Television Access Services - Literature Review

prepared by i2 media research on behalf of Ofcom

Publication date: March 2006

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Section 1

Foreword

In July 2004, Ofcom published its Code on Television Access Services, extending to some 70 channels obligations to provide subtitles, signing and audio description (television access services) on a gradually increasing proportion of their programmes. In so doing, Ofcom implemented relevant provisions laid out within the Communications Act 2003. The Act came into force on 29 December 2003 and required the access services obligations to take effect among most broadcasters a year later (i.e. by the end of 2004).

In preparing the Code on Television Access Services Ofcom had to rely on existing estimates of the numbers of people who stood to benefit from access services as well as the numbers actually making use of them. Following discussions with stakeholders involved in this area, Ofcom committed to undertake further research in order to inform the first review of the Code, to be carried out within 18 to 24 months of its publication.

Ofcom began planning the research in early 2004 by commissioning a review of existing literature in this area in order to take stock of all sources of relevant research that had been carried out in recent years. i2 media research ltd conducted this review on behalf of Ofcom.

This report details the full findings of the literature review.

Ofcom would like to thank those organisations and individuals who contributed to the literature review, which helped to establish the baseline for further research.

Section 2

Executive Summary

Market sizing

- Access Services can enhance the television viewing experience for people with visual and hearing impairments. Estimates for how many people there are with sensory impairments in England vary depending on the source of information.
    - 312,000 people are officially registered with a visual impairment whilst representative groups estimate that there are 2 million people with sight problems.
    - 214,000 people are officially registered with a hearing impairment whilst representative groups estimate that there are 9 million people with hearing problems.
- People with other impairments, and those without impairments, may also benefit from Access Services

Target audience' awareness and adoption of digital television

- No research was identified focusing exclusively on awareness and adoption of digital television amongst people with sensory impairments. Digital television adoption by target users of Access Services is not well quantified at present.
- People with sensory impairments are likely to be older and older people are less likely to be aware of digital television and its capabilities.
- Older people with impairments are also more likely to have difficulty purchasing, setting up and using digital television. This may limit current access service use, because the provision of Access Services is wider on digital television.

Target audience' awareness, perception and use of Television Access Services

- The extent of research identified into awareness, perception and use of Television Access Services varied across the Access Services.
- With regard to signing:
    - No research was identified on awareness, perception and use of signing.
- With regard to subtitling:
    - Several reports indicate high awareness (in the region of 90% of people with hearing impairment) and high usage (in the region of 75% of people with hearing impairment). However older viewers (aged over 65) have been found to be less likely to know about subtitles and how to access them than younger respondents.

- With regard to audio description:
  - The research identified in this area indicates a low to moderate awareness of audio description; estimates of awareness of audio description by people with visual impairment range from 13% to 36%.
  - Appreciation of audio description by users has been reported to decrease with age, and there is mixed evidence that appreciation is related to severity and duration of visual impairment.
  - No UK data were identified in relation to usage of audio description. US data indicate relatively low usage.
- Reasons accounting for low usage of Access Services (where low usage has been reported) include limited availability of signing and audio description (programmes available and equipment requirements), lack of awareness, failures in transmission and over-editing of subtitles, and general usability considerations.

Information (Communications) about Television Access Services

- Promotion of Access Services is widespread within relevant charity publications.
- No research was identified through this review in relation to communications about signing.
- Research about how users find out about subtitling and audio description and for which programmes the services are available revealed that:
  - 'TV listings' in newspapers and magazines are the most popular sources for information about subtitling;
  - 'word of mouth' and 'relevant publications' are the most popular sources for information about audio description;
- No research was identified through this review that investigated the effectiveness of different information campaigns.
- Reports reviewed here suggest that if Access Services were easier to find and better understood, target users would be more inclined to use them regularly. This suggests value in research to identify how best to communicate to target users about Television Access Services.

Television is popular among target users of Television Access Services

- Older people often report watching television as one of their favourite leisure activities, and there tends to be a positive relation between extent of television viewing and age; one study reviewed reports that people aged over 65 watch an average of 5 hours and 14 minutes a day, whilst people aged 55-64 watch an average of 3 hours and 28 minutes a day.
- People with impairments have a strong attachment to television, even if they have difficulty viewing.
  - A study involving people with visual impairment showed that programmes they rate as being most difficult to watch are among some of the programmes they most enjoy.

Preferred programmes for Television Access Services

- Programmes that viewers would like Access Services to accompany vary with impairment and personal preference, although some generalisations have been made through research.
- Viewers with hearing impairments who use British Sign Language (BSL) would like to see news, educational programmes and documentaries signed.

- Subtitles are already available on a wide variety of programmes, however subtitle users with hearing impairment would like to see more sport and children's programmes subtitled.
- Viewers with visual impairment find films, sport and dramas the most difficult to watch. Experimental research suggested that audio description for dramas, particularly mysteries, would be most valued.

Benefits of Television Access Services

- Perceived benefits of Access Services vary with degree and level of impairment and other individual differences.
- Limited research into signing indicates that signing on television allows BSL users to become aware of regional variations in the language.
- Studies involving children with hearing impairment have found that using subtitles can improve their literacy and social inclusion with peers. Potential benefits of subtitles for people without hearing impairment include being able to continue to watch and understand a programme if there is too much background noise, or if accents and words within a programme are unfamiliar.
- People with visual impairment understand and enjoy audio described programmes better than programmes without them. This can yield social benefits for people with visual impairment, as they feel more comfortable talking about television with others. Research suggests that people without visual impairment (who watch television with people with visual impairment) do not find audio description intrusive. For people without visual impairment, benefits of audio description have also been cited, such as the ability to "listen" to the television whilst doing something else.

Satisfaction with Television Access Services

- Perceived satisfaction with Access Services varies with degree and level of impairment and other individual differences.
- No research was identified regarding satisfaction with the current provision of signing reported by people with hearing impairment.
- Research into satisfaction with subtitles has looked at people's views on the best and worst programmes for subtitling and differences between analogue and digital subtitles. Preferences were mixed, depending largely on personal opinion.
- People with visual impairment are generally satisfied with Audio Description. However individual differences in level of visual impairment affect preferences for the extent of audio description.

Refinement of Access Services

- Empirical studies have been conducted focusing on specific elements of digital television (e.g., the use of icons and colour combinations for subtitles, and the possibility of using Smart cards for personalised television viewing preferences).
- Other research has been conducted with regards to the specific elements of certain Access Services (e.g. size and font of subtitles, position on screen of signer).
    - Research on signing has focused on the creation of virtual signers and users' attitudes towards them. Research regarding the

position of a signer during a programme indicates a tendency for viewers to prefer the signer on the right hand side of the screen.
    - Research on subtitling is more established and up to date. It has focused on user' attitudes relating to the speed, editing, typeface, style and presentation of subtitles.
    - Much of the research on audio description has focused on production issues. Less research was identified that focused on the cost effective reception of audio description, or on individual preferences for audio description.
- Because of large variation in the impact of different sensory impairments (dependent on type and level of impairment), customisation of digital television displays and controls has been frequently recommended in the reviewed studies.
- New technologies are also in development to enhance Access Services and the general usability of digital television. These include Touch TV and speech responsive EPGs.

Section 3

Background & objectives

Ofcom's Code on Television Access Services was published in July 2004[1]. The Code sets out requirements with regard to the provision on subtitling, sign language and audio description (Television Access Services) for television services licensed in accordance with the Communications Act 2003, the Broadcasting Act 1996, or the Broadcasting Act 1990.

Ofcom commissioned i2 media research ltd. to conduct a literature review of research relating to Television Access Services. The review was commissioned to allow Ofcom to efficiently target any future primary research. An overview of existing data was required by Ofcom to enable it to establish whether additional primary research is required to:

- inform a planned review of the ITC's subtitling, signing, and audio description standards,
- shed light on the costs and benefits of the Code's approach to mandating Access Services, and
- gauge awareness amongst potential beneficiaries of Access Services, and to identify additional barriers to use.

The Code specifies stepped increases in the provision of Television Access Services, setting out from a 'relevant date' for each qualifying service ten year targets for subtitling, signing and audio description and five year targets for subtitling. The 'relevant date' for the purpose of determining the tenth anniversary of services is 1 January 1997 in the case of BBCs 1 and 2, 1 January 1998 for Channel 5, 1 January 2000 for Channels 3 and 4 and S4C Digital. In the case of digital television programme services, the relevant date is the date on which the provision of that service began, and in the case of other television services, the date is the entry into force of the legislation, which is 29 December 2003. In the case of television services starting after 29 December 2003, the relevant date is the date on which provision of that service commenced. Briefly, the targets for the provision of Television Access Services start from requirements for 10% of programmes to be subtitled, 2% to be audio described, and 1% to be signed. These targets rise progressively over ten years, until by the end of year 10, 80% of programmes are to be subtitled, 5% signed, and 10% audio described.

For more detail on the targets applicable to specific services, the reader is referred to Ofcom's code, available online: http://www.ofcom.org.uk/tv/ifi/codes/ctas/#content

The literature review examined recent research on Television Access Services conducted in the UK and US, (largely) within the last five years, and reviews work conducted by academics, broadcasters, disability groups and government bodies. A full list of all sources referenced is allocated in section 10 of this report.

The review aimed to identify research in relation to the following domains:

- Baseline Target Audience/ Market Sizing Information
- Information (communications) about Access Services
- Overall television experiences (of users of Television Access Services)
- Refining access service provision

[1] Ofcom (2004) Code on Television Access Services. Statement by Ofcom [139]

Section 4

A definition of Access Services

4.1 Signing

British Sign Language (BSL) is the main sign language of the deaf community in the UK. It is a non-verbal, visual spatial language involving movement in primarily the hands, but also the face (eyes, brows, cheeks, lip patterns) and body (upper torso, shoulders), and has its own complex grammatical structure[2, 3].

4.2 Subtitling

Subtitling is an on-screen text based representation of what is being said in a broadcast programme, and sometimes includes descriptions of background sounds. It can be visible continuously (open subtitles) or included with the picture as desired (closed subtitles)[2]

4.3 Audio Description

Audio description is 'an ancillary component associated with a television service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment particularly, but not exclusively, for viewers who have visual impairment. The description content is voice only, often in mono, and is typically confined to gaps in the normal programme narrative.' (p. vii)[2]

[2] Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. [118]
[3] Stallard, G. (2003) Standardisation Requirements for Access to Digital TV and Interactive Services by Disabled People. Cenelec (European Committee for Electrotechnical Standardization). [119]

Section 5

Baseline Target Audience/Market Sizing Information

5.1 Target audience

The potential target audiences for Access Services can be narrowly or more broadly defined depending on whether Access Services are seen solely as a necessity for viewers with sensory impairments, or as an accessory to the standard broadcast programming for all viewers (with or without any sensory impairment).

- *Access Services can enhance the television viewing experience for people with visual and hearing impairments. Estimates for how many people there are with sensory impairments in England vary depending on the source of information.*
  - *312,000 people are officially registered with a visual impairment whilst representative groups estimate that there are 2 million people with sight problems.*
  - *214,000 people are officially registered with a hearing impairment whilst representative groups estimate that there are 9 million people with hearing problems.*
- *People with other impairments, and without impairments, may also benefit from Access Services*

This section presents published figures on the prevalence of various registered (and estimated) disabilities, as well as other potentially relevant audiences for Access Services.

Prevalence of hearing impairment

Statistics from the Department of Health and Office for National Statistics[4] indicate the number of people registered as deaf or hard of hearing in England in the year ending 31 March 2004 are as follows:

- 55,000 people are on the register of **deaf** people
- There has been an overall increase of 45% (17,100 people) registered since 1989
- Between March 2001 and March 2004 the number of people on the register increased by 9% (4,700). This increase is across all age groups, with the largest growth being in the number of people aged 65-74, which increased by 29%
- 24% of those registered are over 75 compared with 20% in 1989

- 159,000 people are on the register of **hard of hearing**
- There has been an increase of 10% since March 2001 (14,400 people) and more than double the figure registered in 1989
- 64% of the people on this register are over 75 compared with 58% in 1989

Summing the figures for registered deaf and registered hard of hearing people gives a total of 214,000 people registered as having some form of hearing impairment. In

[4] (Dec, 2004) http://www.dh.gov.uk/assetRoot/04/09/81/34/04098134.pdf [68]

contrast, deaf/hard of hearing support groups such as Hearing Concern[5] and RNID[6] present higher estimated rates of the prevalence of hearing loss on their websites. They claim that nearly 9 million people in the UK have some form of hearing loss, of which they may or may not be aware. RNID[6] give an extensive breakdown of estimates of the incidence of deafness and hard of hearing in the UK, reporting that there are:

- 8,945,000 deaf and hard of hearing people, of whom
  - 2,474,000 are aged 16-60 (28%)
  - 6,471,000 are aged 61+ (72%)
- 8,257,000 people with mild to moderate deafness, of whom
  - 2,366,000 people are aged 16 to 60 (29%)
  - 5,891,000 people are aged 61+ (71%)
- 688,000 people with severe to profound deafness, of whom
  - 108,000 people are aged 16 to 60 (16%)
  - 580,000 people are aged 61+ (84%)
- The ratio of interpreters (inc. trainees) to BSL users is 1:156
- The ration of interpreters (fully qualified only) to BSL users is 1:275
- Hearing aid users: 2 million (of which 1.4 million use regularly)

In terms of the potential audience for signing on television, the RNID[7] report that 50,000 people use BSL as their first or preferred language. Tanton, Ware, and Armstrong[8] give a slightly higher estimate of BSL use, reporting that it is the preferred language of 55,000 people. The methods used to calculate these estimates were not reported.

