Video Relay Service Research – International Comparison

Final Report

For Canadian Radio-Television and Telecommunications Commission (CRTC) – Social and Consumer Policy group

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Prepared and submitted by the Canadian Centre on Disability Studies Inc., operating as Eviance

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FINAL REPORT

Introduction

This report is submitted to the Canadian Radio-Television and Telecommunications Commission's (CRTC) Social and Consumer Policy group by the Canadian Centre on Disability Studies Inc. operating as Eviance, in response to a need for research on Video Relay Services (VRS) in other countries. This international comparison is part of a CRTC review of the VRS regulatory framework in Canada. This comparative analysis of international VRS will be used to enhance and compare with the Canadian VRS.

In preparation for its review, the CRTC commissioned public opinion research to collect user's experiences of registered VRS subscribers to help determine what works; how VRS should be improved and whether it should be extended to serve businesses. As noted in the statement of work for this research, some users suggested Canadian VRS should look to the United States VRS for ideas on how to improve Canadian VRS. The present research is designed to respond to these suggestions by conducting an international comparison of VRS in other countries. This research began in October 2020 and was completed in January 2021.

This report provides some background information on the Canadian VRS including a summary of key points from the recent public opinion research to provide a context for the present study. Next, we provide some definitions of key terms and an overview of our methodology. Following this, we present our findings on research conducted on the functionality, features, services, regulations, and funding of VRS provided in other countries. This report concludes with a summary of key findings highlighting the similarities and differences between the Canadian VRS and the international VRS explored during this research.

Background

VRS is a basic telecommunications service that enables persons who are Deaf, deafened, hard of hearing or have a speech disability who use sign languages to communicate with voice telephone users. The Canadian service is offered in American Sign Language (ASL) and Langue des signes québécoise (LSQ). The VRS process involves the sign language user making or receiving a video call to connect to a VRS operator using Internet-based videoconferencing. The operator then connects via a voice telephone call to the other party and relays the conversation from sign language to voice and vice-versa.

As noted in Telecom Regulatory Policy 2014-187 Video Relay Service, issued in April 2014, the CRTC determined that VRS must be offered in Canada (CRTC, 2014). VRS was launched in Canada in September 2016 and, since November 2017, the service is available 24 hours a day, 7 days a week. VRS is implemented and overseen by the Canadian Administrator of VRS (CAV), an independent and centralized administrator.

The CRTC committed to reviewing the VRS regulatory framework three years from the launch of the service. Part of this review involved collecting the user experiences of registered VRS subscribers to help determine what is working well, how VRS should be improved, and how the service might be extended. This research was conducted by Sage Research Corporation in March and April 2020. They produced a report of their findings from 16 online interviews with service users. The report of their findings informs the present research.

The Sage Research report noted that participants valued the 24/7 availability of VRS in Canada. Participants indicated that they used the service on various devices but did not like the Waterfox browser required to use the VRS app on a Mac computer. Some participants from this research indicated that the U.S. VRS services are **technologically more advanced** than Canadian VRS in terms of features and functionality. Participants said they learned a lot about VRS from the **Deaf community and suggested the need to invest in outreach activities to non-users to create awareness of VRS**. Participants suggested that **customer service** should be available during evening hours and that there is a need to use service user complaints to enhance the service. Several participants suggested that there should be **stricter standards** for video interpreters (VI), and a mechanism to provide feedback on a VI. Some participants suggested there should be deaf interpreters available for certain VRS users and that sometimes there were challenges with wait times for an interpreter, especially when the VRS user needed to make a call at a pre-set time. According to the Sage Research Corporation (2020), "the most notable suggestion was to implement a communication program to increase awareness and understanding of VRS among business and the general public, as this would substantially benefit businesses staffed with individuals who are deaf" (p. 9). This research report also noted that participants suggested that the VRS app "should be updated, and updated more often, and that U.S. VRS services provide models for how the app should be improved" (p. 9). This report noted that the most common issue with the app involved ineffective notification of incoming calls.[1] According to Sage

[1] According to Canada VRS, "As long as the Deaf customer has their device turned on and is logged into **Canada VRS**, the app will signal that there is an incoming call. The "ringing" behaviour will depend on the device being

Research, participants suggested there be a flashing light and/or vibration (for a smartphone). When using VRS for 911 calls, some said "the call went fine" and were connected quickly but others took issue when the VI refused to stay on the line to assist with communication with emergency responders as this was considered a VRI service which is not allowed on VRS.

In light of this previous research, the objective of the present research is to:

1. Perform desk research to identify which countries currently offer VRS, the functionality/features/services of VRS provided in other countries, the VRS regulations, and how VRS is funded is each country researched. If there are more than one VRS provider in a country, each VRS service provider analysed should be identified and the functionality/features/services should be broken down by service provider;

2. Perform a comparative analysis of the international video relay services to compare with the Canadian VRS; and

3. Create and deliver in an electronic form a final MS word report that provides

    a. A comparison of the Canadian video relay service with international services. The report shall (i) describe the functionality/features/services of each video relay service; (ii) set out the government regulations for each service; and (iii) identity how VRS is funded in each of the countries researched.

The report shall also identify:

    a. Similarities and differences between the Canadian video relay service and the international services explored during this research.

Definitions

A few key definitions are important to highlight here. We have developed working definitions of "service", "feature" and "functionality". These definitions are based on the findings from our research and have been confirmed by the CRTC project team.

used and the user settings." Retrieved from: Make a Call - SRV Canada VRS. Blynchlights also became available around the same time of the Sage Research data collection in April 2020.

***Service* =** The interpretation and connectivity between communicants that the VRS provider makes available, including the languages the VRS provider interprets, the geographic scope of service coverage, and the days/hours of service.

***Feature* =** What the VRS provider's app, platform and technological infrastructure can do for the user.

***Functionality* =** How a feature or service performs, (e.g., its versatility, ease of use, level of user control it affords, etc.).

Other important definitions include:

VI = Video Interpreter, i.e., a person who does the interpreting on a call.

VRS = Video Relay Service, i.e., the interpreter services, features, and functionalities a VRS provider makes available to users.

VRI = Video Remote Interpretation, i.e., a form of sign language interpreting that allows people who are deaf or hard of hearing to communicate with a hearing person at the same site via videoconferencing instead of by live, on-site interpreting.

The use of VRS and the experience of its service quality are interrelated. A person who cannot use the service at all has no experience of its quality, except to say that they may experience service quality as poor because they have been prevented from using it at all. However, a person may be able to use a VRS provider's service but experience less-than-optimal quality. This can happen because features are not in place to facilitate full use of the service. For instance, interpreter service may be available, but not in the user's main language, or if there is a poor internet connection or limited access to highspeed internet.

Services, features, and functionalities are also interrelated. For instance, as a service, the VRS may facilitate a person's choice of a particular VI for a call. The user's app may have a feature that facilitates easy, straightforward selection of the VI. In contrast, instead of offering a feature on their app, the person may have to undergo another, more time-consuming, and less convenient procedure for selecting a VI. If selection is available through the app, this digital feature may be functionally complicated and cumbersome to use. A VRS provider may offer high quality services that are fully accessible and useable to some. However, access to highspeed internet, hardware, and/or software may render the services and features less useable for some people on lower incomes.

Methodology

The present research is a comparative analysis of VRS providers and systems in other countries using a qualitative description approach, and an individualizing comparison method. A qualitative description approach seeks to give a thorough and straightforward account of relevant information and provide a report or data in as unbiased and raw a manner as possible (Homer, 2017; Sandelowski, 2000). Qualitative description is useful for quantitative data and mixed method investigations for developing interventions and refining evaluations. Qualitative descriptions can provide constructs for developing or modifying these interventions.

Similarly, individualizing comparison contrasts a relatively small number of cases to grasp the peculiarities of each case (Adiya & Ashton, 2017; Tilley, 1984). This basically involves describing fully the characteristics or features of each of the cases being studied. This helps to broaden knowledge and gives insight to see cases in-depth.

Sampling Strategy

We have used a purposeful sampling strategy to select information-rich cases for in-depth study. To be relevant for the present research, we began with an online search of VRS in countries with similar socio-political-economic contexts to Canada such as the United State, Western Europe, Australia, and New Zealand. Our research revealed a small number of previous studies and comparisons of VRS models in other countries. One particularly relevant study by Mission Consulting (2012) identified nine countries outside Canada that tested and deployed VRS. These countries include Australia, New Zealand, Finland, France, Germany, Sweden, Switzerland, United Kingdom and United States. This report was conducted to inform the development of VRS in Canada and provides relevant previous research on which to build upon so that we may gather an in-depth understanding of the VRS systems in the above-mentioned countries. Thus, these nine countries will be researched for the present study with a particular focus on VRS in the United States.

Data Collection

Our data collection process followed the scope of work outlined in the CRTC Statement of Work for the present research. We have conducted desk research to identify which countries currently offer VRS and present this report for consultation with the Project Authority and the Project Team of the CRTC Social and Consumer Policy group.

Data collection involved an online search to identify the functionality, features, and/or services of VRS provided in other countries, the VRS regulations, and how VRS is funded is each country researched. When there

was more than one VRS provider in a country, each VRS service provider was identified and analyzed for their functionality, features, and/or services. Desk research was supported with a small number of key informant informational interviews to seek missing information not found in the online public domain.

Data Analysis

Qualitative content analysis was used in this research as it is both reflexive and interactive. This analysis approach allowed for continuous adaptation for the treatment of data in the face of new data, and new insights. Qualitative content analysis is geared towards summarising informational contents of data to apprehend both the apparent and the tacit content of data (Sandelowski, 2000). This content analysis was complemented with an intersectional analysis of the VRS regulations, functionality, features, and services of VRS provided in other countries. The intersectional analysis sought information to consider the inclusion of the needs of diverse service users inclusive of gender, age, ability, race/ethnicity, etc. in various VRS frameworks in other countries (Hankivsky, 2012; Buettgen, et al., 2018).

Sample

The following list presents the jurisdictions researched for the present project based on the results of an online search for VRS in other countries and previous research on their functions, features and/or services, regulatory frameworks, and funding sources. This list includes a brief overview of the contexts of the VRS system in each country, starting with Canada. The jurisdictions researched are the United States, Australia, New Zealand, Finland, France, Germany, Sweden, Switzerland, and the United Kingdom. This list was presented for review and confirmation by the CRTC Project Authority and the Project Team.

The following information builds on previous research gathered by Mission Consulting (2012). Each country noted below includes approximate population estimates retrieved from various government and institutional websites. However, detailed census data on all aspects of disability is often difficult to obtain and is lacking in many countries. According to a report from the Conference of State Parties to the Convention on the Rights of Persons with Disabilities (2015):

> Disability is a complex and multidimensional issue that poses several challenges for data collection and measurement. The lack of a uniform definition and understanding of disability among countries and the application of non-comparable methodologies in the measurement and collection of data and statistics mean data are not consistent or comparable among countries. (pp. 3-4).

Thus, we have presented data from various sources to provide an estimated population of people who are Deaf, hard of hearing and use sign as a primary language.

Canada

> **Total population:** 38,005,238[2]
> **Deaf population:** 36,717[3] to 340,000[4]
> **Hard of hearing population:** 1,266,120[5] to 3,150,000[6]
> **Use Sign as primary language:** 27,500 to 340,000[7]
> **Name of Sign Language:** American Sign Language (ASL) and la Langue des Signes Quebecoise (LSQ)
> **VRS vendors:** Canada VRS is managed by the Canadian Administrator of Video Relay Service (CAV), Inc.

As per Statistics Canada (2009),

> In 2006, 1,266,120 (5.0%) Canadians aged 15 and older reported having a hearing limitation. Over eight in ten (83.2%) hearing limitations were mild in nature, while the remaining 16.8% were classified as severe…The majority of persons with a hearing difficulty described themselves as having some hearing loss.

This is the most recent census data from Statistics Canada collected in 2006 which indicates that the Deaf population is 36,717. According to the Canadian Association of the Deaf (2015a) and Canadian Hearing Society (Noik, 2018), this number is much higher at approximately 340,000 to 357,000 Canadians. Likewise, the hard of hearing population is estimated at 3,150,000 according to the Canadian Association of the Deaf (2015) and Canadian Hearing Society (Noik, 2018). Data from Statistics Canada in 2006 indicates 1,266,120 Canadians who are hard of hearing. The Canadian Association of the Deaf (2015b) suggests that the Deaf population use Sign as a primary language, whereas Statistics Canada suggests that approximate 27,500 Canadians use Sign as a primary language.

With strong disclaimers as to the dependability and accuracy of any data, "It is the opinion of the Canadian Association of the Deaf that no fully credible

[2] See Statistics Canada (2020)
[3] See Statistics Canada (2009)
[4] See Noik (2018)
[5] See Statistics Canada (2009)
[6] Ibid
[7] See Canadian Association of the Deaf (2015)

census of Deaf, deafened, and hard of hearing people has ever been conducted in Canada" (2015a). The Association argues that Statistics Canada data underestimates the number of Deaf and hard of hearing people in Canada. For more information see their position on Statistics on Deaf Canadians (2015a) noted in the reference list of this report.

United States

Total population: 328,239,525[8]
Deaf population: 600,000[9]
Hard of hearing population: 6,000,000[10]
Use Sign as primary language: 200,000[11]
Name of Sign Language: ASL (American Sign Language)
VRS vendors: Convo Relay, Purple Communications, ZVRS, Sprint, Sorenson, Global VRS, Malka Communications Group, Inc., URRelay

Australia

Total population: 23,401,890[12]
Deaf population: 40,000
Hard of hearing population: 20,000-3,550,000
Use Sign as primary language: 11,680[13]
Name of Sign Language: Auslan
VRS vendors: Concentrix

New Zealand

Total population: 5,084,300[14]
Deaf population: 77,000
Hard of hearing population: 200,000
Use Sign as primary language: 28,000
Name of Sign Language: New Zealand Sign Language (NZSL)
VRS vendors: Sprint International New Zealand (up to February 2021); Concentrix (as of February 2021)

[8] See U.S. Census Bureau (2020)
[9] See Gallaudet University (2011)
[10] Ibid
[11] See Mission Consulting (2012)
[12] See Australian Bureau of Statistics (2017)
[13] See Deaf Australia (2013)
[14] See Stats NZ (2020)

France

Total population: 67,130,000[15]
Deaf population: 100,000
Hard of hearing population: 3,000,000
Use Sign as primary language: 100,000
Name of Sign Language: Langue de Signes Français (LSF)
VRS vendors: Elioz and Tadeo-Acceo

Germany

Total population: 82,110,097
Deaf population: 100,000
Hard of hearing population: 260,000
Use of sign as primary language: Not available
Name of Sign language: Deutsche Gebärdensprache (DGS)
VRS vendors: TeleSign, TeSS

Sweden

Total population: 10,367,230[16]
Deaf population: 13,000
Hard of hearing population: 530,000
Use Sign as primary language: 30,000
Name of Sign Language: Svenskt Teckenspråk (SSL)
VRS vendors: Bildtelefoni

United Kingdom

Total population: 66,796,800[17]
Deaf population: 87,000[18]
Hard of hearing population: 2,300,000
Use Sign as primary language: 151,000[19]
Name of Sign Language: British Sign Language (BSL), Irish Sign Language (ISL)
VRS vendors: InterpretersLive! (Sign Solutions UK), InterpreterNow, SignLive Unlimited, and SignVideo

[15] See INSEE (2021)
[16] See Statistics Sweden (2020)
[17] See Office for National Statistics (2020)
[18] See British Deaf Association (2020)
[19] Ibid

Finland

Total population: 5,525,000[20]
Deaf population: 8,000
Hard of hearing population: Not available
Use Sign as primary language: Less than 5,000
Name of Sign Language: Finnish Sign Language, Finland-Swedish Sign Language (FinSSL)
VRS vendors: N/A (VRI provided by Kela [aka Kansaneläkelaitos])

Switzerland

Total population: 8,688,200[21]
Deaf population: 10,000
Hard of hearing population: 500,000
Use Sign as primary language: 10,000
Name of Sign Language: Swiss-German Sign Language (SDGS), Swiss-French Sign Language (SLSF), Swiss-Italian Sign Language (SLIS)
VRS vendors: Procom

Limitations of this research

Like any research project, this study has a few limitations. For example, this study was limited to primarily online searching. Given the timeframe of this research, we were unable to further ascertain some details of regulations, features and services of some providers. As such, we focused on breadth and as much depth of information as possible. Most providers shared limited information publicly on the web about costs, fees, or other details of their VRS. The summary table in the appendix reflects the breadth of information gathered through this research. The following report includes more details on each country and provider reviewed. Future research could involve more qualitative data gathering through formal interviews with VRS vendors/providers and regulatory authorities. Next, we provide an overall summary of findings before getting in to further details.

