phone and were likely to believe all phones were the same.

6.4 Differences in use and attitudes

While there was a spectrum of attitudes and behaviour within our sample the users in the trials can be broadly categorised into 3 groups:

- High volume users;
- Low volume, non-disabled users; and
- Low volume, disabled users.

6.4.1 High volume users

High volume users used their own phones heavily, making large numbers of calls and sending frequent texts. They also used a range of additional features, particularly sending emails, listening to music and taking photographs. They tended to be younger, generally under the age of 35.

While usability mattered to this group, this was rarely the reason why a specific phone was purchased. Purchasing decisions were primarily based on a combination of aesthetics and the number and desirability of features. This was particularly the case for the youngest members of the sample, for whom image was crucially important and who placed great weight on having the latest phone.

This group did not have any significant difficulty with their own phones and did not expect difficulties with new phones. They knew what types of features phones had and could make an educated guess about where they were likely to be found. They were confident enough to explore a new phone based on these expectations. They also knew that they would not do any damage or change anything that they could not undo. They had no difficulty with any of the tasks in the trials, and the majority did not bother to use the step-by-step instructions provided since they considered they could work out how to use the phones unaided. While they could identify features that made a phone more difficult to use, these were irritating rather than posing any real obstacle to use.

6.4.2 Low volume, non-disabled users

This group used their phones in a much more limited way. They focused almost exclusively on making calls and, in some cases, sending texts. The majority used their phones rarely, perhaps making five calls or sending two texts every week. Some were more likely to use them to receive calls or texts than send them. Many considered mobile phones as devices to be used in an emergency rather than for casual conversation. They tended to be older, certainly over 35 and more often in their 60s and above.

They were easily able to identify features that made a phone more difficult to use. They often had age-related disabilities or health problems that made these obstacles more difficult to overcome, although they did not identify themselves as disabled. This was compounded by their infrequent use, which meant they were less likely to become familiar or at ease with their phones. Also, because the phone was less important to their lives, they could be less motivated to persevere. They also tended to have a lack of experience of using advanced technology generally, so did not necessarily have the basic background understanding of how such products are operated.

6.4.3 Low volume, disabled users

Most of the disabled users in our sample had a similar approach to mobile phones and similar patterns of use to the older, low volume users. This was partly because a large proportion of disabled users are older. Among the younger disabled users in our sample style was more important, but because of the difficulties they had using their phones usability was still the dominant factor.

The main difference between this group and the other two was that poor design of phones affected them more immediately and more seriously. Characteristics that were minor nuisances to others were major obstacles for this group and in some cases made the phones impossible to use.

All three of the user groups in our trials could identify features in the phones that were difficult to use. The main difference was in the impact these features had on the different groups of users. The first group might view these features as irritating but it did not impair their ability to use the phone and they were prepared to put up with the problems if the phone was stylish and provided ‘must-have’ features. In contrast, for the third group these usability issues could make the phones much more difficult, if not impossible to use.

6.5 The usability ladder

Changes that improve usability for disabled and older users do not all benefit mainstream users. Some changes help everybody, some changes make no

difference to mainstream users, and some changes reduce the usability or desirability of a phone for mainstream users.

6.5.1 Changes that would benefit older and disabled users without negatively affecting mainstream users

There are a number of changes that could be made that would increase usability for older and disabled users and, while not being advantageous for mainstream users, would not reduce usability or desirability for this group. These include:

