Final document for the project

Preparing a European Deaf Network for Information and Communication

submitted by:

Research Center for Sign Language and Communication of the Hearing-Impaired, University of Klagenfurt

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1. The project

1. 1. Background of the project

1. 1. 1. Socio-communicative background

The deaf are a relatively small target group of information technology; as their needs are little known, they often get overlooked. Probably for these reasons there are relatively many offers for the hard of hearing (with regard to technical aids for the acoustic channel) but only very few (with regard to aids or services via the visual channel) for the core group of the deaf (those who were born deaf or deafened before acquiring spoken language). Those deaf-specific offers will have to be centrally oriented towards enabling the deaf to use their visually transmitted sign languages.

The special communication needs of the deaf refer to the use of the respective sign language, usually their language of choice [1], and to the possibility of access to all the information the hearing get as a matter of course. This holds for both the written information via the visual channel and the acoustic information via the acoustic channel.
Possibilities for the use of sign languages can be created through their official recognition as visual minority languages [2], similar to spoken minority languages, and through their use in education and society. The technical basis for the use of sign language in modern information technology is either a direct transmission using visual data or a fully functional (and at the moment, not very probable) system of transferring them into other, non-visual codes, e.g. a translation into a written language or vice versa.
The possibilities of information access via the visual channel already exist, at least potentially; actual access to written versions of the spoken languages of the hearing are severely impaired by their frequent lack of knowledge which a rather large number of deaf people show with respect to these languages. This deficiency may be removed by providing deaf people with improved education, including a systematic use of sign languages [3].
Access to acoustic information will only be possible by transferring acoustic data into visual ones, from simple signals (especially important with emergencies) to the transfer of spoken language into writing or its translation into a sign language.

The most important advantages of the information society [4] for the deaf (from the local or regional to the European level) are the improvement of communication and information access by developing more comprehensive systems (e.g. the integrating use of technologies like mobile

telephony): in the wake of fax and e-mail (currently the communication devices which are used by most people) further developments with regard to written electronic communication and the exchange of digital videos (similar to the exchange of written messages) seem possible. As for real-time visual communication, video telephony and video conferencing may be regarded as a technical 'high end'; from the viewpoint of the deaf, they are simply the equivalent to the normal telephony of hearing people. Their use allows the deaf direct communication using sign languages or the use of respective on-line services (interpreting, advice, etc.).
Especially the deaf must not be isolated at an electronic workplace through modern information technology. On the contrary, this technology must serve as many deaf users as possible by offering them not only electronic information but also all electronic means of communication.

1. 1. 2. Initiatives in the European Union

1. 1. 2. 1. E-europe

We are citing from the report of the special interest group dealing with people with special needs. Some issues referred explicitly to the needs of the deaf; cf.
(http://www.egroups.com/group/eeurope-pwd) [5]:

> Human communication is at the heart of the Information Society. Full participation of older people and people with disabilities in the Information Society requires a flexible and robust information environment, with support for multiple methods of communication and interaction, such as speech, text and video.
> The technologies and knowledge required to augment all forms by which people with a disability can communicate and interact already exist. However, policy-makers, the industry, and the society in general have a serious lack of understanding on how and why to address disability access to the standard technologies, products and services of the Information Society.
> The liberalization and deregulation of the information technology (IT) market has had a positive impact on the price and availability of services. However, most of the operators, providers, manufacturers, etc. are not aware of the problems and market opportunities associated with people with disabilities. They do not have a real obligation, as some former monopoly players had. Regulation bodies do not see this as one of their responsibilities. This vacuum must be filled.
> Besides the aspects of design for all/design for diversity of the mainstream technologies, products, and services, it is important to look for new opportunities for older people and

people with disabilities throughout the information society: new concepts of support for care and independent living, new kinds of employment, new communication lines.
In E-Europe it has to be noted that many people with disabilities are in disadvantageous economic conditions. Affordability and financial support are therefore key issues.
The essential actions to be taken by policy-makers to promote an Information Society for older people and people with disabilities were identified in the European project PROMISE (PROMoting an Information Society for Everyone). The five key actions identified by PROMISE are: awareness, availability, accessibility, affordability and appropriateness (details can be found at http://www.stakes.fi/promise). These are being adopted by many governments around Europe: Portugal (National Initiative for Citizens with Special Needs in the Information Society); Denmark (Freedom to Choose: Action Plan for IT Use by People with Disabilities) and Sweden (I.T. for disabled and elderly). E-europe should adopt similar policies in order to create synergies between national initiatives.

Recommendations to the European Council

The accessibility to the Information Society is a right for all citizens. The rights of the citizens are guaranteed by laws and government measures. The EU should adopt and fund measures so as to ensure equal access to the IS for older people and people with disabilities.
The discussion group recommends actions in fields addressed by the E-Europe targets, (legislation, standards, public procurement, web accessibility, Centres of Excellence, Virtual European network, European Curriculum in Design-for-All) and also in the fields of benchmarking of best practices, awareness-raising, and education.

<u>1. Benchmarking of Inclusive Information Society for older people and people with disabilities</u>

The European Commission and the member states are invited to establish Information Society Inclusion Indicators for older people and people with disabilities and conduct a benchmarking exercise on national practices in Europe.
Benchmarking is essentially aimed at understanding where improvements are needed, and how best practices observed elsewhere can be transferred and implemented. Specifically, at least the following practices should be analyzed:
A - How European public TV networks are facing their audience with disabilities and what are the requirements relating to the provision of subtitling, sign language and audio description on analogical and digital terrestrial television.

B - Phone services for people with disabilities.
C - Web Accessibility on governmental Web sites.
D - Copyright legislation on all media (print, television, video and multimedia) as it affects the freedom of production of alternative formats to meet the needs of people with disabilities.

2. Awareness-raising

2.1. European states should take action to raise social awareness about persons with disabilities and older people - their rights, their needs, and their enhanced potential of contribution to society through the use Information and Communications Technologies.
2.2. The sign languages used in the EC countries should be included in the planned measures of the "European Year of Languages 2001".

3. Education

3.1. Projects should be founded to train older people and people with disabilities in the use of information technology.
3.2. Students with disabilities are more likely to be successfully integrated in mainstream schools if modules on integration of assistive technology are included in continuing education courses for schoolteachers. The development of such modules is therefore required.
3.3. The EU states should establish and support a Special Library with sign language digital video textbooks for deaf children (comparable to the special libraries for the blind).

Recommendations to the European Commission

Implementation

We are concerned about the implementation of the E-Europe targets further on down the road. Some are political, to be handled within the legislative and regulative framework. However, real actions require real money. The E-Europe initiative did not include details on funding. We ask for clear and realistic funding strategies. For example, how do ongoing programs like the IST support the initiative? Further concrete actions require people for actually doing things and also people for monitoring. How can this be implemented?

Research

Sign languages should be included, in an explicit fashion, in the MLIS (Multilingual Information Society Programme) and other programs.
Standardization will foster the deployment of products that support accessibility; in order

to be timely and efficient, this standardization activity should also receive public funding and not be left uniquely to market pressure.

Recommendations to the European Union Member States

To ensure equal opportunities of personal communication for citizens who cannot use voice telephony fully, implementation of the standardized Total Conversation concept from the ITU (International Telecommunication Union) for video, text and voice communication is recommended. Efforts are proposed for inclusion into pilot implementation projects reaching many users in many member states. Product and service validation organized with society support is also proposed, in order to ensure interoperability between Total Conversation in different networks, from different service operators and product manufacturers. Support is proposed for further standardization as needs appear in the implementation process. Relay services for translation between modes of conversation should be encouraged.

1. 1. 2. 2. PROMETEUS

The signers of the "Memorandum of Understanding" of PROMETEUS (PROmoting Multimedia access to Education and Training in EUropean Society, http://prometeus.org) are trying for measures promoting consent with regard to multimedia access to education and further education [6]. This consent is to lead to a balance between research, technological development, political and legal regulations.
The European market for education technologies [7] and telematics supported services is split up because of e.g. the different languages. Therefore the European standardization and the consent between users, suppliers and education authorities are to be supported with regard to the contents and services in the networks under development. Within PROMETEUS, different special interest groups exist. One of these is the special interest group "Accessibility", dealing with the access to the information society for people with special needs.

1. 1. 3. On the economy of specific solutions for small target groups

Technical solutions for smaller target groups can only be realized in an economic way if there is a uniform and platform-independent concept and if potential providers of such solutions are willing to coordinate their efforts. Only if all synergies are used and existing technical aids are adapted (we expect that in many cases technical components can be adapted with little effort),

potential investments by the industry will receive a positive economic evaluation.
According to our experiences, especially the deaf demand a standardization of existing technical aids and more consideration of their special needs. In many cases, they prefer integrated solutions.
We are convinced that - with relatively minor and cheap adaptations - existing technical systems or solutions could also be used for the deaf.

1. 2. Goals of the project

The project will be based on the results of the EU-Workshop which took place in Klagenfurt in February 1999 ("Steps Towards an Improvement of the Participation of Deaf Persons in the Information Society"). The final report of this workshop found that the deaf are very interested in an equal participation in the so-called information society and that there are already some initiatives. Due to the limited time of that workshop, the goal formulated by the participants during the preparatory phase, namely the development of concrete further measures, could not be reached.

In agreement with the goals of the program PROMISE, i.e. information about the possible consequences as well as an optimum use of our information society, the following aims were developed for our project:

1. 2. 1. Presentation of an overview of the existing technology and its possibilities as well as existing deaf-related initiatives. Collection of available information on existing systems (including contacts to producers in order to invite them to the planned fair or give them the opportunity of presenting their products during the workshop).

1. 2. 2. Evaluation of all information from projects, initiatives and networks of the European Community (trans-European networks, research and development, standardization); evaluation of possible links to the proposed deaf network.

1. 2. 3. Inquiries into the needs of the deaf with respect to the technology as well as the organization and the contents; inquiries concerning their experiences with existing systems (through representatives of the deaf, who are to be involved as partners or experts).

1. 2. 4. Analysis of technical and socio-communicative aspects of the information society from the perspective of the deaf.

1. 2. 5. Presentation of the results of the survey and the analysis as well as of existing systems and solutions during a workshop with a small product fair.

1. 2. 6. Establishment of contacts between deaf users and European producers, who offer interesting solutions or services for the deaf. These producers should also be invited to demonstrate their systems and developmental possibilities.

1. 2. 7. Realization of a deaf-specific offer for an information and communication network on the basis of existing technical possibilities, formulation of further demands of the deaf with regard to new technical developments, organizational layout and contents of this network. This main goal of the project - suggestions for realizable practical solutions - should be reached by the joint analysis of the current situation from the perspective of the deaf and the technical experts.

One of the basic concepts of this project is that the deaf, who as a group have been at a disadvantage for a very long time, similar to other people with special needs, should receive preferential treatment allowing them to be among the top users of the so-called information society. We are pleading for a kind of positive handicap: People with special needs - the deaf among them - should get special advantages in order to be able to ‘start into information technology (IT) before others do’. Of course, there are IT “experts” also among the deaf, but we have to provide suggestions for the development of the deaf or sign language community as a whole.

1. 3. Target groups of the project

The target group of the project includes the European deaf communities as users and the European producers of information technology as possible sellers or developers of information-technical solutions for the deaf.

2. Steps taken to reach the goals of the project

Work on the project began on January 17, 2000. The preparatory phase lasted from this date to the beginning of the workshop.

2. 1. Preparatory phase

The following is a brief description of the activities during the preparatory phase:

2. 1. 1. Information of the deaf about the project via their national associations and the European Union of the Deaf

This information was spread among the deaf as follows: On the one hand, members of the project working group (cf. 2. 1. 5.) participated in pertinent meetings; on the other hand, the (mostly electronic) information was sent to muliplicators in the deaf area as well as to selected deaf persons.
Trude Dimmel, Franz Dotter and Ute Froehlich participated in the conference of the European Union of the Deaf (EUD) in Gent (April 13 - 15, 2000), informing all the participants with posters, leaflets and personal communication. As the representative of the European Deaf, the EUD was invited into the working group as well. Because of the possibility of providing all national deaf associations with the respective information during the Gent conference, we decided not to call on all of them in their home countries. Nevertheless, the information was sent to them once more via letter/fax or e-mail.
Ute Froehlich and Franz Dotter also participated in the annual conference of the BHSA (Bundesarbeitsgemeinschaft hoerbehinderter und gehoerloser Studenten und Absolventen) in Stuttgart (May 31 - June 3, 2000) and made a presentation dealing with this project.

The participants of the EU-workshop in Klagenfurt in February 1999 (“Steps Towards an Improvement of the Participation of Deaf Persons in the Information Society”) received the information; moreover, a comprehensive announcement was made public via the homepage of the Research Center for Sign Language and Communication of the Hearing Impaired at the University of Klagenfurt (Forschungszentrum fuer Gebaerdensprache und Hoergeschaedigten-kommunikation; FZGS) and also via pertinent mailing lists (EUD-mail, SL-LING).

2. 1. 2. Information of the developers of information technology about the project

We wanted to contact as many companies and other interested parties as possible. The main information sources were the Internet and pertinent magazines. Personal contacts were important, too, both from our earlier workshop and from various other conferences. The addresses (preferably e-mail, because of its speed) were then listed in tables (cf. supplement) which served as a basis for sending out the information. Special consideration was given to well-known developers of PCs and mobile phones. We decided to include not only suppliers of deaf-specific products, but also those dealing with people with special needs, with a focus on communication devices.

We composed a letter to the respective companies (both a German and an English version, cf. supplement), inviting them to participate in the workshop and the product fair, and sent it to them via e-mail. Where no e-mail address could be found or it did not work, we contacted them per letter or fax. The first announcement was sent out in May; if we did not get any reply, we contacted the companies again at the end of July. A second letter was composed, asking whether they had received the information and informing them that this project simultaneously investigates which companies are interested in the deaf from an economic point of view. If they did not reply until September 4, we would be forced to assume that our offer was of no interest whatsoever to them and therefore we would have to inform the European Commission that there does not exist a market for deaf-specific products.

We did receive only a few answers which can be found in the tables (cf. supplement). Most of the companies politely declined, but some were interested in co-operating with us: They either participated in the workshop or at least sent brochures and other material for the fair.

Members of the Research Center for Sign Language visited the Forschungszentrum Telekommunikation in Vienna, the Siemens company and the 12th National Deaf Children's Society's Technology Exhibition in Wolverhampton (June 23 - 24, 2000). Neither the Forschungszentrum Telekommunikation nor Siemens took up our suggestions. The Wolverhampton conference led to a lot of new information and some contacts.

2. 1. 3. Collection of information on existing technologies with a focus on deaf-specific solutions

The information listed in the tables "Mobile phones" and "Handheld and PalmPCs" (cf. annex) stems mainly from various Austrian newspapers and magazines (not only technical magazines, e.g. e-Media, but also weekly magazines, e.g. News). For the tables dealing with technical data ("Daten zu den technischen Geraeten") and additional equipment ("Sonderausstattung der

technischen Geraete"), information was also taken from the Internet and from personal communication with different companies.

All tables are in alphabetical order. They are only surveys with no claim to completeness regarding developers and functions. It is quite possible that certain devices offer even more functions than are given in the table. Only those data were included in the table which appeared in the materials used, i.e. most of the time not all functions were mentioned. The purpose of the tables is to give a general overview of what is available on the commercial sector. The columns contain the respective product names, with the exception of the mobile phones (there are sometimes no product names, but only a "ja" (yes); in this case, the respective company offers devices with this function). The abbreviation "int." stands for "integrated".

2. 1. 4. Preparation of a workshop in connection with a small fair of existing information technological offers

The respective activities were carried out by the Research Center for Sign Language and Communication of the Hearing Impaired at the University of Klagenfurt. Additionally to deaf people, experts and producers of information technology, the respective ministries (e.g. education and social affairs) of the EU-countries were invited to the workshop, but only a representative of the Swedish Ministry of Education and Science participated in the workshop; the others did not even reply to the invitation.

2. 1. 5. Establishment of a small working group for accompanying the project and editing the final report

The following institutions or associations took part in the project (in alphabetical order; with the respective competence in parentheses) [8]:

- Bayrisches Institut zur Foerderung der Kommunikation Gehoerloser und Hoerbehinderter e.V. (Bavarian Institute for Deaf Communication; competence in working with the deaf)
- Bundesarbeitsgemeinschaft hoerbehinderter und gehoerloser Studenten und Absolventen e.V.; BHSA (German Association of Deaf Students and Graduates)
- Deutscher Gehoerlosenbund (German Deaf Association; representative of the users)
- Forschungszentrum fuer Gebaerdensprache und Hoergeschaedigtenkommunikation der Universitaet Klagenfurt; FZGS (Research Center for Sign Language and Communication of the Hearing-Impaired, University of Klagenfurt; coordination, deaf research)
- Gehoerlosenverband Muenchen und Umland (Munich Deaf Association; representative of the

users)
- Landesarbeitsgemeinschaft der gehoerlosen Gebaerdensprachlehrer Bayerns; LAGS (National Bavarian Association of Deaf Sign Language Teachers)
- Oesterreichischer Gehoerlosenbund (Austrian Deaf Association; representative of the users)
- Oesterreichisches Forschungszentrum Seibersdorf GmbH (Austrian Research Center Seibersdorf; IntegraNET as a communication network, survey of technical solutions)
- Scottish Interactive Technology Centre, University of Edinburgh and Scottish Sensory Centre, University of Edinburgh (competence in working with the deaf)

The partners established a working group which should offer help and advice during the whole measure. The first meeting of this group (the main means of communication within the project was the Internet) took place on March 4, 2000. The next meetings followed on May 27 and July 1, 2000 (in Munich, in the rooms of the SIGMETA company). The meeting on May 25 was preceded by a conference of the Munich Deaf Association on May 26, which dealt with theoretical and practical aspects of relay centers for the deaf.

The working group made the following decisions:

If the participants from EU-countries do not fill all available places, participants from EU-candidate countries will also be considered.
The compensations for travel expenses for interpreters and deaf people will not be paid as a lump sum as was originally intended in the project proposal, but as 20 percent compensation of the actual travel costs.
Project work was regarded as a survey; an analysis of the market seemed impossible to all partners. Taking the needs of the hard of hearing, the deaf-blind, and the multiple handicapped deaf into consideration was impossible, too, due to the extent of the measure.

The Research Center prepared lists for contacting companies, deaf people and other experts, which were then submitted to the partners for completion. The same holds for the lists of devices and their functions.
As for the wishes of deaf users, all partners were asked for their feedback, especially with regard to experiences with various solutions and respective suggestions for improvement.

2. 2. Workshop (Main phase)

The workshop was held from September 21 to September 24 at the University of Klagenfurt. It had the following agenda:

- Presentation of the available information;
- Presentation and evaluation of existing systems, solutions and initiatives by the deaf and the developers;
- Survey of user demands and summary of the analysis;
- Small fair with regard to existing systems, establishing of contact between deaf users and European developers;
- Development of suggestions for a European information and communication network for the deaf;
- Documentation of the workshop results and preparation of the final document.

The workshop itself was a combination of different parts (cf. the time table in the supplement for a detailed outline): A general introduction by the organizer, the Research Center for Sign Language, was followed by presentations on important subjects by the participants. The second part of the workshop was dedicated to four working groups which had been thematically described by the preparatory group; the participants were asked to choose one of them when submitting their registration. The four working groups were: Communication between the deaf and the hearing, Communication among the deaf, Access to information and Technical aspects. Due to a lack of applications for the subject “Communication between the deaf”, this was not treated in a specific working group during the workshop. The respective issues were dealt with in the other three working groups.

2. 3. Final phase

This phase starts with the end of the workshop and ends with the publication of this report. The final meeting of the working group for the final editing of this report took place on November 25 to 26, 2000, during the BHSA-conference in Nuremberg. This end report can also be found on the homepage of the FZGS (http//www.uni-klu.ac.at/fzgs).

3. Results of the preparatory phase

3. 1. Preliminary remarks

The ‘explosion’ of the amount of data and information, which has become a common figure of speech, results in advantages and disadvantages also for the deaf: Certainly there has never been so much information potentially available. Yet the ‘fragmentation’ of the offered electronic information is so big that not only the deaf resign before they have found the information they were looking for. The deaf have the additional problem that in dealing with the Internet they usually have to use written languages - that of their native country at least as a second, English as a third language.
The above-mentioned abundance of data and the time limitations of many projects and initiatives often are reasons that informative websites are either no longer updated or even disappear or that the information necessary for the implementation of results according to the EU notion of ‘Best Practice’ is not available at all. So there are still massive problems with the realization of existing knowledge. This fact was mentioned repeatedly during the workshop of this project. It was also the reason that during the preparatory phase, we were not able to do a complete survey of this subject area. Therefore our information has partly to be regarded as preliminary.
The main sources of information were the Internet and pertinent publications (mainly magazines dealing with the IT area).

3. 2. Summary of an inquiry of the Bavarian deaf sign language teachers **(Landesarbeitsgemeinschaft der gehoerlosen Gebaerdensprachlehrer Bayerns; LAGS)**

The general opinion was that there existed no communication device for the deaf which satisfies the demands of every situation. The following reasons were given:

- Incompatibility of the devices;
- The hearing seldom have the same devices (no videophone, Nokia Communicator, etc.);
- Limited number of characters for SMS (a maximum of 160);
- No centralized number for emergency calls;
- No hotline for sign language teachers;
- A lack of relay centers. “C2U”, which was established in Muenster (Germany), has already been discontinued after a test phase. The same holds for the branch office in Graz (Austria);
- There is no high quality interpreting agency for videophones;
- There are no replies to fax messages or only with delays of several hours up to several weeks.

This concerns especially the sign language teachers. An effective exchange of experience becomes impossible.
Formerly the textphone as the first communication device was also the most widespread one. Then there was a change towards exchanging information and news per fax. Recently, the videophone appeared as another communication possibility for the deaf. It includes also the relationship level, because one can see the facial expression and the sign language of the communication partner as well. This is important for understanding the content. Besides, spontaneity is maintained. One person stated that this technology allows the deaf to be human (although written language is essential, too). At the moment, the videophone is the only really satisfying kind of communication; unfortunately, it is also the most expensive one. For cost reasons, very few deaf people are equipped with videophones.

It has to be pointed out that the development of sign language was strongly suppressed by the oral method of education, introduced after the Conference of Milan (1880). This had grave consequences for the deaf until today. Because of oral education, the deaf are forced to painstakingly acquire their knowledge of the foreign language German and to learn lip-reading. The structural differences between these two languages result in insurmountable communication problems between the hearing and the deaf and which in turn often lead to misunderstandings. Since the time of the Conference of Milan, the deaf get an education in simple German. This means that the standard of written language education for the deaf does not correspond to that of the hearing. This lack of information could be reduced with the aid of new technology and sign language, thus bringing about equality with the hearing.

General access to information is unsatisfactory for all the deaf. Even the existing Internet sites with information websites like www.taubenschlag.de, www.deafworld.de, www.planetdeaf.de, etc. are insufficient and expensive in contrast to the comparatively comprehensive and cheap information of other media which cannot or almost cannot be used by the deaf. This is especially negative, if one takes into consideration the simple jobs and low wages of the deaf.

What is badly missing is an institution which answers questions on certain specialized subjects, e.g. psychology. Moreover, there are hardly any possibilities to get general information. There is a total lack of programs with special exercises for sign language teachers. They need materials for different subjects (e.g. psychology, examination methods, communication training, sociology, new media) as well as for general education (administration, politics, etc.). Especially important is a graphic and appropriate processing of the information with the goal of disseminating the knowledge.

There are also problems with the exchange of information among the sign language teachers. Many deaf sign language teachers live far away and far from each other. Especially in the countryside, they have no possibility of exchanging information although this would be very important right now because of the qualification of the sign language teachers. A sufficient improvement of the training/qualification will probably not be reached during the next five years. In order to reach this goal faster, video conferencing is warmly recommended. A virtual education in addition to the job will be necessary before a relatively quick solution for the education and improvement of the qualification of the existing sign language can be found. In the course of time, a full-time education will have to be introduced so sign language teacher can become an officially recognized profession.

The conception of multimedia products has to be speeded up. Computers, information and communication technologies are of great importance. In our opinion, the following conditions must be met:

- High data transfer with at least double ISDN speed;
- Fast computers with sufficient memory capacity and a high transfer rate with regard to networking;
- Flat rate: cheaper than it is now;
- An appropriate studio with the necessary technical equipment;
- Availability of a person for care and control so that the information and communication network remains technologically up-to-date and there are no breakdowns;
- The fast development of technology requires planning for longer periods of time.

