Paper

A way of integrating deaf, hearing- and speech-impaired people into modern communication society

Marlene Hilzensauer

Abstract— This article deals with the exclusion of deaf, hearing- and speech-impaired people from our modern communication society, as they are unable to use the phone. This situation leads to discrimination and disadvantages in their everyday lives. One solution to this problem is the implementation of so-called relay centers which act as go-betweens; with the aid of communications assistants and interpreters, a direct conversation with a hearing person becomes possible. The Center for Sign Language and Deaf Communication has developed a concept of such a relay center for Austria. The main innovations are the integrative technological approach (trying to integrate all possible communication devices) and the embedding into an Internet portal, including additional services for the target groups. An overview of the activities carried out during the 6-month preparatory project is given, and the results are described.

Keywords— telecommunications, communication society, integration, inclusion, deaf, hearing-impaired, speech-impaired.

1. Introduction

In our modern communication society, most people prefer to use the phone for long-distance communication. Whether at work or at home, if you have a question, if you need some information, want to order some product or just simply chat with someone else, you will usually reach for your phone – even more so with the introduction of the mobile phone which allows people to be available around the clock.

However, probably because this way of communication is such an integral part of our lives, we hearing tend to forget that there exist several groups of people who are unable to communicate via the phone: the deaf and the severely hearing-impaired because of their acoustic inability, the speech-impaired because they have trouble with their articulation. They can either manage only with difficulty and frequent misunderstandings, or they are even barred completely from using the phone. The latter group is forced to depend on friends, relatives and colleagues to make their phone calls for them. In Austria, for example, this concerns more than 100 000 people.

There are negative consequences not only for their private lives, but especially for their professional lives. Companies are wary of hiring employees who cannot make phone calls, e.g., to customers and suppliers, so members of the target groups may be turned down by prospective employers; with deaf people, there is an added fear of difficult face-to-face communication.

As access to telecommunications may be regarded as a civil right, some countries have taken measures to fight this discrimination: one possible solution is the implementation of relay centers.

2. How a relay center works

2.1. Basic functions: text and video

If deaf, hearing- or speech-impaired people are unable to use the phone without assistance, a relay center is needed as a go-between. Basically, there are two types of relay center: text-based or video-based.

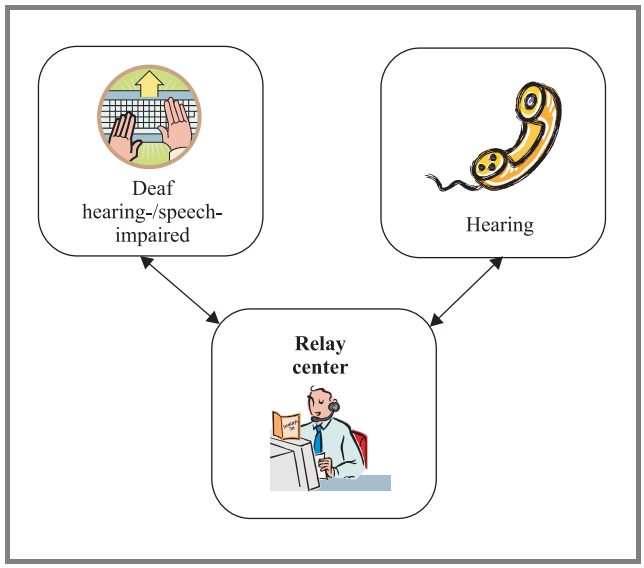

Fig. 1. How a text relay service operates.

Let us assume that a deaf person wants to contact a hearing colleague: first, s/he has to establish communications with the relay center. If s/he is using text, s/he will probably either do this via a computer or a textphone[1]. The communications assistant in the relay center will then phone the respective hearing person and read to them what the deaf person has written. The spoken answer is written down and sent back to the deaf person (Fig. 1). Naturally, the com-

[1]A text telephone (TTY) – also called telecommunications device for the deaf (TDD) – is a special phone for deaf people, where text is transmitted via the normal phone network. Two people using textphones can communicate in real-time, as every character that is typed shows up instantly on the other person's display. Nowadays, no special device is needed as modern computers can emulate a textphone. For more information about TTYs [1, 2].

munications assistants must be well-trained (for example, they are required to type at least 60 words/minute in the USA) and they are obliged to keep every conversation totally confidential (offenders are immediately fired). This kind of relay center is called text relay service (TRS).
With video, the same principle applies, but the user sits in front of a camera, e.g., a web cam or a videophone (Fig. 2).

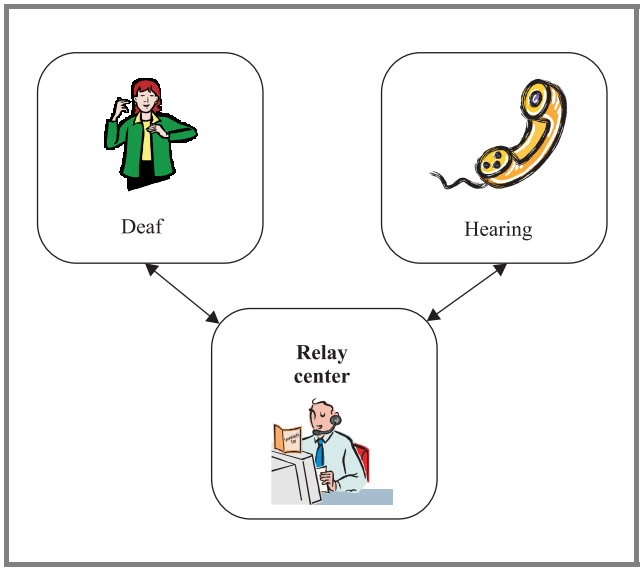

Fig. 2. How a video relay service operates.

