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REACH112

REsponding to All Citizens Needing Help

Deliverable Report

D2.1: Current status and availability of Total Conversation systems, aspirations of users; Legal requirements and structures of emergency services in each Participant country.

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List of Abbreviations

AFR	Avon Fire and Rescue
ASP	Avon and Somerset Police
AXEGA	Agencia Galega de Emerxencias
BDA	British Deaf Association
BT	British Telecom (BT Group plc)
CHU	Grenoble University Hospital
COCOM	The Communications Committee (of the European Union)
DUST	Duplex Universal Speech and Text
EENA	European Emergency Number Association
EGEA	Expert Group on Emergency Access (of the European Union)
EISEC	Enhance Information Service for Emergency Calls
ETSI	European Telecommunications Standards Institute
GPS	Global Positioning System

HMI	Human Machine Interface
IETF	Internet Engineering Task Force
IM	Instant Messaging
ICT	Information and Communication Technology
KLPD	National Police Authority of the Netherlands – P8
MTT	Mobile Textphone
NENA	The National Emergency Number Association (USA)
NFTH	Nordic Forum for Telecommunications and Disability
Ofcom	The UK communications regulator
OTE	Hellenic Telecommunications Organisation SA
P2P	Peer to peer (person to person)
PATS	Publicly Available Telephone Service
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
PTS	Swedish National Post and Telecommunication Agency
RNID	The Royal National Institute for Deaf People – P5
RTT	Real Time Text
SAMU	Service d'Aide Médicale d'Urgence (France)
SBNDJ	Stichting Belangen Nederlandse Dove Jongeren
SIAT	Swedish Institute of Assistive Technology
SMS	Short Message Service
SNEN	Single Non Emergency Number
SOS	SOS Alarm (Sweden) – P20
TC	Total Communication (voice+text+video)
UNISDA	Union nationale pour l'insertion sociale des déficients auditifs
USO	Universal Service Obligation
VoIP	Voice over Internet Protocol

Pre-Amble

With the sustained growth of the European Union and ever-increasing mobility of people within the EU, it is vital that visitors from one state to another, as well as those living within a particular state, can access appropriate emergency services reliably and easily whenever they need them, and to have confidence that they will be able to do so. This deliverable reports on the effectiveness of present emergency services access provisions for people with communications disability, and indicates what needs to be done to improve the situation – both within the lifetime of the project and beyond.

Workpackage 2 provides the essential groundwork for later parts of the project from the perspective of stakeholders associated with emergency services provision and usage. The WP2 work programme involves assessment of individuals' past experiences of emergency services use in various partner countries, together with reviews of relevant published literature. This is followed by surveys of the emergency services themselves, and of existing relay services that can facilitate access to these emergency services for people with impaired communication abilities. Key learning points from these activities can be found in the Conclusion.

Executive Summary

By definition, people with disability are likely to find challenges in using products and services that their able-bodied peers may take for granted. In the specific case of telecommunications, it will be people with communication disabilities that can be expected to face the greatest barriers since those with, say, motor or visual disability should find themselves able to use the communication

channel effectively once they get to it. The REACH112 project therefore focuses on the issues for communication-disabled people in attempting to access emergency services.

The experiences of people with communication disability (hearing loss and/or speech production difficulty) who have called, or have attempted to call, emergency services in various countries represented within the project have been collected and analysed. This has yielded valuable information about current levels of accessibility of these vital services – principally fire, police and medical emergency – and has established a benchmark against which we can later measure any improvements in accessibility brought about through the establishment of the pilot projects. The variety of challenges that have been reported by these users not only strengthens the case further for equality of access, but also is already informing subsequent project activities. It has become clear that while robust and effective processes for getting emergency services help have evolved in most countries when contact is via traditional communications channels (typically voice telephony), access falls well short when using more recent technologies, especially Internet-based telephony – this despite the apparent obligation in (at least) some countries for accessibility through such routes.

As well as collecting user experiences, the level of accessibility of the emergency services themselves has been investigated in order to understand how well they presently respond to calls for assistance from people with communication impairment, and what plans they might already have in place to improve access in future, including across national boundaries, and through the use of newer technologies. Specific issues such as the need for solutions for getting reliable caller location information in the case of Internet-initiated calls have been highlighted.

Finally, we have examined relay services which, where they exist, can provide essential mediation functions between users with communication impairment (who might need to use text or video-based communication technologies) and the traditionally equipped emergency services. This has enabled the project to understand the value added to communication by such services and identify gaps in provision that still exist.

Taken together, these three 'user perspective' investigations have provided a good indication of current emergency services access provision for people with communication disability, and while we have been able to investigate the situation in detail only for those countries directly represented within the project, we have no reason to suppose that the challenges will be any less for other countries within the EU.

1 Introduction

The provision of emergency services is rightly seen as essential in modern society – it can literally be a matter of life or death – even if use by the average citizen is hopefully infrequent. In most countries, robust practices have evolved over long periods of time to enable access to appropriately equipped services in the event of fire or rescue need, medical emergency or the presence of police being required. In countries with relevant topography, this list may be extended to include access to 'coastguard' type services and/or mountain rescue. In order to provide effective equality of access, these services need to be easily reachable by the greatest possible number of people within society. The REACH112 project has been established to address significant gaps in access to emergency services for people with communication disability, by proposing and/or developing effective solutions.

A very substantial number of people across Europe can be classed as facing significant communication barriers when assessed against the need to access emergency services through voice communication (voice telephony) alone – wherever and whenever that might arise. Of these, the greatest proportion will be those with hearing loss, actually one of the most common chronic disabilities in people over the age of 65. And the number of people affected is gradually increasing, as European populations age, and people live longer. Although no overall statistic exists to

describe this communication-disabled group, in the UK alone it is estimated that over 450,000[1] adults have a level of hearing loss considered too great to permit reliance on a standard voice telephone, even with significant additional amplification – and it seems highly likely that the statistics will be similar throughout the EU.

Since hearing loss is so common, it effectively acts as an exemplar in this project for communication disability as a whole. And also because it is common, it not only effects those who have hearing loss themselves, but also (indirectly) the person's family or friends, and those who otherwise need to communicate with that person. In general, incidence of hearing loss is highly correlated with age, such that about half of all people over the age of retirement experience a noticeable loss of hearing.

Clinically, a person's hearing (level) is measured in decibels as a function of loss against a standard internationally agreed level that represents the hearing of a typical young adult. And a hearing level of greater than 20 decibels is commonly taken as the onset of clinically significant hearing loss – albeit very mild at this level, and comparable to the experience someone might have during a heavy cold.

Access to voice telephony is a defining issue with regard to the practical impact of hearing loss; it divides people into those who can still make effective use of a voice telephone, and those who, even with appropriate amplification, are unable to communicate in this way. Experience has shown that this division equates to a hearing loss of around 80 decibels or so across the speech frequency range. It should be noted, however, that because sensitivity to sound is not linear but amplitude dependent in the most common type of hearing loss (sensorineural), a loss of 80 decibels is typically offset by an amplification of approximately 40 decibels. Such a level of gain can easily be provided by modern hearing aids, and even by some models of amplified telephone. Note, however, that the concomitant loss of frequency and temporal resolution is generally a greater arbiter of potential voice telephone use rather than the more commonly considered lack of sound intensity.

Approximately 10% of people with hearing loss sufficient to warrant amplification (such as a personal hearing aid) find they are unable to use a voice telephone effectively, and, as stated above, this amounts to over 450,000 adults in the UK alone. Also of particular relevance to telephone use is the fact that approximately two thirds of people with significant hearing loss experience similar loss in both ears, while the remaining one third have a significant loss on one side only. The great majority of this smaller group therefore have the possibility of using the telephone on their 'good' side.

Around one in a thousand people are born with severe to profound deafness, or lose their hearing soon after birth from a variety of causes. These are the group of people most likely to communicate through sign language, although it is possible that the proportion of people doing so might diminish over time as a result of the increasing use of cochlear implantation. People who acquire an equivalent loss of hearing later in life almost always wish to continue using their voice and whatever hearing they have remaining when they communicate with others – whether face to face or remotely.

People who are deaf from birth or lose their hearing before spoken language has been properly acquired (typically around 5 years of age) are likely to face speech production challenges too. This is not because they are unable to speak in the physiological sense but because good speech is acquired largely through imitation of others and through auditory feedback of one's own speech. As a result, such people often prefer not to use their voice, even when attempting to communicate with a hearing person.

Many other people experience speech production difficulties through a variety of causes ranging from delayed development in childhood (either on its own or in association with other disability) to

[1] http://www.textrelay.org/about_us.php Accessed 02 December 2009

traumatic outcome from stroke (cerebral haemorrhage) or other brain injuries. In between are issues such as speech articulation and fluency problems (including stammering), and cognitive and motor impairments.

While sudden serious loss of hearing can occur, it is uncommon, and for the vast majority of people hearing loss can be considered as a gradual process. Sudden onset speech difficulties are, however, rather more likely to be encountered (as a result of stoke for example) and this needs to be borne in mind by service providers when considering emergency services' accessibility. Any temptation to 'pigeonhole' users should be avoided since a person could quite swiftly move from a state of being non-disabled to becoming communication disabled, without warning. Multi-modal communication channels, which are thoroughly reviewed in this report, can provide added robustness when routinely available but are insufficient alone. And, especially for people facing some form of 'language barrier' (for instance only being able to communicate through sign language or those with impaired speech), access to an intermediary such as a relay service operator is essential to achieving the level of access that is available to the general population. It should be further remembered that a person whose speech is understandable by their family and friends in a one to one situation cannot necessarily be assured of making themselves understood remotely (when the loss of 'redundancy' in speech that has been compressed or processed makes itself apparent), to strangers, and while under stress – such is likely to be the case when attempting an emergency services call.

In order to explore the key issues associated with emergency services access in detail, three specific tasks were identified for investigation within this workpackage:

Task T2.1 explores the personal situation of communication-disabled individuals, through user questionnaires and focus groups. This information is supplemented by a comprehensive review of published literature relevant to 'total communication' and its component audio, text and video modalities. The results relating to this task are presented in Sections 2 and 3 of the report.

Task T2.2 examines the emergency services themselves, including their structures and legal requirements. A particular aspect considered is that of interoperability, and the identification of obstacles to its achievement. The results relating to this task are presented in Section 4 of the report.

Task T2.3 reports on the extent to which present relay services (in those countries for which they exist) provide access to emergency services, as a subset of general conversational support. This includes analysis of the essential features of these services, their staffing and their training resources. Published performance data are also reviewed. The results relating to this task are presented in Section 5 of the report.

2 Review of published literature

This part of the report provides an overview of published literature relevant to user communication through voice, video and/or text – not only individually but also in the simultaneous combination, known as 'Total Conversation'. Total Conversation can be regarded as the 'gold standard' as it allows the greatest chance of successful communication being established, and enables the calling and called parties to negotiate their preferred modalities for that particular communication event.
As there are presently significant differences in service availability and usage throughout member states, we start from the position for the European Union as a whole, and follow this with particular reviews from the perspective of five candidate countries, France, Greece, The Netherlands, Sweden and the United Kingdom.

2.1 European Union

The REACH112 project is the result from ongoing work within the EU to highlight and address the need for more accessible electronic communications across the Union. Through documents such as the INCOM 03-23 report to COCOM 04-08 'Urgent need for accessible communication for disabled' from January 2004[2], the Commission has highlighted present barriers and suggested components for a solution. Among the findings was the fact that the emergency services ('112') remain inaccessible to a large, and growing, number of European citizens. The key action areas identified by this report are:

- Access to national emergency services
- Access to telephone services for deaf/hard of hearing/speech impaired/deaf-blind people
- Access to public pay telephones
- Access to mobile phones
- Access to directory services
- Access to broadcasting, digital televisions and related services

The INCOM report describes the lack of real-time communication services for modalities other than voice and notes fragmentation and interoperability barriers. It sets out a strategy of convergence towards a single set of compatible and interoperable standards for communication services and promotes the concept of Total Conversation as a suitable response in terms of making electronic communication systems more accessible.[3]

2.1.1 Requirements set out by the European Commission

In the project programme for REACH112, a requirement was specified that the project should base the services on the standards described in 'INCOM07-06x Network requirements for accessible conversational services'. The objective of the project, as formulated in ICT PSP WP 2008[4], is "to implement a pilot service focusing on the validation of total conversation access to emergency services (making the 112 number accessible for all across Europe), encouraging replication as well as ensuring interoperability and assessing cost effectiveness and user acceptance."

A first aim is full Total Conversation (TC) interoperability (to be achieved for IP terminals, 3G devices and networks, and within IP networks) based on one set of common standards. This also includes mainstream multimedia services catering for people with disabilities (real-time text, video,

2 http://ec.europa.eu/information_society/activities/einclusion/docs/access/incom%20reports/2004_report_cocom.pdf

3 IETF SIP for call control, ITU-T H.263 for video, ITU-T T.140 with transmission as specified in IETF RFC 4103 for text and ITU-T G.723.1 for audio.

4 http://ec.europa.eu/information_society/activities/ict_psp/documents/ict_psp_wp2008.pdf

audio and possibly also other existing solutions). Relay services, automatic speech-to-text, lip animation etc. should also be covered.

Secondly, the project must demonstrate Total Conversation access to a great diversity of Emergency Services systems solutions. This includes handling calls in any modality to enable people in emergency situations to contact a local service wherever they are, by means of their usual communication solution. This should result in a remodelling of the traditional emergency calling technical architecture while potentially lowering cost and complexity. Not only users with disabilities should benefit from the service, but all citizens.

Furthermore, standards compliance must be observed to avoid fragmentation, and cooperation with relevant standards authorities must be ensured. The pilot must involve organisations along the Total Conversation/Emergency Services value chain. The pilot project should produce reference materials, including guidelines, manuals and educational materials. It should also involve dissemination actions enabling relevant authorities and bodies to implement and replicate interoperable, accessible solutions.

2.1.2 The European Legal and Regulatory framework

National legislation and regulation of the telecommunications sector is based on a common EU legal framework for electronic communications. At the time of this report, these national implementations across the EU are based on the 2002 framework, of which the major elements are:

- Directive (2002/21/EC) on a common regulatory framework[5]
- Directive (2002/19/EC) on access and interconnection[6]
- Directive (2002/20/EC) on the authorisation of electronic communications networks and services[7]
- Directive (2002/22/EC) on universal service and users' rights relating to electronic communications networks and services[8]
- Directive (2002/58/EC) on privacy and electronic communications[9]
- Directive (2002/77/EC) on competition in the markets for electronic communications services[10]
- Regulation (2000/2887/EC) on unbundled access to the local loop[11]

The 2002 framework provides a 'light touch' regulatory regime through National Regulatory Authorities, with focus on more competition in liberalised markets. The approach to consumer rights (including access to basic service provisions) is that of a safety net. The framework provides regulatory instruments for universal service intended to sustain the then current situation in the member states. In response to the rapidly changing technological and societal realities, the Commission launched a review of the 2002 rules in November 2007[12], under the co-decision procedure. The European Parliament and the Council of Ministers reached an agreement on the EU Telecoms Reform package in November 2009[13], after intense negotiations and debate.

The reforms modernise the rules and extend regulatory powers in areas where the 2002 package did not provide cover, or only partly. Following intense lobbying by consumer organisations[14], the

[5] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0021:EN:NOT
[6] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0019:EN:NOT
[7] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0020:EN:NOT
[8] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0022:EN:NOT
[9] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0058:EN:NOT
[10] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0077:EN:NOT
[11] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000R2887:EN:NOT
[12] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007DC0696:EN:NOT
[13] http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm
[14] See for example http://www.ictrnid.org.uk/docs/ecrev.pdf and http://www.ictrnid.org.uk/docs/berrecf08.pdf

new package also strengthens consumer rights and protection. In particular, the reforms establish citizens' rights to Internet access, seeking net neutrality and more choice in broadband, strengthens privacy and data protection rights, etc. Importantly, the new framework also seeks to improve access to emergency services and 112. The new telecoms rules extend access requirements from traditional telephony to new technologies. It also strengthens operators' obligation to pass location information to emergency authorities. The new framework also seeks to improve access to services for people with disabilities. It includes a provision on the availability of terminal equipment offering the requisite services and functions for disabled users.

Under the new framework, a new European Telecoms Authority (Body of European Regulators for Electronic Communications, BEREC) is created to oversee competition rules and to seek more consistency of regulation in the telecoms market.
The new framework now needs to be implemented. The next steps in that process are:

- Publication in the EU's Official Journal (December 2009)[15];
- Establishment of the European Body of Telecoms Regulators BEREC (spring 2010);
- Transposition of the telecoms reform package into national legislation in the 27 EU Member States (by June 2011).

2.1.3 Requirements set out by the European Disability Forum.

The European Disability Forum (EDF) also provided a specification for REACH112[16]. EDF noted that people with disabilities are discriminated against while accessing emergency services. It also observed that in an emergency anyone (caller or operator) can be disabled, and improvements in accessibility of emergency services can benefit any citizens. EDF's aim was stated to be: "an access to 112 and existing national emergency numbers for people with disabilities in an equivalent manner to that enjoyed by other end-users. People with disabilities shall be able to use their everyday communication means (e.g. terminal equipments and services) for reaching emergency services."

The key requirements as stated by EDF are:

- Emergency services shall be contactable via ordinary emergency numbers, if possible throughout Europe. As emergency numbers may vary from one country to another and from one type of disability to another, promoting the use of 112, the common emergency number, is the evident solution for this requirement.
- People with disabilities shall be able to contact emergency services via mainstream and assistive terminal equipments and services. Diverse technologies are targeted. Some of them are currently used to reach emergency services but these technologies are not satisfactory and shall progressively be replaced by other ones.
- People with disabilities shall be able to contact emergency services free of charge whatever the technology they use.
- When using SMS and text telephone, emergency services shall provide acknowledgement of receipt to say that the emergency contact has been received, the emergency is being handled and when emergency services will be on place. Operators who handle contact via videophone and Total Conversation shall be able to answer using sign languages. For this specific issue, the call could be processed using both emergency services and sign language relay centre.
- Localisation information shall be available for all (landline, mobile, pre-paid card users, VoIP, etc) and developed simultaneously as it is developed for voice phone emergency.

15 http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1966&format=HTML&aged=0&language=EN&guiLanguage=en

16 http://cms.horus.be/files/99909/MediaArchive/library/EDF%20REACH%20112%20DisabledUsersRequirements.doc

- Informing people with disabilities on how to contact and use emergency services is crucial. Websites of emergency services, public bodies with responsibility for emergency services and telephone operators should be accessible. Information made available to the public should also be provided in alternative formats.

2.1.4 Real-time text

For the majority hearing population, a great proportion of daily communications – important as well as trivial – are mediated most naturally through spoken conversation. However, for people for whom communication disability disallows communication in this way, real-time text can be considered the closest equivalent they are likely to experience. So, while not presently available as widely as, say, message services such as SMS or email, real-time text can offer substantial benefits to those who need to rely on text as an alternative to voice. Real-time text (also referred to as interactive text or conversational text) allows for 'conversation' in which the recipient is able to view what is being typed in real time. In contrast, message based systems can only be accessed by the recipient once the entire message has been drafted, sent and delivered to the recipient. This is often swift but can take an unpredictable amount of time, a factor that could prove critical in life or death situations. Even so-called Instant Messaging (IM) systems face similar limitations in that while both parties may be logged on at the same time, the messages themselves are 'bursty' and not conversational in the usual sense. They therefore lend themselves particularly to informal communications. And while they are frequently used in, for example, IT support centres (with one agent handling a number of simultaneous calls), their relative informality does seem at odds with the type of communication required for emergency service support.

The benefits that real-time text can offer people who are deaf and hard of hearing are discussed on the RNID Technology website, most notably in the article *Why real-time text*?[17] This article argues that "text telephony is specifically meant to be the text equivalent to voice conversation for deaf, hard of hearing and speech-impaired people. To make it an equivalent of what voice is for hearing people, text telephony must offer equivalent features in terms of conversationality as voice does to hearing people".

Voice conversation is characterised by a number of specific features:

- Information flows in real time (at least from the user's perspective – even if technically speaking this is only almost real-time).
- Participants may interrupt each other at any stage in the conversation.
- Communication is at least two-way.
- It must be possible to 'speak' to hearing people who are using 'normal' voice phones.

It is the character-by-character (or at least word-by-word) interaction permitted by real-time text applications (or as a subset of Total Conversation) that is important in making text telephony for deaf people the equivalent to voice for hearing people. This is especially true for relay calls, which cannot be made via message based systems such as SMS or email as these would greatly diminish the two-way interactivity between the user and the relay operator.

2.1.5 ETSI EG 202 320: Duplex Universal Speech and Text

The European Telecommunications Standards Institute (ETSI) produced an overview in 2007 of user requirements in Guide EG 202 320[18]: *Duplex Simultaneous Speech and Voice*, which also documents technical standards for Total Conversation in different network environments. Note that although not implied in the title, this document does contain requirements relating to acceptable video quality for signing and lipreading, whenever video mode is provided.

[17] RNID Technology 'Why real-time text?' (http://www.ictrnid.org.uk/whyrtt.html) Accessed October 7, 2009.
[18] http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=18331

The key requirements listed in the document are:

- *Universality:* Text communication should be available on all networks on a universal basis.
- *Call setup:* Text communication should be as easily set up as an ordinary speech call.
- *Conversational text:* Live two way conversational text communication should be available to all users with delays that do not impair normal interactive conversational flow.
- *Conversational quality:* Error free live conversational text communication should be available to all users.
- *Speech communication:* Speech communication of good quality should be available simultaneously with the text communication.
- *Display:* Terminals should be able to display the text of both parties in the character set in which they are typed.
- *Loss in transmission:* Missing text should be detected and an indication should be given in the display.
- *Editing:* Simple editing functions should be provided.
- *Service accessibility:* All services should operate with text in addition to other media.
- *Call progress information:* Alternative modes of communication should be available for all of the call progress information that is normally provided in audio form in both basic and supplementary services to make it accessible to text users.
- *Conferencing:* Conferencing services should support DUST capable terminals.
- *Multimedia telephony:* A Duplex Universal Speech and Text (DUST) compliant service should offer service in all modes within the capabilities of the terminals and networks engaged on a call.
- *Terminal configurability:* Terminals supporting the DUST service capabilities should be configurable by the user to suit the communication preferences and abilities of the user.
- *Signing and lipreading:* Any service offering a video mode should provide a video display with a quality that is sufficient for signing and lip-reading.
- *Service configurability:* A DUST compliant service should be configurable by the user to suit the preferences and abilities of the user.
- *Call configurability:* A user of the DUST service should be provided with the means to alter the terminal or call configuration during a call.
- *Relay services:* A capability should be provided within the network to enable communication between users of terminals that do not share common modes of communication.
- *Masquerade:* Means should be provided to minimize the possibility of masquerade. Participants in a speech conversation have the opportunity to validate the identity of a caller (and possibly their age and sex) by recognizing characteristics of their voice. This facility is denied to participants in a text conversation and the risk of masquerade is consequently higher. Some means of overcoming this problem is therefore highly desirable.
- *Integrity*: A telecommunications service user has the right to expect his communications to be protected against unauthorized modification.
- *Confidentiality:* All communication should be treated as confidential.

2.1.6 ETSI ES 202 975: Harmonized relay services

Another ETSI standard, ES 202 975 *Harmonized relay services*, describes service level requirements for a set of relay service types. A report describing the then status of relay service provision in Europe and globally was also produced (ETSI ETR 102 974).
ETSI ES 202 975 defines relay services thus:
"A relay service is a telecommunications service […] that enables users of different modes of communication to interact by providing conversion between the modes of communication."

2.1.7 The United Nations Convention on the Rights of Persons with Disabilities

On 13 December 2006, the United Nations adopted The Convention on the Rights of Persons with Disabilities[19] and an Optional Protocol, which opened for signature in March 2007. The Convention entered into force in May 2008. It is a very broad document focusing on people with disabilities as individuals in their own right, as opposed to subjects of charity and care. The Convention seeks to enable people with disabilities to be fully enabled citizens that can live active and free lives and make their own choices.

As a Human Rights document, the Convention is a horizontal instrument, contrasting in both approach and remit with vertical consumer protection and inclusion provisions in telecommunications legislation. Traditionally, the latter uses the concept of a 'safety net', with specifically defined scope, whereas the former is an open, rights-based model. The Convention addresses a very broad range of competencies and areas of citizenship. These include references to access to information and communication services, for example in Article 9.1 on Accessibility.

While many member states of the EU have now signed the Convention, not all have ratified it and several member states have done so only with specific reservations or declarations.[20] For instance, Greece signed the United Nations Convention on the Rights of Persons with Disabilities, but not the Optional Protocol. The United Kingdom has signed and ratified the Convention and the Optional Protocol, but has made specific reservations.

The legal and regulatory framework for electronic communications is a clear EU competency with a common EU framework transposed in national law, whereas currently the obligations under the Convention seem to be dealt with primarily under the subsidiarity principle[21]. As indicated above, further complications in implementation arise from the differences between the vertical nature of telecoms law and the horizontal approach of the Convention and other Human Rights instruments. Specific laws and regulations within individual EU states might clarify some of these issues in the future.

2.2 France

2.2.1 Improved accessibility R&D programmes

Following the withdrawal of the Minitel Dialogue (a real-time text terminal developed in the 1980s and used both for P2P and in the first experimental text relay service), France Telecom Group took the decision to continue working to improve accessibility of conversational services by means of several R&D programs (DefiScience, Accessibilité, Orange Touch, Disable etc.) and in particular through pursuing the Total Conversation concept at the European level. A number of R&D documents relating to this work have been published since 2006; these are listed under (A) of Appendix 1.
Key features of this work have been:

- Real-time text
- Video quality required for signing and lip-reading
- Multimedia transmission
- Interoperability between networks, providers or terminals (H323, SIP, IMS)
- Interoperability between systems in scope and legacy text telephony
- Accessibility of Orange's Customer Relationship Management system
- Accessible Human Computer Interfaces
- Integrating the Total Conversation (TC) concept within standards and regulatory affairs in which France Telecom is active (IETF, 3GPP, etc.)

[19] http://www.un.org/disabilities/convention/conventionfull.shtml
[20] http://www.un.org/disabilities/countries.asp?navid=12&pid=166
[21] http://europa.eu/scadplus/glossary/subsidiarity_en.htm

In addition to having participated with other REACH112 partners in e-accessibility workshops organised by the European Commission (TCAM eWG), France Telecom works on the development of real-time text communication with the T.140 codec. This codec has been implemented in the *eConf* (proprietary Orange multimedia conferencing solutions) software, and also in the development of further new customer products.

In 2002, WebSourd and France Telecom launched the first professional remote Sign Language interpreting service based on the e-visiophony (eConf) platform. The following joint developments of eConf software have enabled prototyping of several Total Conversation services on PC and smartphone platforms in France, and have improved accessibility and communication for customers of call centres of Ivès, FT and WebSourd:

- The Video Live plug-in that enables video telephony to be embedded in a web page for the VisiO08 service (http://www.visio08.com).
- The Video click-to-see service (http://www.autonomie.francetelecom.fr) which provides a TC link to Orange sales service for deaf, hard of hearing or speech impaired people.
- Visio-Conseil: the use of SIP video cameras to assist visually impaired people at work (http://visioconseil.visioassistance.net/).
- Oculaire : a TC interface that can be controlled with eye movements.

This work will be used within, and completed for, the REACH112 project.

2.2.2 Research and experimentation into the use and application of Total Conversation

Studies on Total Conversation, based on various trials using the French relay centre, have been carried out in France. In conjunction with partners mentioned above, WebSourd developed this centre, and have trialled it for business and administrative use as well as for receiving calls from deaf members of the public, and for personal use at home (see section 5.2 for more information about the French relay service). For a video clip showing a personal call via an interpreter. see: http://www.visio08.com/visio08-perso_solution.php; For a video clip of face-to-face communication in a public administration context through a remote interpreter see: http://www.visio08.com/visio08-guichet_solution.php and for a clip of various business enterprise situations (face-to-face, answering machine and on the move), see: http://www.visio08.com/visio08-sourd_solution.php A clip showing the use of a relay service for contacting an administration or a business via a website, see: http://www.autonomie.francetelecom.fr/ and, http://agefiph.visio08.com/infos.php

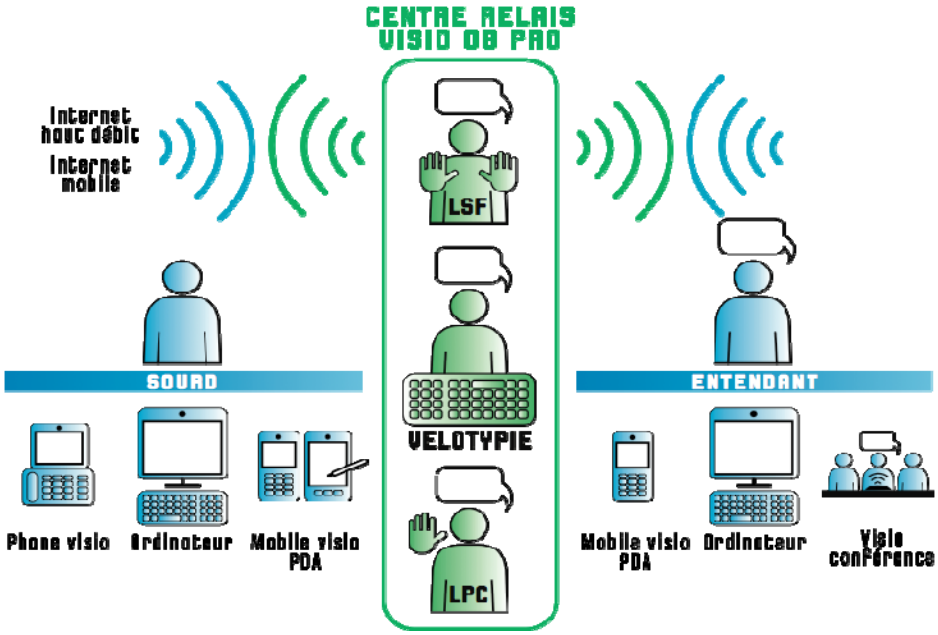


Figure 1 - Relay centre for deaf people, Visi008 from Websourd

Social research interviews with more than 60 deaf users of the relay centre (covering both private and professional use) show the impact these services can have on the lives of deaf people as well as hearing people who live or work with them. A video has been produced featuring deaf actors who demonstrate the importance of access to the telephone, including its vital use for emergencies.[22]

In Appendix 1 are listed further scientific research and publications by deaf groups that reinforce the issues of service quality and skills requirements for relay operators, including important ethical considerations. These also highlight the different ways of self expression in sign language via different media (mobile 3G, videophone, videoconference with several users, video-interpretation etc), and the importance of adaptation by the user, as well as the need for training of interpreters (see appendix 1, B-C-D).

2.2.3 Research into access to medical and emergency services by deaf people

Many published documents describe and analyse the history and characteristics of health care and mental health care centres in France for people who are deaf (see appendix 1, E-F-G). Below are diagrams and tables giving a summary overview (from Garcia V, 2009, pp4&12).

