

Assistive social interaction for non-speaking people living in the community

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ABSTRACT

The move from institution to community care has resulted in more disabled and elderly people receiving care at home. For some, their disability or frailty prevents them from being involved in social activities outside the home, resulting in unacceptable social isolation. This problem is compounded if the person has a speech or language impairment. In general, social interaction is important for people, and they often use stories, pictures and other media to present important events to others. In this paper, we will describe a communication service designed to provide non-speaking people with a means to interact socially when living independently, based on the sharing of stories using pictures and other media..

Keywords

Community care, social isolation, videoconferencing, Internet, assistive communication.

INTRODUCTION

Care in the community has become a dominant means of delivering care over the last decade in many countries. In the UK, for example, the 1990 National Health Service and Community Care Act defined the reality of the move from institutional care to community care for a number of people requiring, or likely to require, long term care. Whilst community care means many different things to different people, political rhetoric is being replaced by concrete measures to ensure that different agencies can work together to provide comprehensive care programmes for people living in their homes or in small community homes. The recently published *Response To The Royal Commission On Long Term Care* [1] details specific measures that will be put in place to improve the quality of long term care, including the role of technology in the provision of care. This was reiterated in a government Statement on Older People [2]. In 1997, the Scottish Executive [3] planned to spend £1.8 M on community care in the fiscal year 2001-02. In the year 2000 spending plans [4], this had risen to a planned spending of £8.1 M for the same year, rising to

£10.8 M for the year 2002-03.

This is primarily targeted at care for the elderly and care for people with learning difficulties.

Community care is favoured because it implies that people are actively involved in their local communities, provided there is a strong social infrastructure and a wide variety of services in place to enable social and economic integration to be achieved. There is a real danger, however, that individuals with health or care needs living at home or in isolated communities could find both the level of care and of social interaction fall when compared with their experiences of living in good long term care facilities. Recognising this, the Scottish Executive have considered a number of these vital services, including transport, building regulations, and services in rural areas [5,6,7].

The political statements are also, to some degree, in response to growing public awareness of rights to, and availability of, high quality care. When considered alongside the various pieces of legislation governing the rights and services for people with disabilities, demand for functioning services will continue to grow [8].

Considering the large numbers of statements, bulletins and research findings published by government agencies, it would be tempting to believe that the concept of community care is well accepted, and that any recognised deficiencies are being addressed. Recent press and television reports have, however, been highlighting the growing incidence of increasing isolation of people living in private homes and receiving care or living in small group homes in the community. For example, MacDonald [9] states:

"Almost one third of the people surveyed felt they needed help with some aspect of daily living. Social isolation, type of housing and other environmental factors affected how much support people felt they needed. Many of those most in need did not use social services."

"People who had said they had little social contact were found to include a number who were suffering from loneliness or some form of mental distress. Bereavement was the most evident cause of isolation and loneliness. However, isolation was not necessarily associated with living alone. Some people living with a partner where one or both needed a lot of support were particularly isolated and lonely."

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This sense of isolation within communities is also reported by Taylor [10], who states that 35% of people with disabilities do not feel at all involved in their local community, compared with 21% of people without a disability.

Social Interaction in the community.

Social interaction is central to community living. Emler [11] showed that human beings spend more than 80% of waking time in the company of other people. Even when engaged in vocational tasks, people still talk to each other. The vast majority of interpersonal interaction is between people who know each other personally. Only around 7% is either between strangers, or are business or service transaction encounters. This is shown in figure 1 below.

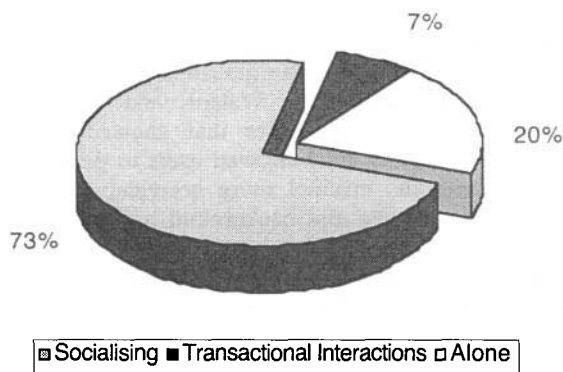


Figure 1: Proportion of waking time spent in socialising

Read and Miller [12] also make the point strongly that humans are social creatures. Social interaction implies interaction with people within society. We learn from others and we share with others what we have learnt. We interact with others in various ways that influence our status and roles in social communities. Humans have more complex patterns of social interactions than any other species.