- Eliminating the need to press multiple buttons within a limited timeframe in order to lock and unlock the phone.
- Including a raised dot or nub in the centre of the '5' key. This helps blind and partially sighted users identify the centre of the keypad and, from there, the other buttons. Of the twelve phones tested most provided nibs on the corners or sides of the button and one had the nib underneath it. Many were too indistinct to be effective.
- Providing grip points on slider and flip phones to make them easier to open.
- Ensuring icons and on-screen instructions are clear and intuitive.
- Ensuring keys used to orientate menu structures are differentiated from number keys, for instance through shape, texture, and/or colour. This helps partially sighted users navigate the keypad.
- Not using red for highlighting things on the screen. Red is often the first colour lost in the spectrum by people with visual impairments.
- Ensuring that on/off buttons are large enough to press easily and are either not flush to the casing or are distinguishable from the casing by colour.
- Providing an option to scroll extra large text.
- Ensuring markings on charger heads clearly indicate which way they should be orientated. In 2009 most mobile manufacturers agreed to adopt a micro USB charger standard for smart phones to reduce the need for a different charger for each phone. This will have significant environmental benefits. However, the adopted standard requires that the charger is orientated the right way up. The new standard charger is required to have tactile markings on one side of the charger head, but some also have markings on the other side of the head, often of the manufacturer logo. The markings can be difficult to distinguish and therefore confusing. Tactile marking should only be used on one side of the charger head so it is easy for blind and partially sighted users to know which way the charger should be orientated[20].
- Providing clearly written instructions in plain language.

There are also some features where there is a range of usability, depending on an individual's abilities or disabilities. In these cases, manufacturers could have a significant impact by trying to ensure that these features were calibrated so as to

[20] ETSI and ITU-T Study Group 5 are working on technical standards for these adapters. The Panel will be raising this issue with both these groups.

fall into the acceptable range for the majority of users. A good example of this is the sensitivity of keys. Younger, frequent users prefer phones that are more sensitive. Older and disabled users tend to prefer keys that require more force to activate, as this helps them avoid pressing keys by mistake. However, no users liked phones at the extremes of this scale, and there is considerable overlap where the amount of force would suit the majority of users.

The size and legibility of key labels is another example. Younger, frequent users are able to operate with a wide range of key labels, older users tend to have difficulty with the smallest key labels, while some disabled users, particularly those with visual impairments, have considerable difficulty with small key labels. Again for most users there is some degree of overlap. Figure 3 below shows two examples, one in which the key labels are too small to suit everyone, and one in which they are large enough to suit the majority of users. Trying to ensure that key labels fall within the latter category will have considerable benefits for older and disabled users, particularly visually impaired users, without having a negative impact on mainstream users.

Figure 3: key labels

Example of key labels that are too small to suit all users in the trials

Example of key labels that are the right size for all users in the trials

6.5.2 Changes that would benefit older and disabled users but reduce usability or desirability for mainstream users

There are some adaptations required for some groups of users that could reduce the usability or desirability of a phone for mainstream users. These include:

- Tactile keys not touch screens. Touch screens are becoming more popular. They make it possible for phones to have larger screens, which makes using the internet and other applications easier. However the majority of people, whether disabled or not, found key pads easier to use. All the touch screen

phones tested were difficult to use one handed and participants struggled to reach parts of the screen with their thumb. For many older people this was partly due to a lack of familiarity with touch screens. Touch screens could also be both under and over sensitive, resulting in more errors and spontaneous activations than tactile keys, particularly for those with limited sensitivity in their fingers. For visually impaired users touch screens did have the advantage that they often came with larger keys. However, many visually impaired users still found touch screens difficult, if not impossible to use. However, for mainstream users, particularly younger users, the desirability of the product was more important than the fact that there is a small increase in errors and difficulty.

> Having tried it I would still prefer something tactile.*Non-disabled male, 68*

> I prefer hard buttons, I think they are easier to use. But I have a touch screen phone because I think it looks cool. *Disabled female, 20*