[22] see: http://relaistelephonique.blog.lemonde.fr/2009/01/17/en-video-la-vie-sans-telephone/#more-94

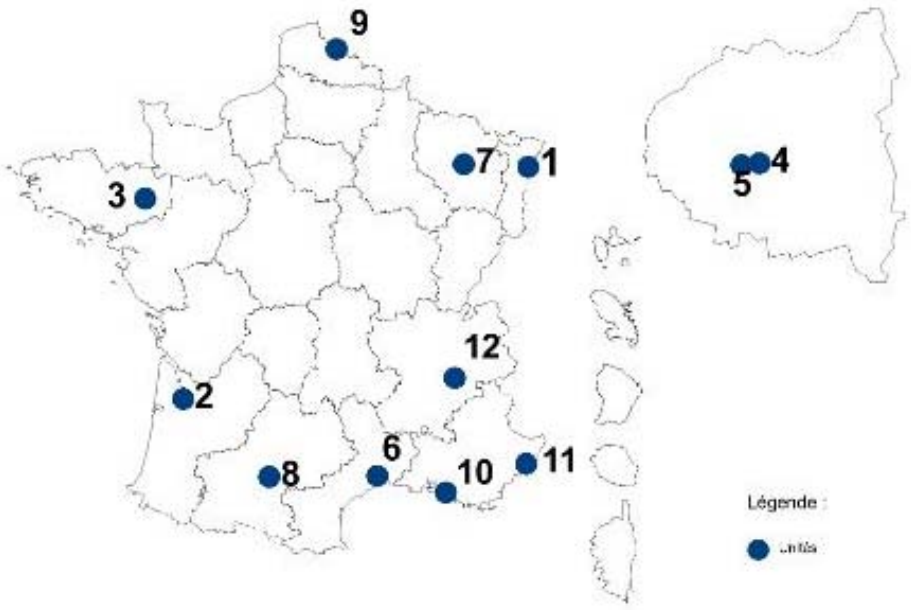


Figure 2 - The units that care for deaf patients in sign language, France

Units	Consultations 2005	Consultations 2006	Growth 2006-2005	Consultations 2007	Growth 2007-2006	Consultations 2008	Growth 2008-2007
Lille	711	967	+36%	1099	+13,65%	1182	+7,55%
Pitié-Salpêtrière	1809	1927	+6,52%	2013	+4,46%	2628	+30,55%
Sainte-Anne	1766	2104	+19,13%	1748	-16,92%	1953	+11,73%
Strasbourg	229	404	+76,41%	524	+29,70%	611	+16,60%
Nancy	88	115	+30,68%	163	+41,73%	204	+25,15%
Grenoble	680	745	+9,55%	1042	+39,86%	1038	-0,38%
Nice	75	90	+20%	113	+25,55%	296	+161,95%
Marseille	485	604	+24,53%	739	+22,35%	1572	+112,72%
Montpellier	58	91	+56,89%	92	+1,09%	92	0
Toulouse	499	666	+33,46%	611	-8,25%	525	-14,08%
Bordeaux	370	477	+22,43%	606	+21,28%	853	+28,95%
Rennes	305	386	+26,55%	534	+38,34%	813	+52,25%
Total	**7075**	**8576**	**+21,21%**	**9284**	**+8,25%**	**11767**	**+26,74%**

Table 1 - Numbers of consultations in sign language, France

The work and experience of these care units for deaf people in France that were established some 15 years ago shows the political importance of involving deaf people to work alongside doctors

trained in sign language, in the establishment of this network. Experience has shown that the most important development has been to have deaf professionals on the medical staff. Published documents and medical theses describe the specific skills needed and the professional role of deaf people called intermediates: "*The function of mediation is complementary to that of interpreters and other professionals. Mediation within and outside the unit helps to clarify the situation between patient and health professionals. It is practised by one or more deaf member(s) of the team. Depending on the situation, the professional, educator or paramedic can act alone or in support of other unit members*" (Garcia V., 2009, p11). Published work on emergency calls in general stresses the importance of communication and empathy in the role, and highlights the need for training and sharing of experience between emergency staff – see appendix 1 (H).

Units	Interventions by deaf staff 2007	2008
Lille	733	658
Pitié-Salpêtrière	317	271
Sainte-Anne	-	218
Strasbourg	232	281
Nancy	36	52
Grenoble	605	506
Nice	101	153
Marseille	75	156
Montpellier	82	20
Toulouse	83	67
Bordeaux	322	440
Rennes	82	238
Total	**2668**	**3060**

Table 2 - Number of interventions by deaf (intermediator) staff, France

These studies on health care for deaf people show great variety of user profile and of users' communication modes. They demonstrate that these services are useful for hearing people too, such as in the case of family members of deaf people, or hearing people who cannot read. See below (Garcia V, 2006, pp28&30):

Patients attending units in 2005	Number in the category	Total of answers at this question	Percentage
Patients deaf since the first years of life	1690	2089	80,90%
Deaf-blind Patients	111	2089	5,31%

Patients attending units in 2005	Number in the category	Total of answers at this question	Percentage
Patients deaf newcomers in France	49	2089	2,35%
Patients deafened in adulthood	58	2089	2,78%
Elderly patients becoming deaf	14	2089	0,67%
Other kind of patients	167	2089	7,99%

Table 3 - Hearing loss of visitors, France
(Note that some patients may be counted in multiple categories)

Units	Other categories of patients identified by units in 2005	Number
Lille	Hearing children of deaf parents (+2 Deaf people accompanying a hearing patient)	31
	Deaf patients who don't use sign language	9
	Patients with no abilities in oral or written French, nor in SL, with whom we must use a total communication involving mime, drawings	3
Sainte-Anne	Deaf patients with additional disabilities	20
Strasbourg	Hard of hearing patients	2
Nancy	Hearing children of deaf parents	2
Grenoble	Hard of hearing patients	10
	Hearing patients with communication disabilities (tetraplegia, mutilated)	2
	Deaf patients with additional disabilities	29
Marseille	Deaf patients over 65 years	11
Montpellier	Hearing laryngotomy patient	1
Toulouse	Deaf patients with additional disabilities	9
Bordeaux	Hearing children of deaf parents	20
Rennes	Illiterate hearing patients	2
	Hearing children of deaf parents	16

Table 4: Other Categories of visitors, France

Published work on the organisation of emergency calls in France, and on the accessibility of emergency services for deaf people, reports initiatives such as the use of fax for some medical or

police emergencies (see Appendix 2 for an example), and the possibility of using SMS text for calling some fire brigades. While these are interesting attempts to improve the situation for deaf people, such local initiatives are not sufficiently robust without strong national coordination. Nevertheless, these attempts demonstrate that emergency service professionals are willing to address the objectives of the REACH112 project.

2.3 Greece

The Hellenic Telecommunications Organization SA (OTE) was the first telecommunications provider in Greece and a monopoly provider until the beginning of 2001 when the market was liberalised in accordance with EU legislation transposed into Greek law. OTE remains one of the largest providers of landline telecommunication in Greece, while it also offers mobile telecommunication services and Internet access through its subsidiaries COSMOTE and OTENET.

Mobile penetration in Greece is very high compared to the EU average, reaching 180% at the end of September 2009[23]. With high mobile penetration and being a very inexpensive method of communication (further strengthened through reduced rates for people with hearing loss), it is no surprise that SMS has become a popular communication method in Greece – for mainstream markets as well as for people with disabilities. Although SMS usability can be hampered by small keypads/keyboards, predictive input significantly improves the user experience such that some audiences consider SMS a more convenient communication option. In particular, this is the case for deaf and hard of hearing people due to the limited availability of alternative solutions or their high cost (for example video calling for sign language users). OTE offers an SMS service across both fixed and mobile phones. Users can send messages from a digital fixed line device to another fixed line phone or a mobile phone. In order to be able to use the service, consumers must be OTE subscribers and in possession of a compatible fixed line telephone, but can send messages to any network that supports SMS services.

Video calls are offered on mobile networks, with providers offering discounts to people with hearing loss. COSMOTE offers a 50% discount on video calls through its Corporate Social Responsibility programme, to demonstrate the company's concern for this user group. Video calls require a 3G-enabled handset and 3G network coverage. 3G network coverage is available in most cities, but is more problematic outside urban areas.

VoIP is rapidly expanding in Greece, as in many other countries, and offers competitive prices – sometimes close to free of charge.

Uptake of ICT, including functional Internet access, is significantly lower amongst people with disabilities compared to the general population, with regard to both infrastructure and provision of services. Specifically:

- 28% of people with disabilities use a computer (desktop or laptop) compared to 58% in the general population.
- 13% of people with disabilities have Internet access at home compared to 27.4% in the general population.

However, when comparing the frequency of computer use and Internet, a recent study found that usage patterns amongst both groups were similar. Specifically:

- 75% of people with disabilities use a computer daily or almost daily compared to 76% in the general population.
- 55% of people with disabilities access the Internet daily or almost daily compared to 61% of the general population.

Furthermore, of those with Internet access at home, 68% of people with disabilities accessed the Internet at home compared to 75% in the general population.

[23] http://www.enet.gr/?i=news.el.ellada&id=100711

The above statistics are based on a study by the Hellenic Observatory of the Information Society carried out in 2007 to examine the digital divide for people with disabilities and other groups in Greece[24]. Although the study shows low overall Internet penetration in Greece, it is assumed that this has increased over the past two years for both the general population as well as people with disabilities. In part, this assumption is based on financial incentives provided under the Information Society Operational Programme. The assumed trend is further justified by the previously referenced report of the Hellenic Observatory of the Information Society which describes how 34% of people with disabilities acquired Internet access during the year preceding the report.

Under Greek legislation, discounts are available for people with disabilities who want to acquire Internet access. Deaf and hard and hearing people who qualify as 67% or more disabled are entitled by legislation to an €18 discount on their total monthly charges for the use of data transmission services (Internet connections). However, following actions by the Ministry of Transport and Communications and the National Federation of the Mobility Impaired, an additional 50% discount for Internet connection charges is now available[25].

2.3.1 Regulatory regime in Greece

The Hellenic Communications & Post Commission is the National Regulatory Authority responsible for regulating the telecommunication market in Greece. The commission was established in 1992 and started operating in 1995, while the Ministry of Transport and Communications retains responsibility for drafting any required legislation. Since the deregulation of the telecommunication market, new privately funded providers have emerged for landline, mobile and data (internet) communications and some of these have started deploying their own networks for telephone and data communication, resulting in faster communication channels, reduced costs for consumers and increased competition.

In recent years, focus on telecommunication services for people with disabilities has increased as a result of recent legislation that defined specific measures to enable and advance communication for people with disabilities. The two main information sources covering these services and provisions are:

- A specialised website for people with disabilities hosted by the Ministry of Transport and Communications.[26]
- A guide for citizens with disabilities[27] published and available for free from the Ministry of the Interior.

Regarding the minimum provision of telecommunication services to the public and disabled persons in particular, article 6 of the National Telecommunications and Posts Commission's decision 255/83/14-06-02 stipulates that special arrangements need to be made for people with disabilities. Among other things, this decision establishes Universal Service, with a single provider being responsible for making telecommunications services available to people with disabilities.

Greece's Equality Law 3304/2005 defines principles of equal treatment irrespective of racial or national origin, religious or other beliefs, disability, age or sexual orientation. It forbids discrimination on the grounds of disability and provides for reasonable adjustments for people with disabilities. On 18 August 2008, following recommendations by the Hellenic Communications & Post Commission, it was decided (decision 44867/1637) to take appropriate measures to ensure access and affordability of telecommunication services for people with disabilities and ensure equivalent access when compared other end users. The decision outlines the responsibilities of the universal telecommunications provider (Hellenic Telecommunications Organisation) in order to take into

[24] The Observatory for the Greek IS, October 2007, "Estimation of the digital divide for people with disabilities, immigrants and elderly in Greece", http://www.observe.gr/files/meletes/AMEA_ap.pdf
[25] http://www.yme.gr/amea/content.php?getwhat=1&oid=12&id=&tid=20
[26] http://www.yme.gr/amea/index.php
[27] http://www.gspa.gr/(1612424028910253)/documents/οδηγοσ.pdf

account the needs of people with disabilities and lists several responsibilities described in the following sections in terms of provision of specialised services and the associated cost.

Following consumer complaints[28] received by the Hellenic Communications & Post Commission alleging non-compliance with the regime set out above, the Commission announced an investigation. The outcomes of that investigation are not yet known; however, most of the required services now appear to be provided. On the 1st July 2008, the Ministry of Transport and Communications launched a four-digit telephone service (1889) offering information on services for people with disabilities.[29] The service operates between 10.00h to 13.00h, Monday to Friday. Initially it could only be accessed from a landline phone, but since autumn 2008 it is also possible to access the service from a mobile phone.

Article 2 of decision 44867/1637 of 18 August 2008 establishes a discount regime whereby those qualified as 50% disabled are entitled to a 50% discount for sending and receiving SMS over mobile networks. The main mobile service providers offer communication with customer departments via SMS, both for hearing customers as well as those with hearing loss. Customers can use this channel for complaints or ask for help with their mobile phones and will receive a reply over SMS as well. Users who register for the rebate scheme available to consumers with hearing loss are automatically registered for the SMS customer support service.

2.3.1.1 Equipment

Article 2 of decision 44867/1637 of 18 August 2008 requires the Universal Service provider to offer devices such as textphones or other specialised equipment at cost price for people with hearing difficulties, subject to being diagnosed as persons with disabilities to an extent of more than 67% in line with the provisions under national legislation. The Hellenic Communications & Post Commission provides textphones and other telephone equipment for deaf and hard of hearing people free of charge through the Hellenic Telecommunications Organisation.[30]

2.3.1.2 Public Call Boxes

Article 2 of decision 44867/1637 of 18 August 2008 requires the Universal Service provider to install public textphones following requests from a reasonable number of people with hearing loss or speech impairments. The same article also requires public call boxes to be made accessible to hard of hearing users. It further enables the Hellenic Communications & Post Commission to define type, characteristics and operational specifications for public call boxes.

According to a report by the Hellenic Communications & Post Commission, 19,000 public call boxes (operating with a phone card) have been installed in public spaces since the year 2000, with 70% of public call boxes accessible to people with special needs[31]. The report does not provide specific information about the level of accessibility of these public call boxes to the REACH112 target audience.

2.3.1.3 Human Rights Legislation

On 30 March 2007, Greece signed the United Nations Convention on the Rights of Persons with Disabilities (see section 2.1.7), but not the Optional Protocol. In addition, article 21 of the Greek Constitution defines the rights of people with disabilities, with entitlement to specific measures that

[28] http://www.disabled.gr/lib/?p=20901
[29] http://www.yme.gr/amea/content.php?aid=143&tid=10
[30] http://www.eett.gr/opencms/opencms/EETT/ProvidersInformation/ote_Edikes_Koin_Omades.html
[31] http://www.eett.gr/opencms/opencms/EETT/ProvidersInformation/ote_Edikes_Koin_Omades.html

should ensure autonomy, employment, and participation in social, economical and political life.

2.3.2 Athens International Airport

Athens International Airport makes specific commitments with regard to its disabled passengers[32]. Among the facilities available, the airport provides textphones for deaf and hard of hearing people. In case of an emergency alarm, special audio-visual warning systems are automatically activated to help guide blind, partially sighted and deaf and hard of hearing people to safely follow the emergency procedures. According to The Ministry of Transport and Communications, 20 such devices are currently in operation at Athens International Airport.[33]

2.3.3 Emergency Services Access

Article 2 of decision 44867/1637 of 18 August 2008 states that in order to provide a service to deaf and hard of hearing people, access to emergency services via SMS or through mobile or fixed telephony must be provided. Despite such requirements being in place, it was not possible to confirm the existence of these different access methods simply from inspection of the websites of the three main emergency authorities:

- Fire Brigade (www.fireservice.gr)
- Ambulance service (www.ekab.gr)
- Police (www.astynomia.gr)

Therefore, each was contacted with respect to confirm the availability of the described services. Of these, only the police presently provide an operational service – specifically via SMS to and from the sender. SMS access from a mobile or fixed phone is free of charge to people with disabilities. Users can send SMS messages to the police shortcode number (100) where they are centrally managed. Upon receipt, the message will be directed to the relevant local authority, based on the region where it originated. The sender will then be informed of receipt via a response message – where necessary accompanied by further information, clarifications or requests for action. This service began after the 2004 Olympic Games in Greece and is available throughout the country.

Although the ambulance service installed the infrastructure to receive and send SMS during the period 2002-03, the system is not presently operational, and its future use is still being considered. In the case of the fire service, no SMS provision is in place but they say that a 'specialised telephone device' is provided to persons with hearing loss that can directly link to the call centre in case of emergency.

Telecom provider OTE offers a service known as *OTEAlert*.[34] This is based on a custom handset with a very sensitive receiver (covering an area up to 120 m^2), a red emergency help button and a portable remote control that can be used at any time without needing to use the handset. Upon initial activation of the handset, the destination numbers associated with the emergency help button are registered. Then when the emergency button is pressed on the handset or the remote control, the call is connected to the Centre for Direct Alert; this operates 24 hours a day. The operator has access to subscriber data (name, address, etc.) and location information. Depending on the nature of the incident, the operator will then call the numbers registered when the handset was activated, or notify an appropriate emergency authority (Police, Fire, Ambulance, etc).

Since 28 June 2007, and following a decision by the Hellenic Communications & Post Commission[35], VoIP providers must tell potential users whether emergency calls are possible through their

[32] http://www.aia.gr/pages.asp?pageid=980&langid=2
[33] http://www.yme.gr/amea/content.php?getwhat=1&oid=10&tid=15
[34] http://oteshop.ote.gr/storefront/en/for-the-home/phone-services/otealert/prodote_alert_home.html
[35] http://www.eett.gr/opencms/opencms/admin/downloads/Announcments/Decision_VoIP.pdf

service, and what provisions are in place to provide location information to PSAPs. They are also required to clearly inform users about the possibility of delayed calls and of failure to connect to the PSAP.

VoIP providers have to make every effort to allow users to call 112 (or its national equivalent) for free where this is technically feasible. If providers are able to retrieve location information, they must provide this information free of charge to PSAPs and inform the authorities about the accuracy of the location information provided.

2.3.4 Relay services in Greece

The 'Call centre for people with hearing impairments' is the text relay service provided by OTE[36]; it operates 24 hours a day. The service allows deaf and hard of hearing users access to voice telephony through an intermediary operator who acts as the communication link between the textphone user and the voice phone user. The operator speaks the text sent by the textphone user and types back the voice reply. The call between the hearing impaired user and the operator is charged at the normal rate for a call between two landline numbers in the same area, while the relay service is provided free of charge including calls made between the operator and third parties as necessary.

The University of Athens provides a relay service for students who are deaf, hard of hearing, speech impaired or otherwise unable to use voice telephony.[37] The service aims to provide remote communication between students and their fellow students, and with academic and administration staff of the University. A video relay service allows signing students to contact voice users and vice versa. A text relay service is also provided. In the case of hearing impaired students who can lip read, the video service may provide a degree of complimentary support.

2.4 The Netherlands

In all, 15 significant publications have been investigated and although a number yielded no user-perspective information relevant to REACH112, those that did are listed below. In addition to these published information sources, the project team carried out interviews with around 300 people who were either existing customers of the mobile textphone solution available in the Netherlands, or who had expressed interest in that product or the REACH112 project.

Research by the University Centre of Utrecht concerning communication between deaf patients and medical centre specialists

This report addresses the issue of whether sufficient attention is paid to communications with deaf people during medical training, as well as in medical practice. The report concluded that the time devoted at present during medical training is inadequate, and revealed that 83% of those who had had actual experience with deaf people professionally had faced difficulties in communication. Miscommunication, misunderstanding and the need for more knowledge about deaf people, together with the extra time required during a consultation, were the key points noted.

Prompted by this research, the project team talked to deaf people about situations that had arisen in hospitals or when talking to doctors. A particular point to emerge was that if a follow-up appointment was deemed to be necessary, it was often difficult to contact an interpreter in order to agree the appointment time and synchronise the diaries of both interpreter and doctor. This then frequently resulted in another appointment without an interpreter, which was clearly unsatisfactory.

Relevant user requirements drawn from this work are:

[36] http://www.yme.gr/amea/content.php?getwhat=1&oid=10&tid=15
[37] http://access.uoa.gr/Unit%20Sign.htm

- The necessary availability of a Dutch Sign Language (NGT) interpreter, required for satisfactory communication in a healthcare situation. Ideally, this would be an interpreter on site, but with current technology an interpreter contacted remotely via a videophone/Internet might be a viable solution.
- Communication could be supported by texting, although it would be more difficult to explain unfamiliar medical terms in this way.
- Deaf people need to be able to contact an interpreter when there is a need to arrange an appointment (mobile text telephony should be adequate for this).
- Medical staff should be required to arrange an interpreter (whenever necessary) in order to ensure the quality of service expected in a healthcare situation. The telephone number of a qualified interpreter should be available at all times.

Research by Tolknet (Tolk op recept) concerning communication between doctors and patients

The overall message from this work is the lack of independence felt by deaf people when they have either to ask others to make appointments for them, or need to physically visit the doctor in order to make an appointment. A further finding is that the relay service (*Teleplus*) provided by the Dutch landline telephone company KPN is perceived by users as difficult to access, and that the response and waiting times are not acceptable.

SEO report "Bottom in the telephony market" ('Bodem in de belmarkt')

This report from Dutch not-for-profit research organisation 'SEO' dates from 2006, and its main aim was to check compliance in the Netherlands with the fixed line Universal Service Directive (USD). It also considered the ongoing requirement for legislation at member state level in connection with the Directive.

The report expresses surprise in finding that legislation in support of disabled people (vulnerable groups in society) was more extensive in a number of other European countries (Belgium, Denmark, Germany, France and the UK specifically cited). It goes on to note that the Dutch implementation of the Directive as applied to KPN does not include specific requirements concerning disabled people. So, while in the Netherlands there is a right to affordable fixed line connection, no equivalent right to text telephony currently exists.

The point is also made that the Dutch implementation of the USD states that there should be neutrality with regard to technology, but the USD itself applies to fixed line only – so this needs to be amended to take account of the burgeoning mobile and Internet-based networks. The report concludes that if USD is perceived as too big a 'tool' to be applied meaningfully to an area such as text telephony, then a better way to assure this might be through support of private enterprise initiatives.

Persbericht: 81%: Mobiele communicatie redt levens

This press release is a short summary of work undertaken by Dutch research agency MWM2 about the impact of mobile telephony on people's lives. It states that 81% of the population in the Netherlands were found to consider mobile communication to be important for their feelings of security, and for their ability to reach emergency services – thereby potentially saving lives. One could therefore conclude that if mobility is key to safety and independence in society generally, it is equally a 'must' for deaf people too.

AnnieS_Marktpilot_eindrapport

This report relates to end user evaluation of the mobile text telephony pilot run by AnnieS in the Netherlands. The report draws attention to the added value that mobile text telephony can bring to the lives of deaf and hard of hearing people and therefore reinforces the messages provided by the press release mentioned above.

SEO 'Onderzoek toegang tot telecommunicatie'

This very recent report from research organisation SEO considers the telecommunications possibilities for people with disabilities (including those with financial difficulties). It is intended as a preparatory report for the implementation of a reformed USD.

User requirements in relation to REACH112 flowing from this report are:

- There should be an affordable relay service in the Netherlands that improves on the present KPN offering, which is seen as being too expensive (for users) and of insufficient quality.
- The cost of using this service should not exceed that incurred when no relay service is involved in the call.
- The service quality should be measured in terms of opening hours, call answering time, and accessibility at a technical level.

The report also states that there is a need to make emergency services available through the '112' call centre environment directly rather than via the special 0800112 access route.

2.5 Sweden

Total Conversation (TC) is widespread amongst deaf people and their relatives in Sweden thanks to the social welfare system. People with hearing loss can apply for a Total Conversation Unit as a communication aid, which nowadays is mostly replacing legacy PSTN textphones. Total Conversation Units and additional aids are provided by county councils for home use. Public Employment Services and Social Insurance Services are responsible for equipment for the workplace. To date, there are about 3,000 Total Conversation users in Sweden. Relay services play an important role in the communication with voice users.

2.5.1 Total Conversation users

Total Conversation emerged around 1996 as a vision from the Swedish Deaf Association to improve functionality and simplify communication for deaf people. The vision was picked up by Omnitor and Kalejdo who, together with the Deaf Association, undertook the *Towards 2000* development project – with the first Total Conversation units being developed by Ericsson to Omnitor specifications. The Swedish Post and Telecom Agency supported the concept and encouraged Omnitor to create international standards for the concept through ITU-T. By the year 2000, there were both technical and functional standards developed for the first implementations of Total Conversation.

At the end of the *Towards 2000* project, the Swedish authorities responsible for providing communication aids and accessible communication services to people with disabilities agreed that Total Conversation was a suitable basis for communication aids and services. Then, through the EU project WISDOM in 2001-2003, the Total Conversation concept was extended to IP based communications. This was based on standards from 3GPP and ETSI, and was found suitable for wireless environments. As a result, Total Conversation was included in the requirements specification for procurement of communication aids for deaf people in Sweden in 2005. Sadly, no specific technical standard was mentioned in the requirement, resulting in a couple of technical variants being provided, with limited interoperability between products.

2.5.2 Relay Services in Sweden

There are currently three main types of relay services that contribute to access to telecommunication for persons with disabilities in Sweden:

- The Video Relay Service, translating between sign language users using videophone/TC/3G video calls and spoken language users on voice phones.

- The Text Relay Service, which translates between written language from a textphone to spoken language on a voice phone.
- A Speech-to-Speech service, which supports and clarifies speech that is weak or hard to understand.

The relay services represent an important means of enabling interworking between different modes of communication. In Sweden relay services are procured by the Swedish National Post and Telecom Agency, PTS.

2.5.3 Call Direct

The original calling model for relay services implied call set-up in three phases. However, during the years 2006-2008, a couple of projects financed by PTS were undertaken by Omnitor with the aim of introducing call routing of relay calls via destination number dialing. The need for direct calling had been specifically asked for by users and was documented in a couple of research reports in 2005-2006. The improved functionality represented significantly better usability of relay services. The same concept was developed in the USA and introduced through FCC mandates in 2009. In both the Swedish and US systems for call routing via relay services, emergency service calls are given special consideration. The Swedish 'Call Direct' trials have not yet (2009) resulted in an established service even though the trial results were very encouraging. As a result, the old three step call set-up method is still used in Sweden at present.

2.5.4 '112'

SOS Alarm is the organisation responsible for the '112' Emergency number service in Sweden. There are different ways to contact 112. SOS Alarm receives emergency calls from:

- Fixed line phones where the phone is registered to a calling address;
- Mobile phones, available even if the pre-paid phone has run out of call minutes or if the handset is not provisioned with a SIM-card;
- SMS, an ongoing project to allow deaf, speech-impaired and hard of hearing people to access the emergency services by text message;
- PSTN textphones;
- Satellite phones, which requires dialing a special number to access 112.

It is also possible to call 112 through any of the relay services in Sweden. SOS Alarm runs the service under agreement with the Ministry of Defence. SOS Alarm is under shared ownership by the government (50%) and the County Councils in Sweden (50%).

2.5.5 Stakeholder organisations

2.5.5.1 The Swedish Post and Telecom Agency (PTS)

PTS oversees electronic communications and the postal sector in Sweden (the term 'electronic communications' includes telephony, Internet and radio). The Agency works with consumer and competition issues, efficient utilisation of resources and secure communications.

2.5.5.2 Swedish Institute of Assistive Technology (SIAT)

SIAT is a national resource centre for assistive technology and accessibility for persons with disabilities. It is run by the Ministry of Health and Social Affairs in association with the Swedish Association of Local Authorities and Regions (SALAR) and works towards full participation and equality for people with disabilities by ensuring access to high-quality assistive technology, and effective provision of assistive devices and an accessible environment.
SIAT activities include:

- Testing and support for procurement of assistive devices.
- Research and development.
- Analysis of needs, knowledge and methodologies.
- Training and capacity building.
- International co-operation.
- Information and communication.

2.5.6 Publications

2.5.6.1 Requirement Specification for Total Conversation Units, Textphones and Videophones

The Swedish Institute of Assistive Technology (SIAT) has produced a requirement specification in collaboration with the Swedish Post and Telecom Agency for Total Conversation Units. In the current version of this document (01 September 2005), SIAT is referred to by its former name of Swedish Handicap Institute (HI).[38] A newer requirement specification is under development and is expected to be ready by June/July 2010.

2.5.6.2 Project IT survey

SIAT has also performed web-based surveys looking at the future of IT and telecommunications. As of December 2009 there have been four surveys. The target group was mainly speech and writing disabled people, individuals with low vision and hard of hearing/deaf people as well as those with mild cognitive disabilities. The research covers issues such as computers, mobile phones, and how to perform online bookings. The purpose of these surveys was to collect ideas and requirements from disabled people. The results are disseminated to product developers, decision-makers and other concerned parties.

First survey

In the first survey there were 62 participants, half of whom had low vision, 8 who were deaf and 15 who were hard of hearing, with the remaining individuals identifying themselves as having mild cognitive disabilities. 96% of the respondents had a computer and Internet access at home. All the deaf participants indicated they wanted better rendering of fast movements in video calls. There was also a need identified for better synchronisation between video and audio for lip-reading purposes.

Second survey

In the second survey, participants had the opportunity to give opinions and to suggest new ideas. 123 people took part producing more than 250 suggestions.
Examples of the suggestions:

- Product design should aim for products that are easy to understand and easy to use.
- A common announcement system (Important Announcements to the Public) for everyone, including deaf people.
- Possibility of making video calls between 3G video phones and videophone/Total Conversation Units.
- Improved opening hours for the Video Relay Service.
- Standard compliant real-time text for the Video Relay Service.
- Answering machine informing the voice user that the destination is a textphone or videophone.

[38] See PDF document "Requirement Specification Total Conversation_HI_Sept 1st 2005" for the full Requirement Specification, presently at: http://www.hi.se/Global/Dokument/english/Requirement%20Specification%20Total%20Conversation.pdf

- SMS location information for people with low vision. There was a desire to be able to SMS/call a service to find out the current location via SMS or speech, mainly for blind users.
- Accessibility legislation and standards along the lines of 'Section 508' in the United States (referring to the *Rehabilitation Act*, which was strengthened in 1998 to require access to all electronic and information technology provided by the Federal government).
- Improved coverage of IP networks and 3G networks right across Sweden.

2.5.6.2.a Third survey

The third survey contained questions on services provided and procured by the National Post and Telecom Agency (PTS). 249 people with disabilities responded – their ages ranging from 17 to 90 years. Less than half (44%) of the respondents said that they knew about the SMS 112 Service – with very few having used the service. However, the SMS 112 service *was* well-known within the subset (33) of sign language users within this overall respondent group, as was the Video Relay Service. In fact, the majority of deaf respondents stated that they had used the Video Relay Service.

2.5.6.2.b Fourth survey

The fourth survey, with 252 participants, confirmed that almost everyone now has a mobile phone. The majority indicated that the best aspect of a mobile phone was the sense of freedom and independence it provided. Many emphasised the feeling of safety and the knowledge that they are able to call for help in emergency situations. Sign language users are happy with the possibility of being able to make video calls, while blind people can access mobile phones through spoken menus.

2.5.6.3 Documents from the Nordic Forum on Telecommunications and Disability (NFTH)

The Nordic countries have established a common organisation called the Nordic Forum on Telecommunications and Disability (NFTH). It disseminates information and creates documents of common Nordic interest that often become the basis for European standardisation or policy.
Three relevant papers are:

- NFTH 3/2002: *Nordic Guide to Video Telephony and Video Relay Service - for persons with impairments*.
- NFTH 2/2005: *The recommendations of the Nordic countries regarding functionality for text telephony*.
- NFTH 4/2006 Nordic Guidelines: *Guidelines - Total conversation units, text phones and videophones*.

2.6 United Kingdom

The United Kingdom, as one of the largest EU member states, has been among the frontrunners in providing access solutions for people with disabilities. It was also one of the earliest countries to privatise its telecommunication market and it is seen as a country with a fairly competitive and profitable telecoms industry.

Today, many services approach near-universal coverage, including for broadband availability.[39] Consequently, attention is shifting towards super fast broadband and the government is seeking to establish a minimum broadband speed of 2Mbit/s by 2012.[40]

[39] See Ofcom's "The Communications Market 2009", Ofcom, London, August 2009

Fixed line telephony and DSL broadband are available to the large majority of UK citizens. 2G mobile is available in almost all postcode districts in England, and in around nine in ten in Scotland, Wales and Northern Ireland. Cable infrastructure extends to around 49% of the UK population – but with significant geographic differences (from 53% of homes in England to just 24% in Wales).[41] Personal use of mobile phones became more prevalent than that of fixed lines in all UK countries for the first time in 2009.

The competitive nature of the UK telecoms market means that a large number of companies are able to provide customers with residential phone services. BT remains the UK's largest fixed line telephone service provider, but cable companies, smaller alternative providers and high street telephone retailers have also gained a share of the market – with Ofcom's latest data suggesting that more than 38% of fixed line access in the UK is now provided by a telecoms provider other than BT.[42]

BT offers its own dedicated *Inclusive communications* website[43], to provide support, advice and information on BT products and services to people who "find communication technology more difficult to use". A guide entitled 'Communication Choices: For deaf and hard of hearing people' is available for download from BT's website.[44] This report was produced with assistance from Ofcom (The independent regulator and competition authority for the UK communications industries), TAG (a small consortium of national organisations for and of deaf people), and RNID (the UK's largest charity representing deaf and hard of hearing people). While BT's guide focuses mainly on traditional analogue telephony, it does cover a number of other options – such as Internet-based solutions and associated technologies.