Signing enables BSL users to access television content in the same way as non-BSL users – in their first language. Of relevance to this point, Paul and Jackson[9] report that 30% of deaf (American) students are illiterate when they leave school compared with less than 1% of hearing students. This suggests that some deaf viewers may have difficulty understanding subtitles.

Prevalence of visual impairment

Statistics from the Department of Health and Office for National Statistics[10] indicate that the number of people registered as blind and partially sighted in England in the year ending 31 March 2003 is as follows:

- 157,000 people are on the register of **blind** people
  - This is a decrease of almost 1% (1,100) since March 2000
- 155,000 people are on the register of **partially sighted** people
  - This is an increase of 4% (6,500) since March 2000

Summing the figures for registered blind and registered partially sighted people gives a total of 312,000 people registered (in England) as having some form of visual impairment. In contrast, the RNIB gives substantially higher prevalence rates of sight

[5] Hearing Concern (undated) Factsheet: Advice and Information, About Hearing Loss. [137]
[6] RNID (undated) Statistics (RNID: For deaf and hard of hearing people). [149]
[7] RNID (undated) Factsheet: Sign language on television. [138]
[8] Tanton, N., Ware, T. and Armstrong, M. (2000) Access services for digital television: Matching the means to the requirement for audio description and signing. International Broadcasting Convention, Conference Publication. (For BBC Research & Development [R&D]). [24]
[9] Paul and Jackson, (1993) cited in Jelinek Lewis and Jackson, (2001) [6]
[10] (Dec, 2003) http://www.dh.gov.uk/assetRoot/04/08/02/33/04080233.pdf [69]

problems in the UK. The RNIB report that 2 million people have serious sight problems and that whilst 94% of blind and partially sighted people watch television regularly[11] 680,000 people with visual impairment have difficulty watching television. They claim that 500,000 people with visual impairment want to watch more films, soaps and other programmes[12]. The basis of these estimates is not reported. Packer and Kirchner[13] report that people with visual impairment are within demographic groups that watch the most television: i.e. they are disproportionately older and less likely to be employed[14].

Marriott and Vale[15] note that (unspecified) research by RNIB indicates that 2 in 3 people with visual impairment have another disability or health problem. 90% of people with visual impairment are aged over 60, and 54% of these live alone. 90% live on less than half the average income and only 30% of those still of working age are able to work. Marriot and Vale state that the problem of visual impairment is increasing with the ageing population and that by 2031 2.5 million people will have problems with their sight.

Cognitive impairment

Whilst the target audience for Access Services is primarily people with visual and/or hearing impairments, people with cognitive impairment or learning disabilities can also benefit by Access Services such as audio description[16] and subtitles[17] enhancing their understanding and enjoyment of the programme content.

As reported in Freeman and Lessiter[18] cognitive impairments range greatly in severity and can be as a result of age, learning disabilities, brain injury, dementia and substance abuse (amongst others). 5.7% of the UK adult population (2.5 million adults) are estimated to suffer from some form of cognitive impairment. The RNID estimate that in the UK 115,000 people have speech impairment, 275,000 people have language impairment, 450,000 are dyslexic, and 1.4 million are intellectually impaired. Cognitive impairment, like visual and hearing impairments, is more prevalent amongst older people. Around 3% of people under the age of 49 have cognitive impairment compared to about 15% of adults over 75[18]. People with severe cognitive impairment are less likely to be in well-paid employment than people without cognitive impairment[19]. As reported above, unemployed status is associated with higher television viewing levels[14]. Having impairments in multiple domains is common, as is having other age related disabilities.

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[11] Marriott, J. and Vale, D. (2002) Get the Picture: Making television accessible to blind and partially sighted people. RNIB campaign report. [20]
[12] Petre, L. (undated) Access to digital television for blind and partially sighted people RNIB/Academic conference slides. [22]
[13] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind. [72]
[14] Papazian, (1996) cited in Packer and Kirchner (1997) [72]
[15] Marriott, J. and Vale, D. (2002) Get the Picture: Making television accessible to blind and partially sighted people. RNIB campaign report. [20]
[16] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind. [72]
[17] Hoda, M. (undated) Subtitling: Rights, Responsibilities and Benefits. RNID. [82]
[18] Freeman, J. and Lessiter, J. (2004) Vulnerable Consumers in Switchover- who are they and where do they live? i2 Media Research for the Ofcom Consumer Panel. [70]
[19] ODPM, (2004) cited in Freeman and Lessiter (2004) [70]

Multiple sensory and cognitive impairments

Coleman, Clarkson and Keates et al.[20] estimated proportions of the UK population over 65 years who have single and multiple capability loss. According to their calculations, motion impairment is the largest category of disability in this age group (over cognitive and sensory impairment). Motion impairment includes a range of symptoms such as restricted dexterity and movement, poor coordination, muscle spasms and reduced muscle strength. Such impairments can be a general effect of ageing, and can be caused by conditions such as Parkinson's disease and as a result of strokes and arthritis[21]. Motion impairment can negatively impact the ease with which Access Services are activated and the use of television generally. For example, users may not be able to position their fingers accurately enough to press the correct buttons on a remote control, or may not be able to control sufficiently well how many times they press the buttons. Coleman et al. estimate that over one in three UK adults aged over 65 years have some form of motion impairment (13.2% have motion impairment alone, a further 13.2% both motion and sensory impairment, and 6.7% combined motion, cognitive and sensory impairments).

Other potential target audiences for Access Services

People without disability can also benefit from Access Services. For instance, audio description can be useful when the television is being used as a background medium, as can subtitles when the audio of the programme is obscured (e.g., watching television in a crowded bar or station)[22].

Subtitles have also been cited as beneficial for people for whom English is not their first language[23] and are learning English as their second language, and for children starting to read[24].

5.2 Take-up of digital services within target audiences

- *No research was identified focusing exclusively on awareness and adoption of digital television amongst people with sensory impairments. Digital television adoption by target users of Access Services is not well quantified at present.*
- *People with sensory impairments are likely to be older and older people are less likely to be aware of digital television and its capabilities.*
- *Older people with impairments are also more likely to have difficulty purchasing, setting up and using digital television. This may limit current access service use, because the provision of Access Services is wider on digital television.*

[20] Coleman, R., Clarkson, J., Keates, S., Johnstone, M., and Lebbon, C. (2004) Inclusive Design in Practice - i~design: Developing design tools information and guidance. Designing for the 21st Century III: An International Conference on Universal Design. [142]
[21] Usability and Rehabilitation Engineering Group (undated) Haptic Feedback and Motion-Impaired Users: http://rehab-www.eng.cam.ac.uk/projects/input/haptic.htm [155]
[22] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind. [72]
[23] Podas, R. (2004) New Directions in Subtitling. Network, 76, 7-14 [51]
[24] Hoda, M. (undated) Subtitling: Rights, Responsibilities and Benefits. RNID. [82]

Awareness of digital television services

The review did not reveal any studies focused on take-up of digital television among access service users. As sensory, cognitive and motion impairments are more common with advancing age, age is used as a proxy. MORI reported that in 2002 70% of people over the age of 65 did not know what digital television was, and that in 2001 71%[25] (and in 2002 72%[26]) of people over 75 years of age were unaware of digital switchover.

A report by the Ofcom Consumer Panel[27] found age to be one of the most significant factors with regards to assessing a knowledge gap. One in five older respondents were up to date with developments in communication services and knew where to go for relevant advice compared to two out of three of those under 35 years. With regard to digital television, across all age groups only one in five respondents understood the term 'digital switchover'. This figure was lower amongst older people and people from low income households. The number of people who reported that they kept themselves informed of the different ways of receiving television channels declined with increasing age (from 45-55 years upwards).

Attitudes to digital television services

In terms of demographic variables (e.g., age and social grade) that are related or relevant to sensory impairment and hence the target audience for television Access Services, DCMS[25] aimed to obtain data on the public's awareness and perception of digital television, current ownership and potential for ownership. The study classified 30% of the UK population as 'Possible' adopters of digital television (i.e., respondents who were unsure when they would switch to digital, but did not say they would 'never' switch) and 15% as 'Unlikely' adopters of digital television viewers (i.e., respondents who said they would never switch to digital). Respondents in these groups tended to be older, of a lower social grade and were more likely to be female. They also tended to have no access to a computer and were less likely to have young children. These respondents were less likely to see a need for digital television and were happy with their existing television services. The Consumers' Association[28] presented a higher estimate of the proportion of people claiming they would 'never' adopt digital television, with 50% of older and retired people saying they 'won't get it'.

In a survey of 209 people with hearing impairment[29] 70% reported that they would be happy to pay for a deaf channel and 59% reported that they would be happy to pay for more interaction - such as the ability to control subtitles and signing. In the same survey only 30% of respondents reported that they would be happy to pay for pay-per-view deaf programmes, citing cost concerns.

The DCMS[30] extended their 2001 survey[25] to focus in more depth on the views of viewers with hearing and visual impairments. Results from focus groups[30] with five

[25] MORI (2001) Digital Television 2001: Final Report. For DCMS (n=1,918) [28]
[26] MORI (2002) Digital Television 2002: Final Report. For DCMS (n=1,053) [29]
[27] Ofcom Consumer Panel (2005) Consumers and the communications market: where are we now? [64]
[28] The Consumers' Association (2001) cited in Perera, (2003) [13]
[29] Dye, M. (2000) Digital TV, On-screen signing and 'Simon the Signer': Perspectives from the Deaf Community. Deaf Studies Trust (for TyneTees TV) [19]
[30] MORI (2002) Digital Television 2002: Final Report. For DCMS. [29]

participants with hearing impairment recruited through the RNID, suggested that the availability of subtitles across digital channels and programmes was a key driver in the uptake of digital television amongst viewers with hearing impairment. Positive aspects of digital television that were cited included the ability to record subtitled programmes, clearer sound and pictures, having a wider choice of programmes and channels, and the possibility of accessing signed programmes more easily.

Results from focus groups[31] with seven people with visual impairment recruited from the RNIB found that a key driver to switching to digital for viewers with visual impairment was the provision of audio description across programmes and channels. The research reported that respondents felt the potential benefits of digital television were not yet realised. Cited benefits of digital television by these respondents were sharper pictures (with the potential to help those who have partial sight) and the scope for audio description across a wide range of programming.

The DCMS[31] research noted a number of hurdles to the adoption of digital television that are particularly relevant to people with sensory (and physical) impairment. Digital television is perceived as expensive for some (particularly people unable to work because of an impairment), and difficult to install. Further, people with hearing impairment may have difficulty obtaining effective support from a telephone helpline.

Intention to purchase digital television

The DCMS[32] reported that older respondents tended to be less likely to see the need to upgrade their televisions and were not considering getting digital unless they had to.

Results of a small scale RNID survey of its members, of whom 93% were at least hard of hearing[33], showed that 23% of non-adopters of multichannel television in the sample were planning to adopt digital television in the future.

Digital television penetration rates

Estimates of digital and multichannel television take up by people who are deaf or have hearing impairment have ranged from 18%[34] to 26%[33]. However, Dye[34] reported that some respondents were unsure of the meaning of the term 'digital television'.

RNID[33] reported that younger respondents were much more likely than older respondents to have multichannel television. Digital television penetration was 50% for respondents aged under 25 years compared to 18% for respondents aged 75 and above. Of multichannel television adopters in the study, 44% had Sky digital, 2% Sky analogue, 36% cable and 14% OnDigital.