This is especially interesting for deaf people, as with modern broadband technology, they can use their native language, a sign language. The deaf person signs their part of the conversation which is translated by an interpreter in the relay center. Again, the interpreter makes a phone call to the hearing party the deaf person wants to talk to, listens to the answer and signs it back to the deaf person. The term for sign language video communication is video relay service (VRS).

2.2. Special functions

Voice carry over (VCO). Some people with a hearing-impairment – especially those who are late-deafened and normally do not sign – may prefer to speak themselves instead of typing their part of the conversation. In this case, they will only receive the answer from their hearing conversation partner in written form.

Hearing carry over (HCO). This feature will probably be used mostly by speech-impaired people. While they cannot speak intelligibly, and therefore have to resort to writing, they can listen to the spoken answer themselves without any problem.

The CapTel phone. Basically, this is a variation on HCO. An American company developed a special captioned telephone[2] for hearing-impaired users, which features an in-built display. It can be used as a normal phone or – if the user so chooses – in connection with a text relay service. The target group are the hard-of-hearing. Many of them can make phone calls themselves, but with varying success, depending on factors like environmental noise or whether they know the person they are listening to. With CapTel, if the text relay feature is activated, everything the hearing person says is repeated by a communications assistant and typed by speech recognition software (the communications assistant is necessary because speech recognition software works much better if it has been specially trained to recognize a certain person's voice, thus making fewer mistakes). In this way, the user can check with the written version if s/he does not understand well or if anything is unclear.

Speech-to-speech. This is another feature for speech-impaired users which is offered by some relay centers, e.g., in the USA. A specially trained communications assistant listens to what the user articulates and repeats everything s/he says to the conversation partner at the other end of the line.

Remote interpreting. Also known as distance interpreting, this is a special, expanded version of video relay for deaf people. Alternative terms are video relay interpreting (VRI) or videophone interpreting (VPI). Although a physical interpreter is always preferable, sometimes this is impossible (one of the main reasons is the shortage of qualified sign language interpreters in many countries). An alternative is to use the interpreter in the relay center: this works similar to video relay, but the deaf and hearing conversation partners are sitting in front of the camera together, while the interpreter translates what is said/signed via video connection (Fig. 3).

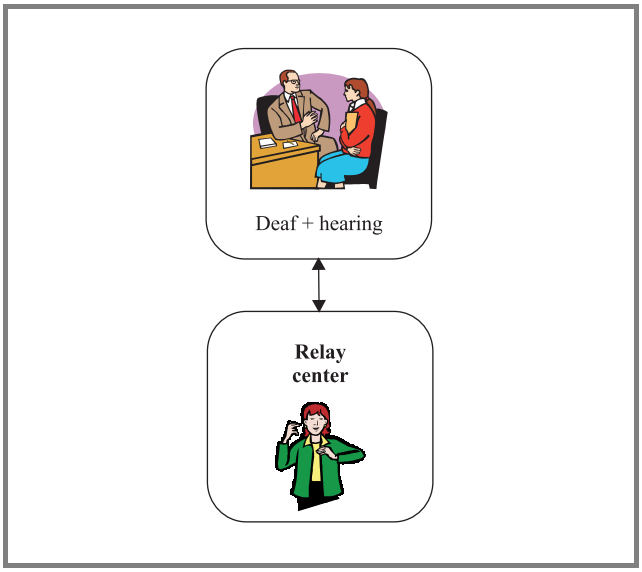

Fig. 3. Remote interpreting.

Communication Service for the Deaf (CSD) provides such a service called online interpreting[3] and calls it a *quick way to get a qualified interpreter in place for an effective*

[2]Cf. http://www.captionedtelephone.com/index.phtml

[3]Cf. http://www.csdinterpretingonline.com/index.html. On this homepage, you can also find a demo video of remote interpreting.

communication with a deaf or hard-of-hearing individual who may require use of sign language [3].

Remote interpreting may not be suitable for every interpreting situation; for instance, in court or at the doctor's, an interpreter should be present, because any misunderstanding could lead to grave consequences. Basically, remote interpreting is ideal for brief conversations where booking an interpreter would be both impractical and too expensive. The German video relay service "Telesign" names inquiries, appointments, brief meetings and instructions as ideal for remote interpreting, but warns of using this service for longer meetings where several persons are present, e.g., psychically difficult conversations or company meetings [4].