2.6.1 Regulatory regime in the UK

When the 2002 European legal and regulatory framework for electronic communications came into effect, the Communications Act 2003[45] was established as the UK's prime instrument for transposing this framework into UK law. The previous licence regime was withdrawn and replaced by a system of General and Specific Conditions of Entitlement. Specific Conditions come in four different flavours: Universal Service conditions, Access-related conditions, Privileged Supplier conditions and Significant Market Power conditions.

Universal Service Conditions are the practical implementation of Universal Service – as set out in the Universal Service Order issued by the Secretary of State. In other words, the Universal Service Order determines the scope and content of Universal Service. Ofcom's duty as the regulator is to implement the Order by designating Universal Service providers on which Universal Service Obligations are then imposed in the form of Specific Conditions of Entitlement. According to Ofcom rules, all Publicly Available Telephone Service (PATS) providers[46] must provide a number of specific

[40] As per its "Digital Britain" report published on 16 June 2009. Also available online at http://www.ofcom.org.uk/research/cm/cmr09/
[41] All data taken from Ofcom's "The Communications Market 2009", Ofcom, London, August 2009. Also available online at http://www.ofcom.org.uk/research/cm/cmr09/
[42] Ofcom: The Communications Market 2009 (August), London, 2009. Also available online at http://www.ofcom.org.uk/research/cm/cmr09/
[43] BT Inclusive Communications (http://www.btplc.com/inclusion/index.htm). Accessed 12 October 2009.
44 'Communication Choices – for deaf or hard of hearing people' (http://www.btplc.com/inclusion/Usefuldownloads/Communication-Choices-fordeaf-or-hard-of-hearing-people.pdf). Accessed 12 October 2009.
[45] http://www.opsi.gov.uk/ACTS/acts2003/ukpga_20030021_en_1
[46] "A service available to the public for originating and receiving national and international calls and access to emergency services through a telephone number or numbers in a national or

services for customers with disabilities. These services, which are highlighted[47] on Ofcom's website, are:

- The provision of an approved text relay service for people who are deaf or speech-impaired. A text relay service relies on intermediate operators to provide live text-to-speech and speech-to-text translation services as required, in order to facilitate two way conversation. The use of such a service from a fixed landline requires access to a textphone. The way that text relay services are provided for mobile users varies depending on the mobile service provider. For example, Vodafone customers can use an integrated terminal, whereas customers on the 3, Orange, O_2 and T-mobile networks must use a separate portable keyboard. Ofcom has developed a 'minimum quality standards' policy to ensure that service quality meets the needs of users. These standards will be discussed in the section on the UK Text Relay service.
- The provision of a free directory enquiries onward connection service for users unable to use a printed directory – such as people who are registered blind or have impaired vision, as well as those who have manual dexterity problems and cannot handle a standard physical telephone directory. In the UK, this service can be accessed by dialing 195.
- A priority service for disabled customers who urgently require faulty telephone equipment to be repaired.
- The implementation of a 'Nominated third-party' scheme that allows nominated persons to act on behalf of a customer unable to adequately manage their own affairs due to disability or illness.
- The provision of bills, contracts and other correspondence in accessible format for the benefit of users who are blind, visually impaired or have cognitive difficulties that lead to difficulty in reading regular print. Upon request, bills are to be provided in large print format, Braille or (even) audio.

Importantly, General Condition 4 requires all Publicly Available Telephone Service providers to ensure that users can access 112 and 999 services free of charge and, where technically feasible, make caller location information available to the emergency services.

2.6.1.1 Public call boxes

Ofcom regulations state that public call box providers in the UK must display the minimum connection charge, and that 999/112 emergency calls must be free of charge.[48] Furthermore, the Universal Service Obligation on public call boxes is in place to ensure basic fixed line services are available at an affordable price to all citizens and customers throughout the UK. So, even though Ofcom's research report *Communications Market 2006* showed that only a negligible number of individuals now rely on public call boxes as their primary means of making calls[49], they can still be vital to people who do not have access to a landline phone and cannot, for whatever reason, use a mobile. Around seven per cent of adults were found to regularly use the UK's 67,000[50] public phone boxes, most of which are operated by BT.

Even so, people are not using these phone boxes as much as in the past, with BT's income from public call boxes almost halving between 2000 and 2006. In fact, BT says that six out of 10 of their

international telephone numbering plan" (http://www.opsi.gov.uk/SI/si2003/20031904.htm). Accessed 19 November 2009.

[47] Ofcom: 'What services must telephone companies provide to customers with disabilities?' (http://ask.ofcom.org.uk/help/telephone/disphone). Accessed 10 October 2009.

[48] Ofcom 'If you need advice about public payphones…' (http://www.ofcom.org.uk/consumeradvice/landline/payphones/payphonecost/) Accessed 18 October 2009.

[49] Ofcom Communications Market Report 2006 – Telecoms (http://www.ofcom.org.uk/research/cm/cm06/cmr06_print/telec.pdf) Accessed 29 October 2009

[50] Ofcom: 'How many phone boxes are there currently in the UK?' (http://ask.ofcom.org.uk/help/telephone/how_many_phone_boxes) Accessed 19 November 2009.

phone boxes lose them money, which is why they have a programme to reduce their number. However, BT cannot simply curtail this service on cost grounds alone. The company has a duty under the Universal Service Obligation to provide a reasonable number of working phone boxes where they are most needed.

2.6.1.2 VoIP

Voice over Internet Protocol (VoIP) enables the use of voice telephony over IP networks such as the public Internet. The user is then able to make calls from their mobile phone, PC or VoIP handset in the home, in the office, or while on the move. Such calls can be made worldwide direct to another VoIP user or through gateways to traditional fixed and mobile telephony numbers.

The use of VoIP Telephony has been growing steadily in the UK over the past decade, often being marketed as a cheaper alternative to traditional PSTN telephony, as well as embracing additional services such as text and video. This growth in VoIP services has been in both the home and business sectors, with 10% of UK households being reported to have used VoIP services during the last quarter of 2006 – double the percentage for the same period in 2005.[51]

As a result of the scope and definitions of the 2002 EU framework for electronic communications, Ofcom's ability to regulate VoIP providers under the Communications Act 2003 is more restricted than for traditional fixed and mobile services. However, amendments of the Act in 2007, in conjunction with various statutory instruments, provide Ofcom with some avenues for incentivising VoIP providers to better match the legal obligations that exist in the regulated fixed and mobile markets – and access to emergency services has been a key focus of this approach. Success in achieving equality of access remains mixed, however, with some VoIP providers continuing to resist the obligation to provide access to 999/112.

2.6.2 Standard Emergency Services Access

In the UK, Emergency Services can be contacted by dialing 999. This is the number of the world's oldest emergency call service (established 1937), which is free of charge to call. Calls made to the standard European Union emergency number 112 are automatically routed to the 999 operators as both numbers correspond to the same physical infrastructure and neither is given priority over the other.

BT receives 30 million calls a year to the emergency numbers 999 and 112.[52] Strict procedures are adhered to when handling such calls, and these are set out in a code of practice established between telecoms operators and the emergency services agents. In 1998 BT introduced a new system by the name of EISEC[53] (Enhanced Information Service for Emergency Calls) whereby all available information about the caller's location is transmitted electronically to the relevant emergency service. Prior to the introduction of this system, the operator was required to start the connection to the control room of the required emergency service by stating the location of the operator, followed by the caller's telephone number. In 2003, the EISEC functionality was upgraded to cater for emergency services calls from mobile phones – allowing location information to be transmitted directly to the emergency service operator. For all residential and business fixed line calls, as well as public payphones on the BT network, name and address information is transmitted, whereas for mobile calls the caller's location information is transmitted in the form of a map 'zone' reference, but without an associated name and address. However, if the call is from a fixed line provided by a telecoms operator other than BT, it may not be possible for the system to automatically provide this location information.

[51] Regulation of VoIP Services: Access to the Emergency Services: Statement and publication of a statutory notification under section 48(1) of the Communications Act 2003
[52] BBC News (online) 'When are silent 999 calls cut off?' 26 November 2008 (http://news.bbc.co.uk/1/hi/magazine/7748046.stm) Accessed 6 October 2009.
[53] BT SIN 278; Issue 1.7; August 2009: Enhanced Information Service for Emergency Calls – Service Description (http://www.btwebworld.com/sinet/278v1p7.pdf) Accessed 18 October 2009.

BT has strict policies and procedures in place to ensure the security of such automatic electronic data transfers is not compromised. BT minimises the risk of unauthorised access by ensuring that the window of access to these data is limited to the time that is operationally required for the operators to discharge their responsibilities. Compliance with the Data Protection Act 1998 as well as the Computer Misuse Act 1990 is stringently maintained. As well as reviewing access to these data on a regular basis and ensuring that all legal and regulatory requirements are fulfilled, BT also ensures that all Emergency Service agents with access to the data abide by the BT EISEC Security Policy: this outlines the agent's responsibilities within the overall BT UK Security Policy.

The issue of 'Emergency Mobile Roaming' has long been a hot topic in the field of mobile telecommunications, and one which Ofcom included as a priority area of work in March 2009. Prior to 14 October 2009, mobile calls to 999 and 112 emergency numbers could only be connected if the caller's own designated network was available in that area.[54] However, it has since become possible for users to call the emergency services numbers through another network – if their own network is unavailable, and an alternative provider has coverage.[55] This 'roaming' facility will be invoked automatically, with the device switching to whichever network has the best coverage in the area – and no cost will be incurred for its use. Ofcom has welcomed the introduction of this service, stating that it "will provide added reassurance to consumers should they need to call 999 or 112 and will be of particular benefit to those in rural areas across the UK". Ofcom does however recognise that this function does currently have limitations. Firstly, the ability to receive calls while on the 'adopted' network is lost. And secondly (and perhaps more importantly in terms of emergency service access), the location information transmitted to emergency services operators becomes less accurate.

2.6.3 Silent Call termination policy

In 2001 the Metropolitan Police (the Met) deployed a system called *Silent Solutions*[56] for dealing with the growing number of accidental silent 999 calls – an increasingly problematic trend largely caused by the capability of mobile phone handsets to dial and proceed with emergency calls, even when in 'locked' mode. Before the introduction of *Silent Solutions*, operators from UK police forces had to attempt to obtain a response by asking a series of questions whenever a 'silent call' was received. For example, they may have asked the caller to vocalise as best they could, or even to tap the screen of their handset if they required assistance.

Under the *Silent Solutions* system all silent 999/112 calls are automatically routed to an automated police voice response system at the Met's Central Communication Command, which plays a recorded message to the caller. This message prompts the caller to press the number 5 (universally identified with a raised dot or bar) on their telephone keypad twice if they require emergency assistance. If the caller then presses '5-5', they are connected immediately to an operator, but if '5-5' is not keyed within the allowable time period, the call is disconnected. In the case of a suspicious noise being heard, the operator can override these procedures and connect the call directly to a police emergency authority control room.

Between July 2001 (when the Silent Solutions system was introduced) and September 2008, more than 40 million silent calls were made to emergency services – averaging around 5.5 million silent calls a year. But, based on recorded instances of callers dialing 5-5 between 2004 and 2008, the Met estimates that only 0.9% of all silent calls received by emergency service operators are

[54] Ofcom: 'Connecting Citizens'. Accessed 15 October 2009 (http://www.ofcom.org.uk/consumer/2009/10/connecting-citizens/#at) Accessed 28 October 2009.
[55] Ofcom: 'Access and Inclusion – digital communications for all' October 15, 2009 (http://www.ofcom.org.uk/consult/condocs/access/ai_statement/ai_statement.pdf) Accessed October 28, 2009.
[56] BBC News (online) 'Technology tackles bogus 999 calls' 23 May 2002 (http://news.bbc.co.uk/1/hi/sci/tech/2002446.stm) Accessed 6 October 2009.

intentional.

2.6.4 'Non-emergency' number trials

An alternative 'Single non-emergency number' (SNEN) service was deployed on a trial basis in a number of UK locations in the summer of 2006.[57] Intended for the reporting of 'low level crime' such as vandalism and antisocial behaviour, the '101' non-emergency number was designed to ease pressure on the 999 service, which (according to figures quoted by Government Minister Hazel Blears) received around 70% non-emergency calls in 2004. Despite being highly successful and receiving over 85,000 calls in the city of Sheffield alone between June 2006 and November 2007, funding for these trials came to an end in early 2008.[58]

2.6.5 Textphones in the UK

A textphone is an electronic device to enable bi-directional communication in text over a telephone line. Textphones are commonly used when one or more of the parties in the conversation have impairment of hearing and/or speech. Textphones incorporate a standard QWERTY keyboard for text generation and a small screen for text display. The typed text is transmitted in real-time to the recipient over the telephone line. In order to receive the text and reply, the recipient must be using a compatible device, such as another textphone or a home computer with special real-time text software installed. It is thought that up to half a million people in the UK are unable to use a standard telephone[59], a proportion of whom use textphones for communication.

2.6.6 Text Relay in the UK

In some countries text relay services have been established to enable those with speech and/or hearing impairment to communicate with hearing people (who use voice telephones) through the transcoding of text into voice and vice versa by a human relay operator. The relay operator speaks the text received from the textphone user for the benefit of the hearing party, and then transcribes their spoken response back into text for the benefit of the textphone user. In the UK, *Text Relay* is currently the only service of this kind. This national, 24 hours a day, 365 days a year service was launched in 1991 as a joint charitably-funded venture between BT and RNID under the name *Typetalk* – and built on a pilot service run by RNID during the 1980s. Since December 2009, *Text Relay* has been operated solely by BT.

In 1994, BT became required to fund the relay service (then *Typetalk*) through a condition in its operating licence since, at the time, licences were part of the then legal framework (as defined in the Telecommunications Act 1984). However, following the introduction of the new regulatory regime in the Communications Act 2003, BT's obligations were transposed into Conditions of Entitlement. Under this regime, the scope of Universal Service (under which the provision of Text Relay falls) is defined in the Universal Service Order. The Universal Service Order defines 'relay service' very narrowly as "a facility for the receipt and translation of voice messages into text and text into voice messages, and the conveyance of that text or voice message to the textphone of subscribers of a person providing a publicly available telephone service". As a consequence, Ofcom is not in a position to impose conditions for the establishment or funding for, say, a video relay service since that would fall outside the definition in the Universal Service Order.

[57] BBC News (online) 'Summer launch for 101 crime line' 8 March 2006 (http://news.bbc.co.uk/1/hi/uk/4786082.stm) Accessed October 10, 2009.
[58] BBC News (online) 'Crime hotline loses funding'. 15 November 2007 (http://news.bbc.co.uk/1/hi/england/south_yorkshire/7097188.stm) Accessed 10 October 2009.
[59] 'Text Relay is good for your business' (http://www.textrelay.org/business.php) Accessed 15 October 2009.

Under Universal Service Condition 4, BT is required to provide funds for the operation of a relay service accessible by any public telephony provider's end-users who need to use the service on account of their disabilities. Under condition 15.3 of the General Conditions of Entitlement, all PATS providers are required to offer access to a relay service which has been approved by Ofcom. In addition, PATS operators must apply a rebate to calls that involve the relay service on the basis that such calls take more time than an equivalent voice phone call. BT voluntarily applies the same rebate to text-to-text calls as well. Condition 15.4 of the General Conditions of Entitlement requires PATS providers to support the use of *Text Relay* prefixes (previously known as *TextDirect* prefixes), including the 18000 emergency number.

In summary – the above three conditions (BTs Universal Service Condition 4 and General Conditions 15.3 and 15.4) mean that BT has to fund and make available a text relay service which has to be accessible to users of other fixed (and mobile) networks. Text Relay is the relay service that BT funds (and currently operates) in order to fulfil its legal obligations.

While BT has a duty to fund and make available a text relay service, and even though this is subject to certain basic service level requirements and approval by Ofcom, the present regime ties funding directly to operational management decisions. It is therefore not in BT's interest to provision the service liberally in terms of capacity or to innovate and develop its technology or its functionality. Rather, it is in BT's financial interest to interpret its legal obligations in the narrowest sense permissible, since this keeps expenditure to a minimum. It is expected that the review of Universal Service currently taking place in the UK will seek to address the shortcomings of this model.

The General Conditions of Entitlement apply to all Publicly Available Telephone Service (PATS) providers, including Mobile operators. Therefore, mobile network operators too are required to meet both condition 15.3, which obliges PATS providers to offer access to a relay service which has been approved as such by Ofcom, and condition 15.4 that requires PATS providers to support the use of the *Text Relay* prefixes (previously known as *TextDirect* prefixes) – including the '18000' emergency number. Note that these obligations do not imply the provision of suitable mobile terminals such as 'Mobile Textphones' – the consequence of which is that solutions for real-time text access on the move are practically limited. In the UK, the only truly mobile textphone solutions are those developed and supplied by RNID.[60]

In June 2004, Ofcom published a report entitled *Universal Service Obligation: Deaf and hearing impaired consumers and text phone services*[61]. This report presented the results of a research study carried out by the MORI Social Research Institute on behalf of Ofcom. The study was commissioned to "develop understanding about the usage of, attitudes towards, and perceived benefits of textphone services". This research involved in-depth interview sessions with three specific audience types, which it was hoped would accurately reflect the views of all text deaf and hard of hearing relay service users. These groups were people with hearing loss who did not use sign language, profoundly deaf people who also did not use sign language, and profoundly deaf people who were sign language users.

The research found that *Text Relay* (*Typetalk* as then known) was a "*familiar, convenient and well appreciated service*", considered by users to be *"the quickest way to contact the hearing community and resolve a call in real time*". The service was however perceived by users to be "*outdated and a one size fits all model of provision, behind modern trends towards personalisation and convergence technologies*". In terms of possible future developments, the report stressed that a compromise is required between an ideal service and solutions that actually work in the real world. The 'ideal service' uncovered by the study was "an organic multi-channel visual and text

[60] See http://www.ictrnid.org.uk/mobtext.html

[61] Ofcom 'Universal Service Obligation: Deaf and hearing impaired consumers and text phone services'' (http://www.ofcom.org.uk/research/telecoms/reports/uso.pdf). Accessed 8 October 2009.

service that is owned by the deaf community and convergent with other mediums". The report stressed that, while there is no need to replace the Text Relay service outright, there should be much greater integration and connectivity between it and other technologies. However, the report further stressed that this proposed evolution of the service should in no way involve resorting to "unproven technology that may lack the convenience and practicality of (*Text Relay*)".

2.6.7 Video Relay in the UK

A videophone is a telephone with built-in video screen, capable of supporting full bi-directional real-time video and audio transmissions. Videophones are useful to deaf, hard of hearing and speech-impaired people who can use them to communicate in sign language with other videophone users, as well as with standard (voice) telephone users by means of video relay services.

A video relay service works in much the same way as the text relay service described previously, the main difference being that video relay services rely on the use of Sign Language-proficient relay operators who translate the conversation from spoken to signed language – such as spoken English to British Sign Language (BSL) – and vice versa, as required by the parties involved in the conversation.

In 2007, pioneering video relay services run by both RNID and the BDA closed due of a lack of sustaining funding, meaning that *SignVideo* remains the sole provider of video relay services in the UK[62]. Established by Significan't (UK) Ltd. in 2004, *SignVideo* is a deaf and sign language led social enterprise that employs only fully qualified and registered sign language interpreters; it reached its 10,000th video call minute in 2006. *SignVideo* provides services for the National Health Service, Local and National Government Agencies, voluntary organisations, deaf businesses and deaf individuals in their places of work. In June 2009, *SignVideo* was awarded ISO 9001 compliance (Government-supported certification achieved by about only 5% of UK businesses) for their interpreting services, technology and service delivery.

SignVideo provides a range of interpreting and translation services – one of which is a video relay service which enables a user to connect to a *SignVideo* interpreter from their own home via a videophone or webcam in order to make a call to the chosen recipient. Upon connecting with the interpreter, the user must then provide the contact number of the person they wish to call. The interpreter then connects to this number and interprets the conversation.
The use of the *SignVideo* service is dependent on the user having access to compatible technology. According to the *SignVideo* website[63], the user must have one of these types of connection:

- Fast broadband internet connection for an IP videophone or videoconferencing unit. (high quality home broadband connection, office LAN or a WAN system)
- ISDN6 connection
- HSPA (post 3G) mobile network connection

In addition, the user must be using one of the following devices:

- Broadband videophone
- Corporate videoconferencing unit
- Webcam with videoconferencing software
- ISDN6 videophone
- HSDPA enabled (post 3G) mobile videophone

[62] SignVideo: 'About us' (http://www.signvideo.co.uk/aboutus.php) Accessed 11 October 2009.
[63] SignVideo: 'Services' (http://www.signvideo.co.uk/services/technology.php) Accessed 11 October 2009

In June 2006, a research study[64] commissioned by Ofcom and conducted by London City University investigated the feasibility of introducing further relay services to meet the Universal Service Obligation of ensuring that basic fixed line services are available at an affordable price to all citizens and customers across the UK. This study concluded that "*video relay clearly does much to promote independence and is favoured by many sign language users because of its ease, speed (once installation problems are resolved) and suitability to convey emotion".* The report also concluded that "*Existing users tend to see video relay as a communication equality issue rather than a service for which they should be prepared to pay extra. To date, the majority of communications tend to be work-related or with friends and relations, and it has tended to replace telephone contact that previously involved their own third party helper. Existing users expect to use the service more frequently in future, some several times a week or even several times daily. Sign language users who have not yet used video relay display a realistic, but very real enthusiasm about its potential. They too see video relay provision as an equality issue to give them better access to the telephone network and decrease their need for help on the telephone. They see it as broadening their access opportunities and forming a very significant part of their telecoms usage strategies. They have concerns about technology, cost and interpreter quality."*

In terms of service delivery, the report concluded that broadband is currently the best way to deliver video relay and, while the study recognised that there were some technical challenges yet to be overcome, the existing video relay services had worked well and showed great promise for further improvement.

Unlike for text relay, however, there is no present legal and regulatory provision in the UK to subsidise the cost of video relay provision, and there are no obligations on PATS providers to offer access to such services. As previously noted, the Universal Service Order defines 'relay service' as "a facility for the receipt and translation of voice messages into text and text into voice messages, and the conveyance of that text or voice message to the textphone of subscribers of a person providing a publicly available telephone service". As the Universal Service Order defines the scope of the obligation, this definition does not permit Ofcom to impose conditions for either the establishment of a video relay service or for its funding. Consequently, such services cannot be funded through a Universal Service funding mechanism. Funding *could*, however, be made available by either modifying the definition in the Universal Service Order to allow Ofcom to designate a provider for such service (or providers), or via other sources such as general or specific taxation.

2.6.8 SMS access to 999/112 in the UK

Just as for the population as a whole, SMS text has become an increasingly important communication medium for deaf and hard of hearing people – as well as for those people with speech impairments. And SMS is of course a standard facility incorporated in the vast majority of mobile phone devices, and one which is (generally) easily used and accessed.

In recent years, several regional schemes have been established for SMS access to local emergency services across the UK. These schemes allow users to text an emergency call centre (often a police call centre) using either a 5 digit short number, or a full 11 digit mobile number. While these services have undoubtedly improved emergency access for non-voice users in some regions, it has led to worrying fragmentation of service delivery with significant differences in implementation – and thus user experience. Also, such schemes often cannot provide essential functionality such as caller ID or location information, both of which are key to effective emergency call handling.

[64] Ofcom 'Feasibility of additional telephone relay services' (http://www.ofcom.org.uk/research/telecoms/reports/relayservices/relayreport.pdf) Accessed 9 October 2009.

In 2005 the UK government's 999/112 liaison committee formed a working group to bring together all stakeholders: government, the telecommunications sector, the emergency services, Ofcom and RNID representing users. This working group has since established a scheme for a national emergency SMS emergency service.[65] And as of September 2009 a pilot service is being trialled in the UK that allows people who cannot make voice calls to contact the emergency services by sending SMS messages to 999. Users have first to register their mobile device(s) before being able to use this service. Once registered, the user is then able to contact the emergency services – should the requirement arise – by sending an SMS text. This will be delivered to the required emergency services operator via the *Text Relay* service, with a relay operator 'speaking' the SMS message to the emergency service operator. The emergency service will then respond to the relay operator in voice, who will convey the message to the user via SMS text. Any subsequent 'conversations' during the emergency event will follow the same pattern.

By integrating the SMS service into the *Text Relay* infrastructure, the emergency SMS service is able to provide caller ID and location information in the same manner as for any mobile voice calls – even though the present mobile standards and implementations do not cover this functionality for SMS.

[65] 'EmergencySMS – SMS to the emergency services' (http://emergencysms.org.uk/index.php) Accessed 9 October 2009.

3 Surveys of user experience of emergency services

This part of the report documents users' past experiences of contacting emergency services and details their aspirations for more accessible service provision in the future. The information was principally obtained from the responses to questionnaires that were sent to individuals within the Netherlands, Sweden and the United Kingdom. Some preliminary data relating to deaf people in Spain were also obtained, and these are now being used to inform a more comprehensive study now underway in that country.

In addition to the questionnaires, in-depth interviews with individuals were carried out in France and the United Kingdom. Section 3.2 presents the findings from these studies.

3.1 Questionnaires

Users' prior experiences of contact with emergency services were investigated by means of a questionnaire sent to a large number of targeted individuals in the Netherlands, Spain, Sweden and the United Kingdom. Questionnaire drafting was led by RNID and then, following a round of feedback from other partners, the agreed version was translated into the other three languages. The questionnaire was disseminated as required through a range of online channels – taking account of the emergency service provision situation in each of the relevant countries. A copy of the original UK questionnaire is shown in Appendix 3.

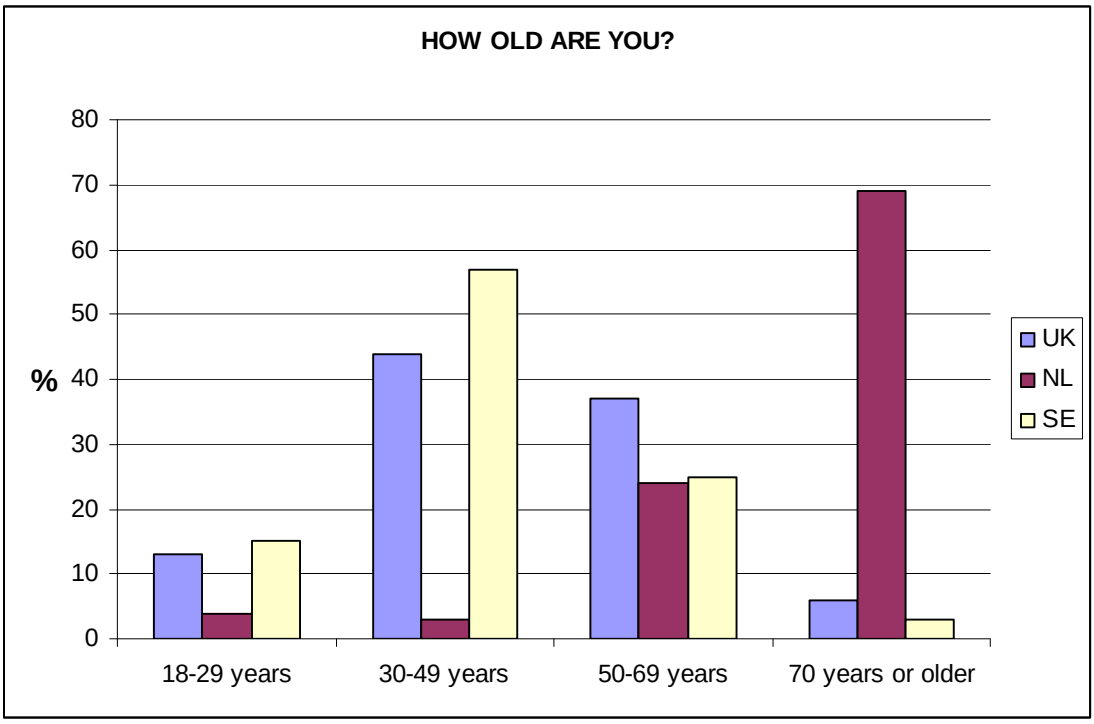
There were three general areas of enquiry – the first to identify basic information about the users (their ages, level of hearing loss etc), the second their current access to equipment and experiences of contacting the emergency services, either directly or via a relay service, and the third to elicit their thoughts on future service provision.

Basic questions required the user to simply tick a box, or rate a service or technology. Such responses enable analysis and cross-country comparisons to be made relatively easily. More detailed information was then gathered through free-form and directed written comments in each section of the questionnaire.

The graphs and diagrams in the following sections do not aim to present and compare every minor aspect of the results of the survey. The total body of information from respondents represents a useful information resource for later stages of the project. Here we highlight the key similarities and differences across parameters and countries that are of particular significance to the project.

3.1.1 Demographics of user groups

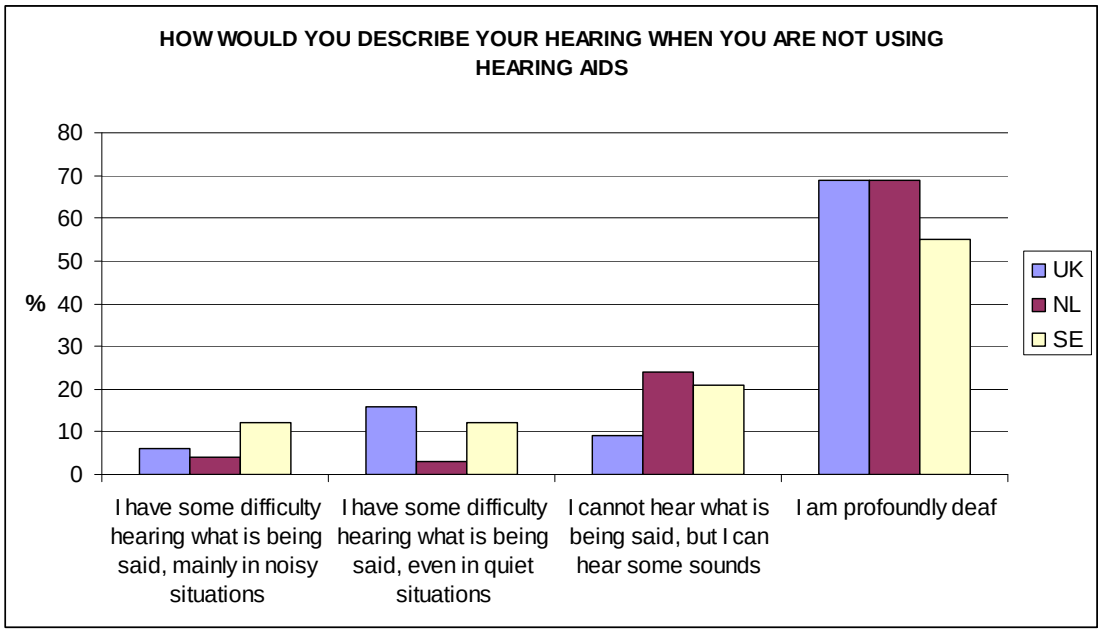
Figure 3 shows the age distribution of respondents in the three countries: the age distribution of the Swedish and UK cohorts are quite similar, but these differ markedly from that for the Netherlands, for which the majority of people were over 70 years of age.



[Totals: UK (161), NL (122), SE (65), Overall (348)]

Figure 3 - Respondents Ages

When asked to evaluate their own hearing ability, users self classified themselves within the range 'mild hearing loss' to 'profound deafness'. However, in all countries the majority of respondents identified themselves as bring profoundly deaf.