The optimal communication device would be a laptop with an integrated videophone, UMTS-radio connection and the possibility of connecting it to the standard telephone system as well as compatibility to mobile phones, fax, computer (Windows or Apple), textphone and videophone. The necessity of video conferencing has to be pointed out.

(prepared by Ernst Henke and Margit Hillenmeyer)

3. 3. Existing technical systems for deaf communication

There are no references to hearing aids, cochlear implants or other devices which support the acoustic perception [9]. Moreover, non-technical communication aids for the deaf such as visual communication systems, cued speech and lip-reading are not included.

3. 3. 1. Types of systems

In principle, one might think that the devices and means of communication normally used by the hearing could easily be used by the deaf as well provided that visual elements are substituted for all acoustic ones. However, this may lead to problems due to the lack of written language competence of the deaf or the lack of efficiency of software transfer systems. For this reason, the better rating of all the possibilities allowing direct or indirect transmission of visual data (including sign language) by the deaf becomes plausible. Developing deaf adequate information and communication systems does not only mean a simple transformation of acoustic data into visual ones, but also taking into account the special position of this group and adapting every single information or communication possibility to it.
The existing systems can be regarded from different perspectives. Based on the form of the transmitted (linguistic) information, one has to differ between:

3. 3. 1. 1. Systems for the transmission of written language vs. sign language data

Systems using written language have some advantages: They can also be used by hearing people who lack any sign language knowledge to communicate with deaf people. Their data transmission rate is rather low, too. From the perspective of the deaf, the drawback of these systems is their exclusion of sign language, so that the deaf are forced to express themselves in a written language in which they are often not as competent as in their native sign language. Nevertheless the deaf have always used written communication among themselves as well as with the hearing; especially for complex questions or formal acts they often hesitate to use this way of communication.

At the moment, systems which allow the use of sign language usually are not fully developed or they need a high data transfer rate, which in turn leads to higher costs. Moreover, conversation partners without sign language skills will need an interpreter (of course, video telephony offers the possibility of visual contacts other than sign language, e.g. lip-reading; such a communication is, however, rather limited).

With regard to immediate communication, we can distinguish between:

3. 3. 1. 2. Systems for 'real-time communication' vs. systems with (potentially) delayed communication

The main characteristic is whether one has to restart a certain device or software program in order to answer a received message or whether the connection remains active while the sender changes. Systems or services like textphone, chat, Internet and video telephony or interpreter allow a continued dialogue of 'real-time' communication (the communication remains 'open', i.e. once a direct communication has been established, it remains until the end of the conversation); other systems like fax, SMS, e-mail and paging do not have this option (they are rather 'monologous' systems, i.e. the communication is limited to a single transmission and the connection has to be re-established afterwards). The differences between these systems also appear in the message itself, e.g. forms of salutation.

The drawback of the latter systems is that they are similar to old-fashioned correspondence by letter: The sender does not get any feedback and it is impossible to know whether the communication partner is available or not (e.g. a question to a doctor per fax; there is no automatic reply similar to an answering machine or an automatic e-mail reply). This means that the sender may receive a delayed reply or even no reply at all.

The following is a survey of available technology (devices, software, transfer methods and services). The so-called 'simple' devices will be presented first, then the growing number of combinations of different functions on the basis of various devices.

3. 3. 2. Written language-oriented systems of inherent dialogous character

3. 3. 2. 1. Textphone

As was already mentioned above, the textphone revolutionized deaf communication. Although it gets more and more pushed aside by other devices, there are improvements also in this area (cf. section 3. 3. 7. 1.)
Not all of the textphones used are compatible with each other: The transfer protocols CCITT V.21/V.22 and EDT (European Deaf Telephone, 110 Baud) are incompatible. There is yet another textphone standard in America. However, there are the so-called "ST" textphones, e.g. the more expensive models of Humantechnik (Germany) and Telescrit (Switzerland) which

integrate both standards so that (after a certain period of time) they can switch over to the respective standard. An ST with the CCITT V.21 or V.22 standard ‘understands’ also the analogue PC-modems in normal commercial usage, if these can switch down to the older standards like V21/V22. ST are “no more than” analogue modems with a keyboard and communication software (cf. the discussion of textphones in www.taubenschlag.de under the subject heading of “Rat und Tat”).
In Austria, the deaf use the "European Deaf Telephone" (EDT). Other types of textphone are Dual Tone Multi Frequency" (DTMF; e.g. Sweden) and systems like the Cept2/Minitel dialogue in Belgium.
In Great Britain, the introduction of the “Virtual Text Network” is supposed to make the access of textphone users to the public phone net or call centers easier.

3. 3. 2. 2. Mobile textphone

We found two pieces of relevant information: The Telesta company in Sweden developed a technology which allows a written “real-time conversation” via GSM. Currently, sender and receiver need the same device (Nokia 9000il Communicator) in order to have a written conversation. This is expected to change in the future.
The Swiss company “ghe-ces electronic ag” offers a mobile textphone. This can be plugged directly into a telephone outlet or, alternatively, the receiver may be fitted into the respective cradle of the textphone, thus initializing the connection.

3. 3. 2. 3. Chat

‘Chat’ means the simultaneous on-line ‘chatting’ of an optional number of participants, coordinated by one or more server(s). Chat programs are either actually on-line, e.g. ICQ, where two ore more users share an on-line connection and each of them can see what the other is writing; or they are subject-related newsgroups that work similar to e-mail (the “adressee” is the subject under discussion [10]).

3. 3. 3. Written language-oriented systems of inherent monologous character

3. 3. 3. 1. Fax

The fax device led to a significant improvement in deaf communication. In contrast to the textphone, the transmission of larger amounts of data or even graphical information (e.g.

drawings) is possible. Another advantage is that also many hearing people such as doctors, adminstration, etc. have a fax device so that deaf people can largely communicate with them on their own.

3. 3. 3. 2. E-Mail

The invention of e-mail resulted in a revolution of telecommunications, especially in the professional area. In comparison with the standard mail system, electronic messages are much faster and cheaper. Also for private use, e-mail is getting more and more important as an easy means of communication. The disadvantage is that one usually needs a PC in order to send or receive e-mails. In the USA, a small, portable e-mail device has been developed, allowing the user to receive e-mails wirelessly. For the sending of messages, a standard telephone jack is required.

3. 3. 3. 3. SMS (Short Messaging System)

With SMS, text messages of up to 160 characters may be sent from one mobile phone to another one (or, alternatively, they may be sent from certain providers, so-called “portals”, to mobile phones). In Finland, there already exists an SMS number for emergencies. At the moment, there are extensive technical developments on the mobile phone sector [11] (with regard to multi-functional systems based on a mobile phone, cf. section 3. 3. 7. 3.; for a German survey of mobile phone usage cf. the article by Christ in the supplement).
With a respective toolkit, it would be possible to receive SMS also on standard telephones. As far as we know, this has not been realized yet.
Still relatively unknown are the free fax and SMS services on the Internet, e.g directBOX (www.directbox.com), Ovalis (www.ovalis.de) or Webs-SMS (www.websms.at, www.uboot.com).

3. 3. 4. Sign language-oriented systems of inherent dialogous character

Sign language-oriented systems require relatively high transfer rates for the transfer of video data, if the pictures are expected to move smoothly. This results in a disadvantage compared to the written language-oriented systems, because of the high amount of processing and the transfer costs.

3. 3. 4. 1. Videophone (as a stand-alone, computer-independent system)

Video telephony offers the deaf an ideal communication system. Via videophone, a deaf person can communicate with another deaf person in sign language (provided that the second person has a videophone, too).
Modern videophones work with different standards, depending on the manufacturer. The German ones with the so-called H.320 standard seem suitable for the deaf, because with the T-view model (Siemens) sign language movements are smoothly transmitted. The production was stopped, however, because of the low number of sales caused by the lack of acceptance of the hearing users (the sign language community in itself is not regarded as a market). UMTS might replace the H.320 standard and lead to better solutions, but there is no information about costs yet.
In Germany, there is currently a pilot study called "telesign" (http://www.telesign.org). Permanent funding is not assured yet.

3. 3. 4. 2. Video telephony via or with the aid of a computer

For this kind of video telephony, a computer with a video card, an ISDN-card and a camera is necessary (in case of speech transmission, an additional sound card, microphone and loudspeaker are required), as well as the respective software and a digital phone connection to an ISDN "network terminal" (cf. e.g. "I sign by Phone"; http://www.xenex.fi). Two types of systems must be distinguished: 'small systems' for private users or small companies are available for about 500 Euro. Such a solution might consist e.g. of a Connectix-QuickCam camera and the software "Net-Meeting" from Microsoft (www.microsoft.com/netmeeting/), which can be downloaded for free from the Internet. However, the quality of the pictures is not very good.

3. 3. 4. 3. Video conferencing (as independent hardware)

We will not go into details with these professional devices because they are much too expensive for individual use; even companies tend to rent them only for a short period of time.

3. 3. 4. 4. Video conferencing via or with the aid of a computer

Similar to video telephony, one has to distinguish between video conferencing systems which are managed by a computer from those which are basically limited to a computer with a web cam.

For example, the PictureTel SwiftSite II video conferencing system needs an additional ISDN-connection and a TV-set; system management is done via a normal web browser (http://www.picturetel.de/produkte/swiftsII.htm).

Desktop systems use software or hardware CODECs (encoder/decoder); the latter are realized as individual chips on the respective computer cards. In this case, a card (ISA or PCI) is required first: The video camera, the audio units and the ISDN S0-cable can then be connected to it.
In contrast to the software CODECs where the processor (typically very fast Pentiums) of the computer has to take over the complete picture and audio compression (up to 1:1000) as well as the encoding of the signal in the respective standard (H.320/H.323), such a solution does not block up any of the computer's memory (except for the normal access to the graphics card by the computer), and there are limited minimum hardware requirements. Usually, existing installations can be used without adding any new components. The HW-CODEC guarantees that working on the computer is possible even during a video conference without any loss of performance (even when working together with the communication partner).

For a list of video conferencing systems, cf. http://bzvd.urz.tu-dresden.de/pc-software and http://www.logitech.com/cf/products/productoverview.cfm/35.

Two important possibilities that will be realized in the near future:

3. 3. 4. 5. Mobile videophone: Mobile phone cum camera

Among the conditions that need to be fulfilled for video on the display of a mobile phone are a high and stable transfer rate for data (e.g. a UMTS connection), a relatively low resolution (ca. 100 x 100 pixel) and a TFT-display.

3. 3. 4. 6. Hologram

If the technology developed by Digital World Centre (Manchester) takes off, holograms of living teachers could be 'teleported' virtually into classrooms many miles away so that their image can teach pupils remotely. The hologram teachers can even hold conversations and look children in the eye. The technology, which goes on show at the BETT education technology show this month, has been designed to allow schools in remote areas to gain access to extra teaching resources, and to allow children to benefit from specialist teachers for minority subjects. Developer Duffy White said the technology works in a similar fashion to the glass teleprompters used

for speeches now, but instead of projecting words, a full-length image of a person is displayed. The image is sent as a signal via the Internet and then transmitted onto a glass laminate screen, which is built into a mobile lectern. All pupils will see a life-size image of the teacher standing in front of them. The teacher can view the class via a camera fitted in the lectern, with a lens that is positioned to be in the same place as their eyes on the screen (from: "computeractive magazine 2000").

3. 3. 5. Sign language-oriented systems of inherent monologous character

3. 3. 5. 1. Videomail

E-mail offers the possibility of attaching files. These attachments can include video files, the so-called video mails, which are of special interest to the deaf.

3. 3. 6. Devices and programs for information access

3. 3. 6. 1. Captioning for television

A brief history of captioning as well as guidelines and related information can be found on the website of the Captioned Media Program (cf. http://www.cfv.org/).
There are different kinds of captioning: Off-line and Real-time (e.g. SysMedia's Automated Subtitling Replay systems for teletext captions and a complete range of WinCAPS Subtitle Preparation workstations for Off-line, Live and Newsroom environments, WinCAPS Multimedia subtitling workstations provide multiformat subtitle authoring for Teletext, Closed Caption, Open Caption, DVD and DVB delivery; cf. http://www.sysmedia.co.uk/). Open captions (subtitles) appear on videos without the need for a decoder or special equipment.
An example of a digital captioning software is VoiceWriter™, owned by Haylea Systems Inc., used by the majority of Canadian broadcasters. For a list of various companies and their captioning products, cf. http://www.captions.org/softlinks.cfm.

Captioning for television could guarantee improved information access for the deaf, if it was done comprehensively. At the moment, neither important news nor other information broadcasts are captioned (with few exceptions).
The following (with the exception of Austria) is an excerpt from a survey (Huainigg 1996) of TV stations (the information was provided by the respective TV stations themselves).

Algeria

Entreprise Nationale de Television broadcasts a weekly magazine with special information for the hard of hearing.

Australia

Due to the law against the discrimination of people with special needs (EEO), the stations are obliged to employ people with special needs. There are some blind presenters on the radio, a textphone connection for the communication with deaf people and an employee of ABC meets with people with special needs and experts four times a year for an exchange of information.

Austria

According to Mr. Maerk (head of ORF teletext; personal e-mail communication, November 16, 2000), there is no Austrian law obliging the ORF to use captioning. Such an act is scheduled for submission and debate in the spring of 2001. The Austrian Deaf Association and the special interest group “People with special needs in the media” are also attempting to get such an act.

Belgium

The Belgian media employ numerous people with special needs: Vision-impaired people on the radio, physically handicapped people and deaf people in the technical services, mentally handicapped people for simple jobs like delivering the mail.
RTBF broadcasts a monthly magazine during prime time, produced and presented by a physically handicapped person. Every evening, the journal broadcast on Channel 1 is presented also in sign language on Channel 2.

Czech Republic

There are special programs for people with special needs and the deaf on the Czech television. People with special needs participate in the creation and presentation of the program.
Twice a day, there are news in sign language; the main daily news are captioned and there is teletext as well. The program “TV Club for the deaf” has been broadcast every two weeks for the last 15 years - in sign language and with captioning. Some of the other programs (educational programs, social politics, family programs, nature and geography programs, important speeches by the president or the parliament) are broadcast either in sign language or with captioning. There has been a magazine in sign language for deaf children since 1993.

Denmark

People with special needs are employed by the Danish media (Danmarks Radio, TV2, 1 Danmark) as programmers, technicians, producers, journalists and presenters.

More than 50% of all the productions of DR TV are captioned; an increase to 60% is already planned. 25% of internal productions are captioned. An increase to 35-40% is scheduled for the next few years.

On week-days, there is a ten-minute news broadcast in sign language, once a week a 25-minute magazine in sign language for adults and a 20-minute magazine for deaf children and youths. All of these programs are produced and presented by deaf people.

Germany

ARD (Arbeitsgemeinschaft der Rundfunkanstalten Deutschlands): In 1993, 38.000 minutes of the program were captioned**.**

The news report "Tagesschau" (from ARD) is repeated in sign language in the program Phoenix.

The Bayrischer Rundfunk (Bavarian Broadcasting Corporation) produces the deaf magazine "Sehen statt hoeren" and broadcasts it once a week. It is created and presented by the deaf (also for the WDR - Westdeutscher Rundfunk).

The MDR (Mitteldeutscher Rundfunk; Central German Broadcasting Corporation) broadcasts the magazine "selbstbestimmt!" in co-operation with the ORB and SFB. The presenter of the magazine, Hans Rener Boenning suffers from paraplegia and is an active member of the German movement of people with special needs.

The DSF broadcasts weekly the half-hour magazine "normal" which is created and presented by people with special needs.

England

The BBC and private broadcasting corporations are obliged to have 50% of their program captioned until the end of 1998. The new digital stations have to start with 5% and increase captioning to 50% during the next ten years.

ITV broadcasts more than 40 hours per week as well as regional programs with captioning, and many corporations broadcast their own local news in sign language. The magazine for people with special needs LINK has been broadcast for 17 years and led to significant changes regarding the respective laws.

France

TDF broadcasts captioning for the programs TF1, France 2 and France 3. All the other channels are without any captioning.

Ireland

There are continuous series with captioning on RTE. A special program for the deaf is “Sign of the Times” (for ca. 6 years). It is broadcast monthly and there are news, entertainment and information, both with captioning and in sign language.

Latvia

Once a month, the 25-minute “Program for the Deaf” is broadcast, which is produced in cooperation with deaf people.

The Netherlands

In 1996, a bill was in preparation for the captioning of 50% of all the Dutch programs.

Norway

NRK-TV broadcasts a monthly half-hour deaf magazine, produced by deaf and hearing people. There is also a monthly 15-minute program for deaf children. At the end of the 5 o’clock news, there are five minutes of news in sign language.

Portugal

There are numerous people with special needs employed in the media and regular broadcasts with captioning.

Slovenia

Two main news broadcasts from STV are regularly captioned. The first evening news, the program AKTUALITY 1 at 7.30 p.m. is broadcast on Channel 2 in sign language for the deaf. The news program AKTUALITY 2 is repeated on the next day at the beginning of the programs at 8.30 a.m. with interpretation for deaf people. Some foreign prime-time movies are captioned, too.

Switzerland

There is a tendency towards more sign language instead of captioning. DRS broadcasts the deaf magazine “Sehen statt hoeren” every two weeks; Radio Suisse Romande broadcasts the deaf magazine “Signe” once a month.

As an indication of how strongly the lack of access to TV broadcasts can be felt as discrimination by the people in question, Australia may be cited: There is a campaign especially for deaf children which aims at captioning for all programs for children until 2002 and all programs of the Austra-

lian TV stations until 2005 (National Working Party on Captioning, email: nwpc@hutch.com.au).

3. 3. 6. 2. Equipment or devices for Internet access without computer

Based on the - partly correct - assumption that certain user groups are afraid of using a computer or want only an Internet access, various products were developed allowing such an Internet access. These devices are in direct competition with mobile phones with Internet access; they have the advantage that one may use the public phone net (which usually leads to lower costs) and that the display fulfills the usual computer standards with respect to size and resolution.

3. 3. 6. 2. 1. TV-set with an already integrated modem for Internet access

Meanwhile it is also possible to use the TV-set for Internet access. At the moment, one still needs a so-called web-box (e.g. Home-Pilot from Dynavisions which enables the user also to write texts and will provide a possibility for video telephony; cf. http://www.dynavisions.de, or the similar "CyberSpider" from Inter-Con/PC; cf. http://www.interconpc.net/home.htm) , which is connected to the set. Some of the newer TV-sets have an integrated Internet access hard- and software as well as a keyboard and use an enhanced remote control (cf. Schneider-Silva's WebTV). In case the TV-set offers more than one image areas, the user can watch TV and access the Internet at the same time. A computer-like accessory for standard TV-sets is the "Totebook 6001" from Inter-Con/PC, which can be expanded to serve also for video conferencing.

3. 3. 6. 2. 2. Webpad

This is a mobile, monitor-like device (size: approx. A4, thickness of a book) which can be used for wireless access to the Internet via a phone basis set (ADSL, cable or LAN). E-mails can be sent as well. With a suitable connection, the configuration will be automatic [12].

3. 3. 6. 3. Note-taking software

This software is designed to facilitate note-taking as a service for the deaf (especially deaf students), e.g. the Sheffield Hallam University's "Stereotype" system.

3. 3. 6. 4. Transfer-, transcription and translation programs

We have to distinguish between systems which convert text to (synthesized) speech (of the same spoken/written language) and vice versa (spoken language to written text), systems which convert the text of a written language to signs and vice versa, and systems which translate a spoken/written language into a sign language.
While there are already a lot of text-to-voice programs which are also used with telephony, e.g. information or mailbox, programs for the opposite direction are much less numerous and frequently less well-developed.
Concerning so-called "text-to-sign" systems, every e.g. English word is substituted with a single sign (the signs are usually taken from an autochthonous sign language). This is purely a word-for-word translation without any consideration of word-order or morphology of the target language at all. Therefore it should not be regarded as a translation program, because its result is not real sign language. However, advertising does not mention the above-mentioned limitations of such system at all; on the contrary, they maintain that it can “translate” spoken language into sign language (cf. 3. 3. 6. 4. 1.).
With regard to translation systems in the true sense, these are all visions for the future. This is valid for translation from a spoken/written language into another one as well as into or from a sign language. Sign language recognition is the less developed part of this challenge. As examples of a future sign language recognition cf. "Handispeak" (The Collegiate School, New York, NY; http://www.toshiba.com/tai/exploravision/2000winners/region1.html) or CyberGlove fromVirtual Technologies (http://www.virtex.com/products/hw_products/cyberglove.html).

3. 3. 6. 4. 1. iCommunicator and TESSA

The Interactive Solutions company (http://www.teachthedeaf.com/) offers the so-called “iCommunicator system”. This system converts text to synthesized speech, real-time spoken language to text or synthesized (computer-generated) speech or Signed English.

A similar system (which suffers from the same limitations as the iCommunicator) was developed by Televirtual (TESSA, "text to sign"; http://www.televirtual.com): The system basically reads plain-text and transfers it to signs word-for-word by using 3-D graphics animation ("avatars"). One first version now helps the English Post Office counter clerks to communicate more effectively with deaf customers; an application for digital terrestrial television is planned..

3. 3. 6. 4. 2. VOICE

The VOICE Project (http://voice.jrc.it/home.htm) is investigating the use of speech recognition systems in conversation, conferences, television broadcasts and telephone calls. It is developing prototypes of user friendly interfaces allowing an easier use of commercial products in translating the spoken voice into PC screen messages and subtitles:

- "Visual sounds" is a system to create visual images corresponding to voice and sounds at home or on television. The main aim of this idea is to filter out the spoken words from the sound effects in television broadcasts, enabling visual representations of the two to be placed in two corners of the television screen. These "wave-like" images would represent the pitch and loudness of people's voices in one corner, and similarly the magnitude and general waveform of the explosions and creaking doors in the other.

- "Voice to Text (VTT) with telephones" provides voice to text recognition and an answering system for the hearing impaired. 'Teletype' and other similar means of communication have already proved themselves vital from a deaf person's point of view. These systems do, however, present one major problem i.e. that all people wishing to contact a deaf person on such a machine must possess one themselves. The use of voice to text recognition with telephones is an application of computer technology that would enable deaf people to contact (or be contacted by) almost anyone. The basic principle is that a person would speak down the phone line, the message would be passed into a PC at the deaf person's end and the words (via some form of voice to text recognition) would be printed out on the deaf person's screen, i.e. they would only need the respective equipment.

- The software package "VTT with subtitles" is a voice to text subtitling system for conferences and television transmissions.

3. 3. 6. 4. 3. LIPCOM

IBM-France developed a program (LIPCOM) which provides a simultaneous transcription of spoken language on the screen [13]. The phonetic transcription should make it easier for deaf people to understand hearing interlocutors. LIPCOM has been tested in various deaf schools for several years; according to IBM, the students showed better understanding of the learning contents. While the students understood only 40-60% of the contents with the aid of lip-reading, they reached 70-90% with LIPCOM.

3. 3. 6. 4. 4. The "Sign Assistant" ("Gebaerdenassistent")

The software “Sign Assistant” (“Gebaerdenassistent”, Version 1.1; Bavarian Ministry for Education, Cultural Affairs, Science and Arts) consists of four CD-ROMs and assists in understanding the content of a text. It can be used with any standard (Windows-based) software which allows the temporary storage of data. In connection with Windows programs, the “sign assistant” will explain difficult words in sign language (signs, text and mouthing). As an independent program, it is a dictionary presenting the words in alphabetical order (word list or input via keyboard). After starting the sign assistant, the program is reduced to a symbol and remains inactive until a piece of text is copied into the temporary storage. If the word in question is included in the program, a digital video of the respective sign is shown in a separate window.

3. 3. 6. 4. 5. Scanner with integrated translation

The miniscanner “Quictionary” (in pen-form) recognizes and translates texts (different languages).

“C-Pen” of the Swedish company “C Technologies” (www.cpen.com) is a pocket-sized, handheld computer that combines a miniature digital camera, OCR and memory. The product works as an electronic highlighter that scans to remember printed text and bar-codes. The scanned text and bar-codes can be stored in C-Pen or transferred to a PC using infrared communication. Collected text is fully editable.