- Buttons provided only on the front of the phone. Keys on the side or back of the phone were disliked by many older and disabled users because they could be activated accidentally when holding the phone. Keys on the side, including the on / off button, tended to be harder to use than other keys on the phone because of their size, spacing or protrusion. Sometimes they could not be easily seen or detected by touch. However, for mainstream users eliminating keys on the back or side could be a problem. Younger users in particular like buttons on the outside of the phone because they provide quick access to some of the more popular advanced features, such as photos.
- Short, simple, logical menus. These are useful for older or disabled people who use a limited range of functions on the phone or who find navigating the phone difficult. However, for mainstream users this could reduce the ability to easily access the breadth of options their phone can offer.
- Aligning keys square to one another. Keys aligned in a square were easier to navigate than offset or differently shaped keys. However, this could reduce the aesthetic appeal of the phone for mainstream users.
- Visual contrast between the keys and the phone, possibly through good use of colour contrast. This can be useful for some visually impaired users, particularly on touch screen phones where participants were unable to navigate by touch, but can reduce aesthetic desirability for mainstream users.
- Large keys. Older and disabled people generally prefer larger keys. Phones with QWERTY keypads in particular can have keys that are too small for many older and disabled people to use. In fact, during the trials a phone with a QWERTY keypad was awkward for all users, including younger, mainstream users. However, it also has significant advantages, particularly for those users who do

a large amount of emailing with their phones. While the trials did find that the keys on a phone designed for older people were the optimum size for most users, large buttons would have some aesthetic disadvantages for some mainstream users. Also, some participants in the trials found texting more difficult with larger keys.

6.6 Different phones to meet the needs of different users

People have a wide variety of needs and preferences, depending on their experience, abilities and type of mobile use. It is unlikely that any single phone will meet the needs of all users. The fact that there are some adaptations that would increase usability for many older and disabled users but reduce usability or desirability for mainstream users clearly illustrates this. The needs of all users will be best served by ensuring a wide range of phones are available on the market, including well designed 'specialist' phones and solutions that allow the integration of mainstream and specialist equipment[21].

6.7 The range of factors influencing usability

As we can see from the details set out above, usability depends on a wide range of factors and the way in which those factors interact. Even among phones specially designed for use by older or disabled people a particular feature, or the way in which different features interact, can significantly reduce the usability of the phone. For instance, one specialist phone in the trials that provided large text was undermined by poor contrast, which meant it was not useful for visually impaired people. As the ICRT report notes (see section 5.3), making a phone accessible involves more than just changing a few features. The features have to work together to ensure the whole phone is usable. It is therefore difficult to provide a checklist that will guarantee usability, and there is a danger that doing so could stifle innovation. Basic guidelines can be useful, but these will need to be supplemented by testing with real users, including older and disabled users. Some manufacturers already test their products with disabled users but this is not universal.

6.8 Familiarity

Familiarity is also a crucial factor in how usable a phone is for its users. As we saw in section 6.4, above, younger, frequent users are familiar with a wide range of features on their mobiles and are confident exploring new phones. This is less

[21] An example of this kind of solution is provided by Vodafone in Italy. Called MiniStation it allows users to connect the mobile network to a fixed socket, which then enables the user to use fixed terminals with mobile facilities and at mobile rates.

often the case for older and disabled users, particularly those who use their phones and change their handsets infrequently. These users are less confident in their ability to operate a phone and are much more reliant on being familiar with the layout and menu structure. This can be compounded by the fact that these users may also be less familiar with the whole idea of menu navigation and selection that are second nature to those who are used to using computers but which can be alien to those who have not used computers and do not have wide experience of technology generally. Older users may also experience some degree of cognitive decline, which can further exacerbate the problem.

It is possible that the issue of familiarity with technology may become less prominent over time as more people with experience of technology in their working and personal lives move into the older category. However, increasing longevity means that there will still be large numbers of older people without this experience and the problem will therefore persist for some time. In addition, even younger members of the older age group may find that they are less familiar with technology as it changes and develops.

6.9 The retail environment

Many older and disabled consumers feel alienated by the retail environment and confused by the jargon associated with mobile phones. Retailers were seen as geared towards the young and technically proficient and staff were perceived as being unlikely to have the time or inclination to explain the basics to the uninitiated. For some older and disabled participants in the discussion groups this had been confirmed in instances when they took a friend or family member with them to the shop and sales staff had addressed questions and answers exclusively to this companion.

