
Monograph:
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Users' Perceptions of Communication Aid Design

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Users' Perceptions of Communication Aid Design

"Augmentative and Alternative Communication (AAC) are the words used to describe extra ways of helping people who find it hard to communicate by speech or writing. AAC helps them to communicate more easily."

Many people use Voice Output Communication Aids to help them to communicate – these are devices that 'provide a voice' for the user. Communication aids are a key tool in the AAC field but little previous research has looked at what users think about the use of communication aids.

This project investigated what users require from these devices and how the devices can be improved. A large amount of qualitative and quantitative data was collected from interviews of users and from questionnaires to users and professionals. The results were compiled into three domains of device usage: device design; the wider picture; and the personal context of using a device.

The project provides a design specification for future device designs and also looks at the decision making process of choosing a communication aid. The results of the project highlight questions about whether the design of communication aids is sufficient to be truly effective; whether AAC services are effective in supporting users; and whether professionals are able to assess users' needs effectively when choosing devices.

D4D AAC Project – Project Report

NHS Sheffield

D4D

Barnsley Hospital NHS
NHS Foundation Trust

Contents

Background

Communication is recognised as a fundamental right[1]. Augmentative and Alternative Communication techniques (e.g. the use of signing, picture boards, alphabet charts, communication books and Voice Output Communication Aids) can enable people to communicate who would be unable to do so otherwise. Voice Output Communication Aids (VOCAs) are particularly useful for those with more severe disabilities that affect their communication.

In the past 10 to 15 years, rapid developments in technology have resulted in a tremendous expansion in the range and number of VOCAs available commercially, even though the number of specialist VOCA manufacturers and suppliers remains small. Despite the increase in device availability and choice, factors influencing the successful use of these devices are relatively under researched.

A number of surveys in recent years, led in particular by SCOPE[2] have considered issues of VOCA supply and provision, for example: Bush et al. (2007), Bercow (2008) and Leese et al. (1993). These surveys have highlighted inequalities in funding, training and support for users (or potential users) of communication aids which lead to disillusionment and disempowerment. Furthermore, the surveys identify that issues of device design and performance and the lack of consideration of users' opinions when selecting devices add to the likelihood of abandonment of the device by the user. For example Dawe (2006) argues that simplicity of design is key to reducing abandonment in (electronic) assistive technology including VOCAs. The problem of abandonment of assistive technology is well recognised (Phillips & Zhao, 1993) and AAC is not exempt from this.

Other authors have highlighted the complexity and poor usability of some communication aids, for example: Murphy (2004) and Salminen et al. (2004). However, there seems to be little research on the real user requirements for AAC devices. Light & Drager (2002) provided a literature review around the design requirements for AAC systems for young children, but this was theoretical and not related to user findings. O'Keefe et al (2007) ran focus groups with AAC users and facilitators and identified 6 themes where further research was agreed as being important, 2 of these related to the development of VOCAS: improve the performance of existing VOCAs; and, improve the design of new VOCAs and low-tech aids.

Inclusive Design and User-Centred Design (UCD) are now well established design principles. Newell & Gregor (2000) discussed how user-centred design can relate to development of assistive technologies; Waller et al. (2005) described the advantages of the application of UCD to VOCAs, drawing on the evidence of feedback from workshops with AAC users and practitioners. Yet, there does not appear to have been significant application of UCD and user-involvement to the design of VOCAs.

Decision making around AAC is relatively under researched. However, there are some existing tools that aid practitioners and users in the choice of AAC strategies. The AAC decision making process can be represented as in Figure 1.

[1] UN Convention on the Rights of Persons with Disabilities, 2007: www.un.org/disabilities/convention/conventionfull.shtml
[2] Scope is a charity that supports disabled people and their families: www.scope.org.uk/

Background

In the pre-consideration phase general needs are assessed – these assessments are generally completed by speech and language therapists, medical consultants and other allied health professionals. The potential AAC users may also have their own opinion and assessments of their abilities in these areas. At the pre-consideration phase the medical professionals and/or client may not have identified AAC as a potential tool.

If AAC is identified as a possible tool then the potential user moves on to the consideration phase. Within this phase a number of important aspects are considered – the communication networks and environments of a potential user need to be considered to ensure that AAC can be supported and effective in these situations. The current communication methods of the potential user also need to be considered in order to identify the situations in which AAC would augment or act as an alternative to current methods. The third consideration is to look at the communicative breakdowns and frustrations of the potential user.

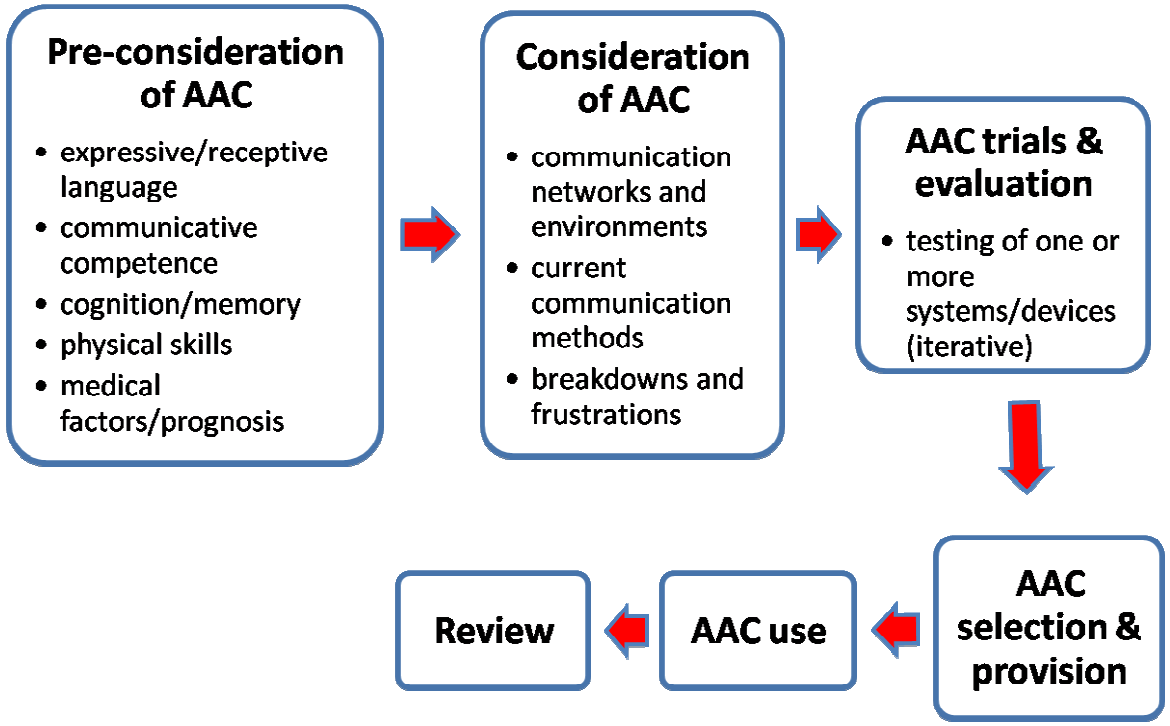


Figure 1: AAC/Aided Communication decision-making process

If AAC is still considered potentially appropriate after the pre-consideration and consideration phases then the potential user can move on to a period of trials and evaluation of equipment. This phase can involve testing one or more devices. This phase can be iterative – in that a device can be repeatedly trialled and 'tweaked' (or changed to another device) to meet the emerging needs of the potential user.

At the end of this period of testing and evaluation it is likely that the potential user and team will have a strong indication as to whether AAC will be appropriate for the potential user. If this is still not clear some of the previous phases may need to be revisited – e.g. further assessments of receptive language or examination of the person's communication networks.

Background

Tools are used by healthcare and AAC professionals to aid with this process of AAC decision making described above. The use of these clinical tools allows systematic and rigorous consideration of the issues relating to the provision of AAC. Mapping existing tools onto this process of decision making highlights potential gaps, shown in Figure 2.

Standard texts on AAC, for example Glennen & DeCoste (1996), currently detail a range of assessment tools and techniques around the 'pre-consideration' phase – i.e. looking at cognitive, academic, perceptual, linguistic and motor areas. Other, specific, pre-consideration tools also exist, for example the 'Triple C' checklist of communicative competence looks at communication skills for people with severe learning difficulties (Iacono, et al. 2005).

The 'Predictive Assessment Model' (including 'AAC Needs Assessment' and 'AAC Activity Analysis') as described in Glennen & DeCoste (1996) covers a number of aspects of the pre-consideration, consideration and trials stages but does not look at a user's perceptions of, or requirements from, a device.

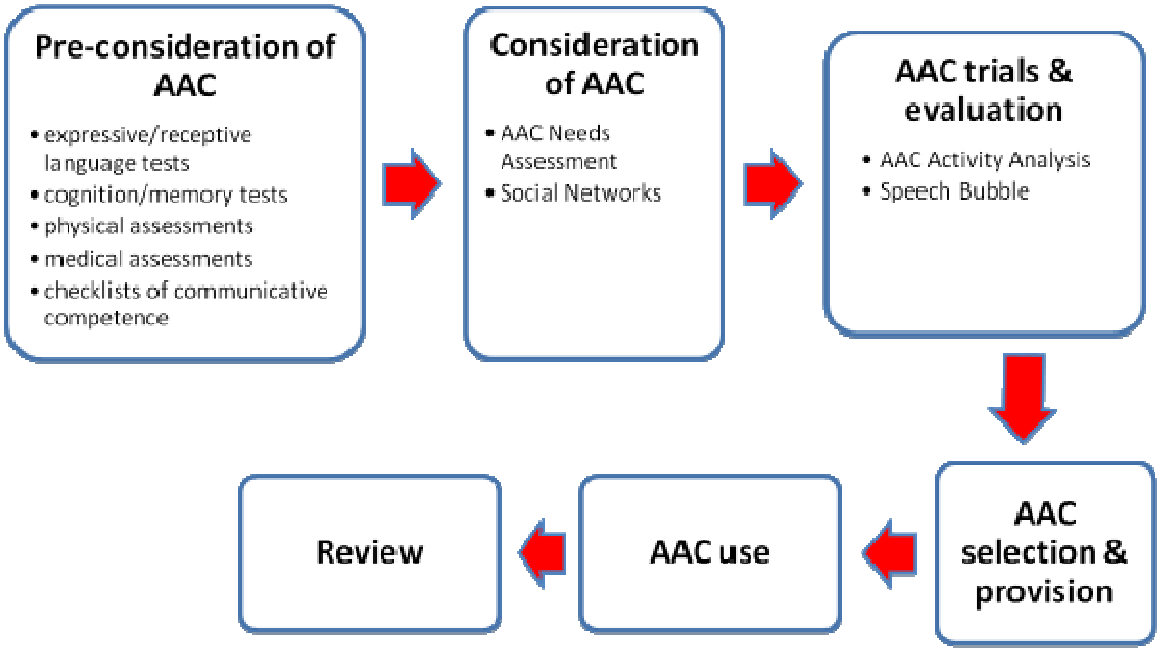


Figure 2: Tools currently used/available in the AAC decision-making process

Background

This process can also be examined from the perspective of models of assistive technology use. A number of models of assistive technology use exist including the Human Activity Assistive Technology (HAAT) model (Cook & Polgar, 2007), Human Environment/Technology Interface (HETI) model (Smith, 1991), and the Matching Person and Technology (MPT) model (Scherer & Craddock, 2002). These are composed of similar domains that could be generalised as: Individual, Technology and Context.

Mapping the tools onto the domains of existing assistive technology models also identifies some deficits as shown in Table 1.

Models			Tool Coverage
HAAT	***HETI***	***MPT***	
Human	Human	Individual	MPT; Social Networks
Activity	AT Control	Technology	Speech Bubble; AAC Needs & Activity
Context		Context	MPT; Social Networks

Table 1: Comparison of tools in relation to standard models of assistive technology

The MPT tool and Social Networks (Blackstone & Berg, 2004) tool both consider the ‘‘individual’ and ‘context’ domains whilst the proposed ‘speech bubble’ project in the UK[3] will act as a resource to describe and look up features of aided communication devices, thus fitting into the ‘technology’ domain.

Looking at Table 1 and Figure 2 there appears to be a deficit in tools that allow a user to closely consider the specific features of VOCAs within the context of themselves and their environment (i.e. to bring the three domains together). Currently the choice of VOCA is a part of the communication aid provision process that, although being key to success, is often left to the intuitive, or subjective, opinion of the AAC professional.

Involvement of the (potential) AAC user is increasingly recognised as key in the successful process of provision, however this is not necessarily recognised in existing tools – which are, in the majority, designed to be carried out by clinicians with the concept of ‘prescription’ still being prevalent.

3 Speech Bubble: http://www.speechbubble.org.uk/

Overview

Project Objectives

The main research objectives of this project were to investigate (i) what users of Voice Output Communication Aids (VOCAs) want from their devices, and (ii) to establish which factors contribute to the perceived success and dignity of use of these devices. In addition, it was hoped the study would establish some evidence around: supporting the development of a best practice guide for VOCA provision; establishing areas of need for future research and to support development of theory, practice and service provision.

The project was split into two stages - the first stage of the project involved interviewing communication aid users in South Yorkshire (n=18). The responses from the interviewees were then used as a basis for the second stage – a national questionnaire to professionals (n=68) and users (n=37).

Method

Stage One – Interviews within South Yorkshire

The goal of the interviews was to investigate the users' and carers' experiences, and their perceptions of their use of voice output communication aids. The interview resources were designed to help participants to explore the issues around the design and use of voice output communication aids.

The structure of the interviews was configured around the use of a topic guide. The guide was developed following a review of existing frameworks for Assistive Technology, including the MPT and HAAT models, a study looking at AT usability (Arthanat et al. 2007) and on preliminary work by one of the authors (Townend, 2007) .

In addition to the topic guide a pre-interview guide and interview prompt sheets were produced in both text and symbolised formats. These resources were designed to facilitate discussion of the topics with participants who would, by the nature of their inclusion in the project, have speech, language or communication difficulties. An example prompt sheet is shown in Figure 3.

The prompt sheets were split across a number of domains of design, encompassing the areas of 'context', 'individual', 'activity' and 'technology' highlighted in existing assistive technology frameworks. The prompt sheet headings were: about myself; communication environments and situations; reasons for communicating; topics; physical environment; ease of use; build quality; speech; access and control; performance; language system; options; cost, security and safety; training and support; and ideas for the future. In addition there was a prompt sheet of words describing levels of 'importance' and also one of more general 'descriptive words'.

Overview

Participant inclusion criteria were designed to select participants who were able to engage actively in the interview process and express opinions about use of their communication aid.

Participants for interview were recruited through local AAC specialists in South Yorkshire and neighbouring areas. The AAC specialists were sent the project information and asked to identify and contact VOCA users meeting the inclusion criteria. Potential interviewees were then followed up, and interviewed by, members of the research team.

This opportunity sample of participants was defined as:

- current users of medium or high tech VOCAs;
- with the ability to produce more than 20 utterances; and, ideally, the ability to produce novel utterances;
- secondary school age and above.

Advocates and carers were also indirectly involved in the interviews in assisting the participants to express their views and contributing to some of the areas of conversation relevant to them.

Figure 3: Examples of symbolised interview prompt sheets (WLS symbols reproduced with permission)

Overview

Stage Two – National Questionnaires

The second stage of the study, the national questionnaire, was developed around the same framework but influenced by the results of the interview stage. The questionnaire was offered in a number of formats to promote as wide an uptake as possible: paper (text, large text, symbolised) and electronic (online, downloadable). The online version was created using LimeSurvey[4] – an open source survey package – and was available from: http://www.devicesfordignity.org.uk/aac/ . Paper copies of questionnaires of any format could be requested and these were posted with a self-addressed envelope to encourage return. The questionnaire was available for a four month period in 2009. An example of a page within the questionnaire is shown in Figure 4.

The questionnaire was aimed at voice output communication aid users and professionals (defined as professionals who provide or assess for provision of voice output communication aids).

The potential population of voice output communication aid (VOCA) users is relatively small. Therefore as wide a range of methods as possible were used to advertise and distribute the questionnaire, and to encourage responses. The questionnaire was advertised through UK AAC networks – for example, through the Communication Matters organisation and conference, the Royal College of Speech and Language Therapists' journal, the Speech and Language Therapy in Practice journal and website, and through support organisations and charities whose membership included potential participants (e.g. SCOPE, MNDA etc)

Section One: About Your Ideal Communication Aid

How A Device Is Made: What physical characteristics would be important for your ideal device?

It would ...	Definitely	Maybe	Not at all	Order of priority for me (1=highest)	My device is like this at the moment (✓=yes)
be **comfortable** to use	☐	☐	☐		☐
be the right size for me	☐	☐	☐		☐
be easy to **carry** around (by hand or on my wheelchair)	☐	☐	☐		☐
be useable in all weathers and conditions (**durable** or rugged)	☐	☐	☐		☐
Is anything else important to do with how a device is made? Please write it here:					

Figure 4: Example of questionnaire pages (text version)

[4] LimeSurvey survey software: http://www.limesurvey.org/

Overview

Interview Participants

Interviews were conducted with 18 communication aid users. Participants had a variety of conditions, with the majority having congenital conditions, the most common of which was cerebral palsy. Since this was an opportunity sample, the participants had not been selected to balance conditions or age. However, the resulting sample included a range of conditions and ages and may well be relatively representative of the population of AAC users as a whole.

ID	Current VOCA	Age	Acquired/ Congenital Condition
1	Liberator 14	Secondary School	Congenital
2	Pathfinder	Secondary School	Congenital
3	Communication Board. & Tablet PC	Young Adult	Congenital
4	Liberator 14	Secondary School	Congenital
5	Lightwriter	Adult	Acquired
6	DV4	Young Adult	Congenital
7	Lightwriter	Adult	Acquired
8	Pathfinder	Secondary School	Congenital
9	Lightwriter	Adult	Acquired
10	Powerbox 3	Young Adult	Congenital
11	Vantage	Secondary School	Congenital
12	Say-It-Sam	Young Adult	Congenital
13	Lightwriter	Adult	Acquired
14	Vantage	Adult	Congenital
15	Pathfinder	Young Adult	Congenital
16	Pathfinder	Secondary School	Congenital
17	Lightwriter	Adult	Congenital
18	Lightwriter	Adult	Acquired

Table 2: Interview Participant Summary

Questionnaire Respondents

164 paper questionnaires were sent out and the online questionnaire was marketed widely online. 33 professionals filled out the paper version of the questionnaire, and 35 filled out the questionnaire online (total **n=68**). 28 communication aid users filled out the paper questionnaire while 15 users filled out the online version (total **n=43**). The overall return rate is impossible to calculate because of the nature of the marketing of the survey. However, the return rate of the paper copies was 37%. 48% of returns from professionals were paper based and 65% of returns from users were paper based [*data: Appendix 1*].

User Respondents:

All but one of the respondents who used aided communication currently used, or had previously used, a voice output communication aid; the majority of respondents were communication aid users although 8 supported someone who used a communication aid [*data: Appendix 2*].

As illustrated in Figure 5, 24 respondents currently used a high tech communication aid, with 'low tech systems' being the next most popular (13) followed by 'mid tech' (9). High tech communication aids showed the biggest change in use from past to current with 4 respondents reporting that they used to use high tech communication aids rising to 24 respondents currently using them. It is interesting to note that most respondents (30) reported that they did not currently use any low tech system. This result, however, may be because respondents tended to only select one answer when the question was intended to allow participants to select more than one (for example 'high tech communication aid' and 'low tech system') [*data: Appendix 3*] .

The majority of respondents reported that they lived with family (75%), with 11% living alone, 8% in supported accommodation, and 6% in residential care homes [*data: Appendix 4*] .

Overview

The age of respondents that used AAC is shown in Figure 5. Most users were between the ages of 12 and 18, no respondents were over the age of 66. The majority of the respondents had Cerebral Palsy (62%), with Learning Disability and Progressive Acquired Conditions being the next most reported (9%). This epidemiology is reflected in the respondents in the interview stage.

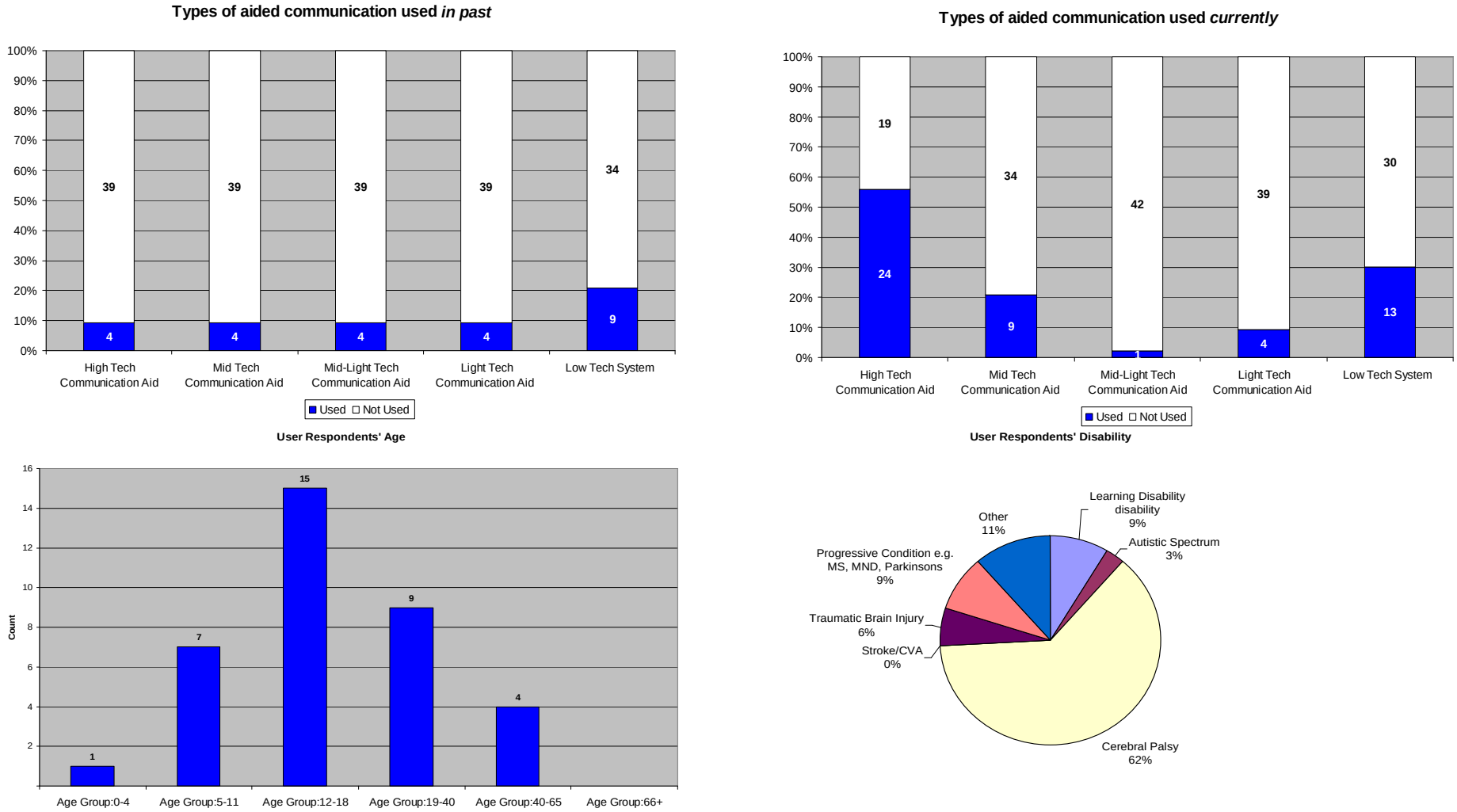


Figure 5: Use of communication aid by participants in past and currently (top). Age and Disability of respondents to 'users' questionnaire (bottom)

Overview

Professional Respondents

The majority of respondents were Speech and Language Therapist (46%|26, 69%|39 including specialist therapists), all other professions were significantly less well represented with Speech and Language Therapy Assistants (4%|2), Specialist Teachers (4%|2) and Technician (4%|2) being the other professions represented by more than one respondent [*data: Appendix 5*].