Dunbar [13] states that around 66% of conversation is concerned with the exchange of information of social relevance. A key element of this "socialising" is the recounting of stories. Even in environments where the focus is on another activity, when conversation starts, it rapidly moves away from the technical, practical, or even functional, to the social, to "gossiping" and to story telling. This aspect of communication is fundamental in allowing a person to enhance their reputation and bond with their peers. One technique for enhancing one's own reputation is to disparage that of another person in the community, diminishing their standing by emphasising negative episodes in the stories told about them.

Story telling is considered to be such an important bonding and community building skill, Dunbar argues that this may have been the fundamental driver behind the development of language in human beings. Story telling is still a primary means of introducing children to language and for stimulating language acquisition.

Dunbar et al [14] studied the details of conversations and found that whilst people claim to have an interest in topics such as sport, culture and religion, around 45% of relaxed conversation is about personal relationships, around 20% about personal experiences, and a further 5% on planning future social activities. One important aspect of this work was that there are significant differences in the balance of conversations involving males and males, females and females and between males and females. Women's conversation tends to be concerned with social networking, whilst men tend to concentrate on themselves and on technical subjects, particularly in conversations involving women.

Social Interaction is vital therefore, for successful and fulfilling community living. If people are physically isolated within the community because of the nature of their care needs, an alternative method of social interaction needs to be in place in order to avoid the inevitable social isolation.

The traditional means of providing social interaction for people that are physically separated is to use the telephone. But care in the community implies that a person is in need of care, because of a medical condition, disability or frailty associated with aging. Within the European population, 2.8% have a speech or language impairment [15], and speech/language therapists are involved in a care programme for 0.65% of the population [16]. Such people are unlikely to be able to use the conventional means of participating in social interaction at a distance, ie. using a telephone. Furthermore, 47% of them will have an additional physical or sensory disability that will reduce their opportunities for social interaction outside their home. They therefore require alternative forms of social interaction, including the means to share stories.

Alternative Communication

Two possible candidate technologies for providing an infrastructure for remote social interaction that have emerged strongly over the last few years are videoconferencing and the Internet.

The history of videoconferencing goes back to the 1920's [17], but deployment has been slow because of technical limitations of the systems and the telecommunications infrastructure, and incompatibility between terminals. Over the years, therefore, the International Telecommunications Union has defined a set of standards to describe the technical characteristics of videoconferencing on a variety of different network infrastructures. The recent definition of the H.323 standard provides for a unifying videoconferencing service standard that eliminates these various incompatibilities [18,19]. It is also this standard that defines the videoconferencing service for the Internet, placing the Internet at the centre of videoconferencing services of the future.

Finn et al [20] discuss various studies that have compared videoconferencing to other methods of engaging in social interaction. An overall conclusion that they cite is that:

"Users' desire for video results from the impact on the process of their interpersonal interactions, rather than

from its perceived effect on any product of their interaction."

They also make the point that:

".... Audio is critical, and that high quality audio is more important than high-quality video."

This fact emphasises the difficulties faced by non-speaking and deaf people who are unable to interact using this critical audio channel.

Use of the Internet

Statistics for the use of the Internet are invariably presented as gross estimates. Hijazi [21] states, for example, that by the end of 1999, there were estimated to be 176.8 million users of the Internet world-wide, an increase of 46% over the 120.5 million in 1998. The increase in Europe was 117% from 23 million in 1998 to 50 million in 1999.

Lieb [22] reported that there had been an increase in the people who used the Internet at home but not at work. It had risen from 36% of those using the Internet in 1997 to 41% in 1999. At the same time, there had been a fall from 19% to 13% of people who used the Internet at work, but not at home. The figures indicate a trend towards greater use of the Internet at home, particularly amongst those who are not at work. This has been encouraged by trends towards higher bandwidth technologies for connecting homes to the Internet and falling costs for these technologies [23,24].

The increase in the penetration of the Internet has been accompanied by a growth in medical, education, business and shopping services. For example, Hijazi (1999) reported that 27% of the UK population over the age of 16 were online in late 1999 and 27% of those users were also using the Internet for online shopping. The regular industry observation performed by Nielsen NetRatings [25,26] had revised the estimate for the UK to 19.47 million people or 32.72 % of the UK population by July 2000.