> We are best placed to know our own needs, but they should at least have training in awareness. To steer somebody down the route to identify the right phone. The right phone for the right person by asking the right questions.*Partially sighted female, 53*

While the research participants did not expect staff to have a detailed knowledge of disability, there was general agreement that they should know what questions to ask and have a sufficiently wide knowledge of the phones to be able to give realistic advice. It was generally agreed that at the moment this did not happen. There was also a desire for high street retailers to stock a wider range of phones aimed specifically at older and disabled people.

7. Delivering improvements

The research shows that there are a number of areas where improvements could be made that would have a big impact for older and disabled people as well as delivering improvements for mainstream users. This is not just a manufacturing issue – operators, retailers, voluntary sector organisations and consumers themselves all have a role to play. Areas where improvements can be delivered are:

- Implementing basic hardware and software improvements that will increase usability. The starting point should be those areas that would improve usability for all users. E.g. ensuring phones provide feedback to indicate when a key has been pressed, have backlit key labels to make the numbers/letters/symbols on the keys easier to see, and that the phone size and shape allows one-handed use. This would not only increase the pool of people who could use the phone it would also be likely to increase the desirability of the handset across the whole customer base.
- Maximising the opportunities offered by customisation, with pre-set options that can then be further refined.
- Testing the usability of phones with consumers, including older and disabled consumers, in a way that takes account of their particular needs. Given the wide range of different needs and the complexity of ensuring that different features work well together, testing phones throughout the development process, including with older and disabled users, will be an important way of ensuring usability for a wide range of potential users.
- Ensuring the sales and post-sales environment more effectively meets the needs of older and disabled people through a combination of better product availability, information and support.
- Finding creative ways of providing mentoring and advice that would help people develop the confidence and skills to use the equipment.

Different players in this field each have a role to play in delivering on these areas. Below, we set out our recommendations in these areas for:

- Manufacturers, including manufacturers of specialist as well as mainstream phones;
- Retailers, including retail outlets of mobile network operators and independents; and

- Voluntary and third sector organisations.

7.1 Recommendations

The Panel has a number of recommendations for each of these stakeholder groups:

Manufacturers, operators, retailers and voluntary and third sector organisations should:

- Work together to provide consumers with better information about the usability of current and future mobile phones, particularly those features most likely to meet the needs of older and disabled consumers. As we have seen there are already a wide range of features and adaptations that increase the usability of mobile phones for all users. There are also a range of things that could be done to increase usability for all consumers, which we hope that manufacturers will include in the design of future mobile phones. However, it is not always easy for consumers to know which features will best meet their individual needs, or which phones include those features. This is particularly the case for many older and disabled users for whom a usable phone is essential, not just a nice to have. One way of overcoming this could be to develop an industry-wide, consumer-facing labelling system that lets consumers know at a glance whether a handset is likely to meet their particular needs. As part of developing this system participants should explore whether it would be proportionate to include independent testing of handsets, which could increase consumer trust.

Manufacturers of specialist and mainstream phones should:

- Work together to develop shared research and guidelines on developing basic usability features. These guidelines should not be viewed as a checklist, where including each element will guarantee a usable phone. Successfully developing a usable phone requires not just that all the different elements are in place but that they work together and this will need to be an iterative process. However, they would be a useful starting point for embedding best practice throughout the industry.
- Use these guidelines to get the basics right across all new mobile handsets, with an initial focus on those features identified as increasing usability for all users, followed by those which help disabled and older users while making no difference to mainstream users.
- Build in usability where possible, ensuring that features designed for older and disabled people, such as text to speech, work across the range of functions and applications available on the phone.
- Increase the facility to customise to include: text size; colour and contrast; backlighting and brightness; font characteristics; choice of icons or list-style menus; and audio and tactile feedback.