There was large variation within the reported caseload sizes. The mean aided communication caseload size was 70 with a standard deviation of 276 and an outlier of 2000. The mean value for the reported voice output communication aid user caseload was 43, again with a large standard deviation. This implies that approximately 60% of these professionals' caseloads used voice output devices as opposed to other forms of aided communication. The mean length of working with voice output communication aids for professionals was 10 years (standard deviation 7 years) indicating that this is a relatively specialist area [*data: Appendix 6*]. A large standard deviation was again evident in the reporting of the number of clients using different types of communication aids, with 'large high tech' communication aids being provided to most clients (mean=38 std.dev=157) followed by 'low tech' communication aids (mean=29, std.dev=39) [*data: Appendix 7]*.

More professionals worked with clients within the age range of 12 to 18 than any other (matching the user respondents' profile) and, in general, respondents worked more with children (under 18) than adults.

People with Cerebral Palsy were most commonly reported as being on the professionals' caseloads (52), with Learning Disabilities (51) and Autistic Spectrum (43) also common [*data: Appendix 8*]. Professionals most often reported seeing clients in educational settings (40) reflecting the paediatric caseload bias and then also in the home environment (39) [*data: Appendix 9*].

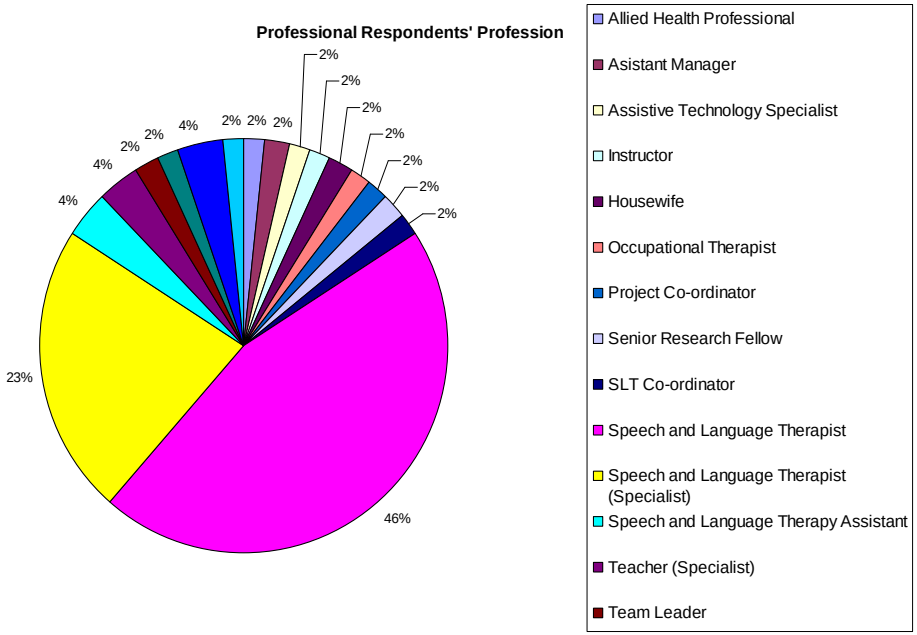
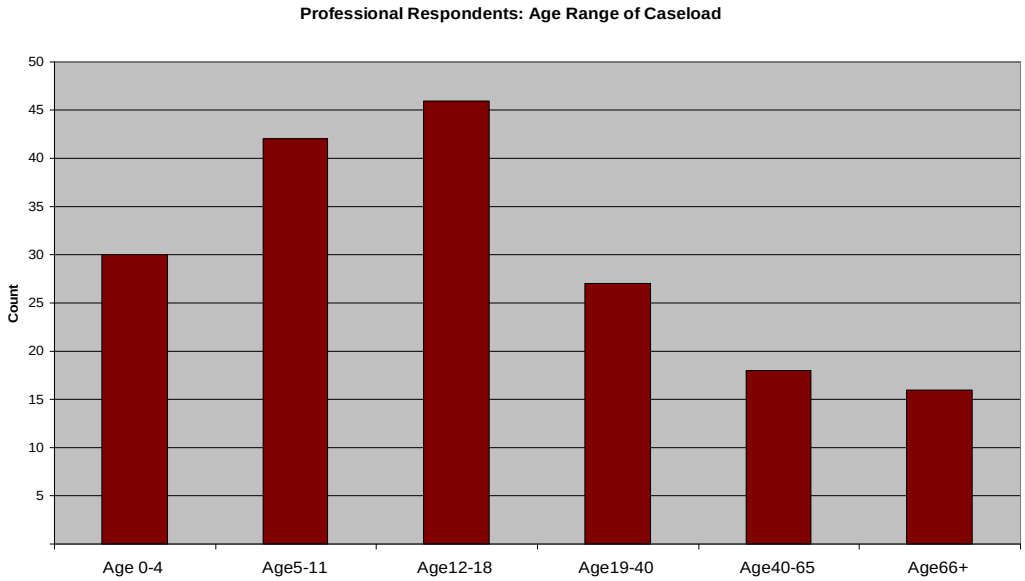
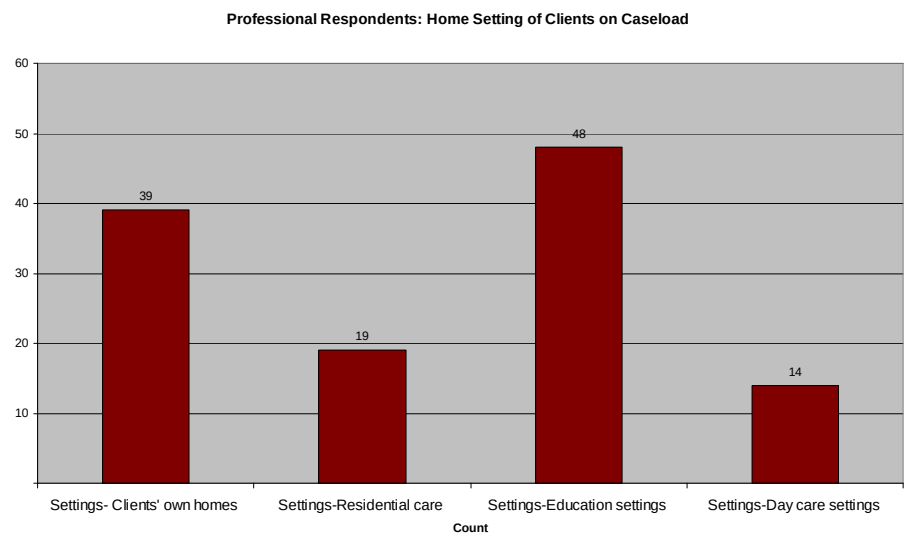


Figure 6: Profession of respondents filling in the 'professionals' questionnaire



Overview



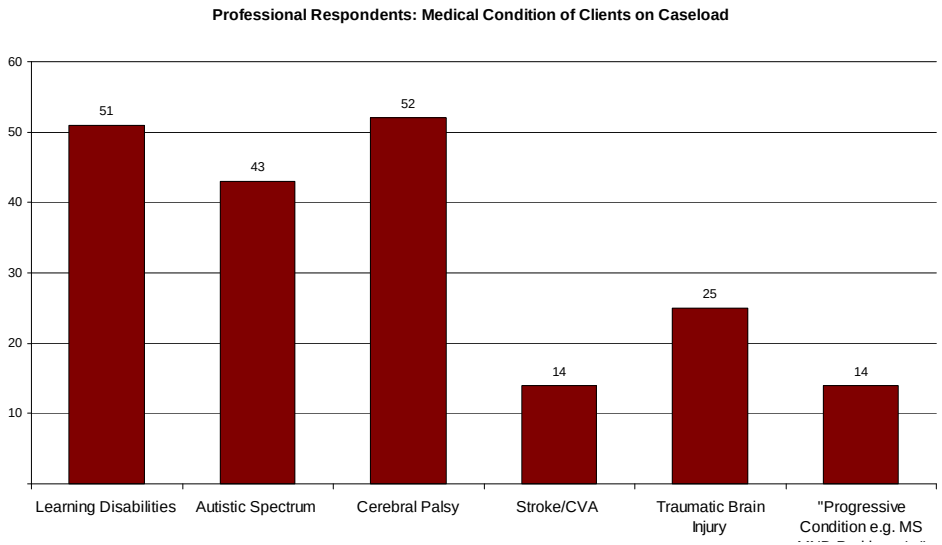


Figure 7: Professional Respondents' Characteristics

Analysis

Qualitative analysis was carried out on the interview data – this analysis was based on framework analysis and resulted in a framework of themes around the use of VOCAs. Analysis was carried out by both researchers in order to ensure a rigorous analysis: the initial framework was jointly constructed through analysis of a sample of interview scripts; the rest of the data was subsequently coded by both researchers; finally the framework was confirmed through discussion of each sub-theme and by joint close inspection of the coded data.

The questionnaire data was collected from the paper-copy returns and the online software and collated into a statistics package (SPSS). Descriptive statistics were extracted for each section of the survey. Chi-Square tests were performed on the 'importance' and 'availability' responses to assess the significance of any associations within responses from each section.

Results

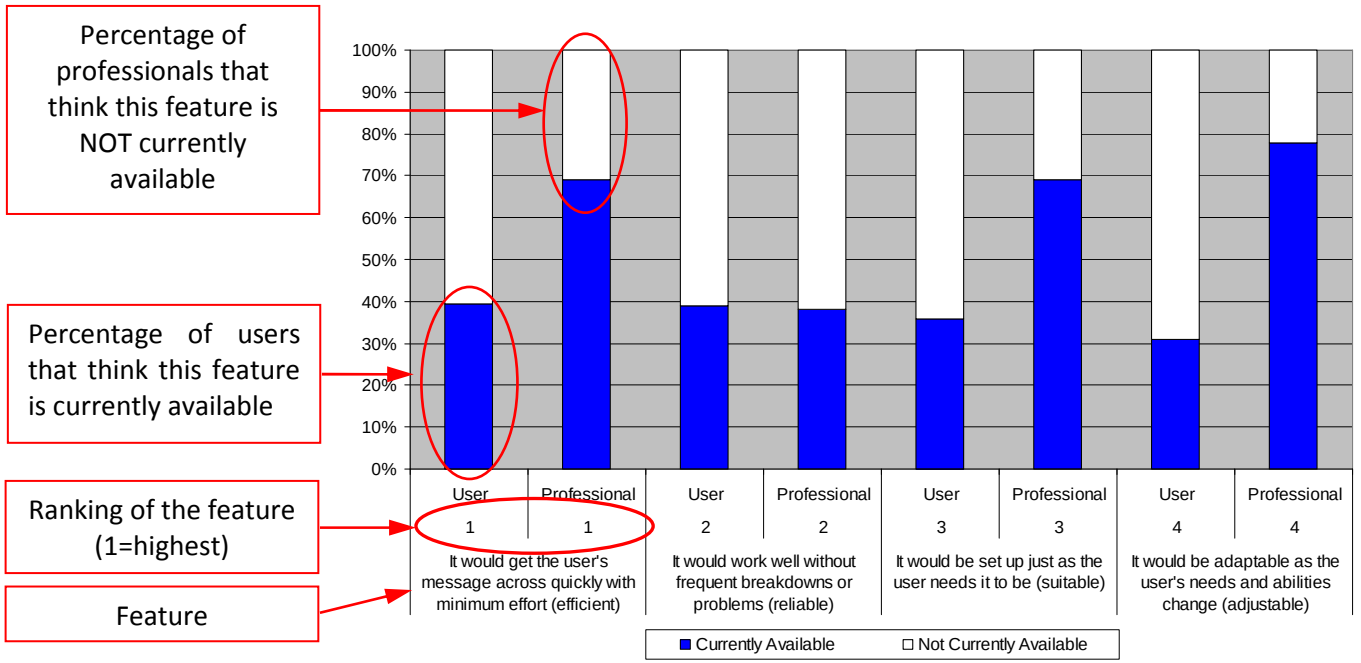
Analysis of the **interview data** from participants provided the framework described below which is illustrated with representative quotes. The framework produced consists of three main themes, each having between five and eleven sub-themes, and in some cases the sub-themes were then further divided. The three main themes were identified as:

- impact of device design on user,
- influence of environment on aided communication, and
- context of aided communication use.

Quotes are given to exemplify and give context to the analysis. Quotes have the following key: I=Interviewer, M=Male Participant (spoken voice), F=Female Participant (spoken voice), CA=Male or Female Participant using Communication Aid, CP=Communication Partner.

Within the **questionnaire** results, the responses for 'Not at all Important' and 'Maybe Important' have been pooled since these cases often had 0 values without pooling. When questionnaire data is presented a graph is used to summarise the ranking and the 'availability' sections of the questionnaire.

The questionnaire contained a **ranking** question for each section. In addition it is possible to rank the responses according to the percentage of respondents who rated a feature as 'very important'. Throughout the data this measure has been compared against the ranking measure in order to allow consideration of this as a primary ranking measure for future questionnaires and also to allow discrepancies or ambiguities to be highlighted.



The results from the questionnaire and interviews were collated into a framework about device design that is represented below and described on the following pages. The framework represents the interaction of three domains on users' perceptions of communication aid design.

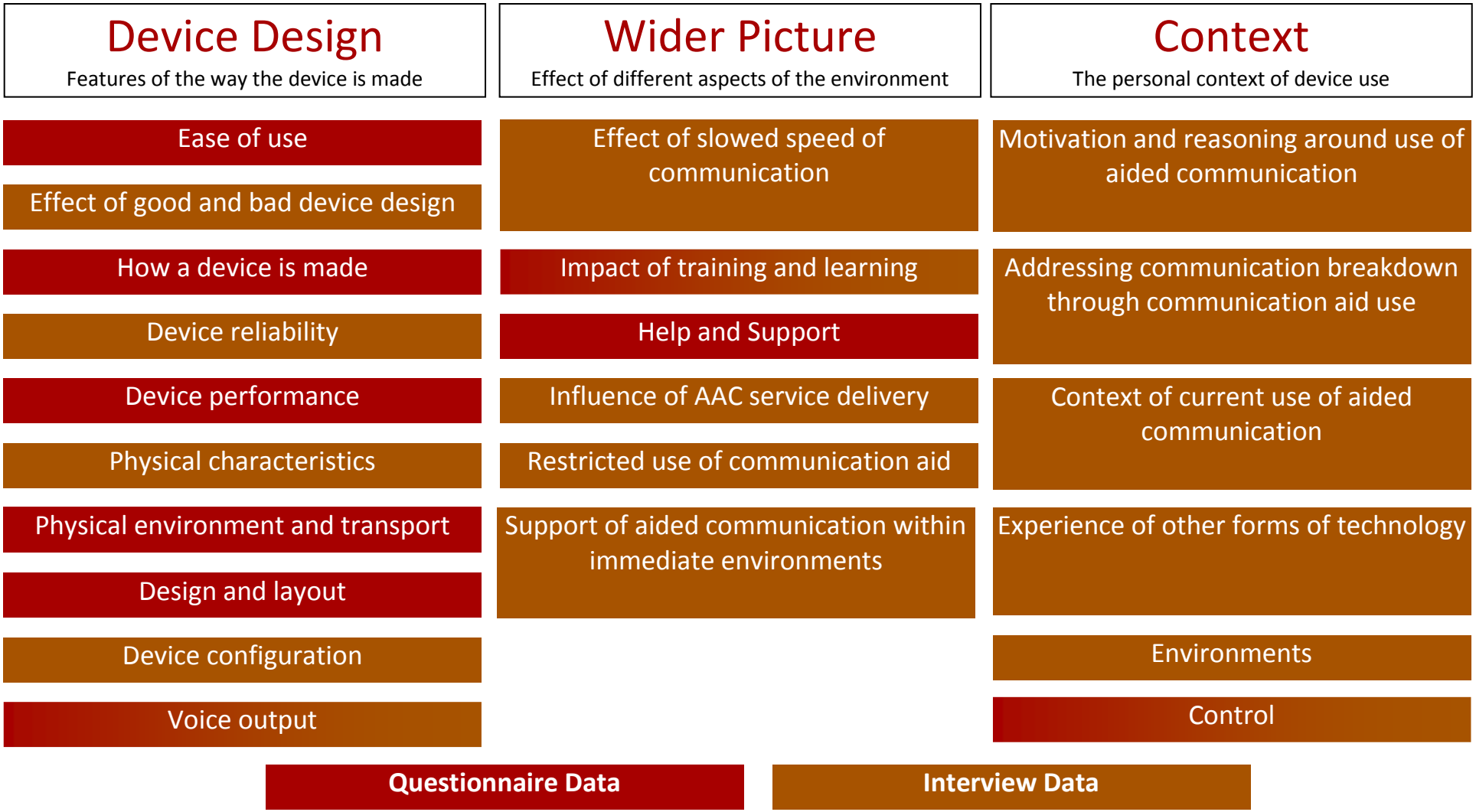


Figure 8: The three domains of communication aid use

Device Design

Issues of device design were clearly identified by participants in these studies and, in general, features of device design were felt to be very important in terms of providing an efficient and reliable device. Users and professionals were able to identify aspects of design that they perceived as good and bad, and simplicity was cited as key to ease of use.

Current devices are not considered reliable or durable by professionals and users, with the implication that these basic design requirements impact significantly on the successful use of a device. Reliability and portability were both features that emerged strongly as important in the consideration of device design. Aspects of device performance, for example being ready to use quickly or having a battery that lasts a long time, appeared to be areas where users and professionals both felt that devices were currently lacking. A wide range of very specific 'niggles' emerged from the interview data – with specific problems emerging around a number of interlinked features such as use outdoors, transportation, weight, size, and mounting.

Being able to access vocabulary quickly and easily was important to users and professionals, as was being able to personalise or programme devices simply themselves. However, the ability of communication aids to integrate additional functions was not highly rated. Users felt that there were limitations to current voices on communication aids.

Device Design

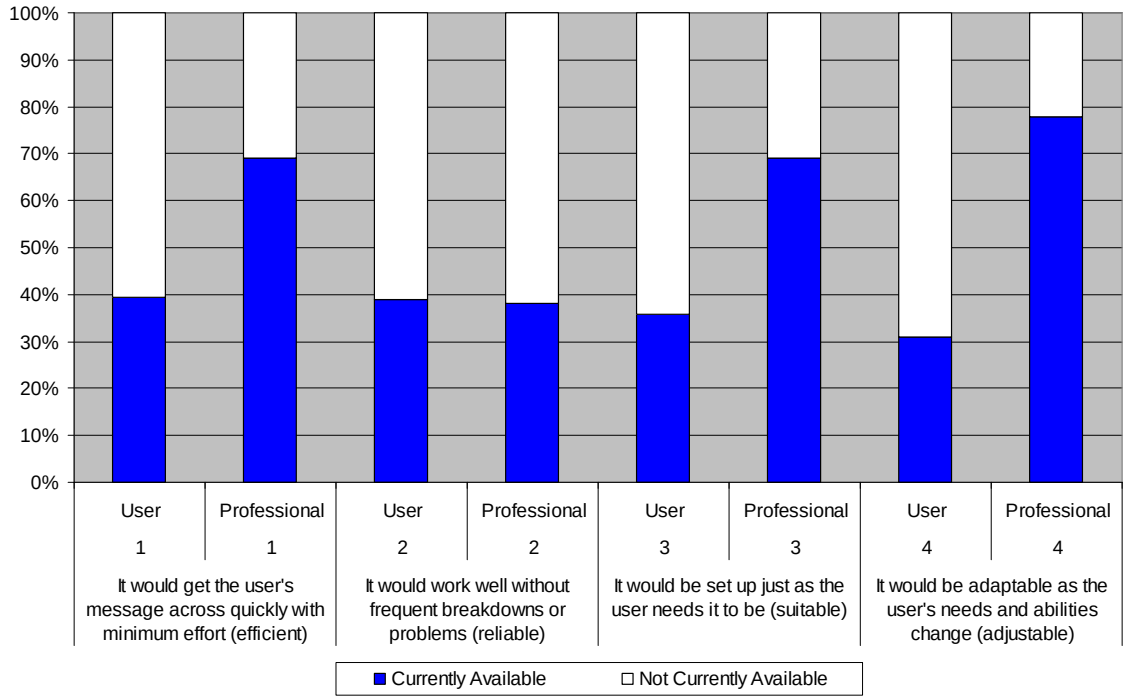
Ease of use

The majority of users and professionals rated all aspects of 'ease of use' as being 'very important' *[data: Appendix 10].*

Users were more likely to rate all features of 'ease of use' as not currently being available while most professionals rated all features as currently available except for 'reliable' (this was a statistically significant association). *In total, 'not currently' was chosen 63.7% of the time by users, and 'currently available' was chosen 63.6% of the time by professionals [data: Appendix 11].*

Both users and professionals ranked the order of importance of the features *[data: Appendix 12]* as:
'efficient' > 'reliable' > 'suitable' > 'adjustable'

The percentage of respondents ranking features as 'very important' correlated well with the ranking scores for this section.



Most professionals and users feel that all features of ease of use are important and that **efficiency and reliability** are the most important features. Both groups are more likely to feel that current devices are **not reliable**.

Device Design

Effect of good and bad device design

A number of participants had positive perceptions of their device in terms of its design and ease of use and referred to them as being straightforward, simple, reliable, easy to locate vocabulary and stored messages, successful in getting their message across, easy to charge up and easy to programme. Those features which relate more specifically to the physical characteristics will be exemplified later [Physical characteristics section].

9	*CA*	*[silence] It seems simple is better.*

Poor design was also evident in the comments from participants. A number of participants discussed negative aspects of design relating to features such as: slowness of speed, non-standard keyboard design, high memory load associated with larger and more complex vocabularies or complex functions on the device, amount of information on the screen (for some too little, for others too much), and dependence on others to turn the device on/off or to charge it up.

Speed of communication using communication aids was also strongly referenced in addition to other perceived features of device design that did not support naturalistic conversation. Over complexity and lack of consideration of users' needs also seemed to support negative perceptions about the design.

18	*I*	*How easy do you feel the DEVICE is to use?*
	CA	*If you're just typing like this it's very easy but it has other functions and I haven't a clue about those.*

There was a strong association between a device being **easy to use** and being well designed and practicable – ease of use was also linked closely with simplicity, or a device being 'simple'. There was also a clear association between participants' perceptions of poor design and the **cognitive load** that they felt the machine placed on them to use it both in operation and configuration/setup.