[20] See Statistics Finland (2020)
[21] See Federal Statistical Office (2020)

Summary of Findings

Overall, Canada appears to be one of a few countries (i.e., U.S., France, Germany, Sweden) that offer VRS 24 hours a day, 7 days a week and 365 days a year. Other countries offer VRS for a limited time during the day, during the week and often not available on weekends or public holidays. Canada's VRS is also available on-demand (in comparison to booking in advance) which offers a relatively high level of flexibility for VRS users in comparison to other countries with more limited hours of available service. Likewise, Canada appears to be doing well in offering prioritization for 911 emergency calling in comparison to other countries.

Presently, there does not seem to be a common standard for enabling d/Deaf people to contact emergency services 24/7/365 by VRS. Text-based options are often held out as the most reliable and most constantly available option, despite the difficulties d/Deaf people may have using text in emergency situations. In the U.S., all FCC certified providers are required to offer 24/7 service with prioritization of 911 calls. Indeed, our research indicates that several former VRS providers were breaking FCC rules, regulations, and the governing Communications Act during the period of 2010-2013. This led to the closure or to cease provision of VRS. It appears that the FCC has enforced regulations to increase the quality and fairness of VRS in the U.S.

In comparison to Canada, we found the U.S. offers more choice in the number of VRS providers available to consumers. It appears that these providers are working to advance their technologies for both hardware and software VRS applications. Malka Communications, Purple/ZVRS and Sorenson appear to be leading this advancement. This includes various options for notification of incoming calls via multi-colour light rings and Bluetooth flashing. Convo Relay appears to be offering competitive options with a strong focus on corporate social responsibility in support of the Deaf and hard of hearing communities. Their "sign-centric" app shows intriguing features and capabilities.

In Europe, there seems to be uptake in the use of the Total Conversation standard among the VRS providers we examined and based on the recent public opining research in Canada, there appears to be a clear preference among d/Deaf Canadians for platforms that operate according to that standard. The International Telecommunication Union's Telecommunication Standardization Sector (ITU-T) has defined Total Conversation service as "[a]n audiovisual conversation service providing bidirectional symmetric real-time transfer of motion video, text and voice between users in two or more locations" (ITU-T, 2000; 2018). Total conversation enables people to

choose to communicate with any combination of those three modes in real-time. Total conversation is an application of universal design principles, which supports communication among a broad range people. IVès, nWise, and Omnitor are among the companies that have operationalized Total Conversation in their digital platforms (IVès, 2021; nWise 2020d; Omnitor AB 2020). MMX is the platform widely used by the European relay services we explored.

Moreover, Canada is doing well in terms of providing VRS for both personal and business use. Other countries appear to offer a more complicated VRS only available through subscribing businesses/organizations (e.g., France, Germany). However, like other countries, such as the U.S., Canadians may be limited in their access to VRS depending on their access to communication technology and/or internet. Access may also be affected by an individual's ability to pay for phone and internet, and/or available phone and internet infrastructure in some geographic locations. In comparison, Switzerland offers requires universal telecommunications service provided at affordable prices in all regions of the country.

Several providers are offering workplace and business supports and services for VRS and VRI in the workplace, schools and other organizations. These services indicate efforts to promote more accessible and inclusive communication among businesses, organizations and d/Deaf and hard of hearing individuals. Some providers, particularly in Europe, provide VRS exclusively for businesses and organizations and charge a subscription fee. These jurisdictions, such as the UK and France, place considerable emphasis on private funding as the revenue stream for financing VRS. Exceptions for access to public funding require individuals to apply for government assistance such that VRS may be used to help a person obtain or maintain employment, in which case departments responsible for employment services have an important role to play in funding on a person-by-person basis for eligible individuals. This means that d/Deaf individuals may be, in effect, excluded from using the services of non-subscribing companies/organizations unless the individuals pay for the mediating VRS/VRI service themselves.

In Canada, VRS, VRI and MRS are offered as separate services. Some other countries offer these services by the same provider(s) thereby increasing accessibility and choice of multiple modes of communication for service users. For example, in Australia, all relay services are provided by the National Relay Service (NRS) and delivered by Concentrix Pty Ltd. In the U.S. Purple Communications offers an array of services (including VRI), as does New Zealand Relay, Procom in Switzerland, and all providers in the United Kingdom.

Some jurisdictions, such as Germany, draw a clear distinction between VRS and VRI and provide public financing only for VRS. The stated aim is to facilitate conversations by phone for d/Deaf people. The state's obligations begin and end in facilitating access to communication between communicants through the telephone system. However, other jurisdictions such as New Zealand do not draw sharp boundaries around VRS and VRI, understanding that in some situations VRS is the most suitable means for d/Deaf people to communicate with others and in other situations VRI is more suitable. The aim in these latter situations is more broadly framed as the state's responsibility to facilitate d/Deaf people's equal participation in communication, regardless of the situations in which they find themselves.

In terms of cost, Canada's VRS is funded nationally by telecommunications service providers via the National Contribution Fund. This means that the cost of using VRS is not assessed to the caller. This is similar to the funding models in the U.S. and Australia. New Zealand and Sweden assesses no cost to the VRS user. VRS in New Zealand is Funded by the New Zealand Government through the Ministry of Business, Innovation and Employment (MBIE).

In other countries (i.e., France, United Kingdom, Germany) VRS is paid for by subscribing businesses/organizations who may a subscription fee for the service. This means that the Deaf, speech impaired and hard of hearing community is limited to VRS communication to businesses/organizations that pay for VRS. The extent of access to VRS is thereby affected by the capacity of individual providers to sell and maintain subscriptions. In comparison, Canada is doing well in avoiding such potential barriers to access.

Related to who will pay for VRS/VRI is whether d/Deaf individuals have a right to such service that will be publicly provided or financed. If they have a clear right to the service and its financing, then they can exercise many other rights and tap into many opportunities. If in contrast there is no clear right to VRS/VRI that is widely available and publicly financed, then it becomes difficult for d/Deaf individuals to exercise other rights and to make the most of the opportunities that would otherwise be more open to them.

Overall, there are boundaries around VRS in several countries. This means that there are limits to the availability and accessibility of VRS for the Deaf and hard of hearing communities. These limits are highlighted in emergency situations, hours of availability, access to individuals, length of call, etc. Our research indicates that only Finland MAY offer a choice of interpreter, however this country does not appear to offer VRS, only VRI. Further

research may explore potential opportunities to choose a VRS interpreter if it exists.

Some key gaps surround the exclusion of Indigenous languages and local/regional dialects by all VRS providers in all countries researched for this project. This reflects a gap in service and supports for diverse disability, d/Deaf, hard of hearing and deafblind communities. We also found limited opportunities for user choice of interpreters. This indicates a limited choice for VRS users to communicate with interpreters who reflect their experiences, social identities, and communication styles. This also indicates a limited amount of social power among service users. This limited power is compounded by often limited hours of service in several countries (Canada excluded). Our research indicates an overall need to enhance user power and control over VRS to progressively realize their right to communicate on an equal basis with others.

While Canada VRS helps raise awareness of VRS and assist customers to use the app, providers in other countries offer broader community awareness services to promote Deaf-owned businesses, and raise awareness of the needs, interests of the Deaf community. For example, Convo Relay in the U.S. is a Deaf-owned company that purports to develop connections to the Deaf community through access to resources for Deaf-owned businesses, Deaf professionals, and other organizations for the Deaf.

Innovative services include those that are run by and for the d/Deaf, deafblind and hard of hearing communities. For example, InterpreterNow is a social enterprise that invests its profits back into the deaf community ad is owned by Sign Language Interactions which in turn is a subsidiary of Sorenson Communications in the U.S. that specializes in communication services for d/Deaf people. Some of these providers also offer Deaf awareness training (e.g., InterpretersLive! And SignVideo in the UK; Malka Communications in the U.S.) to increase general awareness of the needs and interests of the d/Deaf and hard of hearing communities. These providers appear to be rooted in a sense of community and social responsibility. These providers may also be showing some connections between access to VRS communication and accessibility in society – both of which are inextricably intertwined.

Detailed Findings

Our research began with a review of the Canadian VRS system followed by a review of VRS in other countries. We present the findings of that research here. This section includes a descriptive analysis of our findings including a

summary table of highlights of the services, functions, and features of VRS across all countries included in our research.

Canada

According to the CRTC:

> VRS is a basic telecommunications service that enables people with hearing or speech disabilities who use sign language to communicate with voice telephone users. The sign language user connects to a VRS operator using Internet-based videoconferencing. The operator then places a voice telephone call to the other party and relays the conversation from sign language to voice and vice-versa. The service is available 24 hours a day, 7 days a week.
>
> The Canadian Administrator of VRS launched the service on September 28, 2016. Canadians can register to the service through the SRV Canada VRS website. (SRV Canada VRS, n.d.-a).

VRS is available to individual Canadians who are Deaf, Hard of Hearing or speech-impaired and use sign language. According to Canada VRS, the service is available to users at home or at work. At work, users are advised to contact their IT representative to verify their network security settings allow a good connection, adjust technical settings to ensure communications is not blocked. It is not currently possible to register a business, organization, government or school for an account and a 10-digit number. According to the Canada VRS website:

> Canada VRS's primary focus is for Deaf, Hard of Hearing and speech-impaired individuals to register for personal use. However, customers can register for a 2nd account and get a 10-digit number for business use…Note, Canada VRS cannot be used to support business or employment activities that rely on phone services. For example: telemarketing, phone-based customer service or other support services, phone sales or repetitive confirmation calling, or other types of heavy or repetitive calling which may be deemed excessive by CAV. (SRV Canada VRS, n.d.-a).

Under the current regulatory framework, VRS and text-based message relay (MRS) are considered two separate services. Each service has its own regulatory framework and offered by different service providers. MRS is offered by each telecom service provider whereas VRS is offered through a single, independent centralized administrator and funded through contributions from telecom service providers. In Canada all telecom service providers that offer local exchange service are required to provide MRS

(CRTC, 2019). The CRTC requires two types of MRS be made available to all Canadians. This includes teletypewriter (TTY) relay service and internet protocol (IP) relay service. All wireless service providers must offer IP relay service to their customers directly or through wholesale arrangements.

When establishing the regulatory framework for VRS, the CRTC determined that a centralized model would be more appropriate/efficient/effective than each service provider offering the service. VRI cannot be provided because VRS is funded by the telecom service providers to provide equitable access to the telephone system.

Services

Canada VRS is available 24/7, 365 days a year and has ASL, LSQ, English and French speaking interpreters on staff to accommodate conversations in all four languages.

Customer service is available Monday to Friday from 9:00am-6:00pm Eastern time by video, email, mail, phone, and live chat. Customer service is closed on Saturdays and Sundays and several national holidays.

In addition, Canada VRS Community Outreach Specialists travel across Canada and have created webcasts to raise awareness of VRS and help customers use the app. Canada VRS is also engaged in school outreach to "empower Deaf students with VRS". At school events, "students, staff and parents ask questions, get technical support and share ideas about new ways to use the Canada VRS app" (SRV Canada VRS, n.d.-b). Likewise, Canada VRS is available for Deaf youth. This availability is explicitly noted on the Canada VRS website. Deaf children under the age of majority can register to use the Canada VRS app with the authorization of their Parent or Legal Guardian. Parents or Legal Guardians can provide authorization via an online or a paper form.

The Canada VRS website also includes information for the hearing community to help inform about VRS. This includes a resource for offices that may require consent or permission to disclose personal information over the phone when a "3rd party" is involved.

Features

Users can register with Canada VRS for a primary account, a second account for business, and/or an account for Deaf youth and then download the app. The app is compatible with Blynclights which are devices that flash when a user is receiving a call and let people nearby know when a user is available

for a VRS call (SRV Canada VRS., n.d.-c).[22] The lights connect to PC or Mac computers and allows users to choose from several blinking colours.

Video mail is also available to allow users to receive messages from callers when they cannot answer their calls. Users can customize their greeting, ring duration and activate email notifications when they have a new video mail message. Caller ID and Caller ID hide are available for users who want to display their name and VRS number when making calls or hide it to keep personal information hidden.

Interpreter qualifications

Participants from the recent public opinion research (Sage Research Corporation, 2020) suggested stricter standards for VIs. Users said they are accommodation of new VIs, but that some VIs "may not be familiar with the general subject matter of the call, and as a result may not be adept at signing certain words or concepts" (p. 5). This indicates a potential need for enhanced interpreter qualifications and experience.

User choice of interpreters

Some participants from the public opinion research (ibid) suggested that users should have the option to request a particular interpreter. For example, these participants suggested that some VRS users may prefer a certain gender to interpret sensitive information in medical situations.

Cost to the user

Canada VRS is free to use.

Emergency calling

Emergency 911 calls go directly to first place in the call centre's queue and answered with top priority. VRS Canada recommends that users use the wireless location information feature in the Canada VRS app on smart phones or other wireless devices so that 911 can locate them.

Functionality

Platform

The app is available for Windows, Mac, iPhone and Android devices.

Technology required

Recommended devices for VRS include Windows PCs and tablets (Windows 10 and above); Apple computers (version 10.13 and above); Android tablets (5.0 Lollipop and above); iPads (iOS10 and above); Android phones (5.0 Lollipop and above); and iPhones (iOS10 and above). Recommended

[22] Available for users to purchase from a third party.

resolution for use on Canada VRS is HD: 1280 x 720 pixels. A 5-inch screen is recommended for smartphones. Good quality VRS calls in Canada require a minimum of 25 to 30 frames per seconds (fps) and a good quality webcam that can produce 30 fps even in low light conditions.

Regulations and Funding

The CRTC regulates and supervises broadcasting and telecommunications in Canada, including VRS. The CRTC's mandate is to ensure that both the broadcasting and telecommunications systems serve the Canadian public.

The Telecom Regulatory Policy 2014-187 covers VRS in Canada (CRTC, 2014). VRS is considered a basic telecommunications service that enables persons who are Deaf, deafened, hard of hearing or have a speech disability who use sign languages to communicate with voice telephone users.

VRS is funded nationally by telecommunications service providers (TSPs) via the National Contribution Fund. The CRTC established a $30 million annual funding cap for all VRS-related costs. VRS is provided using a centralized funding and administration model in accordance with public input.

According to Telecom Regulatory Policy 2014-187, section IV:

> There are many different models of VRS internationally. Canada has many distinct characteristics, including two official languages, two corresponding sign languages, a relatively small population spread unevenly over its large land base, six time zones, and a unique Canadian telecommunications regulatory context.
> In deciding how to implement VRS in Canada, the Commission must take into consideration the specifics of the Canadian marketplace. The Commission has considered the following issues with regard to how VRS should be implemented in the unique Canadian context:
> - number of VRS providers and competition in VRS;
> - equivalence of ASL and LSQ services; and
> - technical and operator elements of VRS. (CRTC, 2014).

The CRTC considers it important for VRS to build service capacity within Canada and to fit the Canadian context. In consideration of enhancing VRS in Canada, the following findings reflect the key features, functions and services of various models of VRS internationally for comparative purposes. Next, we review what is offered in the U.S. VRS system.

United States

We began our review of the U.S. from a list of nearly 30 providers identified in previous similar research conducted in 2011 (Mission Consulting, 2012). We reviewed a total of 32 providers in the U.S. Eight of which are currently VRS providers. The remaining 24 providers offered VRI, other interpreting services, were no longer in operation and/or were acquired by another company.

The following table presents the list of U.S. VRS providers that we reviewed and the associated website for their services. Many of the providers listed below offer VRS as one of one of several services such as VRI, Communication Access Real-Time Translation (CART), TTY, etc.

Table 1: U.S. VRS providers and website links

Provider	**Website**
Convo Relay (Convo Communications, LLC)	convorelay.com/vrs[23]
Purple Communications (A Division of ZP Better Together, LLC)*	purplevrs.com[24]
ZVRS (A Division of ZP Better Together, LLC)*	zvrs.com[25]
Sorenson	https://www.sorensonvrs.com[26]
Sprint (Internet and Telecommunications Relay Service Provider for the Federal Government)	federalrelay.us/index.html[27]
Global VRS	globalvrs.com[28]
Malka Communications Group, Inc.	malkacommunications.com[29]

*Note: Purple Communications and ZVRS are all associated with Kinderhook Industries, LLC ("Kinderhook").