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[31] MORI (2002) Digital Television 2002: Final Report. For DCMS. [29]
[32] MORI (2001) Digital Television 2001: Final Report. For DCMS (n=1,918) [28]
[33] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[35] Dye, M. (2000) Digital TV, On-screen signing and 'Simon the Signer': Perspectives from the Deaf Community. Deaf Studies Trust (for TyneTees TV) (n=209) [19]

With regard to the visually impaired community, Pettitt, Sharpe, and Cooper[35, 36] conducted interviews with people with visual impairment and found that they were low spenders on electrical equipment. Their ownership of television, remote controls, cable and satellite was comparable to the general population but ownership and usage of video recorders and Teletext was lower.

Current figures for digital television take-up among people with visual and hearing impairments are less well established. This is a gap given the increased availability of audio description and the fast take-up of Freeview since its launch.

5.3 Awareness and perception of Access Services

- *The extent of research identified into awareness, perception and use of Television Access Services varied across the Access Services.*
- *With regard to signing:*
  - *No research was identified on awareness, perception and use of signing.*
- *With regard to subtitling:*
  - *Several reports indicate high awareness (in the region of 90% of people with hearing impairment) and high usage (in the region of 75% of people with hearing impairment). However older viewers (aged over 65) have been found to be less likely to know about subtitles and how to access them than younger respondents.*
- *With regard to audio description:*
  - *The research identified in this area indicates a low to moderate awareness of audio description; estimates of awareness of audio description by people with visual impairment range from 13% to 36%.*
  - *Appreciation of audio description by users has been reported to decrease with age, and there is mixed evidence that appreciation is related to severity and duration of visual impairment.*
  - *No UK data were identified in relation to usage of audio description. US data indicate relatively low usage.*

Signing

No specific information was identified from the literature reviewed with regard to target audience awareness and perception of signing on television.

Subtitling

Awareness of subtitles and how to access them have been estimated for viewers with deaf and hearing impairment. These have varied substantially across different (all RNID related) surveys conducted over consecutive years – 66% (1999)[37], 92% (2000)[38], and 41% (2001)[39]. Details of each study are provided below.

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[35] Pettitt, B., Sharpe, K. and Cooper, S. (1996) AUDETEL: Enhancing television for visually impaired people. The British Journal of Visual Impairment, 14, (2), 48-52 (n=100) [17]
[36] Pettitt, B., Sharpe, K. and Cooper, S. (1995) AUDETEL WP14.2: AUDETEL audience reaction research final report. EC WP deliverable RNIB research. [18]
[37] RNID (1999) Subtitling for deaf and hard of hearing people. RNID research report. [65]
[38] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. [115]
[39] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]

RNID[40] aimed to establish people with hearing impairments' use and awareness of subtitles, the coverage of programmes with subtitles, possible barriers to use and perceptions of subtitles and style preferences. In their report RNID present results of their own survey of subtitle use with a sample of RNID members in addition to reviewing previous studies about subtitling and assessing the current provision of subtitling on television. The study sample comprised RNID members in addition to a representative sample of people aged over 55 years. Of the total sample, 1300 were profoundly deaf, 1800 were hard of hearing and 1000 had tinnitus usually in combination with another hearing impairment. A small number (less than 100) of responses were from children attending special schools for deaf people.

With regards to awareness, the research found that around a third of people with a hearing impairment aged over 55 years who reported that they 'rarely or never' used subtitles were unaware of how to access them. RNID calculated that 1.7 million people with hearing impairment did not know how to use subtitles and that 570,000 would use them if they knew how.

An RNID survey conducted in 2000[41] found higher rates of awareness of subtitling than did the RNID[40] survey reported above; 92% of its RNID Cymru were aware of how to access closed caption subtitles. The report did not specify whether or not the research had drawn a distinction to respondents between accessing subtitles on analogue or digital television services. However, the result was reported in the context of ownership of Teletext televisions, thus respondents may have been reporting with regard to accessing subtitles on analogue television. The authors[40, 41] reported that previous research conducted by NOP[42] suggested that 5% of the UK population use subtitles often or all the time (where available).

In terms of *how* respondents reported they had become aware of closed captioning (note: respondents could endorse more than one option), RNID[41] reported that 32% learned about them through television on-screen promotions, 30% via friends and family, 25% through school/health/other professionals/organisations, 21% via magazines and newspapers, and 1% through posters/hoardings/petrol pump adverts.

This data was further broken down by level of impairment. For profoundly/severely deaf respondents, 'through friends/family' was the most frequently endorsed source (32%) followed by 'TV on-screen promotions' (29%) then via 'school/health/other professional/organisations' (27%). For respondents classified as 'hard of hearing', 'TV on-screen promotions' was the most frequently endorsed source of awareness of the availability of closed caption subtitles (47%), followed by 'family/friends' (25%) then 'newspapers/magazines' (24%).

A questionnaire study commissioned by RNID[43] asked whether subtitles could be accessed on multichannel television. 41% of respondents reported that they were aware of the availability of subtitles. Awareness was higher for respondents who had

[40] RNID (1999) Subtitling for deaf and hard of hearing people. RNID research report. [65]
[41] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. (n=550, comprising RNID supporters and members, of whom 90% were at least hard of hearing) [115]
[42] NOP (1998) Solutions Research on Subtitling. (n=1,002 comprising people over 15 years, telephone interviews.) Cited in RNID (1999) [65] and RNID & S4C (2001) [115]
[43] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]

adopted multichannel services: 88% of OnDigital adopters, 71% of Sky adopters and 64% of cable adopters in the sample were aware that subtitles could be accessed on their multichannel platforms. Of respondents who were aware of the availability of subtitles on multichannel television, 26% cited word of mouth, 26% broadcasters' literature, 25% RNID and 24% on air announcements as the source of their awareness. In addition, 17% of respondents were aware of the availability of subtitles through information provided in their Electronic Programme Guides (EPGs).

With regard to age, Stallard[44] cited a study conducted by NOP World (January 2003) which found that the respondents over the age of 65 were less likely to be aware of subtitling and how to access the service than younger respondents, in spite of subtitling having been available for around 25 years.

Audio Description

A briefing paper by Petre[45] reports results from research conducted for RNIB by Taylor Nelson Sofres in early 2003[46]. A third of participants (all with visual impairment) were aware of what audio description was, 36% recognised it by name and 42% recognised it after having a section played to them. Appreciation of audio description was reported to decrease with age; 72% of 16 to 54 year olds, 65% of 65-74 year olds, and 38% of 75+ year olds reported that they appreciated audio description. The briefing paper reported that user concerns regarding ease of use and cost often outweighed the perceived benefits of using the service.

The American Federation for the Blind (AFB) Household Survey[47] revealed that 13% of people from the U.S. with visual impairment had heard of video (audio) description. The sample of people with visual impairment was screened from a survey of the general population (rather than by recruiting respondents with visual impairment through disability groups). Packer and Kirchner[48] indicated that this lack of exposure to, and awareness of audio description was apparent in respondents' (mis)understanding of what audio description does and why it is of benefit. When respondents who did not know what audio description was were given a brief description of the service, their response was generally positive. Younger people with visual impairment and people with more marked visual impairment(s) were most interested in audio description.

In terms of appreciation of audio description, Petre[49] reported that the extent to which respondents appreciated audio description varied depending how recently they had acquired their visual impairment. 74% of respondents who had been blind since birth reported valuing the service, as did 46% of respondents who had been blind for more than 6 years and 40% for respondents who had been blind for less than 5 years.

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[44] Stallard, G. (2003) Standardisation Requirements for Access to Digital TV and Interactive Services by Disabled People. Cenelec (European Committee for Electrotechnical Standardization). [119]
[45] Petre, L. (2005) Briefing paper: user feedback on audio description and the case for increasing audio description targets. RNIB [23]
[46] Taylor Nelson Sofres (2003) Research for the RNIB, BBC, ITV and Channel 4; n=385, comprising people who were blind and partially sighted. Cited in Petre, (2005) [23]
[47] AFB Household Survey (n=417) reported in Packer & Kirchner (1997) [72]
[48] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind. [72]
[49] Petre, L. (2005) Briefing paper: user feedback on audio description and the case for increasing audio description targets. RNIB [23]

In the AFB survey Packer and Kirchner[50] found that some respondents were less positive about audio description. Whilst people with visual impairment generally value television greatly, some of the respondents with the most marked visual impairment in the AFB survey reported that they were less likely to use television or videos and so did not value audio description greatly. Equally, some respondents with less severe visual impairment(s) felt that they were not sufficiently visually impaired to need audio description.

Packer and Kirchner[50] reported what they referred to as a number of misconceptions regarding audio description. Examples they gave were that some respondents presumed there would be extra charges for the service or that they needed special equipment to access the service. Others believed that the audio describer would talk over the programme dialogue thereby spoiling their television experience, or that it would be difficult to establish the source of the audio (i.e, audio describer vs. programme audio). Interviews conducted by AFB for the National Science Foundation, detailed in the same paper, indicated that while people with visual impairment and blindness who had no experience of audio description did not perceive the service positively, after experience of it, their opinions changed positively towards it.

Similar UK data to that obtained in the US AFB Household Survey was not identified in this review. In particular, it may be important to evaluate the expectations, perceptions and experiences of respondents with visual impairment screened for inclusion in the research from the general population, in addition to members recruited through representative organisations.

5.4 Usage of Access Services

Signing

No specific information was identified from the literature reviewed with regard to target audience use of signing on television.

Subtitling

High usage of subtitling by people with hearing impairment has been reported, with overall figures ranging between 70% (2000)[51], 75% (1999)[52] and 84% (2001)[53]. Details of the studies are provided below.

RNID[54] found that around 25% of people with hearing impairment over 55 years rarely or never used subtitles. They calculated that 1.7 million people with hearing impairment did not know how to use subtitles and that 570,000 would use them if they knew how. Darsa[55] noted other RNID research (conducted by NOP), which

[50] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind [72]
[51] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales [115]
[52] RNID (1999) Subtitling for deaf and hard of hearing people. RNID research report (Care Equation Ltd research; n=3,800) [65]
[53] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[54] RNID (1999) Subtitling for deaf and hard of hearing people. RNID research report (Care Equation Ltd research; n=3,800) [65]

reported that 600,000 people with deaf and hearing impairment did not know how to use subtitles. RNID[54, 55] estimate that between 2.2 and 5 million adults in the UK use subtitles most of the time when watching television.

A questionnaire study commissioned by RNID[56] revealed that 84% of a sample of respondents with hearing impairment had used subtitles before. Usage was related to severity of hearing impairment, with 94% of profoundly deaf, 90% of severely deaf, and 61% of hearing impaired respondents reporting that they had used subtitles. Of the full sample, 72% of respondents reported using subtitles as often as possible/ more than once a day. 88% of respondents said they would like to use subtitles in the future.

A survey on subtitling was conducted by RNID Cymru between May and October 2000 amongst a Welsh sample (total n=~1,100) recruited from two sources: RNID Cymru and S4C viewers[57]. Results revealed that 70% of the RNID respondents reported always using subtitles when they watch television (in English), compared to just 9% of the Sgrin respondents. More of the RNID sample had some form of hearing impairment than did the Sgrin sample. 7% of the RNID respondents and 25% of the Sgrin respondents reported that they would like 'comprehensive Welsh subtitles'.

Reasons for using subtitles?

Two RNID surveys, one conducted in Wales in 2000[57] and the other in 2001[56] in the UK asked why respondents used subtitles. Aside from their hearing impairment, participants cited 'people on TV mumbling a lot' as the most popular reason (25% and 48% in the two studies, respectively). Other reasons cited by respondents to both surveys included: 'avoiding having the set too loud', 'background noise on television', 'accents/words [being] unfamiliar', 'background noise in house' and because their 'English [was] not particularly good'.

Audio Description

Whitehead[58] states that in the UK '6% of programmes per channel are audio described, which works out at approximately 10 hours per week'. The AFB Household Survey[59] reported that just 7% of people with visual impairment had experience of audio description. Audio description usage figures (on television or video) were higher (at 66%) for people with visual impairment sampled from a mailing list held by an organisation providing large print publications that include 'programming information for Descriptive Video Service' ('DVS(r) Guide Users Survey').