Device Design

How a device is made

The majority of users and professionals rated all features of 'how a device is made' as being 'very important' *[data: Appendix 13].*

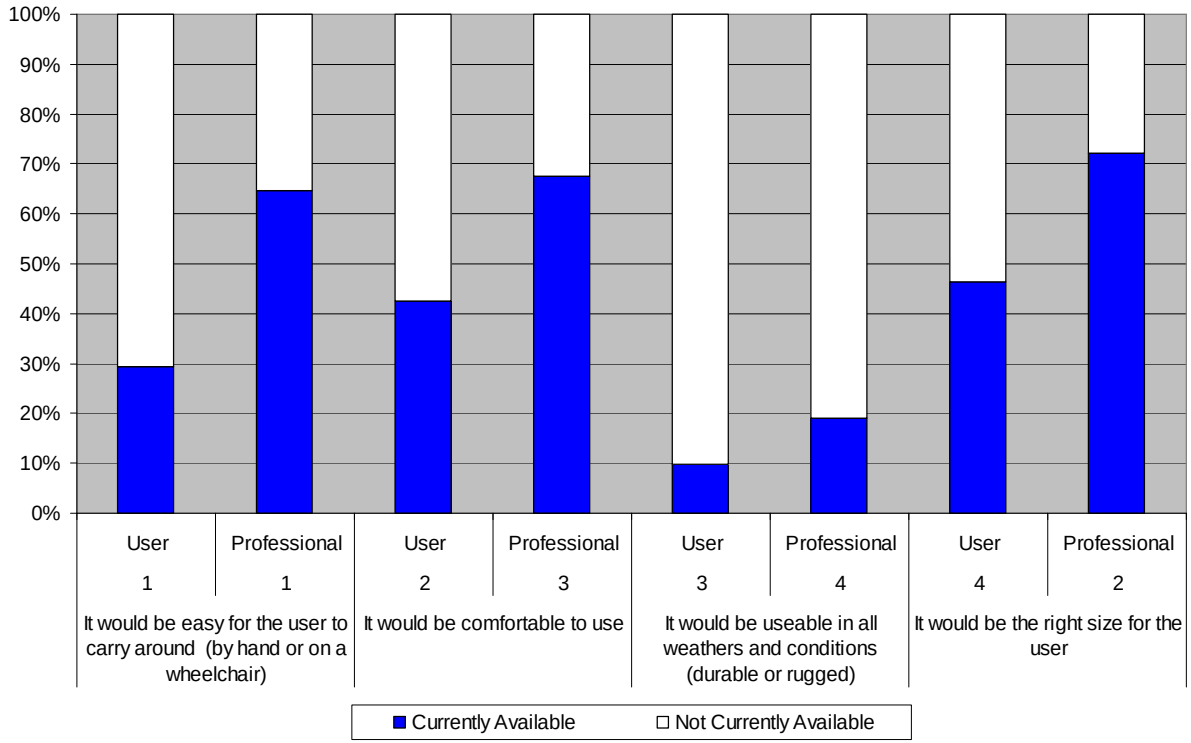
Professionals were more likely to rate all features of 'how a device is made' as being currently available except for 'durability' (this was a significant association) whereas most users rated all attributes as not being currently available, with 'durability' being rated most strongly. *In total, 'currently' was chosen 55.9% of the time by professionals and 'not currently' was chosen 68.1% of the time by users [data: Appendix* 14*].*

Users ranked the order of importance of the features as:

portable > comfortable > durable > size.

Professionals ranked the features differently although they agreed on the most important feature:

portable > size > comfortable > durable.



Comparing the ranking measures for users showed poor correlation. Ranking the percentage of users rating a feature as 'very important' gives results which tally with the professionals ranking score. This suggests that the results of the ranking by the user participants is not reliable in this section, possibly simply because of the lower sample size of users - the ranking order may have converged with a greater sample size. *[data: Appendix 15].*

This data indicates that both users and professionals feel that there are no **durable** devices currently on the market although both groups do not rate this as a feature that has the highest importance. All features of how a device is made are considered important to both groups and the most important feature is that a device is **portable**.

Device Design

Device reliability

A number of issues relating to device reliability were raised which affected participants' **confidence** in using their devices. For example, devices making unexpected noises; breaking down; and taking a long time to repair. Sometimes ongoing, unsolved problems were reported. Participants and their carers reported feelings of frustration, anger and panic when they were unable to rely on their device working well, or were left for long periods of time without a working device. In a number of cases this led to a lack of motivation to use the device. In contrast, however, some participants were happy and satisfied that their device was reliable.

6	*CP*	*Actually you've just been without your communication aid haven't you for four or five weeks. You might want to tell (Interviewer) what you thought or how you felt when you didn't have it. How did you feel every day coming into college without your communication aid? So remember, we were asking you how you felt so you need to say 'I..' That's 'like', is that what you're after or are you looking for 'feel'? It's under your verbs I think. Feel's over there.*
	CA	*Feel.*
	CP	*If it's in the past you might want to say 'I felt' so you'll need to – yeah.*
	CA	*Felt.*
	CP	*You just say how you felt with no communication aid. There's no right or wrong answer, it's just what you feel.*
	CA	*Angry.*

Device Design

Device performance

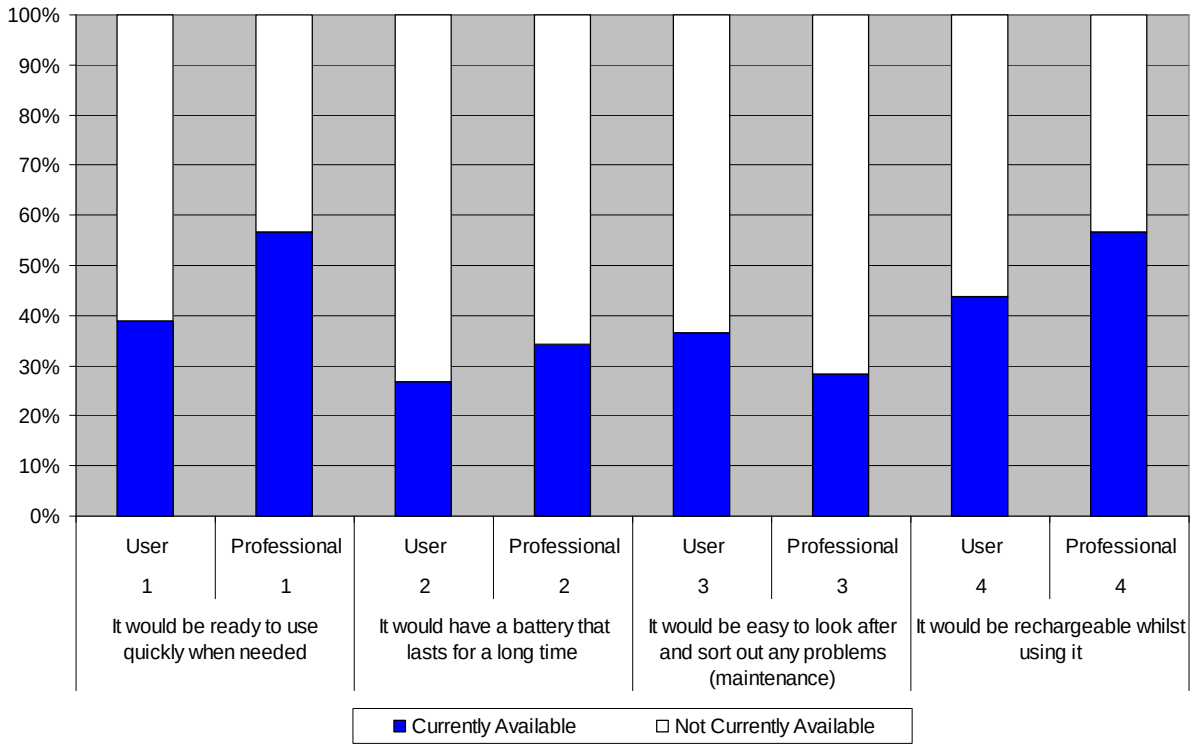
The majority of users and professionals rated all features of 'device performance' as being 'very important' *[data: Appendix 16].*

Users rated all features as not being currently available, with 'having a battery that lasts a long time' being chosen most often as not available. Professionals gave mixed responses: 'ready quickly' and 'rechargeable while using' were marginally more likely to be considered currently available whereas the other features were both more likely considered not to be currently available (this is a significant association). *In total, 'not currently' was chosen 63.4% of the time by users and 56.0% of the time by professionals [data: Appendix 17]*

Users and professionals ranked the order of importance of the features identically *[data: Appendix 18]*:

'ready to use quickly' > 'battery that lasts a long time' > 'easy to look after' > 'rechargeable whilst using'.

The percentage of respondents ranking features as 'very important' correlated well with the ranking scores for this section.



The evidence appears to indicate that professionals and users feel that there are no current devices with **batteries** that last a long time or that are **easy to look after**. The most important feature for users and professionals is having a device that is **ready quickly** when needed. Overall professionals rated features as 'not available' 56% of the time whereas for most other sections professionals have more often rated features as 'currently available'. This may indicate that this is an area of design needing **further development.**

Device Design

Physical characteristics

Many different aspects were reported during the interviews which related to a broad range of physical characteristics. In order to fully illustrate the considerations of users in these areas, this sub-theme was further sub-divided into nine areas.

Batteries

Battery life and ease of charging were identified as important factors by many participants. For most users the battery life was too short to get through the day and constraints were imposed on their movement whilst the device was plugged into a mains socket to recharge. A number of users also felt limited in their ability to use their device independently as they had to rely on someone else to charge up the communication aid for them.

14	*I*	*what do you think makes for a successful communication aid? So you've obviously got a comparison that you can make between the three, or five.*
	CA	*[silence] The battery life, the chargeability.*

Design and aesthetics

Within this category the main concerns expressed by participants were related to devices 'looking good', not 'old-fashioned' in a time of burgeoning technology, and most importantly for many users, the colour of their device. In contrast, however, some participants stated that they did not care about image and appearance.

5	*CP*	*Well you get past 40 and you couldn't care less about your image*

13	*I*	*OK. What do you think about the way the DEVICE looks?*
	F	*Old fashioned.*
	I	*Old fashioned?*
	F	*Yes.*
	I	*Does that put you off at all?*
	F	*Well, with the technology today it could look smarter.*

Device Design

Display

There were some comments about the advantages of the communication partner being able to read a message on screen, for example, in a noisy environment, for a private conversation, or when the voice is not working and, specifically, some participants felt that dual display screens, whereby the message can be read on two sides of the device, were of particular benefit. There was also a suggestion for a new development – keys that light up.

7	*I*	*And I noticed yours has got an alternative display, it's got a display that other people can read. Do you think that's good? Yeah. So is that useful? Particularly when the voice doesn't work, yeah! [laughing]*
	F	*[laughing]*
	I	*OK. Is it useful when the voice does work? Yeah.*

Mounting

Attaching and positioning of a device was highlighted as an issue by some participants, for example when in a wheelchair or at a plinth or when moving between places, and the hazards of devices being dropped or damaged if not held securely. However, this was a weakly referenced theme and there was a diversity of experience and provision of mounting systems. In some cases devices were felt to be appropriately and securely positioned with suitable systems in place across different environments, in other cases there was no mounting system in place, requiring users to carry devices on their knees if in a wheelchair. In yet other cases the instability of the mounting contributed to problems with the reliability and functioning of the device.

10	*CP*	*When it's on its bar as well and like you said about it going down and bumping about.*
	CP	*It wobbles, which we think has created the problem with the internal battery, the connections are coming loose and things like that, it just doesn't make it as robust as you think it is because it's quite heavy and solid.*

Ruggedness

Although weakly referenced, a number of participants highlighted problems with the robustness of devices (also seen in the example above).

7	*I*	*You've said before it's a bit unreliable but is that anything to do with the way it works or is that to do with dropping it? Yeah, it's to do with dropping it. Being more rugged. It's more to do with rugged rather than reliable.*

Device Design

Size

There was a variety of opinion about the appropriate size for a device. In some cases smaller meant more portable and, therefore, better; in other cases larger meant easier to see and, therefore, better.

2	*CP*	*But when he's older and hopefully he will go off to a pub and things. I can't see him taking such as that down the pub*
	M	*no*
	I	*because of?*
	CP	*the size*
	I	*the size*
	CP	*because of the size and just.. I mean he may well be friends with other people like himself and they can make themselves understood without needing a device of any sort*

Weight

Issues of size, weight and portability appeared to be closely linked. In particular, participants viewed heaviness as a factor which limited their use of the device in different environments.

2	*I*	*what do you think of having to carry it with you?*
	(beeps from VOCA as (X) selects message)	
	CA	*too .. heavy*

10	*CP*	*I think the other things to do with the aid, (X), because you're less involved with that part of it, is the weight of it can be quite cumbersome really, especially when we took it on holiday. You want something that's a bit easier to sort of pack. We're going to Florida and I don't even think we'll consider taking a communication aid to Florida on holiday.*

Device Design

Transporting

For those participants who did not have a device on a fixed wheelchair mount, or who were themselves mobile rather than in a wheelchair, it was important that they could carry their device easily between environments.

As also illustrated above, size and weight were closely linked to portability. Having a suitable bag in which to transport the device was also discussed, with some participants making specific reference to needing to protect the device from damage and from adverse weather.

6	*CP*	*(X), would that make a difference if it was easier to carry around, would you use it when you were doing physical activities?*
	CP	*You would, right.*

7	*I*	*Do you always have it on your lap? Yeah. You don't ever put it on a table and use it on a table? No, it's always on your lap.*
	I	*OK, so it's easy to carry.*

Use outdoors

How much participants felt able to use their devices outdoors was influenced by two factors – the rain and the sun. The idea of protecting devices from the rain was a recurring theme in the interviews; participants felt reluctant to take the device outdoors if rain was likely. Waterproof covers were sometimes available but not always reported to be the best solution as they could create additional problems. Some participants had found their own makeshift solutions. The difficulty of seeing the screen clearly in bright sunlight was also highlighted by participants, again limiting their use of the device outdoors. Some participants found they relied heavily on remembering where messages were stored on a display they could not see, others had once again found their own unique solutions.

10	*CP*	*And the other thing we looked at, the criteria at first, was we wanted some element of it being waterproof. I know it can't be perfectly waterproof but that would be better as well. If she's outside and suddenly it rains you want to make sure it's safe don't you otherwise you think OK, we can't take it because there's a risk it will rain.*

15	*CP*	*I worry about it if it gets rained on don't I? I keep it dry.*

Device Design

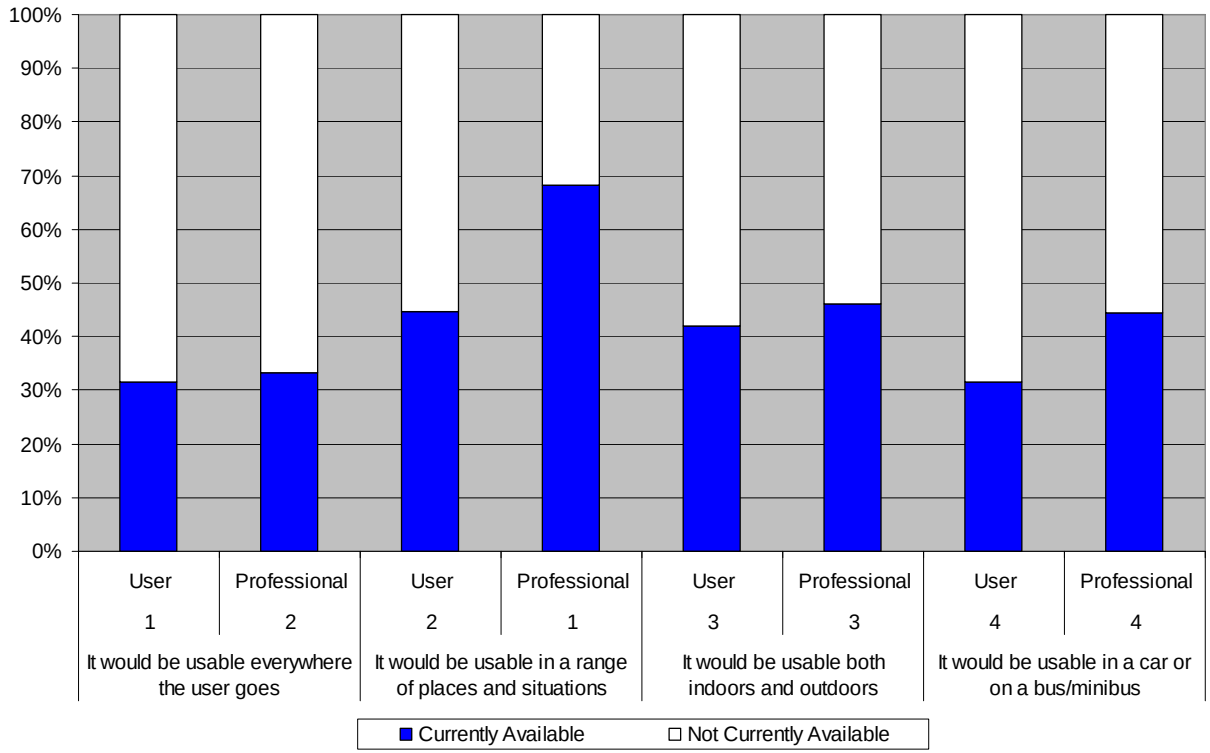
Physical environment and transport

The majority of users and professionals rated all features of 'physical environment and transport' as being 'very important' *[data: Appendix 19].*

The majority of users rated all features as not being currently available; professionals agreed that the features were not currently available except for being 'usable in a range of places and situations' (this is a significant association). *In total, 'not currently' was chosen by users 62.5% of the time, and 52.0% of the time by professionals [data: Appendix 20].*

Users ranked the order of importance of the features:
'usable everywhere' > 'usable in a range of places' > 'usable indoors & outdoors' > 'usable in a car or bus'.
Professionals rated the features similarly except ranking *'usable in a range of places' > 'usable everywhere'* as the top ranked features *[data: Appendix* 21*]*.

The percentage of user respondents ranking features as 'very important' correlated poorly with the ranking scores for this section.



Both users and professionals felt that most features around use of a device in the physical environment and transport were not currently available; however none of the features provoked strong responses. This is un-characteristic for professional respondents who have typically ranked most features as currently existing. The lack of correlation when comparing the ranking responses suggests that the questionnaire questions may be too ambiguous or not distinct enough in this section.

Device Design

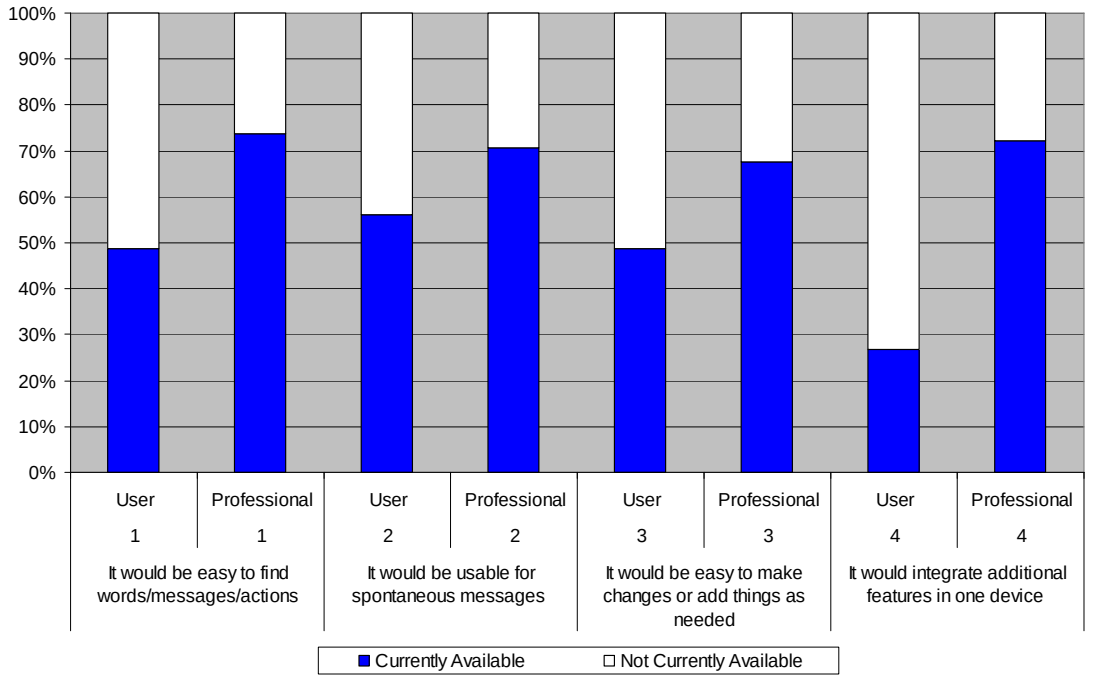
Design and layout

The majority of users rated all features as 'very important' as did professionals except for 'integrate additional features' (this was a significant association) *[data: Appendix 22].*

The majority of users rated all features as not currently available except 'usable for spontaneous messages' *(*this was a significant association). The majorities were very marginal, with the exception of 'integrating additional features' where 73.2% of users chose 'not available'. Professionals rated all features as currently available. *In total 'not available' was chosen 54.9% of the time by users and only 28.8% of the time by professionals [data: Appendix 23].*

Users and professionals both ranked the order of importance of the features *[data: Appendix 24]*:
'easy to find words/messages' > 'usable for spontaneous messages' > 'easy to make changes' > 'integrate additional functions'.

100% of professional respondents chose 'Very Important' for 'easy to find words/messages'. The percentage of respondents ranking features as 'very important' correlated well with the ranking scores for this section.



A small majority of users consider all the features to be very important whereas the majority of professionals consider all but **'integrating additional functions'** to be important. Both users and professionals rate **'being able to find words and messages easily'** as the most important feature. Most users consider that devices do not currently offer the ability to 'integrate additional functions' and interestingly they do feel that current devices allow people to produce spontaneous messages – even though at other points of the survey users indicate that this is challenging.

Device Design

Device configuration

There was variation among participants around whether they or their carers were able, and felt confident, to modify or programme their devices. The value of **personalising** a device in terms of vocabulary, pictures, and layout, and how it impacted on participants' use of the devices, was a recurrent theme throughout the interviews.

15	*I*	*OK. Do you have any comments on how well made you think it is?*
	CA	*[silence] I have changed a lot of things.*
	I	*So when you say you've changed a lot of things what do you mean by that?*
	CA	*[silence] I moved words around. I moved words around.*

10	*CP*	*We find – this is probably not particularly(X's) frustration although she'd be frustrated with us when we're using it, trying to set it up, it can be quite slow and laborious.*

In some cases limitations were felt to be due to the device itself, in others the limitations appeared to be more related to levels of support and training to use the device. These will also be reported later in the Help and Support section.

The length of time often taken to programme devices was seen as an issue which could lead to frustration with the device, whilst the relative openness of information stored in a particular communication aid, and the potential ease with which it could be accessed were highlighted as a problem for some participants.

The need for devices which could be set up to speak in different languages was also relevant for some participants.

Device Design

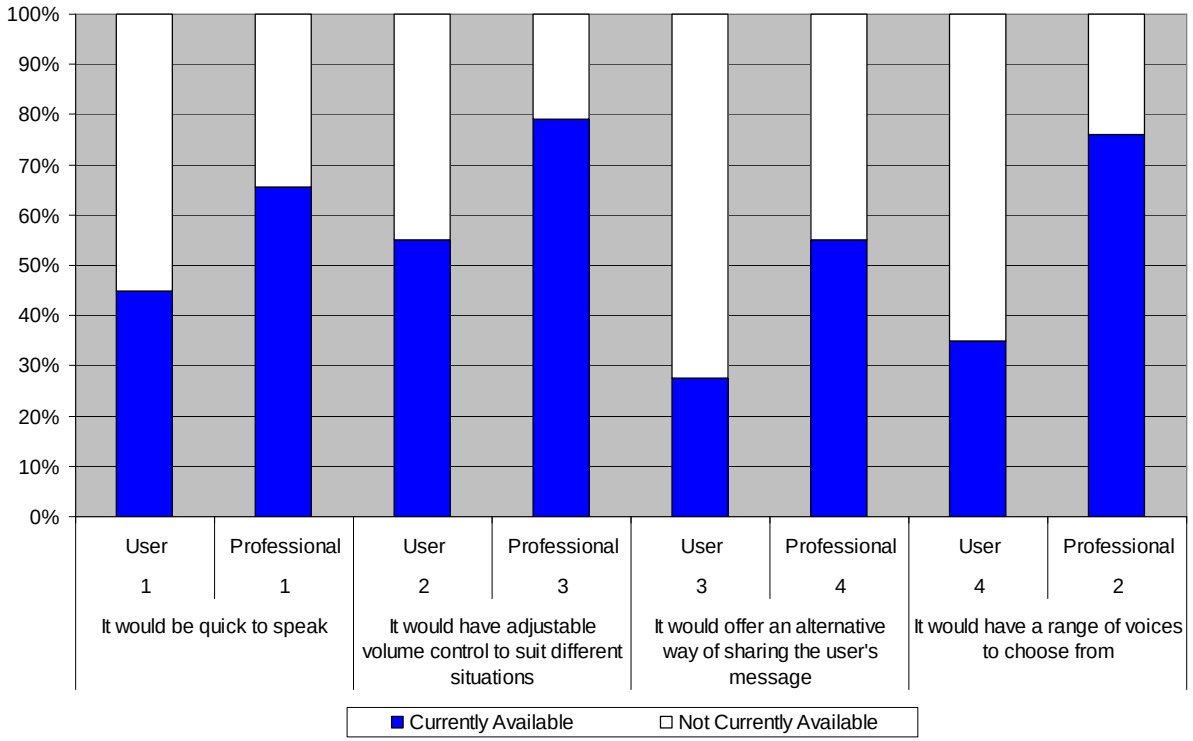
Voice output

The majority of users and professionals rated all features of 'speech output' as 'very important' although this was a marginal majority for 'it would offer an alternative way of sharing user's message' *[data: Appendix* 25*].*

The majority of users rated 'adjustable volume control' as the only feature currently available whilst most professionals rated all the features as currently available. For both users and professionals 'alternative way of sharing a message' was most often chosen as 'not currently available' *[data: Appendix 27]*.