An overview of which situations are regarded as difficult by an experienced interpreter is listed in [5]:

1. *Meetings/dialogues with more than 4 persons present in the room, if the videophone is without an extra microphone or other equipment upgrading the sound.*
2. *VPI from a location with a lot of back ground noise.*
3. *If the users of the videophone have to be mobile, more around in the area, stand up, sit down, etc.*
4. *From classrooms or courses where the blackboard or AV-equipment is used.*
5. *Outdoors.*
6. *When the situation [requires] that the sign language interpreter can see all the participants or for other reasons where the sign language interpreter needs to get the visual information at the spot.*

For the interpreters themselves, video relay and remote interpreting demand high standards of them: not only do they have to adapt to a multitude of different interpreting situations from one call to the next, but there are even some changes in the sign language used for interpreting, to mirror the special situation: for instance, Danish interpreters have altered the sign for "I" by no longer pointing to themselves but rather to the microphone of their headset, thus emphasizing that the hearing conversation partner has said something [6].

3. Advantages of a relay service

To people who can use the phone themselves without a second thought, relay services may seem a slow and awkward way of communicating. What is important, though, is that it makes direct communication possible. One need not wait for a person's answer, but can interrupt them, ask a question or clarify at once everything that one may not have understood.

While this system is certainly not perfect, relay services nevertheless help the target groups to regain their independence with regard to telecommunications, and allow for a better inclusion into society, while at the same time improving their job chances. This is especially true of video relay for deaf people.

When talking with hearing people, the question if relay centers are really necessary keeps coming up. Usually, written communication in the form of SMS, e-mail, fax, etc., is regarded as an easily accessible and much cheaper alternative for relay services. These forms of electronic communication are an important part of our lives, but they are no substitute for a relay service. First of all, you need the respective number or address, which may not always be available. Then there is the problem of confidentiality: with a fax, for example, you never know who might have read it besides the recipient. There is also no proof that it has reached the intended person – SMS and e-mails have been known to arrive days later or even not at all. Sometimes, such a breakdown in communication can have serious consequences: take, for instance, deaf parents who want to contact a doctor because their child is sick. They send a fax to the doctor's office and wait patiently for an answer, while the doctor is on holiday – simply because they cannot listen to the respective tape message. With SMS, there is also the size limit of 160 characters, which makes a longer communication rather difficult.

Another problem is the hearing communication partner – imagine, for example, discussing some question about your income tax with the tax office via SMS. Probably the hearing party will answer once or twice, but will not write back ten times or more. Even if they do, the information will usually be condensed or not complete, because people do not want to write so much.

The need for sign language. For the deaf, there is still another barrier: most hearing people are not aware of deaf people's difficulties with written language. According to their way of thinking, when somebody cannot hear, they can always read the same information; and if they cannot speak, they can still write their message down. However, mostly due to education methods which are not tailored to their unique needs, many of the deaf have trouble understanding longer or more complex texts. In writing, they make a lot of mistakes, and because they know this, they do not like to write to hearing people. What the hearing forget, is that any written language is usually a second language for the deaf. Therefore, the possibility of using their own language, i.e., a sign language, comes as a relief to them.

A second reason for video relay is the ease of communication. Signing is much faster than writing, especially if the user in question does not type very well.

The advantages of video communication are not limited to deaf people, however. Hard-of-hearing people may profit from lip-reading, while showing some object or watching the other person's emotional reaction is possible for all people.

Advantages of remote interpreting. Although there are some drawbacks – for example, the quality of the video connection may be less than perfect – remote interpreting is ideal for rural or remote settings (e.g., in Norway or

Australia, where the next interpreter is far away), and spontaneous questions or conversations. Booking an interpreter for an on-the-spot meeting is an impossibility (especially if there are only a few interpreters available, you need to book them far in advance), and often the expense is too high for such a short duration. On the interpreters' side, a lot of time is saved because they do not have to drive to a certain location – this takes often longer than the whole interpreting session. During the same period of time, they can deal with multiple requests.

A special application is the use of video mobile phones: although the video quality tends to be worse than with some stationary device, the mobility is a bonus. As the Swedish company Netwise shows in one of their demo videos, you practically have an interpreter in your pocket[4]. In this video, a deaf lady was able to make her own appointment at the dentist's and to communicate all her wishes by simply putting her mobile on the receptionist's desk and signing into it, while the receptionist listened to the interpreter's voice.

In Australia, it is regarded as discrimination, if deaf people are denied access to an interpreter; one way of guaranteeing this is the use of remote interpreting:

Failing to provide a Deaf person with access to an interpreter is unacceptable in the era of Disability Discrimination legislation. Such legislation underlines obligations regarding the provision of communication access for all people. Employers, colleagues and others who work with Deaf people must not accept that inadequate numbers of interpreters can dictate access to communication for and with a Deaf person. Alternative methods of providing communications access must be found. VRI is one possible option to help improve access. With careful planning, marketing, close work with interpreters and consumers, VRI could become an invaluable service, if not a "life-line" for many people [7].