Our preliminary search has found several U.S. providers that offer features and services that address some of the challenges suggested by Canadian VRS users (Sage Research Corporation, 2020). Below we summarize some of these features and services, as well as the functionalities of VRS in the U.S.

Services

Hours of service

VRS providers in the U.S. are required to operate for the public 24/7 and 365 days of the year. One exception is Sprint which provides VRS for the federal government on Mondays from 7 AM - 11:59 PM EST; Tuesday

[23] See Convo Relay (n.d.-a)
[24] See Purple Communications, Inc. (n.d.-a)
[25] See ZVRS (n.d.-a)
[26] See Sorensen Communications (2021a)
[27] See Federal Relay (n.d.)
[28] See Global VRS (2021)
[29] See Malka Communications Group, Inc. (2017a)

through Thursday: 24 hours; Friday: 12 AM - 11 PM ET; Saturday and Sunday: Closed. The service is also provided on Federal holidays excluding those Federal holidays occurring on weekends.

Customer service hours vary by provider. Most providers offer customer service support between certain hours during the week and some on weekends. Customer service support is often available by email, phone and live online chat.

Languages supported

According to the Federal Communications Commission, VRS calls may be made between ASL users and hearing persons speaking either English or Spanish.

Other services

Several providers have highlighted a focus on awareness and inclusion of the Deaf and hard of hearing community. For example, Malka Communications' website states that:

> Our mission is grounded in our CEO's desire to place the Deaf on a level playing field with the Hearing. This objective requires several key components, all of which are fundamental focuses of Malka:
>
> - Interpreters who understand their clients so well that they never distort, exaggerate, or ignore any element of the conversation;
> - Glitch-free technology that allows for the Deaf party and Hearing party to forget that they are looking at a screen;
> - Giving clients the capacity to work with us and our interpreters so that we may fully accommodate them;
> - Ensuring that interpreter attendance is 100% (an attendance-rate we have maintained to this day); and
> - Educating the Hearing on Deaf needs and educating the Deaf on self-esteem and independence (Malka Communications Group, Inc., 2017b).

Similarly, Convo Relay's website states:

> As a Deaf-owned company, our understanding of human connection is different than most. In a rapidly advancing world, technology is often developed on the basis of spoken language. We offer a different perspective: universal communication solutions that just feel right. Traditional hierarchies don't fit our culture, so we practice a structure that encourages more fluid communications instead. We bring new meaning to design. How we connect signers and technology is our contribution to the world. (Convo Relay, n.d.-b.).

Other services provided by Convo include interpreters and connections to the Deaf community through access to resources for Deaf-owned businesses, Deaf professionals, and other organizations for the Deaf. As of December 2020, their website is also supporting investment in the "Deaf Ecosystem" with a #shopdeaf campaign (Convo Relay, n.d.-c).

Similarly, Purple Communications which is part of ZVRS, claims to employ over 300 Deaf employees. Purple Communications was established in 1982 and is now a part of ZVRS which states its history as:

> Launched nationally in 2000, CSDVRS was developed by and for Deaf and Hard of Hearing individuals as one of many services available from a non-profit human services agency in Sioux Falls, South Dakota. It was the first organization to commercially develop and perfect video relay applications for Deaf and Hard of Hearing consumers, spawning a booming video relay services (VRS) industry. Today, we are called ZVRS—a stand-alone, for-profit company still dedicated to that same spirit of innovation and commitment to excellence. (ZVRS, n.d.-b).

This emphasis on the history of VRS developed by and for people who are Deaf is also highlighted by Sorenson Communications which claims to have "created the first videophone designed by and for people who are Deaf" (Sorenson Communications, 2020e). From a human rights perspective, Sorenson also states that the company "was founded on the premise that access to communication is a fundamental right for all people." Most providers indicate that their service is aligned with the needs and interests of the Deaf and hard of hearing communities to promote inclusion and accessibility in communications.

Overall, several VRS providers in the U.S. offer services for the Deaf and hard of hearing communities and for businesses. ZVRS offers Enterprise Solutions including accessible videoconferencing technology. This service is framed in terms of "Deaf and hard of hearing employees have the legal right to functionally equivalent telephone communication access. That's why our Enterprise Video Solutions Team has worked tirelessly to advocate for equality in the workplace since 2007" (ZVRS, n.d.-c).

Convo Relay offers customized work bundles (Convo Relay, n.d.-d). Their website claims that their "customized bundle comes with a personalized automated message and curated tools to support your VRS experience as a professional." Convo Relay will work with businesses, professionals, organizations, and schools. They support strategizing for accessible communication to fit each workplace's needs.

The official provider of VRS for the federal government is Sprint. The internet and telecommunications relay services for the federal government is operated by Sprint in support of the General Services Administration Federal Relay contract. Sprint provides an array of telephonically based and internet-based services for the government. VRS is provided for federal employees. User-friendly features of this service are described as, language preferences (English or Spanish); Voice Carry-Over and dialing instructions. A high-speed internet connection, WiFi or LTE is required; as well as a computer with built-in webcam, videophone or external webcam, and some brand of VRS software or app. This service is only provided on Mondays from 7 AM - 11:59 PM ET; Tuesday through Thursday: 24 hours; Friday: 12 AM - 11 PM ET; Saturday and Sunday: Closed. The service is also provided on Federal holidays excluding those Federal holidays occurring on weekends.

Features

We found several providers that offer special features to alert service users about incoming calls. For example, ZVRS offers a Bluetooth flasher as part of the Call Alert package (ZVRS, n.d.-d). This is a separate device that is intended to help users to avoid missing calls because they have left the room or looked away from their phone. The ZVRS Call Alert package also includes alerts via email and/or text.

Sorenson offers a Multi-Colour LightRing on their ntouch VP2 videophone (Sorenson Communications, 2021b). In addition, they also offer N11 dialing[30], VRS announce, call waiting, call transfer, group call, don't accept anonymous calls, personal signmail greeting, contact photos, push notifications, video centre, voice carry over, signmail, myRumble[31], and Bluetooth compatibility. Several of these features are also offered by other providers such as Convo, Sprint, ZVRS, and Purple.

Several providers highlight the benefits and features of their VRS app. Many of these features overlap and are customizable by individual users. Some examples include Wavello by Sorenson which advertises its capability to allow users to "see everyone on the call" (Sorenson Communications, 2020d); and sivo by Purple Communications and ZVRS which similarly allows a Deaf User, Hearing Party and VI to see each other while on a VRS call (Purple Communications, Inc., n.d.-b). Uniquely, Convo Relay's VRS is 100%

[30] "N11 codes are used to provide three-digit dialing access to special services. In the U.S., the FCC administers N11 codes" (Somos, Inc., 2020)

[31] "myRumble allows [users] to quickly identify who is calling by assigning specific vibration patterns to different contacts when receiving calls on [a] mobile phone" (Sorensen Communications, 2021c).

app-based, updated automatically and has a "Sign-Centric Design" made by and for the Deaf community (Convo Relay, n.d.-a).

Other technological innovations are highlighted by Malka Communications which is developing a comprehensive "visual communication system" with face-to-face, over the phone and text communications. Our search found that in December 2010, Malka Communications began as a VRS company with the mission of providing universal communications access for the Deaf. Amidst tremendous competition and intense oversight by the FCC, Malka has aimed to compete with the rest of the industry and improving the general communication experience. Malka describes their visual communication system functions as:

> Visual Communications System: The purpose of installing VCS throughout a country is to better connect members of the Deaf community with the rest of its society. VCS establishes a network of interpreters, video communication software, and video communications devices that connect Deaf and Hard-of-Hearing individuals with those who are hearing. This system allows the Deaf to speak with anyone through an interpreter using their local sign language.
>
> What it is: Our idea is to provide a communication system whereby the whole of society can integrate and interact with Deaf individuals, wherever and whenever it is needed: in houses of worship, in the classroom, on-site with coworkers, on the road, in a café, at the market, during an emergency or at an accident site, with the police, with doctors, with teachers, with scholars, etc. This service will require setting up a call center where sign language interpreters will be able to receive calls from both Deaf and Hearing parties over high speed internet and interpret between sign and spoken language. Interpreters will be able to do this in real time and through three main mediums:
>
> > 1. Face-to-face: A Deaf person connects to the interpreter at the call center and uses sign over his own smartphone or tablet camera. The interpreter speaks what is said via the speaker of the device connecting them to the Hearing person. [This allows communicants to be co-located].
> >
> > 2. Voice over the phone:
> >
> > > a. Making a call: A Hearing person can dial a Deaf person's number and the call will be re-routed through the call center. The Deaf person receives the call, sees the

interpreter signing to him through his phone or tablet screen, and the Hearing person listens to the interpreter voicing the Deaf person's responses immediately through the phone or tablet.

b. Receiving a call: A Deaf person can call any Hearing person, and the call is re-routed through the call center to that hearing person. The Deaf person signs through his phone or tablet camera and the interpreter voices what he says to the Hearing person's phone or tablet. The interpreter then signs back the Hearing person's response to the Deaf person.

3. Voice over text (voice carry over): A Hard-of-Hearing person who can speak but has problems hearing over the phone (and may not use sign language) would be able to send and receive calls with text interpretation of the conversation on their phone screen in real time. (Malka Communications Group, Inc., 2017c)

This developing initiative by Malka Communications is an example of the ways in which several U.S. providers claim to be promoting inclusion of the Deaf and hard of hearing communities. These efforts are described under the providers' services which will be summarized next.

Interpreter qualifications

Our research found limited information about interpreter qualifications for VRS in the U.S. Most providers simply note that their interpreters are "highly qualified" and respectful. Global VRS and ZVRS have explicitly noted on their websites how their service meets U.S. regulations for VRS. ZVRS summarizes U.S. regulations as such:

> ZVRS's provision of Video Relay Services (VRS) is governed by the rules adopted by the Federal Communications Commission (FCC) (47 C.F.R. 64.601 et. seq.) pursuant to the FCC's authority under Section 225 of the Communications Act of 1934, as amended, 47 U.S.C. 225. Under these rules, VRS Communication Assistants (CAs) must meet certain minimum standards in order to qualify as VRS interpreters. While all of ZVRS's interpreters are qualified to provide VRS under the FCC's rules, different credentialing and licensing requirements are imposed by each of the individual states with respect to the qualifications needed to provide legal interpreting, i.e., interpreting for depositions and other legal proceedings. Because ZVRS is centrally located in some states, it cannot guarantee that all of its interpreters meet all of the legal interpreting qualifications of every single state. No

> party shall have the right to rely on such VRS for any specialized interpreting service needs. (ZVRS, n.d.-e).

Thus, legal interpreting qualifications may vary by state.

User choice of interpreters

Due to the scope of this research, we did not find any information indicating that VRS users have a choice of interpreter for their calls. Exceptions may include those who require an interpreter that speaks Spanish.

Cost to the user

The per-minute rate for VRS is not assessed to the caller. VRS providers are compensated for their costs from the Interstate Telecommunications Relay Service Fund, which the Federal Communications Commission oversees. Financial costs may apply to business or other organizations for accessibility services and/or technology.

Emergency calling

Emergency 911 calling must be prioritized according to federal regulations.

Functionality

Platform

VRS in the U.S. is typically accessible using a videophone, smartphone, Mac or PC. Likewise, we found that most services are available for iOS, Android, macOS and Windows with some variance and specific system requirements for each provider. One exception is Global VRS which offers a VRS software program that appears to only be compatible with videophones.

Technology required

Overall, we found that most U.S. providers indicate that their services work best over a high-speed internet connection. Similar to Canada, it is important to note that everyone does not have access to high-speed internet thereby posing some potential equity issues. To address this concern in the U.S., Sorenson offers Reflex Video which is designed to provide a smooth stable connection whether the network speed is fast or slow. Learn more about this option in their press release (GlobeNewswire, 2018).

Some providers offer customizable settings for their VRS app such as sivo by Purple Communications/ZVRS and Wavello by Sorenson (Purple Communications, Inc., n.d.-b; Sorenson Communications, 2020d). The majority of VRS providers highlight the use of their service with a videophone. Some providers sell videophones as a product (e.g., Sorenson, Purple Communications) in addition to providing VRS.

Regulations and Funding

Overall, the U.S. was one of the earliest adopters of nation-wide VRS. In the US, the Federal Communications Commission (FCC) regulates a number of telecommunications services, including VRS. One of their initiatives is called Accessible Communications for Everyone (ACE) and is described on their website as such:

> Accessible Communications for Everyone, or ACE, is an FCC initiative that seeks to break down barriers to communications services through collaborative efforts with software developers, engineers, technologists, and organizations in the disability community. One of its primary purposes is to ensure that people who rely on telecommunications relay services (TRS), including video relay services (VRS), have access to communications services that facilitate their ability to reach family, friends, businesses, and government services through seamless communications across TRS providers.
>
> The FCC engages the deaf, hard of hearing, speech disabled, and deaf-blind communities in these efforts to ensure that the accessibility needs of these populations are met. Two projects under the ACE umbrella are Direct Video Calling and ensuring the interoperability of TRS. (Federal Communications Division, n.d.).

This initiative is important in relation to the interoperability of the various providers to meet regulatory standards in the country. One of the services provided by ACE is called ACE Direct which is described as an open source video prototype developed through the FCC, to enable businesses and government entities to communicate directly with their customers, constituents, and beneficiaries using ASL over broadband facilities. This is intended to support greater accuracy, privacy, and efficiency for the individuals making calls and for the recipients of such calls. ACE also offers Direct Video Calling which is one-to-one video communication provided by a call center to allow conversations to occur between two callers using ASL.

According to a report on the funding and reform of VRS, the Congressional Research Service (2019) explained that the FCC has adopted various rules to maintain quality and fairness of VRS service. This means that:

- 80% of all VRS calls must be answered within 120 seconds;
- Service must be offered 24 hours a day, seven days a week;
- VRS providers must provide their users with a 10-digit telephone number, so users will be able to make 911 calls and have their location data routed to the appropriate emergency agency;
- Preferential treatment of calls is prohibited;

- VRS providers must handle calls in the order in which they are received which means that they cannot selectively answer calls from certain consumers or certain locations;
- Equipment distributed by a certified VRS provider must be interoperable with the technology of other certified VRS providers; and
- VRS providers may not offer financial incentives to use their service or to make more or longer VRS (or TRS) calls. (Federal Communications Commission, 2020, p. 2).

These FCC rules stem from an extensive review of the VRS program from 2010-2013. The Congressional Research Service (2019) described that:

> [I]n June 2010, the FCC began a comprehensive review of the rates, structure, and practices of the VRS program to minimize waste, fraud, and abuse and update compensation rates that had become inflated above actual cost. Rules in that proceeding were issued in June 2013. The new rules initiated fundamental restructuring of the program to support innovation and competition, drive down ratepayer and provider costs, eliminate incentives for waste, and further protect consumers. In addition, the new rules transition VRS compensation rates toward actual costs over the next four years, initiating a step-by-step transition from existing tiered TRS [Telecommunications Relay Service] Fund compensation rates toward a unitary, market-based compensation rate. (p. i).

Our research may reflect this restructuring as we found fewer VRS providers in the US compared to previous research conducted in 2011 (Mission Consulting, 2012). Previous research identified nearly nine providers with FCC certification, plus 20 others that were VRI providers, interpreting services and/or seeking FCC certification. Our research found that some of these providers received citations from the FCC for violations of the federal Communications Act or charged by the FBI for fraud. Others were acquired by other companies, no longer have FCC certification and/or no longer provide VRS but may provide other communication services such as video remote interpreting, real-time texting, etc.

In terms of funding, the FCC's consumer guide (2020) notes, "The per-minute rate for VRS is not assessed to the caller. VRS providers are compensated for their costs from the Interstate TRS Fund, which the FCC oversees" (p. 1).

According to the Congressional Research Service (2019):

> TRS Fund is a revolving fund financed through contributions by all providers of interstate telecommunications services. Contributions are based on a "contribution factor" that is set on an annual basis by the FCC…Contributions are made by all carriers who provide interstate services, including, but not limited to, cellular telephone and paging, mobile radio, operator services, personal communications service, access (including subscriber line charges), alternative access and special access, packet-switched, WATS, 800, 900, message telephone service, private line, telex, telegraph, video, satellite, intraLATA, and international and resale services. (p. 2).