Responses from the ranking question were mixed, both groups agreed that 'quick to speak' was the most important feature, but there was poor correlation between users and professionals for the other features.

The percentage of all respondents ranking features as 'very important' also correlated poorly with the ranking scores for this section *[data: Appendix 27]*.



The majority of users and professionals agreed that devices should be **quick to speak** and that the ability to share a message in a variety of ways was not very important. Professionals rated the **choice of voices** much more highly than users and 76% of users felt that there was not currently a choice of voices available to them. As previously seen the majority of users felt that the features did not exist in current devices whereas the majority of professionals felt that all the features did exist.

Device Design

Voice Output

Three main aspects were reported during the interviews around participants' perceptions of the voice output of their devices: **Personalisation, Quality and Volume**.

Personalisation

For participants the fact that the voice on their device was American was an issue, and generally there was an expectation that the voice should be of the same gender as the communication aid user. Some participants expressed a desire for a regional accent but others did not feel this was a priority. In some cases the flexibility to change between voices at different times was recognised.

10	*CP*	*Would you change the accent?*
	I	*You would.*
	CP	*Would you make it Scottish? No? You would, would you make it Scottish? No. What would you do? Would you make a more regional accent from Yorkshire? Do you think she should sound like she's from Yorkshire, (X), your communication aid? You do. [laughing] I didn't know that. You've surprised me! [laughing]*
	I	*Do you want it to sound more like (Support Worker)?*
	CP	*Would you like it to sound more like (Support Worker) or more like me or anybody else?*
	CP	*Like me? You don't want to listen to me all the time! [laughing]*

Voice quality

Whilst some participants reported satisfaction with the quality of the voice on their device others commented on problems with speed, pronunciation and intonation.

Volume of speech

Further issues relating to the volume of speech output of devices were raised, especially when competing with lots of background noise. In some cases participants were satisfied that the volume could be raised sufficiently but for others the volume was not felt to be adequate in noisy situations. Some participants wanted to be able to shout or argue more effectively through their device.

Wider Picture

As well as considerations around the design of the device there was recognition of the wider picture around the use of a voice output communication aid. The slow rate of communication using a communication aid was strongly identified in its own right and may be one of the factors that led to the very restricted use of communication aids that emerged as a theme from the interviews. Many communication aid users used their communication aid purely within their immediate environments (e.g. home, school). There was a strong sense that slowed communication was detrimental to the users' day to day life and that it caused deep frustration, particularly if the person had previous experience of verbal communication.

A number of 'environmental factors' were identified which impacted on the use of communication aids. The importance of training and learning how to use a device was recognised and participants had mixed experiences of this. Training the user, carer and family were all considered important for success. A lack of ongoing training from professionals was identified, as was a desire from both professionals and users that there should be ongoing help and support from professionals, although it appears that these need not necessarily be regular routine visits. Help and support from carers was felt to be important but may not commonly be available.

The role of AAC service delivery is a strong theme in a number of areas in this report and it emerged in its own right as a factor affecting the effective use of communication aids, with very mixed experiences of levels of service delivery. Despite the desire for ongoing professional contact that emerged from the questionnaire data, there was little evidence of this in the interviews.

Wider Picture

Effect of slowed speed of communication

Participants reported that using a communication aid was a **slower** means of communicating than would be experienced in naturalistic spoken conversation. This was a cause of frustration for some participants, particularly where they had previous experience of communicating verbally and were coming to communication aids later in life (see Effect of good and bad device design section also).

In some cases this was perceived to be due to the user's own physical limitations, in others it was perceived as more related to the device itself. In some cases participants were clearly aware of other people's impatience with the slowing of conversation brought about by the use of a communication aid.

9	*I*	*OK, it sounds like you're quite good at being resourceful around making it as useful as possible. Overall how easy do you find it to use? How easy do you feel your communication aid is?*
	CA	*[silence] Easy but slow.*

9	*I*	*Is there anything that is unsuccessful about using it? Anything that causes you a problem?*
	CA	*[silence] As you see there's a delay while I type*

11	*I*	*what makes it hard? (pause) What makes it hard for you (X)?*
	F	*when I miss it .. when I miss it*
	I	*when you miss .. when you miss it?*
	F	*what I want*
	I	*Ok so you're using a switch and that's moving around, scanning around the screen so when you miss the one that you want*
	F	*yeh*
	I	*and you have to start again and that takes longer*
	F	*yeh*

Wider Picture

Impact of training and learning

Participants reported mixed experiences of initial training upon receiving a device as well as of longer-term encouragement to **practice and to learn** how to use it. In some cases participants felt they were very much left to find their own way around the device; this was perceived as a poor introduction by some but as a preferred option by others. Some participants were of the opinion that very practical training, being shown how to do something on a device, had been of benefit to them initially, and some had benefitted from intensive practise with a communication partner, perhaps on a daily basis. Complexity of device and the cognitive load this imposed were highlighted as factors in learning how to use a device successfully.

15	*I*	*OK. What do you feel about the training that you had when you first got the communication aid?*
	CA	*[silence] Crap.*
	I	*[laughing] Can you explain a bit more about why?*
	CA	*[silence] No-one brought [silence] showed me and (X) how to use it. [silence] No-one showed me and (X) how to use it.*

Manuals, instruction books and crib sheets were generally described by participants as useful for ongoing reference in order to get maximum benefit from their device, or in some cases this was expressed in reverse, i.e. that their experience was of being left without a manual which meant they were frustrated as they could only remember how to use the most basic of functions. However, for some participants the manuals were perceived as too complex and, therefore, as unhelpful.

The benefits of prior familiarity with a similar device and the cross-transfer of knowledge and skills learnt from other devices or other forms of technology were also commented on.

When asked to think beyond their own experience, and to say what they felt the ideal levels of training on receiving a new device should be, participants gave a range of responses; preferences were expressed for training for the user only, for the user and their Speech and Language Therapist, for the user and their carers and family members. A desire for initial, intensive training and practice was expressed.

Wider Picture

Impact of training and learning

The majority of both users and professionals rated all aspects of training as 'very important' *[data: Appendix 28].*

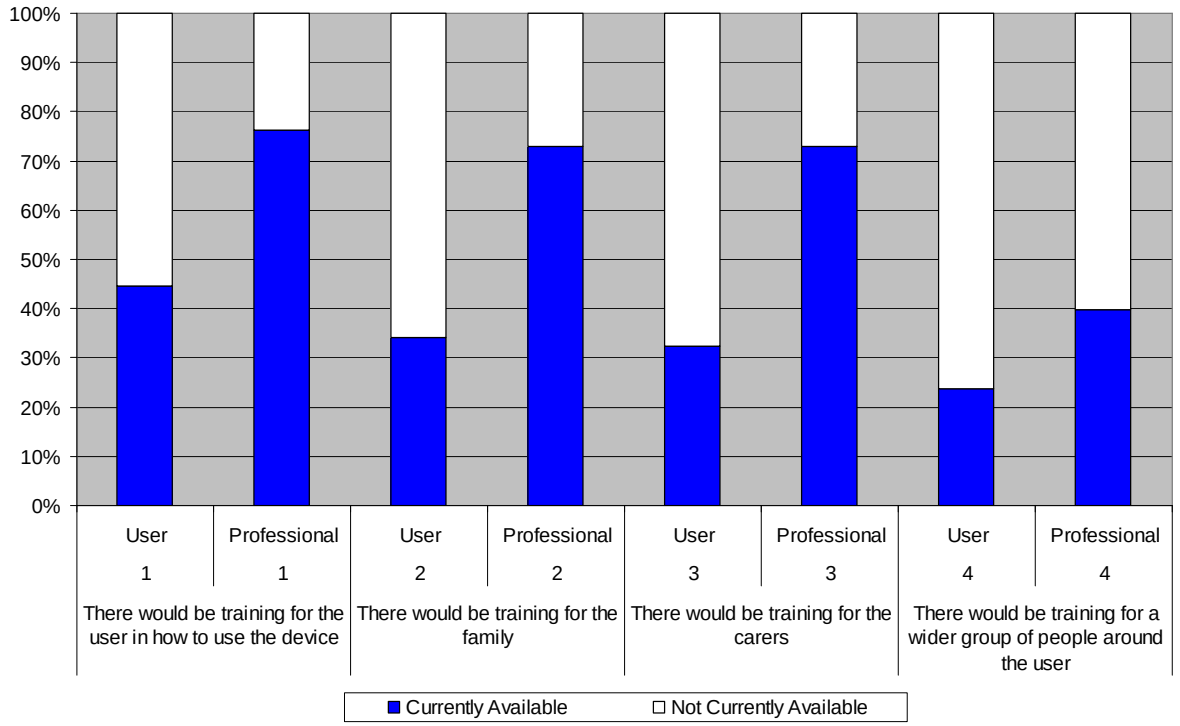
The majority of users rated all aspects as not being currently available whilst most professionals rated all the aspects as currently available except for 'training for the wider group' (this can be considered significant). Only a small majority of users rated 'training for the user' as being not currently available *[data: Appendix 29].*

Both users and professionals agreed that 'training for the user' was the most important aspect when looking at the simple ranking question, and users and professionals agreed on the priorities on this measure as:

'training for user' > 'training for family' > 'training for carers' > 'training for wider group'

There was poor correlation for professionals' responses when checking against the ranking of the aspects rated as 'very important' which gave *[data: Appendix 30]*:

'training for carers' > 'training for family' > 'training for the user' > 'training for wider group'



The majority of users and professionals felt that training was important in general. Training for the wider group of people was agreed to be the least important type of training but there was also majority agreement that this did not currently exist. Users and professionals seem to agree that training the user is most important followed by training the family and carers. However, looking at another measure professionals appear to also think that training carers and the family may be more important than training the user.

Wider Picture

Help and Support

A clear majority of both users and professionals rated all aspects of help and support as 'very important' *[data: Appendix* 31*].*

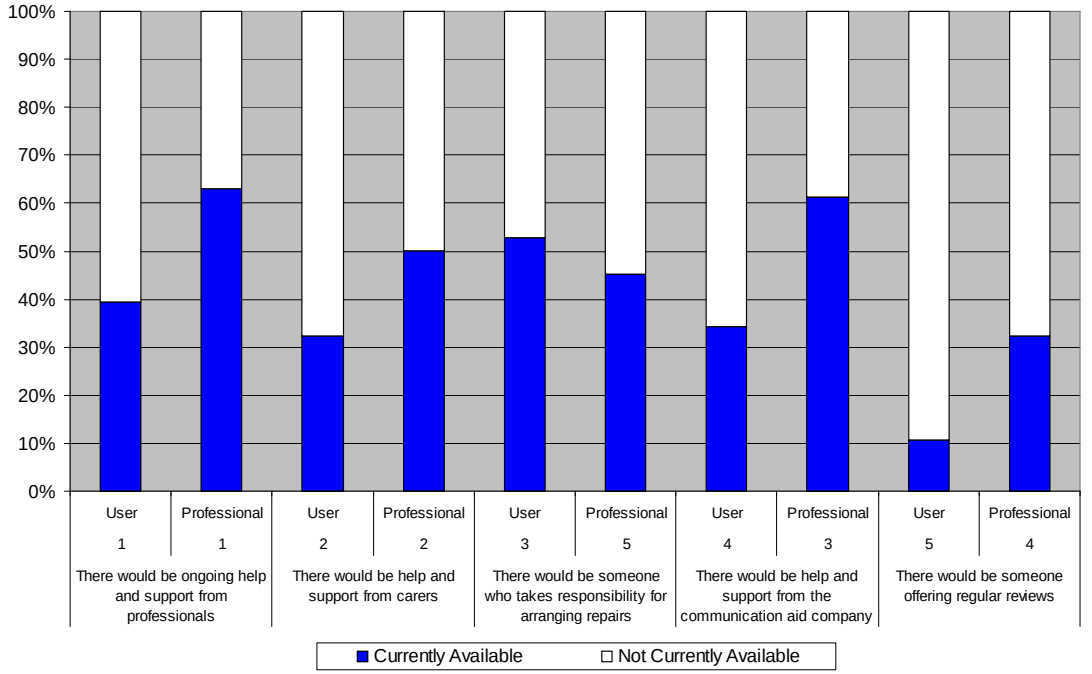
The majority of users felt that all aspects of help and support did not currently exist, except a very marginal majority who felt that there was currently *'someone who takes responsibility for arranging repairs'*. Professional responses were uncharacteristically mixed: a marginal majority of professionals felt that there was not *'someone who took responsibility for arranging repairs'*; a greater majority (68%) also felt that there was not currently *'someone offering regular reviews'*. The variations can be considered significant *[data: Appendix* **32***]*.

Users ranked the features as:

'support from professionals' > 'support from carers' > 'someone for repairs' > 'support from company' > 'regular reviews'

and professional respondents ranked similarly except *'someone who takes responsibility for repairs'* was ranked last *[data: Appendix 33].*

The percentage of respondents ranking features as 'very important' correlated well with the ranking scores for this section.



Both users and professionals seem to strongly rate the importance of help and support and agree that ongoing help and support from professionals is most important whereas regular reviews per-se are not important. There are differences in the perceived importance of someone taking responsibility for repairs and a complex picture around which aspects of help and support currently exist – professionals and users only agreeing that there is not currently someone offering regular reviews (although the importance of this is rated lowly) and possibly that there is not help and support from carers (although professionals were balanced on this).

Wider Picture

Influence of AAC service delivery

In this sub-theme participants shared their experiences of AAC services, particularly in relation to how their communication aid was supplied and how it was funded, who provided troubleshooting advice or support for problems with their devices, and how breakdowns and repairs were dealt with.

Some participants reported that they had been able to look at or try out a range of devices before selecting their current device, whereas others had no knowledge of devices beyond the one they had been given and had had no part in the decision to select that particular device. Participants were aware of current developments in communication aids to widely varying degrees.

3	*I*	*So you think you've tried quite a few before having this one.*
	CP	*Yes.*

5	*I*	*Did you get much opportunity to try different communication aids out?*
	M	*No. I'd seen this DEVICE being used by other people*

5	*I*	*And have you ever felt tempted to explore some of those newer ways of communicating?*
	M	*Well, all the information we get is in the (XX) Bulletin*

Participants reported in some cases that carers or family members were able to deal with minor problems with their device and/or that they could call on local AAC support services (for example, Speech and Language Therapists or other AAC specialists) when help was required. When devices experienced more serious problems they were returned to the supplier for repair, and in some instances, a replacement device was provided on loan by the communication aid company. In the cases where a device was away for repair for an extended period and no temporary replacement was provided, the participants expressed frustration at the reduction in communication strategies left open to them.

Wider Picture

Influence of AAC service delivery

Provision of ongoing AAC support was also discussed in the interviews. As noted above, participants reported that they usually knew who to contact when there was a problem with the device, but otherwise they did not have regular contact with AAC professionals once their device had been supplied and set-up. This situation was universal but was perceived differently by different participants, some were satisfied that someone was at the end of a phone and could be called when needed, others expressed frustration that they did not receive more regular support.

15	*I*	*Right, OK. Have you had any issues or have you come across any issues about funding for communication aids?*
	CA	*[silence] Yeah.*
	I	*What sort of issues?*
	CA	*[silence] Difficult to get the money.*
	I	*OK. Does that apply to repairs as well?*
	CP	*There was an episode last year wasn't there where people couldn't agree who was responsible.*
	I	*And was that for a repair or for –*
	CP	*A new machine. I think it was a repair at the time but it was the potential replacement that brought the subject up.*
	I	*OK. And do you feel that that has an effect on you?*
	CA	*[silence] Yeah.*

In some cases participants had never needed to consider issues of funding: they had their device supplied by a local AAC service and repairs were sorted out through that service too, but in other situations users had experienced funding difficulties. Some users had been able to self-fund their device and were especially aware of the costs involved if repairs were required.

Competition for limited resources within the NHS was recognised.

Wider Picture

Restricted use of communication aid

Participants did not necessarily use their communication aids in all environments and in all situations and this was evident as some participants did not use their device during the interviews. This was where the text and symbol resource materials prepared for the interviews were of particular benefit. Some participants preferred to communicate verbally even thought this did not make for easy conversation.

In general participants did not use their devices outdoors and limited their use to key environments such as school/college/day centre and respite care. Use at home, with close family members or carers, varied greatly between individuals. Some felt the device was a benefit in the home; others felt it was unnecessary in that familiar environment. Devices were reported to be used very occasionally when shopping but not during crucial appointments with the GP or at the hospital. Neither were they used during physical and sporting activities.

1	*I*	*OK. You said that you use your DEVICE at home and at school and at (respite care). Do you ever use it when you're outside?*
	(beeps from VOCA as (X) selects message)	
	F	*no*

6	*I*	*But you don't use it when you go out and about?*
	CP	*Maybe not, no.*

6	*I*	*So you don't use it that much with your close family, right. Do you think it would be useful if you did? No, because they understand you. How about with extended family, so that means members of your family who aren't your mum or your sister. Do you use it with them? No. Do you think it would be useful if you used it with them? Yeah.*

Factors which participants reported as limiting their use of their communication aid in a variety of environments included: close family understanding them without a device and/or speaking on their behalf; other people's expectations of communication and lack of understanding of aided communication; health and safety/personal security issues; and issues highlighted earlier such as slowed speed of communication, adverse weather conditions, volume issues, and lack of portability.

Wider Picture

Support of aided communication within immediate environments

Feeling that there were people in their day to day environment who could offer immediate help and support appeared to relate closely to how **confident** participants were in using their communication aids. However, there was widely reported variation in the range of people who were able to fulfil this role. Some participants benefitted from well-defined AAC support teams who offered the potential for daily or weekly contact in a school/college/day-care environment; others relied on close family members for day to day support.

17	*I*	*How often do you use your DEVICE in a day?*
		[laughing]
	CPF	*It's what, (X)?*
	CPM	*Depends – it all depends who's on? It all depends who's here.*
	I	*Oh right.*
	CPM	*She tends to use it a lot at weekends because I'm here.*

Context

When discussing the design of communication aids it was impossible to ignore the context in which they were used – in other words how each particular individual used the device and the people, places and organisations around the person.

Starting with the user, their motivation and reasons for using a communication aid were viewed as crucial – the device was viewed as unlikely to succeed if the potential user did not have a strong drive to use the device or a highly motivating reason such as socialising or making choices. Devices were used in combination with other methods where possible and they were often cited as being used to resolve breakdowns in communication initiated using other methods.

Looking to the device, the importance of a good control method that could be used with the device was apparent and that this was linked to the potential speed of communication. In some cases participants felt that they still did not control their device in the best way possible although responses to the questionnaire indicated that users and professionals thought that devices offered a range of control methods. Overall devices were used in a range of environments (e.g. school, home) but often people only used the device in a single place (e.g. school). Some aspects of device control were still considered lacking and potentially important – survey respondents citing turning the device on and off independently and charging a device independently.

Rather than expecting communication aid design to stand still participants clearly expected innovation to occur and had aspirations for future designs.

Context

Addressing communication breakdown through communication aid use

During the interviews there were a number of occasions when the benefit of using a communication aid to clarify a misunderstanding was clearly demonstrated. As reported above some participants preferred to interact verbally during the interviews but their speech could not always be understood. Sometimes those participants reached spontaneously for their device when a verbal misunderstanding arose; sometimes they were prompted to do so. Participants also quoted examples of other occasions when they used their device to repair conversational breakdown.

17	*CPM*	*That's what she tends to use her light writer for. She only uses her DEVICE – if I get this wrong, (X), just interrupt me – she only uses her DEVICE with her new carer that's struggling with her communication because it's very difficult sometimes to get into what (X's) actually saying.*
	I	*Right.*
	CPM	*But she prefers to talk.*

Motivation and reasoning around use of aided communication

When discussing why they used a communication aid and why they felt it was important to them, participants gave reasons that ranged from simple statements of fact, such as 'to talk' or to 'say some words'; through practical reasons such as 'people are not always able to read my writing' ; to core reasons for communicating, such as 'socialising', expressing thoughts and feelings, chatting and gossiping; making friends and furthering relationships; making choices and requests; and giving instructions to carers, especially when new and unfamiliar with the user

In some cases the device features beyond face-to-face communication were cited as the most motivating reasons for using the device at the present time. This seemed to be for two main reasons: either because this was a way for the user to get immediate gratification from independent activity (e.g. playing music or looking at photos) whilst working towards the slower process of developing communication via the device, or because the user's speech was developing and the device was now more helpful in facilitating other areas of functioning.

10	*CP*	*we decided that it would be good to have a lot of the options available to you on an ordinary computer as well as a communication aid so that she could use it almost as a little entertainment centre for herself if she wanted to play her MP3s if she wanted to or look at something online or whatever, it would have that facility, which is what we did eventually find in your communication aid.*

Context of current use of aided communication

When asked to describe their current means of communication, participants identified a number of different high-tech devices, supplied by a variety of communication aid companies in the UK. In general these devices were supplemented by a full range of no-tech, low-tech and other high-tech means, for example: facial expression and body language; pointing, gestures and signing; vocalisation or spoken words; alphabet boards; pen and paper; texting on mobile phones; and writing on a computer.

18	*CA*	*I use this machine. I also text, use computer and I write.*
	I	*So you use DEVICE, texting on your mobile phone, a computer and writing with a pen and paper.*

6	*I*	*Have you got any other ways you communicate? I mean obviously I can guess some of them, so you do signing as well, that's good. Anything else that you think helps with your communication?*
		[laughing]
		Facial expressions, right! I think so too! So do people often pick up a lot from your face and your nodding and your yeses and nos and smiling and all that kind of facial expression? Yeah, that's good. And what do you think you use more? Do you think you use your communication aid more or your facial expressions or signing? Right, signing, that's interesting.

Context

Experience of other forms of technology

Whether users had experience of any other communication aids or other related forms of technology (e.g. typewriters and computers) prior to their current device was influenced by factors such as their underlying aetiology, and the cause and length of time they had experienced communication difficulties. Participants with acquired disorders were more likely to know just the one device and to have been using it for a shorter period of time, for example one year. In contrast some participants with congenital or life-long disabilities had had three or more devices over a 20 or 30 year period.

Some participants reported previous familiarity with typewriters and computers which had helped them in understanding and using their communication aid; for others the concept of high-tech devices had been a new challenge embraced by necessity and to some extent may have dictated the type of device they used. Not all participants were comfortable with the complexities of high-tech equipment.

18	*I*	*OK. So quite a change, quite a big event in your life then. Were you familiar with things like computers and mobile phones before your illness?*
	CA	*Mobiles, yes, but haven't a clue about computers.*

Context

Environments

The environments in which participants used their devices varied according to personal needs, preferences and perceived limitations (see also 'Restricted use of communication aid'). For some users it was vital that they used their device in common daily settings, such as home, school/college/day-care, and respite care; for others they were used in broader settings too, such as when out shopping or at the pub or on work experience. Some users reported limited use and others that their device went everywhere with them.

18	*I*	*What sort of places do you use it in?*
	CA	*I've been on nights out, weddings, birthdays, murder mystery nights, bowls.*
	I	*So, a whole range of places then. OK. What about in your sort of day to day activities, do you use your DEVICE then?*
	CA	*It's always with me.*

7	*I*	*So we were talking about where you use your communication aid. So you use it in your bedroom, around the home, when you're doing your activities. Are there any other times? Can you think of any? No. So that pretty much covers when you use it then. Right.*

Context

Control

One of the elements which influenced the type of device that participants used was the way in which they were able to physically access or control a device. For some users their physical skills were unchanging, meaning that once the decision on most appropriate access method had been made their longer term need had been catered for; for others their physical skills were changing (in some cases this meant aiming for an increase in physical ability, in others an inevitable deterioration) and they needed to be able to adapt and change their access method, and sometimes device, over time. This required an element of foresight and planning ahead. Not all participants felt they had the most appropriate or easiest method for them set up at the current time. Some participants expressed the feeling that their own perfect solution was not yet clear, and some felt it would not easily be met by the inhuman side of technology.