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[55] Darsa, S. (2003) Subtitling Revolution in your own Home [136]
[56] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[57] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. (Sample of ~1,000 split by: n=550 comprising RNID members and supporters, 90% with hearing impairment, n=565 comprising Sgrin magazine readers, 23% with hearing impairment) [115]
[58] Whitehead, J. (2005) Audio description on digital television. http://www.rnib.org.uk/xpedio/groups/public/documents/publicwebsite/public_audiodescriptionontv.hcsp [108]
[59] AFB Household Survey (n=417) reported in Packer & Kirchner (1997) [72]

This highlights the importance of sampling to ensure representative figures are derived for people with sensory impairments, including both respondents who are and respondents who are not associated with charity/support organisations.

5.5 Hurdles and barriers to take-up of Access Services

- *Reasons accounting for low usage of Access Services (where low usage has been reported) include limited availability of signing and audio description (programmes available and equipment requirements), awareness, failures in transmission and over-editing of subtitles, and general usability considerations.*

Issues specific to Access Services

Neale and Keyte[60] reported to Hearing Concern a range of problems with subtitling identified by participants as making their use difficult. Respondents were readers of the Hearing Concern publication (n=~500). Issues identified included:

- poor accuracy of subtitling and poor spelling (21%) [also 65],
- delays in the update rate (21%),
- insufficient amount of text (20%),
- 'failures' (unspecified by the authors, but perhaps in transmission – 10%) [also 65],
- speed/time on screen (7%) [also 65], and
- positioning of the subtitles on screen (obscuring important content – 4%).

Neale and Keyte noted that digital television users had more problems than analogue television users[60].

A report by Ofcom[61] explored issues with subtitles for people who have hearing impairment. People with hearing impairment found it more difficult to follow subtitles if BSL was their first language. Subtitles were easier to follow if the programme and the characters were familiar to the user.

The AFB Household Survey[62] found that some respondents claimed that they were not interested in services that made them appear 'different'. This finding was also reported by the AUDETEL project[63] where younger respondents (aged 15-20 in particular) reported being more conscious of being treated differently to the rest of society.

RNID[64] noted that subtitles are often perceived as being too slow and are associated with older people, which may influence younger people not to use them. RNID cited a survey conducted in 1995 that found various reasons for not using subtitles. These included not liking them and not wanting to become dependent on them. RNID reported that hearing impaired viewers were annoyed that when transmission problems occurred with subtitling transmission of the programme was not stopped. In the same study, hearing impaired respondents reported that programmes

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[60] Neale, B. and Keyte, B. (undated) Subtitles questionnaire - what you told us. Hearing Concern. [16]
[61] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? Conducted between April and July 2003; n=54 depth interviews, 2 mini-discussion groups n=5 per group conducted at Derby College for Deaf People) [21]
[62] AFB Household Survey (n=417) reported in Packer & Kirchner (1997) [72]
[63] Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. [118]
[64] RNID (1999) Subtitling for deaf and hard of hearing people. RNID research report [65]

advertised as being subtitled were often not. Finally, the report noted that lack of awareness of subtitles amongst people with hearing impairment limits their use.

Ease of Use – digital television

In a report for the Ofcom Consumer Panel that reviewed research on vulnerable consumers in relation to aspects of digital switchover, Freeman and Lessiter[65] predicted that people with visual impairment might have more difficulty setting up their set top box because of difficulty following setup instructions and seeing the on-screen messages.

The requirement to use an additional remote control to operate a digital television set top box can cause difficulty for people with visual impairment, especially when the remote control is not well designed for people with sight impairment[65]. Remote control button labelling (symbols vs. words) is an important design consideration in this regard[66]. Controlling the volume at which a programme is viewed is a basic and essential function for all viewers, and for people with hearing impairment in particular. Conversion to digital television using a set top box often necessitates the combined use of two remote controls, the set top box remote control to change channel and the television remote control to operate volume. This requirement in itself can cause usability difficulties for some people. Freeman and Lessiter[65] proposed that integrated digital televisions are likely to be easier to use by people with sensory impairments, as they are operated with just one remote control (like analogue television). Of course, with the adoption of new equipment, new ways of controlling the equipment often have to be learned[65].

Because there are more channels available on digital television, changing channel using direct channel number entry can require a viewer to enter 3-digits in close succession on their remote control. This task can be difficult to people with dexterity impairment. Channel navigation using the EPG can be difficult for viewers with visual impairment, as EPGs can be difficult for many people with visual impairment to see, and very difficult (especially in the absence of an audio output of the EPG data) if the user is blind[65, 67]. People with visual impairment could benefit from screen-reading technology for on-screen television displays[67], though the provision of auditory feedback from an EPG may have cost implications[65].

Other restrictions: Financial and Pragmatics

Financial concerns with regard to making use of Access Services have been noted by RNIB[68]. For example, some people with visual impairment resent having to pay more for the same services that sighted people receive as standard[68].

The European Commission funded AUDETEL project started in 1991 and aimed to develop cheap, user-friendly technology to deliver audio description to people with visual impairment on their televisions at home[69]. The project conducted extensive user trials involving elderly people and people with visual impairment, to construct

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[65] Freeman, J. and Lessiter, J. (2004) Vulnerable Consumers in Switchover- who are they and where do they live? i2 Media Research for the Ofcom Consumer Panel [70]
[66] e.g., Gill, J. and Perera, S. (2003) Accessible Universal design for Interactive Television. Euro iTV Conference proceedings (for RNIB) [9]
[67] MORI (2002) Digital Television 2002: Final Report. For DCMS (n=1,053) [29]
[68] MORI (2002) Digital Television 2002: Final Report. For DCMS (n=1,053) [29]
[69] Wiesen, M. (1992) Audio Description: present state and future prospects. Viewpoint, 46 (208), 72-74 [54]

quality guidelines and identify features of audio description that are preferred (in terms of intelligibility of the audio descriptions, *what* is described and sound quality) [70, 71, 72]).

An article in Mailshot by Podas[73] noted that users of subtitles sometimes complain about the subtitles being over-edited. There is a trade-off between the amount of displayed text and keeping pace with the broadcast audio. Fast-paced dialogue is often edited to be displayed in subtitles, to avoid there being too much text on-screen. If there are too many words, redundant ones are removed and where possible long words are changed for shorter ones with the same meaning. Swear words are often removed and some users feel patronised by the exclusion of offensive words[74].

DCMS[68] reported that users with visual impairment were disappointed with the lack of channels and programmes providing audio description at the time of their research. The report stated that although there were more channels, the proportion that were subtitled was lower on digital than on analogue, and that EPGs did not indicate which programmes provided Access Services. Users of the subtitling service can also be irritated by the limited number of programmes that are suitable for them to view enjoyably[75].

New technologies to support Access Services that are less expensive and more efficient to produce have faced technical (and other) problems that have to date limited their implementation[72]. For instance, the ViSiCAST project[76] which initially aimed to provide BSL by translating Teletext subtitling into (realistic) 3D virtual signing faced a number of difficulties in translating syntax. ViSiCAST then used motion capture techniques to harness human signers' movements with sensors[77]. These were then used to drive the virtual signers' movements. There was mixed user acceptance of the virtual signer (referred to by some people with hearing impairment as the 'cartoon character')[72].

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[70] Pettitt, B., Sharpe, K. and Cooper, S. (1995) AUDETEL WP14.2: AUDETEL audience reaction research final report. EC WP deliverable RNIB research [18]
[71] Wiesen, M. (1992) Audio description on television: New prospects for Europe. New Beacon, 76 (898), 206-209 [61]
[72] Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. [118].
[73] Podas, R. (1999) Subtitling: myths and misconceptions. Mailshot, 9-10 [45]
[74] (1991) Parents want swear words subtitled. British Deaf News, 22 (9), 4 [37]
[75] Podas, R. (1999) Subtitling: myths and misconceptions. Mailshot, 9-10 [45]
[76] ViSiCAST (2000-2002) ViSiCAST project synopsis. EC IST (5th framework) funded project. [113]
[77] Wakefield, M. (2002) ViSiCAST Final Report. EC IST (5th framework) funded project [135]

Section 6

Information (communications) about Access Services

- *Promotion of Access Services is widespread within relevant charity publications.*
- *No research was identified through this review in relation to communications about signing.*
- *Research about how users find out about subtitling and audio description and for which programmes the services are available revealed that:*
  - *'TV listings' in newspapers and magazines are the most popular sources for information about subtitling;*
  - *'word of mouth' and 'relevant publications' are the most popular sources for information about audio description;*
- *No research was identified through this review that investigated the effectiveness of different information campaigns.*
- *Reports reviewed here suggest that if Access Services were easier to find and better understood, target users would be more inclined to use them regularly. This suggests value in research to identify how best to communicate to target users about Television Access Services.*

Whilst this review has found examples of the promotion of Access Services and some research addressing how people have heard about different Access Services, less research on the effectiveness of different information campaigns has been identified. Methods of communicating about Access Services and the programmes on which the Services are available can include paper television guides, information at the start of programmes, television text services, websites, and on-screen adverts.

6.1 Current communications about access service availability

Subtitles

An RNID survey conducted in 2001[78] found that respondents classified as severely/profoundly deaf reported that the best ways to find out which programmes are subtitled are:

- 'information pages in newspapers and magazines' (48%),
- 'information on subtitling on screen at the start of the programme' (36%),
- via 'Ceefax/Teletext television programme information pages' (30%), and
- 'on-screen throughout a subtitled programme' (13%).

For respondents classified as 'hard of hearing' 'information on subtitling on screen at the start of the programme' was most frequently endorsed (52%), followed by:

- 'information pages in newspapers and magazines' (26%),
- 'Ceefax/Teletext television programme information pages' (19%), and
- 'on-screen throughout the programme' (17%).

[78] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. (n=331 severely/profoundly deaf, n=226 hard of hearing. Both comprised RNID Cymru supporters and members) [115]

A further questionnaire study commissioned by RNID[79] asked respondents how they found out which programmes were subtitled. 36% preferred to look in newspapers and television listings and 34% liked to use 'TV-viewing magazines'. 25% relied on information at the start of television programmes and 10% found out from Teletext. At the time of the study, the least popular methods were EPGs (4%), broadcasters' literature (1%) and word of mouth (1%). Participants were also asked how difficult it was to find out whether a programme was subtitled on a 'non-terrestrial channel' using a scale of 1 to 10 (where 1= 'very difficult' and 10= 'not at all difficult'). The mean score was 4.4 with 5% reporting that it was 'not at all difficult' and 13% reporting it to be 'very difficult'.

Subtitles monitoring research conducted by Hearing Concern was reported by Neale, Wood and Keyte[80]. Hearing Concern attempted to monitor the subtitle services being provided by broadcasters, in order to pass on information to users regarding the availability of subtitles on analogue services. Computers were used to read Teletext pages 24 hours a day to see how much broadcast content was subtitled. This information was then passed onto broadcasters and statistics published in Hearing Concern's newsletter. The study reported that evaluating the quality was difficult without watching the programme in question. The software used to monitor the amount of subtitles was able to detect whether subtitles were blocked or rolling, how many words per minute were displayed, whether the subtitles were in colour and whether their transmission was disturbed at any point and if so, whether an apology was displayed.

In an update to the subtitling monitoring project, Neale, Wood and Keyte[81] reported that they were pleased that new technologies such as word recognition were being utilised to make subtitling production quicker and cheaper, but expressed concern that in an attempt to meet increased subtitling targets, the quality of subtitles would be sacrificed. They were still unable to monitor quality easily with their software. The use of scrolling and block subtitles was mixed but scrolling was used more on live programmes. The speed at which subtitles were displayed varied from 119wpm for BBC1 to 93wpm for (channel) Five. This was dependent on the types of programmes shown on those channels with (channel) Five showing more films and using more blocked paraphrasing, and BBC1 displaying verbatim subtitles for their live programmes. They could not measure the delay between speech and subtitles using their methodology.

Audio Description

Packer and Kirchner[82] report data from the AFB's DVS(r) (Descriptive Video Service (r)) Guide Users Survey (n=884, comprising mailing list users for information on Descriptive Video Services) which revealed that word of mouth (friend/relative: 42%) and publications (42%) were the most common ways that respondents had heard about audio description. Others reported that they heard on television that a

[79] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[80] Neale, B. Wood, J. and Keyte, B. (2003) Subtitles monitoring- new challenges. Hearing Concern, 11 (4), 26-27,34 [48]
[81] Neale, B. Wood, J. and Keyte, B. (2004) Subtitles monitoring- new challenges. Hearing Concern, 12 (1), 26-28 [49]
[82] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind [72]

programme was audio described (17%). 13% reported having found audio description on television by chance.