The Congressional Research Service (2019) report explicates provider contributions, compensation, and reimbursement as:

> On June 28, 2019, the FCC adopted per-minute VRS compensation rates for the 2019-20 Fund Year, effective from July 1, 2019, through June 30, 2020. For VRS providers with more than 500,000 monthly minutes, the applicable per-minute VRS compensation rates for the 2019-20 Fund Year are:
>
> - $4.82 per completed conversation minute for a provider's first 1,000,000 monthly minutes (Tier I) (no change from the 2018-19 rate);
> - $3.97 per completed conversation minute for a provider's monthly minutes between 1,000,001 and 2,500,000 (Tier II) (no change from the 2018-19 rate); and
> - $2.63 per completed conversation minute for a provider's monthly minutes exceeding 2,500,000 (Tier III) (a 7.1% reduction from the 2018-19 rate of $2.83).
>
> For VRS providers with 500,000 or fewer monthly minutes (Emergent Tier), the rate for the 2019-20 Fund Year is $5.29 per completed conversation minute, no change from the 2018-19 rate. The FCC estimates that these compensation rates will save the TRS Fund approximately $22.4 million for VRS services provided during the period between July 2019 and June 2020, compared to the rates in effect in June 2017. (p. 3).[32]

[32] See Federal Communications Commission (2021) for more information from the FCC about VRS for consumers

Australia

In Australia, relay services are provided by the National Relay Service (NRS), which is a government initiative that allows people who are deaf, hard of hearing and/or have a speech impairment to make and receive phone calls. The Department of Infrastructure, Transport, Regional Development and Communications is responsible for the NRS. Presently, Concentrix Pty Ltd is delivering the service under a three-year contract which runs from October 1, 2019 to September 20, 2022. Previously, the Australian Communications Exchange (ACE) had held this contract since the inception of the NRS in 1995. ACE was a merger organization that consisted of Deaflink Inc. and Deafness Resources Australia (Southwest Museum of Engineering, Communications and Computation, 2007). ACE's voluntary status was revoked in 2020 and the organization is no longer operating (Australian Charities and Non-for-Profits Corporation, 2021).[33]

The NRS describes its role as

> … to provide an environment in which all Australians can access and benefit from communications services, creative experiences, and culture. Our purposes are to enable all Australians to connect to effective communications services and technologies, for inclusiveness and sustainable economic growth; and to support inclusiveness and growth in Australia's creative sector and protect and promote Australian content and culture. (Commonwealth of Australia, n.d.-a).

Services

The Australian Government recently announced that users will need to be registered with the NRS, beginning in 2021. Registration will require provision of basic personal information, an ID check and confirmation of need for the service. The Government maintains that registration is consistent with the findings of a 2017 Consultation Report and is being introduced to allow the government to contact users of the NRS for future consultations, to help prevent non-genuine use of the service, including scams and fraud, and for providing accurate information about how many people use the service, and how they use it (Commonwealth of Australia, 2017a). Voice callers attempting to reach a user of the NRS will not be required to register (Commonwealth of Australia, 2017b).

[33] See Burgess, K. (2020) for more information

Hours of Service

Video Relay is only available from 7am to 6pm (Eastern Standard Time in Australia) Monday to Friday. It is not available in the evenings or on national public holidays. The Helpdesk is open from 8am to 6pm, Monday to Friday. Concerning the limited hours of service, a coalition of major ("peak") d/Deaf-led and disability organizations in Australia said in their joint position paper of 2017,

> The video relay service is currently only provided on a limited basis, thus excluding Auslan users from functionally equivalent access to a telecommunications service. This puts Auslan users who are employed and who work at night or on weekends at an unfair disadvantage which is potentially detrimental to their work performance and career path. They are also at risk (health and wellbeing) when they may need to make important or emergency calls (eg; natural disaster times such as Cyclone Debbie or domestic violence situations) and the video relay service is not available to them. Text alternatives such as emails and direct SMS are not real time, and additionally they must occur in English, which is the second language of most Deaf people and may actually be inaccessible to a significant proportion of the Deaf community. (p. 6).

Calls must be pre-booked through a RO.

Languages supported

Video Relay supports communication between people who use Auslan and English. Auslan is the national sign language of Australia. British Sign Language and ASL are not supported.

Features

The NRS provides several relay options:

- Video Relay for people who use Auslan, which is the Australian sign language;
- NRS Chat, previously known as Internet Relay;
- SMS Relay, which people can use on any type of mobile phone to make SMS Relay calls, e.g., for people who prefer texting;
- SMS Relay (Text and Listen), which people can use on any type of mobile phone to type a text message and listen to the other person's response, e.g., for people who have trouble being understood on the phone;
- NRS Captions, for people who find it hard to hear on the phone but want to use their own voice in their side of a conversation. In other

jurisdictions, this service is sometimes called voice over text or voice carry over; and
- Voice Relay (previously known as Speak and Listen), which is for people who have trouble being understood on the phone because of a speech impairment. In this service, the user speaks directly with the other person, and a RO on the line to re-say any of their words if needed. There are separate versions of Voice Relay: one is for landlines or mobile phones, and the other uses the NRS app on smartphones.

Interpreter qualifications

We were unable to find information about the kind and level of certification that is required, if any, to serve as a sign language interpreter for Australia's VRS. However, The National Accreditation Authority for Translators and Interpreters Ltd (NAATI) is the national standards and accreditation body for translators and interpreters in Australia. NAATI has several levels of certification for sign language interpreters: Certified Provisional Auslan Interpreters (for accurately interpreting non-complex, non-specialized messages); Certified Provisional Deaf Interpreters (for skillfully transferring meaning between Auslan and/or written English and other signed languages); and Certified Auslan Interpreters (with more experience than Certified Provisional Auslan Interpreters, and who transfer complex, non specialised messages from one language into another). Further specializations are available for interpreting in the fields of health care, law, and conferences (NAATI, n.d.). The Diploma of Auslan is delivered by a TAFE (Technical and Further Education) institute or Registered Training Orgranisation. The Diploma of Auslan typically requires 2 years full time study and usually provides most learners with some level of Auslan proficiency (DeafNav, n.d.).

User choice of interpreter

We did not find information on whether VRS users have a choice for their interpreter.

Cost to the user

There is no cost to the user for VRS, and Skype and the NRS app are free to download. However, broadband data costs will apply when making a video connection to the NRS. Costs to the user will depend on their data plan.

On the issue of cost, the above-mentioned coalition of d/Deaf-led organizations pointed out in their joint Coalition Position Paper (2017) that,

> Any discussion on affordability should note that many people who use the NRS are already paying for a fixed line and/or a data plan to access the service. Some people pay for a fixed line

> just so they can access their TTY if there's an emergency; others who rely on video relay must pay for data plans that allow heavy use of Skype. Video communication and Video Relay data usage is high due to the high resolution needed for signing and finger spelling, as well as, the need for a synchronous data communication. (p. 10).

Emergency calling

People who have a life-threatening or time-critical situation *can* use the NRS to contact emergency services. However, there is no queue priority for VRS calls to emergency services, callers must wait in the queue for the next available Relay Officer (RO), and Video Relay only operates in limited hours. Accordingly, the NRS encourages people to use an alternative NRS call option in emergency situations. Through all the other NRS call services, the NRS prioritizes calls to emergency services ahead of other calls.

Functionality

Platform

The NRS provides its own app free of charge, which enables people to use NRS Chat, NRS Captions, Voice Relay and Video Relay calls. The NRS also provides Teletypewriter (TTY) options. The NRS does not support the use of Video Remote Interpreting (VRI).

Video Relay uses Skype as its operating platform. The NRS can be accessed at a dedicated number directly through Skype from the user's own device or through the NRS app, which routes the call through Skype.

Technology required

The service is designed for use with a computer, tablet or mobile phone with a high-definition webcam, and an internet connection with both download and upload speeds of at least 1.5 megabits per second.

To make a VRS call, the user logs directly into Skype on a desktop computer, laptop, or mobile device, or uses the NRS app. When using the app, the user selects Video Relay (sign using Auslan) from the 'Select your call type' menu, then clicks 'Start Skype'. They then open 'Contacts' and find and open the 'NRS VIDEO RELAY SERVICE'. They will then be automatically redirected to the Skype app. After tapping 'Send message' they will be taken to a chat screen. When they type 'hello', a window will appear in which the caller will select 'Make a Call' near the bottom of the picture.

To receive a call, the call receiver must have Skype open. (The caller will need to call the NRS and provide the call receiver's Skype contact name and ask to be connected.) A RO (RO) will complete the call. A flashing alert will

show on the receiver's screen. The receiver will click the green video button to answer the call. The RO will sign the receiver into the call, will tell the name of the caller and relay what they are saying. The receiver signs their response to the RO, who speaks that response to the other person. This continues until the caller or receiver says 'goodbye', at which point the RO will indicate that the call has ended.

Regulations and funding

The legislative authority for Video Relay is the *Telecommunications (Consumer Protection and Service Standards) Act, 1999* (Commonwealth of Australia, 2020a). Among other things, the *Act* requires that "the National Relay Service is to be reasonably accessible to all persons in Australia who: (i) are deaf; or (ii) have a hearing and/or speech impairment; wherever they reside or carry on business; … and "that a video relay service is reasonably accessible to all persons in Australia who communicate in Auslan; and (j) that a software application is reasonably available to assist all users of the National Relay Service in communication with emergency call services (S 13, i & J). The *Telecommunications (Consumer Protection and Service Standards) (National Relay Service Rules) Determination 2019* and explanatory notes lay out various administrative rules for contracted providers of the service (Commonwealth of Australia, 2019c).[34]
The *Telecommunications (Industry Levy) Act 2012* (Commonwealth of Australia, 2018) is the legislative authority for gathering revenue from telecommunications carriers with eligible revenue in excess of $25 million (and certain other entities) for:

- reasonably accessible standard telephone services and payphone services to all Australians on an equitable basis, regardless of where they live or carry on business;
- a national telephone service to enable people with a hearing or speech impediment to make and receive telephone calls;
- delivery of emergency call services; and
- delivery of other public policy telecommunications outcomes. (Commonwealth of Australia, 2020b).

Funding for the NRS Video Relay (and the associated Outreach service) was AUD $29,784,160.96 (including GST) in 2018-19 (Commonwealth of Australia, 2019a), which was about CAD $28,250,000. The costs of these operations at the 2017-18 and 2016-17 fiscal year ends were AUD $31,160,374.91 and AUD $32,219,511, respectively. Outreach includes the services that respond to customer queries and complaints via telephone calls

[34] This portal includes explanatory notes.

to the Help Desk, emails, and forms through the NRS website. Outreach costs comprised AUD $1.4 million of the total in 2018-19, AUD $1.3 million in 2017-18 and AUD $4.3 million in 2016-17.

A recent fact sheet from the Department of Communications and the Arts (Commonwealth of Australia, 2019b) announced that, "The funding allocation to deliver the NRS will *remain unchanged* [italics added] at AUD $22 million per year (including GST) for the life of the new contract [i.e., with Concentrix]." There was considerable controversy over what was, in effect, a cut to spending on the NRS in the transition from ACE to Concentrix as providers.[35]

Funding is gathered through levies on telecommunications companies with eligible revenue of more than $25 million, and certain other entities. The Australian Communications and Media Authority (ACMA) assesses company revenues and sets levies according to the *Telecommunications (Consumer Protections and Service Standards) (Levy Formula Modification) Determination 2019* (Commonwealth of Australia, 2019d). ACMA's activities in the area of levies are also informed by other pieces of legislation on its website[36].

[35] See, for instance, McKenna (2019)

[36] See Commonwealth of Australia (2019e)

New Zealand

New Zealand's VRS is a joint government agency initiative led by the Ministry of Business Innovation and Employment, with the participation of the Accident Compensation Corporation, Ministry of Education, Ministry of Health, and Ministry of Social Development. New Zealand Relay is supported and funded by the New Zealand Government through the Ministry of Business, Innovation and Employment (MBIE). It is also endorsed by the National Foundation for the Deaf, Deaf Aotearoa New Zealand and Good Soundz Limited. Until recently, the Government had been contracting Sprint International New Zealand to provide a variety of relay services, which in turn had been subcontracting Communication Services for the Deaf NZ Ltd (CSD) to deliver video interpreting, video relay and other services (MBIE, 2018). However, Concentrix was recently awarded the service contract instead of Sprint. Concentrix is to begin delivering services in February 2021 (MBIE, 2021). A proposal submitted by a consortium of disability organizations[37] lost out in the bidding process (Pennington, 2020).[38] CSD will continue to provide video interpreting and VRS into early 2021 (CSD, 2020). We were unable to determine who will provide those services after the changeover to Concentrix.

Services

While VRS and VRI are operationally distinct services, the MBIE does not seem to draw a major distinction between the two, perhaps because they both use video interpreting as their common element. For instance, NZ Relay web links for VRS and VRI found here lead to the same page about accessing video interpreting service[39]. A recent consultation document by MBIE (2018) describes the services as follows:

> Video Interpreting Service (VIS) links any Deaf or hearing impaired person who uses New Zealand Sign Language (user) with a Video Interpreter (VI) and a hearing person (including staff from government agencies). The hearing person may be in the same room as the user, or in another location (including overseas). The user and VI sign to each other on a video screen. The VI will then talk with the hearing person on the telephone, or through video if they are in the same location as the user, and relay the conversation between the two parties. (MBIE, 2018, p. 8).

[37] Consortium members were Autism NZ, Blind and Low Vision (formerly the Blind Foundation), CCS Disability Action, Cerebral Palsy Society, Deaf Aotearoa, Hearing New Zealand (formerly the Hearing Association), and Life Unlimited and Stroke Foundation, backed by T-Meeting, a Swedish company experienced in relay services.

[38] See Pennington, 2020

[39] See NZ Relay, 2013a; NZ VIS, 2021a

Registration for a NZ Relay Calling card has been required for people who want to make chargeable calls through NZ Relay. Users must also have their own privately purchased calling cards to make chargeable calls. Calls between a landline and a cellular mobile phone, long distance overseas calls, and calls to a premium number (0900) are chargeable. Premium numbers (0900) are used by firms that charge the caller extra for access to information, goods, or services.

The NZ Relay call centre stores registered users' calling preferences in a confidential database. However, with changes to be introduced in February 2021, international and cellular calls will be free, so registering for a calling card will not be required (NZ Relay, 2013a). Users had also found the use of NZ Relay and personal calling cards a confusing requirement (MBIE, 2018). On the basis of information at the NZ Relay website and other documentation available to us, we were not able to ascertain how calls to premium numbers will be managed.

Registration has not been required for other NZ Relay services, although the idea has been "floated" and has met with some support among d/Deaf people. Perceived benefits of registration include better experiences for hearing people and organizations in calling d/Deaf users directly via the relay services, better access to civil defense notifications for service users, having a directory of other relay service users, saving interpreter preferences in user profiles rather than having to repeat this information when calls are made, the elimination of need for calling cards, and several other benefits (MBIE, 2019).

Hours of service

The NRS provides links to several apparently contradictory sets of hours in which video interpreter services are available.

- One set is from 8am to 8pm, Saturday 10am to 5pm, and Sunday 12pm to 5pm, excluding public holidays, except for Auckland Anniversary (New Zealand Video Interpreting, 2021a).
- A second set of hours is Monday through Friday from 10am to 8pm, Saturday from 10am to 5pm, and Sunday from 12pm to 5pm, open on public holidays (New Zealand Video Interpreting Service, 2021b).
- A third set of hours is from Monday through Friday, from 8am to 8pm, excluding holidays (New Zealand Video Interpreting Service, 2021c).
- NZ Relay provides yet another set of hours of service for Video Relay: Monday to Friday, from 9am to 5pm, and closed on public holidays (New Zealand Relay, 2013b).

Regardless of which information one chooses, VRS is not available for late night calls. Limited service hours were flagged as a significant problem by the New Zealand Relay Advisory Group, which consists of representatives from the telecommunications industry and members from the disability community, including people who are d/Deaf, hearing impaired, speech impaired, deafblind and parents of children with communication disabilities (MBIE, 2018; NZ Relay, 2013c).

Calls made through NZ Relay are answered in the order they arrive at the Relay centre. Pre-booked calls are not a part of the service offering (NZ Relay, 2013d). However, a link ostensibly for the Video Relay leads to a page about booking the Video Interpreting Service that says, "To provide the most appropriate interpreter, it is preferred that this booking is made at least two business days prior to the appointment". But, if an interpreter is available, a person can access an interpreting session for up to 20 minutes without a booking (New Zealand Interpreting Service, 2021a).

