

SignWorks: Developing Deaf Business

Final Report to DTI

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Prepared for the partners by

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CENTRE FOR DEAF STUDIES

SignWorks: Developing Deaf Business¹

Executive Report

One of the key initiatives of government over the last 10 years or so has been to encourage people to implement good ideas as small businesses, to use their inventions as a way to create a market and to take and expand already existing small businesses in ways which reflect the opportunities of the Information Society. This initiative has been promoted through publicity, provision of advice, distribution of leaflets and booklets. Such a strategy has supported a huge number of business start-ups.

However, with one group, the initiatives have had little success – Deaf people. Although Deaf people have the same capacity and potential as hearing people (they just cannot hear), they require support for business in a language to which they can have direct access. This language (British Sign Language) is visual and spatial and constructed quite differently to English. The problem is that BSL is not a written language and only recently with the advent of video recorders has it become possible to preserve information in BSL.

Although various attempts have been made to provide a news service to deaf people through video, these have proved unsuccessful because the video medium is linear – allowing only crude search techniques and more or less requiring people to watch the whole of one hour programmes in order to obtain sections of information. Video does not offer a substitute for text in books and leaflets.

SignWorks is a first attempt to deal with this problem and to begin to provide an effective information service to deaf people which will support and encourage the development of deaf business. SignWorks by using videophones and developing a video server, has created an on-line, 24 hours a day, video-on-demand solution to the need for key BSL information on deaf business. Video information in sign language is compressed and stored in an indexed form on a remote computer. Deaf people who dial the server number from their videophone are able to work through a menu to reach the specific information which they need.

SignWorks has 4 main components:

¹ SignWorks (January 1998 – December 2000) is a project within the Multimedia Demonstrator Programme of the DTI's Information Society Initiative. There are five partners: Centre for Deaf Studies, Motion Media, Doug Alker Associates, Forest Bookshop, Deaf Studies Trust.



- The use of ISDN-based videophones by deaf people
- The construction of an information service on a video server
- The parallel development of a web site with instruction, illustrations and the possibility to purchase on-line the relevant, books, video and other materials for business.
- The support of a Deaf Model Business, the Attic Design Studio – a graphic design company, to illustrate the issues for the development of a real deaf business, charting the early stages of business life, in the context of the technology offered by SignWorks.

1. Videophones have developed sufficiently to allow **person to person live signed conversation** – deaf people can discuss and obtain information on-line from each other. This is a major breakthrough for the deaf community and will have major implications for community life in future. In the early stages of the project SignWorks tested the information flow and comprehensibility of conversation. The success of the medium is indicated in the early deliverables of the project.

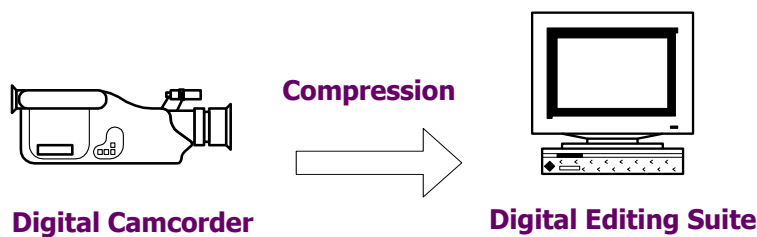
Videophones were then installed in 21 locations - 16 user sites and 5 partners. All users were requested to maintain logs of the use of the videophone. Frequent checks were made by CDS to ensure that the videophones were "live" and available to answer the incoming calls. The results tended to be disappointing, with sites unable to maintain the videophones as a continuous resource. The reasons given were the lack of personnel, unfamiliarity with the medium and the relatively low number of incoming calls. There were also significant and continuous problems with Cable and Wireless who were supposed to install and maintain the videophones. In the latter part of 1999, Cable and Wireless still could not confirm that they had a minicom (text telephone) with which they could contact deaf organisations or individuals.

In the planning of SignWorks it had been expected that there would be a huge increase in the penetration of videophones in the market. This was based on BT projections and published statistics on the installations of ISDN lines. Despite this data and the proven effectiveness of the videophones for conversation (signed and spoken) by the end of the project, the market penetration was hardly greater than at the beginning. The reason was simple – cost. The installation and running costs remained high and well beyond the reach of most organisations and individuals.

Nevertheless, the future prognosis is much better, with prices falling and public awareness on the increase. The purpose of this project was to demonstrate the use of the technology and this was done during the fixed trial periods when users had reasons to make calls and obtain information.