3. 3. 7. Multifunctional devices and networking of different systems

There is an increase of devices which integrate e.g. fax, telephone, answering machine, detachable scanner and e-mail function and which also allow web-browsing and faxing via Internet. Due to the ever changing market, we decided to forego a market survey and to cite only a few illustrative examples:

3. 3. 7. 1. Textphones with multiple functions

3. 3. 7. 1. 1. Mobidig

The “mobidig” system is presented on http://www.mobidig.net . It allows various connections between different communication systems: one-directional between SMS and other mobile

networks (in Germany D1, D2, E-plus and the GSM-network of Viag), SMS and fax, voice telephony and e-mail, SMS and pager (in Germany, Cityruf, Skyper, Scall); bi-directional between SMS and e-mail (longer e-mail messages will be realized by multiple SMS messages), fax and e-mail. Messages will be sent to the Mobidig computer via a certain telephone number. The computer will then recognize the kind of message automatically, i.e. whether it is a short message, an e-mail or a fax, and send it to the respective receiver. Internet access is possible by entering a web address into the mobile phone. All functions can be controlled via the mobile phone or the user's computer with Internet access.
According to the supplier, this system allows open chat, closed "conference" via SMS, circulars to a certain group of users, storing of mails on the user's hard-disk, personal Fax-In-number (number for Internet fax receiver) and personal Voice-In-number (number for Internet answering machine), the latter two in the so-called "professional" package. Announced is an alert on the mobile phone for received fax messages, fax forwarding and printing option as well as reading and storing on the user's computer with Internet access. Messages to textphones are not possible.

3. 3. 7. 1. 2. WinText

The server program "WinText Server" and the client program "WinText 32" of the Textax AB company in Sweden allow communication between a textphone and a computer and vice versa. This system offers the user multiple services in four areas:

- WinText 32 users can call a textphone without direct access to a local modem or a local phone jack;
- WinText Server distributes the incoming calls. It answers and offers various alternatives. The caller can then choose who they want to be connected with. Textphone calls can reach any user of WinText 32 as well as normal textphones on the public net;
- Two users of WinText 32 can hold a real-time conversation;
- The WinText Server offers textphone users various information technology services, e.g. documents stored on a HTTP-server.

3. 3. 7. 1. 3. Minitel

France Telecom also improved on the design of their textphone (Minitel), so that also photos can be viewed on the display. The so-called "boîtier dialogue" connected to the device allows direct written communication; furthermore, messages can be prepared and sent as soon as the connec-

tion has been initiated. An additional visual call alert can be installed. People with hearing or speech impairments get both devices for free. In contrast to older versions, the new Minitel has a large display. Another innovation is the textphone MinitelNet with an e-mail function.

3. 3. 7. 1. 4. Web Screen Phone

A new variant of the textphone is the “Web Screen Phone” (Samsung Anyweb) with Internet access. It is already configured and can be used immediately, containing a touch screen and a keyboard. An ISDN connection is required. With the integrated ISDN-interface the user can make phone calls, send e-mails and work in the network at the same time. In the Netherlands, the Stichting Scan company offers such a phone. They have also developed a textphone (NeW-TeL textphone) with additional functions beside text and voice telephony: Internet access, e-mail, SMS, “Smart Card Reader” and fax. Via a modem, data can be transmitted between the textphone and a computer.

3. 3. 7. 2. Fax with e-mail function

This is a standard phone with fax and e-mail function. The user gets a personal e-mail address; e-mail messages can be sent to any other address. Internet access is not required. The messages can also be printed.

3. 3. 7. 3. Additional functions for mobile phones

Some mobile phones of the next generation (e.g. Nokia and Ericsson) have an integrated fully functional miniature PC. They offer management of addresses, telephone numbers and dates as well as services in connection with satellite navigation (GPS). Together with a notebook or an efficient Handheld PC, the mobile phone becomes a so-called “mobile office” (e.g. an organizer combined with the Ericsson T18s mobile phone). E-mails, SMS and fax messages can be sent to mobile users via Internet; with WAP technology, it is possible to call up specially prepared Internet pages. At the moment, there are e.g. the following developments which are supposed to become standard (for a detailed list of the different functions and technical equipment, cf. the table “mobile phones” in the annex):

- Internet Access (currently limited; in the future, ca. 2002 or a bit later, all mobile phones supposedly will be equipped with UMTS). Internet access for mobile phones can be guaranteed via an integrated hardware modem (built into the device) or an integrated modem on a software basis (e.g. GPRS “simulates” a modem). With infrared modems, the connection

between modem and PC/PDA is established with the aid of infrared light (e.g. “IrDa” = infrared data communication);
- Almost all modern mobile phones have the option - dependent on the provider - to send SMS messages as e-mail;
- built-in camera (with the new UMTS technology, video telephony as well as the transmission of pictures and graphics will become possible);
- larger display;
- Touchscreen;
- Voice Dial.

In order to make the writing of SMS and other, longer messages easier, various mobile phones with keyboards are appearing on the market. Fax messages can be stored in a mailbox if the provider also runs a fax server. For the “mobidig” system, cf. above.

Due to the multitude of functions and their different distribution on the individual kinds of devices, one of the experts consulted by our partner BHSA, Wolfram Hell, suggested to take into account this multifunctionality by only listing the product functions in the survey, not product types like “mobile phone”. The names of the developer and the respective product and product type, serving to identify the product, should be combined with a list of functions, thus making clear the blending of the different, apparently strictly separated product types. In this way, not only hardware but also (by citing hardware system requirements) services and software could be catalogued. An (incomplete) example of such a detailed list by Wolfram Hell can be found in the annex.

3. 3. 7. 4. Computer

3. 3. 7. 4. 1. Stationary computer (Desktop)

The classical example of a multifunctional system which allows processing and storing of information and data is the computer. On the one hand, there is a trend towards more and more powerful devices with integrated modem (for example, PC with a 500-700 Mhz processor, 64-128 MB main memory and 10-40 GB harddisk and modem). On the other hand, many prognostics and companies keep talking about the soon-to-be replacement of the PC by other systems. The Internet speeded up the development of the normal PC into a multifunctional device. However, the prophesied trend towards the so-called “slim Internet computer”, which in the extreme case does not possess any harddisk at all, downloads all programs from the Internet and

stores its data with a provider, has not succeeded. The reasons for this are probably enormous transmission costs as well as the lack of power of the network. In our opinion, the users also did not want to give up the total control of their possibilities and activities.
Provided that the PC is equipped with the respective hardware (e.g. loudspeakers, microphone, web cam, etc.) and software [14], the following functions are possible among others:

- Video telephony and video conference
- communication between textphone and PC and vice versa
- sending and receiving of e-mail, SMS and fax (e.g. via www.directbox.com).

3. 3. 7. 4. 2. Mobile devices

Notebooks and laptops as mobile versions of the PC nowadays offer practically the same possibilities as the stationary desktops. A good notebook has both a serial and a parallel interface for printer, scanner and modem as well as separate sockets for mouse, keyboard and a larger monitor. Many notebooks are equipped with a built-in analogue modem (Standard: V.90, 56 kilobit/sec. speed) and ready for Internet access. A problem with notebooks is their operating time, unless they are connected to the mains: One and a half hours operating time are already better than average. A lithium-ion accumulator can be recommended. A new chip from California promises to remedy this: the Crusoe from Transmeta, an intelligent mobile processor which guarantees eight to ten hours of operating time (regardless of CD-ROM, disk drive, DVD and frequent access to the harddisk during loading of software). The new generation of Pentium-III-notebooks is also equipped with the power-saving Speed-Step technology: As soon as the notebook is unplugged, the tact frequency sinks to 550 MHz.
Also notebook users have more and more functions at their disposal. For instance, the Sony notebook “Vaio C1XD” has an integrated CCD-camera for stills and moving pictures.

3. 3. 7. 4. 3. Problems for the deaf

Once again, one has to refer to the “language problem”: In order to start a PC or a notebook, the user needs to have at least some basic knowledge. Even if a deaf person succeeds with that, the texts and instructions during working with the PC are often too difficult for them (and sometimes for hearing people as well). Another problem specific to the German-speaking countries is that a lot of the information is in English. If a deaf person does not know how to start the computer, they are unable to do that due to the lack of information (there are almost no deaf-specific introductions to working with a PC). In case of the deaf, access problems to communication technology are obviously multiplied.

3. 3. 7. 5. Organizer, Handheld und Palm-PC

As these terms all refer to computers smaller than laptops and notebooks, they are sometimes used interchangeably. Actually, an organizer (in a technical sense) is a pocket computer with a built-in filofax (which can store phone numbers and possibly notes); a handheld is a more powerful organizer which fits into the user‘s hand (usually, they do not have a keyboard; data may be entered with a special pen directly on the screen); a palmPC (originally a brand name) is an organizer with a PALM system (and no keyboard); a palmtop is a pocket-sized organizer with a keyboard (and any system); a PDA (personal digital assistant) is a device which is more than just a simple filofax (usually with a keyboard). As always, there are exceptions which e.g. do have a small keyboard and/or a PC connection. The following standard operating systems are used: PALM OS, Windows CE, EPOC (Psion). Most of the newer devices allow data transfer between the device and a PC via cable or infrared connection.
A subnotebook is a device up to a size of A5 and a weight of about 2 pounds, but with the full capacity of a notebook. In contrast to all other devices (which operate with individual systems or Windows CE), it uses Win98 or Win2000 systems.

There are also very fast technical developments on this sector (for a detailed list of technical equipment and functions, cf. table “Handheld and PalmPCs” in the annex): Originally, they were intended as “assistants” on travels, but they are more and more becoming powerful miniature PCs. Their functions include text processing, spread sheets, data management, protocoling and agenda and they can even serve (in a limited way) as a voice memo and media-player (partially with MP3). Handhelds can be connected to a PC via a so-called docking station or a cable and thus allow simple transfer of data. The advantage of these small computers is that they are frequently easy to handle.

3. 3. 8. Services: Call Center

For deaf people and other people with special needs regarding voice telephony[15], special call centers or relay centers have been established. These services can be divided into two groups:

3. 3. 8. 1. Call Center with written language as only communicative basis for the deaf

With these call centers, deaf people have to use a text-based device (e.g. a textphone, e-mail or fax). The deaf person sends the message to the call center via textphone. Then the message is passed on to the hearing interlocutor by a collaborator of the call center. The reply is relayed

back to the deaf person via textphone (e.g. National Relay Service in Australia; www.acein1fo.net.au; Relay Texas and Specialized Telecommunications Assistance Program, http://www.puc.state.tx.us/relay/index.cfm).
If the provider has a fax server, faxes can be stored in a mail box. This is technically possible, but depends on the extent of services offered by the call center. From a technical point of view, receiving fax messages as e-mails is certainly possible with the respective routing (however, no concrete examples are known to us).

The Austrian telecommunications company "Mobilkom Austria" offers a limited service, the so-called A1-ReadMe-Service: a kind of hotline with 40 specially trained operators. Various services can be claimed by sending an SMS, e-mail or fax, e.g. making an appointment at a doctor's or calling a taxi. This service costs ATS 15,- for each request (even if several calls are necessary). To qualify for this service, the user must prove their deafness by showing documentary evidence. The rates for deaf people are ATS 2,-/min. for a fax, and ATS 1,-/min. for e-mail and SMS. The standard rates for deaf people in Austria are ATS 4,-/min. for a fax, ATS 1,-/min. for SMS. The basic fee is ATS 0,-/min. Voice telephony costs ATS 10,-/min. in order to prevent misuse.

3. 3. 8. 2. Call Center with sign language and written language as communicative basis for the deaf

In such call centers, deaf people may use sign language via video relay. For that reason, this is the most interesting solution for the deaf. A deaf person may use a PC (with camera and respective software) or videophone at home and have a conversation with a hearing person via a sign language interpreter at the call center. The interpreter translates the deaf person's message and voices it to the hearing interlocutor. The reply of the hearing person is then relayed to the deaf person in sign language.

Interpreting can also be done on-line: An example of video remote interpreting (VRI) is Interpreters, Inc. in North Carolina (http://www.interpretersinc.com/homepage.html) which works with a new video remote interpreting program that uses video conferencing equipment and ISDN phone.

3. 3. 9. Alerting devices

Deaf people require e.g. vibration or light signals (cf. e.g. http://www.telekom.de, http://www.humantechnik.com/) to alert them to incoming messages. There are light-signal devices for e.g. textphone and fax as well as combined light/bell devices which signal every call (also optionally) acoustically (bell) as well as visually (flash). Vibra call is a standard feature of some mobile phones; incoming calls appear also on the display, where usually the background lights up (however, the owner will only notice this when constantly keeping an eye on the display).
Various technical means of communication (e.g. fax) and aids like light-signal devices for deaf and hearing-impaired people can be found on http://members.magnet.at/avisocom**.** The Swiss company "ghe-ces electronic ag" also offers light-signal devices (e-mail: info@ghe.ch).

3. 3. 10. Storage of information (communication data) and processing of information

Using modern information and communication technologies, often the question arises how to store certain communications or information for later use. Information can be stored via spoken (sound recording) or written language, sign language (video recording, drawings or SignWriting) or non-verbally via pictures, schemes, etc.
In any case, the concept of the user simply calling up information or communication (e.g. voice box for mobile phones), while any storage takes place only with the respective provider and the user has only little control over it, is diametrically opposed to our concept of providing the user with sufficient capacity and comfortable use for data storage in their control (and physically close to them).
The storage capacity for information from the Internet outside the computer (with harddisk) depends on the respective operating system technology: for a mobile phone with WAP-function it is currently only a few kilobytes, for the settop box of a TV-set with Internet access a few megabytes.

3. 3. 11. Ways of data transfer

3. 3. 11. 1. Overview of the transfer rates of the different systems

Kind of transfer	***Maximum transfer rate***
public net	44-56 kilobit/sec
public net ISDN	64 kbit/s; both channels bundled: 128 kbit/s (with low resolution, one can get a good frame rate)
public net ADSL	from actually 512 kbit/s to a maximum of 8 megabit/s towards the individual participant ('downstream') and from 64-256 kbit/s to maximally 800 kbit/sec towards the net ('upstream')
GSM	9,6 kbit/s (for the duration of the connection, one channel is blocked)
WAP	9,6 kbit/s
GPRS	theoretically, a maximum of 171,2 kbit/s (2,5 times single-channel ISDN) via a combination of 8 channels at 21,4 kbit/s each (error-correction encoding included); mobile phones offer at the moment 26,8 kbit/s
UMTS	2 megabit/s
PLC	2 (to 5 mbit/s; the Ascom company plans on up to 10 mbit/s in 3-4 years)

The more recent kinds of transfer will be dealt with in the text below (we do not comment on the well-known systems like public net, ISDN, ADSL and GSM; for HSCSD cf. the glossary in the annex).
Additional (less common) possibilities of data transfer are telecable (about 300 kbit/s for download and 64 kbit/s for upload), wireless (up to 10 mbit/s, costly) and satellite (theoretically 4000 mbit/s for download, telephone connection necessary for upload) systems.

3. 3. 11. 2. WAP (Wireless Application Protocol)

WAP is announced to turn the mobile phone into a ‘mobile Internet terminal’ (no computer required), mainly with functions in the following areas (data transfer instead of acoustic tele-

phony):

- E-commerce: ordering, booking, buying (without cash or credit card; payment via telephone bill)
- Information: various news and other services (e.g. stock prices, recipes, traffic information, horoscopes, program for the movies)

In order to use these functions, one has to access the respective WAP homepage; from then on, there is no difference to normal Internet use.
Currently there is in different countries only a limited offer (in Austria, only Mobilkom customers can buy tickets for the movies, railway tickets and flowers) [16].

The prognosis of the providers is that by the end of 2000 about 10% of the mobile phone customers will use WAP. An Austrian consulting firm (Durlacher; Mobile Commerce Report) prophesied that business will increase from today's ATS 4,5 billion to more than 300 billion in 2003. The mobile Internet use (Web-browsing) will increasingly be used from 2002 on.

The worst problems of WAP are the lengthy calling up of WAP-pages during searching and ordering (long waits and interruptions), also depending on the design and comfort of the respective WAP homepage, as well as complicated menus, system crashes similar to those with computers (this means that the accumulator of the mobile phone has to be taken out and put in again) and a slow connection. These factors influence the costs (at the moment, in Austria ATS 2,-/min.).
Use free from interruptions requires optimum receiving, which currently is often available only in urban areas. Therefore WAP technology and successive technologies could lead to a stronger disadvantage for people living in the countryside, limiting their access to communication and information.

Generally, WAP is expected to be only an intermediate stage on the way to GPRS and UMTS, which have much better chances of becoming mass media because of their faster and more reliable data transfer.

For e-commerce, which will not be dealt with systematically here, a study regarding its economic use (University of Freiburg, Consulting Partners and Heyde AG: E-Reality 2000 study; cf. also the e-commerce study by Anderson Consulting; http://www.andersonconsulting.com) came to the following result: Most companies are rather sceptic with regard to its possible success and do not expect better business because of electronic commerce, at least for the time being (for about 12% of the companies, on-line business has replaced the traditional one, for about 75% of them,

electronic business supplies about 10% of their total). However, they invest in it because of public relations, an improved corporate identity, to be closer to their customers and to offer them new services. The Internet is considered an important channel of communication, but does not replace personal contact with the customers. Nevertheless it plays an important role in getting their own supplies.

3. 3. 11. 3. GPRS (General Packet Radio Service)

With this way of transfer, data packages are being sent and reassembled again; this means that more data can be transferred via parallel connections than with GSM. Furthermore, normal telephony is possible at the same time (quality and functionality of the phone call are not affected compared to GSM).
The advantage of GPRS is the quick access to Internet; one of the problems is that its capacity sinks with an increasing number of participants.
In Austria, the costs are between ATS 0,49 and 3,-/min. Mobilkom has activated a first network.

3. 3. 11. 4. UMTS (Universal Mobile Telecommunication System)

A study of the consulting company “legend.at” on the Austrian market with regard to UMTS found that its start in 2002 is seen as unrealistic by some providers and developers and its chances of success are considered too optimistic. At first, UMTS will be expensive and useful only for business applications. Nicholas Negroponte (founder of the Media Lab at the Massachusetts Institute of Technology) prophesied even a total failure of UMTS. First offers for the mass market are expected for 2003 or 2004 (extensive coverage for 2007 at the earliest). At first, only the urban areas will get it. A period of about 12 years is calculated until a profit will be returned. The problems are the following: Constructing the network takes much longer than expected because of a shortage of hardware (the UMTS network requires about a third more transmitters than GSM, even more in the urban areas; for Austria, there is an estimate of 5-6000 transmitters). Due to technical reasons, there will not be full capacity at first (possibly only one tenth of the maximum, and this only with stationary use), so that video will be possible only with bad quality, if at all. There will be relatively little supply for the first years and almost no advantage to competitors’ products.

3. 3. 11. 5. PLC (Powerline Communication)

Speech and data are transmitted via the supply network (keyword “Internet from the wall-socket”) which is used only from the user’s device to the first current-transformer; from then on the public phone net takes over. An adapter and a network card (in Austria, about ATS 1500,--) are required.
Its advantage is that the user does neither need a public phone jack nor access; Internet and telephone can be used in the same way.

There are still unsolved technical questions, e.g. with respect to the electromagnetic compatibility (frequencies are needed which may interfere with other radio services); the additional devices are not at the production stage (this is planned for the middle of next year). A technical limitation is that the next current transformer must be within 300 meters of the end device (which may be possibly extended to 500 meters). At the moment, this is the case for 70 percent of the households in urban areas and for 50 percent of those in the countryside. There has to be a dense optical fiber network
The problems of PLC are that a large number of users can reduce the rate of data to 1 Mbit and that the legal conditions are not completely cleared yet.
Also with this solution, the urban areas will be privileged because of the costs for each connection.

As for the costs, it is planned to use either flat rates or a settlement according to the volume of data (with the latter, pictures and videos would be very expensive); profitableness is supposed to be 20 to 40 customers per current-transformer.

3. 3. 12. Schematical overview of the flow of communication

In section 6. 1. of the annex you will find some schemes which present the act of communication between deaf people, between deaf and hearing people, using different devices and services.

3. 3. 13. Information on systems and applications for potential users

It is considered a grave problem that most of the available information stems from advertisements of the suppliers or from various technical magazines, which often do not offer a comprehensive survey, but only present individual products. It would be of great advantage to the deaf and their relatives if there were some neutral center providing them with technical and user-

oriented information (similar to the National Deaf Children‘s Society for the education of the deaf and hard of hearing; http://wwwndcs.org.uk or the Royal National Institute for Deaf People; http://rnid.org.uk in Great Britain; such information do not comprehensively exist in many countries)[17]. As for national information on telecommunication services cf. "Telecommunications services for people with disabilities" (http://www.oftel.gov.uk/consumer/dis298.htm).

3. 3. 14. Preliminary evaluation by the preparatory group and the working group

3. 3. 14. 1. Behavior of deaf users regarding the different systems

It has to be mentioned that most deaf people prefer sign language at least for more complex communicative situations or to achieve more adequate and comfortable communication. The use of a written language is in most cases only the second choice (except for short and simple messages).
If hearing people want to comply with the communication needs of the deaf, they should either have some knowledge of a sign language and possess a suitable communication device, or they have to refer to a call center or an interpreter for assistance. This problem can only be solved with the existence of functioning automatic translation programs between spoken/written and sign languages, which in turn presuppose a fully working sign language recognition and synthesis. As long as such solutions do not exist, the deaf have the disadvantage that all ‚cheap‘ solutions are written-language oriented due to the needs of the hearing majority and the market conditions resulting from that. The conversion into sign language is then often seen as a superfluous and expensive demand of a small language minority.

Although the textphone symbolized a revolution for the deaf with respect to communication independent of hearing people, it was very hard to communicate with foreign countries due to the differing national technical standards. In Austria, the deaf use the European Deaf Telephone (EDT). In Sweden, for instance, there is the Dual Tone Multi Frequency (DTMF). In Belgium, systems with limited communication possibilities are used (e.g. Cept2/Minitel dialogue). From the view of the fast development of information technology, the textphone - in spite of all additional functionalities developed recently - is an antiquated device. This former main means of communication of the deaf has already been replaced by other devices in many countries. It will probably lose even more importance because of the exceedingly fast technical developments on the communication sector.

Interestingly, there are two opposed tendencies with respect to the use of the textphone, which offers, however, at least true dialogue functions:
In some countries like Great Britain, communication via textphone is frequent and regarded as good and reliable (in Great Britain, there is an emergency number and several other numbers for personal and official calls).
In other countries, there is a tendency towards communication mostly by fax (and nowadays SMS), away from the textphone. This holds for the following countries: the Netherlands (although e.g. the Dutch health service is in favor of the textphone), Belgium (Minitel, fax and SMS are used), Germany (there is a problem with emergency calls, because the numbers differ), Austria (there is also a problem with emergency calls [18] and the rates for textphones keep increasing) and Hungary (where also the pager was replaced, because it was impossible to reply to a message). SMS was well received because the cost-use-relationship seems good to the users and it is obviously also an economic success for the providers.

3. 3. 14. 2. Expectations of further technical developments

For technical developments, there is a tendency away from monofunctional towards multifunctional devices. This is impressively illustrated by the mobile phones. The original mobile phone turns into a multimedia device. A research group at the MIT works on the “mobile phone 21”: It looks similar to a normal mobile phone, but is equipped with a larger display, a video camera, infrared detectors, voice recognition and a powerful computer. On the touch of a button, the user will be able to switch between web-browsing, radio, phone calls and TV. With the software “Bluetooth” developed by Ericsson in Sweden, home technology is linked to the mobile phone. Bluetooth allows to link up to 127 devices like computers, digital watches, camera or household appliances (e.g. refrigerator "Screenfridge" developed by Electrolux). Ericsson and Electrolux have installed a lot of new technology in the so-called "Smarta Huset" (clever houses) at Vaermdoe, Sweden; cf. also the Cisco-Laing-House in Watford, Great Britain.

Fax machines with e-mail function, TV-sets with Internet access and Palmtops, Handheld PCs and Organizers with more and more functions prove that in the future monofunctional devices are not up to the user’s demands. Even the “normal” PC serves as radio, fax, telephone or (with a web cam) videophone, thus even allowing video conferences. In the future, mobile phone, notebook, Handheld, camera and Walkman will be combined in a single, easily portable device.

Data should always be accessible and everywhere. This is not only a demand of businessmen who often have to travel for business reasons, but also of private users. Both groups demand a

universal information and communication infrastructure, i.e. all devices - telephone, PC (including notebook and Handheld), fax and mobile phone must perfectly cooperate. Industry has reacted to this and has already developed such “networks” (e.g. Sony Vaio). At the moment, a drawback of this system is the mobile phone and its Internet access. With the mobile phones of the WAP generation, only specially prepared webpages can be accessed. The problem is the low transfer rate. From 2002 on, UMTS technology will probably lead to a data transfer rate up to 200 times faster than today’s.