Languages supported

NZ Relay supports communication between people who use New Zealand Sign Language (NZSL) and English.

Features

In addition to VRS, NZ Relay provides further accessibility features to support d/Deaf, hearing impaired, speech impaired, and Deafblind users. The following is a list of features that allows them to communicate with standard phone users:

- *NZ Mobile Text Relay* (MTR) enables Deaf and hearing-impaired people to make a relay call using a mobile text application on their smartphone or tablet to communicate with hearing people;
- *NZ Internet Relay* (NZIR) service enables Deaf and hearing-impaired individuals to place relay calls over the Internet via their computer, laptop or tablet with an internet connection. The NZIR user types their message to the standard phone user. The Relay Assistant (RA) reads and voices the text to the phone user. The phone user person voices their response to the RA, who types the response to the NZIR user;
- *TTY to Voice* enables a TTY user to connect to New Zealand Relay via a toll-free number and type their conversation to a Relay Assistant (RA), who then reads out the typed message to a standard phone user (hearing person);
- *CapTel NZ* provides both a phone-based and a web-based service. Both services display captions of phone conversations so that the CapTel NZ user listens to what the other person says, which is also

displayed on a screen for the user to read. The phone-based option is being phased out beginning in February 2021;
- *Voice Carry-Over* (VCO) allows Deaf or hearing impaired people, who prefer to use their own voice, to speak directly to the party they are calling. The RA will type the other party's responses back to the VCO User who reads the typed message on their TTY screen;
- *Speech to Speech* (STS) enables a person with a speech impairment to communicate over the telephone using his or her own voice or a voice synthesizer. STS calls can be made by anyone, as long as one of the parties calling has a speech impairment;
- *Hearing Carry-Over* (HCO) allows people who are speech impaired to use their hearing abilities to listen directly to the standard phone user (hearing person). The RA voices the typed responses from the HCO user to the standard phone user, who then speaks directly to the HCO user without RA intervention;
- *Speech to Speech* (STS Video-Assisted) uses speech to speech technology for speech-impaired users to make relay calls via an STS RA and video communication. The speech-impaired user uses Skype to communicate with the STS RA, who places calls on their behalf; and
- *VRI* is a free service available to Deaf people when they have a meeting with staff at a government agency when a face-to-face NZSL Interpreter is not available.

To make a call, the deaf user opens the Skype program they have installed, clicks any available video interpreter (which are listed as NZVIS01, NZVIS02, NZVIS03, etc.) and makes a call. The hearing person who wishes to speak with a New Zealand Sign Language user calls the Video Interpreting Service (VIS) number by regular phone or through Skype. The number is provided at the VIS website.

Calls to cellphones, plus international and premium numbers (0900), can be made using the VIS. Users need to purchase a calling card of their choice from any retail outlet. The interpreter will ask for the user's card details and continue to place the call using the card. Callers must pre-register to make chargeable calls. Beginning in February 2021, however, cellular and international calls will be free of charge.

We were unable to obtain detailed information online about the process for receiving video relay calls. However, NZ Relay makes a range of technological devices available free of charge to people who use its services. For people who use VRS, the Trillium Visual Signal Alert and the Bellman and Symfon Base Unit and Pager (which delivers a flashing and vibrating alarm), would be useful devices for detecting incoming calls (NZ Relay, 2013e).

Interpreter qualifications

All NZ Relay VIs are qualified with a diploma in New Zealand Sign Language/English Interpreting as a minimum and are members of the Sign Language Interpreters Association of New Zealand (SLIANZ). New Zealand does not have a stand-alone testing system to accredit sign language interpreters. People qualify by completing a training course at Auckland University of Technology (AUT).

In addition, the *New Zealand Sign Language Act 2006* gives official recognition to NZSL, along with Māori and English. As observed by Dr. Rachel Locker McKee, the founding president of the Sign Language Interpreters Association of New Zealand, "Deaf New Zealanders now generally regard communication access via an interpreter as their right, and hearing people interacting with Deaf people are increasingly likely to consider this the right thing to do. The expectation of using qualified, competent interpreters is strengthened by the NZSL Act, especially in the government sector" (McKee, n.d.).

User choice of interpreters

A recent consultation conducted by MBIE found that most VRS users want greater choice in the interpreters they work with. This includes an ability to choose interpreters who are familiar with the user's signing skills, have topic knowledge (e.g., medical vocabulary), as well as other language skills (e.g., Te Reo, Pasifika and International sign language skills), or who are trusted to interpret for sensitive situations, such as a gender match for general practitioner appointments (MBIE, 2019). Presently, the procedure through Skype allows user selection from a list of available interpreters. However, the list consists of several anonymized identifier numbers without specific information about the people and skills "behind" those numbers.

Cost to the user

Remote video interpreting and interpreted local and national landline calls are free of charge. Calls between a landline and a cellular mobile phone, long distance overseas calls, and calls to a premium number (0900) are chargeable. Users must pre-register to make chargeable calls. Users pay for their own telephone line rental and mobile service packages. Beginning in February 2021, mobile and international calling will be free, without need for a calling card.

Concerning costs of broadband access for low-income relay users, MBIE seems satisfied with various service packages that private-sector providers offer, such as those provided through Vodafone, Spark and 2degrees (MBIE, 2018).

Making emergency calls

NZ Relay advises users not to use relay for emergency services. Police receive all emergency text, TTY and FAX calls for Police, Fire and Ambulance services and coordinate these calls to the appropriate service. In case of an emergency, users are requested to contact the Deaf emergency call centre directly. The NZ Relay website lists separate numbers for Deaf Emergency Fax, Deaf Emergency TTY, and voice calls. A separate 111 service and web link is available for texting in emergencies.[40]

MBIE has acknowledged delays and other problems for d/Deaf people needing emergency assistance. However, in a recent consultation document, the Ministry said, "… we are not proposing to include emergency calling as a part of the relay service. Emergency calling remains and will continue to be the responsibility of emergency services; however, we will coordinate with providers to ensure that these services are accessible to relay service users" (MBIE, 2018, p. 21).

Functionality

Platform

NZ Relay uses Skype as its operating platform for video relay between users of phone-base or internet-based video technology. Video interpreting services can be accessed by computer, tablet or laptop on Skype. Skype allows for text messaging and for the sending, receiving, and viewing of data files between communicants. Shared file size is limited to 300 megabytes. Files remain available on Skype for 30 days (Microsoft, 2021a, 2021b).
For the remote interpretation of in-person meetings, NZ Relay will also be supporting use of both Zoom and Microsoft Teams if the user provides a link when booking. Advocates in New Zealand have criticized Skype as sometimes unreliable for video (MBIE, 2019).

NZ Relay will be introducing a new-look website and NZ Relay app starting in February 2021. Users of VIS will access this service on the new NZ Relay website, which combines all services in one place instead of linking to VIS at a separate website. There will reportedly be no changes to the way the service is used or to service functionality.

Technology required

The NZ Relay app is compatible with tablets and iPads. The app can be used in landscape or portrait mode. Tablets or iPads need the following operating systems:

- iOS version 12 or greater; and

[40] However, if the NZ Relay call centre receives a request for a TTY emergency call, the NZ Relay call centre will attempt to dial 111 and relay the conversation between the caller and the emergency centre personnel.

- Android version 7 or greater.

The web page for people to book an interpreter allows people to indicate whether they will be using Skype, or a Cisco (Telepresence) device, Polycom Video Phone, or some other device (NZVIS, 2021a). While a smartphone can be used, the NZ VIS advises that it "isn't recommended due to poor visual quality" (NZVIS, 2021d).

Regulations and funding

Section 70 of the *Telecommunication Act 2001* authorizes the Minister of Communications to declare telecommunications service obligations (TSO) and instruments (deeds) "to facilitate the supply of certain telecommunications services to groups of end-users within New Zealand to whom those telecommunications services may not otherwise be supplied on a commercial basis or at a price that is considered by the Minister to be affordable to those groups of end-users" (70(1)) (New Zealand Parliament, 2001). The 2004 and 2011 TSOs, and a 2011 Deed, set out that "telecommunications relay services are to be made available so that people who are deaf, hearing impaired, or speech impaired can communicate with other telephone users. Telecommunications service providers must comply with the terms of the TSO instrument" (New Zealand Parliament, 2004 and 2011; Ministry of Economic Development, 2011).

Commerce Commission New Zealand determines the total cost to the Government to provide Telecommunications Relay Service each year. The cost is paid from the Telecommunications Development Levy (TDL). The levy is paid by companies, or groups of companies, earning more than $10 million per year from operating a component of a fixed or wireless public telecommunications network. Until recently, the Government has contracted and compensated Sprint International New Zealand to provide conventional relay services, and meet service quality measures (SQMs), to address the communication needs of the deaf, deafblind, hearing impaired, and speech impaired (Commerce Commission New Zealand, 2019a, 2019b). Conventional relay services include text-to-voice conversation, voice-to-text conversation, and speech-to-speech relay. Sprint was also required to provide CapTel (captioned telephone) service and meet SQMs. Concentrix is the new holder of the contract. CapTel is not one of Concentrix's service offerings.

NZ Relay is supported and funded by the New Zealand Government through the Ministry of Business, Innovation and Employment (MBIE). For 2020-21 through to 2023-24, $4.7 million has been budgeted annually for the entire mix of relay services (MBIE, 2020, pp. 38 & 147). We were unable to obtain budgeted or actual cost figures for the video interpretation, video relay, or video interpreting components.

France

The two main providers of VRS in France are Elioz and Tadeo-Acceo.

Elioz was created in December 2015 and is owned by the IVèS company, which specializes in setting up telephone relay centers at an international level.[41] Elioz was created based on an alliance between several companies that specialize in deafness and d/Deaf employees, and that have experience in relay centers for deaf, hard of hearing and hearing people. Elioz enables a hearing-impaired or deaf person to call and communicate from a computer, smartphone or tablet with establishments that offer "the Elioz Connect solution" (Elioz, n.d.). Elioz also provides individual users a directory of companies and organizations that subscribe to Elioz's services and provides other accessibility services for businesses.

Tadeo was created in 2007 to deliver Instant Speech Transcription (TIP)[42] and Visio-interpretation French Sign Language (LSF) through its remote platforms, using proprietary software, e-transcription and visio-interpretation. Tadeo aims to meet the quality and safety requirements demanded by employers. Tadeo was founded on the basis of a partnership between a consortium of large companies and Delta Process. Delta Process was created in 1993 by Hervé Allart de Hees, an accessibility expert in project management assistance and commercial architecture, who designed a solution dedicated to communication between hearing and deaf or hard of hearing people in the exercise of their profession.

Acceo is Tadeo's spinoff technology and service that allows telephone-mediated and onsite remote interpretation for people who are d/Deaf or hard of hearing. Acceo is an app that is intended mainly to meet the needs of companies and public authorities in their communications involving d/Deaf and hard of hearing individuals.

Services

Elioz works with companies and other organizations to make their telephone and physical reception services accessible to people who are d/Deaf or hard of hearing. Elioz provides three modes of interpreted communication: French Sign Language (LSF), French Language Completed Spoken (LPC),[43] and Text

[41] The Canadian subsidiary of the IVèS company has been equipping the Canadian relay center for 3 years

[42] This service is delivered by proprietary technology (software) and Tadeo staff who are trained in how to use it. See https://new.tadeo.fr/en/ and https://new.tadeo.fr/en/who-are-we.php. Further details about the platform are not provided at the Tadeo website, but it seems to be a speech-to-text processing platform.

[43] French Language Completed Spoken is a form of cued speech, which represents sounds of individual words via a system of visual phonetics. It facilitates lip reading by utilizing a system of hand gestures to augment and clarify spoken sounds that a person cannot hear and for which the speaker's lips on their own may not provide enough

Transcription (Texte). Elioz promotes itself as providing services to individuals who are d/Deaf or hard of hearing (Elioz Connect) and to business (Elioz Enterprize). The services, however, cater in the first instance to the needs of businesses and other organizations. *Elioz Connect* provides links to its services, which subscribing firms and other organizations can install on their websites and mobile applications for individuals to access. Elioz also lists the organizations in its own online directory, which individuals can use to connect with subscribing organizations. An individual in France or overseas wishing to connect with one of those organizations selects the weblink or number provided. The individual also specifies the modality of communication they would prefer to use with the organization (LSF, LPC, or Texte). *Elioz Enterprise* provides service to subscribing organizations whose employees need one of the three modalities of interpretation to communicate with others for work-related matters, such as colleagues, suppliers, and customers. Elioz provides VRS for communicating by FSL in one-on-one telephone or computer-based conversations. Elioz also provides (what is, in effect) VRI for meetings between d/Deaf or hard of hearing employees and hearing persons at work (e.g., co-workers, supervisors, clients).

Tadeo promotes its services as meeting the fundamental requirements of employers in terms of the security of proprietary technologies, professional secrecy, the skills of those involved, the quality of services and the sustainability of the service (Delta Process SAS, 2020a). Tadeo's services include:

- Instant Word Transcription in French and Instant Speech Transcription in English for meetings and conference calls[44]; and
- LSF Visio-interpretation.

For Instant Word Transcription and Instant Speech Transcription, the services are provided by Tadeo operators using proprietary technology ("e-transcription") and specifically trained in this method. The state of France

information for the d/Deaf communicant to accurately decipher, e.g., / m / p / b /. See, for example, Cued Speech (2017)

[44] Essentially, these are differently named but similar services in French and English that use a human interpreter and voice recognition software, in which the interpreter "transcribes in writing, in real time, everything that the hearing person says. The interpreter performs their work by using a stenographic keyboard and a "stenomask". The interpreter, who is remote from the hearing and deaf communicant, repeats the words the hearing communicant says into the mask, which is connected to proprietary software which converts the spoken words to visual display for the deaf communicant in real time. The Tadeo website does not provide detailed information on how the transcriptionist coordinates their use of the keyboard and stenomask to provide a continuous live transcription. Presumably the stenomask provides more control over the audio signal and therefore more accurate speech-to-text conversion than an unmediated audio signal, which is subject to variations in volume, background noise and other disturbances. See https://new.tadeo.fr/metier-e-transcripteur-transcription-instantanee/

now recognizes e-transcription and its certification (Delta Process SAS, 2020a).

The Acceo app, which is a free search engine that indicates all accessible establishments (i.e., those served by Tadeo-Acceo), a geolocation system to find the establishments closest to the user, and a utility that facilitates access to the services of Tadeo operators who specialize in Instant Speech Transcription (TIP), LSF video-interpretation or French Language Completed Spoken (LPC) video-coding (Delta Process architecture, n.d.-a).

Tadeo tailors its services to meet the needs of employers who are recruiting for new d/Deaf employees and need assistance in the recruitment process (e.g., during job interviews). Tadeo also tailors its services to support higher education establishments make their courses accessible to deaf, hard of hearing, dyslexic or dyspraxic students (Delta Process SAS, 2020a).

Elioz boasts the largest network of relay operators (120) in France. Tadeo employs about 30 video relay interpreters (Delta Process SAS, 2020b). Neither Elioz nor Tadeo seem to draw a major distinction between relay interpretation between people by phone (VRS) and VRI. Both modalities involve video interpreting.

Hours of service

Elioz says of its Enterprise services that "hearing-impaired or deaf employees can make and receive calls, attend meetings … using their computer, smartphone or tablet, anytime, anywhere" (Elioz, n.d.-a). The statement implies that Elioz's hours of service for VRS are 24/7/365. However, in website tests we performed with several of the links in Elioz's directory, a range of hours of service were provided, which depended on the organization contacted. Generally, the hours were on weekdays, with limited hours service in some instance on Sundays and no service on public holidays. Presumably, these were the organizations' regular hours of service. Information at the same Elioz webpage says "we regularly adjust the number of communication agents connected on the platform. Real-time indicators, alerts and periodic reports allow us to be proactive." It would seem, then, that if demand for late night, overnight, weekend or holiday service is low because organizations are not operating at those times, fewer Elioz relay operators will be available on call.

Tadeo's video interpreting services are available 24/7. Tadeo promotes as one of its benefits the "real and immediate availability of the Tadeo service, regardless of the frequency, duration or time of calls." Unlimited use enables "full communication between the user and … interlocutors", regardless of when and for how long the service is used. In providing immediate support

and a high level of service availability through several interactive platforms (including video interpreting), Tadeo promotes itself as meeting "essential conditions for reliable daily communication whatever the context" (Delta Process SAS, 2020a). Again, however, many businesses are not open 24/7/365.