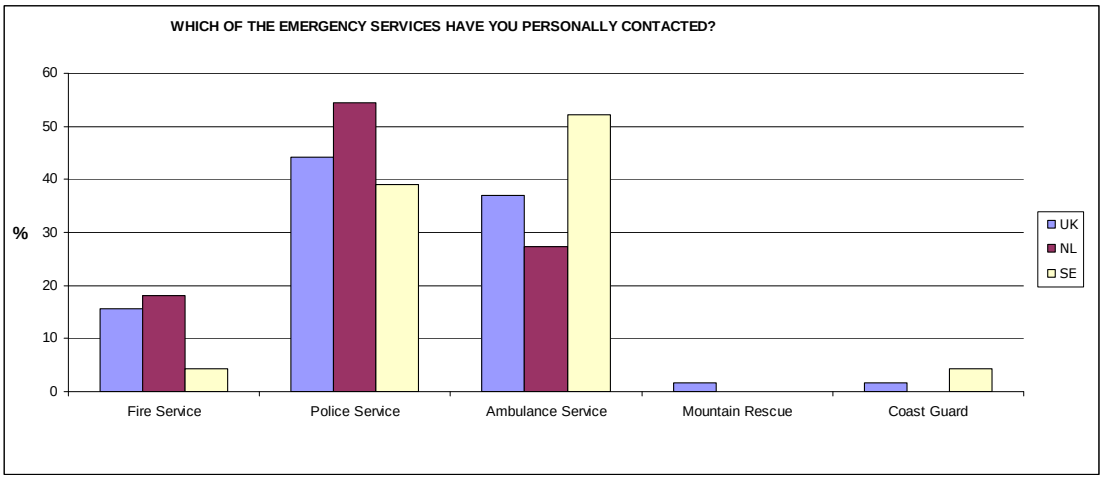


[Totals: UK (159), NL (122), SE (67), Overall (348)]

Figure 4 - Respondents Hearing Losses

3.1.2 Equipment and Past Experiences

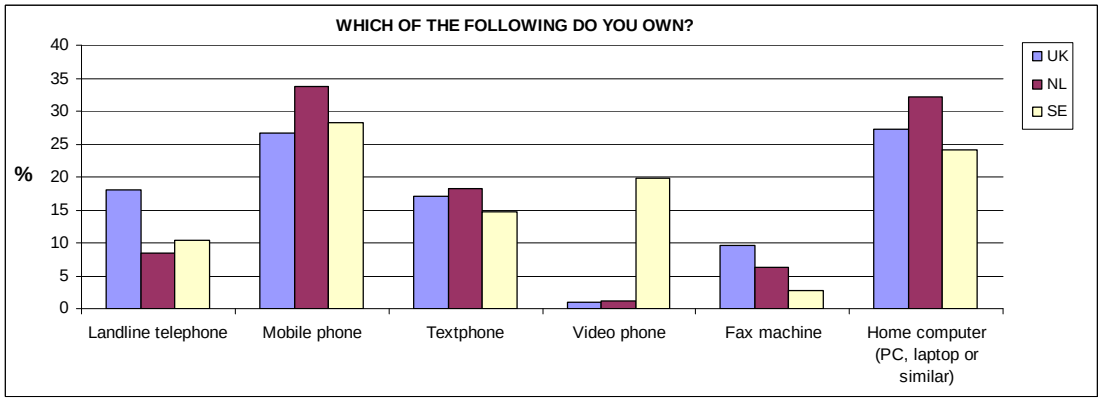
Of users who responded to the questionnaire just under half had contacted the emergency services either directly or through a relay service. Note that, as might be expected, some users reported having contacted more than one of the emergency services.



[Totals: UK (122), NL (22), SE (23), Overall (167)]

Figure 5 - Previous Contact with Emergency Services

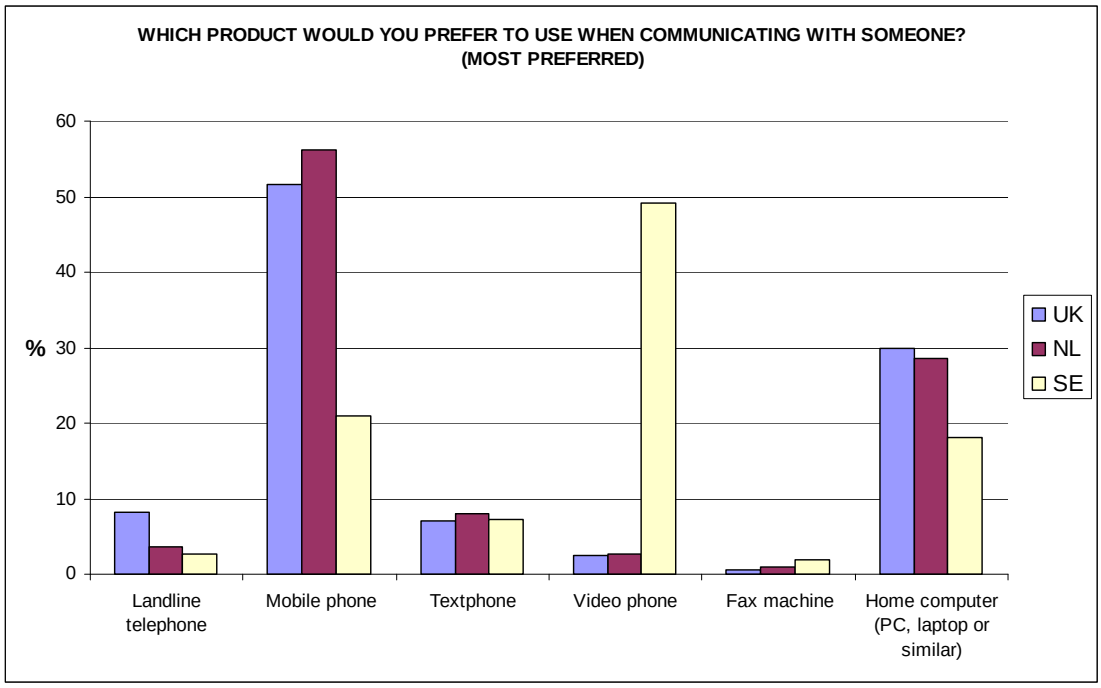
Respondents were asked to identify which communication equipment they owned and this did highlight some interesting differences between countries. Sweden was the only country where a significant number of respondents owned a videophone. All countries have a majority of users with a mobile phone and computer, but the UK showed many users owned more traditional communication devices including fax machines and textphones.



[Totals: UK (568), NL (335), SE (212), Overall (1115)]

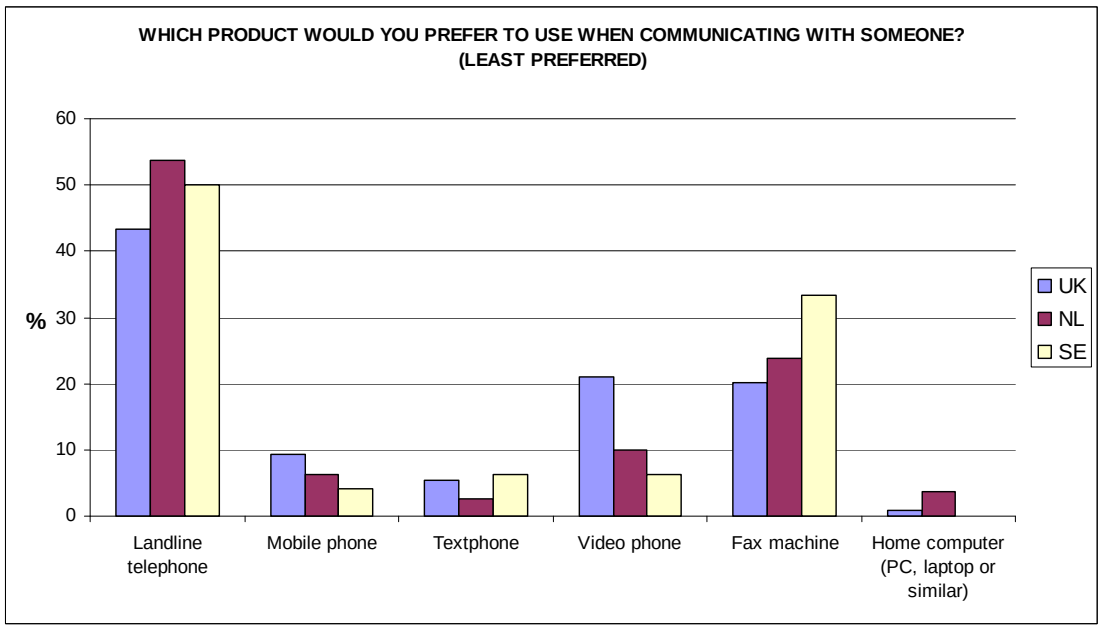
Figure 6 - Previous User Experiences of Emergency Services

The ownership of particular devices did impact on users preferred communication choice with Swedish users showing a strong preference for video communication that is not mirrored in the other survey countries. Across all countries there was a strong preference for both computer-based and mobile communication solutions. Respondents in all countries did not feel landline voice phones or fax machines were key technologies for communication.



[Totals: UK (157), NL (112), SE (110), Overall (379)]

Figure 7 - Most Preferred Communication Device



[Totals: UK (129), NL (80), SE (48), Overall (257)]

Figure 8 - Least Preferred Communication Device

Users' responses to experiences of text relay services were limited, with only the UK showing significant use of the service – most likely due to the large number of legacy textphone devices still in use, and the long establishment of the text relay service. Most users indicated that they were satisfied with their experience.

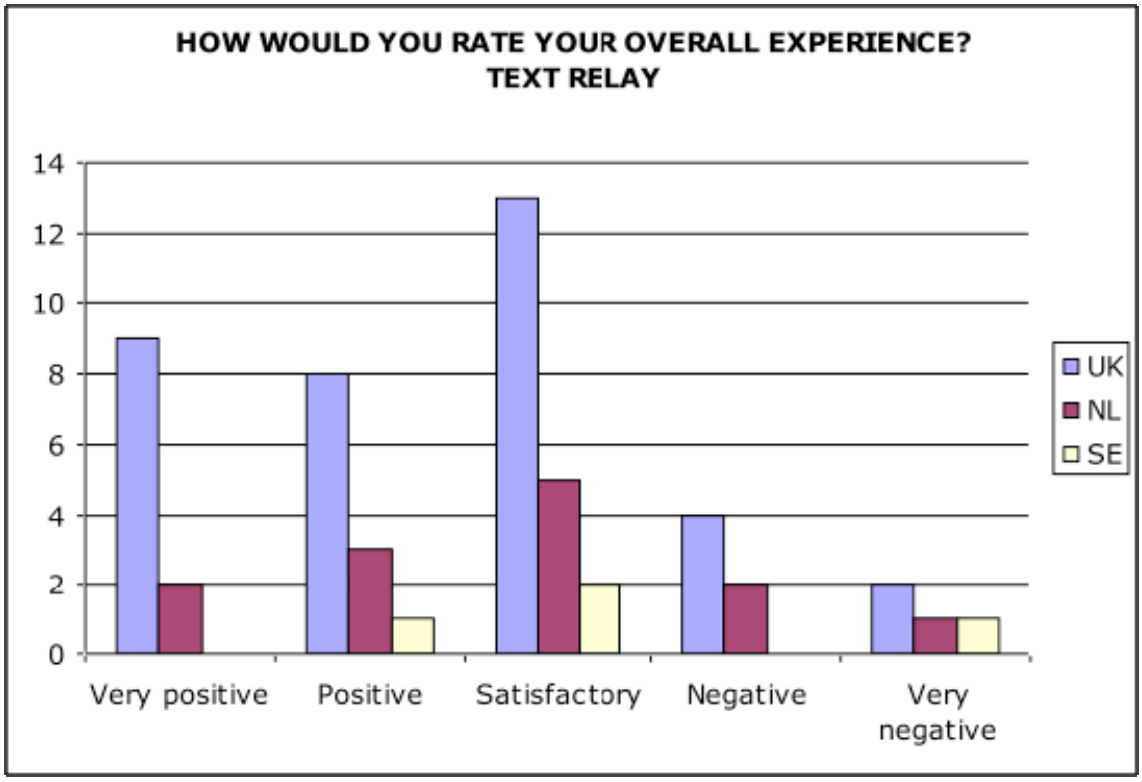


Figure 9 - Text Relay Service Rating

Only 9 respondents had contacted emergency services through a video relay. This is a relatively new communication channel with comparatively low take up, but it can be expected to grow as these services gradually become established across Europe.

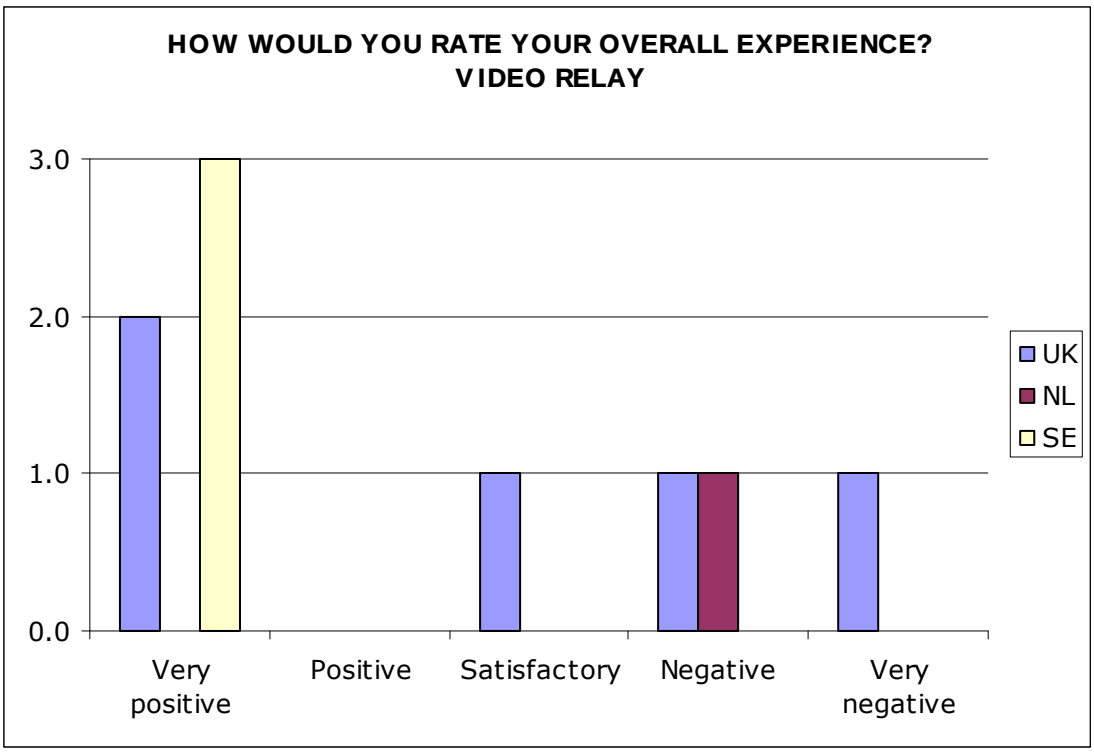


Figure 10 - Video Relay Service Rating

One of the strongest responses to the questionnaire was around the perceived access level of services with only 25% confident or very confident that they received the same level of service as people contacting through traditional voice channels. This is an important issue to be addressed within the project.

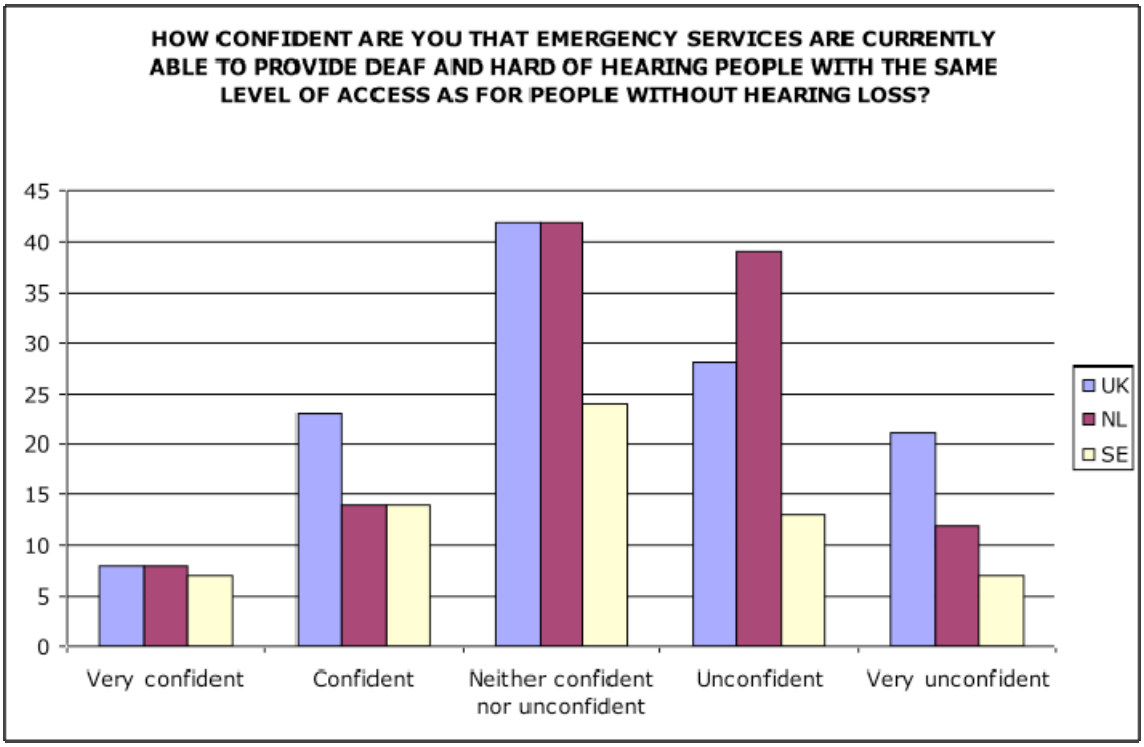


Figure 11 - Confidence in Emergency Services

Across all countries there was a strong feeling (74% agreeing) that enabling text, video and voice (Total Conversation) communication with emergency services would make it easier to contact the emergency services.

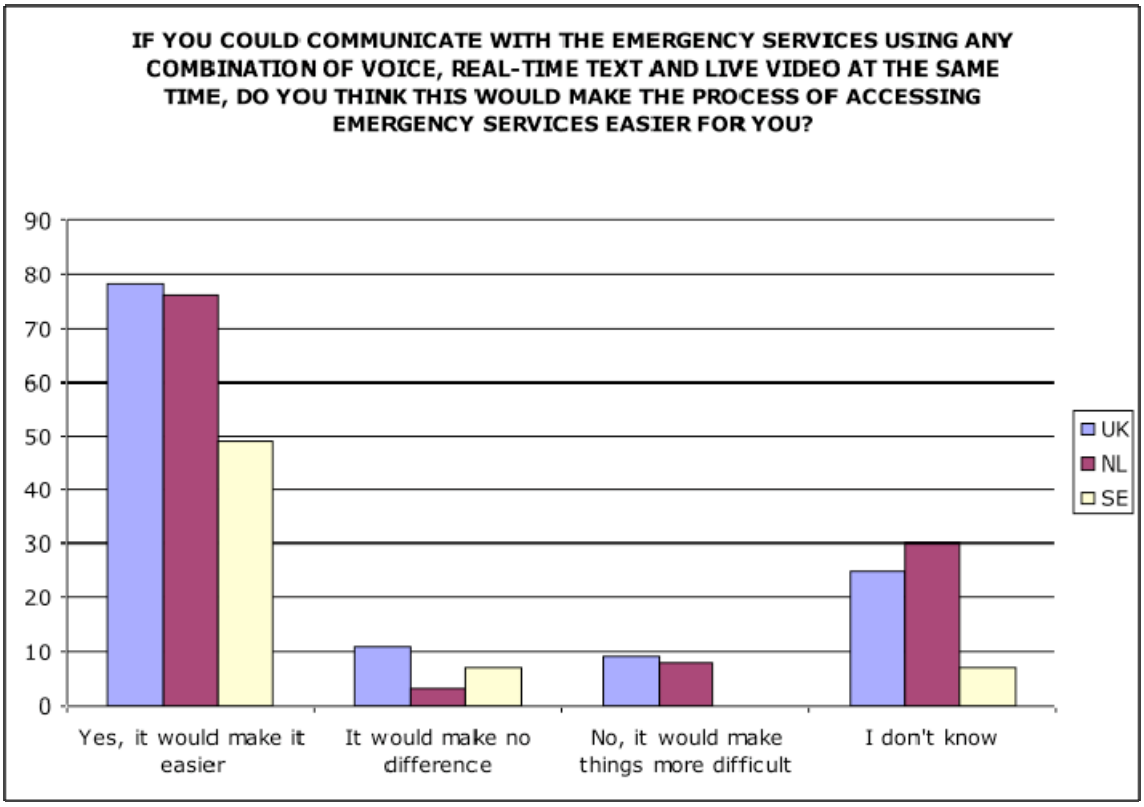


Figure 12 - Ideal Communication Technology

3.2 In-depth investigations with users

3.2.1 France

The French survey of user experiences of emergency services is presented in two sections.
First, we have worked on the identification of the needs of end users. Rather than quantitative data, it was decided to investigate the widest range of emergency situations and to gather an exhaustive set of evidence in order to understand the nature of the difficulties encountered, as well as the possible solutions. So, the first section describes our method for gathering the information, the characteristics of people interviewed, the evidence about deaf people and emergency, and a synthesis of the needs of all end users.

The second section presents how the French pilot intends to take into account these needs within the project. We first summarize the technical and organisational accessibility constraints of 112 calls in France, and then explain the choices of the French pilot. In particular, we describe the special linguistic skills the 112 PSAP staff must have, and so, our choice of having both deaf and hearing 112 PSAPs. We discuss the need to create a stage one PSAP in France, and our work on the platform interface and the PSAP's needs.

3.2.1.1 Identification of the needs of end users

3.2.1.1.a Organisation of the Survey

The French pilot is based on a network of deaf people, interpreters, medical staff and emergency staff. The data collected on the needs and experiences of people who cannot use a voice phone relate to different individuals from a wide range of profiles and situations. Rather than quantitative

data, it was decided to investigate the widest range of emergency situations and to gather an exhaustive set of evidence in order to understand the nature of the difficulties encountered, as well as the possible solutions. It is for this reason that respondents were offered the choice to provide evidence in French Sign Language (on video), or in written French. The survey was widely publicised on the web, and on scientific and association websites, mailing lists and forums. We welcomed responses in written or sign language, via written or video email, messages on a forum, IM in French over MSN, ooVoo (videoconferencing) and others – or through face to face interviews.

26 deaf people, four hearing members of deaf families and 11 health care and interpreter professionals responded to our call for evidence. We collected 58 case studies of emergency situations, most of them medical. The case studies revealed that it could be difficult for these individuals to answer a questionnaire as people have usually experienced several cases of emergency in very different circumstances and via a range services that are either established or being piloted (mobile, fax, relay centre etc.). People with speech or motor difficulties have been contacted (via visits to relevant associations), and we will continue to consult them in this way. The needs of deaf-blind and elderly people have been collected via scientific and medical networks. They will be more involved in the project later, for experimentation and validation of the devices selected and our organisation of 112 calls for them.

3.2.1.1.b Evidence about deaf people and emergencies

Nine detailed cases of medical emergency have been collected from six doctors or medical students and professionals, on the basis of daily medical work with deaf patients in Toulouse, Grenoble and Marseille. One of these cases has been reported by a nurse in a workplace. These testimonies are valuable and highlighted the importance of communication in emergency and care situations. Above all, the cases highlighted that the lack of communication in regular medical relations can have dramatic consequences, and can become the source of emergency. They also pointed to an aspect frequently mentioned and developed in interviews and testimonies of deaf people themselves, that is they want to know what it is happening to them, the nature of their medical problem, what they have to do or not to do, and what the medical or emergency staff want to do.

Five testimonies from five interpreters (from different cities) have also been collected, with specific information about dates and identities of the deaf individuals removed. These cases reveal that it is now urgent to establish a protocol for emergency calls because these professionals encounter many difficulties in their work, even though they are not trained to interpret in these particularly stressful situations. The testimonies reveal that some emergency services don't understand the situation of deaf people or the use of interpreting services, and this has also been confirmed by the families of deaf people. Nevertheless, the testimonies report also that certain services (for instance, border Police, and some medical emergency services working with care units for the deaf) already take into account the needs and human resource requirements for good communication with deaf and hard of hearing people.

Forty-four cases involving ambulance, police and fire brigades, have been collected from 26 deaf people (18 female, 8 male) and 4 hearing members of their families (3 female, 1 male), living in different areas, both in large or small cities. All of them are over thirty years old, and the majority are between 30 and 50 years old, (there were younger people only among the hearing family members). The cases reported include both recent and old situations.

Cases of five deaf people have been reported by the national association UNISDA, and six cases concerning five deaf people have been collected in the context of interviews about video-interpretation by WebSourd. A further thirty-three cases involving 16 deaf people and 4 hearing members of deaf families have been collected on the basis of voluntary testimony for REACH112 work. These testimonies are of great value to the work of the French pilot and the REACH112 project as a whole. The cases are not reported in detail here but, with the agreement of the people concerned, all these testimonies (with names and locations remaining omitted) are being made available on the REACH112 website:
http://www.reach112.eu/view/en/testimonies.html

The interviews found deaf people keen to support the REACH112 project as it offers them solutions to their needs: direct calls in an emergency, the naturalness and full communication of sign language, access to emergency services on the move by real time text services and the rapid immediacy available via RTT. This encompasses all the services and modalities that they want. Their testimonies report some complicated and highly surprising real-life call scenarios: a deaf person calling for example a person by SMS who can phone a member of his hearing family (who does not have mobile phone), who could give all medical or administrative information needed by the emergency staff or who could take charge of other important aspects of an emergency situation such as looking for child, or contacting a lawyer or insurance company. The deaf people we interviewed stressed the importance of accessibility of the emergency services as a whole, not only as far as calling the 112 number, but also with regard to communicating with medical staff and police etc, and for being able to call a lawyer (for instance) directly. The interviewees said they would like direct 112 call access to police, fire brigade and medical staff trained in sign language, and for there to be public access to relay centres. The fieldwork also highlighted unexpected emergency situations for deaf people, such as being accidentally locked in their house or office, or needing car breakdown assistance on the road. Deaf people stressed the need for the PSAP to answer children's phone calls (on behalf of their deaf parents) but at the same time to avoid using these children as interpreters when the emergency service personnel arrive on site. It has become apparent therefore that the needs are not only technical; there has to be adequate means of informing and training the emergency professionals too.

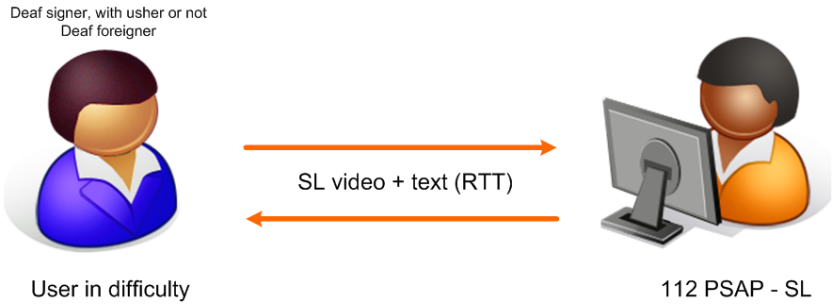
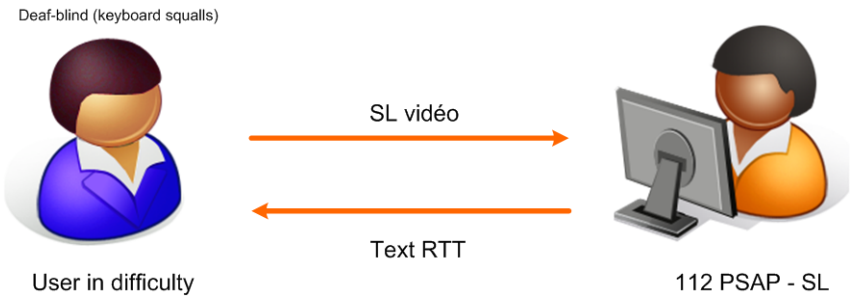
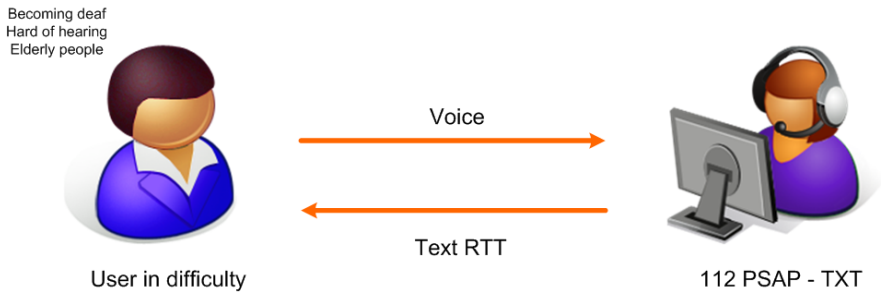
3.2.1.1.c Synthesis of the needs of all end users

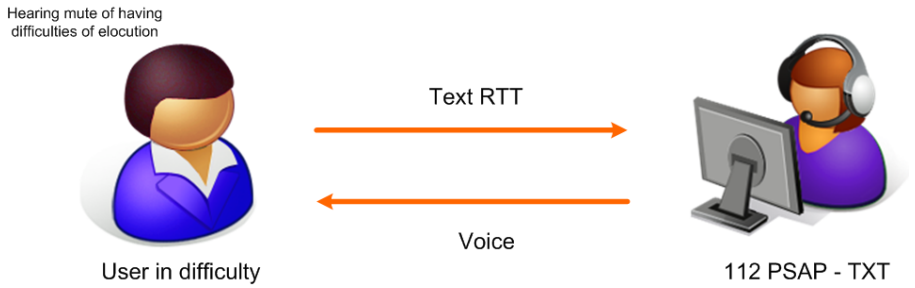
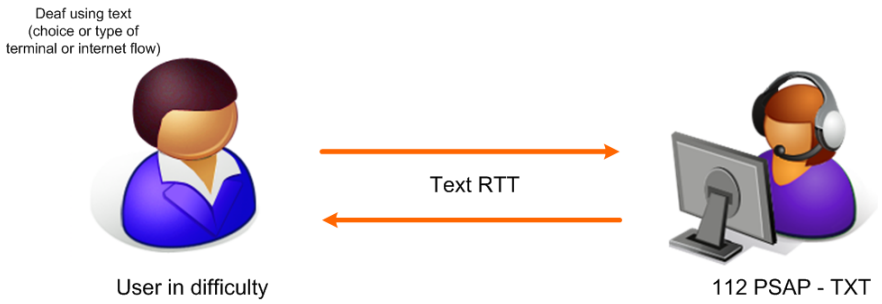
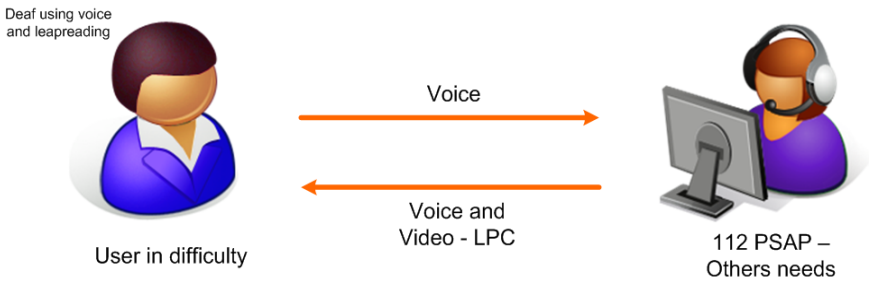
It became apparent that deaf people (even those very competent in written French) wish to be able to call both in sign language and in real-time text while on the move, or when Internet access is inadequate for video calls. Users highlighted that even when calls are principally in sign language or voice, communication by text is still useful in order to be able to accurately convey address information or phone numbers for example. Deaf foreigners and deaf people with Usher's syndrome (a degenerative deaf-blindness genetic disorder[66]) are also interested in sign language communication, although the former may need more iconic sign language and the latter sign language expressed within a smaller area close to the face. The possibility of calling 112 via mobile phones is an important issue for deaf people. Deaf-blind people may need to express themselves in sign language but to receive the answer in tactile text via a special keyboard. People who are losing their hearing, and those who are hard of hearing and elderly generally, wish to express themselves by speech. Some hard of hearing people are able to use ordinary voice phones under good acoustic conditions (little background noise), perhaps in conjunction with hearing aids, but find themselves in difficulty with public telephones, or when using mobile phones. These users would benefit from continuing to be able to use their voice, but to get the reply by text.