Lewis et al [27] estimated from a MORI poll that, by mid 2001, 23 million people in the UK would be online. Significantly, 20% of the UK population expected to be dependent on the Internet for shopping within the next few years, and 30% for banking.

Videoconferencing on the Internet

One characteristic of the growth in these services has been the increasing deployment of videoconferencing. The benefit of videoconferencing in medicine has been recognised for some time. In 1998, Versweyveld [28] summarised some early projects where videoconferencing was used, including the relaying of live video from ambulances to hospital emergency departments to allow them to more appropriately prepare for the incoming patient. More recently, Versweyveld [29] has described the launch of a telephonic stethoscope to be used in conjunction with a standard H.323 videoconferencing terminal.

The trends show a society where the Internet is playing an increasingly important role in communication and in functional activities of life. As the bandwidth available to

end users increases, videoconferencing will become an increasingly important component of the services used on the Internet.

The widespread deployment of the Internet, particularly the deployment to domestic dwellings at affordable costs provides the opportunity to deliver services tailored specifically to the needs of people with disabilities. These include information services that specifically emphasise the data required by these users, and social interaction and practical health and welfare services.

For this type of technology to be used by people with disabilities, the equipment and services should be designed to take the specific needs of these users into account. The European Technical Standards Institute, for example, is actively involved in attempts to ensure that systems and services in Europe meet that goal [30,31,32,33].

There are a number of factors that make videoconferencing as a method of distance communication more attractive than conventional telephony. Watson and Sasse [34] summarised a number of studies that showed that the addition of the video channel allowed users to perceive the contents of the audio channel more accurately, and deal with poor audio quality and background noise. Not only could those with poor hearing benefit because the video might help them interpret the audio channel, but people with good hearing might be able to better interpret speech from a user with impaired speech.

Ramsey et al [35] highlighted the fact that during informal communication and interaction, there is often the need to share a piece of information in a more persistent way than the dynamic, transient nature of the audio and video channels supports. They support the addition of text exchange, shared picture viewing and whiteboard facilities as necessary components in a videoconferencing system designed for informal communication as well as more formal business or transactional interactions.

Recent examples of trials of services for people with disabilities have generated renewed interest from service providers and manufacturers of rehabilitation technology [36]. This seems to indicate that these agencies and commercial companies believe that it is becoming realistic to deploy services to the community, as more and more domestic and community dwellings will have the necessary telecommunications or network infrastructure.

For users with poor speech, however, an alternative communication channel needs to be available for information exchange. Some work has taken place to consider suitable possibilities. McKinlay et al [37] and McKinlay et al [38] began to explore issues such as turn taking and the use of text prediction techniques to enable text chatting to be used as an alternative communication channel by these users.

A promising recent development is the integration of Internet based videoconferencing with the World Wide Web (WWW), so that videoconferencing is delivered via a conventional web browser. This is an immensely flexible method of delivering videoconferencing as the browser can also be used to deliver a variety of other communication

services using a variety of media within one integrated web page.

Multimedia story-telling

Given the trend towards greater deployment of the Internet and the requirement for social interaction services for disabled people living in the community, various alternative enhancements to a videoconferencing service were tested. The most promising provides a user with impaired speech or language with a means of presenting stories in the form of a multimedia narrative.

Scott [39], in reviewing the work of Schank and Abelson [40], makes the point that story telling does not automatically imply the use of words. Other forms of representation are possible, for example using pictures or images, symbols, objects or even mathematical equations.

Csikszentmihalyi and Rochberg-Halton [41] reported that photographs are the third most treasured possessions in the home of a modern western family after furniture and visual arts. When this is broken down by age, they were ranked sixteenth by children and teenagers, and ranked first by grandparents. An important aspect of this work is the significance of the pictures, and of other objects, to the owner, and the way that they interpret the objects owned by others. In general, younger people are seeking to establish an identity, to understand their place in the world, and then to assert their individuality and their individual worth. Older people tend to reinforce their comments with evidence of relevant experience. Elderly people tend to share memories, and to seek to pass on wisdom based on their experience. This is reflected in the significance that they place on the objects that they gather, and in particular in the photographs that they hold and display. In all cases, however, the photographs are a means of preserving and recalling memories. Csikszentmihalyi [42] does make the distinction between this use of photographs to record history, and the use of photographs as an art form and a means of exploring reality. In the case of photography as art, the viewer is challenged to interpret the photograph, to identify with the iconicity or ambiguity in the photograph. It is important, therefore, to realise that there is the potential for ambiguity to be present in all photographs.