7	*CPM*	*She uses head controls now to use the DEVICE. She was using clickers in her hands but she was finding it more and more difficult so she has these various chairs.*
	I	*So you've kept a way of using it.*
	CPM	*Yeah.*
	I	*So you've kept the same device.*
	CPM	*Oh yeah.*
	I	*Just changed to a different way of using it.*
	CPM	*Yeah, yeah*

13	*TM*	*I do find this difficult because of the arthritis.*
	I	*So it's the DEVICE you find difficult*
	TM	*holding the button down.*

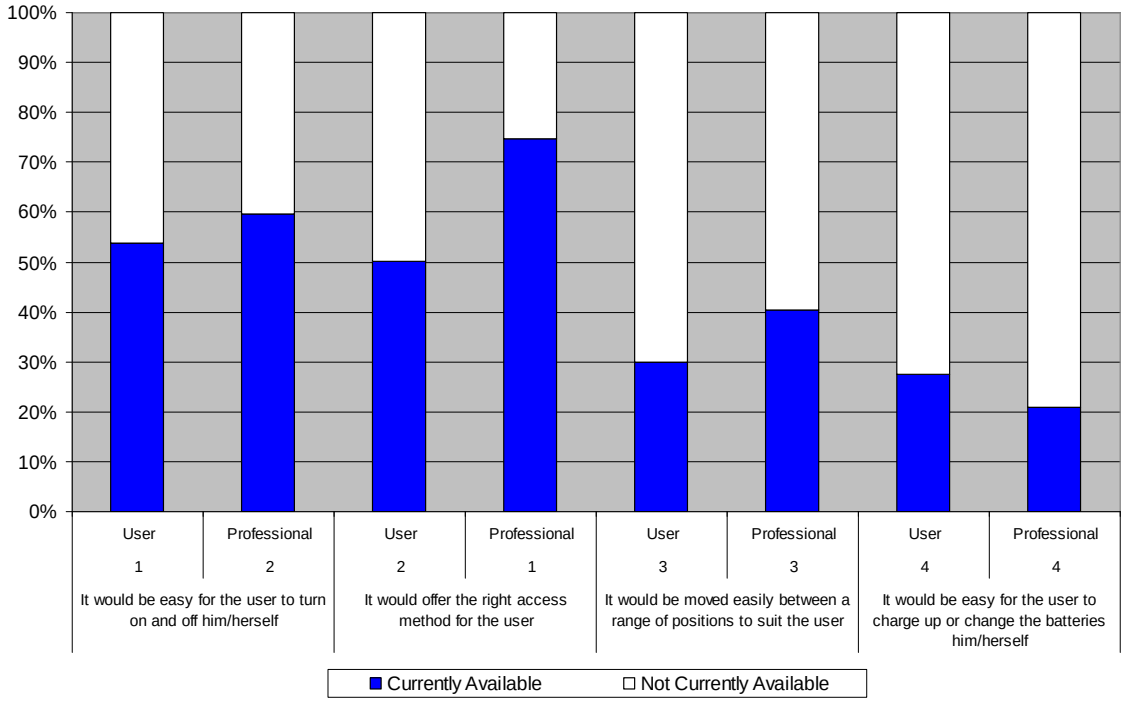
Context

Control

A majority of users rated all aspects of control as 'very important'. Most professionals agreed, except for *'it would be easy for the user to charge up or change batteries him/herself'*. This can be considered significant *[data: Appendix 34].*

Responses around which features currently exist were similar for users and professionals: the majority felt devices were currently available which were *'easy for the user to turn on and off him/herself'* and which *'offered the right access method'* (responses from users were more balanced on the latter). Both users and professionals felt that devices did not currently exist that let users *'charge up or change batteries him/herself'* or *'move easily between a range of positions'*. These could all be considered significant associations *[data: Appendix 35].*

Looking at the ranking of the aspects showed a fair correlation between users and professionals. The ranking for users was:
'easy to turn on and off him/herself' >' offer the right access method' >' moved easily' >' easy for the user to charge up or change batteries'
Professionals rated *'offering the right access method'* first.



The percentage of user respondents ranking features as 'very important' correlated poorly, with *'moving easily between a range of positions'* being ranked highly on this measure *[data: Appendix 36].*

Both users and professionals felt that having a device that was easy to charge up was of low priority, but did not currently exist. They also both felt that devices did not currently exist that were easy to move between a range of positions and on one measure users ranked this highly. Having the ability to turn a device on and off him/herself and having the right access method were both highly rated by professionals and users.

Context

Aspirations for communication aids

During the interviews users or their carers talked about how they would like to modify their current device to suit their needs better now or as they foresaw possible or inevitable changes in their own physical abilities or levels of functioning in the future.

Some of these wishes included devices or options or access methods that were available currently but which individual participants were not yet aware of or did not have access to at the present time. In this category were aspirations for differently-sized devices (both bigger and smaller); protective cases to extend durability; laptop-styled devices; communication aids with full computer functionality which enabled access to word processing, email and Skype, internet shopping and banking, music and photographs, and use of the telephone or mobile phone (voice and SMS); communication aids with integrated environmental control (e.g. to control T.V.); and eye tracking/eye controlled devices.

2	*CP*	*no I don't think so. I think (X) obviously prefers to vocally talk erm.. I just feel perhaps for later in life I kinda don't see him taking this down the pub, you know. I probably as a mum would look at something smaller that he could have as a safety blanket basically for when he's out and about when he's on his own. I mean it's all very well I'm with him now*

Some of these aspirations offered ideas for new developments in the future, including such things as: interchangeable languages in one device; improved speech output through voices with better intonation, and expression of emotion and humour; improved memory capacity; improved battery life and on-the-go charging options; flat screen devices built into wheelchair trays; inbuilt videophone potential; individualised facilitated communication letter charts with speech output; and more futuristic ideas in the form of 'mind-reading' devices.

When asked to define the most important feature of a communication aid a range of responses were given. These reflected individual experiences and needs. For example: clarity of speech, speed of use, size and portability.

Overall Priorities

Respondents were asked to rank each of the main sections (overarching features) in order to try to understand their overall priorities for devices. In addition, the data from all sections of the questionnaire was combined and the top and bottom features compared in terms of ranking and availability.

The ranking of the overarching features confirms that *'ease of use'* and *'support'* are the most important aspects of using a device. Professionals and users correlated well in their ranking of these overarching features, with the one exception that users' perceived 'moving a device around' to be ranked more highly than professionals.

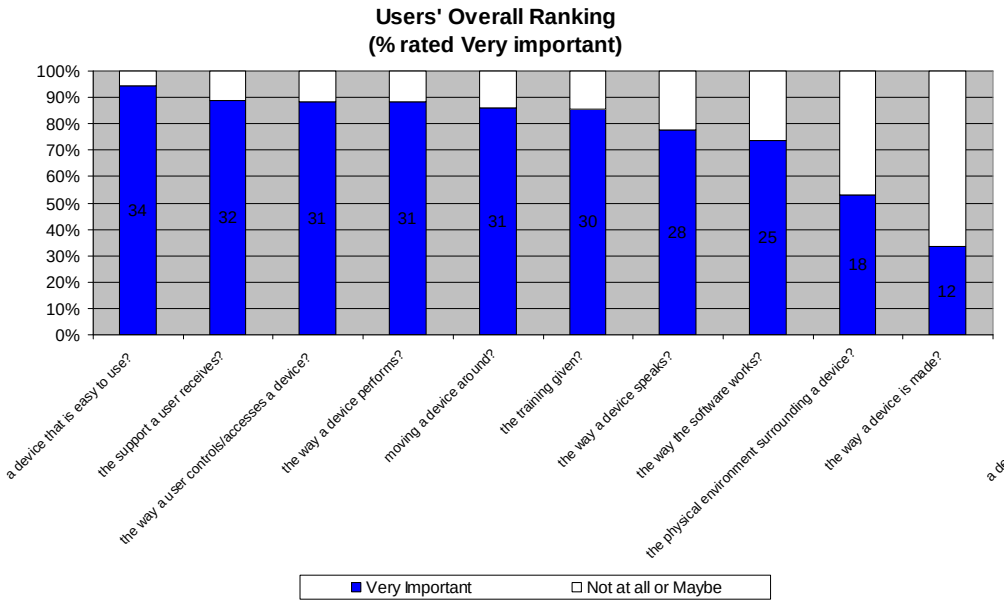
Looking back over all the questionnaire data also highlights the importance of speed of communication, which is an aspect of many of the top five rated features for users and professionals.

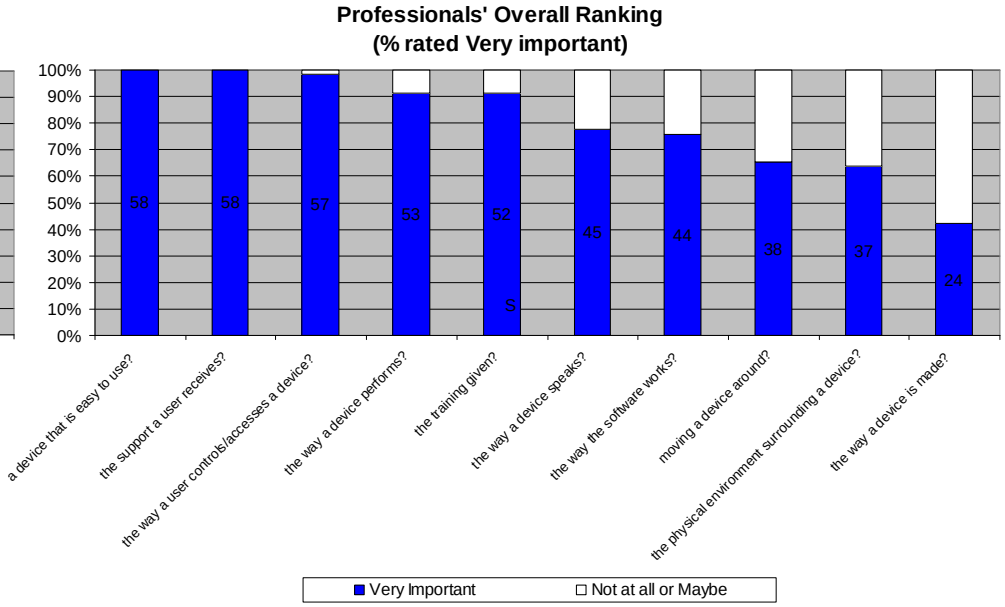
The variation between users and professionals, in terms of their responses to whether a feature is 'currently available', is highlighted – users generally consider features to be unavailable whereas professionals generally consider features to be available. There is weak correlation between ranking and availability for users and professionals – both groups are more likely to consider a feature 'currently available' if it is highly ranked. However, there are some notable exceptions to this. For example, *'integration of features'* is the lowliest ranked feature by professionals but is also something generally considered to exist already.

Overall Priorities

Ranking

For the overall ranking section, as can be seen from the graphs below the correlation between users' and professionals' rankings was good (r=0.85 for ranking score, r=0.91 for ranking of responses rated very important) . In addition, the correlation between the ranking measures was good (r=0.96 for users and r=0.98 for professionals). Indeed, the only variation between users and professionals was that users ranked 'moving a device around' more importantly than professionals *[data: Appendix 37].*

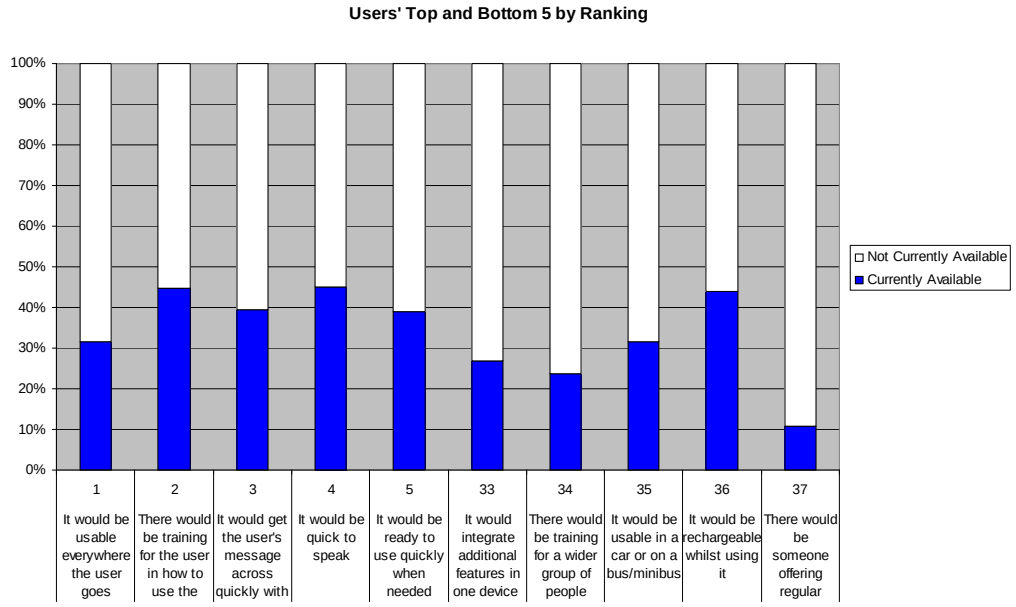


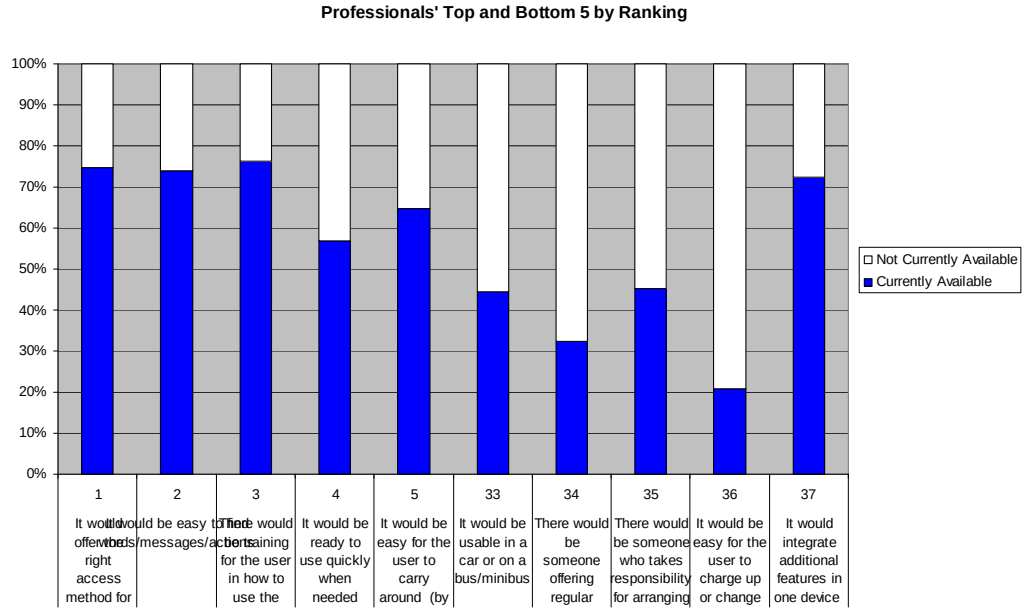


Ease of use, Support, Control Method, *Device performance, Training and Speech Output* are ranked most highly (*Moving a Device* also being ranked highly by users). The way the *Software* works, the *Physical Environment* around the device and the way a *Device is Made* are ranked most lowly. There is good correlation between users and professionals in the overall ranking and also good correlation between the two ranking measures.

Overall Priorities

The graph below shows the top and bottom ranked features across all the responses from the questionnaire and compares against the 'availability responses':





Speed of communication emerges as an aspect of many of the top rated features by users and professionals: *'it would be ready to use quickly when needed', 'it would get the user's message across quickly with minimum effort', 'it would be quick to speak'.*

For users, being *'usable everywhere'* is the highest ranked feature and yet is also a feature of the top five least likely to be considered as available. Someone *'offering regular reviews'* is the lowest ranked of all features and also the least likely to be considered currently available by users.

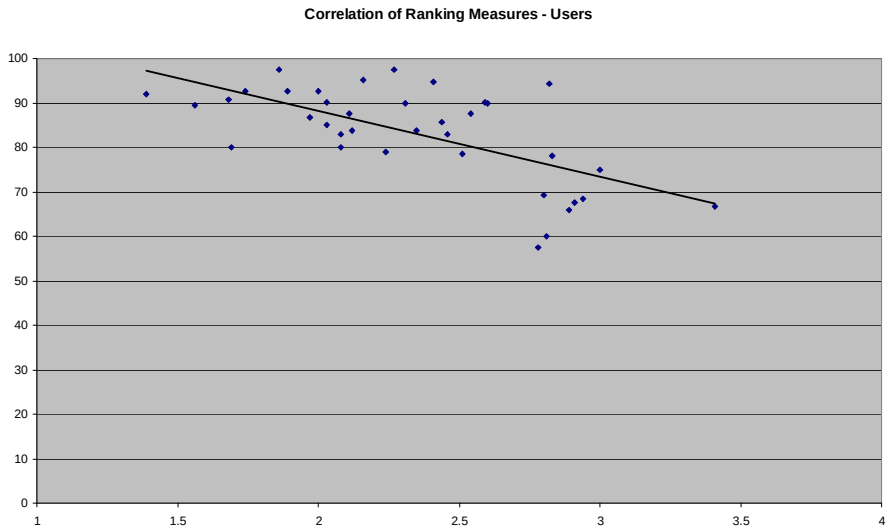
Overall Priorities

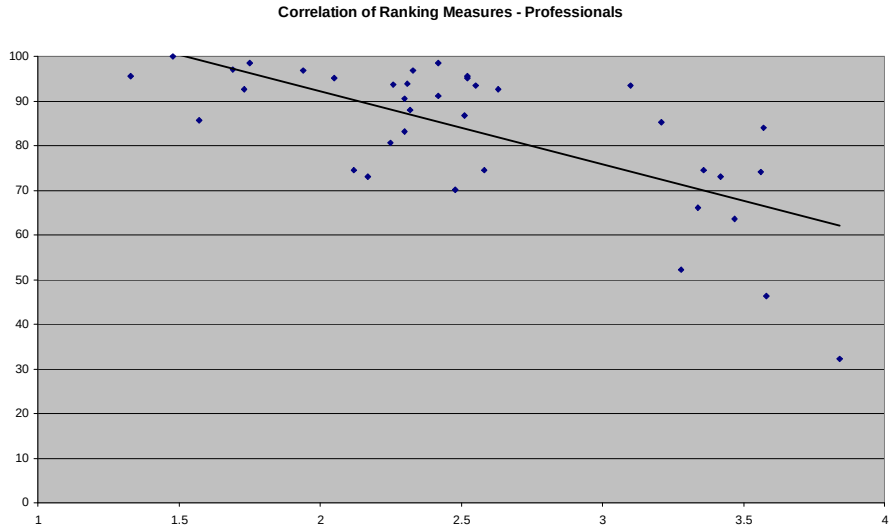
Professionals perceive the need for the correct *'access method'* as the most important feature of all. The lowest ranked feature, the *'ability to integrate additional functions in one device'* was also considered by most professionals to be currently available whereas the other bottom five ranked features were considered not to be currently available.

Users' responses demonstrate that the majority of the time they do not feel features are available (irrespective of ranking) while professionals are more likely to think that the top ranked features are currently available.

Ranking Measure Correlations

Two methods of indicating the ranking of features have been used throughout this report – the mean score of the ranking question and the number of respondents rating a feature as 'very important'. Comparing the ranking methods shows a moderate correlation between measures for users (r= -0.5838) and professionals (r=-0.617). Looking at the correlations of the ranking measures over individual sections however, it can be seen that there are a number of outlier sections with poor correlation (users: how a device is made, control and physical environment; professionals: speech output and training) *[data: Appendix 38]* .





Overall Priorities

The ranking measures correlate moderately well; poor correlation in some sections may indicate possible problems with the questionnaire design for these sections.

Comparing Users' and Professionals' rankings

In general, comparing all the features across sections gives a good correlation between users' and professionals' responses when looking at the ranking scores (r=0.83) although it was less good when looking at the ranking of the responses rated 'very important' (r=0.62).

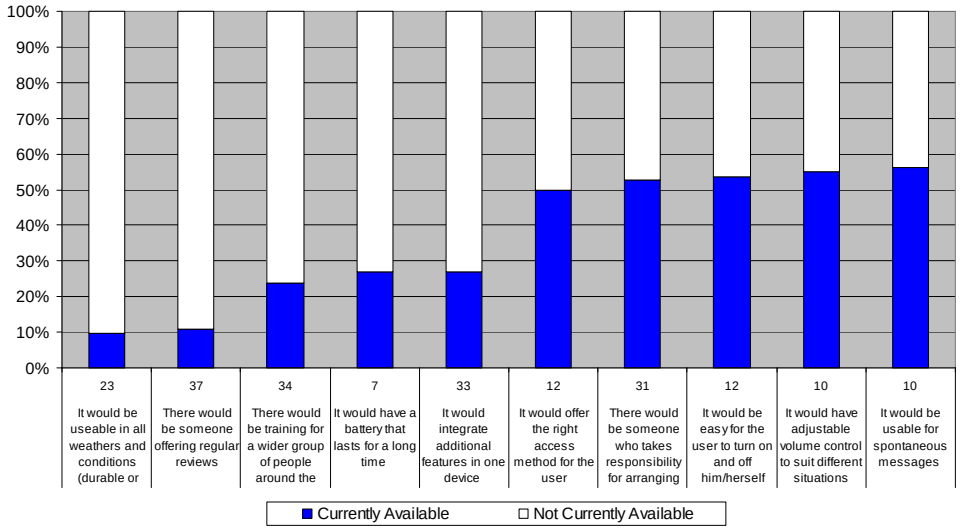
A good correlation between users and professionals in ranking features suggests that professionals are able to empathise with the viewpoints of users'. Outliers in this – i.e. features on which users and professionals have different priorities are drawn out in the sections in this report.

Overall Priorities

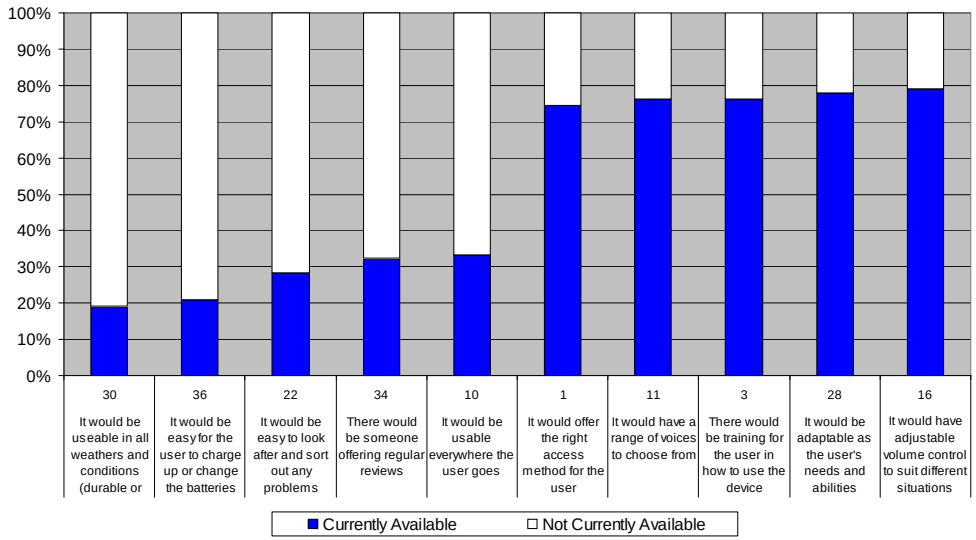
Availability

The questionnaire asked respondents to choose which features they considered 'currently available' and the graphs below show the top 5 features chosen as 'currently available' and 'not currently available' across all the sections of the questionnaire. The corresponding ranking for the feature is also shown.