2. How the SignWorks Server works

Sign language information is recorded digitally and compressed and then placed on a computer server. The choice of the information was based on considerable research of available business information sources, of the packages offered by the small business units of banks and other organisations. The key information was assembled by a deaf business consultant and deaf actors were filmed in a range of locations to provide short explanatory clips of digital video in BSL, dealing with topics from initial business idea to managing workers and cash flow. Target length of clips was 2 minutes to allow easier indexing of content and to make sure users could tell early in a clip that it contained the information which they needed. In total, over 20 hours of video were created for the server.



The deaf user dials the server phone number and is automatically connected to the menu. By choosing the numbered elements, the deaf person reaches a video in BSL which can then be watched or recorded for later use.



In this way the deaf user can obtain information on a wide range of business topics. User trials were carried out with specific tasks of information gathering given to each user and these were to be completed in a fixed and relatively short space of time (one week). In addition, there were lab trials, where users were timed in navigating the Server files, in order to find specific information.

There were preliminary user trials, which determined the validity of the trials format and the viability of the users participation and there were full user trials which were carried out when the server content was complete.

All trials were successful in demonstrating the SignWorks server concept. They also indicated a great deal to be developed to make the server ideal for all users and identified a need for training and awareness raising to be carried out in order to ensure that users were able to cope with the potential of the video-server.

Aspects developed as a result of the initial work

As a result of the success of the videophone and the Server concept, two further ideas were tested – remote interpreting and videosignmail.

Remote interpreting consists of the three way conversation between a deaf sign language user, a hearing speaker (non-signer) and a sign language interpreter. Any two of the three can be on the same site or all three can be on separate sites. All four scenarios have been tested and shown to be valid. In fact, all user feedback interviews were carried out by using an interpreter remote from the deaf user. The work on remote interpreting has been so successful that it is to be set up as a commercial venture in the near future.

Video Sign Mail offers the possibility to leave messages in sign language when a user is unavailable. At present, this is not automatic, as in, say, mobile phones, where the caller is automatically directed to a central voice mailserver, but the concept itself works in the same way. When a user is unavailable, the caller is directed by the user's message (the videophone opens automatically on an incoming call) to the mailbox number and given a key specific to that user. The caller re-dials the mailbox and enters the key then signs a message. The user can check the message before storing it. The user can later check his/her mailbox and, by providing a second key, is able to watch any signed messages which have been left. The concept has been demonstrated, but is not yet commercially viable.

3. Sign-Works Web site

There is also an Internet site: www.sign-works.org.uk This integrated web site offers business information and links. It is integrated with Forest Bookshop, where users can browse and buy resources. It contains similar, but not identical, information to the server (the media are different and are not designed to duplicate one another).

However, website topics are referenced according to server file code numbers and the user can go from web topics directly to the video server for the BSL information.

4. Deaf Model Business

As part of the development of the project, it was important to study the progress of a real deaf business. The Attic Design Studio was chosen as an embryonic deaf business which might be influenced by, and able to influence, the development of SignWorks. The business was a very early start-up and the progress was slow. SignWorks provided a videophone, access to information, commissioned work, Website design and personal business advice from the deaf consultant. The partners in Attic were filmed on three occasions describing their business and the progress made and this has been made available on the SignWorks server for other new businesses to use as a case study. The Attic Design Studio was neither a high flyer or failure, but a typical early-stage business, growing rather hesitantly. To that extent, it was very useful to the SignWorks project.

Conclusions

SignWorks has shown that videophone sign language communication is possible in a range of settings. It has demonstrated successfully the VideoServer concept for Deaf people and has created the circumstances in which a whole series of new commercial opportunities can be set up.

Signed communication can be made available to **all** Deaf people at a distance when the price is right and there are enough video servers delivering desired information. There are planned developments in health information, citizen's advice and expansions of the business information into training.

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1. Introducing SignWorks

1.1 The background and rationale

There are many sources of information for people to use when they have a business idea. For example, people can call one of the Government's Business Links Centres. But if it is a deaf person, that call is not possible since the proposed conversation cannot be heard by one of the participants. If, in an interview with the business consultant, the deaf person talks about the technology which he wants to use in his own language – sign language – then the hearing adviser is unlikely to understand.

The alternative for the deaf person is to obtain information through the voice relay service where he/she can receive text information through an operator, who speaks. But the rate of typing and transfer make the whole communication laborious and unproductive.

These are hardly very useful services for deaf people, trying to develop their own business. They are available but they are either inaccessible or are so limited as to be unusable.

SignWorks is a project designed to support deaf business within the DTI's ISI programme. The only drawback is that there is virtually no deaf business in the UK. As a result, SignWorks has been engaged with the embryonic development of deaf people as entrepreneurs, managers and professionals, within a framework of multimedia information services.