- Create pre-set options on their phones, with some of those most likely to be beneficial to older and disabled people available pre-loaded. Being able to tailor these profiles would further increase ease of use.
- Involve users, including older and disabled users, in the development process, testing phones with these groups in order to refine and improve the design of both software and hardware. This could include some form of external audit in which manufacturers submit some of their phones for external testing and assessment. This would both help ensure that the testing process is rigorous and includes the whole consumer journey, and would provide users with independent information about which handsets would be most likely to meet their needs.
- Sign up to the GARI database and work together to develop it further, potentially including some form of third party or user monitoring and assessment.
- Ensure that all phones come with instructions that are easy to follow and written in plain language. At a minimum these should cover basic functions, even if this is in the form of a quick start guide. They should also be illustrated and follow accessibility guidelines. These should be printed for distribution by retailers as not all consumers have access to the internet.

Manufacturers of 'specialist' phones should:

- Investigate new retail channels, for instance well known pharmacy chains, where their target audiences are less likely to feel intimidated. This is already done in Austria, where specialist phones are sold through a major pharmacist chain.

Retailers, including third party retailers and mobile network operators, should:

- Stock a wider range of phones, including specialist models. This may not be realistic for all stores but should be possible in larger stores. If it is not possible in all stores staff should be able to order in specialist phones on request or direct consumers to the nearest store that stocks them.
- Provide sales and support staff with better information and training about the likely needs of older and disabled users and the phones and features available to meet those needs. This should include the facilities offered by specialist phones and staff should be able to identify prospective customers for whom they would be an appropriate choice. If this is not realistic for all stores it should certainly be possible in larger stores and customers should be directed towards stores that have this facility, or put in contact with specialist staff who are able to help them.
- Provide consumers with information about the different phones and features available that will meet the needs of older and disabled consumers, both in-store and on their websites. A good way of doing this might be by providing a

link on their websites, or in-store access to the GARI database. If this was done they should also provide feedback to the MMF on how well the database meets the needs of their customers.
- Offer instructions and demonstrations that are geared to the needs of older and disabled people, particularly as many phones are supplied without manuals, or with manuals that are difficult to read or understand.

Mobile network operators should:
- Include older people among audience segments they use for selecting and marketing phones, if they do not already do so.
- Request high levels of usability from manufacturers and back this up with the phones that they stock. They should have a particular focus on the basic elements set out above.
- Encourage manufacturers to use and develop the GARI database.
- Offer specialist phones on their pay-as-you-go and contract options.
- Provide third sector and voluntary organisations with regularly updated information about what services and features they offer for older and disabled users. This information should include:
    - General information about what is available and the strengths and limitations of different phone designs and different features;
    - Comparative buying guides, for people with different needs; and
    - A guide to pricing options

Voluntary and third sector organisations should:
- Push for the take-up and development of the GARI database.
- Work with manufacturers to source suitable volunteers for testing of mobile phones.
- Publicise information about what phones and features are available for their client groups.
- Consider providing or encouraging ongoing, peer-led mentoring and support for those of their beneficiaries who wish to learn to use technology, including mobile phones. This will, of course, depend on resources.

During the development of this report the Panel has engaged extensively with representatives from manufacturers, retailers, mobile network operators and voluntary and third sector organisations. Their input has helped us to develop, refine and secure buy-in to the recommendations. This has helped to create a platform for the recommendations to be implemented.

In 2010 the Government announced that, as part of its review of the consumer representation landscape, it would be considering the future of a number of consumer bodies, including the Panel. It has also announced that it is currently minded to incorporate many of the current functions of the Panel into a new consumer body, rather than continuing with the Panel in its current form. We will

therefore be looking to a number of other bodies to take forward the recommendations set out in this report, including:

- The eAccessibility Forum
- The Mobile Manufacturers' Forum
- Ofcom

The e-Accessibility Forum is an initiative led by the Department for Business, Innovation and Skills (BIS). It brings together Government, industry and the voluntary sector to explore and understand issues surrounding e-accessibility so better and more inclusive services can be developed, enabling users and industry to benefit from sharing best practice across all sectors. BIS has agreed to share the findings of this report and help bring together key players to develop the recommendations set out in this report.