Users' Top 5



Professionals' Top 5



These results suggest that, in general, device design is considering the right issues: the features rated most lowly in terms of current availability were also generally ranked lowly in importance and vice-versa.

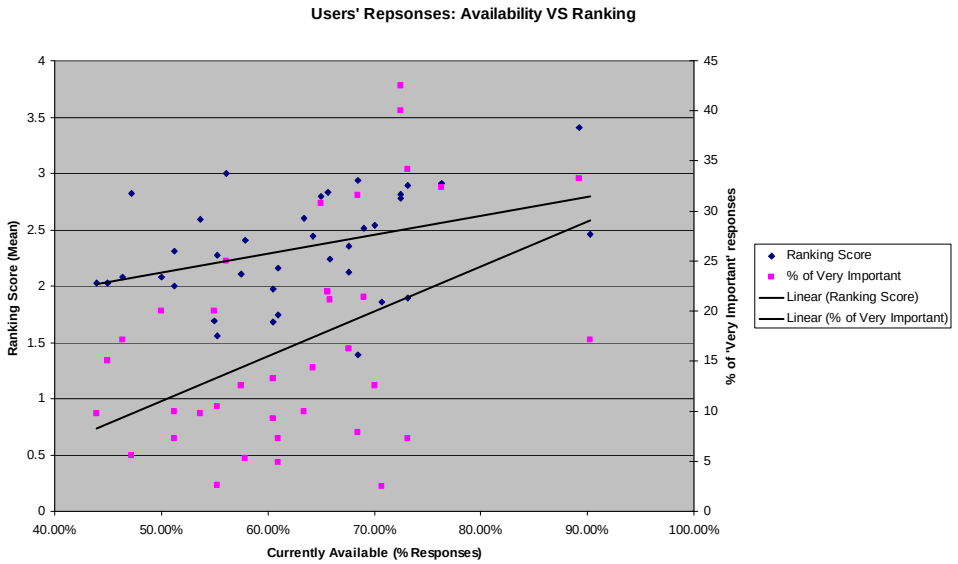
It should be noted, however, that on average users are more likely to consider features as *'not currently available'* (63% of the time) – only five features were chosen as currently available by a majority of users. A majority of professionals thought that twenty five of the thirty seven features were currently available - on average stating that features were *'currently available'* 57% of the time.

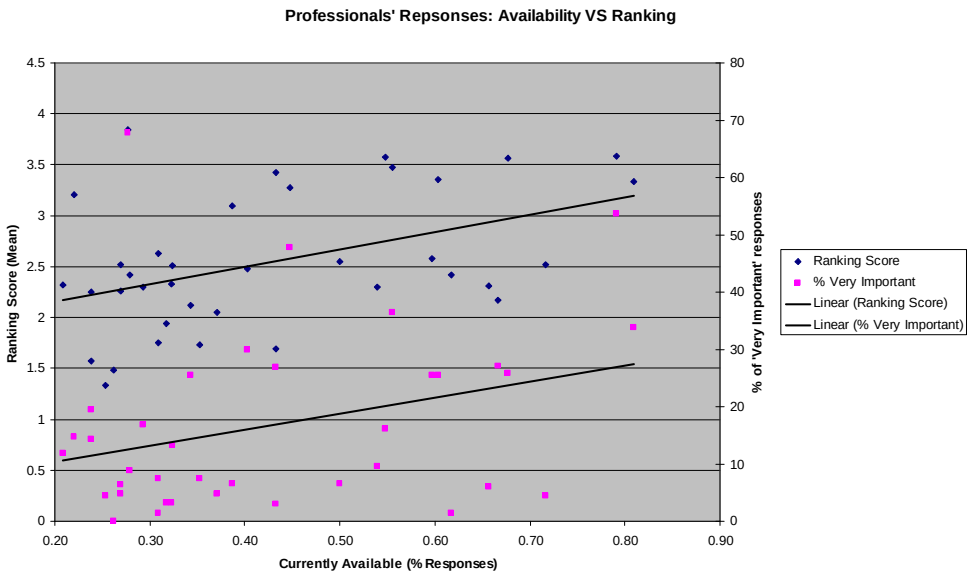
Overall Priorities

'It would have a battery that lasts for a long time' for users and *'it would be usable everywhere the user goes'* for professionals stand out as features that are considered relatively important but also not currently available. Users were more likely to consider that there '*was someone who was responsible for arranging repairs'* but did not rate this highly, whilst professionals were likely to consider that devices exist that '*are adaptable as the users' needs and abilities change'* but ranked this lowly. *'Offering the right access method'* is considered both relatively important and likely to be available by both users and professionals.

Correlation between availability and ranking

A weak correlation is seen between ranking and availability – i.e. the more highly ranked a feature the more highly rated as 'currently available' the feature will be. For users (r= 0.02343) this correlation was weaker than for professionals (r= 0.4431). Outliers to this trend have been highlighted elsewhere.





Discussion

This report provides an extensive investigation into the features of communication aid design as perceived by users of these devices and professionals who provide them to users. The results of this work can be separated into a number of strands which emerged as strong themes throughout the investigation: *Unreliable and complex, a damming verdict on communication aids?* discusses how users and professionals perceive the way that communication aids are made; *Choosing a communication aid, the black art?* examines the tools available to people to help inform the decision around which communication aid is appropriate for someone; *Is there a knowledge gap between users and professionals?* looks at some of the implications for service delivery that emerge from this work.

Throughout these strands of discussion run the three domains that emerged within this research. As can be seen throughout this report the domains are extremely interlinked and inter-dependent: the context of use of an aid affects the requirements for the design of an effective device and success may be entirely dependent on the wider picture around the device use. This inter-dependency should be considered when reading the following discussion: if this research is a damming verdict on the design of communication aids, this cannot stand alone from the effect of the context and wider picture; if choice of a communication aid is currently a black art, this cannot just sit within the responsibility of services or individuals but also highlights deficits in the design of devices and may be exacerbated by the context of the individual user; poor device design and transparency of features may contribute to the knowledge gap between users and professionals; and the context of individual users may mask the root problem.

Discussion

Unreliable and complex, a damming verdict on communication aids?

Of the three domains that emerged from this research the domain of 'device design' is most damming – interviewees frequently referred to the design of devices with negative connotations and the questionnaire results also highlighted a number of failings of device design. Current devices in general were not considered reliable or durable by either professionals or users. This lack or reliability, it is suggested, impacts severely on the use (and success) of the devices and can possibly contribute to the limited environments that users reported using their device in. An indication of this 'lack of success' of communication aids was the large number of participants who did not use their communication aids as their predominant communication method during the interviews – falling back to using their (often difficult to understand) speech and/or communication partners.

Another strong theme emerging through the data was the effect of the slow speed of communication. This slowed communication rate was linked to the success of devices; users and professionals felt strongly that communication aids should enable communication to be as speedy and spontaneous as possible. The effect of slowed access to a device was acknowledged by users but with the implication that better access methods should be found and systems developed to allow spontaneous communication.

Simplicity of use emerged strongly as a theme and one which was perceived to be related to reliability and speed of communication. Simplicity was referred to both as an aspiration (by users who did not feel their current devices were simple) and with positive connotations when participants felt their devices were currently simple and easy to use. Ease of use was the most highly ranked section in the questionnaire.

Discussion

A large number of design issues emerged from the data which could constitute a useful specification for a communication aid: devices were not perceived as reliable or easy to look after and this was broken down into a number of very specific problems. These features of device performance included: battery life; aesthetics; display options; mounting; ruggedness; size; weight; transportation; and use outdoors.

Of interest in the questionnaire data are the features which (the majority of) professionals and users both agree are 'not currently available'. As discussed, in general, professionals felt that most features already existed and users did not. However, there was agreement from the majority of users and professionals on a number of features – again this could be said to contribute to a specification for the design of future devices. Notable features (those chosen by the majority of both users and professionals) include: *'being useable in all weathers and conditions (durable or rugged)'* - rated most lowly in terms of current availability; *'a battery that lasts a long time'* - featured as not currently available but relatively highly ranked; and *'usable everywhere the user goes'* - the most highly ranked feature for users, but generally considered not currently available.

On the flip side, the *'integration of additional features'* received a low average ranking from both users and professionals but was a feature that professionals generally felt was currently available – this could be considered an unwanted feature by professionals.

In general, the design of devices could be argued to be moving in the right direction – there was a correlation between ranking of features and their considered availability – in other words features that were rated more highly in importance were more likely to be rated as available (by users and professionals).

Discussion

However, as well as a potentially damming review of communication aid design, this data could also reflect poorly on the assessment for and provision of devices – as it could be argued that many of the features noted by participants already exist within some devices on the market. Other data within this report also discusses the context and wider picture of the use of devices which clearly impact greatly on the successful use of devices. Yet, even considering these additional factors, the data still strongly points to required improvements in device design.

Looking at the implications for device design, the data suggests that effort should be concentrated on designing devices with a high perceived speed of communication that are reliable, simple and portable.

Discussion

Is there a knowledge gap between users and professionals?

A result which stands out within this data is that users consistently rate most features as not currently available whereas professionals rate most features as currently available. This disparity implies a significant knowledge gap between users and professionals. Looking at this in more detail, the majority of professionals felt that 25 out of 37 features in the questionnaire were currently available, whereas the majority of users felt that only 5 of the 37 were available.

This result suggests that, whilst professionals working within the field of AAC may have regular exposure to a range of communication aids, users generally appear to have limited exposure to alternative devices. Part of this disparity may be explained by the different perspectives of the users and professionals. In other words, users are naturally more critical of the available features as they have in-depth experience of a device and may find it difficult to generalise past this. In addition, some users may have forgotten information about other devices that may have been presented during the selection and provision process. It is also possible that users and professionals would disagree about whether a feature was effective enough to 'exist'. However, this result also suggests that users are not shown, or described, the range of possible devices during assessment and that the assessment process may often be orientated around a specific device – i.e. fitting the device to the person – and that the user has not trialled other devices or understood that other devices may exist with features that may meet their needs more closely.

An interesting example of the difference in opinion and perception between users and professionals can be seen when looking at the responses to the *'it would integrate additional features in one device'* question: the majority of professional respondents acknowledged that this feature exists in current devices but ranked it

Discussion

lowest of all features. Users also ranked the feature lowly but the majority were not aware that this was possible with current devices. Similarly with *'it would offer the right access method for me'* (which was ranked highly by users and most highly by professionals) users were evenly split on whether this was possible with current devices whereas 75% of professional respondents felt that this was already possible.

The interview data also supported this assertion. When participants discussed their aspirations for communication aid design, or described things which they would like to improve about their current device, they often described features that currently exist in other devices on the market. Again, this suggests failings in the provision process – that there had not been review of users device usage after provision; that users had not felt able to request a review of their device when they perceived difficulties with them; that they were unlikely to have been given an effective opportunity at the outset of provision to trial devices in depth. This is further highlighted when looking at the data around the context and wider picture of communication aid use: users indicated that training and support was an important requirement. Regular reviews per-se were not necessarily required but targeted reviews initiated either by users, device failure or planned preventative maintenance may be preferable. These aspects of training and support tie in with the discussion around device design as there was recognition that simpler and more reliable devices would reduce the need for training and support (or allow self-directed learning and support).

Other results within this study, i.e. the good correlation between users and professionals rankings, imply that professionals are able to empathise with users' needs relatively well. However the data also suggests that professionals are not able to turn this empathy into an effective assessment of 'device need'.

Discussion

Choosing a communication aid, the black art?

This research highlights the challenge in choosing a communication aid effectively – many of the issues and themes emerging from the research illustrate deficits in the service provision of communication aids, and it is suggested that many of the problems highlighted relate back to the initial assessment or decision making process. The research illustrates that in-depth consideration of the features of the AAC device with the potential user is a key stage in terms of the success and effectiveness of a communication aid.

It is suggested that there is a deficit in the available tools to support the AAC decision making process. This research has highlighted a large number of 'features' and 'factors' that impact on someone's use of a communication aid. These features are split across the three domains of device design, the wider picture and the context of use [see Figure 8]. Many of the themes relating to the decision making process emerge in the 'wider picture' domain. The *'influence of AAC service delivery'* emerged as a strong theme with a number of interview participants discussing the paucity in the assessment process and little reference to any extended trials or extended period of decision making about an appropriate device. The principles of 'assessment' rather than 'choice making' in collaboration still seem to be prevalent.

The device design domain also highlights the issue around assessment: many of the features presented in this domain emerged from the data as a result of a deficit – for example, *'weight'* was a consideration that participants discussed, mainly suggesting that their device was too heavy; thus weight is a feature which should have been more comprehensively covered at the assessment or decision making stage.

Discussion

An effective decision support tool used in the communication aid choice process, based around these features and factors, could save time and resources by reducing trial periods and abandonment and lead to more appropriate and functional provision.

One of the outputs of this research is the potential seed of a ***decision support tool***. A number of the interviews in the research described above relied heavily on the use of the prompt sheets in order to facilitate discussion. This demonstrated the ability of such support materials to elucidate information about communication aid design from users. Analysis of the interview data has highlighted the issues of particular importance on the prompt sheets and the possible gaps. Analysis of the questionnaire data has also identified the features and factors of importance to users and professionals, and also those which are less important or are ambiguous to users and professionals. To give examples: a large number of features were mostly rated as 'very important' by users and professionals – these are all features that, by this measure, should be included in a decision support tool; a number of the questionnaire sections did not give a clear correlation between the two ranking measures – suggesting that the questions in these sections were not sufficiently distinct and that participants found them ambiguous.

This research has highlighted problems within the decision making process around communication aids – during this process, professionals and users are not considering all of the features and factors that may affect their future use of a device. Deficits in the assessment procedure (in a clinical setting) or decision making process (in an individual or shared setting) will impact strongly on the success and effectiveness of a device and it is proposed that a decision support tool may be able to help address some of these deficits.

Discussion

Limitations of the study

The qualitative interview data presented in this study was sourced from participants predominately in South Yorkshire; this provides significant potential for regional variance to exist particularly around issues such as service delivery where regional variation is known to exist.

There is an inherent difficulty in interviewing people with speech, language or communication needs in that they are often unable to give long and free-flowing responses to questions and there can be a difficulty in having an unstructured conversation around a topic. Resources were prepared, and used, during the interviews to aid involvement of the users in the interviews and this did have some success in helping participants investigate the issues around the topic. There was a difficulty, however, in helping participants to discuss the topic in more general terms and the use of the resources did significantly lead the interviews.

The interviews often relied significantly on conversation partners/carers 'interpreting' for the user and also often advocating on their behalf. This is likely to reflect the situation for these participants in most aspects of day to day life, but may have influenced the data by not allowing participants to voice their own opinions effectively.

The number of respondents to the questionnaire who were communication aid users was generally too low to be able to derive significant trends in this data. More professionals (possibly a significant percentage of the 'professionals' population') responded than users, even though the population of users should be significantly greater than that of professionals – this indicates the relative difficulty in 'reaching' communication aid users and this also suggests that only 'empowered' (and possibly more affluent and time rich) user participants replied to the questionnaire.

The design of the questionnaire was possibly too long and complex which may have impacted on the response rate, particularly among users. This was, in fact, noted by some respondents and could also possibly be seen in a slight drop off in responses to some later questions. The combination of the 'availability', 'importance' and 'ranking' measures, whilst successfully completed by users and professionals, may also have been too complex. Although significant efforts were made to offer the questionnaire in a number of symbolised formats it was not possible to offer it in all formats (in one case because the symbol company would not grant permission) – this again may have restricted the response rate. This also raises an ethical question over the use of symbols – where the symbol company has, effectively, been able to veto the publication of information and potential involvement of users in the study.

There is also an inherent difficulty in differentiating the questionnaire for use by all potential respondents as some of the concepts were not possible to represent meaningfully in more simplified language.

The 'importance' measure (a 3-point likert scale) was not used effectively – responses were more usefully pooled into 'very important' and 'not important or maybe important'. However, a number of respondents commented that they found it difficult to rank the criteria effectively. Ranking the 'importance' responses did provide a relatively good proxy for the ranking measure – it correlated moderately well. It is suggested that only a single measure is used in future studies, but the choice of this measure may prove challenging.

Future Work

The ethos behind the work described here was to begin a process of involving users in the design of communication aids and a number of possible future work streams have emerged from this research. Users should be more actively involved in both designing communication aids and in the decision making process of choosing an aid. The design of communication aids is closely linked to the decision making process around choosing communication aids and there is a need to address both aspects in further research.

Future Work

Improving the design of communication aids

A number of design challenges can be seen in the results – the challenge of designing a truly effective communication aid appears to be one that is still far from being met. The results of this research, summarised in the 'domains of communication aid use' in Figure 8, can be seen as an initial specification for future device design. This specification has been derived from working with users and professionals in the ways described, however these methods could be improved upon to make the data richer. The fact that such a large number of features have been highlighted could also suggest that industry needs to be engaged more fully in involving users in the design process.

Improving the way that communication aids work

Another way of looking at the results from this research is that devices need to be improved to overcome the problems highlighted. Looking at the 'device' domain of communication aid use, a large number of factors have been identified that may lead to the abandonment of devices. These factors are all ones that it could be argued have been overcome in other areas of technology development – thus one solution to these problems maybe the application of current high-end technologies. For example, e-ink technology used in e-books has overcome the problems of sunlight readability that were highlighted during the research, however this technology is yet to be implemented within a communication aid.

Future Work

Decision Support – Choice Making and Assessment of Communication Aids

This research suggests that there is a gap in the tools available to AAC professionals to aid with assessments and to potential users to aid with decision making around the choice of a communication aid.

A decision support tool could be used as part of the consideration, trials, selection, provision and review processes.

Both the questionnaire and the interview prompt sheets could be used as the initial basis for a decision support tool: the questionnaire can be the basis of a tool for users to self-evaluate their requirements for the communication aid; the prompt sheets could also be developed into a tool that could be used independently or collaboratively between an AAC professional and a user.

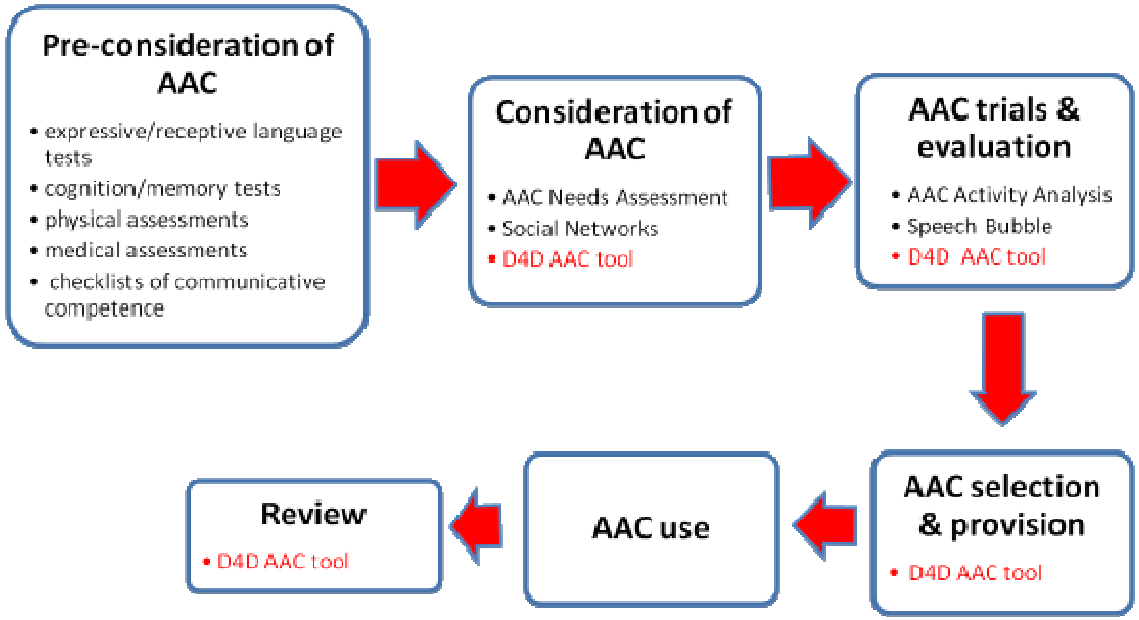


Figure 9: Use of proposed Decision-Making Tool

It is suggested that such a decision making tool has been partially validated through the process of using both the prompt sheets and the questionnaire in this study. This research has also, as discussed previously, highlighted a number of areas within the potential tool that should be modified or emphasised.

Glossary

AAC:
"Augmentative and Alternative Communication (AAC) are the words used to describe extra ways of helping people who find it hard to communicate by speech or writing. AAC helps them to communicate more easily." [ISAAC, 2008] There are two main types of AAC system: unaided and aided. Most people who use AAC use a combination of unaided and aided methods.

Aided Communication:
"This is how we describe methods of communication which involve additional equipment, such as a picture chart, a communication book, a computer or special communication aid. Aided methods of augmentative communication may be 'low tech' or 'high tech'. Both low and high-tech systems can be used by people who are unable to spell or read, as well as by people who are highly literate."[1]

VOCA:
A Voice Output Communication Aid (VOCA) is "any device whose primary function is to use electronically stored speech as a means of communication." [4]
VOCAs can range from simple single-message devices which use recorded speech, to complex computer-based systems which store many messages and use an artificial or computer-generated voice. They are often referred to as 'Talkers'

Low-Tech:
"Low-tech communication systems may take many forms and are anything you can use which does not need a battery to function. Low-tech communication systems include a pen and paper to write messages, alphabet charts, charts and books with picture symbols or photos, and tangible symbols."[2]

High-Tech:
"High-tech communication systems are devices requiring at least a battery to operate. High-tech communication systems range from simple high-tech (e.g. single message devices, pointer boards, toys or books which speak when touched) to very sophisticated systems (e.g. specialised computers and programs, electronic aids which speak and/or print)."[3]
Within this project devices have been categorised into 'high tech', 'mid tech' and 'light tech'. Those with a dynamic screen and a synthesised voice were either 'high tech (medium to large size)' or 'mid tech (small or handheld size)' whilst those with a static screen and a recorded voice (subdivided into '9 or more squares' or '1 to 8 squares') were categorised as 'light tech'.