In the last years of the 1990s, one of the most important aspects of employment flexibility is access to information, as a basis for new business, job promotion and job counselling. One of the critical demands of this delivery of information is that it allows interactivity. Virtually all current delivery systems exclude deaf people and deny their intellectual and physical capacities.

In SignWorks, interactivity is defined in terms of personal response and open access to information and to training. SignWorks takes its name from the ability to transmit and receive sign language messages in the context of employment, management and business.

Previous research on the deaf community carried out by the Centre for Deaf Studies in the UK and in Europe, confirms the major difficulties faced by deaf people in employment. In the latest study (July 1997) of all EU member states, it is clear that deaf people lack the necessary access to information for real progress in employment. What is also clear is that deaf employment is typically limited to semi-skilled and unskilled jobs. On the whole, deaf people are not in business for themselves, do not hold managerial or professional roles and are unable to exploit any entrepreneurial ideas they may have. In discussion, with a group of deaf people attending management training in Bristol, it became clear in addition, that deaf people lack the facility to talk

with other (deaf and hearing) people about business, managerial and employment matters – there is no deaf Round Table and there was at that time, no real use of videophone for sign conversations.

The Department of Employment offers various schemes for training and support in the workplace, through technology. But there is limited take-up of this and it creates a dependency role for deaf people as recipients of help. This is in complete contrast to the enabling services which hearing entrepreneurs experience.

Services to hearing business people in the UK are well-advanced and in the context of this DTI initiative, it is possible to identify specific business performance areas which need to be improved. For deaf people, the issues are about how to get into business in the first place and then how to cope. A priority for us is to provide a foundation service for deaf people.

1.2 The Purpose

SignWorks was set up as a Multimedia Demonstrator Project, in order to

- (a) provide videophones to a representative sample of likely future, deaf users.
- (b) create a dial-up video information service, accessible through menus from the videophone, through which instructional or information material can be received (pre-recorded information in sign language)
- (c) provide WWW access for each site linked to the project's home page, where deaf-relevant business information can be provided
- (d) generate WWW content for business and management
- (e) offer an interactive system for developing a business idea and a model for examining its viability
- (f) provide an on-line bookshop and resource locator so that participants can be sent further materials as appropriate
- (g) produce a monitoring and evaluation procedure for determining on-line use and effectiveness

SignWorks has achieved all these and more.

Deaf people have begun to use the videophone to sign to each other. It saves time, transfers information more accurately and more efficiently.

There is now a video server - a computer with sign language files – which is organised in a series of menus. Deaf people call the server and are able to step through the menu to reach the short video of information concerning the topic of their choice.

There is a parallel WWW site which has partner information and more business details. It provides the codes for access to the server.

There is a link to the Forest bookshop – Business Books – where the user can read about the books and purchase them on-line.

A new system has been developed so that video sign mail can be sent. When a user is not available the caller can reach a video mail box which will accept a sign language message which can be viewed and responded to at a later time.

In the latter stages of the project, the Sign Works team has been able to evaluate the users with the systems. Despite the unfamiliarity of the video medium for signed conversation, results indicate ease of use and effective transmission of information in British Sign Language.

1.3 The exploitation of SignWorks

This is just the first stage. SignWorks has to be created as a public service with funding for continued updating of the news and information. The project team will operate the SignWorks server for the next year but seek to make the service viable commercially.

SignWorks can supply most types of information – eg news, health, citizens advice.

SignWorks can be a portal to relay and remote interpreting which offers the deaf person direct access to the hearing community through an interpreter.

With the initiative shown by BT in their recently announced trials of the videophone, we can look forward to more and more deaf people being able to use the videophone at home and at work. SignWorks is actively seeking partners and sponsors to extend the service to all deaf people and to almost all domains of information services.

When we began the project, we thought that the difficulties in the situation of deaf people are so great that it will take some time to change the attitudes and prepare the deaf community for a more effective role. From the advances made by SignWorks we can see that the hearing community is ready for these developments. We now need to deliver the tools into the hands of the deaf users – into the hands of the deaf businesses.

2.0 SignWorks in detail: The Workplan

2.1 What is SignWorks?

SignWorks is a demonstrator project of the DTI's MMDP (www.multimedia.isi.gov.uk). It is focused on deaf business information and will seek to support deaf business from a sign language on-line server and through two allied developments - the SignLinks scheme (cf www.businesslinks.co.uk) and the Deaf Model Business (DMB - see workpackage 6). SignWorks draws on existing advanced technology for information and business (see www.isi.gov.uk). A brief outline is provided at the beginning of this report. SignWorks also works with the British Deaf Association as an advisory partner.

SignWorks has adapted innovation in telecommunication through an ISDN-based videophone to provide person-to-to person communication in sign language, to offer a remote information resource in sign language and to provide an experimental remote interpreting service.