People unable to speak or who have speech problems are in the opposite situation to hard of hearing people, as they would prefer to write/type and have the answer through voice. This possibility of being able to communicate with 112 could also be useful following accident or illness that has led to temporary speech impairment. We have also to take into account the possibility that some people with speech problems still wish to express themselves through voice, even if they may not be well understood. It is the same case for some deaf people, for whom when using video communication it may be important to be able to receive the answer through lipreading or cued speech. People and their families affected by both speech production and motor difficulties were very interested and pleased to be informed about the REACH112 project as they "often felt forgotten" (their expressed feeling), yet their needs must not be overlooked. People with multiple yet varied disabilities are in a relatively rare situation ('rare disability'). Work with associations of such individuals is still in progress, but we have identified that they want to use (different) special keyboards for communicating by picture or text. Most of them can receive feedback by voice, and some by simple text or pictures.

[66] http://www.usherlife.co.uk/whatisusher.html

The figures below represent the synthesis of all these needs. Software and equipment must be accessible for all, so they must exhibit good contrast for people with visual difficulties and must be simple to use. Above all, it is very important that the equipment and software proposed for calling 112 should be that already be in daily use for other needs, as part of everyday life.

Case 1 Deaf signer, (with or without Ushers) Deaf foreigner	
Case 2 Deaf-blind (Braille keyboard)	
Case 3 Becoming hard of hearing/ deafened Hard of hearing Age related hearing loss	

Case 4 Hearing person without speech or having speech difficulties	
Case 5 Deaf person using text	
Case 6 Deaf person using voice and lipreading	
Case 7 Hearing person with speech difficulties	

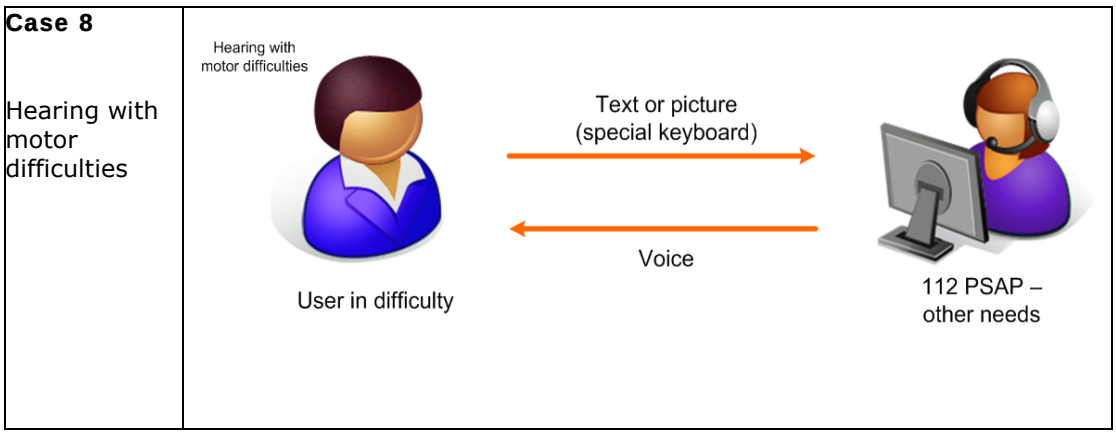


Figure 13 - Communication Needs Between End Users and 112 PSAP

3.2.2 Organisational needs for accessibility of 112 calls

3.2.2.1.a A stage one PSAP and particular linguistic skills

The accessibility of 112 calls requires the PSAP to provide special and specific linguistic skills. For example, a PSAP agent using French sign language has to be able to deal with foreign sign language users, and to be understood by using the more iconic signs commonly shared by deaf people generally (note that inter-language barriers are regarded as being much lower for sign language users than for those using spoken language). The PSAP agent must also be able to understand somebody expressing themselves under stressful conditions, making linguistic mistakes, or wrongly localising signs (within the signing 'space'). The PSAP agent must be able to deal with sign language users in unusual situations (deaf people in difficulty or ill). In addition, they have to be able to understand imperfect writing or writing influenced by sign language syntax. The agent must give confidence to callers so that people in difficulty are able to express themselves more clearly. Therefore, PSAP agents using sign language need to have the skills of a native sign language user, together with pedagogical abilities, and the special training required for dealing with emergency situations. For this reason, the French pilot has decided to train and employ deaf employees for the sign language and text '112' PSAP services, together with hearing '112' PSAP agents with specific competencies for the vocal and written services. This decision was based on the experience of the 12 health centres for deaf people in France which have worked since their creation 15 years ago with doctors who use sign language, interpreters, and with deaf intermediates (see the survey section above). Interpreters alone may not be able to provide sufficient assistance, in particular for deaf foreigners, showing again the relevance of involving a deaf mediator or intermediate (the first only for intercultural dialogue, the latter having also particular language skills). The hospital of Grenoble, a participant in the French pilot, will organise the recruitment and training of the deaf PSAP agents[67] in collaboration with the Grenoble medical emergency services, fire brigade and police.

It is important to bear in mind the particular organisation of the French 112 service, which automatically routes calls directly to the medical emergency service or, sometimes to the fire brigade, as well as the lack of coordination between police, medical emergency and fire brigade services. ***We have to stress the great diversity of equipment, software and Internet access and connectivity of the different emergency services and of the different regions of France.*** This is the reason why the organisation of the accessibility of 112 call in France needs to be at a national or supra-regional level as a stage one PSAP (see later sections 4.1 and 4.3.1), and why we are creating this on the basis of the competencies and partnerships already involved in

[67] http://www.websourd.org/spip.php?article139101

the development of the relay centre for deaf people in France (see section 5.2). Furthermore, to understand the different professional ethics and practices associated with the different emergency services (police, fire, medical), and to understand how the REACH112 project is perceived and what is at stake, WebSourd (as part of the French pilot) has involved an academic scholar to prepare a sociological thesis on this subject.

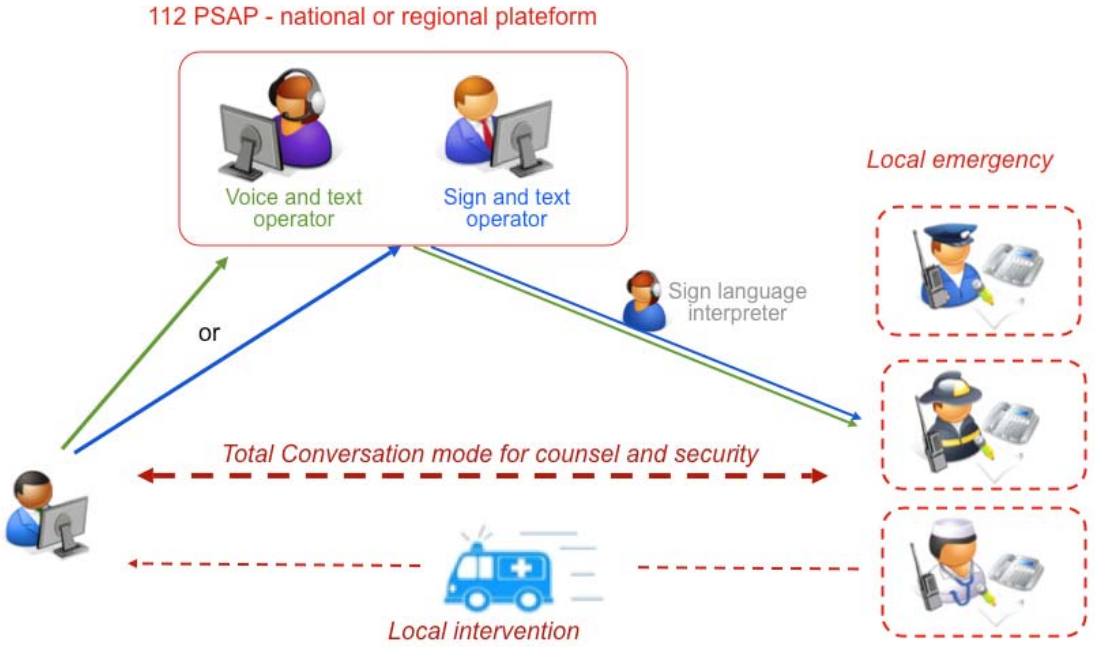


Figure 14 - Call Flow Proposal in France

3.2.2.1.b Work on the platform interface and the PSAP needs.

The role of the 112 operator is to determine the location of the emergency, evaluate the needs (police, fire rescue or hospital; advice or intervention), get all the necessary information (age, gender, name, contact etc) and to route the call. The 112 platform should be able to store Total Conversation communications, and the French pilot must specify rules to permit (or deny) access to the data.

The methodology used for working on the 112 PSAP interface was to simulate a call with a deaf user and PSAP agent, but without any specific equipment – that is, it is 'paper simulation' with no technical limitations and with a user-centric perspective. It enabled the researchers to understand REACH112 platform activity flow, and to co-design the platform interfaces via iterative loops with the technical team and growing HMI specification document. This methodology was also useful for discovering unexpected communication situations and technical needs.

Figure 15 - 112's Deaf Operator in Communication With Deaf People

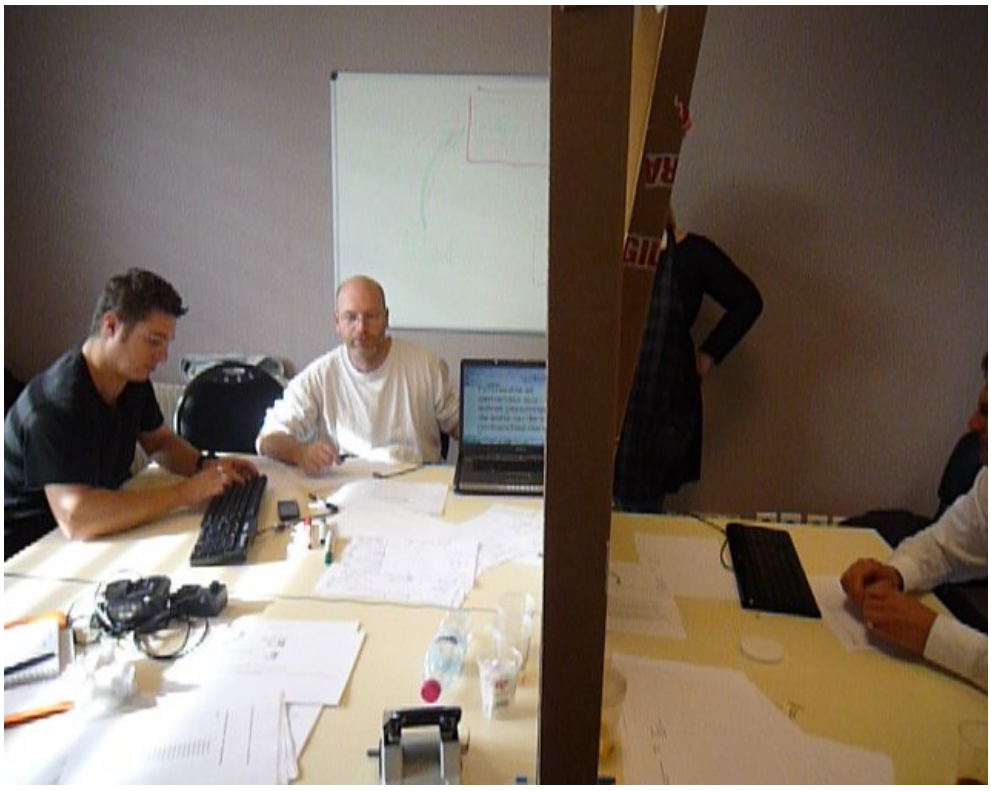


Figure 16 - Deaf User Calls With His Voice and Receives the Answer in RTT

3.2.3 United Kingdom

To supplement the UK online questionnaire survey, three focus group sessions were organised to further investigate access to emergency services for people who are deaf and hard of hearing. The sessions took place at RNID Head Office in London over a three week period during August/September 2009. A call for participants was sent to a large number of RNID members and registered volunteers so that we could sample a good cross section of the deaf and hard of hearing population in terms of age and degree of hearing loss – as well as to enabling us to recruit equal numbers of male and female subjects. A specific criterion for inclusion was that volunteers should have had some experience of contacting emergency services.

Two of the three sessions were one-to-one 'structured interviews' sessions with one participant in each. The third session was a group discussion with four users from a variety of backgrounds. Details of the participants, all of whom were from the Greater London area, are shown in

Table 5.

Session	Participant ID	Gender	Level of hearing loss	Hearing aid user?	Preferred language to communicate
1	UK1	Male	Severe	Yes	English
2	UK2	Male	Severe	Yes	English
3	UK3	Female	Severe	Yes	English
3	UK4	Female	Profound	Yes	BSL
3	UK5	Female	Profound	Yes	BSL
3	UK6	Male	Profound	Yes	BSL

Table 5 - Details of UK Focus Group Subjects

To ensure that key areas of interest were sufficiently covered, the session moderator employed the user survey questionnaire to guide discussion. However, discussion was not unduly restricted, and any additional pertinent observations were recorded. Participants are identified below only by their anonymised participant ID numbers (for example, UK3).

The key points from each of the sessions were:

Session 1

- UK1 revealed he had not in fact accessed the emergency services in the past, but had needed to contact his local police service on a number of occasions for non-emergency issues. Despite not matching the desired inclusion criteria for this study, it was decided that his experiences would still be relevant to the aims of the research and so the session continued.

- UK1 revealed that, on the occasions when he needed to contact the police department, he had used a standard landline telephone. He found the overall experience extremely difficult, as he was unable to hear the operator with clarity, and became conscious of their increasing frustration each time he asked for a sentence to be repeated. He described the conversations as being "terse and extremely rapid".

- UK1 stated that in the event of needing to contact the emergency services in future, the number he would use would be 999. He was unaware that 112 could also be used.

- UK1 had never used a text or video relay service.

- UK1 strongly agreed that the provision of Total Conversation facilities would likely improve his future experiences of contacting emergency services. He especially liked the concept of video communication, which would allow him to lip-read. However, he questioned whether the speed at which such communication would take place (typing, signing etc.) would be suitable for emergency communication.

- When asked to suggest an 'ideal' system for contacting emergency services, UK1 proposed a voice based telephone system which incorporated a system of multi-choice menus that could be navigated by simple button pressing.

Session 2

- Although UK2 did not have personal experience of accessing emergency services, his profoundly deaf wife *did*, and he revealed that she had been exceptionally happy with the experience . . . "no problems whatsoever".

- UK2's wife had contacted the ambulance service using a ScreenPhone[68], via a *Text Relay* operator. UK2 was of the opinion that accessing the services in this way means having to dial too many digits – and that deaf and hard of hearing people are put at an immediate disadvantage by having to dial more than three digits (i.e. 999 or 112).

- UK2 had past (non-emergency) experience of using Text Relay, and was pleased with the service received. He did however feel that Text Relay call centres could benefit from having more relay operators on duty at peak times, since he did not like being put 'on hold' to wait for an operator to become available. He saw this as an obvious - and major - disadvantage of contacting emergency services via Text Relay.

- UK2 believed that emergency service operators would benefit from training in how to communicate effectively with deaf and hard of hearing people – if they hadn't undergone such training already. He argued that there should be an "unambiguous, streamlined plain-English script" for operators to follow when responding to calls from people who are deaf or hard of hearing. This would greatly facilitate communication.

- UK2 had never previously used a video relay service – although he said he would like to and was very impressed with what he'd seen of such services.

- UK2 strongly agreed that the provision of Total Conversation facilities would likely improve his future experiences of contacting emergency services. However, as a Mac user he stressed the importance for any such services to be "open standard" and not restricted to certain platforms only.

Session 3

- UK4 reported that she had once attempted to use a standard fixed line telephone to call the emergency services to request an ambulance for herself. She was unable to make out what the operator was saying, and so attempted to vocalise as best she could. She was relieved when an ambulance arrived at her address shortly after.

- All participants in the session thought that the ability to contact the emergency services by SMS would be extremely advantageous for deaf and hard of hearing people and an 'ideal world' solution.

- Only one of the participants (UK5) was aware that 112 could be used as an alternative to 999 for contacting the emergency services. However, due to familiarity with the number, all participants agreed that they would use 999 if they had to make such calls in the future.

[68] An RNID 'big button' style telephone with added screen and Text Relay functionality.

- All participants were of the opinion that incoming text from *Text Relay* operators is delivered at a rate which is difficult to keep up with. They agreed that Text Relay operators could help them by typing at a slower speed – one that might allow them to better digest the information transmitted to them.

- All participants strongly agreed that the provision of Total Conversation facilities would likely improve their future experiences of contacting emergency services. However, participants UK3, UK4 and UK6 expressed their concerns over the idea of any type of PC-based access to emergency services. They argued that the need to contact emergency services could occur at any given time, and did not like the idea of having to leave a PC turned on constantly – due to environmental reasons added running costs and fire safety concerns.

4 Surveys of user experience of emergency services

The following section provides an overview of the requirements and structure of the emergency services. The six emergency services or PSAPs participating in REACH112 within five pilot countries are: CHU (France), AXEGA (Galicia, Spain), KLPD (the Netherlands), SOS (Sweden), AFR (UK) and ASP (UK). The emergency services responded to a questionnaire prepared by EENA with the support of RNID; this covered a wide range of topics pertaining to the management of emergency calls (available upon request).

The following analysis of the five pilot projects concerning the accessibility of 112 services has been made with the help of published EENA, EGEA and COCOM documents in order to provide the necessary understanding of the functioning of emergency services in the pilot countries. Documents provided by emergency services in REACH112 were compared with the official responses of the Member States.

Questionnaires were followed by exchanges of emails and phone interviews to either verify the correctness of responses or to request further information.

The following section of the document is structured in four parts:

- ***Emergency services' structure and organisation***, in order to present the characteristics of traditional emergency call handling in the pilot countries.
- ***Emergency services' legal requirements***, to understand the legal frameworks within which they operate and the issues that could arise within REACH112.
- ***Emergency services and REACH112***, to comprehend the aspirations of emergency services within the project.
- ***Recommendations, challenges and risk analysis***, in order to highlight potential risks to run the pilots and to present the potential solutions available to overcome these risks.

4.1 Emergency services structure and organisation

4.1.1 Traditional organisation of emergency calls response and procedures

4.1.1.1 France

Emergency calls are answered by emergency services at the local level. Four emergency numbers are available, namely 15, 17, 18 and 112. Calls to 15 are responded to by the SAMU (emergency medical service), 17 by the police and gendarmerie, and 18 by the fire brigade. Depending on from which French department a call to 112 is made, either SAMU or the fire brigade respond to the call (in about 80% of cases, fire brigades handle the 112 calls). This is represented in the diagram below:

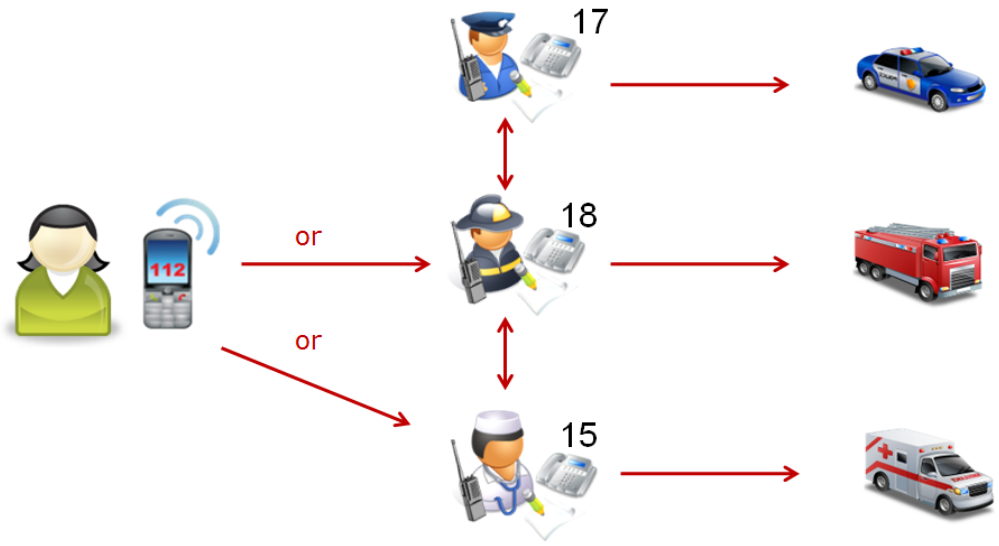


Figure 17 - 112 Call Flow in France

The emergency services are often physically separated, and opposing legal cultures of 'secret medical' for health services and obligation to investigate for police services make such coexistence difficult. The fact that services are organised on the local basis (departments) explains that the organisations, call handling system and information systems can be very different across the various part of the country.

In the specific case of Medical Emergency services in Grenoble (accessed by 15), computer and telephone interconnection exists with the fire brigade (18/112), but not with the police or gendarmerie (17), which means that EMS and fire services are unable to share emergency call and caller data with the police services. Calls can however be transferred from one emergency service to another (incoming emergency calls to CHU can be transferred to fire services and police control rooms and vice-versa).

CHU Grenoble answers calls to 15 directly but does not directly answer emergency calls to 112. Calls to 112 are first answered by fire services and then transferred to CHU if needed. Their platform is interconnected with that of the Isere fire services so they can share voice and data. CHU (and fire services located in the same department) handles 1.2 million emergency calls per year with an average of one call per year per inhabitant. Within the department of Isere, the share of mobile phone emergency calls is 30%; the remaining calls are landline. By contrast, 60% of calls handled by the 18/112 centre (fire service) are mobile phone calls.

The average answering time is 19 seconds and their intervention time (time to get to the scene of incident) is 19 minutes.

4.1.1.2 The Netherlands

112 is the single emergency number in the Netherlands. All 112 calls from mobile phones are answered by the stage one PSAP located in Driebergen and then transferred to the regional emergency service responsible, whereas landline calls are routed directly to one of the 25 regional PSAPs. Typically, the National 112 Centre filters the mobile emergency calls and routes them to the appropriate regional PSAPs after confirming the nature of the emergency calls and the exact location. This is represented in the diagram below:

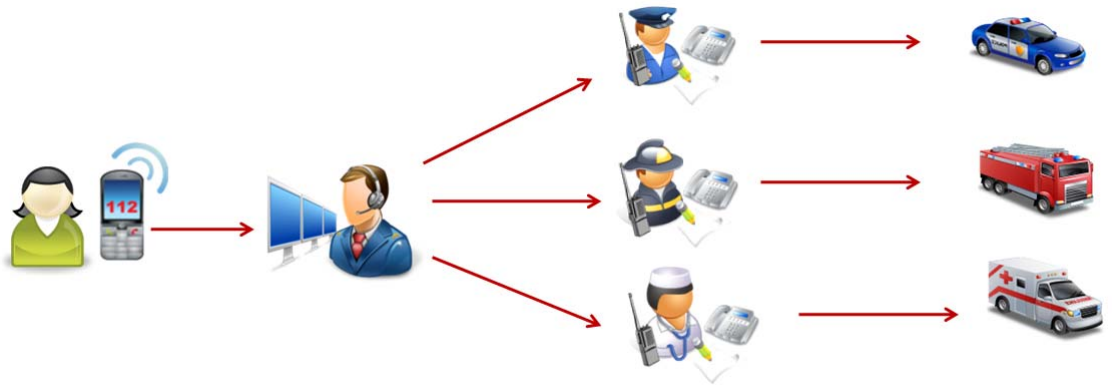


Figure 18 - 112 Call Flow in the Netherlands

Information is transmitted to the other PSAPs by voice since data cannot be transferred. KLPD handles 4.4 million emergency calls per year of which 75% are misuse. 80% of emergency calls are made from mobile phones for which the call set-up time is less than six seconds. 90% of 112 calls are answered within 10 seconds and the arrival time is 10 minutes for urban areas and 15 minutes for rural areas.

4.1.1.3 Galicia (Spain)

AXEGA PSAP (one single PSAP at a single location) receives all calls to 112 in Galicia. The calls are filtered and then transferred to the appropriate organisation at the local level e.g. police, fire, ambulance.

The flow of the 112 calls is simplified in the chart below:

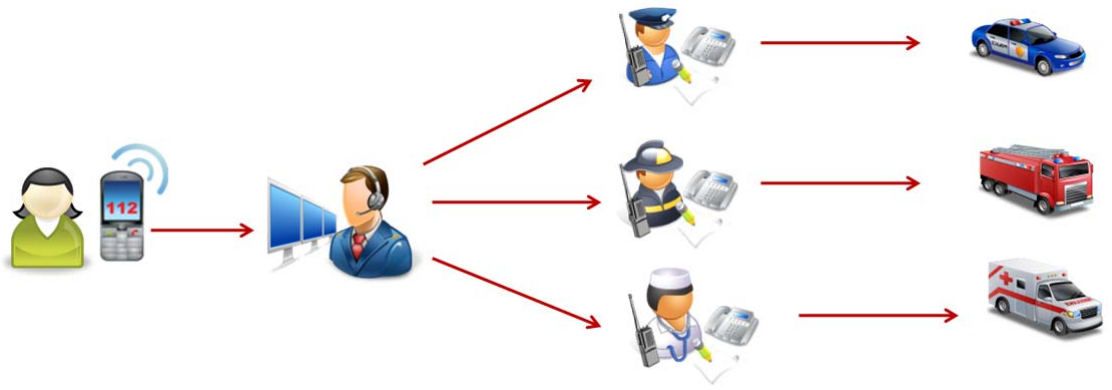


Figure 19 - 112 Call flow in Spain

Voice calls are transferable, but data can only be transmitted to some specific organisations. AXEGA handles about 1.5 million calls per year, of which some 75% are from mobile phones. It takes on average three seconds for a 112 call to be answered in Galicia.

4.1.1.4 Sweden

SOS alarm handles all calls made in Sweden to the number 112 at its 18 PSAPs, which are distributed geographically. The calls are routed to the nearest PSAP. All PSAPs receive all types of calls (fixed, mobile, IP-based) and all PSAPs can serve all different types of assistance, e.g. fire, police, ambulance etc. In most cases SOS Alarm has the responsibility to despatch rescue teams and ambulances. Usually each PSAPs co-located with the rescue team, ambulance centre or (sometimes) police centre.

All emergency service organisations have a contract with SOS Alarm. The flow of the 112 calls for each PSAP covered region (i.e. geographical area for which a PSAP has a responsibility) is simplified in the chart below:

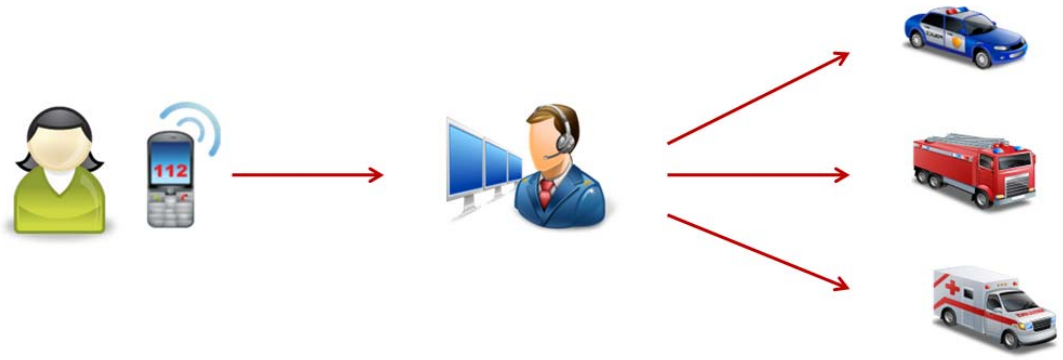


Figure 20 - 112 Call Flow in Sweden

Calls can be transferred between SOS Alarm PSAPs but data cannot. In principle, if an emergency call is transferred, the dialogue with the caller must be repeated. SOS Alarm handles 3.6 million calls per year (almost all to 112). 68% of emergency calls are from a landline, 31.5% are mobile calls and 0.5% are IP-calls. The average answering time is eight seconds.

4.1.1.5 United Kingdom

All emergency calls to 112 and 999 are received by a stage one PSAP and this service is provided by BT (80% of calls), Cable & Wireless (20%), Kingston Communications (<1%, for Hull area only) and Global Crossing (<1%, for calls made within the railway network). Other telecommunications companies have contracts with BT and Cable & Wireless for handling calls. Calls are then forwarded to the appropriate emergency service control room, also known as a stage two PSAP.

The stage one PSAP operates centralised services, though spread over several sites for resilience. BT has six sites and Cable & Wireless two sites. The stage two PSAPs have around 250 regional sites, divided along emergency service authority boundaries.

The flow of the 112 calls is simplified in the chart below:

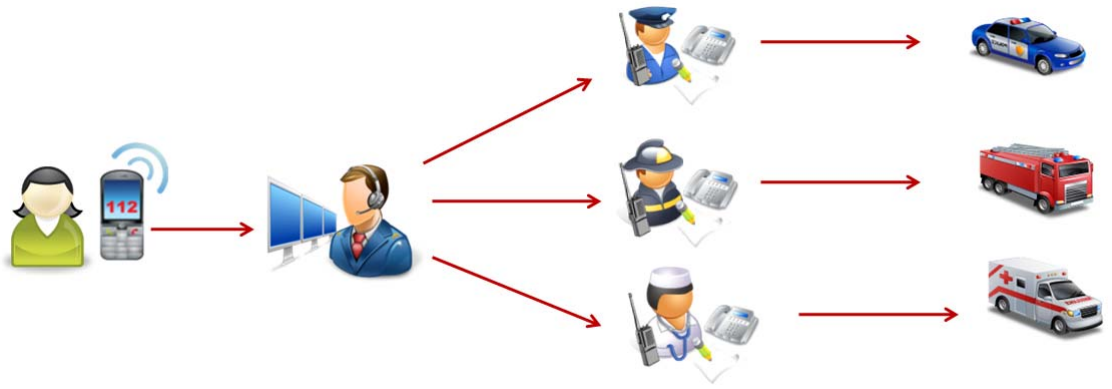


Figure 21 - 112 Call Flow in the UK

In REACH112, two stage two PSAPs are participating, namely AFR and ASP. AFR and ASP do not transfer emergency calls. The information is passed to the other agencies by voice and data if needed. AFR handles about 26 000 calls per year. ASP handles some 320 000 calls every year. BT expects to answer 95% calls within five seconds and 99% calls within 15 seconds. These calls are then transferred to the requested emergency service, usually within several seconds.

4.1.2 Availability of caller information in REACH112 PSAPs

The Universal Service Directive[69] (2002) requires Member States to "ensure that undertakings which operate public telephone networks make caller location information available to authorities handling emergencies, to the extent technically feasible, for all calls to the single European emergency call number 112". The technical feasibility of providing location information for fixed line and mobile calls has been demonstrated by the European Commission in 2003 (2003/558/EC). This has been reinforced in the reformed Universal Service Directive[70] adopted in November 2009 and which is to be transposed into national law within 18 months: "Member States shall ensure that undertakings concerned make caller location information available free of charge to the authority handling emergency calls as soon as the call reaches that authority. This shall apply to all calls to the single European emergency call number '112'. Member States may extend this obligation to cover calls to national emergency numbers (etc)"

In all the pilot countries, location information is available for both landline and mobile emergency calls to 112. Four respondents have indicated that they get or can get the location information from the network operators automatically (AFR, SOS, KLPD, AXEGA). CHU has indicated that only landline location information is obtained automatically. ASP has to request (to pull) the location

[69] Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) – available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0022:EN:NOT

[70] Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws Text with EEA relevance
Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0011:01:EN:HTML

from the mobile operators.