The Internet plays a more and more important role. The “traditional” access was provided by a PC (with a modem and the respective software). In order to reach an even faster data transmission, mainly for the transmission of movies, videos, etc., transfer technology progressed. With an ADSL Internet access (e.g. A-Online-Speed), there are new dimensions of web-browsing.

Internet access is no longer limited to PCs and high-quality notebooks (e.g. Toshiba). Access to the Internet via mobile phone or notebook is often possible, but painstaking, because the connection is very slow. PC-cards with built-in antennas for GSM data transfer are rather useless: They are quite expensive (in Austria, ATS 4-6000,-), prone to defects and slow.

The new palmtops and handhelds are also equipped with Internet access. Internet can also be accessed via a television set, including a so-called web-box, which is connected to the TV (cf. Microsoft's WebTV Networks and AOL-TV in the U.S.A.).

In order to be able to communicate via sign language, deaf people need video telephony and/or conferencing, but with special parameters: As the acoustic channel is not needed, the synchronization of pictures and sound is not necessary and the part of the transmission which is normally devoted to acoustics could be transferred to video transmission. The deaf do need a good resolution and position of the camera as well as a high frame rate for the perfect transmission of sign language. It will be a great challenge for the future to offer systems which meet these conditions and are cheap enough to be used by a big percentage of deaf people.

4. Results of the workshop

4. 1. Introduction

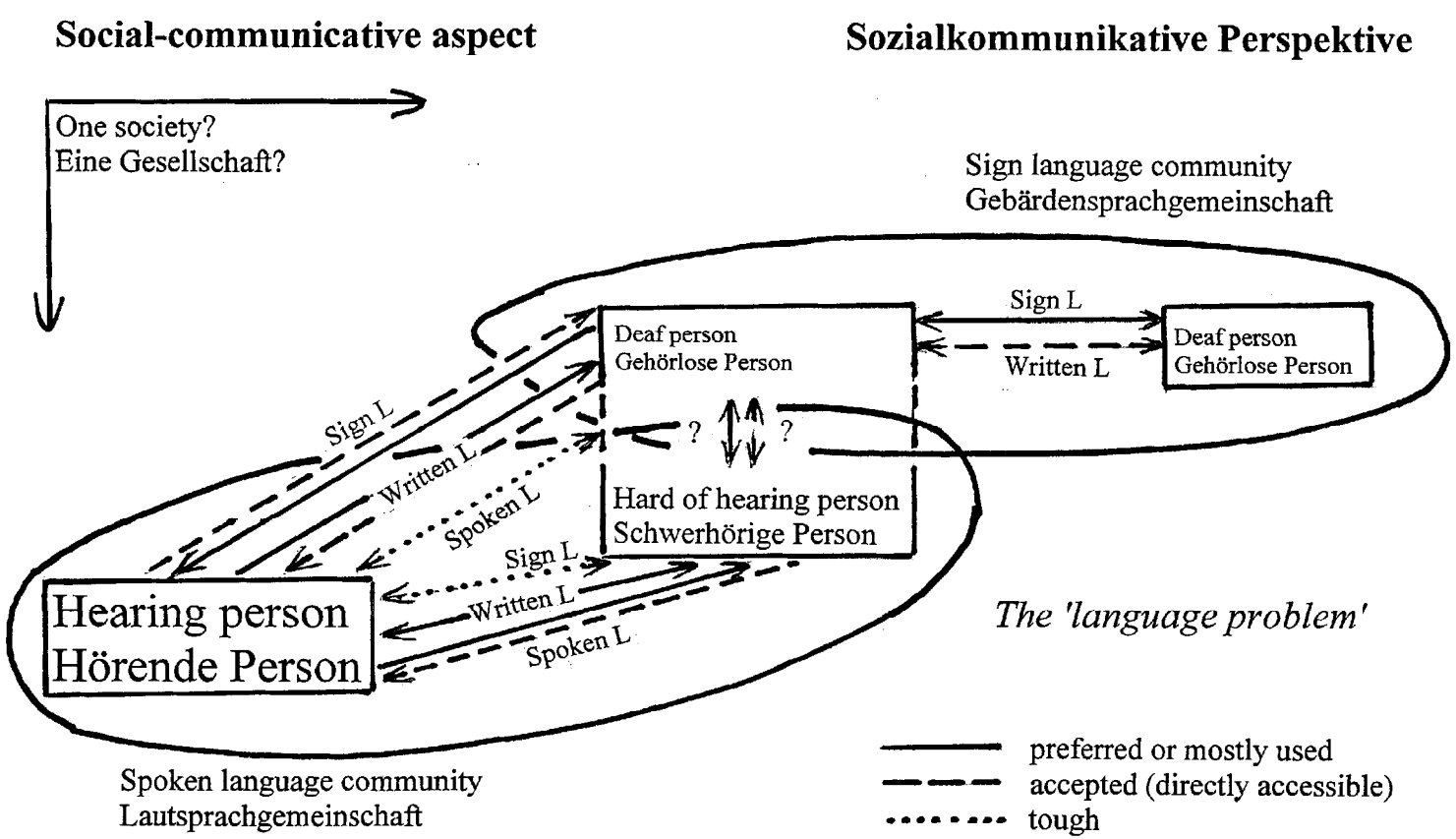
The results of the workshop are presented in a chronological order (except for the parallelism of the working groups and the separate publication of the presentations). The instructions for the entire workshop and the working groups were discussed in the introductory presentation, which was followed by reports and presentations of the workshop participants. The registration for the subsequent working groups produced an interesting result: Only one person had registered for the working group “Communication between/among deaf people”. The most probable explanation for this result can be divided into two parts: first, the deaf seem to know how to communicate with each other or which technical devices to use; secondly, the deaf seem to be aware of the fact that the real problem lies in the communication with hearing people, so that (almost) all efforts have to be directed towards improving this aspect. To give an example: while the Swiss call center for the deaf shows a comparatively low number of calls from hearing to deaf people (however with an upward tendency), in Sweden the directions deaf-to-hearing and vice versa are almost balanced. From a socio-communicative perspective, we have to add here that in Sweden the communicative integration of deaf people has made decisive progress in that also hearing people are getting aware of deaf people as interlocutors. To reach this aim has to be the central social objective of the well-developed information society.

4. 2. Preparation of the working groups

4. 2. 1. Introductory presentation in the plenary session

This presentation was mainly driven by schematic overviews ('sheets') which are given within the respective text sections (i.e. sheet i appears within the text headed with 'sheet i').

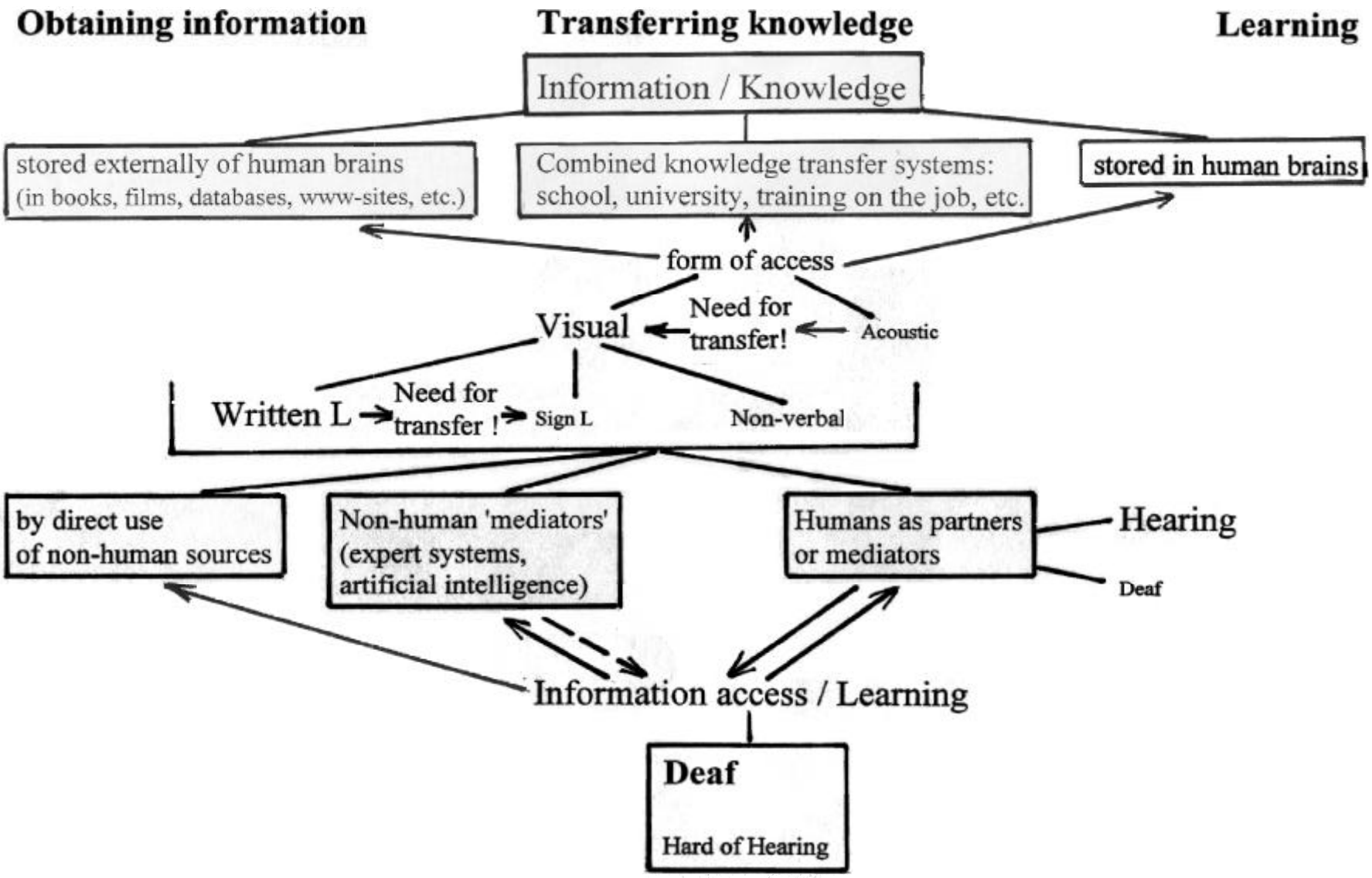
Sheet 1:
The first scheme shows the relations between spoken language and sign language communities from the socio-communicative perspective, in short, 'the language problem' within our theme. We use here 'sign language community' as a term for all people who are communicating in sign language in a certain context. This term comprises of course the deaf community as the core of the sign language community and allows to circumscribe the group of all users of sign language, may it be their preferred or only their second language. In the sign language community, the pre-


Social-communicative aspect
Sozialkommunikative Perspektive
One society?
Eine Gesellschaft?
Sign language community
Gebärdensprachgemeinschaft
Deaf person
Gehörlose Person
Sign L
Written L
Deaf person
Gehörlose Person
?
?
Hard of hearing person
Schwerhörige Person
Sign L
Written L
Spoken L
Sign L
Written L
Spoken L
Hearing person
Hörende Person
The 'language problem'
preferred or mostly used
accepted (directly accessible)
tough
Spoken language community
Lautsprachgemeinschaft

ferred language for direct, personal communication is by definition a sign language of a deaf group. Other communication (e.g. via fax or SMS) is performed using a written language. Overall, communication within the sign language community does not create any big problems. The possibilities of communication between deaf (or people preferring a sign language) and hearing people depend on the type of language channel used. The usage of channels between the different groups is asymmetrical (look at the different types of arrows in the scheme): While hearing (or better: non-signing) persons prefer or use spoken and written language, the deaf prefer sign language whenever this is possible in asymmetric communicative situations (usually only in cases in which a sign language interpreter is present or the hearing person understands at least some signing). While written language would be a good option because it is a visual code accessible to both deaf an hearing people, it is only a restricted solution for two reasons: a) some deaf people do not have sufficient competence in written language and b) the written mode does not really allow a lively dialogue between two partners as any spoken or signed mode does. Therefore written language is always the second best solution and the needs of the deaf are completely met only by using sign language.

The hard of hearing often find themselves in between the two other groups: their position depends on the self-identification of the respective individuals, on their hearing abilities and on the expectations of their communication partners. If a person shows some hearing, 'normal' hearing persons tend to use spoken language in most cases, sometimes helping with written language. Those hard of hearing persons who have competence in a sign language can move within both the spoken and the sign language community if their hearing loss is not too high. In the latter case, they will show a tendency towards living in the sign language community. In the past, there were some tensions between the groups of hard of hearing and deaf people because of the different forms of behavior and identification of hard of hearing people. The term 'sign language community' gives a more open impression so that any person with special needs in the field of hearing may join this community at will. It is also a sign from the deaf side that they would like to be an 'open' minority.
Keeping in mind that the spoken language communities are the overwhelming majority of the population, it is a legitimate question whether we can earnestly speak of 'one society', containing both the spoken and the sign language communities.

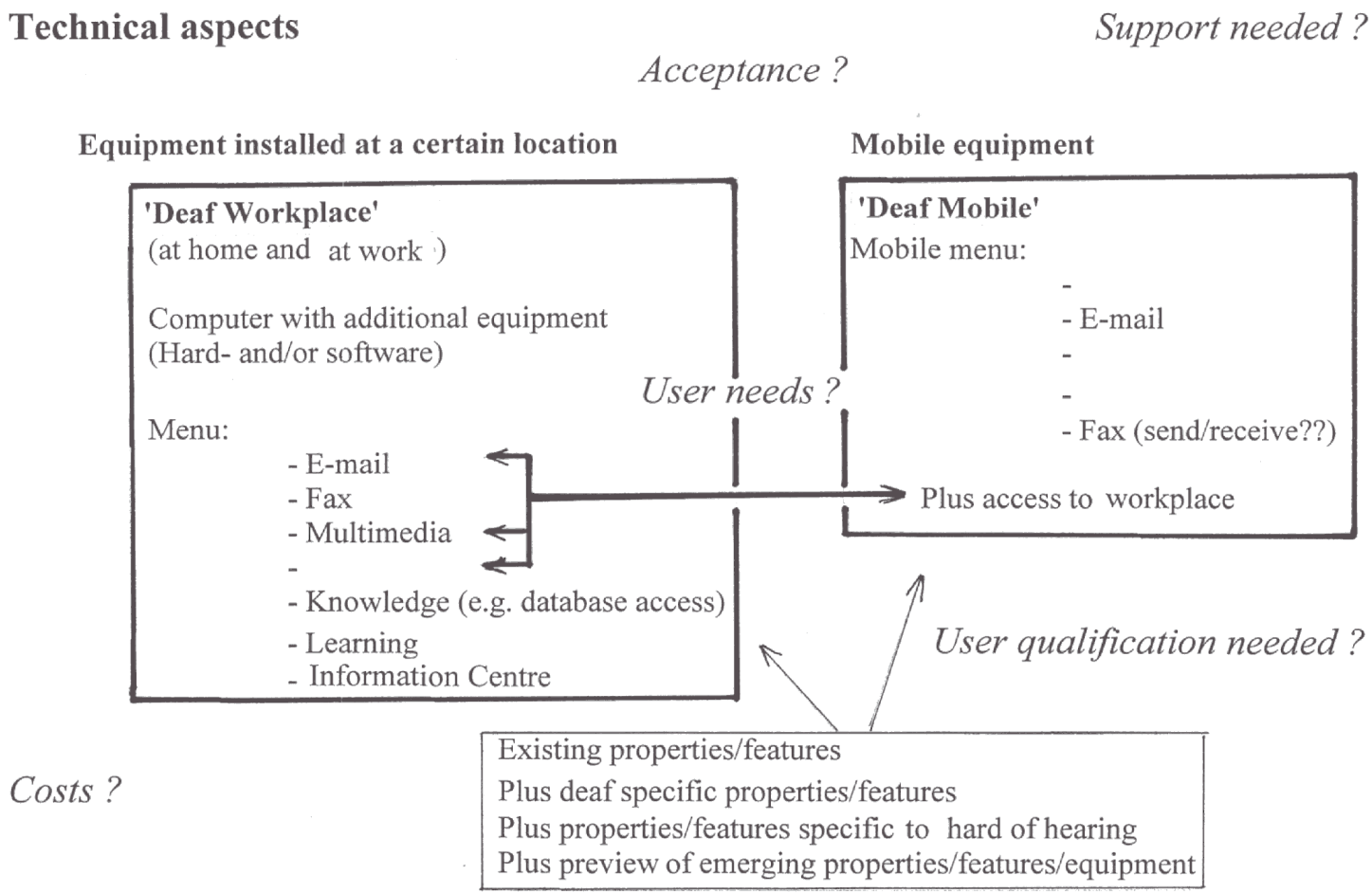
Sheet 2:
The second scheme shows some determinants of obtaining information, transferring knowledge and learning. We have to differentiate between knowledge which is stored within and knowledge which is stored outside human brains. For learning, our society has developed complex know-


Obtaining information
Transferring knowledge
Learning
Information / Knowledge
stored externally of human brains
(in books, films, databases, www-sites, etc.)
Combined knowledge transfer systems:
school, university, training on the job, etc.
stored in human brains
form of access
Visual
Need for
transfer!
Acoustic
Written L
Need for
transfer !
Sign L
Non-verbal
by direct use
of non-human sources
Non-human 'mediators'
(expert systems,
artificial intelligence)
Humans as partners
or mediators
Hearing
Deaf
Information access / Learning
Deaf
Hard of Hearing

ledge transfer systems like schools, etc. For stored information as well as for knowledge transfer, we can look at the forms of transfer. Regarding the transfer channel, the clear need of deaf people is a transfer from the acoustic to the visual channel. As for the visual channel, the current situation shows also a need for transfer from the written to the signed mode. Knowledge transfer can be performed by direct access to the respective data, by utilization of non-human 'mediators' like expert systems etc., or - which is in many cases the best solution - by communicating with human beings. Only in the last case, a fully symmetrical communication can be established; utilization of simple information sources is only a one-way communication. With regard to human beings as partners, we again face the above-mentioned language problem: since most of these human partners are (non-signing) hearing individuals, the needs of the deaf often cannot be met directly.

Sheet 3:

Equipment is obviously only one component of a successful information access or communication. We additionally need adequate infrastructure and human interaction. Scheme 3 concentrates on the equipment for which we used the term 'deaf workplace', in connection with a 'deaf mobile (equipment)'. We assumed that it would make sense to develop a unified deaf-specific, computer-based system. Such a system should have a comfortable menu which comprises all forms of communication and information access deaf people demand and would be integrated into a deaf information and communication network, which is another request. The participants of the working group were asked whether they would accept or wish to have this concept of networked machines with mobile components and a deaf-specific orientation (cf. also 4. 2. 2. 1. 2.).


Technical aspects
Support needed ?
Acceptance ?
Equipment installed at a certain location
Mobile equipment
'Deaf Workplace'
(at home and at work)
Computer with additional equipment
(Hard- and/or software)
Menu:
- E-mail
- Fax
- Multimedia
-
- Knowledge (e.g. database access)
- Learning
- Information Centre
User needs ?
'Deaf Mobile'
Mobile menu:
-
- E-mail
-
-
- Fax (send/receive??)
Plus access to workplace
User qualification needed ?
Costs ?
Existing properties/features
Plus deaf specific properties/features
Plus properties/features specific to hard of hearing
Plus preview of emerging properties/features/equipment

4. 2. 2. Instructions for the working groups

The working groups were asked to use the networks (cf. annex) and the introductory orientations described above. In addition, they were told that the experiences and concepts of the deaf still need to be included.

4. 2. 2. 1. General instructions for all groups

Each working group was moderated by two people, assisted by one hearing and one deaf member of the FZGS (in addition to the taped protocol, the hearing team member produced a written version, which was used for the compilation of the working-group report in combination with the flip chart notes).
The following goals and questions had been discussed in the preparatory group and were then handed over to the moderators of the working groups:

4. 2. 2. 1. 1. Working procedure

The results of the discussion in the working groups should be:
- An evaluation of the current situation by the workshop participants with regard to the existing communication possibilities (advantages and disadvantages);
- A survey of the user needs;
- Suggestions on how the situation can be improved and presentation of model(s) for better communication possibilities;
- An estimation of reasonable costs of existing as well as new possibilities.

The participants were asked 'to think in scenarios'. How do we communicate? Which types of communication do we use in various situations? In many cases, the hearing community uses the phone to establish communication. Which possibilities do the deaf have? Imagine the following: You are looking for some information in the Internet and need a sign language interpreter to explain part of the information to you; think about the organization and communication which would be necessary. Other situations refer to the establishment of contact:
- How can you be contacted by a hearing person (e.g. for an official purpose)
- How can you make an emergency call (to get an ambulance, to inform the police or the fire brigade)?
- How can you be informed in case of an emergency (e.g. when there is a fire in your hotel, in the house you live in, etc.)?

4. 2. 2. 1. 2. New communication and information systems

The participants were asked to make suggestions for new systems and to describe the design as well as the features they should have.
The first objective was the formulation of immediate solutions plus outlook for the future (e.g. textphones are discontinued; all young people (at a certain age) should be given a PC instead of the textphone).
The second objective was a uniform system with two important functions:

- Access for the deaf and hard of hearing to all sources of information which are available for hearing people (e.g. Internet, captioning)
- Communication between the deaf/hard of hearing and the hearing

In the opinion of the preparatory group, this system should fulfill the following conditions:

- Center of the configuration should be a computer (in order to guarantee a high memory capacity and comprehensive local working possibilities) within a network of other useful components (as many as possible). Based on our recent research, mobile telephony will certainly play a major role.
- The costs for the purchase of such a system should not be too high and also the operating costs should be held low.
- The special needs of deaf people require that any information is transmitted in a non-acoustic way. This means that the whole configuration must be modified respectively; i.e. error messages, new messages, etc. need to be expressed visually; equipment cannot be operated by verbal commands. Optimally, the system should allow the use of sign language, i.e. the visual channel can be used for the real-time transmission of digital videos (which means, for example, the use of computer- and/or mobile-based videophones). Moreover, an automatic conversion of spoken language into written language (mostly unavailable at the moment) or a translation from spoken/written language into sign language or vice versa would be ideal.
- Operation should be as easy as possible and based on the respective national language.
- The desktop menu should be well-structured and give a clear view of the contents for comfortable use.

4. 2. 2. 1. 3. Costs

As for the costs, the main questions for all working groups were the following:

- How much is better communication and information worth to you?
- For what kind of communication or information would you be willing to pay more?

- Which costs should be taken over by the government or the companies?

From the general questions, the following specific questions emerged for the individual working groups:

4. 2. 2. 2. Specific instructions for the working group "Communication between/among deaf and hearing people"

4. 2. 2. 2. 1. Current situation

- Which communication possibilities exist (at the moment)?
- Which of these possibilities do you use; which one(s) would you use under which conditions?
- Evaluation of the different possibilities; which changes or innovations would you suggest and why?

4. 2. 2. 2. 2. User needs

- Which kind of communication do you prefer and why (SMS, e-mail, fax, videophone, etc.)?
- Which communication devices do you use for which purpose (SMS with friends, fax for official purposes; on which occasions, do you prefer an operator? Are there solutions which are better or worse?)
- Where do you need communication (at home, at work, to make appointments, to book a trip, in educational measures)?
- What is the main purpose of your communication?
    - to get information (simple or complex)
    - short information or longer explanation (through reading or in a two-way communication)
    - organization (e.g. to make an appointment)
    - conversation
    - emergency call
- How can you communicate with (and from) foreign countries (e.g. via a call center)? What about the costs?
- If you use a call center, do you prefer one with a sign language interpreter or is it easier to communicate via TTY?
- When using a TTY with a call center, does it bother you that an unknown person can read your mistakes? Do these mistakes impede the flow of communication?

- When contacting an interpreter at a call center, do you trust this person to interpret correctly?
- In which cases automatic translation and transmission may be used? On which occasions do you prefer the ‘personal’ translation or call center?
- Which other possibilities (besides the call center) can you think of?

4. 2. 2. 3. Specific instructions for the working group "Access to information"

4. 2. 2. 3. 1. Current situation

- Which sources of information do you use (printed information, electronic media, teletext, subtitles, libraries, etc.)?
- Do you know where to get specific information (e.g. via a call center with the additional function ‘information agency‘)?
- Are there existing initiatives to get more information or to access them more easily?
- Which sources of information are especially important to you (Internet, teletext, subtitles?
- Which are the problems with these sources of information? How could the access be improved?
- What are the advantages and disadvantages of different kinds of storage of information?