The social implications of the ability to take pictures and make movies personally and non-professionally are explored by Chalfen in his book *Snapshot Versions of Life* [43]. He develops the notions of "Home Mode" photography, and explores the culture that they portray, encapsulating it in the term "Kodak Culture". He extends the work of Csikszentmihalyi & Rochberg-Halton [41] by including home movies as a means of recording significant events and objects from the world within which people exist. His work explores the reasons that people have for recording their life, the parts that they record, and the selection of specific parts of that record that are shown to various audiences. He makes the important point that each individual has a unique perspective on reality, coded in many symbolic forms (e.g. music, words, images, signs and events), and weighted to reflect their knowledge and opinions about the society in which they live. This unique,

individual perspective is reflected in the way that they record their world, and in the way they present this recording to others. He argues that the popularity of "home mode communication" reflects the need of an individual to make significant and personal statements about their place in society, and to record the significance of their own involvement in that society.

Chalfen [44] went on to study the differences in video and pictures as a means of capturing and reliving memories. The key findings of this work were that video is perceived differently to pictures, and that video gives a greater sense of "being there". In general, these media do not simply remind or inform the viewer of an aspect of truth. They tend to trigger a memory thought process or a process of identification with the subject being conveyed. For this reason, additional explanation of the image is rather important, otherwise the viewer may be triggering thoughts that are diverging from those intended by the person showing the media.

The use of images in mobile communication has been studied by Mäkelä et al [45]. They report that little research has been done on the use of still pictures in communication, but they found that images have an important role in communication at a distance. A conclusion of their field trial studies was that images are not sufficient for functional communication. Text or speech is required as an additional annotation medium, alongside the picture, to make its meaning or communication intention clear. Neilson and Lee [46] reiterate the need for pictures to be set in a context with an accompanying natural language statement. Without this, the message of the picture, or the statement that it is intended to convey may be ambiguous.

The personal value of images was found by Mäkelä et al [45] to be in socialising and social interactions, and in recording memories. In fact, this study qualified the work of Csikszentmihalyi & Rochberg-Halton [41], by showing that younger people tended to use images to capture humorous situations or everyday objects that were important to them. This is contrasted with older people who tend to use them to illustrate memories and to recount them in stories. A fundamental finding here was that the message of an image is likely to change over time. Its meaning for the user changes, and the story that it tells changes. In all cases, the images were used to add detail to a description, or to explain when the user is having difficulties describing an object or situation with words.

A MULTIMEDIA STORY-TELLING SERVICE

Based on these findings, a multimedia story-telling service was developed that allowed a user to collate pictures, video clips and audio clips and to present them as sequences of narratives. The individual media items were organised using a database, and presented through a web browser as an interface based on web pages. The architecture of the service is shown in Figure 2 below.

The stories are organised according to a small number of topics and sub-topics. These topics are presented as a set of choices. When a topic is selected, the five stories associated

with that topic are retrieved from the database, and added as choices to the interface.

When a story is selected, the five media items associated with the story are retrieved from the database and added as choices to the interface. When a media item is chosen, it is presented on the interface, together with a single phrase of text stating the message of the media item. The entire interface is shown in Figure 3 below.

A series of tests have been undertaken that have shown that not only does this interface enable users with disabilities to retrieve story elements more quickly than a text only interface, but that people viewing the presented story gained a more accurate version of the story, and were able to form a stronger impression of the personality of the person presenting the information. This showed that this was a valuable means of presenting stories, and therefore a useful tool for promoting social interaction for people with a speech or language impairment.