6.2 Research on effectiveness of communications strategies

RNID[83] asked participants to rate how difficult it was to find out whether a programme was subtitled or not. The average difficulty rating was 7.7 (1='very difficult' and 10='not at all difficult'). This compared to a rating of 4.4 for 'non-terrestrial channels', suggesting that respondents found it easier to find out if a programme on a terrestrial channel was subtitled. Respondents who had used subtitles previously, but not at the time of the survey, gave an average difficulty rating of 4.93. The authors interpreted this finding as suggestive that one reason such respondents no longer used subtitles is that they found it difficult to find out which programmes were subtitled.

[83] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]

Section 7

Overall television experiences

7.1 General television consumption

- *Older people often report watching television as one of their favourite leisure activities, and there tends to be a positive relation between extent of television viewing and age; one study reviewed reports that people aged over 65 watch an average of 5 hours and 14 minutes a day, whilst people aged 55-64 watch an average of 3 hours and 28 minutes a day.*
- *People with impairments have a strong attachment to television, even if they have difficulty viewing.*
  - *A study involving people with visual impairment showed that programmes they rate as being most difficult to watch are among some of the programmes they most enjoy.*

Gill and Perera[84] cite details of a study conducted by Bruce, McKennell and Walker[85], which reported that 94% of blind people watch television and noted that only 7% of people with visual impairment are completely blind with no light perception.

A questionnaire study commissioned by RNID[86] revealed that on average respondents spent 3 hours 30 minutes watching television a day, with the majority watching television between 6pm and midnight. This compares to an average of 3 hours 25 minutes per day of television viewing by all individuals as reported by BARB (August 2005).

In an article about the AUDETEL project, Pettitt, Sharpe and Cooper[87] (n=100, recruited for interviews from RNIB database) reported that viewers with visual impairment watched an average of 23.9 hours of television a week, which they cited as broadly comparable to the 24.8 hours reported by the general population at the time (1992). Pettitt, Sharpe and Cooper pointed out that in the general population older people watch about 40% more television than average, so the participants in this sample (of whom 90% were over 60 years) watched less than the average for older people.

Packer and Kirchner[88] presented figures indicating that television and video viewing measured in a sample of (American) people with blindness or visual impairment (n=417) was similar to that of the general US population (n range 2000-4000). For example, the proportions who watched television at least 2/3 times a week was 97% for the AFB sample compared with 95% for the general population[89]. Packer and Kirchner reported that their sample of people with visual impairment viewed 24 hours

[84] Gill, J. and Perera, S. (2003) Accessible Universal design for Interactive Television. Euro iTV Conference proceedings (for RNIB) [9]
[85] Bruce, I. McKennell, A. and Walker, E. (1991) Blind and partially sighted adults in Britain: The RNIB survey. [15]
[86] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[87] Pettitt, B., Sharpe, K. and Cooper, S. (1996) AUDETEL: Enhancing television for visually impaired people. The British Journal of Visual Impairment, 14, (2), 48-52 [17]
[88] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind [72]
[89] Roper (1995) cited in packer and Kirchner, (1997) [72]

of television per week, less than the 29 hours per week viewed by the general US population at the time[90].

83% of the visually impaired AFB sample owned a VCR (compared with 85%/80% of the general population) [90,91]. 81% of the AFB sample who owned VCRs reported renting, borrowing or buying videos, a figure broadly comparable to that for the general population (79%)[92]. 26% of the AFB sample rented, bought or borrowed videos one or more times a week, compared to 31% of the general population[92]. The differences between these figures are not significant. The authors concluded that viewers with visual impairment valued watching videos as much as the general population.

Age and television consumption

Sensory and cognitive impairment becomes more common with age, placing older people more generally in the target audience for Access Services. Older people, with or without disability, have high television viewing rates. According to statistics from the General Household Survey[93] 99% of people aged 60+ had watched television in the previous month. It was the most popular reported home-based leisure activity in this age group.

That older people (without specified impairments) watch more television than the general population is supported by ITC statistics cited by RNID[94]. Hoda cites data from Hanley[95] showing the average amount of television watched per day by people aged 55-64 is 3 hours and 28 minutes, and 5 hours and 14 minutes for people aged over 65.

For American viewers with visual impairment, watching television alone increases with age[96]. Whilst 14% of under 34s watched television on their own most of the time, this increased to 46% of people aged over 55. Higher statistics for viewers with visual impairment were reported in the NTN/Nielsen study[97] in which 50% of people with visual impairment reported (sometimes) watching television alone. Further, 78% reported receiving help from viewing partners with aspects of the visuals that they miss.

Accessing television programmes without Access Services

Pettitt, Sharpe and Cooper[98] with reference to the AUDETEL project, reported that 57% of their sample of people with visual impairment (n=100) reported watching at least one programme that they find difficult to watch, suggesting a high attachment to

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[90] Nielsen (1995) cited in Packer and Kirchner (1997) [72]
[91] Roper (1995) cited in packer and Kirchner (1997) [72]
[92] Roper (1994) cited in Packer and Kirchner (1997) [72]
[93] General Household Survey (2002) cited in Age Concern (2004) Older People in the UK: General Statistics.2004. [151]
[94] Hoda, M. (undated) Subtitling: Rights, Responsibilities and Benefits. RNID [82]
[95] Hanley (2002) The Numbers Game. Older People and the media. ITC Research Publication.[156]
[96] Packer, J. and Kirchner, C. (1997) Who's watching: A profile of the Blind and Visually Impaired Audience for Television and Video. American Foundation for the Blind [72]
[97] NTN/Nielsen study (1996) cited in Packer and Kirchner (1997) [72]
[98] Pettitt, B., Sharpe, K. and Cooper, S. (1995) AUDETEL WP14.2: AUDETEL audience reaction research final report. EC WP deliverable [18]

programmes. The three most often cited reasons for a programme being difficult to watch were subtitles/text on screen, too many characters/ difficulty in distinguishing between characters, and scenes changing too fast. Sport, films and drama serials were rated as some of the most difficult types of programme to watch by the sample, though these genres accounted for a large proportion of the television viewed by the sample.

The majority of respondents reported planning ahead with regards to what they wanted to watch and being disappointed if they missed something. This was reflected in the statistics of what they watch on television. Pettit et al. reported that despite regarding sport as being a difficult genre to watch for them (along with documentaries and hobby programmes), viewers with visual impairment tend to watch more sport programmes than do the average population.

In relation to an experimental study of television image interpretations involving 12 people with visual impairment, Rice and Fels[99] noted that context was important in 'filling in the gaps' for elements of scenes that were not clearly visible to low vision television users. Dimmed environmental lighting was preferable to bright lighting and helped low vision users see the television screen better. Movement could also help direct attention to prominent features. For instance, in viewing a football game, one observer was able to gain insight regarding the ball location by tracking the clusters of colour indicated by the football shirts worn by the players.

Over half of the experimental sample[99] seated themselves at a viewing distance of 0.3 meters, reporting this as their normal behaviour. This compares to the optimum viewing distance of between 5 to 6 picture heights from the screen, although many viewers sit further than this[100]. For instance, Tanton[101] in a survey of normal domestic television viewing distances among BBC R&D staff found the average relative distance to be 8.5 picture heights from the screen (absolute average distance=2.7m). Rice and Fels's[99] participants reported a preference for images to be displayed higher on the screen as it reduced excessive head movement that could cause back strain related to sitting so near to the television screen.

An RNID survey conducted in 2000[102] asked 550 RNID Cymru supporters and members (90% of whom were at least hard of hearing) whether they used any aids or devices to help them watch television. 53% reported using a hearing aid, 26% reported lip reading, 21% reported increasing the volume, and 19% reported using a television hearing aid.

The AFB household survey[103] explored current experiences of television programmes of people with visual impairment, and the actions they take to access them. The sample was divided by level of visual impairment ('very limited or no usable vision' [n=80]; 'some usable vision' [n=147]; and 'considerable usable vision' [n=190]). The

[99] Rice, M. and Fels, D. (2004) Low vision and the visual interface for interactive television. Euro iTV Conference proceedings. [132]
[100] Stallard, G. (2003) Standardisation Requirements for Access to Digital TV and Interactive Services by Disabled People. Cenelec (European Committee for Electrotechnical Standardization). [119]
[101] Tanton (2004) Results of a survey on television viewing distances. For BBC R&D [127]
[102] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. [115]
[103] AFB Household Survey (n=417) reported in Packer & Kirchner (1997) [72]

most common experience was for people with visual impairment to ask others with them about what is happening on screen (64%, 56% and 55% respectively). Other common actions included:

- sitting closer to the television set (42%; 51%; 44%),
- taping shows in order to re-view particular parts (38%; 48%; 38%)
    - or to re-watch with someone else who could provide more information to the person with visual impairment (31%; 24%; 16%),
- adjusting the picture contrast or hue (21%; 33%; 33%), and
- 'other' actions (16%; 16%; 10%), which included buying a larger television or magnification screen, and using viewing devices (e.g., prescription binoculars).

Packer and Kirchner concluded from these results that the burden on viewers without visual impairment who watch television with a person who has visual impairment can be reduced through the provision of audio description.

Stelmack, Rosenbloom, Brenneman, et al.[104] reported that low vision is associated with decreased functional status, increased emotional distress and other health problems. They report that services that help low vision are associated with increased functional status and improve quality of life, though with variable success. When they asked their sample what low vision devices would help, 74% said they would like devices to help them watch television from a distance.

7.2 Television genre preferences for access service provision

- *Programmes that viewers would like Access Services to accompany vary with impairment and personal preference, although some generalisations have been made through research.*
- *Viewers with hearing impairments who use British Sign Language (BSL) would like to see news, educational programmes and documentaries signed.*
- *Subtitles are already available on a wide variety of programmes, however subtitle users with hearing impairments would like to see more sport and children's programmes subtitled.*
- *Viewers with visual impairment find films, sport and dramas the most difficult to watch. Experimental research suggested that audio description for dramas, particularly mysteries, would be most valued.*

A questionnaire study commissioned by RNID[105] revealed that the top 3 genres of programmes viewed by people with hearing impairment were the news, documentaries and entertainment.

Signing

Dye[106] asked 209 hearing impaired participants about their thoughts on current and future digital television services, their opinions about signing and attitudes towards the use of an avatar instead of a real person signing. An avatar is a computer

[104] Stelmack, J., Rosenbloom, A., Brenneman, C. and Stelmack, T. (2003) Patients' perceptions of the need for low vision devices. Journal of Visual Impairment and Blindness, 97, (9), 521-535. (n=149 low vision patients) [4]
[105] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[106] Dye, M. (2000) Digital TV, On-screen signing and 'Simon the Signer': Perspectives from the Deaf Community. Deaf Studies Trust (for TyneTees TV) [19]

generated visual representation of a human, whose body and face movement can be driven by automated scripts or by a person whose movement is tracked, in real time. When asked what programmes were the most important to be signed, participants rated the news (both regional and national) as the most important, this was followed by educational programmes, documentaries, current affairs and the weather. Sport, soaps and recent films were rated as being the least important types of programmes to be signed.

Subtitling

RNID's questionnaire study[107] asked respondents which programmes they would prefer to see subtitled. News, general entertainment and films were the top three genres cited, with documentaries a close fourth.

RNID[108] reported in their subtitling research that sport and children's programmes are the least subtitled genres of programmes and that this needed to be changed to encourage other people who might also benefit from subtitles (e.g., children learning to read) to use them. News, drama and factual programmes and those scheduled for broadcast around peak time (after 6pm) were the most subtitled.

Results of a 1992 survey[109] revealed that in the context of (at the time) a limited number of programmes being subtitled there was a strong preference for more serious programmes to be subtitled, though profoundly deaf viewers indicated a preference for lighter programmes.

In terms of the least suitable programmes for subtitling, Ofcom[110] research reported that sitcoms, stand-up comedy, films and debates are the most difficult to enjoy with subtitles. Both sitcoms and stand-up comedy can use accents and expressions and timing between actions and words when speaking to make the content amusing, and this can be lost through subtitles. Films are more difficult for deaf viewers to follow, especially at their start, as viewers are 'unfamiliar with the characters, style, pace and feel of the film'. Due to the emphasis on the content in debates rather than the visuals of the programme, hearing impaired viewers find these less enjoyable too.

Hearing Concern[111], in an update on findings from their subtitling monitoring programme (started in 1996), reported having monitored Astra satellite signals to establish which satellite channels provided subtitles on their programmes. Hearing Concern reported that according to their monitoring, only 3 channels were subtitling over 50% of their programmes in 2000: Sky Premier, Disney and UK Gold. The report also stated that many advertisers were subtitling their adverts, which could be seen on most channels, regardless of whether or not the programmes on that channel were subtitled. The researchers concluded from this that the subtitles were perceived as commercially beneficial to advertisers (i.e., by increasing the number of people who were able to understand the commercial).