Where service is interrupted for any reason, including maintenance, Tadeo says its team "will do their utmost to restore access as soon as possible" (Delta Process SAS, 2020c).

Elioz's and Tadeo's relay services are available on-demand. Pre-booking is not required.

Languages supported

Elioz provides three modes of interpreted communication: Langue de Signes Francais (LSF), French Language Completed Spoken (LPC),[45] and Text Transcription (Texte).

Tadeo provides sign language interpretation for people who use LSF. Through a separate Acceo app, Tadeo claims ability to facilitate communication between non-French speaking "hearing" people in more than 100 languages (Delta Process architecture, n.d.-b). It is unclear whether Acceo supports communication between LSF users and people who speak any of those non-French languages.

Features

Elioz' directory connects users with about 120 affiliated companies/organizations. Major categories of listed organizations are:

- Mutual Insurance;
- Bank;
- Employment;
- Transport / Travel;
- Telecom;
- Public body;
- Energy;
- Agribusiness;
- Brand and merchant site (for a variety of goods and services); and
- Territorial community (for local governments).

[45] French Language Completed Spoken is a form of cued speech, which represents the individual sounds of words via a system of visual phonetics. It facilitates lip reading by utilizing a system of hand gestures to clarify spoken sounds that are not heard.

Tadeo's directory includes 516 subscribing organizations. The contact information can be obtained from a single page with all the listings, or through a search function which filters the links according to 20 categories, some of which are the same as or similar to those in Elioz's system. There are also features at the Elioz and Tadeo websites which, for users in France, would display subscribing organizations in the caller's locale. It does not appear that Elioz or Tadeo enable subscribing organizations to connect with individuals, or for individuals who are not affiliated with subscribing organizations to connect with one another.

Interpreter qualifications

Elioz's interpreters are graduates in LSF interpretation and have on average more than 10 years of telephone relay experience. Relay operators receive compulsory training, renewed every 5 years, in customer relations, banking, insurance, law, administrative procedures, professional life and daily life. Text transcriptionists have a writing speed of 500 characters per minute. LPC coders have a professional license and have received additional training in telephone relay coding (Elioz, 2021).

Tadeo-Acceo recruits for qualified LSF interpreters. If hired, they will be provided up to two months of further training in work tools and the basics of video-interpretation, and over the course of a year will develop a gradual increase in competence in trinomial, then in pairs, on meetings (Delta Process architecture, 2020).

According to the European Forum of Sign Language Interpreters (EFSLI), there are four post-secondary institutions that provide accreditation in FSL translation in France: the University of Paris 8; École Supérieure d'Interprètes et de Traducteurs (EIST), hosted by the University of Paris 3; the University of Toulouse Le Mirail; and the University of Lille 3. The programs take from two to three years to complete (EFSLI, 2010).

Cost to the user

As the primary intended users for Elioz and Tadeo are businesses and other organizations, their subscription fees pay for the service. Individual d/Deaf or hard of hearing individuals wishing to connect with the subscribing services do not pay, other than for the connection and data charges per their individual service arrangements with telecom providers.

Emergency calling

Neither Elioz nor Tadeo provide information about how individuals would make calls in emergencies using their services, nor list emergency services among their subscribing organizations.

User choice of interpreters

Neither Elioz nor Tadeo provide information how a user would select an interpreter.

Functionality

Platform

Elioz promotes its platform as available on all media such as smartphones, touch pads and desktop or laptop computers under any Android or iOS operating system. The Acceo software works on Windows, Android, iPhone, iPad and Mac operating systems.

Technology required

Neither Elioz nor Tadeo specify on their website the minimum technologies that users are required to have.

Regulations and funding

Since October 7, 2018, the French law for a Digital Republic requires companies with more than 250 million euros in turnover, and public services managed by the State, to bring telephone accessibility into conformity for deaf people and people with hearing impairments. The law is administered by Commission nationale de l'informatique et des libertés (CNIL) or French Data Protection Authority, which can impose fines up to EUR 3 million. In addition, Elioz and Tadeo must abide by French law n ° 78-17 "Informatique et Libertés" of January 6, 1978, as amended and with Regulation n ° 2016/679 of the European Parliament and of the Council of April 27, 2016, which provide for the protection of individuals with regard to the processing of personal data and the movement of such data ("General Data Protection Regulation").[46]

Elioz and Tadeo obtain funding from subscriptions that businesses and other organizations pay for service. Elioz points out that businesses may be able to obtain funding for the positions of d/Deaf or hard of hearing employees from AGEFIPH or FIPHFP. AGEFIPH is "l'Association de gestion du fonds pour l'insertion professionnelle des personnes handicapées", or Fund for the professional inclusion of disabled people. AGEFIPH is an organization dedicated to furthering professional inclusion in the private sector. FIPHFP is Le fonds pour l'insertion des personnes handicapées dans la fonction publique, or Fund for the Integration of Handicapped Persons in Public Service.

[46] See Légifrance (2016) and Proust (2016) for more information about the legislation.

Germany

The two providers of VRS and VRI in Germany are inter-related: Tess Relay-Dienste and TeleSign.

Tess is a telephone interpreting service which enables people who are d/Deaf or hard of hearing to communicate by telephone with hearing people in: a) sign language through Tess' TeSign, which is Tess' video relay service, or b) in written language with TeScript. Video interpreting is provided where one or both communicants are communicating by means of the telephone network. Tess does not provide video remote interpreting. TeleSign provides interpreters for Tess and uses Tess' digital platform for that purpose. TeleSign also provides VRI and VRS to non-Tess customers.

TeleSign's video relay and remote sign language interpreters connect the d/Deaf and hearing callers and call receivers and interpret their conversations from German sign language into German and vice versa (TeleSign, n.d-a). TeleSign provides the sign language interpreters for Tess, and Tess offers the technical platform and support for TeleSign (TeleSign, n.d-b).

Services

Deaf and hard of hearing people must register with Tess to use its relay services. People who want to register can go to the Tess homepage and set up a personal, professional, or business account. Business accounts have the option of allowing "joint users" (Tess, n.d.-a). The professional account can only be used by one person (Tess, n.d.-b). People who use Tess for personal and professional calls must have separate personal and professional accounts and email address for those accounts (Tess, n.d.-c). Tess does not require registration for hearing callers to make normal telephone calls to speak to Tess customers with hearing impairments. The hearing caller would use the pertinent TeSign number available at the Tess website for private or business calls. The caller will be connected to an interpreter who will connect them to the desired participant and translates the call.

TeleSign provides both telephone video and remote video interpreting for everyday work. TeleSign requires people who want to use its services to complete, sign and send by email a performance agreement and data protection declaration, using the forms provided at the TeleSign website. TeleSign promotes itself as serving d/Deaf individuals who work for employers or are self-employed, who can use the interpreting service and can request the purchase of technical equipment from their integration

office[47] as part of the work assistance mandated by Social Code IX (SGB IX). TeleSign also promotes itself as providing its services to "all companies or institutions that want to offer barrier-free communication by means of a telephone connection for people with hearing impairments in a professional context" (TeleSign, n.d-a). This would include service for hearing people who work for various organizations who have frequent contact with d/Deaf people, including hearing people who work for integration specialist services, other advice centers, employment offices, municipal and city administrations, police stations, clinics, practices, pharmacies, and other companies (TeleSign, n.d-d). Calls can be between individuals or conference calls (telephone interpreting) and for meetings (remote interpreting) to a maximum of 30 minutes. TeleSign also provides seminars on "Basics of communication on the telephone" in German sign language.

Interpreters are entitled to a break after a continuous interpreting time of 30 minutes. Interpreters determine whether a break is necessary. If the interpreter needs to take a break, the Tess customer has the option of calling again and continuing the conversation with another interpreter if one is free. If all interpreters are busy, the customer will be put on hold and will then be connected to the next available interpreter (Tess, n.d.-d). This would appear to place a 30-minute limit on most calls, unless the other communicant in a potentially long conversation is prepared for it to be interrupted and to undergo possible delays in resumption. Tess is not permitted to provide VRI because the services were commissioned by the Federal Network Agency to give hearing impaired people access to the publicly available *telephone* service. Tess explains that the physical distance involved in a phone call is not present between the hearing impaired and other communicant who are both in the same room. The interpreter is used "remotely" and not through "telephoning. The exceptions are emergency calls to two numbers (110 and 112) (Tess, n.d.-e).

Hours of service

Tess relay services are available for private use 24/7, 365 days a year, and for professional use Monday to Thursday from 8 a.m. to 6 p.m. and on Fridays from 8 a.m. to 5 p.m. On national public holidays, Tess reserves the right to make the services available for professional use at limited times (Tess, n.d.-f). The hours of Tess' customer service and technical support are posted at the homepage of its website (Tess n.d.-g). Customer service can

[47] "Federal Integration Offices" are located in all [German] states as a resource to workers and employers. Employees with qualifying disabilities are protected from dismissal (termination) until their employer obtains the consent of the integration office prior to dismissal. The local Integration Office examines all types of assistance which might ensure the continuation of the employment. Consent to dismissal is granted if, after considering the interests of both sides, continued employment of the person is deemed not possible or not acceptable." Disability:IN (2020).

be reached by phone or email on Mondays from 10am to 12pm, and 1pm to 3pm; Tuesdays and Thursdays from 10am to 12pm, and 1pm to 4pm; Wednesdays from 11am to 3pm; and Friday from 10am to 12pm.

TeleSign's interpreters are available Monday to Thursday from 8 a.m. to 6 p.m. and on Fridays from 8 a.m. to 5 p.m. TeleSign's remote interpreting is available on demand and by pre-booking "for meetings and events of all kinds, both in the professional and in the private sector" (e.g., to attend a short consultation for which it would not be cost-effective to hire an interpreter; for an interview between a parent and someone at their child's school on short notice; to attend an event for which a face-to-face interpreter has not been found). On-demand service is available only for customers in work-related situations, which includes individuals who have a permit from the integration office, are self-paying, or are with an employer who will pay. Such customers already have access to VRS by phone. If a hearing boss, customer, or colleague wants to communicate spontaneously on-site (i.e., without prior notice), the d/Deaf customer can spontaneously set up a connection to a TeleSign interpreter to interpret the conversation for up to 30 minutes, at which time the conversation much end. Billing takes place on the customer's monthly invoice. If interpretation is needed for a non-work appointment and an interpreter cannot be found, a TeleSign interpreter can be booked in advance through the VideoSign service. This service can be used by anyone, not just TeleSign customers. Conversations are not limited to 30 minutes (but are limited to 2 hours). The service order form provides TeleSign technical information about the service requester's communication device, software, and other details. Invoicing for this service is separate from invoicing for other TeleSign services. Who will be responsible for payment needs to be clarified before TeleSign will provide service.

The boundary line between conversations TeleSign is and is not permitted to interpret is not altogether clear. For instance, one webpage says VideoSign can be used for consultation meetings and other events, and conversations such as with a doctor or bank (TeleSign, n.d.-e). Such interpretation may require the d/Deaf communicant designating the interpreter with Power of Attorney (TeleSign, n.d.-f). However, a TeleSign factsheet says, "Our interpreters must refuse private calls. Use the interpreting service TeSign Privat (Tess) [instead]" (TeleSign. (n.d.-g). Another fact sheet confirms that message by providing examples of allowable calls that involve discussing matters that are clearly work-related, even though they may have a few personal elements as well. That same fact sheet says TeleSign is not permitted to interpret calls that are mainly about personal matters, including personal matters that may involve professional service providers.

Languages supported

Tess and TeleSign translate between German spoken and sign languages. TeleSign can provide interpreting in English on request (TeleSign, n.d.-e).

Features

Standard services from Tess provides an Internet platform that enables connections from the telephone network and cellular network. Tess provides relay services and the establishment of landline and cellular connections. The customer chooses either the sign language interpreting service (TeSign) or the written interpreting service (TeScript) from Tess. Depending on the customer's choice, a sign language interpreter or a text interpreter will contact the customer and establishes communication between the customer and the desired communicant. The TeSign sign language interpreters translate the conversation in German spoken and sign language. The TeScript written interpreters translate written German into spoken German and vice versa. In addition, Tess offers Voice Carry Over, which enables d/Deaf and hard of hearing people with good spoken communication skills to speak their part of a conversation and receive sign language interpretation for the part they cannot hear (Tess, n.d.-h). Tess has entered into arrangements with several public and private service providers that allow for the waiving of costs for Tess users to call those organizations (Tess, n.d.-i).

A Tess customer may call the TeSign Home / Work relay service over a video connection. If all lines are busy, the caller will be put on hold free of charge. When the line is free, a video window will open and will show a sign language interpreter. After the greeting, the caller informs the interpreter of the name and telephone number of the person they want to call. The interpreter calls that person over a telephone connection. When the hearing communicant picks up the call, the interpreter briefly introduces the service and states who would like to speak to them. The name of the sign language interpreter is not given to the listening conversation partner. The interpreter signals that the caller can begin the conversation with the listening partner. The interpreter translates the conversation between both participants in German spoken and sign language. When the conversation has ended, the caller also ends the connection with the interpreter by pressing a red icon of a phone receiver.

TeleSign shares limited information on additional features of its service beyond what is shared in this report.

Interpreter qualifications

New TeleSign’s interpreters are individually trained for three months by TeleSign’s experienced interpreters and receive an offer for training once a

year. All TeleSign interpreters *must* take part in a training course at least once every three years.

Due to the scope of this research, we were unable to obtain information about Tess' interpreter qualifications. Their website lists the names and pictures of the interpreters but does not provide information about their qualifications.

Emergency calling

Tess transfers emergency calls to emergency control centres free of charge nationwide. A Tess interpreter will translate the emergency call. The service is available to registered Tess users and to people who want to use Tess only for emergency calls. People who are not Tess customers must pre-register to use the service when the need arises. There is no charge to use the service for emergency calls. Emergency calls are featured as an additional service via the relay services (Tess, n.d.-j). Tess points out that it has neither a legal nor a contractual obligation to receive and make emergency calls (Tess, n.d.-k).

TeleSign indicates that it will field calls to two emergency numbers. Instead of providing details, it provides a link to the Tess website for information on how calls to those numbers are handled (TeleSign, n.d.-c).

User choice of interpreters

No information is provided at the Tess or TeleSign websites about if and how a user would select a preferred interpreter. However, TeleSign encourages dissatisfied customers to contact their complaints department and points out that the names and pictures of all its interpreters are all available at its website, so the complainant can easily find out who they had difficulties with. Feedback will be provided to the interpreter in question – anonymously if the complainant wishes (TeleSign, n.d.-h).

Cost to the user

For individuals' private use, there is no monthly basic fee to use TeSign. The cost of connecting to and using Tess TeSign for d/Deaf and hearing persons from the landline network is € 0.14 per minute. The price for calls from the cellular network is a maximum of € 0.42 per minute. Prices include interpreting services and outgoing landline, mobile and international telephone calls. International calls are only translated in German. Foreign language translation is not included in the service. The user bears these costs. For professional use, the monthly Tess subscription fee is € 261.80 (and € 392.70 if bundled with TeScript). The cost of interpretation Tess for d/Deaf and hearing persons for professional calls is € 2.02 per minute. This includes interpreting services and outgoing landline, mobile and international

telephone calls. International calls are only translated in German. Foreign language translation is not included in the service. Business calls from hearing persons to Tess customers are billed at the same rate as for d/Deaf subscribers to Tess. All prices reported, here, include Value Added Tax (VAT). There are no setup costs. Customers are billed monthly based on use and can pay by direct debit or bank transfer (Tess, n.d.-l. and Tess n.d.-m). One webpage at the Tess website says that Tess customers bear the cost of professional calls from hearing persons (Tess, n.d.-n). However, another page says that the hearing callers bear the connection charges (Tess, n.d.-o). There is no cost for Tess users to call the organizations with which Tess has entered into arrangements to provide video interpretation for their callers. Tess customers who use its services for professional purposes may be eligible for public financial support (Tess, n.d.-p).