Unaided Communication:
"This is how we describe methods of communication that do not involve a piece of additional equipment. Body language, gestures, pointing, eye pointing, facial expressions, vocalisations, British Sign Language, and Makaton are examples of unaided methods of augmentative communication."[5]

[1,2,3,5][Communication Matters website, www.communicationmatters.org.uk] [4] [ACE Centre website, www.ace-north.org.uk]

Appendices

Appendix 1: Survey Completion

	User		Professional	
	Count	Column N %	Count	Column N %
Paper	28	65.1%	33	48.5%
Online	15	34.9%	35	51.5%

Appendix 2: User Participants Breakdown

	No		Yes	
	Count	Row N %	Count	Row N %
Do you use aided communication	5	14.7%	29	85.3%
Do you support someone who uses aided communication	11	57.9%	8	42.1%
Do you use (or have you used) a voice output communication aid	3	9.7%	28	90.3%

Appendix 3: Types of aided communication used currently and in past

	Not Used		Used	
	Count	Row N %	Count	Row N %
Current: High Tech Communication Aid	19	44.2%	24	55.8%
Past: High Tech Communication Aid	39	90.7%	4	9.3%
Current: Mid Tech Communication Aid	34	79.1%	9	20.9%
Past: Mid Tech Communication Aid	39	90.7%	4	9.3%
Current: Mid-Light Tech Communication Aid	42	97.7%	1	2.3%
Past: Mid-Light Tech Communication Aid	39	90.7%	4	9.3%
Current: Light Tech Communication Aid	39	90.7%	4	9.3%
Past: Light Tech Communication Aid	39	90.7%	4	9.3%
Current:Low Tech System	30	69.8%	13	30.2%
Past:Low Tech System	34	79.1%	9	20.9%

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Appendix 4: Users' main setting

		Count	Column N %
setting	Live alone	4	11.1%
	Live with family	27	75.0%
	Live in supported accommodation	3	8.3%
	Live in residential care home	2	5.6%
	Other	0	.0%

Appendix 5: Professional Respondents' Professions

		Count	Column N %
What is your job title?	Allied Health Professional	1	1.8%
	Asistant Manager	1	1.8%
	Assistive Technology Specialist	1	1.8%
	Instructor	1	1.8%
	Housewife	1	1.8%
	Occupational Therapist	1	1.8%
	Project Co-ordinator	1	1.8%
	Senior Research Fellow	1	1.8%
	SLT Co-ordinator	1	1.8%
	Speech and Language Therapist	26	45.6%
	Speech and Language Therapist (Specialist)	13	22.8%
	Speech and Language Therapy Assistant	2	3.5%
	Teacher (Specialist)	2	3.5%
	Team Leader	1	1.8%
	Technical Advisor	1	1.8%
	Technician	2	3.5%
	Technologist	1	1.8%

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Appendix 6: Professionals' Caseloads – Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How many people do you work with who use aided communication?	51	1.00	2000.00	70.8235	276.98698
Of these how many people use voice output communication aids?	52	.00	1200.00	43.7885	165.31542
How long have you worked with voice output communication aids?	57	1.00	30.00	11.7632	7.04584

Appendix 7: Professionals' Aided Communication Provision – Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
High Tech Communication Aid - Large	51	.00	1000.00	38.6863	157.38850
High Tech Communication Aid - Small	49	.00	400.00	19.0204	63.32900
Mid Tech Communication Aid	51	.00	225.00	10.6471	34.23614
Light Tech Communication Aid	48	.00	500.00	20.9583	74.16800
Low Tech System	52	.00	200.00	29.5192	39.24458

Appendix 8: Professional Respondents - Medical Condition of Clients

	No		Yes	
	Count	Row N %	Count	Row N %
Learning Disabilities	11	17.7%	51	82.3%
Autistic Spectrum	19	30.6%	43	69.4%
Cerebral Palsy	10	16.1%	52	83.9%
Stroke/CVA	48	77.4%	14	22.6%
Traumatic Brain Injury	37	59.7%	25	40.3%
"Progressive Condition e.g. MS MND Parkinson's "	25	64.1%	14	35.9%

Appendix 9: Professional Respondents - Settings in which see clients

	No		Yes	
	Count	Row N %	Count	Row N %
Settings- Clients' own homes	23	37.1%	39	62.9%
Settings-Residential care	43	69.4%	19	30.6%
Settings-Education settings	14	22.6%	48	77.4%
Settings-Day care settings	48	77.4%	14	22.6%

Appendices

Appendix 10: Ease of Use Section - Importance

user_professional			Choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would get the user's message across quickly with minimum effort (efficient)	Count	4	39	43
		Expected Count	5.4	37.6	43.0
		% within question	9.3%	90.7%	100.0%
		% within choice_pooled	19.0%	26.5%	25.6%
	It would be set up just as the user needs it to be (suitable)	Count	6	36	42
		Expected Count	5.2	36.8	42.0
		% within question	14.3%	85.7%	100.0%
		% within choice_pooled	28.6%	24.5%	25.0%
	It would be adaptable as the user's needs and abilities change (adjustable)	Count	9	33	42
		Expected Count	5.2	36.8	42.0
		% within question	21.4%	78.6%	100.0%
		% within choice_pooled	42.9%	22.4%	25.0%
	It would work well without frequent breakdowns or problems (reliable)	Count	2	39	41
		Expected Count	5.1	35.9	41.0
		% within question	4.9%	95.1%	100.0%
		% within choice_pooled	9.5%	26.5%	24.4%
	Total	Count	21	147	168
		Expected Count	21.0	147.0	168.0
		% within question	12.5%	87.5%	100.0%
		% within choice_pooled	100.0%	100.0%	100.0%

user_professional			Choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would get the user's message across quickly with minimum effort (efficient)	Count	1	67	68
		Expected Count	4.2	63.8	68.0
		% within question	1.5%	98.5%	100.0%
		% within choice_pooled	5.9%	26.3%	25.0%
	It would be set up just as the user needs it to be (suitable)	Count	5	63	68
		Expected Count	4.2	63.8	68.0
		% within question	7.4%	92.6%	100.0%
		% within choice_pooled	29.4%	24.7%	25.0%
	It would be adaptable as the user's needs and abilities change (adjustable)	Count	10	58	68
		Expected Count	4.2	63.8	68.0
		% within question	14.7%	85.3%	100.0%
		% within choice_pooled	58.8%	22.7%	25.0%
	It would work well without frequent breakdowns or problems (reliable)	Count	1	67	68
		Expected Count	4.2	63.8	68.0
		% within question	1.5%	98.5%	100.0%
		% within choice_pooled	5.9%	26.3%	25.0%
	Total	Count	17	255	272
		Expected Count	17.0	255.0	272.0
		% within question	6.2%	93.8%	100.0%
		% within choice_pooled	100.0%	100.0%	100.0%

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Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	5.763a	3	.124
	Likelihood Ratio	5.903	3	.116
	Linear-by-Linear Association	.055	1	.815
	N of Valid Cases	168		
Professional	Pearson Chi-Square	13.741b	3	.003
	Likelihood Ratio	13.821	3	.003
	Linear-by-Linear Association	.313	1	.576
	N of Valid Cases	272		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.13.				
b. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 4.25.				

Appendix 11: Ease of Use Section - Current Availability Responses

user_professional			Current		
			Not Currently	Currently	Total
User	It would get the user's message across quickly with minimum effort (efficient)	Count	26	17	43
		Expected Count	27.4	15.6	43.0
		% within question	60.5%	39.5%	100.0%
		% within current	24.3%	27.9%	25.6%
	It would be set up just as the user needs it to be (suitable)	Count	27	15	42
		Expected Count	26.8	15.2	42.0
		% within question	64.3%	35.7%	100.0%
		% within current	25.2%	24.6%	25.0%
	It would be adaptable as the user's needs and abilities change (adjustable)	Count	29	13	42
		Expected Count	26.8	15.2	42.0
		% within question	69.0%	31.0%	100.0%
		% within current	27.1%	21.3%	25.0%
	It would work well without frequent breakdowns or problems (reliable)	Count	25	16	41
		Expected Count	26.1	14.9	41.0
		% within question	61.0%	39.0%	100.0%
		% within current	23.4%	26.2%	24.4%
	Total	Count	107	61	168
		Expected Count	107.0	61.0	168.0
		% within question	63.7%	36.3%	100.0%
		% within current	100.0%	100.0%	100.0%

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user_professional			current		
			Not Currently	Currently	Total
Professional	It would get the user's message across quickly with minimum effort (efficient)	Count	21	47	68
		Expected Count	24.8	43.2	68.0
		% within question	30.9%	69.1%	100.0%
		% within current	21.2%	27.2%	25.0%
	It would be set up just as the user needs it to be (suitable)	Count	21	47	68
		Expected Count	24.8	43.2	68.0
		% within question	30.9%	69.1%	100.0%
		% within current	21.2%	27.2%	25.0%
	It would be adaptable as the user's needs and abilities change (adjustable)	Count	15	53	68
		Expected Count	24.8	43.2	68.0
		% within question	22.1%	77.9%	100.0%
		% within current	15.2%	30.6%	25.0%
	It would work well without frequent breakdowns or problems (reliable)	Count	42	26	68
		Expected Count	24.8	43.2	68.0
		% within question	61.8%	38.2%	100.0%
		% within current	42.4%	15.0%	25.0%
	Total	Count	99	173	272
		Expected Count	99.0	173.0	272.0
		% within question	36.4%	63.6%	100.0%
		% within current	100.0%	100.0%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	.852a	3	.837
	Likelihood Ratio	.861	3	.835
	Linear-by-Linear Association	.041	1	.840
	N of Valid Cases	168		
Professional	Pearson Chi-Square	26.728b	3	.000
	Likelihood Ratio	26.317	3	.000
	Linear-by-Linear Association	10.282	1	.001
	N of Valid Cases	272		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.89.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.75.

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Appendix 12: Ease of Use Section – Rankings Responses

	Users				Professionals			
	Rank	Mean	Std. Dev.	'Very Important' % (Rank)	Rank	Mean	Std. Dev	'Very Important' % (Rank)
It would get the user's message across quickly with minimum effort (efficient)	1	1.68	.904	90.7% (2)	1	1.75	.841	98.5% (1)
It would work well without frequent breakdowns or problems (reliable)	2	2.16	1.128	95.1% (1)	2	2.42	1.103	98.5% (1)
It would be set up just as the user needs it to be (suitable)	3	2.44	1.252	85.7% (3)	3	2.63	1.042	92.6% (3)
It would be adaptable as the user's needs and abilities change (adjustable)	4	2.51	1.144	78.6% (4)	4	3.21	.978	85.3% (4)

Appendix 13: How a Device is Made Section – Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would be comfortable to use	Count	5	35	40
		Expected Count	4.2	35.8	40.0
		% within question	12.5%	87.5%	100.0%
		% within choice_pooled	29.4%	24.1%	24.7%
	It would be the right size for the user	Count	4	37	41
		Expected Count	4.3	36.7	41.0
		% within question	9.8%	90.2%	100.0%
		% within choice_pooled	23.5%	25.5%	25.3%
	It would be easy for the user to carry around (by hand or on a wheelchair)	Count	1	39	40
		Expected Count	4.2	35.8	40.0
		% within question	2.5%	97.5%	100.0%
		% within choice_pooled	5.9%	26.9%	24.7%
	It would be useable in all weathers and conditions (durable or rugged)	Count	7	34	41
		Expected Count	4.3	36.7	41.0
		% within question	17.1%	82.9%	100.0%
		% within choice_pooled	41.2%	23.4%	25.3%
	Total	Count	17	145	162
		Expected Count	17.0	145.0	162.0
		% within question	10.5%	89.5%	100.0%
		% within choice_pooled	100.0%	100.0%	100.0%

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user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would be comfortable to use	Count	9	59	68
		Expected Count	10.8	57.2	68.0
		% within question	13.2%	86.8%	100.0%
		% within choice_pooled	20.9%	25.8%	25.0%
	It would be the right size for the user	Count	6	62	68
		Expected Count	10.8	57.2	68.0
		% within question	8.8%	91.2%	100.0%
		% within choice_pooled	14.0%	27.1%	25.0%
	It would be easy for the user to carry around (by hand or on a wheelchair)	Count	5	63	68
		Expected Count	10.8	57.2	68.0
		% within question	7.4%	92.6%	100.0%
		% within choice_pooled	11.6%	27.5%	25.0%
	It would be useable in all weathers and conditions (durable or rugged)	Count	23	45	68
		Expected Count	10.8	57.2	68.0
		% within question	33.8%	66.2%	100.0%
		% within choice_pooled	53.5%	19.7%	25.0%
	Total	Count	43	229	272
		Expected Count	43.0	229.0	272.0
		% within question	15.8%	84.2%	100.0%
		% within choice_pooled	100.0%	100.0%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	4.806[a]	3	.187
	Likelihood Ratio	5.613	3	.132
	Linear-by-Linear Association	.102	1	.750
	N of Valid Cases	162		
Professional	Pearson Chi-Square	23.065[b]	3	.000
	Likelihood Ratio	20.963	3	.000
	Linear-by-Linear Association	9.253	1	.002
	N of Valid Cases	272		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 4.20.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.75.

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Appendix 14: How a Device is Made Section – Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would be comfortable to use	Count	23	17	40
		Expected Count	27.2	12.8	40.0
		% within question	57.5%	42.5%	100.0%
		% within current	20.7%	32.7%	24.5%
	It would be the right size for the user	Count	22	19	41
		Expected Count	27.9	13.1	41.0
		% within question	53.7%	46.3%	100.0%
		% within current	19.8%	36.5%	25.2%
	It would be easy for the user to carry around (by hand or on a wheelchair)	Count	29	12	41
		Expected Count	27.9	13.1	41.0
		% within question	70.7%	29.3%	100.0%
		% within current	26.1%	23.1%	25.2%
	It would be useable in all weathers and conditions (durable or rugged)	Count	37	4	41
		Expected Count	27.9	13.1	41.0
		% within question	90.2%	9.8%	100.0%
		% within current	33.3%	7.7%	25.2%
	Total	Count	111	52	163
		Expected Count	111.0	52.0	163.0
		% within question	68.1%	31.9%	100.0%
		% within current	100.0%	100.0%	100.0%

user_professional			current		
			Not Currently	Currently	Total
Professional	It would be comfortable to use	Count	22	46	68
		Expected Count	30.0	38.0	68.0
		% within question	32.4%	67.6%	100.0%
		% within current	18.3%	30.3%	25.0%
	It would be the right size for the user	Count	19	49	68
		Expected Count	30.0	38.0	68.0
		% within question	27.9%	72.1%	100.0%
		% within current	15.8%	32.2%	25.0%
	It would be easy for the user to carry around (by hand or on a wheelchair)	Count	24	44	68
		Expected Count	30.0	38.0	68.0
		% within question	35.3%	64.7%	100.0%
		% within current	20.0%	28.9%	25.0%
	It would be useable in all weathers and conditions (durable or rugged)	Count	55	13	68
		Expected Count	30.0	38.0	68.0
		% within question	80.9%	19.1%	100.0%
		% within current	45.8%	8.6%	25.0%
	Total	Count	120	152	272
		Expected Count	120.0	152.0	272.0
		% within question	44.1%	55.9%	100.0%
		% within current	100.0%	100.0%	100.0%

Appendices

Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	15.390[a]	3	.002
	Likelihood Ratio	17.164	3	.001
	Linear-by-Linear Association	12.439	1	.000
	N of Valid Cases	163		
Professional	Pearson Chi-Square	50.463[b]	3	.000
	Likelihood Ratio	52.465	3	.000
	Linear-by-Linear Association	32.140	1	.000
	N of Valid Cases	272		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.76.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 30.00.				

Appendix 15: How a Device is Made Section – Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	'Very Important' % (Rank)	Rank	Mean	Std. Dev	'Very Important' % (Rank)
It would be easy for the user to carry around (by hand or on a wheelchair)	1	1.86	1.032	97.5% (1)	1	1.73	.947	92.6% (1)
It would be comfortable to use	2	2.11	1.149	87.5% (3)	3	2.51	1.064	86.8% (3)
It would be useable in all weathers and conditions (durable or rugged)	3	2.46	1.238	82.9% (4)	4	3.34	.930	66.2% (4)
It would be the right size for the user	4	2.59	1.166	90.2% (2)	2	2.42	.924	91.2% (2)

Appendices

Appendix 16: Device Performance – Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would be ready to use quickly when needed	Count	3	38	41
		Expected Count	5.1	35.9	41.0
		% within question	7.3%	92.7%	100.0%
	It would have a battery that lasts for a long time	Count	3	38	41
		Expected Count	5.1	35.9	41.0
		% within question	7.3%	92.7%	100.0%
	It would be rechargeable whilst using it	Count	10	30	40
		Expected Count	4.9	35.1	40.0
		% within question	25.0%	75.0%	100.0%
	It would be easy to look after and sort out any problems (maintenance)	Count	4	36	40
		Expected Count	4.9	35.1	40.0
		% within question	10.0%	90.0%	100.0%
	Total	Count	20	142	162
		Expected Count	20.0	142.0	162.0
		% within question	12.3%	87.7%	100.0%

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would be ready to use quickly when needed	Count	2	65	67
		Expected Count	6.8	60.2	67.0
		% within question	3.0%	97.0%	100.0%
	It would have a battery that lasts for a long time	Count	4	63	67
		Expected Count	6.8	60.2	67.0
		% within question	6.0%	94.0%	100.0%
	It would be rechargeable whilst using it	Count	18	49	67
		Expected Count	6.8	60.2	67.0
		% within question	26.9%	73.1%	100.0%
	It would be easy to look after and sort out any problems (maintenance)	Count	3	64	67
		Expected Count	6.8	60.2	67.0
		% within question	4.5%	95.5%	100.0%
	Total	Count	27	241	268
		Expected Count	27.0	241.0	268.0
		% within question	10.1%	89.9%	100.0%

Appendices

Appendix 17: Device Performance – Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would be ready to use quickly when needed	Count	25	16	41
		Expected Count	26.0	15.0	41.0
		% within question	61.0%	39.0%	100.0%
	It would have a battery that lasts for a long time	Count	30	11	41
		Expected Count	26.0	15.0	41.0
		% within question	73.2%	26.8%	100.0%
	It would be rechargeable whilst using it	Count	23	18	41
		Expected Count	26.0	15.0	41.0
		% within question	56.1%	43.9%	100.0%
	It would be easy to look after and sort out any problems (maintenance)	Count	26	15	41
		Expected Count	26.0	15.0	41.0
		% within question	63.4%	36.6%	100.0%
	Total	Count	104	60	164
		Expected Count	104.0	60.0	164.0
		% within question	63.4%	36.6%	100.0%

user_professional			current		
			Not Currently	Currently	Total
Professional	It would be ready to use quickly when needed	Count	29	38	67
		Expected Count	37.5	29.5	67.0
		% within question	43.3%	56.7%	100.0%
	It would have a battery that lasts for a long time	Count	44	23	67
		Expected Count	37.5	29.5	67.0
		% within question	65.7%	34.3%	100.0%
	It would be rechargeable whilst using it	Count	29	38	67
		Expected Count	37.5	29.5	67.0
		% within question	43.3%	56.7%	100.0%
	It would be easy to look after and sort out any problems (maintenance)	Count	48	19	67
		Expected Count	37.5	29.5	67.0
		% within question	71.6%	28.4%	100.0%
	Total	Count	150	118	268
		Expected Count	150.0	118.0	268.0
		% within question	56.0%	44.0%	100.0%

Appendices

Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	2.733[a]	3	.435
	Likelihood Ratio	2.791	3	.425
	Linear-by-Linear Association	.084	1	.772
	N of Valid Cases	164		
Professional	Pearson Chi-Square	17.988[b]	3	.000
	Likelihood Ratio	18.266	3	.000
	Linear-by-Linear Association	5.322	1	.021
	N of Valid Cases	268		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.00.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 29.50.				

Appendix 18: Device Performance – Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	'Very Important' % (Rank)	Rank	Mean	Std. Dev	'Very Important' % (Rank)
It would be ready to use quickly when needed	1	1.74	1.039	92.7% (1)	1	1.69	1.022	97.0% (1)
It would have a battery that lasts for a long time	2	1.89	.867	92.7% (1)	2	2.31	.906	94.0% (3)
It would be easy to look after and sort out any problems (maintenance)	3	2.60	1.193	90.0% (3)	3	2.52	.943	95.5% (2)
It would be rechargeable whilst using it	4	3.00	1.393	75.0% (4)	4	3.42	.869	73.1% (4)

Appendices

Appendix 19: Physical Environment and Transport – Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would be usable in a range of places and situations	Count	1	37	38
		Expected Count	4.5	33.5	38.0
		% within question	2.6%	97.4%	100.0%
	It would be usable everywhere the user goes	Count	3	35	38
		Expected Count	4.5	33.5	38.0
		% within question	7.9%	92.1%	100.0%
	It would be usable in a car or on a bus/minibus	Count	12	26	38
		Expected Count	4.5	33.5	38.0
		% within question	31.6%	68.4%	100.0%
	It would be usable both indoors and outdoors	Count	2	36	38
		Expected Count	4.5	33.5	38.0
		% within question	5.3%	94.7%	100.0%
	Total	Count	18	134	152
		Expected Count	18.0	134.0	152.0
		% within question	11.8%	88.2%	100.0%

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would be usable in a range of places and situations	Count	2	61	63
		Expected Count	12.0	51.0	63.0
		% within question	3.2%	96.8%	100.0%
	It would be usable everywhere the user goes	Count	17	46	63
		Expected Count	12.0	51.0	63.0
		% within question	27.0%	73.0%	100.0%
	It would be usable in a car or on a bus/minibus	Count	23	40	63
		Expected Count	12.0	51.0	63.0
		% within question	36.5%	63.5%	100.0%
	It would be usable both indoors and outdoors	Count	6	57	63
		Expected Count	12.0	51.0	63.0
		% within question	9.5%	90.5%	100.0%
	Total	Count	48	204	252
		Expected Count	48.0	204.0	252.0
		% within question	19.0%	81.0%	100.0%

Appendices

Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	19.410a	3	.000
	Likelihood Ratio	17.278	3	.001
	Linear-by-Linear Association	1.803	1	.179
	N of Valid Cases	152		
Professional	Pearson Chi-Square	29.029b	3	.000
	Likelihood Ratio	31.880	3	.000
	Linear-by-Linear Association	1.661	1	.197
	N of Valid Cases	252		
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 4.50.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.00.				

Appendix 20: Physical Environment and Transport – Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would be usable in a range of places and situations	Count	21	17	38
		Expected Count	23.8	14.2	38.0
		% within question	55.3%	44.7%	100.0 %
	It would be usable everywhere the user goes	Count	26	12	38
		Expected Count	23.8	14.2	38.0
		% within question	68.4%	31.6%	100.0 %
	It would be usable in a car or on a bus/minibus	Count	26	12	38
		Expected Count	23.8	14.2	38.0
		% within question	68.4%	31.6%	100.0 %
	It would be usable both indoors and outdoors	Count	22	16	38
		Expected Count	23.8	14.2	38.0
		% within question	57.9%	42.1%	100.0 %
	Total	Count	95	57	152
		Expected Count	95.0	57.0	152.0
		% within question	62.5%	37.5%	100.0 %

Appendices

user_professional			current		
			Not Currently	Currently	Total
Professional	It would be usable in a range of places and situations	Count	20	43	63
		Expected Count	32.8	30.2	63.0
		% within question	31.7%	68.3%	100.0 %
	It would be usable everywhere the user goes	Count	42	21	63
		Expected Count	32.8	30.2	63.0
		% within question	66.7%	33.3%	100.0 %
	It would be usable in a car or on a bus/minibus	Count	35	28	63
		Expected Count	32.8	30.2	63.0
		% within question	55.6%	44.4%	100.0 %
	It would be usable both indoors and outdoors	Count	34	29	63
		Expected Count	32.8	30.2	63.0
		% within question	54.0%	46.0%	100.0 %
	Total	Count	131	121	252
		Expected Count	131.0	121.0	252.0
		% within question	52.0%	48.0%	100.0 %

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	2.330a	3	.507
	Likelihood Ratio	2.334	3	.506
	Linear-by-Linear Association	.050	1	.823
	N of Valid Cases	152		
Professional	Pearson Chi-Square	16.200b	3	.001
	Likelihood Ratio	16.510	3	.001
	Linear-by-Linear Association	3.880	1	.049
	N of Valid Cases	252		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.25.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 30.25.

Appendices

Appendix 21: Physical Environment and Transport – Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
It would be usable everywhere the user goes	1	1.39	.899	92.1% (3)	2	2.17	1.206	73.0% (3)
It would be usable in a range of places and situations	2	2.27	1.008	97.4% (1)	1	1.94	.827	96.8% (1)
It would be usable both indoors and outdoors	3	2.41	1.012	94.7% (2)	3	2.30	1.013	90.5% (2)
It would be usable in a car or on a bus/minibus	4	2.94	1.268	68.4% (4)	4	3.47	.724	63.5% (4)

Appendix 22: Design and Layout – Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would be easy to find words/messages/actions	Count	3	38	41
		Expected Count	6.3	34.7	41.0
		% within question	7.3%	92.7%	100.0%
	It would be easy to make changes or add things as needed	Count	4	36	40
		Expected Count	6.1	33.9	40.0
		% within question	10.0%	90.0%	100.0%
	It would be usable for spontaneous messages	Count	4	37	41
		Expected Count	6.3	34.7	41.0
		% within question	9.8%	90.2%	100.0%
	It would integrate additional features in one device	Count	14	27	41
		Expected Count	6.3	34.7	41.0
		% within question	34.1%	65.9%	100.0%
	Total	Count	25	138	163
		Expected Count	25.0	138.0	163.0
		% within question	15.3%	84.7%	100.0%

Appendices

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would be easy to find words/messages/actions	Count	0	65	65
		Expected Count	14.2	50.8	65.0
		% within question	.0%	100.0%	100.0%
	It would be easy to make changes or add things as needed	Count	2	63	65
		Expected Count	14.2	50.8	65.0
		% within question	3.1%	96.9%	100.0%
	It would be usable for spontaneous messages	Count	11	54	65
		Expected Count	14.2	50.8	65.0
		% within question	16.9%	83.1%	100.0%
	It would integrate additional features in one device	Count	44	21	65
		Expected Count	14.2	50.8	65.0
		% within question	67.7%	32.3%	100.0%
	Total	Count	57	203	260
		Expected Count	57.0	203.0	260.0
		% within question	21.9%	78.1%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	15.063a	3	.002
	Likelihood Ratio	13.367	3	.004
	Linear-by-Linear Association	10.083	1	.001
	N of Valid Cases	163		
Professional	Pearson Chi-Square	1.122E2	3	.000
	Likelihood Ratio	114.724	3	.000
	Linear-by-Linear Association	89.001	1	.000
	N of Valid Cases	260		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.13.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.25.				