4. The preparatory project for an Austrian relay center

The idea of implementing an Austrian relay center dates back to a workshop hosted by the Center for Sign Language and Deaf Communication (Zentrum für Gebärdensprache und Hörbehindertenkommunikation, ZGH) in 2000. During the workshop which dealt with preparing a European deaf network for information and communication (for a final report [8]), some of the participants related their experiences with relay centers in other countries, e.g., in Sweden and Switzerland. Encouraged by their example, the Center for Sign Language and Deaf Communication decided to found a similar business in Austria. In the fall of 2003, we started searching for the necessary funding; finally, the Carinthian branch of the Social Welfare Office agreed to fund a three-month preparatory project, starting with August 2004 (this project was later extended for another three months because of the scope of the project and the work involved). Further assistance came from the university initiative "Build!", which helps graduates to found their own businesses and provides information and support. The main objectives of the preparatory project were the following:

- First, we were to collect as much information as possible on existing relay services worldwide and find out about "best practice".
- Second, we wanted to have a look at possible technical solutions.
- Third, we had to provide information to the Austrian deaf community and to the interpreters, and to initiate talks with the government.
- Fourth, we were to look at the legal situation in Austria, whether some law could provide a basis for a relay center.
- Fifth, we had to identify possible partners (both for the technical/strategic and the operative/contents side of the project).
- Sixth, we had to develop a concept for a relay center for Austria.

4.1. International relay centers

As for the European countries, the contacts that had been established during the workshop in 2000 proved very useful. Both Switzerland and Sweden did not only offer a wealth of information, but also invited the project team to their respective countries to have a look at their centers (a text relay in Switzerland, a text relay and a video relay in Sweden) and their technical solutions. With the USA, an Internet search led to lots of e-mail contacts and finally to personal meetings with representatives of US-based relay services (Sprint/CSD[5], Hamilton Relay[6], and Hands On Video Relay Service[7]). The head of the Center for Sign Language and Deaf Communication had the chance to visit a relay center run by Sprint/CSD in the USA. We tried to get a clear picture of the organization and to evaluate the procedures used in the relay centers whether they could be included in or adapted for the Austrian concept.

The Internet provided even more information on international relay centers, from diverse countries like Australia, New Zealand, Spain, etc. Very useful were reports about experiences with existing services, e.g., [9, 10], as well as publications like [11] to get an overview of what can be done.

[4]Netwise (formerly Envilogg) provides, e.g., multimedia technology which can be used for relay centers. Cf. http://www.netwisecorp.com/default.aspx?id=3

[5]Cf. http://www.sprint.com

[6]Cf. http://www.hamiltonrelay.net/

[7]Cf. http://secure.hovrs.com/VRS_SSL/hovrs.aspx

We also sent out a questionnaire to all the relay services that could be found; although some of the information we asked about was regarded as confidential, we did receive answers which proved very informative and were included in an overview table.
All the information has been compiled in a final report for the preparatory project [12].

4.2. Technical solutions

We soon realized that Austria's delay in implementing a relay center also had some advantages: in other countries, text and video relay were usually provided by separate centers. Text relay had come first, and when video finally appeared, often new companies took over and offered this service. Another problem was that even when new technology was used, there had to be some provision for users who still had the old equipment; for instance, outdated brands of videophones had to be included, if these users were not to be left behind.
Based on all the information we had gathered, we wanted a single product which would include video, text and speech. Those features could be used in any combination, so that the users were free to choose whatever suited their individual needs best. With text, it was important that every character was transmitted as soon as it was typed, similar to a textphone (not as it is usually done when chatting to someone, where you have to wait until they have typed a whole sentence or even paragraph).
Looking at the various technical solutions which were used, the software differed a lot, also with regard to costs and maintenance. In the course of the project, we made a first selection, based on our experience with best practice and what was needed for our Relay Center Austria. The field was narrowed down to six possible choices. These were to be tested during a field trial, together with the target groups and the sign language interpreters.
As the funding for the trial period took longer than we had expected, some of the companies in question generously let us try out their products in a small field test carried out by the Center for Sign Language and Deaf Communication. Special emphasis was given to qualities like easy installation and user-friendly handling, costs for the users, and reliability. Another factor was the geographical location of the companies involved – the closer to Austria, the better; also, with German-speaking companies, manuals and other materials did not need to be translated.
As all of the solutions had advantages and disadvantages (for a discussion of the products involved and our test results [12]), we decided to take an existing software and add some modifications to fulfill all our needs. If possible, it should be computer-based and web-based. The latter is important, because end users should need only a minimal installation, ideally none at all. The software will be integrated into an Internet portal, which provides additional services (cf., Subsection 4.6).
It is important, that the communications assistants or interpreters can take calls from different devices at a single workstation – although it might be possible to make do with a computer plus textphone, fax, etc., this would only serve to complicate an already demanding work.
As for contacting the relay center, the majority of the users will probably use some kind of computer. However, as we do not want to exclude anyone, the users should be able to use any device, even older ones like videophones, textphones, etc. Of course, computer-based solutions will be implemented first; older or rarer devices will be added later on, probably in separate smaller projects, in the order of their priority. An alternative for older people who do not want to use a computer could be access via a videophone which is connected to the TV-set.
What is important is that people can contact the relay center not only from a stationary device, but also from a mobile one (e.g., a mobile phone).
The technical base of the relay service should also offer an automatic conversion of different text formats; for instance, changing a fax message into an e-mail (because the deaf often use devices like a textphone or fax which are not owned by all hearing people).
Additional functions are, e.g., changing the layout of the software according to personal preferences or needs (larger print for partially sighted people), the possibility to save text communications and maybe even video calls, some visual alert signaling incoming calls, and an inbuilt answering machine.
Provision must also be made for users who need special devices, ranging from, e.g., deafblind users with a Braille keyboard to the hard-of-hearing who use induction loops.