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[107] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[108] RNID (1999) Subtitling for deaf and hard of hearing people. [65]
[109] (1992) TV Subtitling: but what about the quality? See Hear! November 14-15 ('Switched ON' Survey, ITC/BBC) [38]
[110] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? [21]
[111] (2000) Subtitles by satellite. Hearing Concern, 8 (3), 18-19 [47]

Audio Description

Pettitt, Sharpe and Cooper[112] found that participants with visual impairment reported finding watching films, sport and drama on television most difficult. What made these programmes difficult was subtitles and text on screen, dark/night scenes, fast/action packed scenes, lots of scenery, facial expressions, poor sound quality, background noise and unfamiliar characters. Audio description has been cited as offering the most benefit for films and drama (including soaps and comedies), followed by wildlife programmes and documentaries[113]. News, games shows, quizzes and chat shows were generally considered to have sufficient dialogue without the need for audio description[113].

Sports commentaries were noted by people with visual impairment as unhelpful to their understanding of the scenes in the programme as they are more complementary to the visuals rather than a replacement for them. Pettit, Sharpe and Cooper state that the live nature of sports coverage presents more practical difficulty in providing supplementary audio description[113].

Respondents to the AFB Household Survey[114] and to the AFB DVS(r) Guide Users Survey[115] were asked about their preferences for audio described genres. Most frequently chosen as preferred genres in both studies were:

- Dramas or Mysteries (85%, 83%),
- Nature or Science (67%, 72%), News and Information (61%, 68%), and
- Comedies (59%, 77%)

Interestingly, Children's Programming was also nominated, which the authors took to suggest that parents with visual impairment might feel they would like to better understand the programmes to which their (probably sighted) children are exposed. In terms of preferred genres for audio description for videos, most frequently cited were:

- Dramas and Documentaries (78%, 70% and 69%, 71%),
- Classic Films (69%, 55%),
- Comedies (68%, 72%), and
- Action and Adventure (65%, 73%).

7.3 Reported/Perceived benefits of Access Services to enjoyment and understanding (of programme content)

- *Perceived benefits of Access Services vary with degree and level of impairment and other individual differences.*
- *Limited research into signing shows that signing on television allows BSL users to become aware of regional variations in the language.*
- *Studies involving children with hearing impairment have found that using subtitles can improve their literacy and social inclusion with peers. Potential benefits of subtitles for people without hearing impairment include being able to continue to watch and understand a programme if there is too much background noise, or if accents and words within a programme are unfamiliar.*

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[112] Pettitt, B., Sharpe, K. and Cooper, S. (1996) AUDETEL: Enhancing television for visually impaired people. The British Journal of Visual Impairment, 14, (2), 48-52 [17]
[113] Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. [118]
[114] AFB Household Survey (n=417) reported in Packer & Kirchner (1997) [72]
[115] AFB DVS(r) Guide Users Survey (n=884) reported in Packer & Kirchner (1997) [72]

- *People with visual impairment understand and enjoy audio described programmes better than programmes without them. This can yield social benefits for people with visual impairment, as they feel more comfortable talking about television with others. Research suggests that people without visual impairment (who watch television with people with visual impairment) do not find audio description intrusive. For people without visual impairment, benefits of audio description have also been cited, such as the ability to "listen" to the television whilst doing something else.*

Signing

RNID report than 100,000 people have passed Level 1 BSL course[116], a figure that is due to rise as a result of a large demand for new courses.

To explore the variation within BSL, Woll[117] analysed the signing that appears on 'See Hear' (the BBC's signed, deaf people's programme) and signing by deaf signers from different regions of Britain. Woll reports that new signs are often created to communicate about new technologies or new political and social concepts. These new words may often start off being finger spelled then various signs are created and eventually one dominant sign is used on television, which reinforces it nationally. Interviewees (n=116 people who were at least hard of hearing recruited via deaf organisations and readers of their literature) in this research rejected the idea that signing on television should be standardised to English-like varieties as this would not take account of different preferences for regional variations in signs for some words. Woll's respondents preferred the idea of a standard form of signing that is appropriate for television. Woll referred to the results of a survey conducted in 1980, prior to See Hear being broadcast, and reported that participants had great difficulty understanding signers from geographically distant areas. Woll reported that by 1994 signers rated most regional varieties of sign language as easy to understand. Younger respondents liked learning and using new signs more than did older respondents. Signers from different areas of the country and even those of different ages reported using different signs. Signing on television introduces signers to the possibility of lexical variants in BSL coupled with a greater awareness of BSL itself, and its different forms.

Subtitling

Gregory and Sancho-Aldridge[118] noted in an ITC report that subtitles are of benefit to deaf or hard of hearing children not only for accessing the same information as their hearing peers, but also for the social inclusion (and socialisation) that sharing television viewing experiences brings in our society. On the basis of user tests and interviews, the authors noted that children in the youngest age group (5-7) benefited little from subtitles per se, but that using them could improve their literacy.

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[116] RNID (undated) Factsheet: Sign language on television. [138]
[117] Woll, B. (1994) The influence of television on the deaf community in Britain. In Ahlgern I, Bergman D, Brennan M. Perspectives on sign language useage. Vol. 2, International Sign Linguistics Association, 293-301 [35]
[118] Gregory and Sancho-Aldridge(1998) cited in Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. (pg 57) [118]

Jelinek Lewis and Jackson[119] conducted a study that assessed and compared hearing (n=50) and deaf (n=50) students' comprehension of captions with and without visuals. Deaf students' comprehension was consistently worse than that of hearing students, regardless of whether visuals were presented with the captions. There was also a significant difference in reading grade level between hearing and deaf students. With reading level held constant, deaf students still performed less well in comprehension than did hearing students.

Within the deaf student group, captions presented alongside the video presentation resulted in significantly better comprehension of the captioned script compared to either video presentation or captions presented alone. Deaf students used the visual cues to comprehend the captions, more so than did their hearing peers. Jelinek Lewis and Jackson attributed this as likely due to young deaf people having had fewer years of experience with oral language and less basic knowledge about vocabulary and syntax than young hearing children. Jelinek Lewis and Jackson's results led them to conclude that if subtitles were utilised in classrooms it could help deaf children advance their literacy levels by improving their vocabulary and syntax. In an earlier study by Jelinek Lewis[120], deaf students needed to be confident in their reading skills in order to benefit from reading captions but by using television captions alongside other forms of media, teachers could expand their deaf students' knowledge base and promote reading skills.

Linebarger[121] investigated the potential of using captions to overcome obstacles children face in learning to read. The children were assigned to one of four conditions, captions with verbal narration, captions with no verbal narration, verbal narration with no captions and no verbal narration and no captions. The presence of captions helped the children to recognise and retain more words relative to those who did not see the captions. The study concluded that viewing captions whilst watching television could enable children to practice and improve their reading skills in what they perceived to be a positive context.

Benefits of subtitles have also been reported for television viewers without hearing impairment. From the survey on subtitling conducted by RNID Cymru with S4C viewers,14% of respondents used subtitles because of background noise in their house and 10% because some accents or words used were unfamiliar[122].

Audio Description

Schmeidler and Kirchner[123] reported that legally blind adult participants gained and retained (at follow-up) more information from watching programmes with audio description (n=111). Participants reported that audio description made programmes more enjoyable, interesting and informative, and that they would feel more comfortable talking about the audio described programme with a sighted person.

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[119] Jelinek Lewis, M. and Jackson, D. (2001) Television literacy: comprehension of program content using closed captions for the deaf. Journal of Deaf Studies and Deaf Education, 6, (1), 43-53 [6]

[120]] Jelinek Lewis, M. (web posted 1999) Television Captioning: A vehicle for accessibility and literacy. [145]

[121] Linebarger, D. (2001) Learning to read from television: The effects of using captions and narration. Journal of Educational Psychology, 93, (2), 288-298 (n=76) [75]

[122] RNID & S4C (2001) Research into the demand for Welsh language subtitling in Wales. (n=565 comprising Sgrin magazine readers) [115]

[123] Schmeidler, E. and Kirchner, C. (2001) Adding audio description: Does it make a difference? Journal of Visual Impairment and Blindness, 95, (4), 197-212 [5]

This effect was greater for programmes that were more visual in nature and had less original narration.

In the AFB DVS(r) Guide Users Survey[124], over 90% of people with visual impairment (irrespective of levels of impairment) reported that audio description was 'very' or 'somewhat' important to their enjoyment of television programmes/videos. The study reported three broad categories of benefit: overall experience, learning benefits and social benefits. 92% indicated that audio description enhances their viewing experience overall. The most frequently endorsed benefit of audio description was 'understanding programs better'. Other benefits included 'getting needed information', 'enjoying programs alone' and 'watching programs I might otherwise not have watched'. 77% of respondents reported benefits relating to enhancing the learning experience of television/video (e.g., 'learning more in general', 'learning more about the visual world', 'learning more about body language'). And 76% of respondents noted benefits relating to the social experience of television/video viewing (e.g., 'being able to watch the same programs others watch', 'talking socially about programming', 'having more enjoyment watching with family and friends'.) 68% of respondents endorsed benefits across all three categories. The most frequently cited additional benefit (not already listed) was not having to ask other people questions during television/video viewing.

In a field trial conducted by RNIB as part of the AUDETEL project[125] the views of 100 participants with visual impairment were explored to see what they thought about audio description. Participants were able to watch 4-5 hours of audio described programmes per week for 4 months. 89% of participants found it helped them to follow a programme and only 8% found it distracting. How much participants benefited from description depended on the extent of their visual impairment, with greater benefits reported by respondents with more marked visual impairment. 93% of participants were satisfied with audio description and 54% were interested in it[126]. Despite being positive about their experience with it, their interest in purchasing it was dependent on price and how easy it was to use.

A study conducted by the AFB for the National Science Foundation[127] reported that the more experience participants with visual impairment had of audio description, the more enjoyable and less confusing they found it.

The AFB DVS(r) Guide Users survey[124] explored perceptions of the impact of audio description on sighted television companions of people with visual impairment. 87% reported that audio description 'never' or 'rarely' interfered with the sighted television companions' enjoyment of the programme. 10% reported that it interfered 'often', and 3% indicated that it 'always' interfered.

At the end of the AUDETEL project, the BBC also investigated the general population's views on audio description[128]. 40% of the respondents thought that the extra commentary audio description provides would be useful for some programmes, as in some instances it would make the information provided in the programme

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[124] AFB DVS(r) Guide Users Survey (n=884), reported in Packer & Kirchner (1997) [72]
[125] Pettitt, B., Sharpe, K. and Cooper, S. (1996) AUDETEL: Enhancing television for visually impaired people. The British Journal of Visual Impairment, 14, (2), 48-52 [17]
[126] Pettitt, B., Sharpe, K. and Cooper, S. (1995) AUDETEL WP14.2: AUDETEL audience reaction research final report. EC WP deliverable [18]
[127] AFB study for the National Science Foundation, cited in Packer and Kirchner (1997) [72]
[128] BBC study (method and sample not specified) cited in Petre, L. (2005) Briefing paper: user feedback on audio description and the case for increasing audio description targets. [23]

easier to follow. Specific benefits for sighted people included the ability to follow a programme whilst doing something else and allowing the recording of a described programme to be played back without a television, for instance, to listen to in the car. 58% of respondents said they would be interested in getting audio description (after prompting with specific instances and at no extra cost).

7.4 Satisfaction with current level and quality of Access Services and their availability

- *Perceived satisfaction with Access Services varies with degree and level of impairment and other individual differences.*
- *No research was identified regarding satisfaction with the current provision of signing reported by people with hearing impairment.*
- *Research into satisfaction with subtitles has looked at people's views on the best and worst programmes for subtitling and differences between analogue and digital subtitles. Preferences were mixed, depending largely on personal opinion.*
- *People with visual impairment are generally satisfied with Audio Description. However individual differences in level of visual impairment affect preferences for the extent of audio description.*

General – digital television

Gill and Perera[129], using a group of 10 people with visual impairment, conducted a study of participants' ability to navigate an interactive digital television menu system. Participants were less concerned about *how* they needed to access a particular service (e.g., number of button presses) than they were with clear presentation of on-screen information to guide them in accessing those services.

Signing

No published research was identified in this review with regard to current levels of satisfaction with the availability and quality of signing on television.

Subtitling

In terms of studies investigating satisfaction with the amount and quality of subtitling among users with hearing and visual impairments, research has been conducted in a variety of areas. These include *which* programmes offer the best, and worst, subtitling; and perceived differences between subtitling on 'terrestrial' (/analogue) compared with 'non-terrestrial' (/multi-channel /digital) television. These are addressed in full below.