SignWorks is a partnership between 5 organisations:

- Centre for Deaf Studies, University of Bristol (www.bris.ac.uk/Depts/DeafStudies)
- Motion Media Technology (www.mmtech.co.uk)
- The Forest Bookshop (www.forestbk.demon.co.uk)
- Doug Alker Associates
- Deaf Studies Trust (www.deafstudiestrust.demon.co.uk)

As a demonstration programme, SignWorks has supplied the videophone application to deaf users and has operated a service for business information in sign language. SignWorks has monitored use and obtained feedback from a user group. This information has been used to further develop the system.

2.2 Aims of the project

The development phase and demonstration phases are identified in the tables below.

The **component aims of the project** are:

1. To identify user groups, individuals and centres (Work Package 1.1) and to specify their needs (WP1.2)
2. To survey the latest technology and software (WP2.1) and to adapt and develop the proposed application (WP2.2)
3. To provide inter-communication between deaf people already involved in or expecting to set up businesses, through video-phone provision (WP2.3) and by access to information and advisory services - the sign language server (WP3.1)
4. Through the use of multimedia e-mail (WP2.4) and WWW facilities (WP3.2), to create a responsive capacity to deal with questions, suggestions and requests for training and

information from deaf people and from SMEs who either employ, will employ or need to know more about deaf people's capacities in the workplace

5. To produce visually enhanced resources for employees (deaf and hearing) in Management and Information Technology; to be accessible in sign language (WP3.3)
6. To offer book and other media resources and to develop an outreach service through an on-line library (WP3.4).
7. To develop the business and training content of a sign language server (SLS) which will be available to callers by videophone at all times (WP 3.6)
8. To manage the project (WP4.1) and to evaluate its outcomes (WP4.2); to set up users groups for feedback and consultancy
9. To model a deaf business development (DMB) which will be supported by the project (WP6.2 - 4).
10. To support the establishment of Signlinks, a visual information, advice and support services dealing with deaf related issues in business (WP 6.5)
11. To develop and carry out a dissemination plan (WP5.1)
12. To evaluate and report on the project (WP7.1)

2.3 Project Plan

There are three components to be taken into account: the service, the application and the users. The primary innovation is in the service and the SignWorks demonstrator provided the integrated services to offer deaf people an entry point into business and management. The *application* was based on existing components (videophone/ISDN) and was specified as a menu driven service (see Appendix 1).

2.4 The Project Components

The project set up a model service for deaf people who wished to enter the business world or who wished to enhance their opportunities in the business world.

- a. Supply of 20 videophones* to key sites including partners. This is described in deliverable D111.
- b. SignWorks Service:* This was the key innovation in the project. The project implemented a service for deaf people related to business and management needs. See deliverable D220 and D361.
- c. WWW content for business and management*
SignWorks has a web site (www.sign-works.org.uk) whose content is designed to complement the sign language component on the SLS and has to have both tutorial and support functions. It will also be used flexibly with the counselling which might arise from videophone contact. The development of this began in the first months of the second year. The work included the adaptation of currently available interactive systems for developing business ideas. There existed several examples (eg Nat West Bank software, Midland Bank) for working

out viability of business ideas. Although these are effective, they require prior knowledge and levels of computer literacy and ordinary literacy that cannot be assumed for all deaf people. SignWorks tried to adapt and to refine these systems and to prepare a deaf-friendly version for use in the project. In most cases this was found not to be effective as the translation produced a version which was in advance of the knowledge of the deaf users. A simpler approach to starting a business was taken and a key focus was the simpler series of books on management produced by Dorling Kindersley.²

d. On-line bookshop and resource locator

This tried to exploit the expertise of Forest Bookshop (a specialist SME) in providing deaf related resources for a wide market. Forest developed its own web presence during the project but SignWorks offered a new dimension - deaf people could call directly on the videophone for the resources that Forest can target. Deaf participants were able to go from the provided content at the web site to search through the resources for relevant material. They were also able to seek advice from Forest directly on videophone. This greatly enhanced Forest's role in contact with the deaf community and allowed it to function more effectively as an employer of deaf people.

e. monitoring and evaluation procedure for determining on-line use and effectiveness

This was an essential component that was developed in the early stages of the project. Indicators of project progress include the speed of installation of systems, the extent of use, the extent of use of the help functions and the interactivity to reach the partners with questions, the number of information "packages" implemented, extent of use of the resource function (Forest). User information was collected throughout as pre-implementation, early feedback on use, mature use and final reactions. All of these were done by systematic questionnaire, and also on-line in sign language. The results are presented in the Trials deliverables (D233, D234, D351).

f. SignWorks - the business

SignWorks supported a Deaf Model Business (DMB). In order to achieve the aims and to bring into being a sustainable structure, a deaf business was identified and supported. Attic Design had as a focus, graphic design for deaf and hearing clients. The partners in the firm were contracted and met with the project partners. Their involvement was monitored throughout and they provided video material about their business which has been used on the server through to the end of the project (see D613).

g. User group meetings

Twice yearly user group meetings were held, starting at month 7 (9th July 1998). These included participants and partners. Their agenda was to set goals for

² Their permission was sought and approval gained for this experimental translation of their material.

information content and to respond to the provision. Their participation in these sessions and their work in the trials was of great importance.