4.3. Information of the target groups and negotiations with the government

The Center for Sign Language and Deaf Communication had naturally had contacts to the deaf community before, but they were intensified for this project. The project team traveled all over Austria to present the concept of the Relay Center Austria to the deaf and hard-of-hearing; information was also included in deaf newsletters and sent to the local deaf associations in the form of sign language videos. The Austrian Deaf Association (Österreichischer Gehörlosenbund, ÖGLB) which had demanded a relay center for years, helped to disseminate the information as well. Some of the deaf in Klagenfurt and Vienna also had the chance to test some of the technical solutions. The deaf's feedback on the concept of the Relay Center Austria as well as the technology was very important for us. The same holds for the sign language interpreters, who were informed of our plans and asked for their cooperation as well as for some input on working conditions for video interpreting (both relay and remote interpreting).
As for the government, we presented the project to local politicians (e.g., the Landeshauptmann, the head of the province of Carinthia) and to the Austrian government (mostly, the Federal Ministry of Social Security, Generations and Consumer Protection and the Federal Ministry of

Transport, Innovation and Technology). One of the problems is that in Austria, responsibility for people with special needs is split between several authorities: only vocational matters are dealt with by the Social Welfare Office. As we did not want to offer a relay service only for vocational issues, some cooperation between the different authorities is necessary. Because it is a technological project, the Ministry of Transport, Innovation and Technology is involved as well.

In February 2005, at the end of the preparatory project, a presentation was held at the University of Klagenfurt. All the Austrian deaf and the hard-of-hearing, as well as local and national politicians, were invited. After the modus operandi of a relay center as well as our ideas for an Austrian version had been described, video connections to the neighboring province of Styria, to Switzerland and to a relay service in the USA were established to demonstrate different technical solutions. Thus, the audience could get an impression of the video quality and see a relay service in action.

4.4. The legal situation

Internationally, relay services are usually funded on some legal basis, because the expenses are too high to be negotiated anew every few years (relay centers that were run on a project basis normally were discontinued when the project ended). An overview of international funding – both in Europe and the USA – can be found in [11, 13, 14]; the situation in the Scandinavian countries is described in [15].

Most countries choose one of two alternatives. The law in question is either a disability or antidiscrimination law – e.g., the Americans with Disabilities Act (ADA) in the USA – or the right to equal access to telecommunications, e.g., in Switzerland or in Germany. Because we had been made aware by the Swiss of similarities between the Swiss and the Austrian telecommunications laws, we engaged the Vienna University of Economics and Business Administration to examine the application of the Universal Service Directive and the Austrian telecommunications law. They produced a preliminary expertise [16] which supported our view to some degree, but was not conclusive.

In Germany, the new telecommunications law resulted in a voluntary commitment of the Deutsche Telekom to fund a three-year project for the implementation of a German relay center. We tried to come to a similar agreement with the Austrian telecommunications providers (as a lawsuit may last for years, with an uncertain outcome, a voluntary agreement would be much preferable); for this, we contacted the Austrian Regulatory Authority for Broadcasting and Telecommunications. They arranged several meetings with representatives of the different providers. Although we received some important information on broadcasting and connections, funding will probably only be provided if they are forced to do so by the law. This problem of assigning responsibility – as there are many competitors, no longer a state monopoly – has also been remarked on by the Nordic Forum for Telecommunication and Disability:

The liberalisation of the field of terminals and services has resulted in a difficulty of assigning any responsibility. The number of suppliers has been multiplied and the market is therefore likewise opaque. It has become easier for the suppliers to "hide in the crowd" with the result that the responsibility which formerly could be placed unambiguously through the political control with the monopolies today is lifted in reference to the free competition. The social responsibility, which the former companies with monopoly had because of their status of public service institutions, has more or less disappeared.

The consequence is that today it is far more difficult to assign the responsibility for the accessibility of new terminals and services for persons with disabilities. In a market of competition it is obviously difficult to get anybody to assume the responsibility of a non-profit field as aids for disabled [persons] or those services, which users with special needs require [17].

It may be helpful, however, that the Austrian government has decided to recognize Austrian sign language as a minority language on July 6, 2005. However, this amendment to the Austrian constitution states that the details are left to the individual laws. Therefore, any services which are not explicitly stated will have to be negotiated with the government. If the result remains unsatisfactory, a special organization, the Klagsverband, can take action. Mediation is obligatory; if this fails, the case can be taken to court.

4.5. National and international partners

Talks were initiated with companies which sell and/or develop multimedia software either for relay centers or for video conferencing. Some of these products were aimed at deaf and hard-of-hearing users, while others were mainstream solutions (mainly for intra-company communication); the former were preferred, because although the companies were much smaller, they were aware of the special needs of hearing-impaired people and had taken them into consideration. For example, a high-quality video is necessary for a sign language conversation[8], and the whole upper body of the communication partner must be visible, not just the face. We also discussed with existing relay services whether they were interested in building up a relay center in Austria, and if so, on which terms. Private telecommunications providers and the former state monopoly, the Telekom Austria, were asked about a possible cooperation.