Which programmes are rated best and worst for subtitles?

Neale and Keyte[130] reported on the results of a survey of readers of the Hearing Concern publication (n= ~500). They report that respondents cited as the programmes with the best subtitling, BBC News, Coronation Street, Countdown,

[129] Gill, J. and Perera, S. (2003) Accessible Universal design for Interactive Television. Euro iTV, Conference proceedings. [9]
[130] Neale, B. and Keyte, B. (undated) Subtitles questionnaire - what you told us. Hearing Concern [16]

Channel 4 News, and The Bill. Programmes cited as having the worst subtitling were BBC News, BBC local news, ITV News, Richard and Judy, ITV local News.

Perceived differences between 'terrestrial' and 'non-terrestrial' subtitling

Ofcom[131] and RNID[132] have reported on users' perceptions of quality differences between (analogue) compared with 'non-terrestrial' (multichannel/digital) television subtitling. The results across the two studies were not entirely consistent.

Ofcom[131] reported that digital subtitles were perceived to be better than those on analogue television. Digital subtitles were perceived as more modern and sharp (white on black colour contrast).

Earlier RNID research[132] asked respondents if they had noticed a difference in quality of multichannel compared to terrestrial television subtitling[133]. A substantial proportion of the sample noted differences between multichannel and terrestrial television subtitles, but did not specify clearly what those differences were.

Audio Description

Research on the quality of audio description services identified in this review has focused on how satisfied users are with the amount of information provided, and how much users with different levels of visual impairment gain from audio description.

In the AFB DVS(r) Guide Users Survey[134], respondents were questioned about the amount of information they get from audio description. The majority (irrespective of level of visual impairment) claimed that the service gave them 'just the right amount' of information. Interestingly, respondents with less visual impairment were more likely to claim that audio description provided 'too little' information. The authors reasoned that people with less visual impairment might notice more detail on the screen for which they would like more description, while people with more marked visual impairment do not.

Peli, Fine and Labinca[135] investigated how much information could be gained from the standard audio of a programme by people with low vision (n=25) compared to people with normal vision (n=24) and people who couldn't see the screen to evaluate the efficacy of audio description (n=29).

Respondents with low vision and with normal vision were presented with the video and standard audio of two programmes with high visual content in genres normally

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[131] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? (n=54 depth interviews with moderately to profoundly deaf people, 2 mini-discussion groups n=5 per group conducted at Derby College for Deaf People) [21]

[132] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]

[133] *It was not clear from this paper how digital terrestrial multichannel TELEVISION ownership was coded. Further the reporting of responses was not entirely mutually exclusive or clear.*

[134] AFB DVS(r) Guide Users Survey, reported in Packer and Kirchner (1997); n=884 recruited from mailing list to a publication that includes information on programmes providing descriptive video services [72]

[135] Peli, E., Fine, E. and Labinca, A. (1996) Evaluating visual information provided by audio description. Journal of Visual Impairment and Blindness, 90, (5), 378-385 [62]

suited to audio description. A third group of volunteers were just presented with the standard audio but no visuals. All three groups were then asked questions based on the content of the audio description that would normally have accompanied the video they had just watched/heard. The questions were designed to determine whether a visual element described by audio description was noticed by respondents. Respondents with normal vision performed best followed by respondents with low vision and sighted respondents who had just heard the audio. The two latter groups both performed above chance levels, leaving the authors to conclude that while audio description can add to a programme, some details that are currently described are redundant as they can be established from the standard audio.

Section 8

Refining access service provision

- *Empirical studies have been conducted focusing on specific elements of digital television (e.g., the use of icons and colour combinations for subtitles, and the possibility of using Smart cards for personalised television viewing preferences).*
- *Other research has been conducted with regards to the specific elements of certain Access Services (e.g. size and font of subtitles, position on screen of signer).*
    - *Research on signing has focused on the creation of virtual signers and users' attitudes towards them. Research regarding the position of a signer during a programme indicates a tendency for viewers to prefer the signer on the right hand side of the screen.*
    - *Research on subtitling is more established and up to date. It has focused on user' attitudes relating to the speed, editing, typeface, style and presentation of subtitles.*
    - *Much of the research on audio description has focused on production issues. Less research was identified that focused on the cost effective reception of audio description, or on individual preferences for audio description.*
- *Because of large variation in the impact of different sensory impairments (dependent on type and level of impairment), customisation of digital television displays and controls has been frequently recommended in the reviewed studies.*
- *New technologies are also in development to enhance Access Services and the general usability of digital television. These include Touch TV and speech responsive EPGs.*

8.1 Digital television general

Research on refining access service provision with particular regard to digital television as a usable medium for disabled groups has focused on a broad range of topics. These include:

- the potential for digital television to improve the provision of Access Services
- general comments from disabled groups relating to user needs and making digital television easier to use
- empirical studies focused on specific elements of digital television (e.g., the use of icons, colour combinations) to establish what works best for, and is preferred by, sensory impaired users.

Because of substantial variation in the types, levels and impact of different sensory impairments, customisation of digital television displays and controls has often been recommended in the studies reviewed here.

General wants and preferences from digital television of sensory impaired groups

Gill and Perera[136] explored what accessibility features people with visual impairment would like digital television to have. Respondents wanted to be able to:

- change text size and colour
- use icons
- navigate using speech input and output
- access audio description
- be allowed more time to review information
- customise their interfaces to decrease the number of functions available

Perera[137] reported that digital television could be made more accessible for people with visual impairment by using Smart cards. These would allow consumers to customize their television by enabling or disabling specific functions to make it easier to navigate around the system. Preferences could be stored and then transferred to another system. In relation to this, Perera evaluated the usability of a generic iTV system by people with visual impairment. Of 10 participants who were recruited to evaluate the system, 8 thought they would like to control their iTV system through stored preferences.

What works best, and offers most, for sensory impaired groups using digital television

Rice and Fels[138] explored navigation icons (size, colour and shape) based on present designs used in broadcast services from Sky and Freeview. These were presented on a 26'' television screen to explore the difficulties that people with visual impairment have with interactive digital television services. Twelve participants were recruited via local disability organisations in the UK. They had a lower mean age (38 years) than is representative for the visually impaired population (the majority of people with visual impairment are over 65 years) limiting the generality of their findings. Eleven of the 12 participants indicated that shape was important to recognition of the icon – simple, functional (meaningful) icons work best. Icons with narrow spaces between the lines of the icon caused users the most difficulty and scaled down less well. In terms of colour, the most legible foreground/background combinations were found to be those with good contrast and included white/black; yellow/blue and yellow/purple. They noted that red in the periphery of the display should be avoided, as it is less easily detected by people with visual impairment. For some respondents, reaction times improved with increases in the size of icons presented, although for others even the largest icon caused difficulty.

8.2 Signing

Research on refining signing services has focused largely on developments in virtual signing, users' attitudes to this approach and their preferences for on-screen signer position.

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[136] Gill, J. and Perera, S. (2003) Accessible Universal design for Interactive Television. Euro iTV, Conference proceedings. (for RNIB; n=400 people with visual impairment; questionnaire) [9]

[137] Perera, S. (2003) Interactive Digital Television Services for People with Low Vision (for RNIB) [13]

[138] Rice, M. and Fels, D. (2004) Low vision and the visual interface for interactive television. Euro iTV Conference proceedings [132]

Virtual signing

The ViSiCAST project[139, 140] investigated the potential for virtual signing on television, to respond to the needs of deaf people for more signed programmes in a pragmatic way given that there are insufficient numbers of skilled sign language interpreters to greatly increase the amount of signed programming. An additional potential benefit of virtual signing is its promise of closed signing (i.e., that a user can switch on and off) in a bandwidth efficient way[141].

Two EC funded projects, first ViSiCAST (Jan 2000-Dec 2002)[139,140], then eSIGN (Essential Sign Language Information on Government Networks: Sept 2002-Sept 2004 – aimed at internet applications)[142] have explored technologies to realise virtual signing, applying it in real-life settings (e.g., post offices, internet information, television) and exploring users' evaluations of the applications.

ViSiCAST developed virtual signers presenting sign language in British, German and Dutch, with captured motion from real signers used for character animation. A notation system called HamNoSys was developed which enabled sign language experts to write the language which was then translated to animate the avatar. Using this method, new signs could be added to the system without having to record a real signer.

eSIGN aimed to provide local government information on the internet in sign language. High quality animations of virtual humans were used as avatars for government internet sites in the UK, Germany and The Netherlands. The RNID conducted the user requirements analysis and user evaluations of the prototypes produced later in the project. Feedback from users was collected using different methods including interviews, focus groups and user tests.

In a paper by Dye[143] 209 hearing impaired participants were asked their opinions about the possibility of using an avatar for signing instead of a real person, specifically 'Simon the signer'. While 'Simon the signer' won an award for technical innovation from the Royal Television Society, there has been mixed reaction (and less than universal user acceptance) to the concept of a virtual signer, from groups representing sensory impaired users and from the users themselves[143,144].

Size of signer

No published research information was identified in this review with regard to the size of a (real or virtual) signer on television.

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[139] ViSiCAST (2000-2002) ViSiCAST project synopsis. EC IST (5th framework) funded project. [113]
[140] Wakefield, M. (2002) ViSiCAST Final Report. EC IST (5th framework) funded project. [135]
[141] RNID (undated) Virtual Signing (Information Sheet). [152]
[142] eSIGN (2004) eSIGN project summary. EC IST (5th framework) funded project [112]
[143] Dye, M. (2000) Digital TV, On-screen signing and "Simon the Signer": Perspectives from the Deaf Community. Deaf Studies Trust (for TyneTees TV) (n=209) [19]
[144] (1999) Simon causes controversy. British Deaf News, 4 [32]

Position of signer

Dye[145] reported that 75% of people with hearing impairment preferred the signer to be placed on the right side of the television screen. Of those 75%, 39% preferred a top right position, and 36% preferred bottom right. The majority (59%) stated they did not like the signer to change position on the screen during the programme, 27% liked the idea of the signer changing position, and 13% did not mind either way.

8.3 Subtitling

Research on specific aspects of subtitling preferences have focused on the presence of subtitles with regard to eye movement patterns around the screen, subtitle speed, editing and scope, typeface and presentation, comparing adults' with children's subtitling needs, general subtitling needs of deaf users, and subtitling for other media forms. These are reviewed below.

Eye movement patterns

Jensema, El Sharkawy, Danturthi et al.[146] compared eye movement patterns of 6 viewers (Institute for Disabilities Research and Training employees) of non-captioned and captioned television. They found that watching captioned television was much more like a reading task and participants spent much more time reading the captions when they were available than attending to the other visual programme information. Individual differences were observed – those for whom English was not their first language spent longer looking at the captions. Those who relied on lip reading in everyday situations spent more time trying to lip-read the characters on-screen if the image allowed.

Speed of subtitling

Ofcom[147] explored participants' enjoyment and comprehension of different types of programmes that used different subtitling speeds. They found that although participants could not differentiate between different speeds, they did not want subtitles to get any faster. Television was seen as a leisure activity and respondents did not want to feel 'worn out' as a result of trying to follow subtitles. Ofcom concluded that subtitles should be no faster than 180 wpm and there should be no more than 3 lines of text on screen.

Jensema[148] investigated the average preferred caption speed. The average preferred speed was 145wpm, which is very close to the average displayed speed of captions on American television (141 wpm). However, most participants were able to adapt to quicker speeds easily and were happy with speeds of up to 170 wpm. There was no significant difference between ability to cope with fast caption speeds and age or sex, but participants who used captions more often or relied on them to watch television were better able to cope with faster speeds.

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[145] Dye, M. (2000) Digital TV, On-screen signing and "Simon the Signer": Perspectives from the Deaf Community. Deaf Studies Trust (for TyneTees TV) (n=209) [19]

[146] Jensema, C., El Sharkawy, S., Danturthi, R.S., Burch, R. and Hsu, D. (2000) Eye movement patterns of captioned television viewers. American Annals of the Deaf, 145, (3), 275-285 [2]

[147] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? (n=54 depth interviews with moderately to profoundly deaf people, 2 mini-discussion groups n=5 per group conducted at Derby College for Deaf People) [21]

[148] Jensema, C. (1998) Viewer reaction to different television captioning speeds. American Annals of the Deaf, 143, (4), 318-324 (n=578 of whom 315 were at least hard of hearing) [43]

Other research has reported variation across age in different preferences of subtitling speed. For instance, RNID[149] reported that younger people reported wanting faster subtitling speeds, and older people preferred them to be slower.