	France	Netherlands	Galicia (Spain)	Sweden	United Kingdom (AFR)	United Kingdom (ASP)
Phone number provided automatically	YES	YES	YES	YES	YES	YES
Automatic landline location	YES	YES	YES	YES	YES	NO
Automatic mobile location	NO	YES	YES	On demand – pull	YES	NO
Mobile location accuracy	Cell-ID Few metres to several kilometres	Cell-ID: Few metres to several kilometres	Cell-ID: Few metres to several kilometres	Cell-ID: Few metres to several kilometres	Cell-ID: Few metres to several kilometres	Cell-ID Few metres to several kilometres
Time for landline location	Immediate	Immediate	Immediate	Immediate	Immediate	Up to a couple of minutes
Time for mobile location	Several minutes (no uniform database)	Immediate	Immediate	Some seconds	Immediate	Up to a couple of minutes
Mobile location Push/Pull method	Pull	Push	Push	Pull	Push	Pull (voice)

Table 6 - Number and Location Information by Country

4.1.3 Access for VoIP emergency calls

Based on responses to the questionnaire, a majority of emergency services are not well informed about the VoIP emergency calls functionality in their country. SOS and KLPD indicated that fixed VoIP calls are routed to the appropriate PSAP and that nomadic VoIP emergency calls cannot be routed at this time.

France
The telecom law of 9 January 2004 known as 'paquet télécom' has been complemented by the decree 2005-862. It states in section 2, article D.98.8 that *"For emergency calls, the operator provides the emergency services with the location of the caller if the network equipment can provide it."* There is no specific provision for VoIP calls but the law applies. Some VoIP providers have of course claimed that due to the nature of their service, they could not locate their subscriber but the vast majority of VoIP service in France is bundled with DSL access and therefore could be associated with a physical phone line and routed accordingly. For other kinds of VoIP service, the provider often requests the customer to indicate a location at subscription time in order to be able to route emergency calls correctly to the proper local emergency service. Each emergency call centre has Internet access, although the bandwidth of the connection has not been indicated.

Galicia (Spain)
The response did not provide information about the regulatory situation regarding VoIP emergency calls. The PSAP has an IP-based network with a 100 Mbps connection. Additionally, there are two support connections, one using Metro Ethernet with 10 Mbps and one ADSL connection with 2 Mbps. The specific mechanism to retrieve IP-based location is not indicated.

The Netherlands
The response claims that there is no legal difference between traditional telephony and VoIP emergency calls. PSAPs receive calls via circuit-switched technology. Location information is obtained via an IP-based interface although the protocol has not been indicated.

Sweden

The regulator defines public telecommunications operators by three criteria, namely

1. Offering publicly available telecommunications services
2. Using numbers from the Swedish E.164 numbering plan
3. Supporting 112

When all these criteria are met then emergency services support has to be provided, even as a VoIP provider.

The PSAPs are connected to a private IP network and Internet access, but this Internet connection is mainly used for non-emergency services purposes. Currently, calls arrive via the circuit switched network but a plan to open an IP-based interconnection exists. This new architecture will allow IP-based calls to be routed to the emergency services network and also to gateway circuit switched calls to IP. Of all the emergency services providers in the project, SOS Alarm seems to be the most technically advanced, with a very clear description of their VoIP emergency services solution.

United Kingdom
Information regarding the legal and regulatory requirements was given in section 2.6.1.2 for VoIP emergency calls in the UK. While there is presently no *direct* connection to an IP network in the stage two PSAPs, ASP is starting a trial project with an IP-based video conferencing service which will use two external police kiosk terminals fitted with web cameras. With their own dedicated broadband connections, these terminals will be located outside a police station and a supermarket store. In order to handle video calls, ASP will have a standalone computer fitted with a web camera with its own ADSL line in its service centre that will sit alongside a normal police force terminal staffed by an operator. This trial will run for about a year.

4.1.4 Accessibility and silent calls

The emergency services were asked to provide more information on their present accessibility solutions and on how they handle silent calls. AXEGA and CHU do not yet have any solution available to enable accessibility at the moment. In France, some emergency services have setup local solutions such as fax lines with fax forms (CHU Grenoble) or SMS based system (Fire service Val d'Oise). These solutions do not use emergency numbers but regular phone numbers. In Sweden, citizens can reach emergency services using text phones and an emergency SMS trial is being run. In the United Kingdom, citizens can contact emergency services using the national platforms such as *Text Relay* (formerly known as *RNID Typetalk*), which supports text phones. Also some local emergency services can be contacted by SMS (using a regular phone number), and a national emergency SMS pilot trial is being run by BT. In the Netherlands, text phones are also used along with a solution based on GPS location that enables aphasia patients to send pre-determined messages and location coordinates to the national 112 centre. AnnieS customers can also use the relay service to be connected to the 112 services.

Concerning silent calls, including those that could be made by speech impaired users, emergency services rely on the provision of accurate location information to be able to intervene and send a rescue team. They have highlighted that today's location information for mobile phones is not accurate enough to enable despatching of resource to the exact place of incident. The UK emergency services do not handle silent calls since they are filtered out by the stage one PSAPs.

4.2 Emergency services legal requirements

4.2.1 Responsibility for handling emergency call and despatching

In the Netherlands, the police are in charge of handling 112 calls and despatching their own resources at the national level and in each security region. EMS and Fire services handle 112 calls at the regional level and despatch their own units. AXEGA is in charge of handling 112 calls in Galicia while the despatching of resources is handled by the responsible services (e.g. police, fire and EMS). In France, either the EMS services or the fire services are in charge of handling 112 calls depending on local department. Each organisation handles the despatching of its resources. In the UK, stage one PSAPs are responsible for initial call handling and then the call is passed on to local emergency services who are in charge of continuing the conversation with the caller and despatching the resources. In Sweden, 112 calls are received by SOS Alarm and the municipalities are officially in charge of despatching first responders (98% of municipalities have a contract with SOS Alarm, and in this case SOS handles despatching).

	Call-taking	Despatching
France	Fire (~80%) and EMS (~20%), depending on the department	EMS, Fire, Police services
Netherlands	Stage 1: *Police (KLPD National 112 centre & 25 security regions)* Stage 2: *Police, EMS and fire services*	EMS, Fire, Police services
Galicia (Spain)	AXEGA	EMS, Fire, Police services
Sweden	SOS Alarm	Municipalities (98% of municipalities have a contract with SOS Alarm and in this case SOS handles despatching)
United Kingdom	Stage 1 PSAPs: *British Telecommunications (~80% of calls) , Cable & Wireless (~20%), Kingston Communications (<1%, for Hull area only) and Global Crossing <1% (for calls made within the railway network)* Stage 2 PSAPs : *Local emergency centres* (EMS, Fire, Police)	EMS, Fire, Police services

Table 7 - Call Routing and Dispatch By Country

4.2.2 Privacy

All emergency services have access to private data such as phone number and location information. There are differences in the storage of emergency calls' recordings and data. In the Netherlands, the recordings are saved for two months. SOS stores the data for three months. In the United Kingdom, recordings are saved for four years. In Galicia, voice calls are recorded and the information is stored for 10 years. In France, EMS services store the data for 30 years whereas fire and police services have no legislation in this domain.

Emergency services usually do not have provisions on the storage of text or video data since they are rather new media used by PSAPs. Some PSAPs stated that it may be difficult for privacy reasons to use the recordings of video calls during the project. However, ASP added that it should be possible upon request and necessary agreements.

4.2.3 International transfer of emergency calls and data

The responses provided by emergency services on the possibility of transferring emergency calls and data to a foreign country are unclear, negative or vague. The topic is new for the emergency services participating in REACH112. However, a large majority of the responses show that in principle calls could be forwarded abroad easier than emergency situation data, also for technical reasons. These technical barriers are caused because PSAP use different call handling solutions and standards which are not interoperable. A majority of emergency services could not use a relay service that is based abroad (e.g. a video relay service located in another EU country). This topic is discussed in Part 5 of this document.

4.3 Emergency services & REACH112

4.3.1 Emergency call handling organisation for REACH112

France

In France, Total Conversation – simultaneous use of voice, video and Real-Time Text (RTT) – will be implemented so that citizens can communicate using voice, text or sign language. Following an analysis of communications used by deaf people, speech impaired people and other citizens currently unable to access emergency services, each call will be handled at the national level either in sign language and text communication by a deaf 112 agent, or in text and voice communication by a hearing 112 agent. Each agent will then pass on the information to the local emergency services, with the help of an onsite interpreter (communication mediator).

While the traditional 112 call handling model relies on local emergency services, REACH112 requires the creation of a national platform that can be assimilated within a stage one PSAP, similar to the stage one PSAPs running in the Netherlands and the United Kingdom. This National Platform will be able to cover emergencies in the whole French metropolitan territory.

This procedure is reproduced in the diagram below:

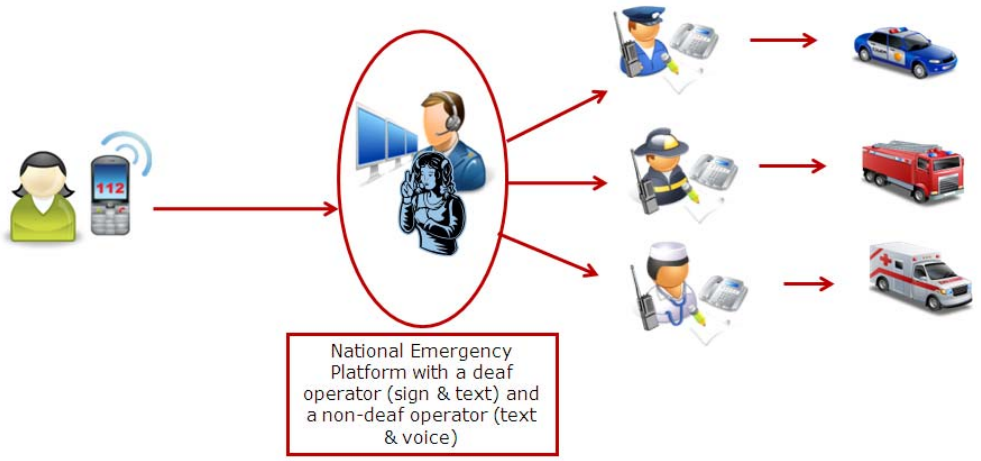


Figure 22 - 112 Pilot Call Procedure in France

Galicia (Spain)

In Galicia, Spain, citizens will be able to use RTT to contact the regional 112 PSAP, once the necessary technology is made available. Citizens will also have the possibility communicate first with the National Relay Centre which will then contact the 112 PSAP. During the project, trials of Total Conversation will also be performed, for testing sign language video-interpretation together with voice and RTT capabilities, in both the PSAP and the relay centre.

This procedure is reproduced in the diagram below:

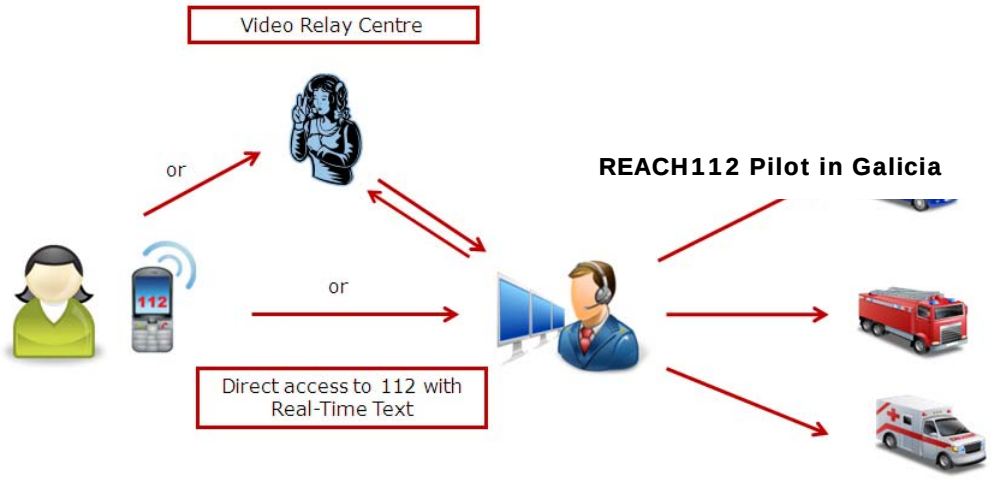


Figure 23 - 112 Pilot Call Procedure in Spain

The Netherlands

In the Netherlands, the stage one national 112 centre located in Driebergen will integrate the necessary technology in its IP-platform so that citizens can contact 112 directly using Real-Time Text (RTT). While emails, SMS, instant messaging and chat are non-conversational, RTT enables conversations between individuals, and in this specific context a live exchange between citizens and 112 call-takers. RTT conversations between citizens and 112 agents will also continue in some of the regional PSAPs. The REACH112 project will not require any reorganisation of the traditional emergency call handling organisation.

This procedure is reproduced in the picture below:

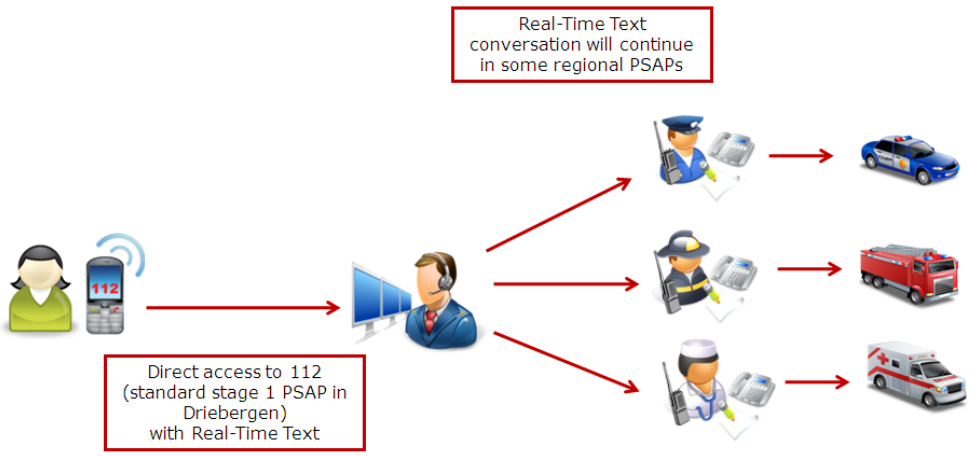


Figure 24 - 112 Pilot Call Procedure in the Netherlands

Sweden

In Sweden, two Total Conversation terminals will be installed in one SOS Alarm PSAP. The operator will view text and video but will be able to use external relay services for sign language interpreting into voice. 112 will be contacted directly. The relay service will be activated at the same time. In case help is needed in a region not initially covered by the PSAP participating to the project, the SOS Alarm centres will contact each other using voice and despatch the resources to the scene of the incident.

This procedure is reproduced in the diagram below:

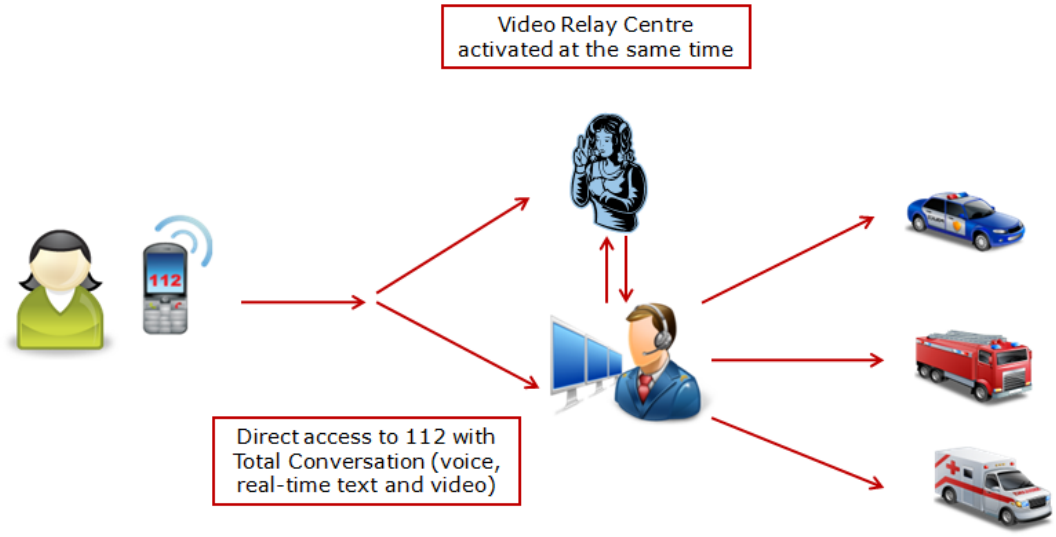


Figure 25 - 112 Pilot Call Procedure in Sweden

United Kingdom

In the United Kingdom, Total Conversation will be used by deaf and speech impaired users from fixed and mobile devices. The communication products will provide access to national emergency services through relay operators who will translate between Real-Time Text/Sign Language and

voice. In addition Total Conversation terminals will be installed in several UK emergency services call centres allowing for direct access to operators. Users registered in the regions covered by these emergency centres will be connected directly through 112 to the sign language operators located in the control rooms.

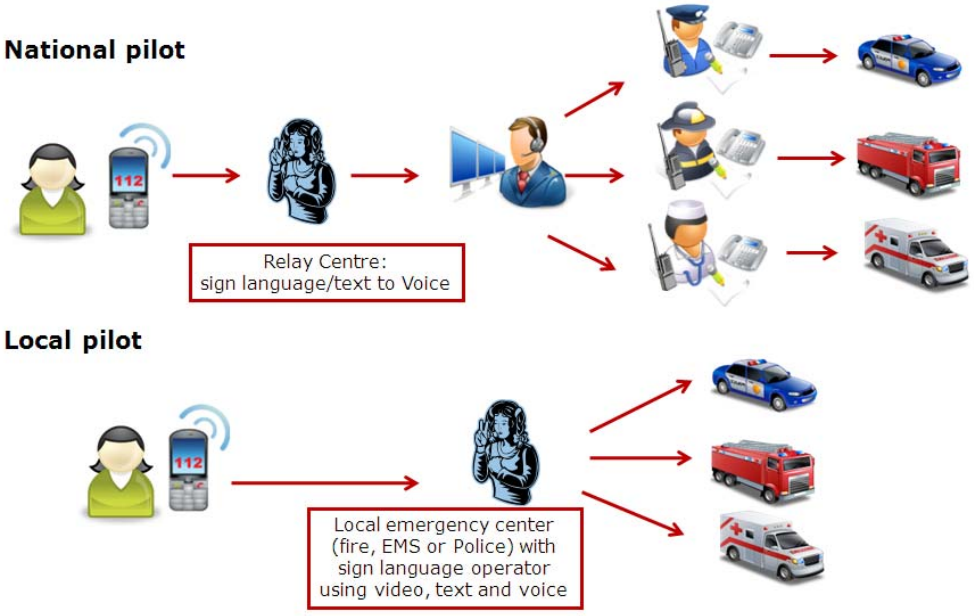


Figure 26 - 112 Pilot Call Procedure in the UK

4.3.2 Requirements for caller location

While the EU mandates compulsory provision of caller-location information for all calls to the European emergency number 112, IP-location still remains unimplemented for emergency access in the EU.
VoIP emergency calls require location for:

- Routing the call to the appropriate PSAP.
- Despatching the rescue services to the scene of incident.

Although the technical feasibility of location for fixed and mobile emergency calls have been demonstrated, standards for locating calls on the Internet are well advanced but not yet finalised.
While all the pilot projects have simplified the routing of the emergency call using a single PSAP (stage one PSAP or local PSAP), locating the caller to facilitate appropriate despatch is still being reviewed by the consortium.

Emergency services participating in REACH112 have made it clear in their questionnaire responses that the provision of caller-location information is of very high importance. The consortium will therefore analyse every possible solution to provide the location information to the emergency services participating in REACH112, possibly using a range of different means (GPS, access provider database, third-party databases). This will be done within Work Package 5 as a specific task dedicated to this issue.

4.3.3 Requirements for accessibility and total conversation

The emergency services are not very familiar with some of the technologies that will be used in REACH112. This lack of understanding of the technical issues and use of the solutions made it hard to collect accurate answers. Consequently, follow up phone and email interviews were carried out to clarify the rather vague and inaccurate questionnaire responses. A major challenge highlighted by these users was the need for appropriate identification and alerts for call-takers in order to ensure that they are notified immediately in the case of incoming Total Conversation calls.

France
CHU would like to receive a combination of voice, video and real-time text. Call-takers should be warned by a light and pop-up. The incoming video call should be activated automatically but the call-taker should be able to chose the way he or she wants to respond to the citizen (activation of the video from the control room should not be automatic). Ideally, CHU would like to have the Total Conversation solution integrated with the standard call-taking platform. CHU agents have also indicated that they would like to raise the attention of the caller during the emergency call using lights or pop-ups

Galicia (Spain)
AXEGA would like to receive a combination of voice, video and real-time text. 112 call-takers should be alerted to an incoming total conversation call via acoustic or visual warning. In the case of video calls, AXEGA would like to be responsible for the activation of the video stream so that video would be on automatically in case it is not needed to communicate with the citizens. Ideally, AXEGA would like to have the Total Conversation solution integrated with the standard call-taking platform.

The Netherlands
KLPD has indicated willingness to receive real-time text, but not video calls. 112 call-takers should be warned by a pop-up appearing on the call-takers screen and additionally with a ring followed by a voice message announcing that the incoming emergency call is a real-time text call.

Sweden
SOS Alarm wants to receive full Total Conversation calls. SOS Alarm managers require clear indication of an incoming text/video call since earlier projects with text calls and telefax had revealed some problems. Video can be activated automatically.

United Kingdom
AFR would like the call handler to be alerted in a similar way as at present, with an audible warning from the call receiver's terminal/PC plus a simultaneous visual alert. In addition, there are plans for the UK to have a new national system in the next 3-4 years, so it may be desirable to provide a semi-automated response to the call making use of a database that identifies the call type, service required, and the location requiring emergency response. Due to the relatively low number of video calls expected, AFR would also like a specific notification for video calls so that the call receiver is prepared for this type of call. It would be desirable for the call receiver to be able to indicate that they are ready and manually accept this type of call. The video link should therefore not be activated automatically. Ideally, AFR would like to have the Total Conversation solution integrated with the standard call-taking platform even though it may not be possible during the project for technical reasons.

ASP is willing to receive full Total Conversation calls and highlighted the need to make sure that call-takers are clearly warned about an incoming call of this type. The warning should be visual such as pop-up and light. The pop up needs to be sufficiently large and noticeable to attract the attention of the operators as the Total Conversation terminal will be a standalone computer.

	France	Netherlands	Galicia (Spain)	Sweden	United Kingdom (AFR)	United Kingdom (ASP)
Video	YES	NO	YES	YES	YES	YES
Automatic activation of video	YES	Not relevant	NO	NO (only when necessary)	NO	YES
Type of call-taker warning	Light and pop-up	Pop-up and ring	Acoustic or luminous warning	Clear indication of an incoming text/video call	Audible alert from the receivers terminal/PC plus a visual alert simultaneously	Pop-up and light
Integrated solution / standalone (ideally)	Integrated	Integrated	Integrated	Integrated	Integrated	Standalone

Table 8 - PSAP Video Connections

4.4 Recommendations and risk analysis

4.4.1 General recommendations to the consortium

Definition of a standard way of warning call-takers
Emergency services have stated their concern about the ways to be warned of incoming Total Conversation calls. They are in favour of visual solutions (pop-ups, lights) and/or audible alerts or pre-recorded messages. The consortium should make sure that all Total Conversation solutions will result in the appropriate warning of call-takers; in particular in the case of roaming emergency Total Conversation calls.

Provision of caller-location information
Emergency services have clearly indicated that caller-location information is crucial for the project. The consortium has already begun closely following the possibilities of using various different sources of caller-location information (GPS, network providers or third-party databases). The consortium should continue to monitor and investigate the standardisation activity updates in this field from different organisations (IETF-ECRIT, NENA NG911 and EENA NG112). Conference calls dedicated to the issue and involving external international experts have been planned. Task 5.4 of the project will focus on reviewing the solutions and giving guidance to project partners. The pilot countries are invited to try various methods in order to provide EU emergency services with some comparison and recommendations in implementing caller-location for emergency calls originating from the Internet.

Transfer of emergency calls and data to foreign countries
The emergency services participating to REACH112 have little experience in the management of trans-national emergency calls. It appears that they would, at this stage, not be able to forward emergency calls and data to foreign countries for both technical and legal reasons. 112 may however be accessible in certain cases only if the users who use the relay service are able to understand a specific sign language; this service may only be located in the country of origin of the caller. The consortium is encouraged to look closely at the activities and results of the REACT project co-funded by the European Commission with the participation of IES Solutions, coordinator

of the project REACH112. Guidance is expected to be provided by IES Solutions.

4.4.2 Specific pilot challenges and risk analysis

France

Change of 112 model

The French partners have decided to create a National Platform that can handle incoming Total Conversation emergency calls at the first stage. As this implies a major change in the way emergency calls are normally handled in France (usually directly at the local level), the French pilot members are invited to provide evidence that the relevant stakeholders – emergency services authorities and national authorities – do not oppose the proposed solution. However, this is not a threat to running the pilot but rather a sustainability issue.

Availability of deaf operators

The French pilot will be based on the National Platform, recruiting both deaf and hearing operators (as well as interpreters for voice communication with the PSAPs). In order to be able to handle many simultaneous calls, an unfeasibly large number of deaf operators could potentially be needed at the National Platform. The solution proposed by the French pilot is to use the external relay service in case of non-availability of a deaf operator.

Spain (Galicia)

Transfer of information to responsible organisations

As all 112 calls are first answered by AXEGA and forwarded to other organisations, AXEGA has been asked to produce a further document providing detailed description on how the different organisations (e.g. police, fire, EMS) will get the emergency call information. In particular, the work by AXEGA should make clear whether AXEGA will handle the whole emergency communication and then pass on the information to the responsible organisations, or the communication will be passed on to the responsible organisations.

The Netherlands

Transfer of information to responsible organisations

Users in the Netherlands will be able to access the KLPD National 112 Centre. Typically emergency calls are transferred to the regional responsible emergency service organisations. As it is improbable that all 25 regional PSAPs will be involved in the project, more information should be provided about how emergencies taking place in uncovered regions will be taken care of. The stage one PSAP operators can however handle the whole RTT conversation and involve the regional PSAPs operators using voice.

Sweden

Transfer of information to responsible organisations

Total Conversation terminals will be installed in only one SOS Alarm PSAP, covering only a part of the country. All TC calls will be routed via this call centre which will pass on the information to the responsible PSAP if the emergency takes place in another region.

United Kingdom

Availability of an IP-Network

AFR and ASP call taking systems are not presently connected to an IP network. However, the two UK emergency services will have the possibility of using a standalone solution that will be connected to the Internet.

Availability of sign language operators

The UK emergency services will use internal sign language operators. In order to answer a large number of emergency calls, a large number of sign language operators could potentially be needed. The solution proposed by the UK pilot is to use the external relay service in case of non-availability of an operator.

Pilot country	Challenge	Risk level for the pilot to run	Comment
France	Change of 112 Model	Very low	This concerns more the sustainability of the use of total conversation after the project rather than the pilot conduction
	Availability of deaf call-takers	Very low	In case of non-availability of deaf operators, relay service will be used.
Galicia (Spain)	Transfer of information to responsible organisations	Very low	In case of *force majeure*, AXEGA call-takers will handle the call and pass on the information to the relevant organisations.
The Netherlands	Transfer of information to responsible organisations	Very low	In case of *force majeure*, KLPD call-takers will handle the call and pass on the information to the relevant organisations.
Sweden	Transfer of information to responsible organisations	Very low	SOS Alarm call-takers will handle the call and pass on the information to the relevant organisations.
United Kingdom	Availability of an IP-Network	Very low	The stand alone solution can be used in the context of the project. Connection to an IP-network is foreseen in the future and will enable sustainability from a technical point of view.
	Availability of sign language operators	Very low	In case of non-availability of deaf operators, relay service will be used.

Table 9 - Country Specific Pilot Risks and Actions

5 Survey of Relay services

Relay services in the context of REACH112 are communication services that transcribe between different modes of communication. They are provided mainly to enable people with communications related disabilities to participate on more equal terms in a society where telephony and electronic communications have become such important parts of life. The primary motivation is to enable people with disabilities that affect their ability to use a voice telephone to be able to communicate with voice telephone users, and/or users of other types of communication equipment they do not use themselves. Relay services are commonly government-enabled or government-mandated because of the clear economic and social value of policies to provide equal opportunities for all in the field of communications.

In its simplest form, a relay service can be provided over a dial up network using an operator to mediate between a textphone user and a voice telephone user. Alternatively, it can be provided by a relay service provider over any form of connection – for example over a mobile network, or via an IP connection where the text/video device might be PC based. Such a service can be automated – using, for example, modems in a gateway, to enable interworking between two text terminals operating in different communication modes (for example, five and eight bit codes). Thus, in principle, any user in any network using one mode of communication should be able to communicate with another user using a different mode of communication in the same or in any other network via a relay service. And, since the manner in which calls are set up would be appropriate to the communications medium being used, it should be possible to set up calls to and from disabled users in the same manner as calls to and from other users. In order to satisfy the requirements of the UN Convention on the rights of persons with disabilities (discussed in 2.1.7), it is also essential that interoperability should be achieved between all services, so as to provide worldwide communication equivalent to that provided for other users.

This section of the report analyses the state of the relay services currently operating within the countries taking part in this project. Date of start-up, performance and staffing issues are among the topics covered by the survey. In reading this section, it should be borne in mind that:

- For users who are hard of hearing, spoken language competence will generally relate to level of hearing. Most people in this group (usually) have an extensive vocabulary and use standard grammar as well.
- People who lose their hearing after acquiring language ('postlingual') do not usually have difficulties in sentence structure, comprehension and expression in the way that those with 'prelingual' deafness' might do.

5.1 Methodology

The methodology adopted for the relay service survey was to create an index of key issues to be covered. This index was developed with the involvement of all partners taking part in this task. Subsequently, each partner started to collect the information needed in relation to the relay service(s) operating in their own country, following the format of questions already agreed. Finally, SERTEL (task leader) assembled and analysed the documentation received from the other partners in order to compile this part of the report. The results broken down by country follow.

5.2 France

WebSourd is responsible of the relay service and has developed a relay centre ('VisiO08') with different partners, and has progressively developed the various services. Since 2004, the centre offers interpretation services, with the involvement of interpreters from the social enterprise INTERPRETIS located in Toulouse (which has been involved in experimentation since 2002). Since 2008, it also offers transcription services, with the involvement of Velotypists from the enterprise SYSTEM RISP located in Caen (involved in telesales with transcription relay for France Telecom since 2002).

These services are now available for approximately 30 businesses and 60 public organisations working to meet the needs of deaf citizens, and for 120 deaf users at home (as a trial since February 2008). Interpretation services are available 08.30h-19.00h daily, while transcription services are provided on Monday afternoon (14.00h-16.00h) and Tuesday morning (10.00h-12.00h).

5.2.1 Users of the relay service

5.2.1.1 Types of deafness / Communication preference

The user group includes people with different degrees of deafness, but mostly they are people born deaf who communicate through sign language. People who are becoming deaf are also represented within the user group but some such people may have been used to 'hiding' their disability, tend to be less well organised as a group in society and may be less confident in the use of the technology.

Transcription services are also currently being developed, since a number of users have expressed interest in this type of communication. People using these services can speak to the interpreters but receive the response in the form of text, or they can carry out the whole communication in text.

Relay centres are mainly used in two types of situation – when all parties are located remotely (as with a typical telephone communication), or for mediating face to face communication, with only the interpreter or transcriber at a distance.

Figure 27 - Phoning Via a Video Interpreter

Figure 28 - Face to Face Communication a Remote Interpreter

5.2.1.2 Other users of the relay service

Hearing people with speech difficulties could also use the service, but have not been involved at this stage of research. However, the relay service is used between deaf and hearing people – so hearing people are effectively users of the service too. These are typically members of the deaf person's family, colleagues, customers, partners, sales staff etc.

5.2.2 Technological evolution of the Relay Service

The research has involved development of both technical aspects and services – for example, answering facility, bi-directional calls (either deaf or hearing party can initiate the call), booking of appointments for long interpretation, services being available for both PC and Mac computers, and for use with different types of videophones.