As for the contents, we used our contacts throughout Austria to find possible partners: from the sign language interpreters' training at the University of Graz to special hospital

[8]According to the Nordic Forum for Telecommunication and Disability, video communication suitable for sign language needs at least 20–25 frames/second and a minimum resolution of 352×288 pixels (corresponding to the common intermediate format, CIF). The delay must not be more than 0,8 seconds, ideally less than 0,2 seconds, to make lip-reading possible [18].

departments for deaf people, we presented the concept of a relay center to institutions dedicated to the education, rehabilitation and/or well-being of deaf, hearing- and speech-impaired people. Other departments of our own university were interested in participating as well, e.g., the informatics department.
An international cooperation would be possible especially with other German-speaking countries, i.e., Switzerland and Germany (for instance, while the sign languages differ, text relay could be shared during the slower night hours). First talks have already taken place. Further cooperation with the neighboring countries of Northern Italy and Slovenia (the Alpen-Adria regions) are conceivable as well.

4.6. The concept of the Relay Center Austria

Based on what we learned and what experienced relay centers shared with us, we developed an integrative concept for the Relay Center Austria. What started out as a simple relay service, soon turned into a comprehensive service center for the target groups. This decision was motivated by two main factors. First of all, it was almost impossible to predict how many interpreters would be needed in the beginning – depending on the target groups' acceptance of the relay service, it was possible either to end up with interpreters twiddling their thumbs or being seriously overworked. In order to avoid this, we adapted a Swiss idea, where the communications assistants write the teletext for the deaf during the night hours, when there are fewer calls. Second, during our presentations we encountered many projects (e.g., SignTime, a Vienna-based project for sign language news for the deaf), where work had to be stopped because of a lack of funding. The Relay Center Austria, with its resources of multimedia technology and interpreters, could serve as a kind of umbrella organization and cooperation partner for such efforts. It might also be easier for the authorities to deal with a single service center.

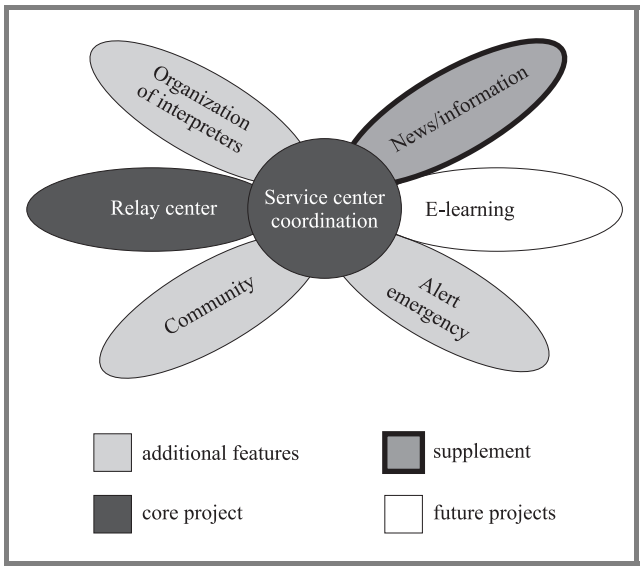

Fig. 4. Concept of a service center.

The relay center itself should be embedded in an Internet portal which offers other services as well. We developed six basic services of varying urgency; some of them are aimed at all the target groups, some only at the deaf (Fig. 4).
In accordance with a first feedback by the deaf associations, the relay service will be implemented first, followed by the other services. The order in which they will be implemented as well as the details will be developed in close cooperation with the target groups.

4.6.1. Relay service

This core service will consist of text and video relay in one, as we will use a product combining video, text and speech. Text will mainly be used by people who do not know sign language, but it may also be used to spell out a name or a difficult word or as a possibility to fall back on when the connection deteriorates. The user can freely choose which of these communication channels s/he wants to activate, based on their equipment or their personal preferences.

4.6.2. News and information in Austrian sign language

Barrier-free access to information is one of the most important issues today. Therefore the website of the relay center should offer news and information for deaf people, ideally in the form of sign language videos (with subtitles or additional text for non-sign language users). There could be a cooperation with institutions which already have this service, e.g., the Austrian Deaf Association[9] and a website with online information for people with special needs, BIZEPS[10]. There have also been talks with the Swiss "sign TV" Focus-5, which is run by deaf people[11].
An additional service could concern too difficult texts: Deaf people could send them to the relay center and get them back either in an easy-to-read version or signed by an interpreter.

4.6.3. Alert/emergency

As most alerts are in acoustic form only (e.g., fire alerts, civil-defense alerts, traffic news), some alternative has to be found for deaf people. One of the possibilities is an SMS alert, although this is not ideal because of the inherent drawbacks of SMS messages (no absolute reliability, character limit, speed, no direct contact, etc.). Again, the details have to be discussed with the target group.
Another problem concerns deaf or hearing-impaired people who need to contact an emergency number. There is, for example, a respective project in Sweden. The (partly negative) experiences are summed up in [19]. In some countries (e.g., Australia or the USA), text relay can be used to re-

[9]Cf. http://www.oeglb.at/
[10]Cf. http://bizeps.or.at/oegs.php
[11]Cf. http://www.focus-5.tv/

port an emergency[12]. Although video relay seems to be the perfect solution for sign language users, extensive tests are necessary to determine its applicability.