Target Groups

Deaf people wishing to set up their own business or who wish to explore a business idea

Deaf people already in business for themselves or who work in management roles in deaf or hearing firms or organisations

The Demonstration Service

The central feature of the service is in (a) *information provision* (SLS) and in (b) *sign language interactivity*.

(a) In order to deal with the particular situation of deaf people, the materials ranged from the simplest introduction to employment, finance and commerce through to issues of deaf-hearing relation in the workplace, management practices and business case studies. In all situations, materials generated were in sign language with supporting material (either on the WWW site or in book/video form). See Deliverable D361.

(b) At all times, deaf people could use the videophones for sign conversation, with the service providers and partners, and also with each other. Depending on the circumstances of the target users, they were able to discuss basic ideas of business start-up, management, training resources. In practice this seemed to happen rarely as deaf people were not yet familiar with the videophone and are not yet ready to fully engage with business practices. The lack of progress in the planned roll-out of videophones and ISDN to the deaf community, had a significant impact on the project as it meant that the only users of the videophones were those sites which had been included in the project,. There was not enough of a critical mass to allow the use of the videophone to expand.

2.5 Outline Timetable

0-6 months: Definition Phase: identification of user needs, equipment specification, target user pool, initial resource list and priorities for information service; first user group meeting, Monthly partners meetings, weekly service providers meeting, first DTI progress report by June 1998.

7-24 months: *Demonstration Phase A* to December 1999: Pilot Demonstration service in operation; continuous iteration between application, user and service provision; monitoring and user feedback; refinement of software

24-30 months: *Demonstration Phase B* to June 2000: Accumulation of server content and monitoring of initial use by participants. User Trials Part 1.

30-36 months: Dissemination phase: At this point, the service became public and other users could enter the system through ISDN and WWW connections; This was intended to be an active period of promotion of the service.

24-36 months: Formation of DMB - a deaf firm in business area to be defined by the project.

36 months : Final report

2.6 Training

The project team provided training for deaf participants at the planned sites, where necessary, as well as the assessment of performance of the subsequent users.

2.7 Outcomes

SignWorks developed, monitored and publicised an information service which allows deaf people to approach the business world with more confidence. *SignLinks* itself is an extension of this work which will offer a more general service to deaf people.

2.8 The Definition Phase Work

January 1998 - June 1998

The definition phase was completed satisfactorily and the project was re-formulated and focused. A set of deliverables were produced and submitted to DTI.

3.0 The Work Packages

These are described more fully in the deliverable D401.

WorkPackage WP1: User Groups

WP1.1: Identification of the potential User group and collection of personal details

WP1.2: Initial Specification of *needs* of the users in terms of business, IT and management information

WP1.3: Final Specification of *needs* of the users in terms of business, IT and management information

Involved the setting up and servicing of the user groups who met twice per year to advise the project team on needs and expectations. *Needs* of the users arose from discussions at the user group meetings but they were also generated directly by contact with the users by the partners involved. This helped set out the specific needs for business information, the type of interface which they wish to use and the time-scales for access to information. Deliverables were in the forms of specifications and details.

WorkPackage WP2 Application Development

WP2.1: Survey of latest technology and relevant software

WP2.2: Development of Application

WP2.3: Installation of videophone systems and inter-connectivity

WP2.4: Multimedia e-mail – the development of video sign mail

WorkPackage WP3: Information and Advisory Services

WP3.1 Setting up of Service

WP3.2: Setting up of WWW site for project which will link with the SLS (WP3.6) and dissemination (WP5.1). A fully working web-site is now in place.

WP3.3: Resources on the Web Site

WP3.4: On-line library and resource locator

WP3.5: Evaluation

Systems were needed to monitor use and to measure learning outcomes. There were three elements: user trials to be designed and carried out by CDS, monitoring of phone use (taken from the phone records for each site - cds) and use of the server (MMTech). The latter needs to be able to track how users are accessing the sections of the server, how long they are spending on files and so on . .