4. 2. 2. 3. 2. Dimensions of the access to information

All kinds of information - databases, call centers, courses and also the idea of a deaf university - belong to systems of information (cf. the introductory orientation, 4. 2. 1.). Examples of sources of information are specialized dictionaries, phone directories (www.infobel.com/inter/world.asp), e-mail and fax (www.teldir.com).

4. 2. 2. 3. 3. User needs

- Describe situations of how to obtain information.
- Which kinds of information do you need or want (news, events, etc.)?
- Do you prefer interactive or non-interactive sources of information (TV, radio and all printed information are non-interactive)?
- Do you prefer written or interpreted information (in which situations)? For example, would you rather have subtitles or sign language interpretation on TV (with live broadcasts)?
- Should the information be presented in a short form or do you prefer detailed explanations?
- Which technical devices should be used for obtaining information (mobile phone, PC, other

devices)? What do you want to receive on mobile equipment (and would you be willing to dispense with sign language)? Or do you wish to have a direct connection between your mobile phone and PC as well as other hardware components (this could be interesting for other user groups, too)?

4. 2. 2. 3. 4. Requirements for the access to information

What is needed to guarantee the deaf access to all systems of information? For the Internet, for example, you need competence in English; the information could be summarized in sign language and texts should be written in simple language.

- Adequate contents (e.g. which are important elements of a good Internet course?)
- Various skills: Training possibilities have to be developed. Good competence in writing and reading is important for the use of all written information. Ideally, the deaf should be enabled to process written language without depriving them of sign language communication or reducing it.
- Supporting measures (e.g. call centers)

4. 2. 2. 3. 5. Costs

- General discussion of costs and strategies for the economical use of means;
- What are you willing to pay as users?
- As developers and suppliers, can you imagine to reduce costs in order to meet the needs of the deaf?

4. 2. 2. 3. 6. Design of an information center

The workstation of deaf people (which is a computer) should include a center of information:

- As much information as possible should be incorporated into the computer menu (including explanations in sign language and support).
- It has to be discussed which kinds of information should be available on the computer (e.g. a German language course, general knowledge, which may also be of interest to hearing people).
- The question of the required software has to be faced.

4. 2. 2. 4. Specific instructions for the working group "Technical Aspects"

4. 2. 2. 4. 1. Deaf experiences

Main task: Please list the experiences of deaf people with existing systems (single solutions and interconnections); the discussion could be based on a selection of devices.
Please use the information from the BHSA-survey:

- Which communication devices (e.g. fax, videophone, textphone, mobile phone, PC) do you use?
- What are the advantages of these devices?
- What are the disadvantages? What would you improve?

Evaluate every system with respect to the following points:

- For which sort of communication do you need the device?
- How does it work?
- How fast is it?
- Costs of the device
- Possible problems
- Limitations
- Compatibility/interconnection with other systems
- Suggestions for improvement

4. 2. 2. 4. 2. User needs

Please list the demands, wishes and concepts of the deaf:

- Should the various devices be interconnected (e.g. fax and mobile phone/PC)?
- Which functions should the device include (fax, e-mail, printer, scanner, SMS, e-commerce, textphone, videophone)?
- Which functions would you like to have at home or at work (e.g. which equipment do sign language teachers need?)?
- Which size should the device have? Would you prefer a stationary or mobile device or a combination of the two?
- Which features should the device have?
  + size of the display
  + integrated modem
  + touch-screen

  + storage capacity
  + free services such as SMS or e-mail (http://www.dialing.de/) on mobile phones
  + videophone for sign language use: For which functions would you dispense with the videophone or even prefer other devices?
  + light-signal equipment for more than one device
- Should existing devices be combined?
- Should the stationary and the mobile equipment have different functions?
- For the mobile equipment, do you prefer the mobile phone, palm PC or organizer (Communicator)?
- Besides the importance of the optimal use of single devices, there is the vision of a comprehensive communication system. What do you think of a large uniform system of networks with a menu for comfortable use?

Principle to follow:
- support the deaf culture and their way towards self-determination

4. 2. 2. 4. 3. Technical clarifications

Here, the results of the evaluation process should be discussed with respect to the technical requirements of the devices (e.g. is there a possibility of improving existing systems?).

Technical requirements:
- Types of transmission (with respect to the rate) especially for video
- Storage capacity for information (e.g. information on TV)
- Interrelation of purpose and form of transmission
- Discussion of videos in the Internet
- Problem with PC‘s: dormant function or answering machine?
- Storage of faxes: with the provider or in the buffer?
- Notify-function also for other messages and when the PC is switched off

4. 2. 2. 4. 4. Use of existing elements and the need for the development of new devices

- Which functions/features can be taken over from other devices?
- Which features can be improved, adapted or invented?
- Where do we need inventions, software, uniform systems, standardization?
- Is there a need for a comfortable menu and an "all-installed solution"?

4. 2. 2. 4. 5. Networking/Combination of devices

- Which of the existing systems can be interconnected under which conditions?
- Which software solutions are needed with an integrated system?
- Which technical standards are required (on a European level or worldwide)?
- The flexibility of the system has to be guaranteed (modifiable solution with standardized "ends"/connections in order to include future developments).

4. 2. 2. 4. 6. Preview

How should we judge the new developments in information technology (e.g. mobile phones with voice dial) with respect to the needs of the deaf?

4. 2. 2. 4. 7. Costs

- How much should the devices cost (costs of purchase and operating costs)?
- Strategies for the economical use of means
- Should the deaf and other people with special needs have free Internet access?
- Existing technical devices could be adapted for the deaf.
- New technologies must be programmed in a way so that deaf people are not excluded from their use (e.g. alternative to voice dial).
- Automation would allow the reduction of costs; what are the arguments against automation?

4. 2. 2. 4. 8. Design of a system

What we need is a design of a comprehensive system (not only of hardware components) - a European information and communication network.
The following points have to be discussed:

- Components of the system
- End devices (both passive and active ones; computer with digital camera, TV-set, phone)
- Forms of transmission (cables, Internet; Infineon-chip)
- Nodal points (intermediate systems/centers according to the Swedish system): automated or operated by people
- Transition points to other systems
- Need for infrastructure to be able to use new technologies (e.g. operators in a call center)

If possible, a scheme of a comprehensive system and its components/functions should be drawn. The objective should be the interconnection of all aids - hardware (devices); software, sources of information (mass media, databases, libraries); relations between the elements (technical and social relations - deaf culture, deaf community, integration) and conditions. Problems will arise with the definition of standards and software. The primary target group should be the deaf community; secondary users will be hearing people who want to communicate with the deaf.

There will be overlaps between the working groups, which we think are useful. The working group “Technical aspects” e.g. discusses the technical features of mobile phones and call centers; the working group “Communication” will look at the purpose of these devices in the communication with hearing people; and the working group “Access” deals with their advantages in obtaining information. The result are three different perspectives on the same subject, which are given below. These perspectives are combined in 4. 4.

4. 3. Results of the working groups

Before presenting the results of the working groups, two frequently stated observations should be mentioned:
The first observation is an appeal to all of us not to forget the hard of hearing. This implies that the communities of the deaf have been developing towards sign language communities recently. The second statement refers to the fact that at former EU-meetings, bigger differences among the countries could be discerned in deaf matters. Today, they have mostly disappeared, which can be considered as a positive feedback for the efforts made by the EU.

4. 3. 1. Working group "Communication between/among deaf and hearing people"

All participants of the working group agreed that the status quo of the communicative relations between deaf and hearing people is unsatisfactory. Besides the problems in everyday communication, specifically the communicative possibilities of the deaf in emergency situations are insufficient. Such situations are usually solved by asking the neighbour to do the emergency call by phone. The deaf consider themselves as a language minority group and believe that video telephony must be available as the minimum of equipment. Due to the current state of affairs, the deaf do not have sufficient access to information. As a result of this lack of information, many deaf people make wrong decisions.

In order to make available optimal communication for the deaf in all situations, two sets of equipment would be needed - a stationary one at home and a portable one to carry around. The best solution would be a portable combination of a textphone, videophone and SMS. These functions should be part of the standard equipment at home, at work and in the portable version. Which communicative facility is used depends on the situation. For older people, who often do not have a PC or feel rather sceptical about the “new technologies”, one should think about adapting the television set to include a videophone. Ideally, everybody - deaf, hearing and hard of hearing people - should be able to use such a system. The user may then choose the function they need.

The workstation of most deaf people is not tailored to their needs. In England, there exists a service called “Access to work”, which is free of charge for deaf people. The job of this service is to find out which equipment a deaf person needs at the workstation to be able to work without problems and to provide this equipment. It includes interpreters, textphones, videophones, etc. In the past, the budget for one person was 21.000 pounds per year. Today, there is no such limit. In other countries, deaf people often have difficulties in getting funding for the necessary equipment. In Belgium, for example, the chances of getting financial support by the health care are best when one argues that the communicative facilities are needed for the integration of a deaf person.

Besides the need for mobile and stationary communication devices, which must be adapted to the deaf users, there is a great want of interpreters and call centers. All participants of the working group complained about the lack of interpreters in their own country. The only ones who seem to be better off are the Scandinavians (Finland and Sweden). Interestingly, with the number of interpreters increasing, also the number of calls is growing. While in the past, a new car was purchased without interpreter, today an interpreter is usually asked to assist. The deaf participants feel that the training of the interpreters is a very important matter. Not all interpreters seem to have sufficient qualifications. As a consequence, the deaf demand European standards for the training of interpreters to assure the same quality in all countries. Another problem refers to the conversation between a deaf and a hearing person when an interpreter is assisting the communication. The deaf participants complain that they are often confused by the communicative behavior of the hearing person, who does not look at the deaf interlocutor but at the interpreter.

As mentioned above, European standards are required for the training of sign language interpreters. In addition, there has to be agreement on technical standards and legal arrangements on a European level. Differences between the various countries have to be removed as well as the

ones which exist on a national level (e.g. in Germany and Belgium).

According to the deaf participants, future suggestions should rather relate to new laws than to hardware components. In this respect, the question arises whether technical means can solve all problems. The technical equipment is certainly important, but it still has to be used and operated by human beings.

More attention has to be directed towards the current communicative situation of deaf and hearing people. One has to be aware that two cultures - the deaf and the hearing - meet. Due to the lack of adequate communicative systems, the majority of deaf people do not have access to the hearing world. In some of the European countries (e.g. Sweden and Finland), there are attempts to provide deaf persons with communicative possibilities similar to the ones existing for hearing people by providing a video relay service (which is still at a developmental stage).

The participants of the working group also agree that deaf people rarely or never take part in the planning or development of new technical facilities. The experience of the deaf is that the hearing often feel they know what the deaf want and do not bother to ask them. Since the facilities should be tailored to the needs of the deaf, the deaf participants demand to be included in developmental work. This especially concerns the mobile video telephony (mobile phones with an incorporated camera), which is expected to facilitate the communication of the deaf in the future. A very important aspect is the range of the camera so that the face, the upper part or the entire body of the signing person can be filmed. Likewise, the display of the mobile phone must be of a size sufficient for the receiver to be able to follow the signing. To assure the practicality of all specifications, the devices have to be tested by deaf users. Furthermore, when creating new devices, the costs (for the users) have to be taken into consideration and must be held low.

An overview of existing communicative possibilities for the deaf in various European countries (not all European countries were represented in the working group) has produced the following results: The fax machine and the mobile phone (SMS) are the communicative facilities which are used most of the times and have thus replaced the textphone. Because SMS is an important function for both deaf and hard of hearing people, it should be free of charge. In the following, some examples of the costs for SMS are given:

<u>Belgium</u>
Deaf people in Belgium who have a subscription to Proximus (525,- bef/month or 13.01 Euro) will pay 3,- bef instead of 6,-- bef per SMS, i.e. 0.01 Euro.

Germany

In Germany, Nokia (Nokia 666) offers a free SMS-service, which works only from Nokia to Nokia phone.

England

The standard cost of an SMS call in the UK is 10 pence a call. In some parts of the country, it can go up to 12 pence per call. If you purchase a £50 voucher for "pay as you go", the SMS call charge is 5 pence. The deaf participants of the working group complain that they do not use the voice service and still have to pay for it.

Austria

Mobilkom Austria offers the so-called A1-ReadMe-Service, a kind of hotline with 40 especially trained collaborators. Deaf people may post various tasks such as fixing an appointment at the doctor‘s or calling a taxi by sending an SMS, e-mail or fax message to the hotline. For each task which has been brought to a close, ATS 15,- are charged (regardless of the number of queries which have to be made back and forth). Deaf people who want to use this service have to possess a document proving their disability. The costs for fax is ATS 2,- per minute; for e-mail and SMS ATS 1,- per minute.

4. 3. 1. 1. Interpreting service

In addition to the technical communicative facilities, the interpreters are of great importance for the deaf. Interpreters are especially needed for more complex tasks such as interpreting at the workplace, at the university, etc. The accounts of the deaf participants present a rather diverse situation in the various countries:

Belgium

In Flanders, deaf people are entitled to 18 hours of private interpreting per year with a possible increase to 36 hours if they want to follow a course. Interpreting at work is available for 10 % of the working hours. Deaf people aiming at a university education have to inform themselves on how many hours of interpreting they may ask for. The number of hours depends on the type of studies and the specific needs of the deaf person. The need for the interpreting service may not be satisfied due to the low number of interpreters and the fact that for certain courses (with rather technical contents such as molecular biology) no interpreters are available.

In Brussels, a deaf person is entitled to 30 hours of interpreting per year. Deaf students attending

university may make use of 600 hours of interpreting per year, which can also be realized as sign language translation during classes.

In Wallonia, interpreting support is unlimited as long as it remains within the global range of hours conceived for all people of Wallonia. For university education, deaf people are entitled to 600 hours of interpreting, which cannot be spent on sign language translation during classes, only on interpreting service outside classes.

Finland

According to the disability act, 120 hours of interpreting per year are available for every deaf person in Finland. The communities may, however, decide on their own whether this number is considered the minimum or the maximum of hours. There is no limit with respect to the deaf person‘s age as they have in the Netherlands. Interpreters can be booked via an agency (the booking is free of charge). Regional differences in the payment of interpreters are planned to be removed in order to reach a national solution. Currently, 500 interpreters have to satisfy the needs of about 5000 deaf people.

Great Britain

Under the "Access to Work" scheme, deaf people are provided with what is called 'BSL support', which includes communication support and interpreting to make sure they have equal access to work as hearing people do. Depending on the content and type of work deaf people do, the interpreting services can be full-time or fixed weekly slots (six hours per week or more). Other tasks concern translation work from BSL into written English and telephoning. Two types of interpreters are distinguished: interpreters qualified for high-level meetings at work or course interpreting and trainee interpreters who take over all other duties. Outside the times mentioned above, deaf people can book an interpreter for other meetings, interviews, a visit to a doctor, etc. Because of acute shortage of interpreters, they must be booked well in advance. In England, 130 highly qualified interpreters are available for 55.000 - 60.000 deaf people who use sign language for communication.

The Netherlands

In the Netherlands, a deaf person is entitled to interpreting service for 15 % of their working hours. At school, interpreting support is available for three mornings (out of 5 school days). There is, however, a limit with respect to the person‘s age: People over thirty who want to participate in educational measures are not entitled to an interpreter.

Portugal

Interpreting service in Portugal has to be considered as rather problematic: Out of 60 interpreters only 30 are professional interpreters. 16 of these work 15 hours a week in schools (in Porto and Lissabon). (Current discussions deal with the question whether interpreters should be seen as belonging to the schools or to the deaf associations). In Portugal, 5000 deaf people sign, another 15.000 people are deaf, but do not use sign language as a means of communication.

4. 3. 1. 2. Relay services

An important step towards communicative systems adequate to the deaf is the establishment of relay services, which are specialized call centers. Currently, deaf people have access mostly to text relay services. Some countries work on installing video relay services, which provide deaf and hard of hearing people with new communicative possibilities. In most cases, these initiatives are projects which are limited in their duration and their financial possibilities. From 15 countries in the EC, only five have professional relay services: Sweden, Finland, United Kingdom, Denmark and the Netherlands. Outside the EC, Norway and Switzerland have professional telephone relay services, and several countries are running trials with limited operating hours and limited services.

Relay services (text or video) do not exist in Hungary, Austria or Belgium. Nowadays, the establishment of such centers is not a technical problem but a political one. Ideally, these centers should include text and video relay as well as automated services. Relay centers have proved an important service for both deaf and hard of hearing people. Also for the hearing such centers may be useful when they want to get in touch with deaf people. The deaf and hard of hearing should cooperate in obtaining such services. The bigger the number of people the easier it will be for them to argue in political negotiations. Other target groups for relay services could be speech-impaired and deaf-blind persons (here adaptions will be necessary).

4. 3. 1. 3. Remote interpreting

Another communication possibility for deaf persons is offered by remote interpreting. In most countries, there is a lack of professional interpreters; one of the problems that interpreters have is that they often have to travel larger distances in order to do an interpretation. This often increases the costs of interpretation. Remote interpreting is an idea that is pursued in countries like Finland, Sweden and the United Kingdom, where an interpreter would answer to a call from his videophone and do the interpretation; the difference between a video relay and remote

interpretation is that, whereas the parties involved in the conversation that is relayed are often in different locations (they are calling each other), both parties involved in the conversation that is interpreted by a remote interpreter are in the same room. In Sweden, remote interpretation is often used at the workplace, when a deaf person wants to talk to his boss and they can do that immediately with the aid of a videophone and a call to the interpreters' service.

Remote interpreting is used in cases in which written communication would be too difficult, e.g. when something has to be described or explained. For deaf people, it is easier when they are allowed to use their mother tongue or when the camera can be directed towards an object so that it becomes clear what is meant. Another advantage of remote interpreting is that large distances can be bridged almost without difficulties. In these countries, interpreters often have to travel far for rather short interpreting jobs. Remote interpreting cannot remove the general lack of interpreters, but they can serve as an intermediate step until enough interpreters will be available. The following is an (incomplete) overview of relay services in Europe:

Finland

The Finnish Association of the Deaf (FAD) is carrying out a video relay project. Within the multimedia project, a total of 29 videophones provide a network of 22 households with deaf members, two FAD regional offices, FAD headquarters, regional sign language interpreting agencies and a business which has deaf employees. This service can be accessed by the participants three times a week (on agreement, this service may also be used at other times). The FAD multimedia project is funded by the Finnish Slot Machine Association (RAY), which is a government-controlled organization running small scale gambling and casino activities. The outcome of the RAY is shared by a government approval to support the organizations in the field of social welfare and health issues.

Germany

The German project Telesign, which lasted from March to June 2000, was aimed at optimizing the communicative situation of deaf people at their workplace. A video relay service was installed, which could be accessed by project members all over Germany. If the project will be continued is uncertain because further financial support is not guaranteed. Unfortunately, Germany does not have laws prescribing such services.

The Netherlands

In the Netherlands, a text relay service is in operation (from textphone to speech and vice versa). Other services such as fax, web or video relay do not exist. The textphone service belongs to

KPN, the Dutch phone company, and is open 24 hours a day and seven days a week. Deaf people who have e-mail access do not use this service very often because e-mails are cheaper and much faster.

Norway

Telenor, the largest Telecom company in Norway, runs the text relay service in Norway. It is a 24-hour service. A Norwegian participant tried to call the relay center and asked them to supply him with some figures, which they refused.

Sweden

Relay services have been available in Sweden since 1982. The service is financed by the National Post and Telecom Agency. The large number of calls shows that both the deaf and hard of hearing make use of this service. The service is mainly contacted by textphones. Also video relay services are available. Currently, the improvement of the latter is discussed because more and more people have access to videophones. A combination of text and video relay services would be the ideal solution.

Switzerland

Switzerland has a text relay service, which is available 24 hours a day and 365 days a year, in three languages (German, French and Italian). The operators working at the center also do translations into other languages (mainly into English and Spanish) on a voluntary basis. The costs for the operating service are taken over by the phone companies because the telecommunication act forces them to provide all people with basic services. The operating service is explicitly mentioned in the act as obligatory basic service.

Problems arising with relay services are mostly due to the fact that the employees are not especially trained for the job. Such a training would be important for people working at a text relay service as well as for those working as interpreters at a video relay service. Operators who are unfamiliar with the special working situation may well run into problems: A deaf person wanted to tell a joke to a friend via textphone/operator, when the operator, before contacting the other person, asked back whether the deaf person could formulate the message more politely. A problem which deaf people encountered using the video relay service in Germany was that they had to wait up to one hour until their call was dealt with.

4. 3. 1. 4. Acceptance of the relay service/Costs

The costs for the use of relay services vary from country to country. According to the participants of the working group, it is important to keep in mind that a conversation via textphone usually takes more time than a normal telephone call, especially when inquiries have to be made back and forth. The large number of calls into the relay centers show the importance of such a service for deaf people. In England, relay services have 3.250.000 incoming calls per year or 65.000 calls per week. These relay services employ 600 operators, 150 of them work at the same time. In Switzerland, 10.000 calls per month are registrated. Also the Swedish relay service has one of the highest number of incoming and outgoing calls in the world.

In England, the deaf have to pay only half of the costs for the relay service. In cases in which the service costs less than five pounds, the deaf user does not receive a bill. The telephone bill and the bill for the textphone is sent directly to the relay service and deaf users get 60 % of the costs reimbursed. Soon, it will be possible for deaf people to make direct calls to hearing interlocutors.

Finland has had a text relay service for quite some time. The costs are a little higher than in Sweden and the service is financed by gambling profits.

In the Netherlands, the costs for a call to a number within the country are 22 cents per minute. Calls going outside the country and to numbers of mobile phones cost 95 cents per minute. When somebody calls the text relay service, they have also to pay for the waiting period (22 cents per minute).

Deaf users in Sweden pay Nkr. 0,35 per minute for the text relay service. The textphones are paid by the social security. In addition, deaf people receive a financial support of approximately Nkr 600,-- per year so that the greater amount of time a conversation takes on the textphone can be compensated. The person who makes the call only pays for the connection to the person he is calling to. All other costs are taken over by the National Post and Telephone Agency.

Next year, a relay service (text and video relay) is planned to be implemented in Portugal. It is going to be run by the Federation of the Deaf and will be open from 8 am to 8 pm. It will be financed by various associations and the government. With the establishment of this service, also the need for interpreters will increase. Interpreters who will be occupied at the relay center will have to go through special training sessions.

In Switzerland, the relay service receives about 10.000 calls per month. At the moment, 40 part-time operators are employed at the center. The (deaf) person calling the center always pays the lowest local exchange rate (approx. Euro 0.045 per minute during the day, Euro 0.022 per minute at weekends, Euro 0.011 per minute during the night).

4. 3. 2. Working group "Access to information"

This working group has decided on the following tasks: They want to collect all sources of information used by the deaf, point out the problems they have using them and come up with possible solutions by taking into consideration the special needs of the deaf. The vision of all participants is a pan-European information center with one system and uniform standards.

4. 3. 2. 1. Collection of sources of information

Which sources of information are used by the deaf or which sources may be used?

Subtitles, newspapers, Internet, teletext, adapted pictures, fax, e-mail, television, computer server, DVD-subtitles, high-quality video conferencing, printed media (books, papers), (automatic) translations of texts, television for the deaf (with sign language), possibility of getting all information in sign language, visual media (television, video), telephone (video, text, SMS), chats in the Internet, communication with hearing and deaf people, electronic media, call center, people (on the phone), experts, people (friends, teachers, colleagues; in sign language), Deaf Intranet

The following groups can be formed:
- newspapers, books, teletext
- television, subtitles (written information on TV), DVD
- multimedia, Internet
- E-mail, SMS, fax, telephone (for short information)
- communication/interaction with people, experts; call center

Plans for the future:
Deaf Intranet (network for the deaf), multimedia department, television channel for the deaf, high-quality video conferencing and access, experts as advisers for the deaf, computer server, media house (where alle media topics can be dealt with), adapted pictures, high-quality training for the use of computers and new technologies, Deaf teachers, deaf teachers, support workers

(people supporting parents of deaf children), advocates (acting as role models), possibility of getting information in sign language

4. 3. 2. 2. Vision of a pan-European information center

A European „meeting point“ should be established, where all kinds of information can be exchanged. Such a platform would be very important for the movement of the deaf in Europe: Contacts can be made, the different deaf associations have the opportunity to inform each other on their activities and start cooperation.

4. 3. 2. 2. 1. The establishment of such a center

- Financial aspects

In order to realize the project of an information center, the financial aspects have to be discussed first. Here mainly the support of the governments will be required. One has to be aware, however, that with the governments the following problem will arise: Deaf people are not considered as a language community but as people with a medical problem, a group with special needs. For that reason, in many European countries sign languages are not recognized as official languages, a fact which could possibly render the setting up of an information center for the deaf more difficult.