4.6.4. E-learning

The website should include an e-learning platform with courses aimed at both deaf/hard-of-hearing and hearing people. For the hearing-impaired, there will be courses with sign language as language of instruction, e.g., German, English and various computer courses (for instance, the European computer driving license/ECDL). The hearing should get the possibility to learn some sign language online, via courses and the database that is being built up by the Center for Sign Language and Deaf Communication[13].

4.6.5. Organization of interpreters

In Austria, few sign language interpreters work full-time. Therefore, it is often difficult to get one, especially if you do not book them some weeks in advance. In most of the Austrian provinces, there is no central organization, either; you have to call each interpreter individually, until you find one who is able and willing to take on the job. The relay center could help by keeping track of when each interpreter is busy. When an interpreter is needed, it would suffice to call the relay center and provide them with the details of the interpreting situation; the relay center would then do the rest and try to find a free interpreter (similar to Switzerland, where you simply fill in a form and send it to the Swiss relay center PROCOM[14]).

4.6.6. Community features

The website will also offer community features which should be managed by the target groups themselves. The details are to be discussed yet, but these features could include, e.g., a message board, chats, an electronic calendar of events, and user profiles (so that a search for other users with special hobbies or qualifications is possible).

5. Next steps

Due to modern communication and information technology, the relay center can consist of several locations in different provinces of Austria. This separation is also important for back-up purposes – if one location breaks down, the service can be switched over to another location. The administration will be centralized, however. The first location is to be in Carinthia, due to the involvement of the Center for Sign Language and Deaf Communication and the University of Klagenfurt.

[12]In the USA, the ADA requires all 9-1-1 centers to have a textphone, while in Australia, there is a special "106 Text Emergency Relay Service", cf. http://emergencycalls.aca.gov.au/ace.htm or http://www.aceinfo.net.au/Resources/Downloads/factsheets/pdf/015ers.pdf

[13]An online version used in the project "Sign-IT" can be found at: www.sign-it.at/ ("ÖGS-Lexikon").

[14]For the form, cf., http://www.procom-deaf.ch/procom/s/dolmetschdienst.asp

As for the next steps, first of all, the necessary funding has to be secured from the government. There has to be an extensive cooperation with the target groups and the sign language interpreters, and the details of the proposed services have to be agreed upon. The infrastructure will be installed, followed by a trial period with the chosen software and hardware. In the meantime, the public needs to be informed about the Relay Center Austria – the hearing must be forewarned about possible calls from the relay center, else they might think it to be some elaborate hoax.
During the first phase, relay services should only be available for two provinces, to test the technology as well as the procedures and to deal with any problems. As soon as this limited service functions satisfactorily, it will be expanded to the other provinces and finally to the whole of Austria.

6. Conclusion

For hearing people, spoken language is the preferred means of communication. Because they are the majority, this is not going to change in the near future. Therefore, those people who are excluded from spoken communication must be provided with an alternative: in the case of phone communication, with a relay center.
Such a relay service does not only guarantee more independence to the deaf, hearing- and speech-impaired and make it easier for them to contact hearing people, but it has the same effect in the opposite direction as well: hearing people can call deaf, hearing- or speech-impaired friends, relatives, etc., directly. No longer is there the problem of faxes, e-mails or SMS messages which remain unanswered (because they did not arrive, were discovered too late or have not been understood).
There are additional bonuses, as the president of the Swiss PROCOM remarks: not only are there fewer prejudices against deaf people, because there are no mistakes in a written text, but a call by a relay center also serves to make hearing people aware of the problems the deaf face regularly in their everyday lives [20].
The integrative concept of the Relay Center Austria – not only a relay center, but a service and competence center for deaf, hearing- and speech-impaired people – makes sense both from an organizational and a business perspective. Furthermore, it allows for a better inclusion of the target groups into the hearing society. Not only does it improve their access to information, by removing or at least lessening the existing deficits like acoustic alarms or a lack of written language competence, but it also allows for e-learning – both with courses which are custom-made for the target groups and by expanding the number of sign language competent hearing people.
In order to achieve this, the following points need to be emphasized:

- No separation between vocational and private inclusion.
- A holistic view of the project (no isolated solutions).
- Integration of existing measures and initiatives.

- Use of modern communication devices (without excluding older devices, true to the philosophy of universal access).
- Setting up of a competence center for the target groups.
- Support for any initiative coming from the target groups.
- Support for (higher and secondary) education of the target groups.
- Barrier-free access to important information.

The final aim is a business which is familiar with the special needs of the target groups.