WP3.6 Development of Sign Language Server Content

This involved the creation of all content. It was completed, compressed and mounted by the time of the launch – October 2001. This included over 20 hours of video in short clips on the server

WorkPackage WP4: Project Management

WP4.1: Management Strategies (Patterns of meetings, internal reports, targets, schedules

WP4.2: User group first meeting was in July 1998

This workpackage deals with the co-ordination and management of the project as whole.

WorkPackage WP5: Dissemination

WP5.1: Publicity

The project summary was agreed and distributed.

WP5.2: Demonstrations were carried out at a range of conferences and meetings
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WP5.3: Research dissemination – this will continue for some time after the end of the project working
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WorkPackage WP6: DMB – Deaf Model Business

WP6.1: Definition phase discussion but beginning in July 1998 the extension of the video server as a general resource to deaf business and deaf community.

WP6.2: Identification of clientele and confirmation of business plan for a deaf firm -are to be decided. Targeting of role for the new firm – pilot work within the project to provide a sheltered environment (July 1998 - June 1999) Identifying the Deaf Model Business
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WP6.3: Initiate activities and begin trading (April 1999 onwards but the participants have to be involved in the training phase and use of the SignWorks materials)
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WP6.4: Annual accounts and Review
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WP6.5: Support for SignLinks operation as an advisory business service for deaf people. This aspect of the work has now been taken as an exploitation of SignWorks.
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WorkPackage WP7: Monitoring and Evaluation

WP7.1: Data collection and database (System setup)

WP7.2: Reports to DTI (annual)

WP7.3: Data analysis and final report (Written and signed report)
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This workpackage has dealt with the monitoring of the project and the evaluation
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3.1 Schedule

This is set out in summary form in the table below. It has been refined during the project.

YEAR	1998				1999				2000			
TIME	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP1.1	X	X	X	X	X							
WP1.2		X	X	X	X	X						
WP1.3						X	X	X	X			
WP2.1	X	X										
WP2.2	X	X	X	X	X	X	X					
WP2.3			X	X	X	X	X	X				
WP2.4						X	X	X				
WP3.1		X	X	X	X	X						
WP3.2			X	X	X	X						
WP3.3			X	X	X	X	X	X	X	X		
WP3.4			X	X	X	X	X	X	X	X		
WP3.5				X	X	X	X	X	X	X	X	
WP3.6		X	X	X	X	X	X	X	X			
WP4.1	X	X										
WP4.2			X		X		X		X		X	
WP5.1			X		X	X	X	X	X	X		X
WP5.2					X	X	X	X	X	X		X
WP5.3				X			X		X			X
WP6.1		X	X	X								
WP6.2				X	X	X						
WP6.3						X	X	X	X	X	X	X
WP6.4									X			X
WP6.5			X	X	X	X	X	X				
WP7.1	X	X										
WP7.2		X		X		X		X	X			
WP7.3							X	X	X	X	X	X

3.2 The Deliverables

The deliverables are described more fully in the paper D402c and they are also listed under Appendix 3 at the end of this report. All deliverables were satisfactorily completed with the exception of the creation of a switching device. This was projected to be needed to cater for excess traffic when more than one user would try to connect to the server at the same time. In the event, the predicted traffic did not materialise and it was not necessary to develop this aspect of the project. Deliverables are wither reports which are attached or are practical hardware and software developments which have been provided and demonstrated in the public launch of the service in London on October 12th 2000. All hardware and software developments continue to be in use.

4.0 The Results

The server and installation as described was set up and trials were conducted with deaf users. The full set of results – preliminary, interim and main trials are provided in the Deliverables (D221,D222, D223; D233, D234; and D351). These are the main points.

4.1 Preliminary Trials

These trials were conducted extensively at the start of the project as la based trials to determine the feasibility of the concept and to show the characteristics of communication in sign language through the videophone. The results supported to development of the project and showed that deaf people could effectively communicate in BSL at a distance.

4.2 Interim Trials

The trials consisted of three distinct tasks.

A pre-trial questionnaire provided background information on the participants.

Querying the Server

Seven people completed this task. Users were instructed to complete a questionnaire, using information stored on the video server. The server was accessed for 15 hours and 26 minutes, during which 1,495 video clips were viewed. Overall users achieved a high success rate and on average two thirds of all questions were answered correctly. Valuable data was gained from this section of the trials, in particular the users experience of navigating the menu. These trials were the first real test of the video servers' performance under intensive use and there were no reports of any malfunction.

In searching the server content, 64% of all questions asked were answered correctly. On average a user was likely to answer 16 questions correctly from a total of 25, that were set. Menu depth had an inverse effect on accuracy of answer so that the deeper an answer was buried, the more difficult it was to find. Nine of the users attempted to answer the trial questionnaire and in total the server was accessed for 18 hours and 21 minutes, during this period 1,982 video clips were viewed. Generally speaking, the longer the user was connected to the video server, the more correct answers they obtained.