- Form of the information center

The discussion starts with questions such as „What should the information center look like?“ „Is it a building?“ „Does it only exist in form of computer networks?“ „Is there a center in each country?“ It does not take long for the participants to realize that the computer fulfills best all requirements of an information center. All kinds of information can be stored in the computer - written information, videos, sign language, pictures, etc. for the use by deaf and hearing people. The participants of the working group become aware that they have to utilize all available technologies as well as the ones which will be coming up in the future.

- European and national activities

For the establishment of a European information network, both national and pan-European initiatives will be needed. There already exist many promising national projects. Exchange of experience should be encouraged by delivering project results to the European center so that as many people as possible can take advantage of them.

The information center must not function as a controlling authority; the ideas have to come from the people themselves so that they become personally involved in the projects and identify themselves with the contents. The problems and needs of the deaf also partly vary among the countries. In Southern Europe, for example, deaf people often have greater difficulties with the written language and foreign languages like English. Here, the presentation of information may have to be different from the one in other European countries.

It is important, however, that the information center is not reduced to an administrative machinery responsible for the exchange of information. The center should also take over the task of providing the environment with new impulses. Many national institutions may develop through the presence of a European network.

4. 3. 2. 2. 2.The presentation of information in the information network

- The kind/form of information

In general, information can be presented in written form, sign language as well as through pictures. Which form is applied depends also on the users: Are they deaf, hard of hearing or deafened at a later age? How old are they? Many older people may prefer books and printed information, younger people will rather use new technologies such as the Internet.

The general target group ought to be all people using sign language (= sign language community). In this group, everyone can be included - the deaf, the hard of hearing, hearing parents of deaf children, etc. A very important point is that the planned information center cannot exist without sign language. Still, it should be possible for the users to choose among the forms of presentation. In order to improve the situation of the deaf, all solutions i.e. written language, multimedia, deaf trainers, etc., are needed.

For reasons of time, not all information can be translated into sign language. As a consequence, the information has to be selected for translation or a certain sign language (or International Sign) has to be chosen, which acts as a substitute for the others. Wherever possible, the translation should be done by deaf people, which - as all deaf agree - has the highest quality.

Many texts have to be presented in written form. In order to facilitate the understanding of such texts, certain programs can be employed to render e.g. difficult German less complicated. At the same time, translations of written texts into different spoken languages will be needed.
This translation work should be done by the center, but must be limited in its extent. The infor-

mation center should also be the place where deaf people can get private texts translated.

In many cases, however, translations are not sufficient. Deaf people often do not have the education to understand the translated information. Here experts and other people can help by explaining the contents of the texts. Besides this support, deaf people also have to be offered an adequate education so that they learn to understand and use information on their own. This means that first of all the deaf have to achieve a certain competence in the written language. The training of the deaf in the written language must include sign language as a means of communication. The same holds true for the teaching of foreign languages. In the future, the bi(poly)lingual education will also play an important role in the lives of deaf people. Possibly, as a consequence, sign language will be needed less.

The deaf must be offered opportunities to learn the written language, e.g. through a language course in the Internet. Such a course could be developed in one country and then translated into the languages of the other countries. The software for such a course is already existing. What is missing is the money for the production of the course. Funding for education must be demanded from the governments. To be able to argue for such courses, studies have to be carried out, which demonstrate that (also) adult deaf people have a need for better knowledge of the written language.

- Standards

The work and project results of one country must be made available to other countries. To make possible such an exchange of information, standards must be agreed upon. When different standards are used, information cannot be accessed by all countries. With uniform standards, the work of different countries only has to be translated.

4. 3. 2. 2. 3. Distribution and management of information

Information may be distributed in different ways. On the one hand, the existing homepage (with their information) may be used. Often it is possible to access information in different languages or the information is translated automatically. In addition, each country can create its own homepage and include links to the homepage of the other European countries. On the other hand, this solution may not be sufficient. What is needed is a center which coordinates the distribution of information. With the new technologies, information can be processed and used much better. The center has the task to collect and make available information from all over the world which is interesting to the deaf of all European countries. Such information includes deaf-specific topics

like the recognition of sign language and deaf teachers as well as topics which affect all people (deaf and hearing) in Europe, e.g. the new European currency (Euro). Other information such as local events are interesting only to the deaf of a certain country and do not have to be stored by the information center. It has to be decided, however, which information is to be included and who makes this decision.

4. 3. 2. 3. Results of the discussion: wishes and demands for the future

An improved access to information has to contain the following:
1. A network to exchange (project-specific) information, with uniform standards and the major point ‚deaf education'
2. The information needs of the individual have to be met.

The working group has the following specific demands:
- Main demand: Deaf people need access to the same information that the hearing have.
- quality of access, services, interpreters, television broadcasting, education for the deaf
- equal access (in comparison with hearing people)
- television for the deaf with subtitles and sign language (via the Internet)

4. 3. 2. 3. 1. Realization of the wishes and demands

The demands formulated by the working group will be delivered to the EC, which is expected to engage in their realization. In addition, each European country has to decide on individual steps to take. There exist several resolutions of the EC-parliament (e.g. equal access for all disabled people) which the EC-commission did not manage to put into action in the various countries. Such work has to be performed separately in each country. In Finland, for example, the sign language of the deaf is officially recognized. If other deaf communities want to achieve the same, they have to fight for their rights in their own country.

4. 3. 3. Working Group "Technical Access"

4. 3. 3. 1. List of existing communication devices

Besides the overview of deaf experience and the survey of user needs (focussing on technical devices), the main tasks of this working group were to clarify the technical questions, list explicit wishes of the deaf and, finally, to design a complete system ready to be realized in a follow-up

project.
It was suggested to focus on person-to-person communication but not chat and the World Wide Web (which are state-of-the-art and fully text-oriented); the final design should allow communication between different user groups, i.e. between deaf and hearing people.

As a first step, the working group listed all the systems which are currently used:
- Text(tele)phone
- Fax
- SMS
- E-mail
- Videophone

There were requests to add some more items to this list, namely:
- Modem
- Total Conversation
- TV

The reason given for adding a modem connection was that e.g. the Nokia Communicator can also communicate with a textphone. However, there was a comment that a modem is only a state-of-the-art connection aid, i.e. a more technical way to realize the communication.
Another suggested topic was Total Conversation which is in use, although not very frequently
There was also a question whether the existence of the working group “Access” meant that “Technical aspects” was not going to discuss technical specifications for access, e.g. TV. The participants agreed that personal communication was only one part, but that time was limited. Information was seen as a kind of communication. It was then clarified that a proposal for a system was expected from the working group and that this result should be a system which allows deaf people access to all information sources. TV was a totally different question. There was no problem with another focus; however, this should be defined immediately. It was added that the presentations from the day before dealt mostly with communication and that it would make no sense to discuss ways to get information from the WWW, as this was technically more or less solved. This led to some disagreement within the group. It was finally stated that TV could be added to the devices, as Internet, e-mail and text telephone could be integrated into a TV-set, as is the case in Spain.
In connection with the Dutch NewTel-textphone, an answering machine was suggested, but this was regarded as part of the group “Telephone” and only relevant for real-time communication. However, there was agreement that switching to different modes of communication should be

part of the design decision. Other aspects that cross devices were mentioned, e.g. services (both relay and automatic). An answering function could be either network-based or device-based, so there was a request to add the network aspect: Where did the participants want to see the general functions (in mobile networks, the old fixed networks, Internet and IP-networks,etc.)? So services and networks should be added as specific topics.
This led to the question whether network and service issues should be discussed for all systems or only for the system that would be proposed to the industry. It was suggested to concentrate on the systems and have the discussion while dealing with the respective system.

During a brief brainstorming session and the following discussion, these systems were evaluated for their usefulness and keywords (in table-form) were written onto the blackboard (cf. Table 1).

Table 1: Discussion of existing communication devices

Text(tele)phone	**Fax**	**SMS**	**E-mail**	**Videophone**	**Mobile systems**
+ D <–> D, D <–> H: - Text - fax - SMS (send/receive) - E-mail + H –> using standard phone + H using modem + speech answering system + connected to other modes (WWW, chat...) + PC –> problems + advantages for D <–> D + D <–> H ==> Call Center, Relay Center	+ communication problems? + fast system + hardware requirement? + mobile use? + e.g. mostly used in Germany, Hungary... + classical device D <–> D, D <–> H + costs for buying	+ fast, real-time, cheap + good combination to WWW/Mobile +limitation nr. of characters (160!) + "modern", "up-to-date" communication + for SHORT messages + widely used in Deaf community + D <–> H, D <–> D ==> √ + Finland: #1!! (E-mail #2) + alerting for incoming mail + SMS –> textphone!! (<– ??) (Relay Center) + Service Center–> SMS –> voice –> Telephone	+ need for Internet connection + no real-time + possibility to attach other kind of information, e.g. VIDEO-MAIL + D <–> H, D <–> D ==> √	+ quality? + speed? + Germany: connection workplace <–> interpreter + COSTS!!! (buying and use!) + standards + D <–> H? ==> interpreter?! + Direct communication + faster to sign than to write + immediate response + ISDN/mobile systems (3G) + COMPATIBILITY!	+ traffic information !!? (WAP) + TV + Internet <–> Language + alarm, etc. + Real-time systems!!! + Text message via ISDN + USA: Wyndtel + connected systems

–> MOBILE TEXT TELEPHONE + real-time communication + Finland/Sweden: 2 mio Euro + 6 mio Euro for relay services –> mobile TT for free + AUT: TT for free + Sweden: Textphones on public net –> cheap, low-tech + 6 protocols ==> standardization!!! SKILLS ==> WAP	IN	READING &	WRITING!	+ low frame rates even for 3G-devices + videophone - ISDN (12,5 frames) + Internet videophone –> bandwidth + sign language translation ==> need? or just RESEARCH ==> different local languages	

Legend:

D	deaf
H	hearing
+	lists another point
<–>	direction of communication, i.e. in both directions; also used for relationships
==> √	means that communication works
–>	in connection with technical devices: used for the direction of communication; elsewhere it signifies comments, thoughts, etc. in connection with the respective issue
==>	usually stands for conclusions

4. 3. 3. 1. 1. Textphone

A textphone offers real-time communication and can be used for communication between deaf people as well as between deaf and hearing people. Especially useful are mobile textphones. There are even projects to use textphones in connection with WAP. A problem, however, are the different protocols in different European countries.
A special device to be discussed was the computer-based Dutch textphone NeW-Tel. The hearing do not need special equipment for communicating with the deaf as the textphone allows multiple communication options: It includes a fax-machine and e-mail as well as a modem connection with a textphone (if a hearing person has a computer with a modem, it is automatically connected to the textphone, so there is nobody between the deaf and the hearing). The display also shows SMS messages, which can be sent via Internet, but also directly, and be received in turn from the Internet. There is an integrated answering-machine. As the system is built into a computer, there is an Internet connection; e-mail and chat are possible. Perhaps it could eventually be used also with a videophone; at the moment, the system is not good enough for sign language.
There is one problem: As the system is a computer, people sometimes put it to other uses, e.g. computer games, which means that communication becomes impossible.
Asked about the costs as compared to other systems (for the system as well as for the provider), it was objected that SMS was independent of a provider. When it was argued that one needs a provider for the mobile phone, the explanation was given that the message is going via modem from the phone connection to the mobile phone provider.
Another question was whether one could buy the complete system as described or whether there was a combination of different systems available on the market. This was answered with a definite yes - the Dutch textphone is a complete system.

4. 3. 3. 1. 2. Fax

Fax was regarded as the “classical device” for deaf communication and as a good and fast system. It can be used to contact both deaf and hearing people, thus serving as a kind of “interface” between them. However, there arose some questions about hardware requirements, communication problems and whether mobile use was possible. The buying costs were mentioned as well.
It was stated that - from a technical point of view - there was not very much to discuss. A standard fax machine starts working as soon as it is connected. Its disadvantage is the large size, so that it is a stationary device rather than a mobile solution. There was an objection that there

are mobile phones with fax, so the original statement was amended: The old fax devices were stationary and needed paper. With modern technology, fax is possible on every computer-like system. As for mobile phones, the users will have to wait for bigger displays in order to read fax messages, and there is room for improvement.
The disadvantage of this system is that it is based on written communication. Signing and talking are much faster than writing and as far as daily communication is concerned, writing is only the second choice if there exists another possibility.

4. 3. 3. 1. 3. SMS

SMS was seen as a fast and cheap way of real-time communication. It is modern and "up-to-date". Originally coming from the mobile phone market, different Internet providers are now offering SMS services as well and some even allow receiving SMS from mobile phones on the Internet. For short messages, SMS is widely used within the deaf community; it can also easily be used to contact hearing people.
This led to an extra need: When a system is so common, you want to use it also at home and so the deaf would have need for some kind of distance alert (e.g. flashing)for incoming SMS messages when they are not having the mobile phone on them (e.g. while the mobile phone is in the charger). To the objection that this was a standard feature came the reply that this was only local (e.g. one feels the vibration) and that they wanted a real-time alert which could be noticed also from the next room.
An alternative was suggested so that one could receive SMS also on the regular phone. Technically, it should pose no problem to route the SMS to a standard phone, provided that it had a display. Routing would have to be done by the provider - at the moment, this was seen as the only possibility - but this was only a technical problem and could be done automatically. There was the opinion that hearing people wanted forwarding to their standard phone, too, so the service providers would find a possibility to do that. SMS to textphone - some wanted a gateway - is possible and works well according to experiences from Finland, but not in the opposite direction: Sending from a textphone to a mobile phone is very hard and the characters are completely messy.
However, communication in both directions would always be possible via a relay center (manually or automatically). Whether the Swedish relay service could handle this right now was uncertain but it was under discussion. They could also convert the message to voice, thus contacting a normal telephone.
The worst drawback of SMS is its limitation to 160 characters. The question was then raised whether the 160 character limit of SMS was enough to communicate; else one would have to

send two or more messages in a row. Therefore SMS is only used for short messages (e.g. arranging a meeting), not for chatting or longer messages - for this, the deaf would rather use e-mail. There are ideas to extend this limit though. Usually typing is also hard, but there was optimism that this would change with the next generation of mobile phones.

4. 3. 3. 1. 4. E-mail

E-mail does not allow real-time communication; usually there is a time-lag between message and reply. Another disadvantage is the need for an Internet connection. However, other kinds of information can be attached to an e-mail, e.g. video-mails, which would even allow sign language communication. Moreover, e-mail can be used for communication between deaf and hearing people as well.

4. 3. 3. 1. 5. Videophone

Videophones allow direct communication; there is an immediate feedback and one can see one's communication partner and make eye-contact: The first reaction - how the communication partner is responding to the message - is very important for natural communication.
For deaf people, signing is much faster than writing. The videophone is also the only communication device (except for video-mails) that does not presuppose at least average skills in reading and writing (although their importance was readily recognized). Videophones are ideal for the communication between deaf people; hearing people would have to know sign language or else use an interpreter (who could also be provided by a relay center). Nevertheless a need for videophones by the deaf as well as by the hearing was identified. However, the participants were also cautioned that old people were not good with computers, therefore it was very important to offer alternatives.
The worst drawback are the extremely high costs, both for buying and use. The problems regarding quality and speed were known and there were lots of initiatives to solve them. As for speed, 100 kbit/second should be a sufficient rate for signed video and ought to be possible in the near future with affordable equipment. Actually, it is already possible but there is the problem of the costs. Broad band systems will hopefully lead to low costs.
There remain the questions of different standards and compatibility. A move over to IP-video telephony was expected when standard Internet connections get rapid enough. There was, however, a problem with no guaranteed bandwidth and so there might be a risk for more problems. Gateways between IP and ISDN-systems had to be checked as well. For the deaf, it was of the utmost importance not to have any borders: A videophone should be able to contact the other

system through its own system and compatibility with relay centers must be assured. This led to a discussion of ISDN and ADSL, VDSL, HDSL, etc. which resulted in the statement that ISDN currently was for point-to-point connections and one could have a quality level that remained the same throughout the whole conversation. As for ADSL, this would come together with Internet access which is risky when too many people use it at the same time.

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Basically, the same holds for mobile phones. At the moment, with the standard of GSM, video telephony is impossible, but GPRS and UMTS will definitely help solve this problem: There should be no problem with the transfer speed necessary for videophones. Furthermore, with a 100 pixel display, there is no sense in having video, but one could reasonably expect that mobile phones with mobile video telephoning will be available in the near future at reasonable prices.

There was an objection that it was not evident that the manufacturers would create an optimized performance for sign language. They had a tendency to prefer 12 or 15 frames/second with better sharpness. The same held for UMTS: The manufacturers were currently designing profiles and planning goals, and too many low frame-rates were appearing there. The participant in question did not understand why the manufacturers seemed not to see the need for smooth movements and thought that the video certainly must look jerky even to hearing people. The deaf needed the very best video codecs and they would not get them automatically. An existing videophone (Allan System) with two channels was cited as an example: Its 12 1/2 frames/second were usable for signing but not perfect; one could change to a coarser image, resulting in e.g. a little blur on the body of the signer, and get 25 frames/second. However, users would prefer 12 1/2 with a sharp image to 25.

There was a request for a videophone which was very clear and simple to use, similar to a normal phone but with a picture, e.g. for older people. It was surmised that a stand-alone videophone would probably be a system with a bad frame-rate, as it was not important for standard communication to have 25 frames. That industry would invest that much in high frame rates for standard telephony was very much doubted. With computers, chances were much better for creating a system that supports a high frame rate. This led to an estimate of much higher chances with a computer-based solution than with a stand-alone.

4. 3. 3. 2. Discussion of the systems

After finishing the list, it was suggested to start with a discussion of the systems written on the blackboard and to give an overview of the state-of-the-art. The participants were asked to think about the advantages and performance of existing devices, whether they were happy with them the way they are, and to consider their costs (both buying and operating; the reason for this is

that, e.g. mobile phones are given away for free, but the operating costs are high). Other issues were problems, limitations of or with the system and compatibility. Finally, they should come up with ideas for improvements.
Later on, another suggestion was made, i.e. that it might be better that every deaf person in the group would write down their experiences and make an inventory of what was missing in their country, what could be improved and what should be added to the system. It was then decided to pass the microphone around; the participants were asked to look at the list of questions and systems prepared on the blackboard (or, alternatively, to add other topics) and to talk about their individual experiences which would then be written down as well. This procedure was approved by the group. It was decided that the hearing participants could add aspects to the discussion as well.

The discussion of the different systems revealed that at the moment, e-mail is one of the preferred means of communication. The same holds for SMS, and not only for cost reasons. However, the participants decided that videophones were one of the systems they were going to focus on. As they were different from communication in text-mode, they were more natural for both deaf and hearing people.
For direct communication or via relay system, the videophone was much faster than a textphone. Admittedly it cost much, but - in comparison with a textphone - when it came down to rates, in the long run it was not so expensive, because signing was much faster. Moreover, as it was very natural to use one's own language, there was less of a risk to make mistakes and one could get instant feedback in case of a misunderstanding. Therefore it was regarded as a good system for the deaf. Another important use was mentioned: If a deaf person had a child who attended school in a different city, the parents could have contact with it every day. It is also hard for children to use a textphone.
Although the future may belong to the videophone, there was the explicit opinion that many hearing-impaired people and those who are not familiar with sign language will still need textphones because they handle written language better. One participant objected that the mobile textphone was missing from the list of devices.
There was general consent that if you were not in a hurry, e-mail and fax would be perfectly fine, too. SMS was great for short messages like "I'm late". However, for direct, immediate communication, a mobile textphone or a videophone would be preferable. When comparing the mobile textphone and SMS, more people tend to use the SMS system, because of cost reasons.
There was an objection that there were some situations, where SMS was even more comfortable than a videophone conversation, because the latter would take the user a long time (preparing the videophone); the participants agreed that there were some advantages to text-communication but

that it was not really useful if one only wanted to chat. In combination with textphones and videophones, interpreters were mentioned. This was seen as a very important point because the opinion was voiced that if a hearing person had to choose between fax and phone, they would usually choose the phone.

4. 3. 3. 3. Situation in different European countries

There were more or less detailed discussions of the situation in different European countries (in alphabetical order):

For Austria, an advisory board for the hard of hearing in a hospital in Salzburg was cited as an example. They had the same discussion about textphone, fax, SMS and e-mail. Financing poses a major problem, because not all deaf people have the money to buy such devices. The deaf use mostly fax, SMS and textphone. There is even a special agreement with an Austrian telecommunications provider so that there are no costs for the textphone at the moment, while the deaf user has to pay the standard rates for a fax. Yet fax and SMS are the most important and least expensive means of communication. The device in use also depends on the age of the deaf person in question: younger people tend to use e-mail, etc., while older people have no relation to a PC and thus would rather use fax or textphone.

In Finland, SMS is nowadays the no. 1 means of communication for the deaf, followed by e-mail. There is also a discussion about alarms and access to general information, but without results yet, except that there is a lack of access to information.
Asked about the yearly expenditure of the Finnish government, the participant was not really sure but stated that the mobile textphones were for free. The deaf had to apply for them at an social security office and had to pay for the calls they make, i.e. only the equipment was free. For calls via a relay service, they had to pay a little bit more. When the question about government costs was repeated, the participant stated that actually the local government, e.g. the respective city, had to pay for it but did not know the exact amount.

In Germany, the situation was seen as bad. Mostly fax is used. The textphone is only for older people (who are not good at writing because of their education), while young people use SMS (for short messages) or e-mail. There was an experiment in the federal states to connect workplaces to interpreters, but the high costs (videophones are expensive, and the connecting costs are high as well) were a problem. So one must try to find a less expensive system. A technical problem is the compression of data to use the videophone in connection with Internet, e-mail,

etc.

In Hungary, the deaf do not really have textphones or videophones, although the Hungarian participants thought textphones a good idea and would like to have them. The Hungarian deaf use fax, SMS and e-mail and think that they are really good; there were no more ideas or suggestions for improvement in connection with those devices. Compared to other countries, communication technology in Hungary was regarded as bad. They did not see a difference between textphones and fax, only that with the latter the user can also use handwriting and does not have to type. SMS is widely used in the deaf community and regarded as really good: It is fast, real-time and cheap. There are no problems with it.
There is, however, a problem with e-mail, because not everybody has a PC. Some people do have one, for instance at the university or at the workplace, but e-mail cannot be used for real-time communication. SMS via Internet is cheaper and can also be sent from a mobile phone (they explained then that Hungarians did not really send SMS to the Internet because it was easier to communicate via e-mail). Basically, SMS is quick and real-time communication. E-mail is quick, too, but there is no guarantee that the message will be read at once. A problem with fax and all other text-based communication is that the message may be misunderstood: The deaf have to learn how to compose a written message, and their abilities to do so vary a lot.
Videophones are not used in Hungary, but they had heard a lot about them, e.g. that the quality was not so good so that one could not really understand signing (because of the wrong speed), so that they were not sure whether it was good or not. If the quality were okay, they would use it; else they would rather stay with the other forms of communication.

In Norway, text on an ISDN phone is a free service, so that one can send messages from one ISDN phone to another locally without incurring any costs.

In Portugal, fax is used by the deaf as well, but they have to buy it themselves. Many deaf people are using SMS to contact both deaf and hearing friends, and more and more of them use e-mail.

In Spain, there is the same problem with videophones as in Germany: The devices themselves are very expensive and so is operating them. One also needs a great bandwidth, e.g. three digital telephone lines for a normal conversation.
The classical communication device for the Spanish deaf is the fax; textphone, SMS and e-mail are also used to communicate with each other. Although they do not have the social skills for writing, they can understand each other without any problems. Currently, the best solution might be to use e-mail and to write or sign, i.e. use video-mail (one would need a computer equipped

with a webcam in order to record and send video-mails).

In Sweden, textphones and videophones are used, but mainly textphones. The latter are (on the public telephone net) are cheap and not so high-tech. However, costs for a mobile textphone are very high. The Swedish deaf are trying to get a reduction; they hope to get a set fee per month instead of paying by the minute. 2 million Euro are spent for private people and the same is estimated for the workplace. Relay services cost 6 million Euro per year.
With regard to the Nokia Communicator and its main usage, SMS are dominant in Sweden.