For individual use by one person, TeleSign's monthly basic fee is € 220 and calls are € 1.70 per minute, even if the d/Deaf subscriber is called by a hearing person. For multiple use by several people but not all at the same time, the monthly basic fee is € 900 and calls are again € 1.70 per minute, regardless of whether the caller is a d/Deaf or hearing person. An alternative pricing package for multiple callers is € 350 for a monthly basic fee and calls charged at € 3.40 per minute. If the integration office pays for TeleSign, then the service may only be used for work. TeleSign can also be commissioned by others, for example by advice centers, other authorities, and private individuals. They then sign a contract directly with TeleSign and finance the service themselves (TeleSign, n.d.-c). TeleSign's cost for institutions is € 100 for an annual account plus € 3.40 per minute for calls. The service is exempt from VAT (TeleSign, 2019).

TeleSign's VideoSign service for remote interpreting involves a flat amount of € 84 per half hour for service and technology, plus the cost of interpreters. For service longer than 30 minutes, two interpreters are required. Total fees (including interpreters, service and technology) for 30, 60, 90 and 120 minutes are, respectively, € 84, € 118, € 254 and € 322.

Functionality

Platform

Tess uses the nWise MMX platform, which is a total communication platform for simultaneous use of video, real time text and voice within the same service (nWise, 2020a). TeleSign uses the Tess platform. nWise promotes MMX as the "most-widely used platform for communication and interpreting services between hearing and deaf people, people with impaired hearing and the deaf blind" (nWise, 2020b). In Tess, MMX requires installation of the myMMXtc client to run on PCs with the Windows operating system.

Smartphones and tablets require installation of the myMMXtc app for iOS and Android devices.

Technology required

To use PC and a Windows operating system, users require MMX software, which Tess provides as a free download for people using Microsoft Windows need versions 7, 8.1 or 10. The MMX software is not usually compatible with the Mac operating system. However, it may in some cases be possible to use the MMX software on an Apple PC by installing the Windows operating system (Tess, n.d.-q). PCs with 2 GHz or more can generally be used for Tess Relay services. Sufficient RAM of at least 512 MB is usually required. Tess usually works with notebooks currently available on the market but requires installation of the MMX app for iOS or Android devices. Notebooks should have sufficient memory. An external camera for TeSign may be required if the built-in notebook camera does not work properly. A good quality, wide angle camera is needed (Tess, n.d.-r). Tess can also be used with selected video phones that Tess has tested (Tess, n.d.-s). Tess relay services cannot be used with other video or chat services such as Skype (Tess, n.d.-t). A microphone and a loudspeaker are required for the transmission of the spoken language, if not already available in the user's device.

People wishing to use TeleSign interpreters need either a PC or laptop with a webcam and the myMMX software (available as a free download), or a smartphone or tablet with the Tess app. The Internet connection should have an upload of at least 256 Kb per second. Other technological requirements are the same as for Tess.

MMX allows for the transmission of text between communicants on that platform. However, neither the Tess nor TeleSign websites draw attention to this feature or explain how communicants can use it. Neither do the websites describe if and how communicants can send data files to one another while in an interpreted session.

Regulations and funding

The Federal Network Agency, or BNetzA for short, is the German federal authority responsible for electricity, gas, telecommunications, post, and railways, and works within the department of the Federal Ministry of Economics. In Germany, provision of the telephone switching service has been regulated by the *Telecommunications Act (TKG Section 45)* since 2009. The legislation covers relay services for people with hearing impairments and falls within the jurisdiction of the Federal Network Agency to administer. Tess receives its public contract from BNetzA and leading public telecommunications providers. In 2019 these providers were: 1 & 1 Drillisch

AG; 1 & 1 Versatel GmbH[48]; 1 & 1 Telecom GmbH; Communication Services TELE2 GmbH; EWE TEL GmbH; freenet AG; M-net Telekommunikations GmbH; NetCologne Gesellschaft für Telekommunikation mbH; QSC AG, Telefónica Germany GmbH & Co. OHG; Telekom Deutschland GmbH; Unitymedia NRW GmbH; Vodafone GmbH, and Vodafone Kabel Deutschland GmbH (Tess, 2019). The agreement with Tess includes its necessary provision of a telephone exchange service for disabled end users in order to take their interests into account in the planning and provision of telecommunications services to the public. The Federal Network Agency determines the opening hours of the interpreting service.

The government has decided that the users of the telephone exchange service must pay a share of the costs of service. However, the law says that the operator service should be offered at an affordable price. The government considers the prices are affordable for using. A portion of Tess' income (5%) is derived from call charges. Telecommunications companies are required to pay the other 95% (Tess, n.d-u). These revenues cover basic operating costs as Tess is permitted to claim only 1 percent of its total expenditure for the provision of its operator service as profit, which is about 10,000 euros a year (Tess, n.d.-v). The basic fee that TeleSign charges for its services (aside from the cost of its interpreters) is to cover the costs of the several interpreters required to be available so conversations can be accepted and interpreted as quickly as possible (TeleSign, n.d.-i).

[48] The suffix GmbH is an abbreviation of "Gesellschaft mit beschränkter Haftung," or "company with limited liability." The suffix AG is used to indicate a public limited company. See Hargrave (2020) for more information

Sweden

The Swedish Post and Telecom Authority (PTS) monitors the electronic communications and postal sectors in Sweden, which includes telephone services, the Internet and radio. The vision of the PTS is "that everyone has access to good telephony, broadband and postal services." The PTS deals with consumer and competition issues, efficient utilization of resources and the security of communications (PTS, n.d.-a.). PTS procures three inclusive call mediation services within electronic communications: Texttelefoni.se, Teletal, and Bildtelefoni.net (PTS, n.d.-b).

Texttelefoni.se mediates conversations between speech and text in Swedish and in English. One communicant uses text or Braille in the call by phone, mobile app or with the service's web. The other communicant uses a regular or mobile phone. A mediator mediates the conversation between text and speech in both directions.

Teletal mediates and provides conversational support in Swedish between speech and difficult-to-understand speech. Both communicants have direct contact with each other by phone or mobile and an interpreter provides support when needed.

Services

Through Bildtelefoni.net, conversations are interpreted, on the one hand, for people using sign language and videophones (including smartphone, tablet or computer with camera function) and, on the other, people who hear and speak and use ordinary telephones / mobile phones (PTS, n.d.-b). The Evantia Group performs Bildtelefoni.net service on behalf of the PTS (Bildtelefoni, 2021a). Eviantia is part of the Honkalampi Group (i.e., Social Enterprises Group), which comprises several housing, work-related, personal support, treatment, rehabilitation, and manufacturing enterprises (Honkalampi-säätiö, 2021a). The Evantia Group also provides sign language interpretation services in Finland. Evantia promotes itself as a "multi-expert in communication with more than 30 years of experience" whose core competencies are interpretation services and communication teaching, and the "largest employer in the industry in Finland" (Honkalampi-säätiö, (2021b). NerikeTolkarna also provides service for Bildtelefoni (Bildtelefoni, 2021b). NerikeTolkarna AB is a company based in Örebro. Its operations are focused on sign language and deafblind interpretation. It promotes itself as having had agreements with most authorities and schools for many years, and as having interpreters with different experiences and orientations. This includes authorized [auktoriserade] interpreters, interpreters with legal interpreter training, written interpreter training, visual interpreter training, extensive experience of educational interpretation within universities and colleges as well as in labor market training (NerikeTolkarna AB, 2019).

As stated on its website:

> Bildtelefoni.net is a national Video Relay Service that also offers limited Video Remote Interpreting. The service is for persons in Sweden with deafblindness, deafness, hearing loss or speech impairment and uses Swedish sign language in their communication. The service is also for Swedish-speaking persons that do not know sign language and are in contact with persons using Swedish sign language. Translation to or from English is not available. The service is free of charge. All calls are handled by sign language interpreters that use sign language and speech so that the persons communicating can have a dialogue. (Bildtelefoni, 2021a).

Bildtelefoni.net's services can be used without registering (PTS, 2020). However, to use the service's free apps to make video calls, the user must have an account with Bildtelefoni.net (Bildtelefoni, 2021c). For information on the apps, see below under "Technology Required." Manuals for the apps are available online, free of charge (Bildtelefoni, 2021d).

Hours of service

Bildtelefoni.net's services are available on-demand 24 hours a day, 365 days a year (Bildtelefoni, 2021a). Customer service is open weekdays between 8am and 4pm. At other times, callers can leave a message for customer service by video, voice, or e-mail (Bildtelefoni, 2021e).

Languages supported

Bildtelfoni.net facilitates communication between people who use Swedish spoken and Swedish sign language (Svenskt Teckenspråk).

Features

Through Bildtelefoni.net, a communicant calls a brokerage service and indicates who they want to call. A sign language interpreter mediates the conversation between the sign language user and the person who hears and speaks. The service can also be used for short interpretation sessions where the sign language user and hearing person are in the same place (i.e., video remote interpreting) (PTS, 2021a).

Bildtelefoni.net provides call numbers for speech telephone and SIP videophone. Calls can also be made via the service's web app and mobile apps. There is no time limit for mediated calls. However, distance-interpreted conversations (video remote interpreting) can last a maximum of 60 minutes on weekdays between 8am and 5pm and a maximum of 30 minutes at other times (Bildtelefoni, 2021f).

If wishing to communicate by phone through a sign language interpreter, including by remote interpretation, a person would call Bildtelefoni.net and can use the service's phone number free of charge. A sign language interpreter will answer the call, will dial the SIP address of the person the caller wants to reach, and will interpret the conversation between spoken Swedish and Swedish sign language. The caller must have the correct SIP address of the person they wish to call (Bildtelefoni, 2021g). If wishing to communicate by video, the procedure is much the same except the caller will use an SIP address to connect with Bildtelefoni.net free of charge and will provide the interpreter the correct phone number of the person they want to reach. The caller does not need their own videophone as the Bildtelefoni.net service has its own apps for mobile devices and computers, which a person can use to call and be called by the service (Bildtelefoni, 2021h). Regardless of the mode the caller uses, Bildtelefoni.net invites them to provide the interpreter any background information that may help in the interpretation of the call, and provides tips on introductions, who to address in the calls, minimizing background noise and other distractions, and ending calls. Communicants can let their interpreter know if they want sound between themselves during a mediated call. The interpreter has the capacity to enable this function (Bildtelefoni, 2021i).

Deafblind persons can use sign language to communicate with the interpreter and can let the interpreter know if they would prefer the interpreter to use sign language or text when responding. The interpreter can adapt their interpretation to the individual's needs. For example, the interpreter can use only capital letters for subtitling, can use "written sign language" or written Swedish (spoken language), can shorten what is said without changing the meaning of the conversation, and ask the other party to speak more slowly (Bildtelefoni, 2021j).[49]

If many people are calling at the same time, the caller will be placed in queue and will be served as soon as possible. Such callers receive notification about their place in the queue and the number of interpreters currently providing service. Queue notice is given as voice, text, and video message (Bildtelefoni, 2021k).

[49] The Bildtelefoni.net website does not provide details about written sign language or which form the service uses, e.g., whether this would be the International SignWriting Alphabet developed by Valarie Sutton (see https://www.movementwriting.org/symbolbank/ISWA2008/) or some other form. Essentially, written sign language employs symbols to signify signs performed by hand. Written sign language can be used instead of ordinary written languages and, accordingly, has become a form of written language of particular interest to deaf persons. See Hopkins, J. (2008). Choosing how to write sign language: a sociolinguistic perspective. *International Journal of the Sociology of Language,(192), 75–90.*

Toll calls cannot be placed to Bildtelefoni.net. Exceptions for emergencies are determined on a case-by-case basis. The example provided at the service's website is for a person who has missed a trip at an airport (within Sweden or abroad) and needs to call a toll-free number to be able to move on at all (Bildtelefoni, 2021l).

Interpreter qualifications

According to Bildtelefoni.net, "Sign language interpreters in Bildtelefoni.net follow the Chamber of Deputies' guidance Good interpreting practice. The staff in the service comply with Swedish law and have a duty of confidentiality in accordance with PTS's requirements for the performance of the service" (Bildtelefoni, 2021j).

User choice of interpreters

We were unable to obtain information from the Bildtelefoni.net's website about if and how a caller would be able to select an interpreter they may prefer.

Cost to the user

There is no charge to use Bildtelefoni.net (PTS, 2021a), other than what an operator might charge the user to connect to the service, and data usage charges that the user's broadband provider may charge for video data. The service's 020 number for voice calls has no call charges. The caller pays for voice calls from abroad to Bildtelefoni.net's 0771 number.

Emergency calling

Bildtelfoni.net calls to Sweden's emergency number (112) are prioritized and answered before other calls. Calls to 112 can placed by videophone at the SIP address[50] 112@tolk.sip.nu, and via Bildtelefoni.net's mobile apps and website (PTS, 2020). When calling 112 with the Bildtefoni.net's own mobile apps, the user clicks on a red icon that says "112 via Bildtelefoni.net" (Bildtelefoni, 2021m). Calls to 112 reach paramedics, emergency services, police, air/sea/mountain rescue services, priests on duty, and information about poisoning (SOS Alarm, n.d.). Calls can also be made to 1177 (for counseling with a nurse and referral in the care of illness), 113 13 (for giving or receiving information in the event of major accidents or crises) and 114 14 (for contacting the police to make a report or provide tips and information) (PTS, 2020).

[50] Session Initiation Protocol, or SIP, is an Internet Protocol used to initiate or terminate live communication sessions. It is the protocol which protocol that controls the transmission of audio and video. See Bildtelefoni (2021i) for more information

People who are d/Deaf or with a speech impairment can make direct calls to the SOS Alarm system and communicate by regular text or SMS messaging. People who use the SMS112 number must be d/Deaf or have a speech or hearing impairment and must be pre-registered via SOS Alarm's website (SOS Alarm, n.d.).

Functionality

Platform

Bildtelefoni.net uses the nWise platform (Bildtelefoni, 2021b), which is a full communication platform designed for use on computer browsers, smartphones and tablets. The nWise myMMX platform is capable of facilitating simultaneous communication by video, real-time text and audio for people who are d/Deaf, hard of hearing, blind, and deafblind, and is adaptable for Braille display, screen magnification and screen readers. nWise promotes its apps as WAI and VCAG certified, designed to be as user friendly as possible, and "the most popular communication products in Europe for people with impaired hearing and those who are deaf or deafblind" (nWise, 2020c).

Bildtelefoni.net can send and receive video in HD quality. If a caller or call recipient's broadband service does not allow for high quality video transmission at high speed, they are encouraged to try lowering the quality setting by one step in their phone to reduce the demands on broadband service (Bildtelefoni, 2021i).

Due to changes that Microsoft made to Skype, it is no longer possible to connect Skype to Bildtelefoni.net. Bildtelefoni.net encourages users to download and use its own apps to call the service (Bildtelefoni, 2021n).

Information about planned service interruptions for technical maintenance are posted on Bildtelefoni.net's website no later than one week before a planned service window (Bildtelefoni, 2021i).

Technology required

Bildtelefoni.net has its own free apps for making and receiving video calls. These include a web app for the user's computer browser, and mobile apps for Apple iOS (iPhone and iPad) and Android devices. The web app is designed for use with the Firefox, Chrome, Safari (Mac) and Internet Explorer (PC) browsers. The text size of mobile apps on menus can be changed by changing the text size in the respective phone / tablet settings in iOS and Android (Bildtelefoni, 2021c). A caller does not need their own videophone as Bildtelefoni.net's own apps for mobile devices and computers can be used to call and be called by the service (Bildtelefoni, 2021h).

However, users can contact a prescriber in their county council / region to determine if they can have a videophone prescribed (Bildtelefoni, 2021n)[51].

Communicants can type and receive text during their call in Bildtelefoni.net's mobile apps for Android and iOS. The text function appears as a T in the upper right corner of the screen in mobile phones and can be switched on, can be used to highlight text, and can be switched off completely. On tablets, the text is constantly visible in separate text boxes on the right of the screen (Bildtelefoni, 2021c).

Regulations and funding

The Swedish Post and Telecom Authority (PTS) has reported at its website that the level functional (basic) access to the internet was raised on 1 March 2018 from 1 Mbit / second to 10 Mbit / second. PTS is required to ensure that households and companies have such access (PTS, 2018). PTS is also responsible for ensuring the availability of call transfer services so everyone in Sweden can call each other, regardless of functional ability (PTS, 2021b). The services are performed by several suppliers on behalf of PTS. Key providers of emergency services are the Swedish Civil Contingencies Agency (MSB), Krisinformation.se, SOS Alarm Sweden, the Swedish Agency for Accessible Media (MTM) and the Institute for Languages and Folk Memories (Isof) (PTS, 2020). PTS has contracted Bildtelefoni.net to mediate conversations between spoken Swedish and Swedish sign language. Bildtelefoni.net also facilitates the use of Braille (PTS, 2021b). PTS determines and secures the service content and functions of Bildtelefoni.net (Bildtelefoni, 2021b).