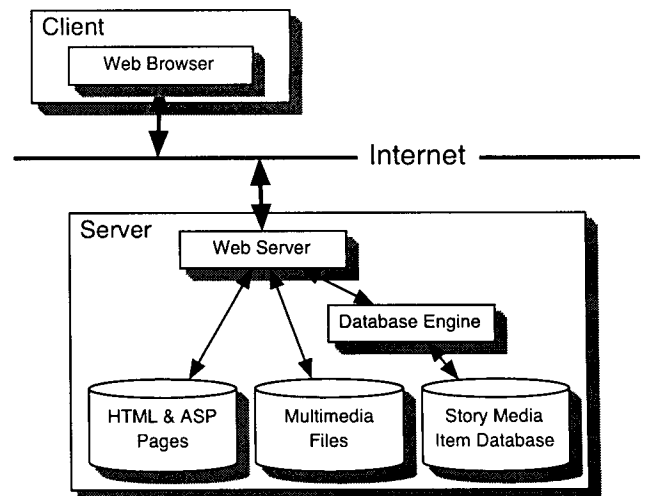


Figure 2. Architecture of the multimedia communication service

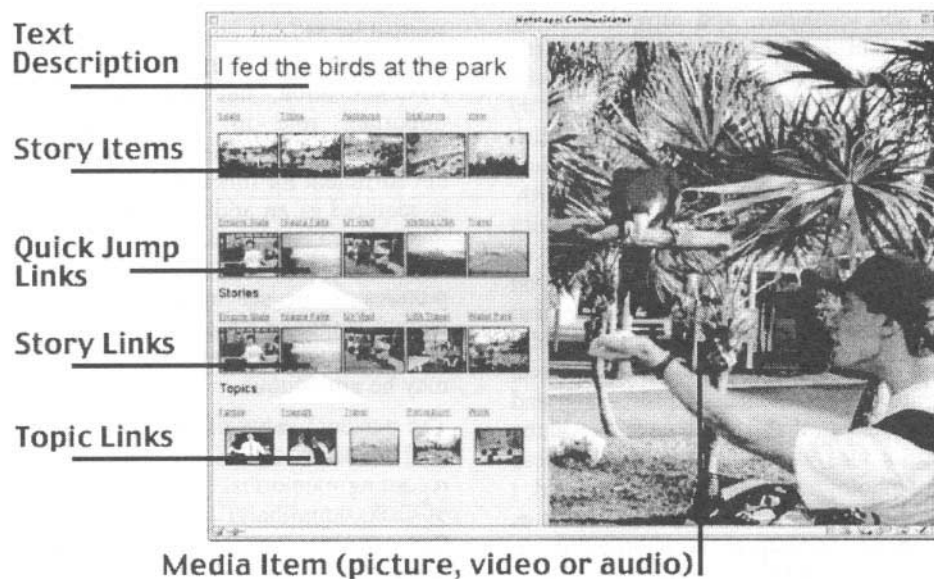


Figure 3. User Interface of the multimedia communication service

ENHANCED VIDEOCONFERENCING SERVICE

In order for it to be effective in promoting social interaction for isolated people living in the community, it needed to be integrated with a videoconferencing system suitable for domestic use. This was achieved by combining the web based interface of the multimedia story-telling service with a web based videoconferencing system. The web based videoconferencing allows users to connect to a videoconferencing server and load a web page into a web browser. This page can include plug-ins for controlling and delivering video, audio and text based chatting. As this web page can be constructed as a set of frames, part of the overall page can be used for delivering another web page, in this case the interface for the multimedia communication service. The web page being

presented within the frame may be synchronised in all the browsers connected to the conference.

In this way, a user with disabilities may select multimedia story items on their browser, and this page is presented in the appropriate frame in the page being browsed by all other participants in the conference. A typical web based conference page, including the multimedia communication service is shown in Figure 4 below.

The videoconferencing plugins are operating in the right hand vertical frame, the text chatting is operating in the lower right hand frame, and the large frame on the right is being used to present the multimedia communication service



Figure 3. User Interface of the multimedia communication service

Trials with non-speaking people has indicated that this service shows promise as a means of enabling rich stories to be exchanged as part of a process of social interaction. Two non-speaking people populated the services with about 15 stories each in the form of pictures, video clips and audio clips. In a demonstration to peers with similar disabilities by one of the users, there was general agreement that this approach engaged the audience much more effectively than a conventional text/symbol based communication aid with spoken output. Further detailed experiments are underway to measure the value of this approach in conveying stories accurately, and in promoting a stronger impression of the personality of the user than a text/symbol/speech output presentation method.

CONCLUSIONS

This paper has presented a case for providing additional means of engaging in social interaction for people receiving care in the community in order to minimise the possibility of these people becoming socially isolated. Evidence for the penetration of the internet into the domestic environment, the case for the wider deployment of IP videoconferencing, and the interest being shown in the use of these technologies to provide services, including care service, at a distance have been presented. A new service for promoting interaction has been introduced and an example of how this can be integrated within an Internet based videoconferencing service has been explained.

Work is currently underway to measure the usability and usefulness of this service as a tool for promoting social interaction at a distance.

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