Team Tasks

Users were grouped together in small teams and asked to complete group tasks. This task failed to produce any useable data. Group tasks require more commitment from users and also require the user to be accessible throughout the entire trial period. Unfortunately this was not always the case and some users complained of having tried to contact a team member repeatedly but were unable to do so.

On-Line Interpreted Interviews

Eleven users were interviewed via an interpreter and using the videophone. The results were very useful in identifying the issues of the videophone in action for sign communication.

There are alterations to the use of signing space which occur in the use of the videophone with re-location of signs upwards towards the face being most likely. Remote interpreting is demonstrated to be feasible although characteristics of the interaction may alter to allow more checking of meaning.

Overall the trials were very positive in establishing the patterns of use of the videophone.

4.3 Lab Trials

In order to determine the effectiveness of the menu structure of the video server, 8 users were given one hour to answer 20 questions by searching the video server through a videophone. The results indicated an 80% success rate in reaching the answers to questions attempted and the data also provides insight into the search pattern. Attempts to produce a commentary by the users in BSL was unsuccessful but this will be an effective approach in future. The individual pattern analysis shows effective use of the menus but considerable backtracking as the user searches. Users were generally satisfied with the principles and form of delivery of the video server information. A search application is needed and considerable care needs to be taken with the construction of the menus in order that logical searching can occur. Familiarity improves performance.

4.4 Main Trials

In these trials, users had to complete a series of tasks individually and jointly which involved interaction with the video server and with each other. Success was measured by the accurate collection of information and the extent of exchange of this information between users.

There were four types of task:

1 Group Tasks

In teams of four, each user was given a 'role' which necessitated the retrieval of information from other users within the group. Users were asked to complete a task sheet and answer a questionnaire.

2 World Wide Web and Video Server Integrated Tasks

Users were asked to access the SignWorks web site (www.sign-works.org.uk) to obtain business information and numeric video codes so that they could access specific video clips on the video server. They were also asked to purchase books 'on-line' from within the SignWorks Business Books web site. Users had to complete a task sheet and questionnaire.

3 Business Consultation

Users were asked to contact a deaf business consultant via the videophone and ask for specific information. Users were expected to complete a questionnaire on the interaction with the consultant.

4 Remote Interpreting

Deaf users contacted an interpreter via the videophone and carried out a three part conversation with the trial coordinator in a third location.

Although Task 1, the group contact task, was seen as easy to carry out by the users, the majority were unable to complete the group information exchange. The major complaint was that they were unable to reliably obtain a response from the user at the other location. Clearly there is some work to be done in order to ensure the non-attended videophone does not prove such an obstacle.

In Task 2, the users did not intuitively understand the integration of the system – SignWorks web site, Business Books and Video server. There were considerable problems with the website (which is entirely predictable because of its English content) but apparently also problems in understanding the notion of video codes as a way to access the video server. Software problems in the Business Books site which meant that certain browsers were unable to properly access it has meant that users who did reach that point were often unable to purchase books.

In Task 3, users were generally successful in working with the business consultant in BSL at a distance but there was a sense in which business consultation would be better done when the user and consultant were in the same room. This is an important finding and may be indicative of the fact that a videophone (despite being designed for face to face conversation) needs to have different services added to it – this result supports the concepts of video server and other information sources as value added to the simple function of the videophone for conversation.

The final task of remote interpreting was completed successfully every time it was attempted and provides confirmation of the above point, that where there is additional service available through the videophone it will be successful.

These trials were vital in providing a balancing view on the use of the videophone and in offering pointers to the areas of developments which are needed.

5.0 Conclusions and Achievements

As indicated earlier in other parts of the SignWorks report, deaf people do not all rush to use the videophone. It is not yet part of their culture and is not yet commonly available. The fact of SignWorks providing 16 sites with videophones was not enough to make the deaf community begin to use the videophones. The number was insufficient to create a critical mass. Innovative use patterns did not emerge – there was simply not enough traffic for this to occur. This can be contrasted with the DPIC project in Bristol, where 250 mobile communicators were supplied to deaf people and the take off in use was

exponential and has influenced the community at large. The policies of the telecommunications companies and their pricing, meant that the expected spread in installation of videophones did not occur during the life of the project (although it is beginning now) and the effects that this creates were not visible in the project. It is clear that we must be careful to understand that the take up in technology, however, innovative is only as effective as the users' perception of it – not the developers. When cost is an additional factor there may be problems.