The Mobile Manufacturer's Forum (MMF) is an international association of telecommunications equipment manufacturers with an interest in mobile or wireless communications. As part of their work on increasing usability the MMF developed the Global Accessibility Reporting Initiative (GARI). GARI continues to be developed and refined and, in our remaining time as the Panel, we will be encouraging the MMF to incorporate the recommendations for further developing GARI included in this report, as well as to encourage their members to adopt the other recommendations for manufacturers.

Under the Communications Act, Ofcom has a duty to promote the development and availability of easy to use consumer equipment. We will be working with Ofcom to examine how they might bring together manufacturers, mobile operators, retailers and voluntary and third sector organisations to progress the recommendations set out in this report.

Appendix 1: methodology

The sample

The sample was selected to provide a wide spread of mobile phone users. They included disabled and non-disabled people, men and women and people from all age ranges. Disabled participants were selected from Ricability's panel of disabled people and non-disabled participants were chosen from a panel maintained by Intertek testing laboratories.

The sample breaks down as follows:

Non-disabled people (28 individuals)

14 'younger' participants aged 18 to 35, 7 of them men and 7 women (this included 7 participants aged 18-25 and 7 aged 26-35).

14 'older' participants aged 36 to 75, 7 of them men and 7 women (this included 2 participants aged 36-45, 2 aged 46-55, 2 aged 56-65, 3aged 66-75 and 5aged 75 and older).

The groups were selected so there was a spread of ages within each band.

Disabled people (32 individuals)

8 partially sighted participants

- 2 aged 26-35, 1 aged 36-45, 1 aged 46-55, 1 aged 56-65, 2 aged 66-75 and 1 aged 76 and over
- 4 men, 4 women

8 severely partially sighted

- 2 aged 18-25, 3 aged 46-55, 2 aged 66-75 and 1 aged 76 and over
- 4 men, 4 women

16 people with dexterity impairments (including swollen hands, arthritis, a shaky hand, reduced grip strength and reduced hand strength)

- 2 aged 26-35, 2 aged 46-55, 7 aged 56-65 and 5 aged 66-75
- 8 men, 8 women

Our sample did not include any deaf or hearing impaired users. The main issues for these users relate to levels of amplification, loudness of the ringer, clarity of speech, hearing aid compatibility and potential interference from the mobile phone to the hearing aid. Many of these require technical measurements rather than user trials. The best approach for these users would be a mixture of technical measurements and usability trials using quantifiable methods. To ensure the needs of these users were taken into account in the report the research therefore drew on other studies, including detailed information from the RNID and from Tiresias, a programme of work on ICT accessibility run by the RNIB. This is reflected in the findings and recommendations.

All users had to own and use a mobile phone. Minimum mobile phone use was defined as at least two calls a week and at least two text messages a week. Participants were recruited so that, between them, they had experience of using a range of brands. These included:

- Acer
- Alcatel
- Apple
- Binatone
- Blackberry
- Doro
- Emporia
- HTC
- LG
- Motorola
- Nokia
- Palm
- Samsung
- Sony Ericsson

The literature review and stakeholder interviews

We began the project with a literature review, looking in detail at research on features that increase usability for older, disabled and non-disabled users. This included a particularly focus on the needs of deaf and hearing impaired users. At the same time, we conducted a number of meetings and telephone discussions with manufacturers, network operators, retailers and organisations representing consumers, including older and disabled consumers. The results of the literature review and interviews were used to understand the context of the research, shape the design of the user trials and focus groups, and inform the development of the final recommendations.