4. 3. 3. 4. Discussion of technical aspects

After completing the round of participants, the most important issues were repeated once more and it was decided to focus more on the technical aspects for each of these points. The participants were asked to tell the group about the systems used in their countries; the others should take notes for comments, so that the systems could be commented on in a second round.
The working group then went on to discussing the technical possibilities for different communication modes. One very important issue was the standardization of differing systems, (e.g. different textphone protocols in different countries): This was seen as the only way into the future.
The group stated that from a technical point of view, e-mail, SMS and fax were solved but that the deaf needed a good supporting system realized by call centers, etc. in order to connect the different modes of communication. There are already some improvements: Fax is becoming mobile, e-mail is getting faster and cheaper and SMS will probably no longer be limited to 160 characters soon. Except for the question of interconnectivity and the end device, the basic problems are already solved. So it would make no sense to define e.g. a new fax device.
It was important that users could select what method they want to use depending on their equipment and their financial situation. For instance, sometimes a textphone might be better than SMS because it is a real-time dialogue system; one could not really say that one system was better than the other.
The participants agreed that textphone and videophone offered good possibilities for the communication between deaf people, but that there were problems with the communication between the hearing and the deaf. The deaf had trouble with writing, while the hearing usually had no knowledge of sign language at all. In both cases, communication is not easy. Relay Services can bridge the communication difficulties between the deaf and the hearing. Their importance was stressed, e.g. for videophone communication, where the interpreter has to translate from and into sign language.

Another problem are missing connections and communication: Hearing people cannot be contacted, because they do not have the same system.

The question was posed to the participants whether they believed that textphones had a future (keeping in mind that five years from now, probably every household would have a PC and mobiles). For some, the answer was a definite yes. Videophones would become better, but there would always be people who prefer textphones. According to the participants from Sweden, textphones are discussed there quite a bit with regard to different target groups: e.g. the problems of young children, young adults and older people, because they have trouble with reading and writing. As schools often do not provide good written language skills, videophones would be ideal for people with communication barriers. They still had a long way to go in order to develop into a good system (frames, etc.), though, so it was important to talk about that. Mobile videophones were important to think about, too, as they might be the future.
The question was then clarified that it was not about the future of text-based communication, which was important, but that there were some services for a very big group of users in this group and therefore a lot of money in the development. Textphones do more or less the same as probably a combination of fax, SMS and e-mail could do, if there were additional relay centers with e.g. translations of text to voice.
The Hungarian participants were of the opinion that a mobile textphone would have a future, but at home the deaf would prefer easier videophones; or they could chat over the Internet with a PC. It was stated that a textphone was more or less on-line communication and mobility was definitely an important factor. There was the idea of a mobile similar to the Communicator so that users could put it in their pockets. Another participant objected that the future of the textphone did not depend on whether it was mobile or not; mobile devices necessarily had to be compact and if a textphone was small, typing would be difficult. At least in the Netherlands, textphones will also be necessary in the future because of the specific situation there: With the Dutch textphones, users can also send faxes, e-mails and SMS. Moreover, if there is any question - e.g. about a defect printer - the deaf would rather use a textphone because of the instant reply. This was mentioned as a frequent problem with fax communication: If a fax was sent to a deaf person, they would answer immediately, while hearing people or companies often replied only days later.
Although the group was impressed by the Dutch system, the question of definition had to be solved: If “textphone” was defined as a text-based, real time large communication device, a PC could be viewed as a textphone, too. For instance, Allan System (Total Conversation) was mentioned as another computer-based system with multiple functions, including text telephony with all European standards (in Europe alone, there exist six different protocols) automatically.

However, for the further discussion the term “textphone” would refer to a standard textphone. Returning to the six different textphone protocols in Europe, the various suppliers would have to work together to make a textphone work in all of Europe (Pronto was named as an example). In any case, European standards were necessary.
Meanwhile, there was a need for technical relay centers in order to connect these systems and their different standards. Human relay centers were necessary, too, for the communication between the deaf and the hearing (transferring signs into spoken language and vice versa). However, this was seen as a social problem rather than a technical one, although there are also technical components.

4. 3. 3. 5. Wishes of the deaf

As a next step, it was proposed to forget everything on the board and to talk about the real wishes of the deaf; maybe it would be possible to define two separate lists of things one would like to have, both for a system at home and a mobile system (cf. Table 2). At first, realization and costs would not matter.

Table 2: Design of home system and a mobile system

HOME	MOBILE
+ text telephone <–> + E-mail <–> + videophone (+ Alarm at accident) + Fax <–> + SMS <–> + WWW (+ connecting to other PC's) + integrated into ONE piece of hardware! + compatibility to any other system + "Voice to text" (radio, telephone calls...) + even using technical relay centers (compatibility) + Human-relay centers for D<–>H + ISDN, xDSL, IP-connection + windows spoken language ==> subtitling (text) and/or sign data speech - data subtitling - data sign language	+ SMS <–> + alarm system at accidents (in neighbourhood) + connected to alarm systems at home + integrated into ONE piece of hardware + videophone in 3D (hologram) + Mobile textphone for chatting (WAP?) + access to information + access to e-mail + (voice to text translator) or wireless communication to mobile system web, SMS, ...? + SMS to "112" even without sim-card + alarm messages (fire alarm, etc.) + wake-up alarm + "Trill" or SMS

It was explained that there were two possibilities: At the end of the workshop, the participants could either make clear statements about each device ("We want to have this or that"; e.g. free textphones for every country) or they could give priority to their wishes and hope that they could be realized in the near future. There might be problems, if the final statement were only that they wanted to have a stand-alone textphone, fax, PC, etc. Even if a need for different modes of communication were identified, the deaf would wish for an integrated solution, at least for at home, because nobody wanted a lot of stand-alones. There remained also the question of maintenance and service costs.
All agreed that the PC was going to dominate life in the near future and that there would be no problem with buying a PC because they were getting cheaper all the time. There was also agreement that there was a real future for mobile phones (although not for big, bulky devices).

Therefore a computer-based system with different modules was suggested for at home. It should be something that will improve the communication between the deaf and the hearing, which is also affordable and realizable in the near future. Naturally, there might be a better solution in ten years, but all agreed that the deaf could not wait so long and that it was better to keep in mind what might be possible in a limited time-horizon, e.g. two years from now. Maybe today's rate of 50 kbit/sec. would be laughed at, but at the same time the requirements might go up, similar to modern computers: Although they keep getting faster, in reality they are not working much faster because the programs are much larger.
All agreed that so many functions would have to be included in the final system design that it would be easiest to do it computer-based; there was also a reference to Allan System's "Total Conversation" (video telephony with text, web-browsing, e-mail, fax, etc.) from a presentation made the day before (The only problem was its availability: At the moment it is only sold to deaf people at work and it requires extra boards, cables, etc.). Another objection was that computers were not as reliable and robust as stand-alones; for instance, certain handhelds need five minutes to start up. So there was a definite need to improve on their reliability and power. A very robust and fast-starting system should be possible, though.

For the system at home, the deaf wanted a textphone (both sending and receiving), e-mail (both sending and receiving) and a videophone. The deaf would like all these functions (fax, e-mail, chatting, video, etc.) combined in a single device, i.e. just one piece of equipment, both for the stationary and the mobile version. The most important feature was that everything was compatible. For videophones, there was an explicit wish for videophones with holograms in 3-D for signing. A "voice to text" function could be used in conversations, education, etc. and would even enable the deaf to have the radio on, e.g. when driving a car, and get the respective text.

Beside stationary communication, it was also very important to have mobile communication, e.g. when travelling. The mobile version should be equipped with SMS (sending/receiving) and an alarm system in case of accidents, disasters, etc. The alarm system should also work at home, e.g. when there is a fire in the neighbourhood. There was the idea of connecting the mobile system to an alerting system on the body; at home, various alarms should be possible, e.g for the doorbell, the phone, when the baby is crying or when the car outside the house is stolen. The deaf need access to the information the hearing get via loudspeaker, e.g. about delays. It was suggested that deaf people could receive this information on their mobiles. Although some trains, for example, nowadays have displays, the deaf would like such a feature.
The question of connecting the different modes of communication came up (which should be possible if the base was a computer and costs did not matter). This could either be done by connecting two computers, or, alternatively, by wireless communication. Some more ideas were a relay service for textphones.

4. 3. 3. 5. 1. Answering machine

A special request concerned some kind of answering machine. There was the idea of a single telephone connection for deaf and hearing people living in one house: The participants wanted to add an answering machine for when the hearing family members are not at home, so that the deaf person could see that there was a call coming in. This was then specified not as an alerting system, but as an answering machine that takes the incoming calls. The Dutch NeW-TeL was cited as an example in case: When a hearing person is calling, the deaf can see it on the display and the call is stored on the answering machine. Once again, NeW-TeL's functions were explained: combined textphone, fax, modem and speech. When a hearing person calls, the deaf will be confronted with a menu and can choose from different options by pressing different buttons on their phone: a connection with the textphone, with the fax, or the normal telephone. According to the Dutch participants, the modem informs the caller that this person is deaf and that they may send a fax on the same number or be connected to a relay center or leave a message after the beep.

4. 3. 3. 5. 2. Alarms and important information

There was a request for a discussion of catastrophe alarms and information for the deaf - for example, the hearing were given information about traffic problems. Maybe something similar could be done via SMS or other systems.

Mobile alarm solutions were of special interest: Train accidents and large fires, e.g. in Sweden, were cited as examples and the question raised how the deaf would get the respective information - how could they get technical devices to make sure that they not only get the information but do so fast? Alarm systems would also have to be connected to a system that is accessible to the deaf. Some worried about the national alarm systems, e.g. when a country was attacked by enemy planes, and that the deaf would not hear the sirens. Therefore a parallel alarm was necessary and could be transmitted simultaneously via Internet or SMS. In a hotel, for example, the mobile must work also as a fire alarm or as a receiver for the wake-up call, either with flashes or with vibration.
The reverse was discussed as well: One participant referred to a meeting of a Swedish group dealing with standardization and discussing SOS calls: For instance, it was discussed to be able to send an SMS to the SOS number 112 (because it is an important function, hearing people can call it even without a sim-card). It was also important that the IP-net can function in connection with an SOS so that such a call can be sent.

Travelling was a very important issue, especially with regard to the audio information at airports, train stations and harbors. Although there are sometimes TV screens where the deaf can read the respective information, much of it is still not accessible, e.g. audio information on buses. There even was a request for information on traffic depending on the region through which you are driving as well as for information on the delays of trains, planes, etc. The deaf wanted free choice to get that information and other services.
A participant wanted to have web mail, too; at home, e-mail was available, and when travelling, one could go to an Internet café and have access to one’s mail.
The participants were asked whether they would like a connection of the mobile system to any local information system (e.g. airport). In any environment where information is broadcast, the deaf wanted to have some connection between the respective system and their mobile set, possibly via web or SMS (although there were doubts whether this would be possible). Others thought that SMS would probably be possible as there were also welcome messages from the providers of new networks after crossing the border.

Two emerging text services were mentioned as well: ISDN text service and WAP (a dialect of the HTML-language used in the Internet).
As for WAP, this comes with the new GPRS standard which promises up to 100 kbit/second . At the moment, the rate is 9,6 kbit/second, i.e. only a tenth of that. Using WAP, one can get information like train or flight schedules and weather reports on a mobile phone. There are even plans to have a communication interface, e.g. in a car connected via GPRS, so that one can read

traffic information on the display in the car. This feature is already available in expensive cars. WAP is not really person-to-person communication but rather using information available on the WWW. There is a need for providers who are providing content for the WAP service; some are offering it right now with lower rates. However, there was certainty that it would go on very fast. Others were more sceptic because in their experience WAP offered only very slow and very limited information. If the plans for a service like chatting where an ordinary mobile phone makes a conversation possible were realized, this would allow real-time text communication. Right now WAP must be slow because it was not planned for 9, 6 kbit/second. This is the same as with HTML: If the deaf could prepare a list of contents they would like, there would be no problem to find a small company willing to provide exactly the information the deaf want.
As for general information on the WWW, it was understood that there was a big language problem, because English was a third language for the deaf. There was also the question of signing on the web - bandwidth was a problem if one needed video on the WWW.

4. 3. 3. 5. 3. Translation

Special regard was given to all matters of translation: For instance, if a deaf person wants to send a message to a hearing person who has only a standard phone, they have to type it to the call center, from which it will then be voiced to the hearing partner. There was a reference to WYNDTEL (USA): a little two-way pager that looks similar to the Communicator and can send or receive messages. Connected to it are services where one can send messages to be spoken out to voicephones, i.e. a message-based relay service.
Referring to a presentation on automated translation from written text to animated sign language the day before, the participants were asked whether they thought that there was a future in that direction and whether they wanted such a system or preferred a human signer; also if there was a possibility to get a (stable) translation from signed to written language.
There was agreement that one never knew because developments were very fast, but also the objection that there was an important difference between spoken and signed language: Sign language was also in the facial expressions and body language, not only in the hands, so it would be very hard to understand if one only looked at the hands, because there were many more components.
This led to a discussion of acceptance; if there was a basic acceptance, research would probably get a boost. This was more of a linguistic problem than a technical one: Translation would only serve to get an idea of what the communication partner was talking about, but rough translations, although dangerous, were better than no translation at all.
Some specific research projects were mentioned: In Hungary, there is work on an animation of

the hands; the next step is connecting the hands with an image of the mouth. It is possible to automatically translate a sign into animation, and a computer can also translate the animations into written language. This will probably not be possible within the next two years, but in the next 5-10 years.
Some researchers in Japan, the USA and Germany (Aachen) are working on sign language recognition. Currently, the systems can understand about 60 signs if signed carefully and separately, and a single signer. They expect improvements (about 300 signs). This mirrors the development of voice recognition (which has reached single person reliability), although there is a difference in the economic interests. Another difference between voice recognition and translation is that there is the linguistic problem of translating from one language to another. It is probably not impossible, but very far away. In Norway, they have worked with a model of sign language, how to store data in a database, and other countries had models that made this possible. One could turn on the computer and make animations. However, there are big differences between sign languages and so it is hard to use the same system for different languages. There is a problem formalizing it and making sign language standards. Thinking of applications of animation and sign recognition where a translation is not yet needed, there were ideas to store signs or present information on the WWW (if one wanted to use animations rather than videos, e.g. because of the bit rate). The animations are getting better and so is the movement of bodies. There is a Dutch project dealing with hands, face and the movements of the body, but only in one direction, namely text to sign. Other people are working on the opposite direction.
Relay centers and interpreters would provide an alternative. As there was the question whether it was possible to have enough well-trained interpreters, an automated solution would be cheaper, although a non-technical translation was always better because it kept the communication personal.
As an afterthought, this discussion led to a request for a device that would type a school lecture in real-time, when the interpreter cannot translate all the technical terms.

4. 3. 3. 6. Design of a concrete system

The participants then went on to design two concrete systems: one for at home and a mobile version. Once again, the most important keywords were written on the blackboard and the system itself was depicted in the form of a diagram (this diagram is summed up in the text).

4. 3. 3. 6. 1. Home system

The center of the home system is a PC which is connected to the outside world with ISDN,

xDSL, telecable or other systems like connection via satellites (or maybe even with a 56k modem, if one was only using the textphone and switching off the videophone, because at the moment it was state-of-the-art). A participant wanted to easily get incoming calls on IP. This led to a discussion of the respective merits of IP and ISDN (at the moment, a lot of videophone systems are working with ISDN and will remain an available connection mode at least for the next few years). Austria is even planning on Internet connectivity via the power lines.

The following connections were required:

- SMS (there was a comment whether it was possible to send SMS without the WWW because it would be faster to go by modem)
- WWW (for e-mail and possibly SMS; the former is usually connected to the WWW)
- Fax
- Textphone (using standard equipment: a keyboard and windows for incoming or outgoing text)
- Videophone (for video calls to have video text and video, i.e. Total Conversation, would require another window to open; technically, it is a different stream of information)
- Speech
- Alert (light and wireless vibration, maybe also ringing; RDS-based; connected to all the rooms of the house or flat)
- Loudspeakers (for hearing visitors)
- Camera
- Printer (Asked whether they preferred a fax message on the screen or on paper, the deaf were in favor of a printer)
- Microphone
- possibly software

As some of the deaf can recognize the voices of their relatives and can talk on the phone with them and they also might have hearing visitors, the system would need a standard phone set connected to the PC, too.

For incoming calls, the caller should first receive the necessary information and then the device should switch to the desired mode. Calls should also be forwarded to wherever the user is.

The device needs to be compatible and should be low-cost and a low-tech human-machine interface (i.e. easy to manipulate, with instructions and signed explanations on a supporting CD-ROM).

The participants were asked whether they wanted automatic voice-to-text translation, e.g. when a hearing person calls (it could either be an automatic translation or via a relay center with automatic or manual translation). A participant with experience in automatic voice-to-text translation thought that it was not really working yet and rather unstable. Besides, there was an objection that such software would be possible only on the PC of the respective hearing person, because the system learns only the voice of its owner; therefore it would not be possible to use it for translation on the deaf person's PC.
In Norway, there exists a proposal for a project for automatic translation. Two possibilities were mentioned: The system might either work with a very limited vocabulary (e.g. bus arrival times or very simple conversation) or might be programmed to recognize certain speakers (e.g. the voices of the deaf persons's parents) so it will function for them, but it will not work for unknown speakers.
Furthermore, the scenario of hearing A calling deaf B was discussed and who would route to the relay center. In Sweden, the caller has to add a prefix to the number. However, the question was raised of how deaf people could connect a caller to the relay center, i.e. the other way around; one suggestion was to have a button like "please link in the relay center" on the terminal. Details would still have to be discussed, e.g. whether to inform the caller first, but the deaf would definitely like such a system.
For voice calls while the deaf are at home alone, they would prefer to choose whether to receive it or to connect it to the answering machine, so that they could turn it on and off themselves. It was seen as disturbing if the alarm light kept blinking because of the regular phone which the deaf person cannot answer.

Asked whether they wanted a call only forwarded to the relay center as an option and what to do with the call if they did not want to answer it immediately, the deaf wanted a free choice of answering a call or not.
With the new textphones, the deaf owner can also choose to turn fax, speech, etc. on or off. When a hearing person calls, the system informs them about possible choices: a connection to the textphone (if the caller already knows that the owner is deaf) or a speech connection telling the caller "I am deaf" and that they can also send a fax or call via the relay service using a certain number. The system automatically connects the caller to fax, modem, textphone or speech. The person at home can see the kind of connection on a display, so if it is a hearing caller, they can either disregard the call or have a hearing person listen to it and type it out for them. Speech can be added, because all the systems can be connected and the system makes automatic connections. The main question was whether the deaf will tell the caller what to do or route the call. One answer was that the caller will get a choice of how to contact the deaf person and then the

respective system will come on. As there was doubt about a general consensus on the way to proceed, the two main possibilities were summed up again:
A deaf person receives a call and recognizes that the caller is hearing. They can then choose whether they want the call forwarded to a relay center or do anything else with it or whether the system automatically returns the message “You are connected to a deaf person...” Those are two totally different ways of proceeding because either the deaf themselves choose the next step or they have to wait for the decision of the caller. The majority voted for the second variant, i.e. that the system informs the caller about their options.
With videophones, there is the question of how to tell the caller that they are going to be connected and who is going to pay for the call when it is forwarded to a relay center, the caller or the deaf person. As for the current situation, different countries have different policies. A participant believed it to be European law that the costs for the line to the relay center would be covered by the government or the telecommunication organizations; the same held for the USA. Another important point was that the people working in the relay center were commonly paid by some kind of social mechanism.

The discussion then turned to alerts - what kind of them, the current state and whether the deaf wanted them in every room. A participant suggested a connection so that the deaf could get their calls wherever they were, similar to hearing people, i.e. a connection to the mobile phone (“Forwarding”).
There was also the question of who would send the alert messages; if the alert is connected to a PC, it can only react if it receives the messages. Different projects for European standards were mentioned, but they still have not found a solution. One system, for example, sends out social alert signals on RDS-FM radio which could connect to the home system. There was the idea that the deaf might perhaps be able to force the development of standards.
It might also be a possibility to implement a sound analyzer which could be programmed to recognize sound alarms in the neighbourhood, e.g. plane attack or gas alarms. The system could analyse the respective sounds and give an alarm. However, there might be a problem with sirens on TV which could cause the alert to go off.
An integrated alert could be transmitted via WWW or SMS, for instance, another suggestion was a wireless alert. There was an objection to this, based on the Swedish model: If a catastrophe happens, people decide how the alarm is sent out, how serious it is and how the information will be spread. Frequently it is given to the radio, which means that if one has a stationary computer, there will be some sort of radio signal going into the computer where it is translated into a text message. About the same kind of model is used for GSM telephones. Therefore it should be tried to use the existing models, if one owns a PC or a mobile.

4. 3. 3. 6. 2. Mobile system

The mobile system should be based on a mobile phone connected to a system which is flexible enough for the needs of the deaf. It should be a programmable device, but programming need not be done by the deaf themselves.
As a connection, only GPRS or UMTS would be possible.

The following functions would have to be included:
- WWW (WAP)
- SMS
- E-mail
- Fax
- Textphone
- Videophone

Maybe the device could also be connected to a handheld PC (PDA).

There was the question if it should be a more or less standard telephone with an infrared connection or rather a single piece of equipment, i.e. should a phone be developed which does all that or would a small “assistant” (PDA) wirelessly connected to the phone be sufficient?
Clarifying the question whether it should be a special device developed for the deaf, the participants thought that the role of the working group was to give the specifications; they were aware of the fact that the market was working with other forces than the deaf. However, they would use the smallest, lightest and fanciest gear they could get. It was suggested to rather look into the standards (i.e. sign communication), because devices came and went every month.
There was some disagreement on the single device: On the one hand, one did not need the same gear all the time. On the other hand, a system which is really a small PC connected wirelessly to a mobile phone is - from the technical point of view - more or less the same as the system at home; nothing which could not be realized in a laptop or in a PDA.

For personal needs, the Nokia Communicator was cited as an example. With the Communicator, during travel and when people have to be informed quickly, SMS is used; faxes are received but seldom sent. E-mail is used also, but SMS is the most important function. It is used at work or when travelling, is easy to use and easy to travel with. The deaf stated that they did not want to travel with a lot of technical devices or a technical “suitcase”. On the Communicator, a small window can be opened; if that could be done a little bit bigger for the proposed system, it would be perfect. For the office, different-sized equipment would not matter.

At home, the deaf would prefer a larger system of comfortable size, while the mobile version should be really small. However, a hand-sized computer might be better than a mobile textphone. Asked whether it should be approximately the size of a PSION, the reply was “something that you can hold in your hand”. There was also the objection that - at least at the moment - one cannot type messages in the standard way on a mobile phone.
As for size, it was difficult to decide what is too big and what is too small. For travels, the deaf would like something smaller than the Communicator, which is too heavy; unless they were travelling for a long time when they would prefer something bigger and with more functions. This idea brought the discussion back to the mobile phone connected to a PDA.
So the system should be modular - if the deaf owner wants to have a videophone, etc. they can connect it wirelessly to special devices. That it would be possible to integrate everything into a single phone was very much doubted because this would need another bulk of programming; so there was no way to implement that at least for the next few years.

4. 4. Results of the final plenary session

Besides the reports from the working groups (which are not reproduced here because they are only excerpts from chapter 3), the plenary session concentrated on suggestions for improvements and solutions for this subject.
From the perspective of the deaf as a specific user group within the information and knowledge society, there is still a grave lack of access to information and communication. Partly this was already addressed and analyzed during the EU-Workshop in Klagenfurt in February 1999 (“Steps Towards an Improvement of the Participation of Deaf Persons in the Information Society”, cf. Dimmel/Dotter/Hilzensauer/Krammer/Skant 1999 and Dotter/Hilzensauer/Krammer/Skant 1999). In the present workshop, there was a focus on suggestions for the removal of these barriers. Therefore, the current situation will only be briefly presented (sections 4. 4. 1. to 4. 4. 3.) before going on to the suggestions for solutions (section 4. 4. 4.). The suggestions form a conceptional unit; this is especially true of the area of information and communication. In our view, these could lead to various proposals for EU-projects in the course of time.

4. 4. 1. General communication needs of the deaf

For the deaf, sign language plays an important role; this holds for the family as well as for education, vocational training and the workplace. Therefore telecommunications has to make provision for a transmission of sign language and improved access to information by transferring it into sign language.

According to the experiences of the workshop participants, video telephony, interpreters and fax are currently very important for work, but are not offered everywhere or wherever necessary by far. A very important instrument of communication between the hearing and the deaf are relay services. Other means of communication are the text telephone and e-mail.

Many deaf people feel misunderstood and are frustrated because their wishes are not taken into consideration. This is due to the fact that they are explicitly or implicitly (by the availability of communication devices) forced to exclusively use the modalities of the hearing majority, i.e. the written and the spoken language.