5.2.3 Human resources

5.2.3.1 Number of agents/team that offers that service

WebSourd works with a network of professional organisations of French Sign Language interpreters, located in different regions within the country. Fifty interpreters are involved, working in six social enterprises or associations:

- INTERPRETIS in Toulouse
- Des-L in Montpellier
- VIA in Lille
- ASIP in Marseille
- SIGNE in Bordeaux
- ADIS in Chambery

The number of collaborating organisations and individual interpreters is expected to increase progressively. WebSourd and INTERPRETIS are engaged in the development of university training for interpreters. For the transcription service, SYSTEM RISP (located in Caen) currently has four Velotypists with a further nine in training.

5.2.3.2 Agent contracts

While most staff are permanently employed, some are employed on short contracts – either because they are new (interpreting services), or because they are working towards full 'professionalisation', having just gained their diploma (transcription services).

5.2.3.3 Agent aptitudes / employment criteria

All interpreters involved in the WebSourd relay centre have a diploma in interpreting and a minimum of two years of experience. The course in interpretation at the University of Toulouse provides specific training about working in a relay centre. Interpreters who have not undertaken this type of course can receive training at the INTERPRETIS enterprise.

There is no university course for Velotypists (transcribers using a specific tool named Velotype) in France. However, SYSTEM RISP provides the required training over a two year period. All the Velotypists involved in the relay centre have received a diploma. The course includes competence in using the Velotype equipment, speed of operation, general culture, and skills in French spelling, syntax grammar together with skills in reformulation of sentences.

For both professions, principal employment criteria are the quality of the diploma and the respect of the business ethics, confidentiality, neutrality, and fidelity of the message.

5.2.3.4 Agent absenteeism

There are very few cases of absenteeism within the teams of transcribers and interpreters. In case of absenteeism in the team of transcribers, there are very few solutions right now: so the only real possibility is to provide more training to ensure more employees are available in the future. However, in the case of absenteeism in the team of interpreters (through illness for example), there are available solutions. WebSourd works with several organisations of interpreters, and these interpreters are able to carry out remote interpretation. So the absence of some interpreters in one organisation can be easily replaced by other interpreters working in another organisation within the network. As interpreters do not work full time in the relay centre, but are still available for work, adjustments of this type are relatively easy to make. Nevertheless, increasing the number of interpreters available (perhaps through increasing the numbers being trained) is regarded as important in the longer term.

5.2.4 Level of service

5.2.4.1 Percentage of attended / non attended calls

From 1 January to 7 December 2009, only 59% of calls were answered. The reason for this was that calls were automatically cut off after two of minutes waiting. Now, however, calls are being cut off only after 30 minutes of waiting, and users are also being informed about their position in the queue. As a result, the percentage of call now being answered has risen to 70%. The present criterion is that no more than three people should be waiting in the queue at any time. Statistics are helpful for predicting number of interpreters needed and for being able to reduce them during quiet periods (this is more difficult for Velotypist since they are fewer in number). Regular meetings between the WebSourd manager, technical services and the interpreter manager are used to control these adjustments.

5.2.4.2 Users per channel

There are fewer users of text communication than sign language video at present. And most of the people using text communication are using sign language relay services too. From 1 January to 7

December 2009, the WebSourd relay centre (VisiO08) handled 31,520 calls for sign language interpretation, and 826 calls for transcription.

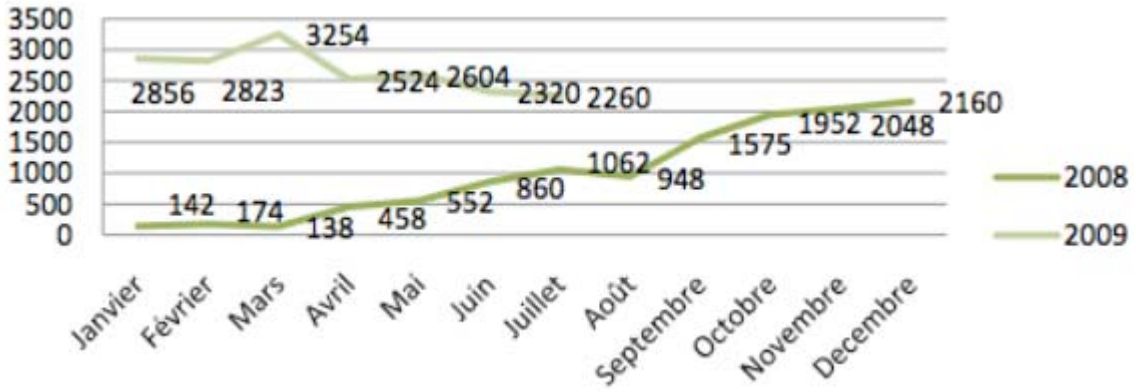


Figure 29 - Evolution of Attended Calls for Sign Language Interpretation

5.2.4.3 Users per region of the country

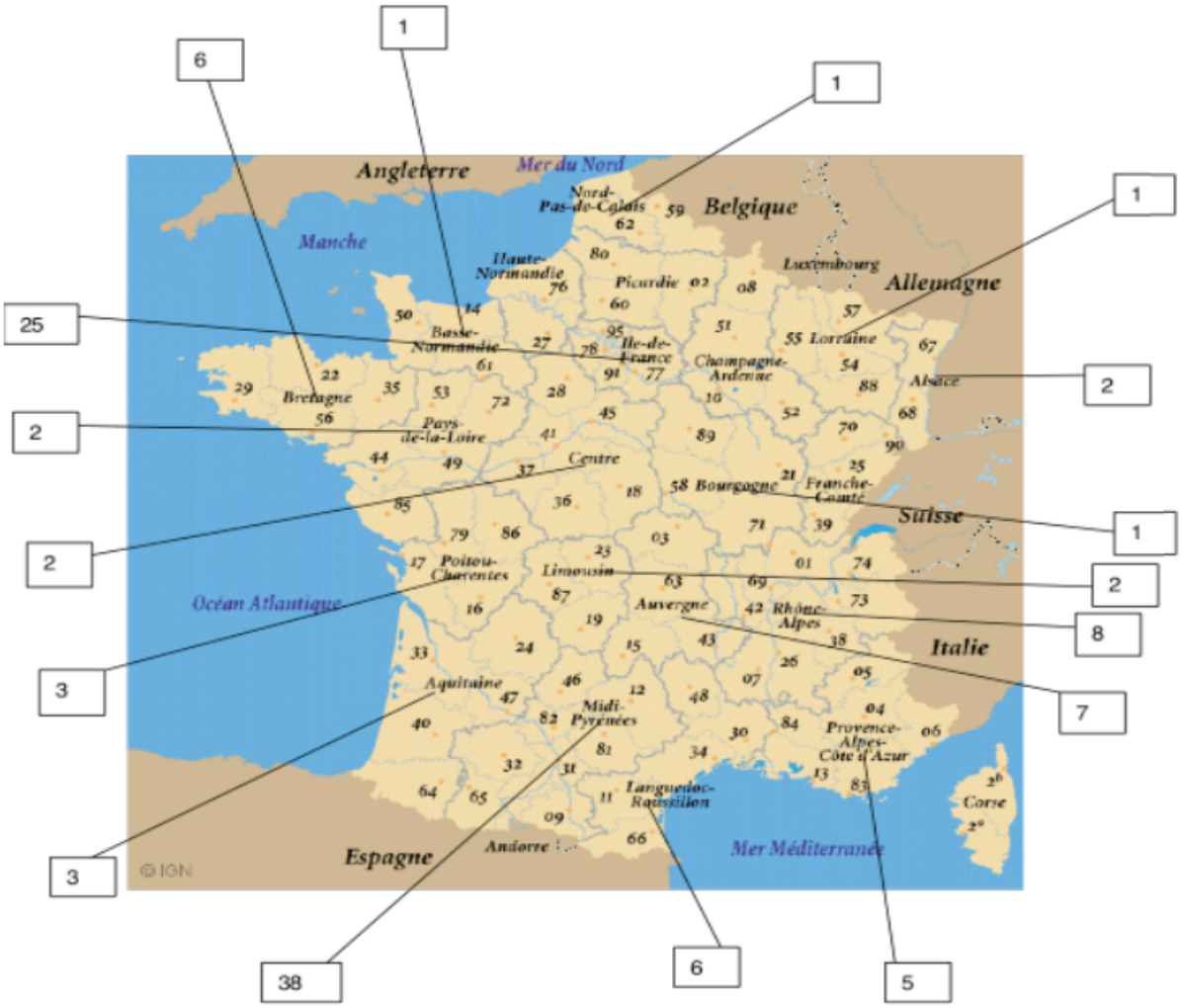


Figure 30 - Users Per Region, France

5.2.4.4 Users per time slot

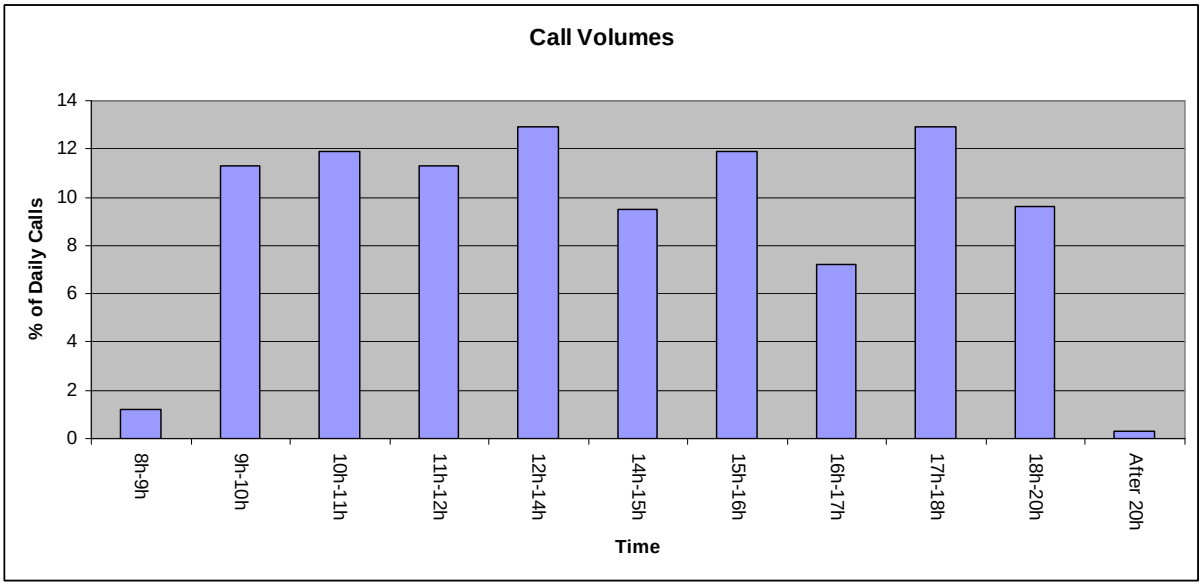


Figure 31 - Call volume distribution across the day

5.2.5 Quality of the Relay Service

The quality of the French relay service is assessed according to the following measures:

- Diploma and experience of all the staff involved in the relay service.
- Respect for business ethics.
- Quality of the technical environment: ambient sound (different materials are being tested), lighting, and provision of a special room for interpretation or transcription via relay centre.
- Development of material or interface (HMI) in relation to the staff who will use it.
- Places and times set aside for discussing the work of/for the relay centre and for sharing experiences. Interpreter managers participate in regular meeting at distance (by video-conference) and on site – and all interpreters in the network can hold discussions on a private forum, and share a private newsletter on the subject. All participate twice a year in a national meeting on the subject.
- Interpreters work only 30% of time in the relay centre (with 70% of time spent on other work)
- From the point of view of the interpreters and transcribers (Velotypists), the major challenge is the limited number of professionals available to be able to offer 24/7 services. For interpretation for example, it would be necessary to create about 10 training centres in different regions of France, with about 10-15 students every year. This has great financial implications.
- Good coordination between the manager of the relay centre, technical staff and interpreters & Velotypists is essential. Statistical information is very important too for good service organisation in the relay centre, and for being able to reduce queuing.
- Interpreter/transcriber attitude and competence are also important issues, and there needs to be a means by which users can report difficulties in using the service, as a step towards improving quality as a whole.

5.3 The Netherlands

In the Netherlands the relay service is provided by KPN, formerly known as de Koninklijke PTT (the Royal Dutch Postal and Telecommunication Services). KPN delivers the service as part of company policy to help disabled people but charges a commercial fee, although it has stated that it loses them money. There is no public or external funding for this service.

Devices used by people with communication impairment, such as analog and mobile textphones, and alerting products (flashing light units for example) are provided by healthcare insurance. In the Netherland, users have to pay for both the subscription and call-fees for the relay services themselves.

Some references to the KPN relay service, including anecdotal stories, are listed in Appendix 2.

5.3.1 History of text relay in the Netherlands

The relay service started in 1983 on a very limited scale. The service was for daytime only calls and it was not possible to connect to international or '06' numbers. The service was also relatively expensive to use. So, the Deaf Council approached PTT to negotiate rates and service hours. As a result, in 1990 KPN reduced the usage costs of the service (*Teleplus*) and extended opening to a 24-hour service. The staff were trained to become more customer focused – giving their name to callers. A second access number (0900-8614) was added for international and mobile use. The name changed to KPN Teleplus Text Telephone Service at this time.

Later, KPN wanted to cut costs by limiting the hours the relay service was available but later dropped this proposal. At this time, KPN outsourced the service to SNT, a call center subsidiary that also provides the directory enquiry service within the Netherlands. However, in the eyes of some users, this led to a reduction in the quality of service. Lack of investment in the service combined with aging technology and a low public profile then led to a reduction in the number of users.

In May 2008 KPN announced that it was considering stopping 24-hour service because it was unprofitable and was used on average just five times a night. It also stated that the existing infrastructure (which had not received investment since the 1990s) was no longer suited to the current environment. As a consequence, they redirected the overnight service to the 112 emergency line (although this is not of course the only reason that deaf people need to communicate at night).

The traditional analog textphone of recent years has been joined by a new generation of text communication media such as SMS and IM. However, despite the introduction of these new technologies, the need for traditional one-on-one communication using traditional textphones still remains. In the Netherlands, the provider of the Mobile Text Phone AnnieS makes substantial investments to maintain compatibility with both the installed base of analogue textphones and the services that use this technology – such as roadside assistance and the relay services.

By the beginning of August 2008, the service was no longer accessible between 22.00h and 07.00h. The Deaf Wellness Foundation Amsterdam (SWDA) , together with Rotterdam Deaf Welfare Foundation (SWEDORO) and Care & Welfare Foundation Deaf, Zoetermeer (WEZODO) then began protest action, and SBNDJ – the organisation for young deaf people – conducted a poll on its website. Prior to this closure, KPN had stated that it would be prepared to modernise the service, but was unwilling keep the service running 24 hours a day for the reasons given. Written questions concerning the reduced service hours were asked of the Minister of Economic Affairs and the State of VWS in the Dutch Parliament. Then in response to the protests of individuals and organisations, together with political pressure, KPN reinstated the 24/7 availability on 15 August

2008. KPN further promised to keep the service running until an alternative solution becomes available. Representatives of the deaf community were approached for consultation. Since then, the relay service has not been actively promoted and it is understood that the only improvement to have been considered is the lowering of the time taken by agents to handle a relay call.

5.3.2 The relay service

The primary users of the text relay service are deaf and hard of hearing people. The relay service is also used by hearing people in order to contact deaf and hard of hearing people. Although speech impaired people are also entitled to use this service, there are no speech-impaired service users known at the present time.

In the Netherlands, the text relay service is accessible by analogue text phone, AnnieS Mobile (MTT) and Internet text phone (www.rttphone.net). The service is in two primary parts – relay calls to fixed line phones (0900-8410) and relay calls to mobile phones and service numbers (0900-8614).

Because there is no external/public funding for this service, the tariffs are not equal to a normal conversation without the involvement of a relay service. The tariff for fixed line calls is €0.15 per minute and for mobiles and service numbers €0.55 per minute.

5.3.3 The Users

In the Netherlands, we estimate that there are approximately 40.000 deaf and 120.000 hard of hearing people who could be interested in using this service. However, because health insurance only covers the costs of devices for people who have been audiologically classified as deaf, the size of the potential user group for the relay service is probably lies between 10,000 and 40,000 (including users of both AnnieS MTT and legacy Text phones. The Internet textphone has much greater potential but is mostly used at present by hearing people to contact friends and family without the mediation of a relay service.

5.3.4 Usage of the relay service

At the moment, it is estimated that around 10.000 legacy textphones are still in use in the Netherlands; however, detailed usage information about this group is not available. For AnnieS MTT users, we determined from our statistics a usage rate for the relay service of five times a month per person.

The relay service seems to be used now primarily for formal communications and its use for social interactions appears to have dropped – possibly through perceived performance limitations, restricted availability and cost of use issues.

5.3.5 Areas of improvement

Out of the interviews and surveys carried out in the Netherlands, the following improvements have been suggested for the relay service:

- Performance (with regard to waiting times)
- Performance (with regard to success rate of the relay calls)
- Quality (fewer technical problems at the call centre)
- Quality (DTMF tones interfering with the voice channel)
- Functionality (combination of speech and text channel on Mobile devices)
- Functionality (video relay)
- Functionality (emoticons)
- Costs (should not be more expensive than a mobile to mobile conversation; the rest of the cost should be funded by public means)

The service limitations mentioned are strongly believed to explain why usage is so much lower than in other countries. People are therefore compelled to employ other means of relaying the call, such as using friends and family to act as an informal 'relay service'. This of course has privacy complications. Some users even replied that they ignored emergency (not life threatening) situations because of the inability to reach a reliable relay service.

Also, the changes in technology within the call centre environment (traditional analogue textphones to integration of the analog textphone with a computer) have led to interoperability problems with the AnnieS Mobile Textphone (MTT). Users are able to call the relay service and will be answered, but say that they cannot be connected to MTT users. However, they believe that if there were to be public procurement of the service, with public money available to support its costs, then quality and performance should improve as a result of demands that could be made by government, in an effort to assure full compliance with legislation.

5.4 Spain

The Spanish relay service (known as 'Centro de Intermediacion') started in 1995 and soon became very popular among the deaf community. Nowadays, it is considered as one of the biggest advances for people with hearing loss in Spain. Several organisations were involved in the establishment of the relay service, which was part of a movement to break down barriers for disabled people. As the ability to communicate was becoming ever more essential in the Information Society, this service was seen as essential in the pursuit of equal opportunities for all.

When the service started in the 1990s, it was promoted by IMSERSO (Institute of Elderly People and Social Affairs) and CEAPAT (National Centre of Personal Autonomy and Technical Aids). Now, it is a service offered to Spanish citizens by the Ministry of Health and Social Policies. Although a public entity is responsible for the relay service, it has been developed and is maintained by the

company SERTEL. SERTEL belongs to ONCE Group (Spanish Organisation for the Blind), and has been providing the service from the outset.

5.4.1 Users of the Relay Service

Deafness can be a disability with severe impact on a person's life. In a mainly hearing society, with high reliance on interaction between people at work as well as socially, communication skills are essential to life chances and citizenship.

The user base for the relay service consists of individuals with widely differing language and communication skills, which the service must be able to deal with. Among the factors impacting on people's abilities are:

- The type and level of education received.
- Whether or not they use oral language supported by sign language.
- Whether or not they are used to being in an environment in which there are other deaf people.

5.4.2 Technological evolution of the Relay Service

The original relay service in Spain could be accessed using legacy textphones as well as by fax. Following its establishment, the use of DTS textphones increased significantly. As new technologies emerged, the relay service also widened its access channels through the introduction of SMS, e-mail and Instant Messaging.

Since late 2007, the relay service centre has adopted a new architecture known as Text and Video Relay Service (TVRS). The TRVS platform integrates all these modes of access into one application and a single incoming call queue. This design has improved both the efficiency of operator resource as well as the quality of the service to end users.

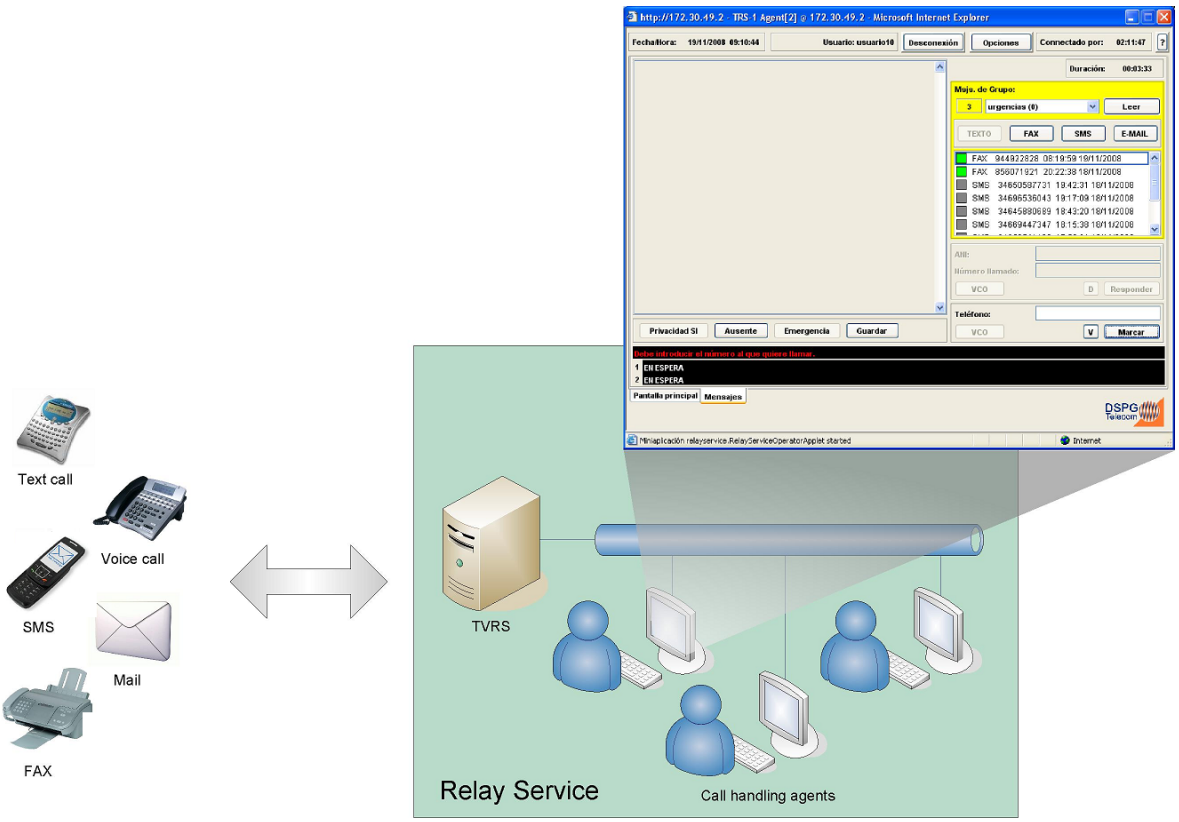


Figure 32 - Overview of the TVRS platform for the Relay Service in Spain

Any operator can answer every type of call, be it voice or text (all forms of text communication across all supported technologies, including real-time text, email, SMS or fax) via their workstation. Similarly, using the same application, operators can establish any type of outbound call or communication. The TVRS platform includes emergency call handling. Calls to the 900 211 112 emergency number are prioritised over other calls and directed to the first available operator.

5.4.3 Human Resources

Prior to the formal launch of the relay service in Spain, a specialised operator pool had to be enlisted. As part of this process, potential recruits were assessed on key aptitudes including oral and written language skills and typewriting (250 characters per minute) ability. Also included in the assessment were the candidates' understandings of tone of voice and emotion in spoken conversation, capacity for empathy and disability awareness. The initial relay service centre team consisted of disabled people and today there are still 87.5% disabled employees of the service.

Currently, the relay service operates a three shift system (morning, afternoon/evening and night). Some operators work double shifts. All staff are permanently employed, and turnover rates are low. More than 50% of current staff has been with the service since its launch in the 1990s. At present, 12.5% of staff are sign language interpreters.

5.4.4 Level of Service

According to the contract, not answered incoming calls should not be greater than 2% – a target that has been achieved ever since the relay service started.

5.4.4.1 Users per channel

Table 10 shows the number of calls made to the Spanish relay service during May 2009. Currently, the most used communication medium is e-mail.

	PHONE (Voice)	TEXTPHONE	FAX	EMAIL	SMS	IM	TOTAL
Calls	1158	2001	1258	14226	371	184	**19198**
Percentage	6.03	10.42	6.55	74.10	1.93	0.96	**100%**

Table 10 - Users Per Channel, Spain

5.4.4.2 Users per region

Customers of Relay Service are mostly from Madrid. The next biggest group is from Catalonia.

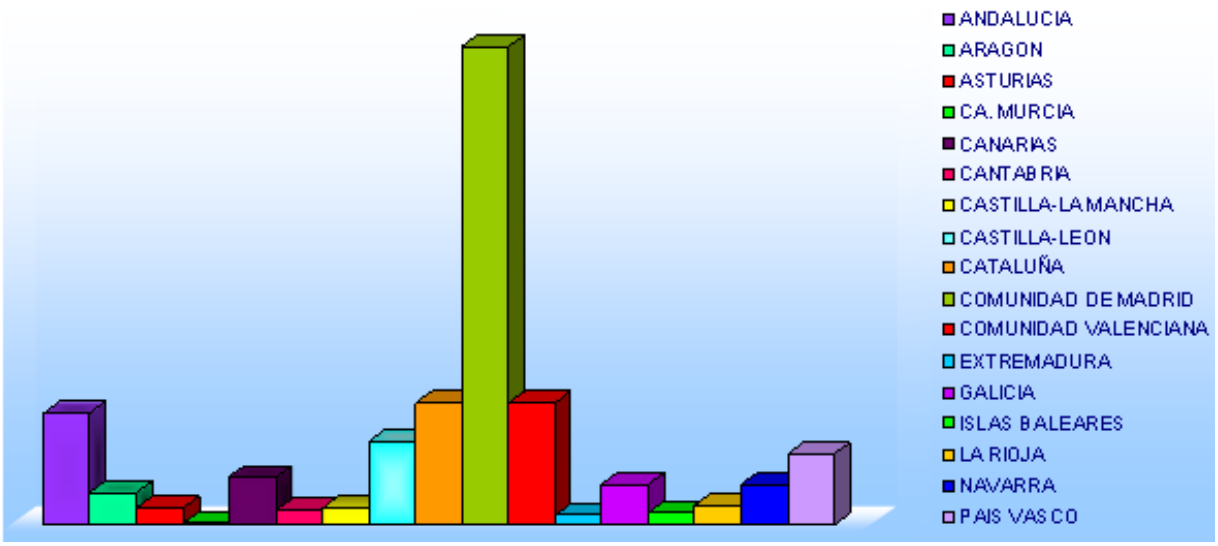


Figure 33 - Users Per Region, Spain

5.4.4.3 Users per time slot

The time slot with the highest call volumes is between 12.00hand 13.00h.

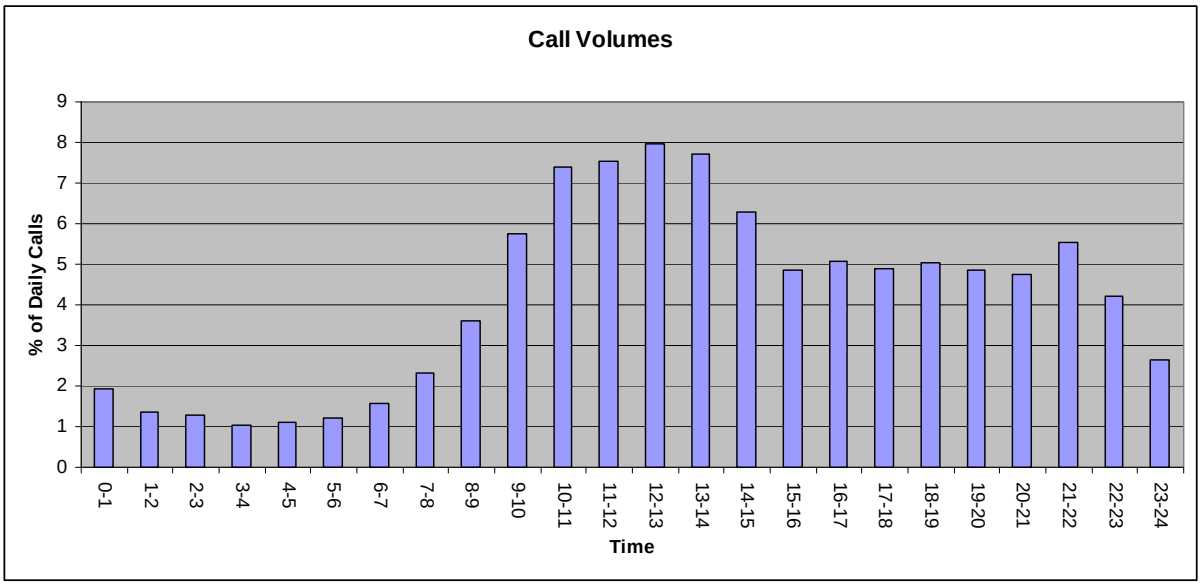


Figure 34 - Call volume distribution across the day

5.4.5 Quality of the Relay Service

Quality of Service Indicators are monitored regularly:

- Abandoned incoming calls. These are monitored daily in an effort to keep them as low as possible.
- Quality of outgoing communications and operator performance controls. Reviews are carried out weekly, evaluating both service level (time taken to respond to incoming calls for instance) and efficiency (including number of calls per agent per hour).
- Customer satisfaction surveys. These are carried out annually and cover user needs and customer satisfaction. Users are also asked for any other suggestions or comments about the service.

5.5 Sweden

In Sweden, the services are specified and procured by the National Post and Telecom Agency (PTS), the national telecom regulator in Sweden. The services are financed by national taxes. County councils, labour authorities and the social insurance system procure text telephones, video telephones and Total Conversation units, and provide them free of charge to the people who need them. There are a number of different types of relay service offering conversion between differing modes of communication – some still under development. This report describes the text, speech to speech and video relay services.

5.5.1 Text Relay

The primary group using the text relay service consists of deaf and hard of hearing people and those with speech impairment. This relay service is also used by those who need to place calls to people within these groups. The conversation between users of voice telephones and users of textphones are relayed by operators. The service is also accessible through the Internet enabling a software application to make it possible to use a computer as a textphone. The relay service itself is open 24/7 and free of charge to the user in that he or she is charged the same amount as calling

without the relay service would cost. The answering time requirements for the public Swedish text relay service were specified in the latest procurement documentation as a maximum of 20 seconds for 90% of calls between 06.00h and 21.00h, and a maximum of 40 seconds for 90% of the calls between 21.00h and 06.00h. The figures are calculated per month, from the arrival time of the incoming call to when the outgoing call is placed. The Swedish text relay service provides traditional text relay, web based text relay, fax relay and limited SMS relay.

5.5.1.1 The users

In Sweden there are approximately 10,000 deaf people. There are twice as many female text relay users as male. In the non-disabled group, the largest group of service users are those aged 50 to 74.

Non-disabled text relay users	
26 - 49	33%
50 - 74	42%
75 and older	25%

Table 11 - Non disabled Text Relay Users, Sweden

In the disabled group, most are experienced text relay users and have used a textphone for more than ten years. In the non-disabled group, just less than half have used text relay for more than ten years.

How long non-disabled users have used text relay	
More than 10 years	47%
6 – 10 years	10%
1 – 5 years	33%
Less than 1 year	10%

Table 12 - Number of years users have accessed text relay, Sweden

5.5.1.2 Usage and benefit

In the disabled users group, approximately half use the text relay service once or more every day.

Disabled users usage of text relay	
Once or more per day	50%
2 – 4 times per week	30%
Once per week	20%

Table 13 - Daily usage of text relay – disabled users, Sweden

The non-disabled user group use the service much less.

Non-disabled group usage of text relay	
Daily	10%
Once or more per week	60%
Once a year	30%

Table 14 - Daily usage of text relay – non-disabled users, Sweden

The overall opinion of both groups is that the service is working at a satisfactory level.

Disabled users say that the service is easy to use and makes them more independent. They also say they can use the service at any time and they are positive about the relay operators. They use the relay service to mostly get in touch with organisations.