Appendices

Appendix 23: Design and Layout – Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would be easy to find words/messages /actions	Count	21	20	41
		Expected Count	22.5	18.5	41.0
		% within question	51.2%	48.8%	100.0%
	It would be easy to make changes or add things as needed	Count	21	20	41
		Expected Count	22.5	18.5	41.0
		% within question	51.2%	48.8%	100.0%
	It would be usable for spontaneous messages	Count	18	23	41
		Expected Count	22.5	18.5	41.0
		% within question	43.9%	56.1%	100.0%
	It would integrate additional features in one device	Count	30	11	41
		Expected Count	22.5	18.5	41.0
		% within question	73.2%	26.8%	100.0%
	Total	Count	90	74	164
		Expected Count	90.0	74.0	164.0
		% within question	54.9%	45.1%	100.0%

user_professional			current		
			Not Currently	Currently	Total
Professional	It would be easy to find words/messages /actions	Count	17	48	65
		Expected Count	18.8	46.2	65.0
		% within question	26.2%	73.8%	100.0%
	It would be easy to make changes or add things as needed	Count	21	44	65
		Expected Count	18.8	46.2	65.0
		% within question	32.3%	67.7%	100.0%
	It would be usable for spontaneous messages	Count	19	46	65
		Expected Count	18.8	46.2	65.0
		% within question	29.2%	70.8%	100.0%
	It would integrate additional features in one device	Count	18	47	65
		Expected Count	18.8	46.2	65.0
		% within question	27.7%	72.3%	100.0%
	Total	Count	75	185	260
		Expected Count	75.0	185.0	260.0
		% within question	28.8%	71.2%	100.0%

Appendices

Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	7.978a	3	.046
	Likelihood Ratio	8.247	3	.041
	Linear-by-Linear Association	2.819	1	.093
	N of Valid Cases	164		
Professional	Pearson Chi-Square	.656b	3	.884
	Likelihood Ratio	.652	3	.884
	Linear-by-Linear Association	.004	1	.951
	N of Valid Cases	260		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.50.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.75.				

Appendix 24: Design and Layout – Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very Important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
It would be easy to find words/messages /actions	1	2.00	1.138	92.7% (1)	1	1.48	.741	100% (1)
It would be usable for spontaneous messages	2	2.03	1.014	90.2% (2)	2	2.30	.873	83.1% (3)
It would be easy to make changes or add things as needed	3	2.31	1.022	90.0% (3)	3	2.33	.803	96.9% (2)
It would integrate additional features in one device	4	2.89	1.207	65.9% (4)	4	3.84	.416	32.3% (4)

Appendices

Appendix 25: Speech Output Section - Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would have a range of voices to choose from	Count	12	27	39
		Expected Count	10.5	28.5	39.0
		% within question	30.8%	69.2%	100.0%
	It would be quick to speak	Count	8	32	40
		Expected Count	10.8	29.2	40.0
		% within question	20.0%	80.0%	100.0%
	It would have adjustable volume control to suit different situations	Count	6	34	40
		Expected Count	10.8	29.2	40.0
		% within question	15.0%	85.0%	100.0%
	It would offer an alternative way of sharing the user's message	Count	17	23	40
		Expected Count	10.8	29.2	40.0
		% within question	42.5%	57.5%	100.0%
	Total	Count	43	116	159
		Expected Count	43.0	116.0	159.0
		% within question	27.0%	73.0%	100.0%

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would have a range of voices to choose from	Count	13	54	67
		Expected Count	17.5	49.5	67.0
		% within question	19.4%	80.6%	100.0%
	It would be quick to speak	Count	17	50	67
		Expected Count	17.5	49.5	67.0
		% within question	25.4%	74.6%	100.0%
	It would have adjustable volume control to suit different situations	Count	8	59	67
		Expected Count	17.5	49.5	67.0
		% within question	11.9%	88.1%	100.0%
	It would offer an alternative way of sharing the user's message	Count	32	35	67
		Expected Count	17.5	49.5	67.0
		% within question	47.8%	52.2%	100.0%
	Total	Count	70	198	268
		Expected Count	70.0	198.0	268.0
		% within question	26.1%	73.9%	100.0%

Appendices

Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	9.064[a]	3	.028
	Likelihood Ratio	9.073	3	.028
	Linear-by-Linear Association	.946	1	.331
	N of Valid Cases	159		
Professional	Pearson Chi-Square	24.828[b]	3	.000
	Likelihood Ratio	24.243	3	.000
	Linear-by-Linear Association	8.877	1	.003
	N of Valid Cases	268		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.55.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.50.				

Appendix 26: Speech Output Section - Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would have a range of voices to choose from	Count	26	14	40
		Expected Count	23.8	16.2	40.0
		% within question	65.0%	35.0%	100.0%
	It would be quick to speak	Count	22	18	40
		Expected Count	23.8	16.2	40.0
		% within question	55.0%	45.0%	100.0%
	It would have adjustable volume control to suit different situations	Count	18	22	40
		Expected Count	23.8	16.2	40.0
		% within question	45.0%	55.0%	100.0%
	It would offer an alternative way of sharing the user's message	Count	29	11	40
		Expected Count	23.8	16.2	40.0
		% within question	72.5%	27.5%	100.0%
	Total	Count	95	65	160
		Expected Count	95.0	65.0	160.0
		% within question	59.4%	40.6%	100.0%

Appendices

user_professional			current		
			Not Currently	Currently	Total
Professional	It would have a range of voices to choose from	Count	16	51	67
		Expected Count	20.8	46.2	67.0
		% within question	23.9%	76.1%	100.0%
	It would be quick to speak	Count	23	44	67
		Expected Count	20.8	46.2	67.0
		% within question	34.3%	65.7%	100.0%
	It would have adjustable volume control to suit different situations	Count	14	53	67
		Expected Count	20.8	46.2	67.0
		% within question	20.9%	79.1%	100.0%
	It would offer an alternative way of sharing the user's message	Count	30	37	67
		Expected Count	20.8	46.2	67.0
		% within question	44.8%	55.2%	100.0%
	Total	Count	83	185	268
		Expected Count	83.0	185.0	268.0
		% within question	31.0%	69.0%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	7.126[a]	3	.068
	Likelihood Ratio	7.197	3	.066
	Linear-by-Linear Association	.129	1	.720
	N of Valid Cases	160		
Professional	Pearson Chi-Square	11.083[b]	3	.011
	Likelihood Ratio	11.029	3	.012
	Linear-by-Linear Association	3.787	1	.052
	N of Valid Cases	268		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.25.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.75.

Appendices

Appendix 27: Speech Output - Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very Important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
It would be quick to speak	1	1.69	1.142	80.0% (2)	1	2.12	1.097	74.6% (3)
It would have adjustable volume control to suit different situations	2	2.03	.878	85.0% (1)	3	2.32	.850	88.1% (1)
It would offer an alternative way of sharing the user's message	3	2.78	1.124	57.5% (4)	4	3.28	1.000	52.2% (4)
It would have a range of voices to choose from	4	2.80	1.106	69.2% (3)	2	2.25	1.132	80.6% (2)

Appendix 28: Training Section - Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	There would be training for the user in how to use the device	Count	4	34	38
		Expected Count	7.6	30.4	38.0
		% within question	10.5%	89.5%	100.0%
	There would be training for the carers	Count	6	31	37
		Expected Count	7.4	29.6	37.0
		% within question	16.2%	83.8%	100.0%
	There would be training for the family	Count	8	30	38
		Expected Count	7.6	30.4	38.0
		% within question	21.1%	78.9%	100.0%
	There would be training for a wider group of people around the user	Count	12	25	37
		Expected Count	7.4	29.6	37.0
		% within question	32.4%	67.6%	100.0%
	Total	Count	30	120	150
		Expected Count	30.0	120.0	150.0
		% within question	20.0%	80.0%	100.0%

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user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	There would be training for the user in how to use the device	Count	9	54	63
		Expected Count	8.0	55.0	63.0
		% within question	14.3%	85.7%	100.0%
	There would be training for the carers	Count	3	60	63
		Expected Count	8.0	55.0	63.0
		% within question	4.8%	95.2%	100.0%
	There would be training for the family	Count	4	59	63
		Expected Count	8.0	55.0	63.0
		% within question	6.3%	93.7%	100.0%
	There would be training for a wider group of people around the user	Count	16	47	63
		Expected Count	8.0	55.0	63.0
		% within question	25.4%	74.6%	100.0%
	Total	Count	32	220	252
		Expected Count	32.0	220.0	252.0
		% within question	12.7%	87.3%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	6.063[a]	3	.109
	Likelihood Ratio	6.007	3	.111
	Linear-by-Linear Association	5.769	1	.016
	N of Valid Cases	150		
Professional	Pearson Chi-Square	15.177[b]	3	.002
	Likelihood Ratio	14.839	3	.002
	Linear-by-Linear Association	3.451	1	.063
	N of Valid Cases	252		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.40.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.00.

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Appendix 29: Training Section - Current Availability Section

user_professional			current		
			Not Currently	Currently	Total
User	There would be training for the user in how to use the device	Count	21	17	38
		Expected Count	25.2	12.8	38.0
		% within question	55.3%	44.7%	100.0%
	There would be training for the carers	Count	25	12	37
		Expected Count	24.5	12.5	37.0
		% within question	67.6%	32.4%	100.0%
	There would be training for the family	Count	25	13	38
		Expected Count	25.2	12.8	38.0
		% within question	65.8%	34.2%	100.0%
	There would be training for a wider group of people around the user	Count	29	9	38
		Expected Count	25.2	12.8	38.0
		% within question	76.3%	23.7%	100.0%
	Total	Count	100	51	151
		Expected Count	100.0	51.0	151.0
		% within question	66.2%	33.8%	100.0%

user_professional			current		
			Not Currently	Currently	Total
Professional	There would be training for the user in how to use the device	Count	15	48	63
		Expected Count	21.8	41.2	63.0
		% within question	23.8%	76.2%	100.0%
	There would be training for the carers	Count	17	46	63
		Expected Count	21.8	41.2	63.0
		% within question	27.0%	73.0%	100.0%
	There would be training for the family	Count	17	46	63
		Expected Count	21.8	41.2	63.0
		% within question	27.0%	73.0%	100.0%
	There would be training for a wider group of people around the user	Count	38	25	63
		Expected Count	21.8	41.2	63.0
		% within question	60.3%	39.7%	100.0%
	Total	Count	87	165	252
		Expected Count	87.0	165.0	252.0
		% within question	34.5%	65.5%	100.0%

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Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	3.804[a]	3	.283
	Likelihood Ratio	3.827	3	.281
	Linear-by-Linear Association	3.187	1	.074
	N of Valid Cases	151		
Professional	Pearson Chi-Square	24.910[b]	3	.000
	Likelihood Ratio	24.068	3	.000
	Linear-by-Linear Association	16.649	1	.000
	N of Valid Cases	252		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.50.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.75.				

Appendix 30: Training Section - Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very Important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
There would be training for the user in how to use the device	1	1.56	.991	89.5% (1)	1	1.57	.991	85.7% (3)
There would be training for the family	2	2.24	.923	78.9% (3)	2	2.26	.794	93.7% (2)
There would be training for the carers	3	2.35	1.012	83.8% (2)	3	2.52	.849	95.2% (1)
There would be training for a wider group of people around the user	4	2.91	1.234	67.6% (4)	4	3.36	1.103	74.6% (4)

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Appendix 31: Help and Support Section - Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	There would be help and support from carers	Count	6	31	37
		Expected Count	6.6	30.4	37.0
		% within question	16.2%	83.8%	100.0%
	There would be ongoing help and support from professionals	Count	5	33	38
		Expected Count	6.8	31.2	38.0
		% within question	13.2%	86.8%	100.0%
	There would be help and support from the communication aid company who supplies the device	Count	7	25	32
		Expected Count	5.7	26.3	32.0
		% within question	21.9%	78.1%	100.0%
	There would be someone offering regular reviews	Count	12	24	36
		Expected Count	6.4	29.6	36.0
		% within question	33.3%	66.7%	100.0%
	There would be someone who takes responsibility for arranging repairs	Count	2	34	36
		Expected Count	6.4	29.6	36.0
		% within question	5.6%	94.4%	100.0%
	Total	Count	32	147	179
		Expected Count	32.0	147.0	179.0
		% within question	17.9%	82.1%	100.0%

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	There would be help and support from carers	Count	4	58	62
		Expected Count	7.4	54.6	62.0
		% within question	6.5%	93.5%	100.0%
	There would be ongoing help and support from professionals	Count	3	59	62
		Expected Count	7.4	54.6	62.0
		% within question	4.8%	95.2%	100.0%
	There would be help and support from the communication aid company who supplies the device	Count	4	58	62
		Expected Count	7.4	54.6	62.0
		% within question	6.5%	93.5%	100.0%
	There would be someone offering regular reviews	Count	16	46	62
		Expected Count	7.4	54.6	62.0
		% within question	25.8%	74.2%	100.0%
	There would be someone who takes responsibility for arranging repairs	Count	10	52	62
		Expected Count	7.4	54.6	62.0
		% within question	16.1%	83.9%	100.0%
	Total	Count	37	273	310
		Expected Count	37.0	273.0	310.0
		% within question	11.9%	88.1%	100.0%

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Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	10.575[a]	4	.032
	Likelihood Ratio	10.800	4	.029
	Linear-by-Linear Association	.002	1	.969
	N of Valid Cases	179		
Professional	Pearson Chi-Square	18.905[b]	4	.001
	Likelihood Ratio	17.755	4	.001
	Linear-by-Linear Association	9.560	1	.002
	N of Valid Cases	310		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.72.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.40.				

Appendix 32: Help and Support Section - Current Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	There would be help and support from carers	Count	25	12	37
		Expected Count	24.5	12.5	37.0
		% within question	67.6%	32.4%	100.0%
	There would be ongoing help and support from professionals	Count	23	15	38
		Expected Count	25.1	12.9	38.0
		% within question	60.5%	39.5%	100.0%
	There would be help and support from the communication aid company who supplies the device	Count	21	11	32
		Expected Count	21.2	10.8	32.0
		% within question	65.6%	34.4%	100.0%
	There would be someone offering regular reviews	Count	33	4	37
		Expected Count	24.5	12.5	37.0
		% within question	89.2%	10.8%	100.0%
	There would be someone who takes responsibility for arranging repairs	Count	17	19	36
		Expected Count	23.8	12.2	36.0
		% within question	47.2%	52.8%	100.0%
	Total	Count	119	61	180
		Expected Count	119.0	61.0	180.0
		% within question	66.1%	33.9%	100.0%

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user_professional			current		
			Not Currently	Currently	Total
Professional	There would be help and support from carers	Count	31	31	62
		Expected Count	30.8	31.2	62.0
		% within question	50.0%	50.0%	100.0%
	There would be ongoing help and support from professionals	Count	23	39	62
		Expected Count	30.8	31.2	62.0
		% within question	37.1%	62.9%	100.0%
	There would be help and support from the communication aid company who supplies the device	Count	24	38	62
		Expected Count	30.8	31.2	62.0
		% within question	38.7%	61.3%	100.0%
	There would be someone offering regular reviews	Count	42	20	62
		Expected Count	30.8	31.2	62.0
		% within question	67.7%	32.3%	100.0%
	There would be someone who takes responsibility for arranging repairs	Count	34	28	62
		Expected Count	30.8	31.2	62.0
		% within question	54.8%	45.2%	100.0%
	Total	Count	154	156	310
		Expected Count	154.0	156.0	310.0
		% within question	49.7%	50.3%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	15.096[a]	4	.005
	Likelihood Ratio	16.571	4	.002
	Linear-by-Linear Association	.195	1	.659
	N of Valid Cases	180		
Professional	Pearson Chi-Square	15.665[b]	4	.004
	Likelihood Ratio	15.913	4	.003
	Linear-by-Linear Association	4.019	1	.045
	N of Valid Cases	310		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.84.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 30.80.

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Appendix 33: Help and Support Section - Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very Important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
There would be ongoing help and support from professionals	1	1.97	1.200	86.8% (2)	1	2.05	.981	95.2% (1)
There would be help and support from carers	2	2.12	1.250	86.3% (3)	2	2.55	1.501	93.5% (=2)
There would be someone who takes responsibility for arranging repairs	3	2.82	1.467	94.4% (1)	5	3.57	1.258	83.9% (4)
There would be help and support from the communication aid company who supplies the device	4	2.83	1.262	78.1% (4)	3	3.10	1.294	93.5% (=2)
There would be someone offering regular reviews	5	3.41	1.663	66.7% (5)	4	3.56	1.402	74.2% (5)

Appendix 34: Control and Access Section - Importance Responses

user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
User	It would offer the right access method for the user	Count	8	32	40
		Expected Count	8.9	31.1	40.0
		% within question	20.0%	80.0%	100.0%
	It would be easy for the user to turn on and off him/herself	Count	7	34	41
		Expected Count	9.2	31.8	41.0
		% within question	17.1%	82.9%	100.0%
	It would be easy for the user to charge up or change the batteries him/herself	Count	16	24	40
		Expected Count	8.9	31.1	40.0
		% within question	40.0%	60.0%	100.0%
	It would be moved easily between a range of positions to suit the user	Count	5	35	40
		Expected Count	8.9	31.1	40.0
		% within question	12.5%	87.5%	100.0%
	Total	Count	36	125	161
		Expected Count	36.0	125.0	161.0
		% within question	22.4%	77.6%	100.0%

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user_professional			choice_pooled		
			Not at all or Maybe	Very Important	Total
Professional	It would offer the right access method for the user	Count	3	64	67
		Expected Count	19.0	48.0	67.0
		% within question	4.5%	95.5%	100.0%
	It would be easy for the user to turn on and off him/herself	Count	20	47	67
		Expected Count	19.0	48.0	67.0
		% within question	29.9%	70.1%	100.0%
	It would be easy for the user to charge up or change the batteries him/herself	Count	36	31	67
		Expected Count	19.0	48.0	67.0
		% within question	53.7%	46.3%	100.0%
	It would be moved easily between a range of positions to suit the user	Count	17	50	67
		Expected Count	19.0	48.0	67.0
		% within question	25.4%	74.6%	100.0%
	Total	Count	76	192	268
		Expected Count	76.0	192.0	268.0
		% within question	28.4%	71.6%	100.0%

Chi-Square Tests

user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	10.198[a]	3	.017
	Likelihood Ratio	9.628	3	.022
	Linear-by-Linear Association	.000	1	.985
	N of Valid Cases	161		
Professional	Pearson Chi-Square	40.406[b]	3	.000
	Likelihood Ratio	45.028	3	.000
	Linear-by-Linear Association	12.311	1	.000
	N of Valid Cases	268		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.94.

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.00.

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Appendix 35: Control and Access Section - Current Availability Responses

user_professional			current		
			Not Currently	Currently	Total
User	It would offer the right access method for the user	Count	20	20	40
		Expected Count	23.9	16.1	40.0
		% within question	50.0%	50.0%	100.0%
	It would be easy for the user to turn on and off him/herself	Count	19	22	41
		Expected Count	24.4	16.6	41.0
		% within question	46.3%	53.7%	100.0%
	It would be easy for the user to charge up or change the batteries him/herself	Count	29	11	40
		Expected Count	23.9	16.1	40.0
		% within question	72.5%	27.5%	100.0%
	It would be moved easily between a range of positions to suit the user	Count	28	12	40
		Expected Count	23.9	16.1	40.0
		% within question	70.0%	30.0%	100.0%
	Total	Count	96	65	161
		Expected Count	96.0	65.0	161.0
		% within question	59.6%	40.4%	100.0%

user_professional			current		
			Not Currently	Currently	Total
Professional	It would offer the right access method for the user	Count	17	50	67
		Expected Count	34.2	32.8	67.0
		% within question	25.4%	74.6%	100.0%
	It would be easy for the user to turn on and off him/herself	Count	27	40	67
		Expected Count	34.2	32.8	67.0
		% within question	40.3%	59.7%	100.0%
	It would be easy for the user to charge up or change the batteries him/herself	Count	53	14	67
		Expected Count	34.2	32.8	67.0
		% within question	79.1%	20.9%	100.0%
	It would be moved easily between a range of positions to suit the user	Count	40	27	67
		Expected Count	34.2	32.8	67.0
		% within question	59.7%	40.3%	100.0%
	Total	Count	137	131	268
		Expected Count	137.0	131.0	268.0
		% within question	51.1%	48.9%	100.0%

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Chi-Square Tests				
user_professional		Value	df	Asymp. Sig. (2-sided)
User	Pearson Chi-Square	9.087[a]	3	.028
	Likelihood Ratio	9.194	3	.027
	Linear-by-Linear Association	6.169	1	.013
	N of Valid Cases	161		
Professional	Pearson Chi-Square	43.888[b]	3	.000
	Likelihood Ratio	46.125	3	.000
	Linear-by-Linear Association	26.853	1	.000
	N of Valid Cases	268		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.15.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.75.				

Appendix 36: Control and Access Section - Ranking Responses

	Users				Professionals			
	Rank	Mean	Std. Dev	Very Important % (Rank)	Rank	Mean	Std. Dev	Very Important % (Rank)
It would be easy for the user to turn on and off him/herself	1	2.08	1.052	82.9% (2)	2	2.48	.797	70.1% (3)
It would offer the right access method for the user	2	2.08	1.251	80.0% (3)	1	1.33	.810	95.5% (1)
It would be moved easily between a range of positions to suit the user	3	2.54	1.094	87.5% (1)	3	2.58	.846	74.6% (2)
It would be easy for the user to charge up or change the batteries him/herself	4	2.81	1.238	60.0% (4)	4	3.58	.708	46.3% (4)

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Appendix 37: Overall Ranking Scores

	Users		Professionals		
Question (ordered by Users' Rank)	**'Very Important' %**	**Rank Score**	**'Very Important' %**	**Rank Score**	**Rank**
a device that is easy to use?	94.44%	2.11	100.00%	2.43	1
the way a user controls/accesses a device?	88.57%	3.17	98.28%	3.46	3
the way a device performs?	88.57%	3.77	91.38%	4.65	5
the support a user receives?	88.89%	4.22	100.00%	3.05	2
moving a device around?	86.11%	4.28	65.52%	7.05	8
the training given?	85.71%	4.69	91.23%	4.39	4
the way a device speaks?	77.78%	4.69	77.59%	6.58	6
the way the software works?	73.53%	4.82	75.86%	6.89	7
the physical environment surrounding a device?	52.94%	6.97	63.79%	7.30	9
the way a device is made?	33.33%	7.24	42.11%	8.87	10

Appendix 38: Ranking Correlation Measures for Users and Professionals

	Users	**Professionals**
Ease of Use	-0.8	-0.9487
How a Device is Made	**-0.4**	-1
Speech Output	-0.6	**-0.2**
Control	**-0.3162**	-0.8
Performance	-0.9487	-0.8
Design	-1	-0.8
Physical Env	**-0.4**	-0.8
Training	-0.8	**-0.2**
Support	-0.7	-0.9487

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