In terms of the time spent viewing captions relative to viewing the on-screen action, Jensema, Danturthi and Burch[150] found that when presented with captions, participants spent an average of 84% of the time looking at them, 14% at the action on screen and 2% off screen. An increase in word speed from the slowest 100wpm to the fastest 180 wpm, resulted in an increase in time spent looking at the captions to 86%. Little effect of age, sex or occupational level was reported on variation in time spent viewing the captions.

RNIB[151] asked participants to rate the speed of subtitles for programmes on a scale of 1-10 (1='poor' and 10='excellent'). Programmes other than news and live programmes were rated 5.94. For news and live programmes the reported rating was 4.43.

Editing of subtitles and scope

Ofcom[152] reported that users of subtitles perceived the editing of subtitles as censorship.

Differences between age groups have been noted with regard to attitudes towards the editing of subtitles. For instance, RNID[149] reported that younger people preferred less editing while older people preferred more editing of subtitling. Further, younger people reported that they wanted more information about background sounds while older people wanted less subtitling for background audio. Older people reported wanting subtitling for trailers and adverts whilst younger people were less eager.

Kirkland[153] asked 207 adult and student participants to watch examples of different captioning feature combinations presented on videodisc. The participants then rated which features they preferred and were assessed to see how much of the content they could comprehend. Adults wanted the captions to be centred and be constructed of sentence fragments, whereas (younger) students wanted the captions to be speaker dependent and be constructed of full sentences.

Fels[154] suggested that with the advances in digital television technologies, efforts should be made to enhance the amount of information conveyed in subtitles. In order

[149] RNID (1999) Subtitling for deaf and hard of hearing people. [65]
[150] Jensema, C., Danturthi, R. S. and Burch, R. (2001) Time spent viewing captions on television programs. American Annals of the Deaf, 145, (5) 464-468 (n=23 deaf people aged 14-61) [1]
[151] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]
[152] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? (conducted between April and July 2003; n=54 depth interviews with moderately to profoundly deaf people, 2 mini-discussion groups n=5 per group conducted at Derby College for Deaf People) [21]
[153] Kirkland, C. E. (1999) Evaluation of captioning features to inform development of digital television captioning capabilities. American Annals of the Deaf, 144, (3), 250-260 [44]
[154] Fels, D. (2002) Issues of closed captioning and interactive television. Conference proceedings [83]

to enable any additional non-verbal information to be conveyed to deaf and hard of hearing viewers, they suggested utilising different shapes, colours and symbols and animation alongside the original subtitles.

Silverman and Fels[155] (in a demonstration of these above recommendations) applied graphic captions in the form of a comic art approach to a spoof opera that contained both speech and music. They used speech bubbles and different text styles to convey different emotions and background sounds, and transitions were conveyed with speech bubbles and icons with descriptions. Eleven deaf and hard of hearing viewers viewed the video and although some had difficulty with the use of comic conventions as they associated these with children's programmes, the majority found that the enhanced captions aided their understanding of the content, something they appreciated.

Typeface of subtitles and presentation

The Tiresias screenfont[156, 157, 158] was carefully evaluated using people with a variety of visual and hearing impairments by RNIB and found to be useful. In its development, design considerations included the character shape, character weight (line thickness), inter-character spacing, compatibility (in terms of maximum type size) with aspect ratio switching, and character shapes that are difficult to distinguish. It has been adopted by the UK Digital Television Group as the standard font for interactive television and subtitling. In March 2000, the set of characters was expanded to cover 40 different languages.

RNIB[159] asked respondents to rate subtitling on different aspects of quality on a scale of 1-10 (1='poor' and 10='excellent'). The typeface used for subtitles was rated 7.10, colour/shading used for subtitles and background was rated 6.40.

Kirkland[160] found that student and adult participants preferred white to yellow letters for subtitling. However, the adult participants wanted the letters displayed on an opaque background compared to the semi or fully transparent background preferred by the students. The students also preferred different fonts. Kirkland found that the different features did not affect comprehension. This was interpreted as encouraging for people working in digital television to investigate ways to make captions clearer and more visually appealing. Based on these findings, Kirkland recommended that digital television manufacturers should look at ways to give individuals choice with regards to what kind of captions they want to see, particularly with regards to the font and background box as these are aspects that would be relatively easy to manipulate and something with which users are familiar from their experiences with computers.

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[155] Silverman, C. and Fels, D. (2002) Emotive captioning in a digital world. Conference proceedings [84]

[156] Gill, J. and Perera, S. (updated 2004) Accessible universal design of interactive digital television. RNIB Tiresias. [90]

[157] RNIB (undated) Visual Impairments. RNIB Tiresias. [91]

[158] Carmichael, A. (1999) Style Guide for the design of interactive television services for elderly viewers. ITC [144]

[159] RNID (2001, NSM Research) Subtitling on Cable, Satellite and Digital Terrestrial Channels. (n=5,074; of whom 93% were at least hard of hearing) [27]

[160] Kirkland, C. E. (1999) Evaluation of captioning features to inform development of digital television captioning capabilities. American Annals of the Deaf, 144, (3), 250-260 (n=207 deaf students and adults) [44]

Research by Neale and Keyte[161] found that 87.5% preferred block subtitles to scrolling ones. Scrolling subtitles were perceived as unnatural, 'jerky' and more difficult to read.

Subtitling needs of adults compared with children

Gregory and Sancho-Aldridge[162] found that children's subtitling needs are different to those of adults. Many deaf adults are not congenitally deaf and so for them accessing subtitles is simply reading a language with which they are familiar. In contrast, deaf children are reading a language that is still being learned, and they may never have heard it spoken. As a result the authors recommended that consideration should be given to providing a simpler level of subtitling that is suitable for children (up to age 11). They suggested a children's version could be accessible via (a new analogue) text service '777' (akin to standard subtitles being available on analogue text page '888').

General subtitling needs of deaf users

Ipsos UK, in research published by Ofcom[163], noted that a hierarchy should be established of the needs of deaf consumers. Basic needs were that more programmes should be subtitled and subtitles should be shown when promised. With regards to quality control, subtitles should match the content of the programme in terms of timing, there should be consistent presentation using good English (e.g., no spelling mistakes) and add-ons (e.g., speaker id) should be considered. Future ideals to be explored with subtitles that were noted in the report included methods for unedited subtitling, and (with the advent of digital services) ability to record subtitles, and keep subtitles on screen when changing channel.

Subtitling for other media forms

DVD

Ofcom[163] noted that many participants in their study about experiences of subtitles felt that modern DVDs set the standard. DVDs were perceived as being 'superior' in terms of both picture and subtitle quality. The cues available in DVD subtitles were also appreciated and seen as beneficial in adding richness and context to scenes.

8.4 Audio description

Research on specific aspects of audio description preferences have focused mainly on how to do audio description (based on results from the AUDETEL project). Much less research has been identified in this review on individual differences in preferences, new technologies to provide this service in a more cost-effective manner, and other media applications of audio description. The reader is also referred back to section 5.2 as research has focused considerably on identifying genres most suited to audio description.

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[161] Neale, B. and Keyte, B. (undated) Subtitles questionnaire - what you told us. Hearing Concern (n=~500 of their readers) [16]
[162] Gregory and Sancho-Aldridge (1998) ITC report cited in Quinn (2003) [118]
[163] Ipsos UK for Ofcom (2005) Subtitling - An issue of speed? (n=54 depth interviews with moderately to profoundly deaf people, 2 mini-discussion groups n=5 per group conducted at Derby College for Deaf People) [21]

How to do audio description

ITC[164] drew up a comprehensive document based largely on the results of trials for the AUDETEL project[165] entitled 'Guidance and Standards for Audio Description'. The reader is referred to the original ITC document for details.

Individual differences

The AUDETEL project[166] found that ability and age affected the level of audio description required by users[167]. They found that elderly people needed longer descriptions to better understand the programme. Trial users wanted customisation in the level of audio description as variations in degree of visual impairment affects the amount of information that can be gained from a programme without help[166].

8.5 Novel Access Services/Technologies in development

A range of research projects have been conducted or are ongoing, which are relevant to this literature review:

- O'Modhrain and Oakley[168] describe the potential utility of adding haptic (touch) feedback to broadcast programmes in their paper on 'Touch TV'. With devices such as haptic remote controls and couch-shakers the aim is to provide a more compelling experience for the viewer. They report that they have found positive results so far with haptic feedback from cartoons and live sport programmes.
- Stallard[169] describes The System for Advanced Multimedia Broadcast and IT Services (SAMBITS). Supported by European research organisations, SAMBITS aims to apply MPEG4 and MPEG 7 technology to the broadcast industry to provide users with hearing and visual impairments full access to assistive services (subtitling, signing and audio description) with the ability to decode this information in a personalised form for the user.
- The award winning VISTA project[170] explored the development and evaluation of a novel speech controlled interface linked to the EPG which provides speech output of the EPG data and responds to speech input data screening requests. Future development of related concepts stands to improve accessibility to digital television.
- The Access to Convergent Media project (run by The National Center for Accessibility to Convergent Media: NCAM)[171] aims to improve usability of

[164] Ofcom Guidance on Standards for Audio Description (based on ITC Guidance and Standards for Audio Description – May 2000). (now available online from Ofcom [154])
[165] Hyks, V. (1993) Audetel. Guidelines on how to do audio description as part of the AUDETEL project [12]
[166] e.g., Pettitt, B., Sharpe, K. and Cooper, S. (1995) AUDETEL WP14.2: AUDETEL audience reaction research final report. EC WP deliverable [18]
[167] Quinn, R. (2003) Accessing television. Broadcasting Commission of Ireland. [118]
[168] O'Modhrain, S. and Oakley, I. (2003) Touch TV: Adding Feeling to Broadcast Media. Euro iTV: Conference proceedings [10]
[169] Stallard, G. (2003) Standardisation Requirements for Access to Digital TV and Interactive Services by Disabled People. Cenelec (European Committee for Electrotechnical Standardization). [119]
[170] Carmichael, A. (2002) Vista Project Deliverable 2.1: Report on Human Factors - Literature Review. (Virtual human interface for a set-top box agent: April 2002-October 2003) [143]
[171] The Access to Convergent Media Project, described in: Stallard, G. (2003) Standardisation Requirements for Access to Digital TV and Interactive Services by Disabled People. Cenelec (European Committee for Electrotechnical Standardization). [119]

EPGs for people with visual impairment or blindness by developing a 'talking EPG', similar to the VISTA project.

- The a-TV project[172,173], led by Bournemouth University and supported by the BBC, RNIB and Philips, intends to develop a commercially available digital set top box that is fully accessible. Based on 'an iterative empirical methodology' and end user research including interviews and a survey (n=100+ users with visual impairment), the a-TV project developed techniques to make accessible to users numerous digital television functions and services. A prototype of the 'a-TV set top box' was demonstrated at Vision 2005 (April) in London. The box provides access to audio description, which, if desired, can be displayed as 'closed' (via headphones) to the user if companion viewers wish to view the programme without audio description. Other features include all digital terrestrial (free to view) channels, an 'accessible' 7 day EPG, an audio visual interaction interface, and the facility to customize the presentation of text based information.

[172] Vasilko, M. (2005) a-TV: a new inclusive digital television technology. Vision 2005 Conference abstracts. RNIB conference: Vision 2005. [95]
[173] RNIB (2004) a-TV: the first inclusive digital TV technology - Techshare presentation. [106]

Section 9

Conclusions

Our review of relevant published research has revealed that:

Television Access Services are appreciated by, and have benefits for, their users
There is a large volume of literature describing the appreciation of Access Services by different user groups. Less literature relating to signing was identified in this review. The review revealed individual variation within user groups with regard to their preferences.

Technical and pragmatic considerations affect extent of access service use
The needs and satisfaction of consumers without visual or hearing impairments are important considerations in relation to the provision of Access Services for consumers with visual and hearing impairments. There is the potential for the development of custom products and services that would allow consumers to switch sign language and audio description on and off as per their requirements, as they are able to with subtitles.

There is a paucity of data on number of potential users of Access Services/ market sizing
The establishment of the potential market for television Access Services may serve as the basis for a commercial drive for the development of products that allow consumers to make use of the Access Services. A lack of current market size data has been identified in this review.

We conclude that a market sizing exercise is needed. This will allow a cost-benefit evaluation of the targets specified in Ofcom's Code on Television Access Services, and may provide a commercial incentive for the development of technological means of accessing the services.

Section 10

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