Disabled users user text relay usage	
Authorities	84%
Family	62%
Friends	46%
Companies	38%

Table 15 - Uses of text relay, Sweden

By contrast, the non-disabled group use the service to get in touch with family and friends. Approximately two thirds of the textphone relay service users, both non-disabled and disabled, believe that they will use the service as much over the next year.

5.5.1.3 Areas of improvement

Approximately 60% of the disabled users feel that there are some areas that need further improvement. Among other things, technical functionality has been identified as a possible area of improvement as well as better use of the service when calling to another country. The disabled users have also voiced the wish to be able to express emotions through symbols and signs, as they believe is possible in American text relay services.

5.5.1.4 Operating company

The text relay service in Sweden was put to public tender in 2007; this was won by Eniro AB. Eniro AB is a Nordic company offering search services and directory assistance '118118' in several countries. The head office is in Stockholm. The company was founded in 2000 when it acquired Telia's telephone directory and online services. Eniro is a former member of the OMX Stockholm 30 index. The public procurement was for a service contract until 1 April 2010 but PTS has indicated that it will probably use the option to extend the contract until 2012.

5.5.2 Teletal – Speech to speech relay

Teletal is a speech to speech relay service. It enables speech impaired telephone users and others to interact by providing skilled operator assistance between the two parties. The service offers translation and note-support for people with speech, voice, language, visual and, cognitive impairment. Three types of support are provided: speech support, read and write support, and memory support. Phone calls are made through ordinary telephone equipment and an interpreter helps the disabled person in form of clarifications, memory support and note-support.

The relay service itself is free of charge to the user in that the relay user is charged the same amount for the call as would have been incurred without the use of the relay service. The service relayed 50,000 calls during 2008.

5.5.2.1 Information about the users

Half of the users are male and the other half female. 40% of users are between 50 and 74 years old and the same percent between 26 and 49 years old. The rest of the group is younger than 25 years of age. 30% say that they use Teletal daily and a further 60% that they use the service between one and four times a week. Together this indicates that 90% of the group uses the service at least once a week.

5.5.2.2 Usage and benefit

Overall the users appear very pleased with the Teletal service, saying that they benefit greatly – with almost 8 out of 10 giving a positive judgment. Users seem pleased with the approach of the operators, the interpretation, accessibility and technical functionality. The prevailing opinion among the users of Teletal is that the operators are polite and professional – and in a user survey reported in August 2009, 84% of respondents said that the service increases their independence. Teletal is used more to make business calls to authorities than is the case with the other relay services, although it is used to a lesser degree for calls to friends and family. The users of Teletal say that they will use the service as much or more in coming year, and most of the users have recommended the service to someone else.

5.5.2.3 Areas of improvement

Regarding possible improvements, the opinions of the users are divided. Half the users do not feel that there is any need for improvement of the service, while the other half feel that there ***is*** a need to improve specific areas including accessibility, queuing times, opening hours, and technical functionality. Some respondents have said that the beep that can be heard to indicate that they are in a three-party call is a problem, particularly for those who are hard of hearing. Some users with reading difficulties have expressed the wish to be able to record the conversation. In these cases, the note-taking as a memory support is considered insufficient.

5.5.2.4 Operating company

Up till 31 August 2009 the service was run for four years by Verbaldigitalius AB. At that time, they lost the contract in a public procurement exercise to Samres AB. Samres is a company employing some 300 people that specializes in running mobility service and medical service transportations call-centres, as well as other call based transportation.

5.5.3 Bildtelefoni – Videophone relay

The video relay service enables sign language users to interact with voice telephone users through conversion between the two communication modes in (substantially) real time. This conversion (interpretation) is provided by a human operator. The service provides video relay for SIP videophones, web client, H.323 videophones, ISDN/H.320 and 3G Circuit Switched video calls. Message based text communication is available during the relay calls. The service is also compatible in video and audio with SIP based Total Conversation terminals.

The call answering time requirements for the public Swedish sign relay service was specified in the latest procurement documentation to be a maximum of 40 seconds for 70% of calls and a maximum of 90 seconds for 90% of calls. This is calculated per month, from the time of arrival of the incoming call to when the outgoing call is placed. The relay user is not actually charged the amount they would have incurred had they called direct, without the involvement of the relay service. Instead, the Swedish Post and Telecom Agency (PTS) reimburses the relay operator for the cost of the call between the relay operator and the person to whom the call is being connected. The relay service itself is therefore free of charge to the user.

5.5.3.1 Information about the users

The primary group using the video relay service are those for whom sign is their first language. The service provides both relay services and remote interpretation. The quoted number of female users is higher than that of male users, approximately two thirds being female. Almost 70% use the service on a daily basis, and 59% several times each day. A further 30% use the service between one and four times every week. This means that overall, 96% of users use the service at least weekly.

For deaf-blind users the video relay service has also proven very beneficial. Most of the people in this group communicate through sign language but when 'listening' to a relayed phone conversation, they plug a Braillewriter into the videophone.

5.5.3.2 Usage and benefit

75% of the users rate the video relay service as good or very good, while only about 6% of the users rate the service as bad or very bad – mainly due to criticism of opening hours and/or technical functionality. With regard to lack of technical functionality, users have mentioned limited image quality of the streaming video, and that the fact that the videophone itself often needs service support (such as software upgrade, component replacement or re-configuration) more than once a year. Almost all the users of the video relay service state that they benefit greatly from the service. Many of them feel that they become more independent through this service, and a majority feel that the service is easy to use.

In Sweden, videophones act as regular phones amongst those who use sign language. The primary use of videophones is to get in touch with friends and family. Due to the possibility of using sign language when talking to others, many users say that they prefer them to textphones.

5.5.3.3 Areas of improvement

Even though most of the users felt the service is good, there were some areas they thought should be improved. In particular, users expressed the view that the opening hours should be extended beyond the present times of 07.00h-08.00h Monday to Friday and 09.00h-15.00h at weekends. Then, following the absence of an adequate queuing system, the next most common complaint was that the image and sound do not always synchronise, and that the image sometimes becomes blurry. A further complaint concerned a perceived shortage of interpreters.

In response to the questionnaire, the video relay operator highlighted the need for priority of incoming relay calls to 112. The need to be able to locate callers in case of emergency is also mentioned as an area for improvement.

There have been trials with the technology called 'Call Direct' that gives the videophone user a direct number to be used by voice telephone users. The users of ordinary voice phones can then call this direct number and it automatically connects through a relay service instead of first calling to a relay service that in turn connects to a videophone user. Call Direct also enables automatic invocation of the relay service when a sign language user calls a voice phone number.

5.5.3.4 Operating company

The video relay service was put out to public tender in 2007 and the winning bid came from Orebro County Council. They are now running this relay service until 2011. Some 300 operators and administrative personnel are involved with the operation. The relay service itself is spilt across seven different locations around the country.

5.5.4 Level of Service

Statistics for the last eight years clearly indicate a trend in relay service usage. In 2001, 797,625 text relay calls were made and during 2008 this number was down to 337,097 calls. The usage of text relay service has dropped approximately 57 % during these years. Alongside this, the usage of video relay services has skyrocketed with 217% increase for the same period. The operator of the video relay service has also indicated clearly that the length of a relayed call has increased during these years.

Year	Text relay calls	Video relay calls
2009	365 177 calls	127 692 calls
2008	387 037 calls	
2006	469 224 calls	
2005	505 729 calls	8 901 calls
2001	797 625 calls	

The dramatic increase of usage of the video relay service can be explained by the fact that many of those who have sign language as their first langue prefer to communicate in this way. Also, within this group, there are individuals who have very poor written language skills, and for them video relay is the only possible way to communicate with users of voice telephones.

The Total Conversation platform therefore gives the user full communication access. The disabled person may communicate through text, sound or video – or a combination of these if required. Even though a person may be fully fluent in sign language, research show that they often like to have the opportunity to communicate some parts of a conversation in text – for instance if detailed information such as an address, phone number or something else needs to be given. Some deaf users also feel that they want to be able to communicate with their voice but would like to see the other party communicating through sign. Total Conversation enables the user to communicate in the way he or she pleases.

5.6 United Kingdom

Two UK existing national relay services are described in the following sections: the text relay service (BT *Text Relay*) and the video relay service (*SignVideo*).

5.6.1 BT Text Relay

5.6.1.1 History and funding

In 1984, RNID launched a pilot text relay service called 'Telephone Exchange for Deaf people'; this was based on learning from a successful six week trial that had taken place some four years earlier. Having developed and established the technical and ethical basis of operation, a full 24 hour national public service called *Typetalk* came into existence in 1991, operated by RNID and funded on a voluntary basis by BT. Then in 1994, BT became required to fund Typetalk by a condition in its operating license. As a result of the Communications Act 2003, the license regime was withdrawn and replaced by a system of General and Specific Conditions of Entitlement. BT is now required to provide funds for the operation of a relay service accessible by end-users of any public telephony provider who needs to use the service because of their disabilities. In 2009, BT took over direct responsibility for operating the service as well as funding it, and the service was rebranded *Text Relay*.

Text Relay offers a 24-hour English-speaking relay operator service every day of the year. It is open to anyone within the UK, and to anyone dialling in worldwide. If a call originates outside the UK, the call can only be connected to a UK telephone number. Calls are charged at the originating telecommunication provider's standard rates, but some providers refund the text part of the call. Text Relay employs around 300 staff, of whom the majority are relay operators (text relay assistants). Technical support for users is available by post, email, textphone or telephone during normal office hours.

5.6.1.2 The users

BT Text Relay is primarily used by deaf and hard-of-hearing people to make and receive calls in real-time using the public switched telephone network. Some deaf British Sign Language users

make use of the service as do a small number of speech-impaired individuals. In all, users made 1,526,900 calls last year. The volume of relay calls made by the groups listed above significantly exceeds those originated by hearing users of the service.

The majority of deaf and hard-of-hearing users currently use dedicated textphones. In the UK, the cost of textphones is not subsidised. Stand-alone textphones are available from both US and UK manufacturers, and many users buy their own, while others may be provided by employers (for those in work) or by local authorities (particularly for those deemed at particular personal risk for reasons of illness or infirmity). A feature of the UK text relay service is that it has always provided the option for PSTN users to choose 'voice carry-over', where the deaf user elects to speak their part of the call instead of typing. Since many older people gradually lose their hearing, and do not like keyboard typing, a textphone variant called the *ScreenPhone* has been developed by RNID. This product includes a large screen on which incoming text is displayed, but there is no keyboard on the standard model. It is proving increasingly popular among this demographic who prefer to speak, but read the reply in text, and is enabling these people to maintain vital social contact with family, friends as well as being able to continue business communication if needed.

5.6.1.3 Technical evolution

In 2001, BT launched a virtual text network facility in the PSTN ('BT TextDirect') that provides an ITU-T V.18 platform to bridge between the various textphone protocols (for example, codes to represent alphabets) in use in the UK. It also provides call status and progress information in text. Calls are routed over the virtual text network through the use of call 'prefixes'. For users, this means they can call direct to any number, with the system bringing in a relay assistant to transcode the call only when needed. From 2003, the introduction of an additional prefix provides a means for users to lock calls in text-to-text mode (i.e. no relay assistant required) if they wish.

Although Text Relay does not provide direct IP access, a growing number of deaf and hard-of-hearing people are now able to access the service from computers and mobile handsets (using dedicated software or an ordinary web browser) via RNID's 'TalkByText' IP to PSTN gateway.

5.6.1.4 Human resources and quality assurance

BT and the UK regulator Ofcom have jointly agreed and published Quality of Service standards[71] for BT Text Relay to ensure that deaf and speech-impaired people receive good service. The main principles of the Quality of Service requirements are:

- The user's call will be answered quickly.
- The relay operator will facilitate the call in a professional way.
- Confidentiality will be respected.
- Emergency calls will be prioritised.

Additionally, customer support is ISO9001 certified. Overall quality assurance is maintained by appropriate recruitment and training, spot checks, test calls and by redundancy in key technical components of the system.

Text relay assistants are required to type accurately (better than 98% transcription accuracy) and at high speed (minimum of 40 words per minute). They undergo deaf awareness training and acquire competence in understanding and dealing with users for whom English may not be the preferred language (such as the British Sign Language community). All relay assistants are trained on the specific handling of emergency calls.

[71] Ofcom 'Quality of service key performance indicators and principles for the relay service' http://www.ofcom.org.uk/advice/qos/ Accessed 22 October 2009.

Relay assistants act as impartial facilitators and do not participate in the conversation except where one party's lack of knowledge of the service or of the other party's communication needs is impeding the conversation. The relay assistant may if appropriate insert notes of sounds or emotions that the textphone user would otherwise miss e.g. phone ringing, laughing, etc.

Relay service employees are subject to the provisions of the Official Secrets Act and must sign a confidentiality agreement which states that they will be dismissed and may be prosecuted if they discuss or use any information from the conversations they relay. They are not normally permitted writing materials at their workstations. In particular, conversations facilitated by the relay service may only be recorded, or parts of conversations noted in the case of emergency calls, for quality measurement and training, when one party is abusive to the relay personnel, or when there is a technical problem that must be investigated. Every relay assistant is monitored at least quarterly for speed of transcription, accuracy and process conformance. Refresher training is undertaken as required. Text Relay aims for less than one complaint for every 1000 relay calls handled and a dissatisfaction rate of less than 5% among surveyed customers.

The service is staffed by a mixture of full-time and part-time paid employees. The size of the permanent staff pool is sufficient to ensure that levels of service can be maintained around the clock (busy hour information is not published), and to cover sickness and holidays. There is a process for bringing in and training temporary staff if required.

To ensure the best possible level of service for its users, BT and Ofcom have agreed specific statistical call-handling targets. These include:

- Answering 90% of standard relay calls within 15 seconds.
- Answering 95% of emergency relay calls within 5 seconds.
- Ensuring that less than 3% of standard relay calls are abandoned.
- Ensuring that less than 2% of emergency relay calls are abandoned.

These measures are monitored constantly, averaged over four week periods and reviewed annually. The latest quarterly report, published in October 2009, indicates that Text Relay had successfully met, and in most cases significantly exceeded, each of these targets during the period 22 June to 11 October 2009[72].

5.6.2 SignVideo Relay

5.6.2.1 History and funding

Significan't is a Deaf and Sign Language led social enterprise that piloted and launched its full SignVideo relay service in London in 2004. It has also secured national contracts with Access to Work and the National Health Services to provide Video Remote Interpreting services throughout the UK – these require similar human and technical resources to the video relay service. The service has received ISO9001 certification in 2008.

The SignVideo service is available from 09.00h to 17.00h on weekdays. Prior to the start of the Reach112 project, the service had not accepted emergency calls. By 2006, the SignVideo Contact Centre had already passed its 10,000th video call minute. Information on the current number of users and volume of calls is not publicly available. The relay centre deploys a contact centre management system to monitor call queuing, and reports it is confident that it is typically able to answer 100% of incoming calls.

[72] Text Relay 'Quarterly Report October 2009' (http://www.textrelay.org/downloads.php) Accessed 28 October 2009.

5.6.2.2 The users

The SignVideo relay service is primarily aimed at deaf British Sign Language users. Support for other sign languages may be available by prior arrangement.

The first videophones suitable for use with sign language were expensive and used multiple ISDN channels. However, since broadband became widespread, more affordable IP-based videophones and computer webcams have become available to the BSL community. Also, some local authorities now have videophones that can be used by the public.

Users can also receive advice and training and try out different videophone terminals at the Significan't premises. For deaf people in employment, or who run their own business, some costs may be recovered through the Access to Work Scheme.

5.6.2.3 Technical evolution

The SignVideo service has technically evolved to support a wide range of videoconferencing technologies, from ISDN to IP, over 3G mobile networks and using SIP and H.323 protocols. A minimum of 384kbps upload/download speeds is recommended.

5.6.2.4 Human resources and quality assurance

SignVideo employs only fully qualified and registered sign language interpreters who work variable hours. A minimum of three interpreter operators is available, rising to four at times of peak demand. Freelance staff are used to cover the full hours of service operation and to ensure that the service is not impacted by sickness or holidays.

Every interpreter is a member of the Register of Sign Language Interpreters and has completed a minimum of three years work in the community since qualification. They are bound by a professional code of ethics and all calls handled are kept strictly confidential. On-site training and assessment of interpreter operators is given before relay call handling is permitted, and staff undergo further training on a quarterly basis.

5.7 Summary remarks

Communications services are vital for all citizens, including those with disabilities who may face significant difficulties when trying to use them. Today we rely on telecommunications to find and to carry out work, to order and consume everyday goods and services, to talk to family and friends, and to participate fully in civil society through access to education, culture and democratic processes. Yet for people with communication disability (and especially for those who are severely or profoundly deaf), telecommunications is especially challenging. When it concerns access to emergency services it can become potentially life threatening.

The real tangible benefits of providing high quality relay services are clear therefore not only to disabled people themselves and those who need to communicate with them, but to society as a whole. They enable people with communication disabilities to continue to play a productive and effective part in everyday life. Provisions such as this have become all the more important as a result of the (financial) imperative to keep the greatest number of people self-sufficient beyond the traditional age(s) of retirement – at a time when many European states face aging populations. It is this backdrop that makes the European standard for harmonised relay services (ETSI ES 202 975 v1.2.1) a significant step towards establishing a firm foundation on which the specification of relay services across Europe can be reliably based.

6 User requirements and Conclusion

The deliverable has reported and analysed user experiences of contacting emergency services by people with communication disability. It has also detailed how contacts from such people are presently being handled by both emergency and relay services, in order to provide as a firm basis for proposing and/or developing improved access solutions. User requirements that have arisen from these three areas of investigation are:

1) The perceived level of service for communication disabled people when compared to that for voice callers is intended to improve as a result of the work done in this project. This should be assessed by contacting a sufficient body of users at the end of the study.

2) Because of the plethora of communication channels now available to the public, it is becoming essential of provide multi-platform access to services generally, and more especially to those related to health and safety issue in particular. A growing number of (younger) people are eschewing landline connections in their homes in favour of mobile only access to communication and broadband connection. This reality must be recognised in any emergency services solution.

3) Mobile telephony has also been found to give people with any form of disability a sense of added security, in that they can be (more) confident of being able to summon help while on the move – so we can expect that disability and similar organisations will advocate this form of communication for their client groups.

4) People with communication disability (and probably those with other disabilities) perceive they have a right, reinforced in law, to access such services – especially emergency services – using their usual or preferred means of communication.

5) Furthermore, people with communication disability wish to be able to access important services using mainstream technologies. It is because of the phenomenal growth in SMS texting as a popular means of remote communication, for example, that some emergency services have already incorporated this means of access to their services, or are in the process of trialing its use (examples cited).

6) Specific instances have been given of failure of network providers to fully embrace accessibility obligations associated with VoIP connection to emergency services. And in some cases it appears that emergency services themselves have been slow to take sufficient account of this growing medium. These issues need to be addressed within the REACH112 project.

7) The failures reported suggest that written regulation alone is not sufficient to guarantee accessibility and that proactive monitoring (coupled with adequate threat of potential sanction) is also required.

8) People with hearing loss form an exceptionally disparate section of the population. This ranges from those with mild hearing loss who need (at most) occasional amplification to be able to hear and who rely exclusively on spoken/written language for communication to the much less numerous group with severe/profound hearing loss from birth whose preferred (or, occasionally, only) means of communication is through sign language. Therefore, any attempt to impose a simple single solution will fail, and this is why the concept of Total Conversation (simultaneous voice, text and video) is so strongly supported by the target user groups.

9) When interviewed, individuals have stressed that it is not only the technical aspects of access that determine equality of service, since the attitude, skills and training of staff involved in the emergency call handling chain just as strongly affect the outcome. In addition, it has also become clear that customers are not always adequately knowledgable about all the relevant

access possibilities, so that technical implementation and staff competence needs to be supported by good public promotion of the arrangements if the service is to be truly accessible.

10) Although the issue of transfer of emergency calls between member countries is clearly very new to the emergency services, their responses suggest that this is an area in which more thought needs to be given as to the challenges involved, particularly regarding the use of relay services. Previous EU-funded work, which has been referenced, may provide useful guidance. Solutions should be provided through tasks T5.2 and T5.3.

11) The implementation of Total Conversation handling within call centres called for by the project will provide a new challenge for most providers, who therefore wish to find ways to 'flag up' incoming calls of this nature. The most appropriate ways in which to accomplish this need to be found, and some standardisation of practice would be valuable.

12) Emergency services have stressed the importance of caller location information and appropriate routing of signals in the context of this project, and the need to share information and investigate technical possibilities has been encouraged. Solutions for this can be expected to emerge through task T5.4.

APPENDIX A French literature review

From the review in France of publications relevant to user requirements, the following extensive collection of references was gathered. Here they are grouped according to the sections in 3.6 from which they are referred.

(A) *R&D documents relating to improved accessibility of conversational services*:

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Mer N., H. Cartier 2007. Bilan de l'expérimentation Total Conversation. © France Télécom R&D
Mer N., L. Aimar 2006. Spécifications fonctionnelles et ergonomiques Total Conversation. © France Télécom R&D.

(B) *Uses of Relay Centre services by deaf people and what is at stake in France*:

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http://itworld.nl/persberichten/34/agents-multi-tasking-inzetbaar-door-speciaal-ontwikkelde-software.html

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APPENDIX C Medical emergency fax

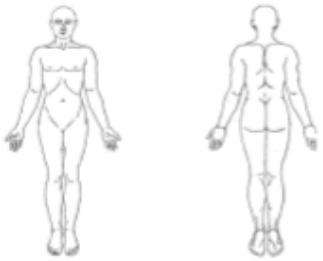
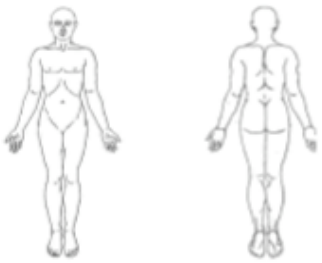
Date /heure:

ACCES SAMU 31 POUR SOURDS – Fax 05 61 77 24 11

Seulement problème TRES URGENT

QUI EST MALADE ?	QUEL PROBLEME ?
Nom Prénom ---------- Age ---------- Adresse (code, n°rue, étage, code postal) ---------- ---------- ---------- Tel/ fax ---------- Nom médecin traitant ---------- Tel médecin traitant :----------	□ **Malade** □ **Accident** (blessé) Quelle heure ? ---------- Comment ? ---------- □ **Prise trop médicaments / toxique / alcool** Nom ?---------- Quelle heure ? ----------

Perte de connaissance ?	Problème respiratoire ?	Problème au cœur	Enceinte ? □ oui □ non
 Evanoui ? oui□ non□ Bouge ? oui□ non□ Tremble ? oui□ non□ Répond il/elle aux questions □ oui □ non	 Respire ? □ oui □ non Respire mal?□ oui □non Doigts bleus?□ oui □non	 Douleur au cœur? □ Pouls ? oui □ non □ lent □ rapide □ normal □ régulier □ pas régulier □	 Combien mois ? ..... Accouchement (va, va, va) □ oui □ non Contractions □ oui □ non Perte eaux □ oui □ non

Douleur, mal où ? (flèche sur le dessin)		
Douleur : □ un peu □ beaucoup □ beaucoup ++++ 	□ sueurs (transpire +++) □ fièvre - Combien ? □ vomissements sang / repas □ diarrhée (caca liquide) □ pipi brûle ?	□ **Sang**, où ? Combien ? + ++ +++ □ **Coupure** où ? □ **Brûlure** où ? □ **Fracture**, où ? (os cassé) (flèche sur le dessin) 

AUTRES :

Si malade (problème santé) **avant aujourd'hui** :----------
Prise de médicaments tous les jours ? Noms ? ----------
Allergies ---------- **Suivi maladie** (diabète, asthme…) ----------
Problèmes cœur ? ---------- **Nom cardiologue ?** ----------

Téléchargeable sur le site du CHU de Toulouse : http://www.chu-toulouse.fr/rubrique.php3?id_rubrique=210

APPENDIX D UK user questionnaire

This is the version of the questionnaire mailed to individuals in the United Kingdom; minor changes were made to customise the on-line questionnaire for the medium. The (translated) questionnaires employed in the Netherlands and Sweden followed a very similar pattern, with minor adjustments made to reflect national circumstances.

REACH112 Access to Emergency Services survey 2009

Section A: About you and your hearing

1. How old are you?
   - ☐ 18 – 29 years
   - ☐ 30 – 49 years
   - ☐ 50 – 69 years
   - ☐ 70 years or older

2. In which part of the UK do you live?
   - ☐ England (North)
   - ☐ England (Midlands)
   - ☐ England (South West)
   - ☐ England (South East)
   - ☐ Northern Ireland
   - ☐ Scotland
   - ☐ Wales

3. How would you describe your hearing when you are **not** using hearing aids?
   - ☐ I have some difficulty hearing what is being said, mainly in noisy situations
   - ☐ I have some difficulty hearing what is being said, even in quiet situations
   - ☐ I cannot hear what is being said, but I can hear some sounds
   - ☐ I am profoundly deaf

4. What is your preferred language for day-to-day communication?
   - ☐ English
   - ☐ Welsh
   - ☐ British Sign Language
   - ☐ Other (please state)

5. Which of the following do you own? (please tick as many as are applicable).
   - ☐Landline telephone
   - ☐Mobile phone
   - ☐Textphone
   - ☐Video phone
   - ☐Fax machine
   - ☐Home computer (PC, laptop or similar)

6. Which product would you prefer to use when communicating with someone? Please rank below, placing a '1' next to the product you *most* prefer to use and a '6' next to the one you would *least* prefer to use. Please rank all of the products even if you don't have access to them

   - ☐Landline telephone
   - ☐Mobile phone
   - ☐Textphone
   - ☐Video phone
   - ☐Fax machine

☐Home computer (PC, laptop or similar)

Section B: Contacting Emergency Services directly

1. Have you ever been in a situation where you needed to contact one of the Emergency Services (Police, Fire Service, Ambulance service or Coast guard)?

☐Yes
☐No (please continue to Section D)

If 'yes', please tell us what you did

☐I contacted the Emergency Service myself
☐I asked somebody else to contact the Emergency Service on my behalf
☐I did not contact the Emergency Service

If you did not contact the Emergency Service yourself, please use the space below to explain why:

2. Which of the emergency services have you personally contacted? (please tick all that apply)

☐ Fire Service
☐ Police Service
☐ Ambulance Service
☐ Mountain rescue
☐ Coast guard

3. Which of these products have you used to contact the Emergency Services? (please tick all that apply)

☐Landline telephone
☐Mobile phone (voice)
☐Mobile phone (SMS)
☐Text phone
☐Video phone
☐Fax machine
☐Home computer
☐Other (please state) _____

4. When you contacted the Emergency Services, which number did you dial? (please check all that apply)

☐999
☐112
☐Other (please state) _____

5. Have you ever been unsatisfied that the correct type of Emergency Service had been sent to handle your emergency?

☐Yes
☐No

If 'yes', please give details including the way in which you contacted the Emergency Service operator:

_____
_____
_____
_____

6. Please rate your experience of contacting Emergency Services with these products by ticking the relevant boxes. Please **only** rate those products that you have used to contact Emergency Services.
After each rating there is space for you to add any additional comments you may have regarding any of the products.
If you haven't used a particular device then please select 'Not Applicable'

How would you rate the **overall** experience?

	Very Positive	Positive	Satisfactory	Negative	Very negative
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					
Fax machine					
Home Computer					

Comments _____

How would you rate the speed of connection to an Emergency Service operator? (for SMS, Fax machine and Home computer, please rate the speed of their *response*)

	Very quick	Quick	Satisfactory	Slow	Very slow
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					

Fax machine					
Home Computer					

Comments_____

How would you rate the duration of the call? (for SMS, Fax and Home computer, please rate the duration of the *conversation*)

	Too long	**Just right**	**Too short**
Landline telephone			
Mobile phone (voice)			
Mobile phone (SMS)			
Text phone			
Video phone			
Fax machine			
Home Computer			

Comments_____

How easy was it to provide the operator with relevant information?

	Very easy	Easy	Satisfactory	Difficult	Very difficult
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					
Fax machine					
Home Computer					

Comments_____

How easy was it to receive and understand the information **from the operator**?

	Very easy	Easy	Satisfactory	Difficult	Very difficult
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					
Fax machine					
Home Computer					

Comments_____

How would you rate the overall ease of communication with the operator?

	Very easy	Easy	Satisfactory	Difficult	Very difficult
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					
Fax machine					
Home Computer					

Comments_____

After the call had ended, how confident were you that you had been understood correctly and that the appropriate action would be taken?

	Very confident	Confident	Neither confident nor unconfident	Unconfident	Very unconfident
Landline telephone					
Mobile phone (voice)					
Mobile phone (SMS)					
Text phone					
Video phone					
Fax machine					
Home Computer					

Comments_____

Section C: Contacting Emergency Services using relay services

1. Have you ever made use of a text relay or video relay operator when contacting an Emergency Service operator?

Text relay	☐Yes	**Video relay**	☐Yes
	☐No		☐No
	☐I don't know		☐I don't know

If you answered 'yes' for either of these, please rate your experience. After each rating there is space for you to add any additional comments you may have.

How would you rate the overall experience?

Text relay	☐Very positive	**Video relay**	☐Very positive
	☐Positive		☐Positive
	☐Satisfactory		☐Satisfactory
	☐Negative		☐Negative
	☐Very negative		☐Very negative

Comments_____

2. How would you rate the speed of the initial response from the emergency service operator via the relay operator?

Text relay	☐Very quick	**Video relay**	☐Very quick
	☐Quick		☐Quick
	☐Satisfactory		☐Satisfactory
	☐Slow		☐Slow
	☐Very slow		☐Very slow

Comments_____

3. How would you rate the duration of the call?

Text relay	☐Too long	**Video relay**	☐Too long
	☐Just right		☐Just right
	☐Too short		☐Too short

Comments_____

4. How easy was it to provide the Emergency Service operator with information (e.g. type of emergency, address, etc.)?

Text relay	☐Very easy	**Video relay**	☐Very easy
	☐Easy		☐Easy
	☐Satisfactory		☐Satisfactory
	☐Difficult		☐Difficult
	☐Very difficult		☐Very difficult

Comments_____

5. How easy was it to receive and understand information *from* the Emergency Service operator?

Text relay	☐Very easy ☐Easy ☐Satisfactory ☐Difficult ☐Very difficult	**Video relay**	☐Very easy ☐Easy ☐Satisfactory ☐Difficult ☐Very difficult

Comments_____

6. How would you rate the overall ease of communication with the Emergency Service operator?

Text relay	☐Very easy ☐Easy ☐Satisfactory ☐Difficult ☐Very difficult	**Video relay**	☐Very easy ☐Easy ☐Satisfactory ☐Difficult ☐Very difficult

Comments_____

7. After the call had ended, how confident were you that you had been understood correctly and that the appropriate action would be taken?

Text relay	☐Very confident ☐Confident ☐Neither confident nor unconfident ☐Unconfident ☐Very unconfident	**Video relay**	☐Very confident ☐Confident ☐Neither confident nor unconfident ☐Unconfident ☐Very unconfident

Comments_____

Section D: General thoughts and future requirements

1. How confident are you that Emergency Services are currently able to provide deaf and hard of hearing people with the same level of access as for people without hearing loss?

☐Very confident
☐Confident
☐Neither confident nor unconfident
☐Unconfident
☐Very unconfident

Comments_____
_____

2. If you could communicate with the Emergency Services using any combination of voice, real-time text and live video **at the same time**, do you think this would make the process of accessing emergency services easier for you?

☐Yes, it would make it easier
☐It would make no difference
☐No, it would make things *more* difficult
☐I don't know

Comments_____
_____

3. If a service was available which allowed you to communicate with Emergency Service operators from a computer using any combination of voice, real-time text and live video at the same time, do you think you would use this service?

☐Yes
☐No
☐I don't know

4. If you needed to contact the emergency services in future, which contact number would you dial?

☐999
☐112
☐Other (please state) _____

5. Before taking this survey, were you aware that the telephone number 112 could be used to contact the Emergency Services in the UK?

☐Yes
☐No

6. Ideally, how would you like to be able to communicate with the emergency services in the future?

Thank you for taking the time to complete this questionnaire

RNID may wish to contact you again during the next stage of this 'Access to Emergency Services' project. Would you be happy for us to contact you for this purpose?

☐Yes
☐No