The existence of a video server with signed information again was not sufficient a motivator, on its own. As a result, the trials which were part of the agreement undertaken by all sites were not completed with commitment and diligence by many of the users. Supplying a free video communication device was not enough to provoke signed communication at a distance. Traffic figures are very low considering the time during which the videophones were installed. Complications with installation with a major telecommunications provider did not help but obviously different expectations need to be put in place in such a demonstrator project. The trials themselves may need to be rethought as the limitation by site was not helpful and it would have been much better to identify individual users and provide a shorter period of access. Too many of the sites chosen, left the videophone unattended for long periods. The strategy for trials in such a situation in future may need to maximise the user contact hours at the expense of the concept of a business location site.

Equally, the tasks set in the trials need to take into account the user needs and uncertainties more carefully. The trials which attempted to offer an integrated service were not accurately enough focused on a trained user base. Not all user sites had WWW access or had experienced users. In addition of course, difficulties in this area only emphasise the in-built difficulties for deaf people in using text based web sites. Some detailed examination of deaf access to the WWW is needed urgently as there is an underlying impression that despite deaf people's low reading level, the interactivity of the WWW overcomes their weakness in this area. It is unlikely and the results which required searching the web site supported the need for a more thorough examination of web behaviour among deaf users.

Within the trials themselves, the returns were disappointing. Whether the facts that the instructions were supplied in English and had a specific time pressure, were the prime reason for the lack of response is not clear, but often organisations for deaf people seemed unable or unwilling to find a deaf person who would be responsible for these trials. Even at the late stage of the project,, there were still cases where the videophones were switched off or inoperable for some reason. Often videophones were unattended. The need to publicise the project appropriately to even the elected participants is pressing. Although there was an evaluation of each site before the project installed the videophones, it is clear that this evaluation was not strict enough in ensuring that the videophone would be at a point of open access, would be used and would be understood by at least one member of the organisation. In the event, the results of the evaluation were waived in favour of a hoped for evolution in user knowledge. This never came and it is obvious that a great deal more thought is required in the introduction of new technology, even when all the responses from the initial user

clinics are positive. Despite the apparent simplicity of use, the users need training in the functional aspects of the system in terms of information resources and interactivity.

These points while apparently negative, are absolutely vital to our understanding of the introduction of this technology. They are exactly the points which need to be raised in order that we can better deal with the needs of users in future and in order that trials will be even more productive.

In the event, the trials did show the viability of the concept and indicated in many instances how successful it will be in future. The perceived evaluations by users was wholly positive and the task is now how to adequately engage all potential users and instruct them in the concepts of information retrieval in BSL. How this is to be done remains an interesting point. While search systems for information in English are wholly systematised and alphabeticised, there is no obvious means of doing this in BSL ... yet. Only further work with the server and with a better training programme for users will allow the development of such a system.

The hardware and software developments were excellent within the project and the National Launch in London was broadly commended by all those who took part. The technology is ready and the concepts are right.

Sign Works has been an ambitious project which has created an advanced business application which allows deaf people with a business idea to seek a source of information and to put it into practice. The use of the videophone is likely to increase in the deaf community over the next few years and at that time, it will become an acceptable means of deaf communication in sign language. At this time, the project is a demonstrator of the possibilities but it will shortly lead to applications in other areas and development work in the mobile arena is also planned.

Appendices

1. SignWorks – the Starting Point
2. SignWorks – explanatory papers
3. Presentations – these are powerpoint presentations which can be supplied on disc. They will be available shortly on the SignWorks Web site

Deliverables List Shaded tasks are software or hardware productions; the remainder are text reports.

Deliverable	Status	Form of Deliverable
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111	complete	User List
112	complete	User Information
121	Merged with D122	User needs description
122	complete	User needs for trials/dissemination phase described
123	Complete	User - Server interface
211	complete	Survey
220	complete	Specification
221	complete	Trials Report
222	complete	Trials Report
223	complete	Remote interpreting
231	complete	Manual
232		Server Final
233	complete	Trials results
234	complete	Trials Results
235	complete	User Interface 3rd party hardware
236	complete	Software
237	complete	Software
241	complete	Application Final
242	Not required	Switch
323	complete	Web site
331	complete	Web Site Final
341	complete	Specification
342	complete	Service - Final
351	complete	Server access
361	complete	Content - Initial
362	complete	Content - Final
401	complete	Specification
402	complete	Specification
411	complete	Meetings Schedule
611	complete	Statement
612	Merged with D613	Business plan
613	complete	Report on Work
711	Subsumed in D236	Measurement system

712	Subsumed in D234	Satisfaction questionnaire
721	Forms Submitted to DTI	Annual Report – not in these papers
722	Forms Submitted to DTI	Annual Report - not in these papers
723	Sum of all deliverables	Final Report

4. Meetings – Notes from all the project meetings