The user trials

Participants were asked to perform seven tasks. They were provided with step-by-step instructions for each task. The tasks were carefully selected to reflect the day-to-day activities required for basic mobile phone use. Participants were asked to:

- Make a phone call;
- Edit a contact's number;
- Send a text;
- Attach the charger;
- Lock and unlock the phone;
- Turn the phone on and off; and
- Remove the battery.

After the completion of each task, participants completed the relevant section of a self-completion questionnaire to record instant feedback about what they found easy or difficult.

The user trials did not look at how easily participants were able to navigate the menu structures of the different phones. While this is an important part of using a phone it was decided that it is closely related to the level of familiarity with a particular operating system and interface and can be learnt with time and practice. In a thirty minute user trial it would not be possible to replicate this ability to learn through practice.

The trials took place over two weeks, with individuals participating in two half-day sessions each. Twelve phones were used in the tests and participants tested all twelve during their two sessions. The order in which the phones were tested was randomised to ensure this did not affect participants' opinions of their usability. Facilitators were constantly on hand to observe and assist participants.

The focus groups

Five focus groups were held with the participants from the user trials. During these focus groups participants discussed in more depth how usable they had found the mobile phones they had tested. They also talked about their own experiences of mobile phones, including:

- Buying mobile phones;
- Retailer advice and customer service;
- Instructions;
- Brand, price, style, applications and usage; and
- Mobile phone use, including more advanced uses like accessing the internet.

Appendix 2: choosing the phones

There are over 200 mobile phones on the market at any one time. The market changes rapidly. While many new phones only differ cosmetically from their predecessors there have also been several game changing developments that have had a knock on effect on the rest of the market. Notable recent developments have been:

- The introduction of the iPhone;
- The growing number of phones with a greater number of sophisticated applications; and
- The growth in the number of phones which use touch screen technology.

Phones were selected for the user trials so that the selection represented the major design differences likely to affect the ease of basic mobile phone use, including making a phone call and sending a text. Given the number of models on the market it was decided to restrict the selection to those phones that were likely to be the easiest to use so that we could report on how well the best of the market was meeting the needs of consumers.

Mainstream phones

A long-list of 37 phones was drawn by an analysis of tests of 235 current models carried out for Which? Magazine. Three key performance criteria from the Which? analysis were selected: ergonomics; ease of making a phone call; and ease of sending a text. Phones which scored either four or five on the magazine's five point scale were included in the long-list. This was supplemented by the inclusion of 5phones that had features suggested by the literature review and analysis of the GARI database as important.

Visits were made to 7mobile phone retailers to test the assumptions underpinning this approach. Staff were asked their opinion of what ease of use features were important to their customers, and whether their newest and/or most popular phones came with these features.

Based on this analysis a number of key characteristics were identified:

- Body type: bar, slide, clamshell and twister.

- Key pad and touch screen phones. An additional phone with a QWERTY keypad was included for comparison.
- Different screen sizes.
- Different screen resolution.
- Distinctive designs of key phone-type keypads.
- Examples of arrow keys, touch pads and other controls.

A short-list was drawn up which included phones with all of these characteristics.

Specialist phones

Two phones designed specifically for older and disabled people were also included in the tests. These were selected using criteria for a good usable mobile phone identified by tests carried out by ICRT in 2010 and the features that emerged as important from the literature review. The phones selected had:

- Large keys;
- Tactile and audible feedback;
- High contrast markings;
- Large display in clear high contrast lettering; and
- The ability to hide some functionality, making the phone simpler to use.

Each phone was set to what was considered the most accessible settings available, based on a judgement made by Mark Harnett, Ricability's Senior Researcher and Ergonomist.

Tested phones

The phones chosen for the trial were:

- Apple iPhone
- Blackberry Curve 8520
- Doro PhoneEasy
- Emporia LIFEplus
- LG Renoir
- Nokia 2760
- Nokia 5800 XpressMusic
- Nokia 6210 Navigator
- Nokia 3310
- Nokia Mini N97
- Samsung GT-C3060
- Sony Ericson W380i Walkman

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