Access to information and communication services should not be regarded only as a hardware problem but as a multi-factor problem influenced by the following issues: the language used, costs, technical standards, contents and whether human services are necessary. An improvement of the situation of the deaf can only be reached by a use of technology, re-editing and offering contents and additional human services (interpreters, call centers). There is a call to “include the sign language community following the goal of 'services open for all'!” In order to reach this goal, information has to be supplied also visually; on the level of language, this means that although written language is a visual mode, use of a sign language must be possible.

The expansion of information access should be done step by step: First of all, existing sources should be made available, deaf-specific sources before general ones. In a next step, the necessary new developments should be made (e.g. dealing with the question of up to which extent general access to any information in the Internet via sign language is possible; there have been the beginnings of translation programs with Signed English, etc.).

As for telecommunications, in the interest of functionally equipping deaf people, we suggest the development of a respective ‘deaf workplace’, taking into consideration the results of the workshop, especially the report from the working group “Technical aspects”. Such workplaces should exist at home, on the job and in some public institutions.

As has already been mentioned, the communication needs of the deaf cannot be satisfied with functional equipment alone. They also need services, depending on the situation or individual decision whether a deaf person needs an interpreter or if written communication will suffice. Wherever possible, there should be multiple options so that the deaf can choose the most fitting one, no limitation to a single solution.

Every individual has special wishes and limitations with respect to communication. For hearing and hard of hearing people, video telephony is mostly useless for the communication with the deaf, if they have no knowledge of sign language. Because they frequently do not succeed at finding a common base for communication, relay services are important in order to make communication between people with different needs possible.

The deaf users should take part in the development of new technologies, both in design and development. These new technologies could include more automated relay services, necessary new components of the systems suggested in section 4. 4. 4. (if any), and even holograms or 3-D videophones in the future.

4. 4. 2. Language use and language competence

There is the question of how to improve the given situation and to solve the 'language problem', at least partly. The rule adhered to during the workshop 'no either - or with the different options, but to offer possibly all of them and a free choice among them in an economical way' also holds for the languages: An improvement of communication and information access is necessary both in the area of sign language and in the area of written languages.

For sign languages, this means that the conditions for the use of interpreters as well as deaf education and deaf research have to be improved in many countries; at the same time, the national sign languages will have to be recognized.
For the written/spoken languages, this means an improved competence of the deaf in the respective national or regional language as well as in English. This is an educational challenge for many countries.

There was consent on the question of how the target group for all the promoting measures that were suggested should be described or called: the 'sign language community'. Thus deafness and special needs with respect to access to the acoustic communication channel are no longer defined medically but linguistically or by the self-definition of the respective group. So every deaf or hard of hearing (but also hearing) person has the freedom of deciding whether they want to identify with a language community at all and to what extent (a sign language can be chosen as first or second language). Although the concerns of the deaf can still be regarded as central, the deaf community as sign language community is open to the hard of hearing or other people who want to join this culture of a 'visual world'.

As for the integration of the deaf, the development in Sweden should at least lead to reflections: The school system is being reformed, in a way that in future the deaf will (again) be taught in special schools for the deaf. The Swedish argument is the following: In the so-called integration forms, the deaf are 'handicapped', but not in schools where their special needs are taken into consideration.

An important issue is that there is a place for the deaf also in the education of deaf children and adults, as is already intended in various countries (e.g. Finland).

The experiences during the last TISLR-conference in Amsterdam led to a longer debate in the plenary session. As there had not been provision for a regular translation into different sign languages, a group of deaf participants suggested the use of a specific sign language as lingua franca, at least for international scientific conferences, similar to English for the hearing. The first choice was American Sign Language (ASL), a second one British Sign Language (BSL); International Sign (ISL) was excluded because of its incompleteness as a language. There was consent that such a decision had to be made by the deaf or the deaf community. We give here only the most important arguments concerning such a solution:
Pro: The choice of a scientific language is supported by the parallelism to the development for the hearing (i.e. English), 'natural' requirements for deaf people with an academic education (they ought to know ASL) and economic reasons (a substantial reduction of the costs for interpreters).
Contra a choice of a sign language at this point in time: All hearing people learn English for several years so that competence in this language can be expected; there is no parallel for ASL and the deaf. At present, a lot of deaf would be excluded from research if they were to use only ASL (this is especially true of the central and south European countries).

4. 4. 3. Costs

Communication between deaf and hearing people leads to higher costs than there are for easier kinds of communication: The hearing need less time for communication because they are able to use the acoustic channel, resulting in additional costs for the deaf (because of the limited number of characters, they sometimes have to send more SMS for e.g. an appointment or a date than hearing people who can often clarify questions with a short telephone call).
These services should not be for free; the deaf should pay the same amount as hearing users of these services. If more than one line is necessary (as is currently the case with using e.g. fax, textphone and videophone; cf. above), only the costs for a single line should be charged.

There are two alternatives how these additional costs could be paid: Either the governments take the money out of their social budgets or the telephone companies out of their profits. In any case, besides earlier voluntary agreements, if any, there should be attempts to arrive at a law for this.

With various telephone services, especially SMS, the deaf already get lower rates than the hearing. These services should be made public.

As for the costs for the use of information, access to the basic services of the information society should be free, not only for the deaf. A distinct economization of the information sector (in the sense that a fee has to be paid for each access) should be avoided in the interest of disadvantaged groups.

4. 4. 4. Suggestions for the improvement of the situation of the deaf

4. 4. 4. 1. Information management

The information that is presently available (potentially also to the deaf) has to be made more accessible. Even a large percentage of the regional or national initiatives on the deaf sector are unknown to large parts of the sign language community and even to hearing professionals. The solution certainly cannot be that everything on regional and national initiatives which has been published in the respective written languages is distributed to all other European countries. In other words, there has to be a criterion for the selection of information to be spread all over Europe. This criterion is called “Best Practice” and implies that especially good or promising suggestions and solutions should be disseminated on a European level so that all citizens may profit from the creativity of single European people. The dissemination of ‘Best Practice’ solutions is supported by the European Commission.

<u>4. 4. 4. 1. 1. European information network for the deaf</u>

We propose a deaf-oriented information network for all of Europe via the Internet. Similar to the information published in several languages by governments or large companies, this information center should offer the same not only for written languages but also for sign languages. There have to be inquiries to the EU about the extent of interpreting services. Possible names included “Visual World” and “Sign Language World”.

This information system cannot consist only of automatons, but needs humans for its management. It also spreads contents. During the first stage, existing information will be checked and chosen according to criteria like “Best Practice” or “Basic/important information for all deaf people”. A second stage will clarify which additional contents should be offered.

The following contents were mentioned: information from social sciences (pedagogical, psychological, sociological, linguistic) on deafness, deaf education (training of sign language teachers), interpreting (cf. http://home.wxs.nl/~euroterp/interpreters.htm), information pool for aids on the IT sector [19]. There were e.g. the following suggestions:

- To provide the deaf with access to the Internet information of various administrative bodies (municipalities, health insurance, regions, federal states, associations, etc.);
- A terminal with a direct connection to a call center for the deaf in public buildings (similar to public WWW terminals in the USA);
- From time to time, there should be special EU-meetings for planning or improving the exchange of information.

First steps in the direction of such a network could be the following:
To bring together or coordinate the most important deaf-oriented websites in the EU, including a translation of important contents (chosen, e.g. according to the Best-practice criterion) into all national written languages. The next step would be the translation of the contents into the European sign languages. The national deaf webpages should also be supported with respect to fulfilling their national duties. This network should be realized through respective proposals for EU-projects.

Although the work should focus on the sign language community (of which everybody, even hearing people, can be a part) the transition to the hard of hearing should not be forgotten with this system. It is open to all, not only to the hearing-impaired. One should not forget, either, that the hard of hearing will easier fit into the sign language community than the deaf into the spoken language community. Besides, there is some support for the hard of hearing, but almost none for the deaf. In any case, the borders between the traditional minorities should fall.

For this information system, also the necessary communicative connections between the people involved have to be established (cf. section 4. 4. 4. 3.). If the access to information and the exchange of knowledge take place via a network or in cooperation, this will save money and time.
In this connection, the EUD mailing list should remain the only list for pertinent projects; a

possible future PROMETEUS list should cooperate with it. For the dissemination of information, also strategies need to be developed to benefit from the initiatives PROMETEUS and e-Europe.

4. 4. 4. 2. Reduction of the 'language problem' between the hearing and the deaf

What can we do for deaf people who are unable to communicate in written English and therefore cannot use much of the information in the lingua franca of the EU (English) or a different written language than their own?
There was one suggestion for a preliminary measure, i.e. to send information to the homepage of the EUD and to have them try to get funding from the European Commission for a translation at least into the written languages of the EU. The same holds for the homepage of PROMETEUS (one would have to find out about the conditions for the use of existing translation services of the EU).
In the long run, in order to reach this goal there must be even harder efforts for a bi- or trilingual education of the deaf as well as for the motivation of the hearing to learn a sign language.

4. 4. 4. 3. Technical devices for an improved communication among the deaf: European communication network for the deaf

We propose the establishment of a test installation for visual communication (video telephone or video conferencing connections) between the national deaf associations and the EUD within the framework of an EU-project. This would vastly improve their opportunities for coordination and communication. Parallel to this, connections between the national and the regional or local associations could be established with national funding. One important question that would have to be answered beforehand are the technical and financial conditions for a suitable sign language communication via video conferencing or videophone and which functions are required by the users. Certainly this can be done with professional equipment, but at a very high price. Economical solutions for connections and equipment would be desirable.

4. 4. 4. 4. Necessary technical developments

4. 4. 4. 4. 1. Deaf workplace

We propose the realization of a deaf workplace as described by the working group "Technical aspects" as an EU-project. Goals of the project are not only the necessary hard- and software but also decisions on which sources of information should be accessible in which way (e.g. with an

installed menu: all-round education or explanations in sign language). In order to reach these goals, the different technical standards in Europe should also be reviewed and unified, if necessary.

4. 4. 4. 4. 2. Individual technical problems to be solved

The following problems should be addressed within the framework of smaller projects or job orders:

- One should be able to switch all the existing devices for telecommunications to a single telephone line. Instead of several lines for different devices at the workplace or at home (e.g. three for fax, textphone and videophone), it would be ideal if they could all be served with a single line or via a "line switch".
- There is no notification for incoming e-mails or other communication attempts via PC if the computer is turned off.
- As more and more deaf people have several devices at home, alerts via light-signal should be designed with multiple connections, so that they can process different signal frequencies and also display them differently (e.g. frequency of the flashes, color).

4. 4. 4. 5. Services

Based on the present situation, an improvement of the situation of the deaf requires two kinds of relay services:

4. 4. 4. 5. 1. Interpreters

In many everyday situations, interpreting between a spoken and a signed language is necessary to guarantee satisfactory communication. The problems are mostly well-known (e.g. the number of available interpreters and their regional distribution, partly also the training for interpreters) and various EU countries have already dealt with them, partially in a suitable way. The two fundamental reasons for the unsatisfactory situation are, on the one hand, the still existing lack of information regarding the communication needs of the deaf, on the other hand, the fear of some governments of too high expenses.

One could say that the constant 'dependency' on interpreters of deaf people are not in accord with the initiatives for a self-determined life of people with special needs. However, although avoiding the dependency on interpreters by offering other possibilities for education and access

or other services is quite useful, this does not release one from the obligation to have sufficient and well-distributed interpreting services. This could be expressed in the following way: 'One should not be dependent on an interpreter in any situation, but one should always have the right to demand one'.

As for the training of interpreters, one would have to think about whether these studies should not be combined with deaf and sign language studies for deaf and hearing people, because this would lead to a larger communication community while at the same time increasing mutual understanding. According to experiences, this method of integrating the deaf via the sign language community results in a good mixture of communication partners; there will be some problems with or for the hard of hearing.

4. 4. 4. 5. 2. Relay services (Call Center or Relay Center)

Call Centers should be introduced in each EU-country. For financial reasons, one might think of successive stages from at first only written language-oriented to sign language-oriented ones. The final goal, however, are call centers with sign language translation. This could also help to solve the interpreter problem, because the interpreters could be supported or partially replaced by interpreters via videophone or video conferencing. Therefore, this so-called 'remote interpretation' via extended call centers should be introduced generally just because of financial reasons.

4. 4. 4. 6. Proposals for the introduction of laws in all EU-countries or on EU level

4. 4. 4. 6. 1. Unification of existing laws

The pertinent European laws are (not least because of the communication situation described above) mostly unknown to the deaf and all in all, even hearing people often do not know exactly which issues are addressed in which laws of the individual EU member states. The same holds for the respective responsibilities in the different governments. A survey, summary and evaluation of the current legal situation could either be part of the information network project (cf. 4. 4. 4. 1. 1.) or a separate project. Such a survey should also take into consideration the laws of countries which are applying for EU-membership (e.g. in Hungary, there is a new law for people with special needs since 1998; a new one is planned for 2006, providing the deaf with more interpreters and more government funding).

On the basis of this evaluation, together with the deaf associations a harmonization of the laws could be attempted based on the recommendations of the European Commission or the European parliament or laws for all of the EU developed wherever necessary or legally possible. The proposals in 4. 4. 4. 5 can serve as an example: Basically, it is incomprehensible that neither the area of telecommunications nor television is completely accessible to the deaf. Therefore laws for minimum standards for relay services and interpreters should be aspired to. The same holds for the captioning of TV broadcasts (complete captioning would amount to about 1% of the production costs, according to Australian estimates).

In the sense of the 'Best Practice' rule, it should be attempted to recommend the Dutch "Convenant" between the government and the deaf association as an example to all other EU-governments. In brief, this Convenant says that the Dutch Government pledges to establish an Institute for work on the Dutch sign language, while the deaf pledge to standardize their sign language for instruction.

4. 4. 4. 6. 2. EU-Budget for interpreting costs for the deaf

For international and European meetings of or with deaf people, an EU-budget should be created in order to pay the expenses for sign language interpreters. This can be based on the present widely varying practice of the EU-member states regarding the funding of interpreters for such meetings and also because this is a 'normal' resource which should be available to the deaf as a matter of course.

4. 4. 4. 7. Proposals for the organization within the deaf field

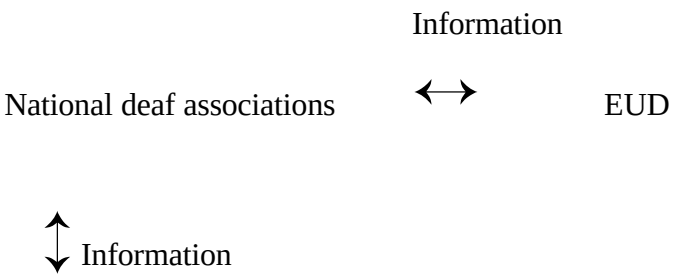
4. 4. 4. 7. 1. Improvement of internal issues and the internal organization of project proposals

The experiences made in the period from the first workshop in Klagenfurt until today prove experiences from other areas of work: During and after such a meeting, the motivation for new projects is very high, but over time, there is a distinct decrease. One reason may be that 'normal' everyday issues take up most of the working hours. This fact cannot be helped, but improved planning, especially communication and coordination can increase the chances for new project proposals: Principally, the European Commission is open to projects for people with special needs, but its representatives expect them to follow the respective conditions of the Commission. Among them are relatively short deadlines for submitting certain projects (combined with difficult requirements for writing down project plans and filling in forms), which in turn lead to frustration

and non-submission of necessary projects. In order to fight these negative effects, we suggest an anticipating organization of project proposals. For some essential issues, joint projects should be prepared and completed with regard to contents; one would then have to wait for a suitable call for projects. Each of the interested parties should decide for themselves how much work they can put into the proposal and a possible project.

4. 4. 4. 7. 2. Improvement of the communication between the representatives of the deaf

We quote the formulation of a participant: “The deaf will have to fight for their rights and the national deaf associations will have to cooperate. Without information, the deaf are powerless.” The European deaf organizations and the EUD should organize or improve the flow of information as follows:



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Editorial information

The parts of this final report were authored or edited by the team of FZGS:
Elisabeth Bergmeister (deaf), Franz Dotter, Marlene Hilzensauer, Klaudia Krammer, Ingeborg Okorn (deaf), Reinhold Orter (deaf), Andrea Skant, Natalie Unterberger (deaf)

Forschungszentrum für Gebaerdensprache und Hoergeschaedigtenkommunikation (der Fakultaet für Kulturwissenschaften am Institut für Sprachwissenschaft und Computerlinguistik), Universitaet Klagenfurt
Research Center for Sign Language and Communication of the Hearing Impaired (of the Faculty for Cultural Sciences at the Department of Linguistics and Computational Linguistics), University of Klagenfurt
Homepage: http://www.uni-klu.ac.at/fzgs
Fax: ++43 (0)463 2700 2899
Postal address: Universitaetsstr. 65-67
A-9020 Klagenfurt
Austria

6. Notes

1. It is no doubt that withholding deaf people from the use of this language of their choice is a severe form of discrimination. This does not only mean the official recognition of European sign languages (which has been appealed for already twice by the European Parliament) but also to care for the possibilities of use in everyday life. Cf. also the website of the European Disability Forum: http://www.edf-feph.org/.

2. On this concern cf. "The Sign Language Users' Tampere Declaration" (Tampere 5 December 1999):
   In the European Union reside about 360,000 sign language users. Many problems exist for these sign language users because of the denial of their fundamental right to communicate in their own language. Good communication begins in the home, with parents who can communicate easily with their child. 90% of Deaf children are born to hearing parents, who cannot communicate in sign language, the natural language of Deaf people. Without good basic communication, language development is hindered, and this continues in the education system where Deaf children are once again denied sign language. Only about 10% of Deaf people receive their education in sign language. The possibility of further education is also thus affected. The lack of a good education leads, in turn, to difficulties in obtaining gainful employment. By denying Deaf people sign language from the very beginning of their life, they are prevented from becoming fully contributing citizens of their nation, and the EU.
   Sign language users who are citizens of the EU therefore propose that the EU must give more attention to language rights. By doing so, the EU will create an environment in which minority and indigenous language users, including sign language users, become fully involved citizens. This can happen by developing a transparent EU structure that involves NGOs more closely in its work. It is essential that this happens before the enlargement of the EU becomes reality, to pave the way for minority language, indigenous language and sign language users in the new member nations to enter into the EU as fully prepared and contributing citizens.
   The European Union of the Deaf (EUD) is the NGO representing sign language users in the EU. The EU should make a policy of consulting the EUD in all matters affecting sign language users; and to ensure that sign language users' needs are taken into account in all EU policies and programmes.
   We, the sign language users of the EU, also emphasise that the Charter of Fundamental Rights must include linguistic human rights.
   (Authored at the meetings of sign language users during the Citizens' Agenda 2000 and the theme seminar entitled The Sign Language Users in Europe organized by the Finnish Association of the Deaf, the European Union of the Deaf and the World Federation of the Deaf).

3. As a project of Magdeburg puts it: Deaf persons will get access to the hearing society as well as to the advantages of the so-called information society by: (adequate) support, (sign) language, and preparation.

4. For people with special needs and especially for the deaf, the new possibilities for information and communication signify first of all a chance for improved access. Therefore possible negative effects of the information society (cf. e.g. Stocker/Schöpf 1998) are primarily of no consequence for this part of the population.

5. The respective group for disabilities within the E-Europe initiative criticized that nine sections within this initiative ignored the needs of people with disabilities, and that an additional one had to be created specifically to address this target group.

6. The Prometeus Memorandum of Understanding and the CEN/ISSS Workshop on Learning Technologies were both formally launched back in March 1999. Both were conceived as complementary activities, Prometeus formulating requirements for standards, specifications or guidance material, to be fed as input into the CEN/ISSS Workshop who then ensures that the necessary standardization related actions take place. ISSS is the "Information Society Standardization System"; CEN is the European Committee for Standardization. CEN's mission is to promote voluntary technical harmonization in Europe in

conjunction with worldwide bodies and its partners in Europe. CEN works in partnership with CENELEC - the European Committee for Electrotechnical Standardization (www.cenelec.org) and ETSI - the European Telecommunications Standards Institute (www.etsi.fr).

7. Cf. the "Draft Report" of the CEN/ISSS Learning Technologies Workshop from March 22, 2000.

8. The following partners had originally agreed to cooperate within the framework of this project:
   - Bayrisches Institut zur Foerderung der Kommunikation Gehoerloser und Hoerbehinderter e.V. (Bavarian Institute for Deaf Communication)
   - Deutscher Gehoerlosenbund (German Deaf Association)
   - Euronet GmbH Frankfurt
   - Gehoerlosenverband München und Umgebung (Munich Deaf Association)
   - Oesterreichischer Gehoerlosenbund (Austria Deaf Association)
   - Oesterreichisches Forschungszentrum Seibersdorf GmbH (Austrian Research Center Seibersdorf)
   - Scottish Interactive Technology Center, University of Edinburgh
   - Scottish Sensory Center, University of Edinburgh.

   After the final editing of the project proposal, two more letters of intent reached us from institutions which had been in contact with us because of a possible participation in the project.
   - Bundesarbeitsgemeinschaft hoerbehinderter und gehoerloser Studenten und Absolventen e.V.; BHSA (German Association of Deaf Students and Graduates)
   - Landesarbeitsgemeinschaft der gehoerlosen Gebaerdensprachlehrer Bayerns; LAGS (Bavarian Association of Deaf Sign Language Teachers).

   There had been the intention to organize a working group of the partners for accompanying the whole project and giving advice, so the final decision on the project participation of interested parties was postponed until the first session of this working group. This meeting took place in Munich on March 4, 2000 (in the rooms of the SIGMETA company). They came to the following decision: As Euronet had withdrawn their application because of personnel changes, the BHSA was accepted in their stead. The two Scottish partners were combined into one; the LAGS was accepted as another partner as well.

9. Compilations on hearing-aids can be found in the brochure "Solutions" by the Royal National Institute for Deaf People (Issue 6, October 1999) or in "The BT guide for disabled people" by British Telecom (Issue 1999/2000;
   http://www.bt.com/world/community).

10. In some chatrooms, it is said to be possible to chat with each other not only in writing, but also to talk with each other. Yahoo! and Excite will equip their chatrooms with voice transmission. "Voice Chat" will enable the users to have live conversations in the Internet (cf. www.hearme.com).

11. Besides the usual mobile devices, there is the mobile watch (Motorola's "Wristphone"; the mobile phone is integrated into a wristwatch; the user gives input via voice recognition and talks into a headset) and the mobile eyeglasses (sender and receiver are hidden in the bow; no brand given).

12. The following quotation from the advertisement for the Webpad "Pronto" by Stichting Scan should be checked by possible users on whether they really want to forego the advantages of a computer (which are not mentioned there) in exchange for easier manipulation:

    > The Pronto Webpad delivers the full, rich experience of Internet Web browsing and electronic communication with none of the technical or convenience problems of personal computers.

13. The speaker's voice undergoes an acoustic analysis in order to identify the phonemes which will then appear on the screen in a phonetic transcription: e.g. if the speaker says "Qu'est-ce qu'y a?", "kèskiya" will appear on the screen.

14. As an illustration of the diversity of software, at www.e-media.at one can find 3.000 programs (office software, chat or multimedia applications and games). These are either freeware, i.e. the programs can

be downloaded for free, or shareware. Shareware may be tested for free; if one wants to continue using the software, one has to pay a small sum.

15. Call centers also offer services which are especially interesting to people with speech impairments, e.g. “Speech to Speech Relay” (e.g. in Australia, cf. www.aceinfo.net.au): These services allow the conversation partners to use their own voices or a “voice output device” to communicate directly with the person they called. The partner with the speech impairment can hear the other one directly and answer via textphone over the relay center. On request, the operator can repeat parts or even the whole conversation.

16. The recommendation to use XHTML as the future standard of internet is sometimes interpreted as a movement against the 'simpler' WAP.

17. We have only got information from Great Britain; therefore we cannot judge the average offer of information in the EU-countries. For Great Britain, one has to emphasize that some of the institutions and initiatives there (besides those mentioned in the text like the Deaf Broadcasting Council, the Telecommunications Action Group with their information brochure “sequel” for the deaf or the UK Council on Deafness) spread information on deafness and communication aids for the deaf.

18. As for emergency calls in Austria, there are no direct connections to emergency numbers with textphones (similar to those used for sick and old people, where one is connected to the red-cross center via a simple press of a button). On the Austrian teletext (page 770), there is a list of all institutions which are equipped with textphones (e.g. the Viennese Red Cross).

19. An example for this could be INCOBS (computer aids for the blind and the visually impaired; http://www.dias.de/incobs/index.html) or http://www.rehadat.de (a database on special needs and rehabilitation).