References

[1] Nordic Forum for Telecommunication and Disability, "Nordic guide to text telephony", NFTH 2/2002, 2002, http://www.nsh.se/NFTH-Text_Telephony.pdf

[2] C. R. Steinhäußer, "Technische Hilfsmittel zur besseren Integration von Gehörlosen", Diplomarbeit Technische Universität Graz, 2000, http://www.taubenschlag.de/lernen/wissenschaft/steinhaeusser/technische_hilfsmittel.pdf

[3] "CSD interpreting online", http://www.csdinterpretingonline.com/index.html#

[4] F. Heinrichs, "Technische Vermittlungsdienste für Hörgeschädigte in Deutschland", Magisterarbeit Universität München, 2004, http://www.taubenschlag.de/lernen/wissenschaft/heinrichs/TechnVermDienst.pdf

[5] W. Andersen, "In which cases does videophone interpreting work good or not so well?", in *Report Nordic Conference for Video Phone Interpreters*, Castberggård, Denmark, 2003, Annex 2, pp. 10–13.

[6] R. Jacobsen and L. Green, "Videophone vs normal interpreting", in *Report Nordic Conference for Video Phone Interpreters*, Castberggård, Denmark, 2003, Annex 2, p. 18.

[7] R. Spencer, "Video relay interpreting trial final report", NRS DOC 030, Australian Communication Exchange, 2000, http://www.aceinfo.net.au/Resources/Downloads/VRI/2000/vri_trial.pdf

[8] Research Center for Sign Language and Communication of the Hearing-Impaired, University of Klagenfurt, Final document for the project "Preparing a European Deaf Network for Information and Communication", Klagenfurt, 2000, http://www.uni-klu.ac.at/zgh/eu_projekte/2000/

[9] Center for Døve, *Report Nordic Conference for Video Phone Interpreters*, Castberggård, Denmark, 2003.

[10] T. F. McCaul, "Video-based telecommunications technology and the deaf community. Research summary of the report", RC DOC 007, Commonwealth of Australia, Australian Communication Exchange, 1999, http://www.aceinfo.net.au/Resources/Downloads/VRI/1997/VRI_full.pdf

[11] P. Roe, "Comparative study of relay services 1991–2001", 2001, http://www.stakes.fi/cost219/Procroerelay3.doc

[12] M. Hilzensauer, F. Dotter, M. Maitz, M. Frühstück, A. Hopfgartner, J. Oberauer, and A.-M. Valentin, "Relay Center Austria: Bericht zur Projektvorbereitungsphase. Ein Projekt im Auftrag des Bundessozialamts", Klagenfurt, Zentrum für Gebärdensprache und Hörbehindertenkommunikation, 2005 (manuscript).

[13] "Equal measures: closing the accessibility gap", T. Shipley and J. Gill, Eds. 2005, http://www.tiresias.org/cost219ter/equal_measures/index.htm

[14] W. Jolley, "When the tide comes", in "Towards accessible telecommunications for people with disabilities in Australia: a discussion paper commissioned by the human rights and equal opportunities commission", 2003, http://www.hreoc.gov.au/disability_rights/communications/tide.htm

[15] Nordic Forum for Telecommunication and Handicap, "Regulation and financing of telecommunications services for disabled persons in the Nordic countries", NFTH 2/2004, 2004, http://www.nsh.se/NFTH-Regulation.pdf

[16] M. Holoubek and D. Damjanovic, "Gutachtliche Stellungnahme zur Frage der Finanzierung eines Telefonvermittlungsdienstes für Hör- und Sprachbehinderte im Rahmen des Universaldienstes gemäß §§ 26 ff TKG 2003", BGBl I 2003/70, 2004 (manuscript).

[17] Nordic Forum for Telecommunication and Disability, NFTH policy document. "Analysis of and strategy for NFTH's future work. Accessibility to the information society for disabled and elderly people", NFTH 1/2002, 2002, http://www.nsh.se/NFTH-Policy_document.pdf

[18] Nordic Forum for Telecommunication and Disability, "Nordic guide to video telephony and video relay service – for persons with impairments", NFTH 3/2002, 2002, http://www.nsh.se/NFTH-Video_Telephony.pdf

[19] J. Åslund, "Report summary. Test of SMS – chat for emergency number 112". Stockholm, Netlight Consulting, 2003, http://www.netlight.se/reports/112-SMS_Chat_Summary.pdf

[20] B. Kleeb, "Die PROCOM-Telefonvermittlung in der Schweiz – und ein Vergleich mit Deutschland". Presentation at the "Kulturtage der Gehörlosen" (Days of Deaf Culture), Munich, Germany, 2001, http://www.taubenschlag.de ("Wissenschaft" → "Referate").

Marlene Hilzensauer was born on November 9, 1967 in Klagenfurt, Austria. She studied Applied Linguistics and English at the University of Klagenfurt. After her Ph.D. graduation in 1994 she participated in several projects (English as a Second Language and Carinthian dialects). She joined the project "Austrian Sign Language" at the University of Klagenfurt in 1995 and has worked there ever since. The project developed into a subdepartment of the Department for Linguistics in 1996 ("Research Center for Sign Language and Communication of the Hearing-Impaired") and a Special University Department in 2004 ("Center for Sign Language and Deaf Communication"). Her main fields of work are preparing multimedia courses/CD-ROMs and teaching materials for deaf (e.g., for German, English) and hearing people (for Austrian Sign Language) as well as the realization of a relay center for deaf, hearing- and speech-impaired people.

e-mail: marlene.hilzensauer@uni-klu.ac.at
Center for Sign Language and Deaf Communication
University of Klagenfurt
Universitätsstraße 65-67
9020 Klagenfurt, Austria