As described by Haualand (2010), regional authorities are responsible for the financing and distribution of videophones for use in everyday life/personal use in Sweden. These arrangements are specified in the Medicinal Products Act (Lag om medicintekniska produkter 1993:584) and regulations by the National Board of Health and Welfare (Socialstyrelsen 2008). The National Insurance Office (Försäkringskassan) and the Public Employment Service (Arbetsförmedlingen) are responsible for financing assistive technology for use in employment. To secure interoperability of models and brands that are distributed in Sweden, Videophones that are eligible for provision through public authorities must be compatible with other models.

We were unable to efficiently obtain information on the amount of money it costs to finance Bildtelefoni.net each year or details about the financing arrangements and service usage patterns.

[51] Haualand (2010) provides information about legislative and regulatory bases for the public financing and distribution of videophones. Obtaining more current information was beyond scope for the present paper

United Kingdom

The four major providers of VRS in the United Kingdom are InterpretersLive!, InterpreterNow, SignLive Unlimited, and SignVideo.

InterpretersLive! is a service of Sign Solutions UK, a nationwide specialist provider of interpreting, training and other language services for businesses, individuals, medical and legal providers. It was founded in 1998 as the first independent provider of British Sign Language (BSL) Interpreting services. Sign Solutions offers a considerable range of interpretation and translation services for people who are d/Deaf.[52]

InterpreterNow is an online interpreting service that deaf people can use to communicate with hearing people in face-to-face meetings or over the phone. InterpreterNow is a social enterprise that invests its profits back into the deaf community. It is owned by Sign Language Interactions (Sign Language Interactions, 2018), which in turn is a subsidiary of the Sorenson Communications, a large US-based company that specializes in communication services for d/Deaf people (Sign Language Interactions, n.d.; Sorenson Communications, 2020e).

SignLive Unlimited was established in 2014 by Joel Kellhofer, an entrepreneur and active member of the British Deaf community. SignLive promotes itself as an organization that can facilitate communication between d/Deaf and other people at work and non-work situations (e.g., at home) and between organizations and their d/Deaf clients.

SignVideo is a predominantly deaf-led organisation that opened in 2004 and led by Jeff McWhinney, a deaf entrepreneur and equality advocate. SignVideo serves government, National Health Service (NHS), councils, UK banks, telecommunications providers, helplines, and other organisations. Sign Language Interactions acquired SignVideo in 2020. Sign Language Interactions is a subsidiary of Sorensen Communications (Sign Language Interactions, 2020).

Services

The Interpreting Service of InterpretersLive! includes VRS and VRI for communication with organizations that have a service relationship with IntrperetersLive! The video relay and VRI services both provide on-demand and bookable service provided by qualified and registered British Sign Language Interpreters. Bookable services are also available for lipspeakers,

[52] See Sign Solutions (2020a)

Speech to Text reporters, Relay Interpreters, and Makaton.[53] InterpretersLive! also provides Deaf Awareness training via online eLearning and BSL Deaf Awareness tutors at its premises or the premises of customers.

InterpretersLive! caters mainly to businesses and other organizations that want to use video relay to be in communication with d/Deaf individuals, and d/Deaf individuals who want to use video relay to be in communication with those organizations. The caption at the top of web pages at the InterpretersLive! website says, "A superb innovation in video interpreting, offering more effective communication for your business" (Sign Solutions, 2020b). Some employees may also qualify for government funding to use InterpretersLive! for work-related communication. Organisations that subscribe to InterpretersLive! receive assistance with contract implementation, ongoing support, and Deaf Awareness training via e-learning. However, InterpretersLive! is not a general-purpose VRS for use between communicants in a wide range of contexts for diverse purposes. InterpretersLive! recently described video relayed communication between a d/Deaf person and a non-subscribing insurance organization as a "one-off" situation (Sign Solutions, 2020c).

InterpreterNow provides VRS and VRI that are designed for individual d/Deaf people registered with InterpreterNow, as well as for registered organizations that want to communicate with d/Deaf individuals. Such organizations include regional health authorities (NHS Trusts); employers; customer services and National Health Centre (NHS) Contact Centres; third sector organizations (such as voluntary organizations and charities); local governmental authorities and county councils; and general practitioner services and health centres.

IntrpreterNow is similar to InterpretersLive! in that registered users can call organizations that are also registered with the service. InterpreterNow promotes itself as a service that also enables registered d/Deaf individuals to use VRS or VRI to communicate with one another, but the examples provided at the webpage for Deaf Users all feature interactions with registered service providers for medical-related assistance. The same webpage reports that IntperpreterNow works with different Deaf organizations and BSL agencies that provide and manage the interpreters, including Sign Language Interactions and Nottinghamshire Deaf Society (NDS) (IntrpreterNow, 2020a).

[53] Makaton is a language program that uses symbols, signs and speech to enable people to communicate. See Makaton Charity, 2020.

SignLive offers a Community Directory of subscribing organizations that d/Deaf people can call for free. SignLive can also be used between the individual who has a personal subscription contract and other individuals. SignLive will provide VRI interpretation of documents that the individual subscriber sends to their interpreter at an email address the interpreter provides.

SignLive's VRS and VRI can be used between d/Deaf and hearing people at work, between d/Deaf employees and hearing customers, between d/Deaf individuals and subscribing organizations, and between individual d/Deaf subscribers and other communicants for personal reasons beyond work (e.g., at home). SignLive advertises at its website how it interpreted more than 57,000 calls in the past year last year and that "customers regularly switch over to SignLive from alternative solutions and continue to do so every month" (SignLive, 2021a).

SignVideo provides professional interpretation through VRS and VRI. The organization promotes its services for use by individuals at home or at work, and by businesses, including d/Deaf-led businesses. The organization also raises awareness among partners and alliances about the BSL community and its core values to promote direct, positive interactions and relationships. The organization has produced a guide for partners on using SignVideo services to communicate with customers.

Similar to SignLive, SignVideo promotes its VRS for business and for individuals to use at work or for personal purposes. For individual subscribers at work, the service enables them to make and receive phone calls like other employees, and to take BSL-interpreted messages on a video answering machine that the individual can return at a more convenient time. A remote BSL interpreter can be used for small team meetings or one-to-one appointments. For individuals at home, SignVideo underscores its value in helping them communicate with service providers (e.g., their GP, local Council, child's teacher, stores) and with other individuals for social reasons (e.g., with family and friends). For businesses, SignLive promotes its value in furthering equal access and communication for d/Deaf or hard of hearing staff who use BSL. VRI can be used to enable d/Deaf and hard of hearing staff to participate fully in last-minute meetings that are effectively closed to individuals and businesses which have to rely on traditional interpreter services, which may require many days advance notice to arrange. The SignVideo also promotes the benefits of its services for businesses' customer service departments. SignVideo welcomes d/Deaf entrepreneurs' to sign up their firms in its BSL Business Directory free of charge, which anyone in the community can use free of charge.

We performed a small random sample of 35 organizations from among the 416 that the UK Council on Deafness (UKCoD) lists at its website as having a relationship with at least one of these VRS providers. Of the organizations sampled, 4 (11%) provided a link to video interpreting with InterpretersLive! (or its parent company, Sign Solutions), 9 (26%) linked to SignVideo, and 22 (63%) to SignLive. We found no links in our small sample from the UKCoD list to InterpreterNow. However, we observed that most of the organizations InterpretersNow lists as subscribing to its services are not listed at the UKCoD website. As well, the UKCoD lists one service that subscribes to InterpertersNow, but the UKCoD list does not feature a link for that service to InterpretersNow.

InterpretersLive!, InterpreterNow, SignLive, and SignVideo require its users to have accounts and to register themselves accordingly. However, anyone who downloads and install's SignLive's free BSL Business Directory app, regardless of whether they are a SignLive customer, can contact the businesses listed in the directory free of charge.

Hours of service

Hours of service for InterpretersLive! video relay service are from 8am to midnight, 7 days a week. Outside of those hours, interpreters can be prebooked for service within 30 minutes (InterpreterNow, 2020b).

Hours of operation for VRS and VRI at InterpreterNow are reported as from 8am to 6pm, seven days a week for individuals and, with prior arrangement, up to 12 midnight. However, information for businesses says that the services are available 8am to midnight, 7 days a week, 365 days a year (InterpreterNow, 2020c). Calls through InterpreterNow are pre-booked by an interpreter.

SignLive's services are available on demand for subscribers. SignLive does not require pre-booking.

SignLive's services are available 24/7/365.

SignVideo's hours of service are from 8am to 8pm Monday to Friday, and Saturday from 8am to 1pm. It is not open on Bank Holidays in England and Wales. (SignVideo, 2020a). However, SignVideo advertises its service packages for businesses as providing service availability for customer service departments from 8am to 6pm Monday to Friday (SignVideo, 2020b). SignVideo's services are available on demand but does book sessions when requested by its customers. Typical scenarios for booking include for interpreting a session between two (or more) people in the same location, between two people in different locations by phone and smartphone, PC or

Mac, and between two people in different locations who share the same screen, e.g., for a consultation meeting.

Languages supported

InterpretersLive! claims the ability to deliver BSL and ASL remotely to anywhere in the world but seems to use mainly BSL between communicants in the UK. InterpreterNow, SignLive, and SignVideo use BSL.

Features

To directly contact over 400 private-sector, public sector, and voluntary organizations that have subscriptions with VRS providers, and which provide services through these providers, callers can consult the online video relay directory provided by the UK Council on Deafness (n.d.).

To make a call using a browser through InterpretersLive!, the user clicks the 'Contact us through a Sign Language Interpreter' button. Users of Firefox, Chrome or Opera will see a screen with a 'call now' button, which they will click to be connected to an Interpreter. Users of Safari or Internet Explorer browsers will first download a plugin (only once) then click the 'call now' button. People wishing to connect by iPad/iPhone/android tablet will download the compatible app and click to make a video call. InterpretersLive! lists 41 presumably subscribing organizations that individuals can communicate with, using its services free of charge (Sign Solutions 2020d).

To use InterpreterNow to call a service or individual, the user and the service or individual receiving the call must be registered with to InterpreterNow. Callers are connected to a qualified BSL interpreter. A hearing person or organization can call registered individuals directly using InterpreterNow. People wanting to receive video calls need to leave their InterpreterNow app running on their smartphone or tablet. When the call is answered, the interpreter will appear on the screen, will tell who is calling and will interpret the conversation. InterpreterNow lists 11 subscribing organizations that individuals can communicate with using its video relay services free of charge (InterpreterNow, 2020d). People who live in Scotland can use the contactSCOTLAND-BSL service to connect with any Scottish government department. This includes NHS 24, The Scottish Parliament and 32 Scottish Local Authorities. People who live in England can contact National Health Service (NHS) 111 (a free-to-call non-emergency medical helpline), the NHS Customer Contact Centre, and Leicestershire Police 101 (for non-emergency calls). InterpreterNow is reportedly working to encourage national organizations across England, Ireland, Northern Ireland and Wales to register with the service.

SignLive's procedures for calling someone involve connecting to the website by browser from a PC or Mac, or by using a smartphone or tablet app, and then selecting whether VRS is required. If required, the interpreter places the call and interprets. For people receiving calls through VRS, calls to the individual subscriber's number are automatically routed to a SignLive interpreter, who then connects the two communicants. A person will receive notification of incoming calls on their smart device or on the Google Chrome web-browser, even if not logged in to SignLive. If a d/Deaf user cannot answer the call, the interpreter will take a message and email it them. Registered users can access SignLive's Community Directory through the app to contact subscribing organizations. These include a mix of Councils, Airports, NHS Trusts and businesses, some d/Deaf-led. Registered businesses wishing to contact SignLive d/Deaf customers enter the unique SignLive number of the person they want to reach, enter the businesses' number, and then ask for a video relay interpreter to mediate the conversation.

To use SignVideo to contact an organization that subscribes to its service, the user would click on the SignVideo BSL Live button at the contacted organization's website, connect to a SignVideo interpreter, and ask for the required person or department. Depending on the organization, the SignVideo user may have to install a plugin (Brent Council, 2020).

Interpreter qualifications

InterpretersLive! provides little information about the organization's interpreters, except that they are qualified and registered BSL Interpreters.

Qualifications for InterpreterNow interpreters include at least a minimum level of training and qualification based on the Codes of Conduct of the Scottish Association of Sign Language Interpreters (SASLI) and/or the National Register of Communication Professionals working with Deaf and Deafblind people (NRCPD). The Code covers issues of professional competence, confidentiality, practice and procedures specific to the work of an interpreter. InterpreterNow also requires that interpreters have a minimum of 3 years post-qualification experience, participate in Continuing Professional Development, hold Professional Indemnity Insurance and current Enhanced DBS clearance (Disclosure and Barring Service, or criminal record check), and agree to abide by an independent Complaints Procedure. SignLive's interpreters have at least five years' interpreting experience, are NRCPD-registered, hold DBS clearance, and be licensed under Protecting Vulnerable Groups (PVG).

SignVideo's interpreters are fully registered, qualified and certified (NRCPD or equivalent), have native or bilingual proficiency in BSL and English, at

least 5-7 years of training before joining the organization, at least 5 years community interpreting experience, a current DBS Enhanced Disclosure certificate, Professional Indemnity Insurance (PII), have signed a Non-Disclosure Agreement at the start of their employment, and are required to complete 24 hours of continuing professional development annually.

User choice of interpreters

None of the four organizations at the focus of this paper provided information at their websites about if and how an individual user can select a preferred interpreter.

Cost to the user

InterpretersLive! promotes its "flexible monthly bundles of minutes, and low set up fee." However, the organization does not provide the costs of various packages at its website. Instead it invites interested people to contact the organization for more information and provides an online form for that purpose. However, InterpretersLive! features 41 organizations that individuals can contact and communicate with, using its services free of charge (Sign Solutions 2020d). For organizations, the InterpretersLive! homepage says, "A link on the 'contact us 'part of your website, allows Deaf people to make calls direct to your customer contact centre. You can conduct a regular telephone call through a qualified Sign Language interpreter and you only pay per minute for the call" (Sign Solutions, 2020b). On the website homepage, however, the organization describes the availability of "monthly tariff options" without providing further details anywhere else at the website.

Calls between d/Deaf users and private and public services registered with InterpreterNow are free of charge to the d/Deaf users. For these calls using 3G/4G, the cost to the individual would be for phone data with the individual's telecom provider because InternetNow uses an internet connection. InterpreterNow estimates that data use for video calls work out to about 1MB per minute.

SignLive provides a Community Directory for d/Deaf people to call subscribing businesses and public sector organizations for free. SignLive has a range of service bundles and prices for individual subscribers. The bundles and fees are not displayed at SignLive's website. Individuals with personal accounts receive their own SignLive telephone number and can monitor on their screen how many minutes of service are left in the month. For personal calls, an individual living in England or Wales may qualify for financial assistance through the Direct Payments program (SignLive, 2021b). For work-related service, the individual may qualify for financial assistance through the Access to Work program, a Government scheme to support Deaf

people and others with disabilities at work (SignLive, 2021c). SignLive provides free advocacy support for individuals who experience difficulties obtaining Access to Work funding. SignLive says it does not use up minutes on an individual's phone contract, but does use data at 100MB an hour, which the subscriber's telecom provider would charge to them according to their personal data plan with the telecom. For businesses and other organizations, SignLive has a variety of service bundles and prices "to suit every budget" (SignLive, 2021a), but which are not displayed at its website. All packages come with an online dashboard for managing minutes and budget. Packages can be split between the departments of larger organizations, and each department can be monitored from a central login. Subscribing organizations are listed free of charge in SignLive's Community Directory. Subscribing individuals and organizations are billed monthly. Organizations have the option of a pay-as-you go plan.

SignVideo draws attention to how individuals may be able to qualify for financial assistance for its services through Access to Work and Direct Payments. For individuals' use at work or for personal reasons, the cost of service will depend on the amount of time their service package allows for. People receiving Access to Work or Direct Payments funding negotiate the amount of time (and cost) they are eligible for.

Emergency calling

None of the four organizations at the focus of this paper provided information at their websites about whether and how individual users can make video relayed calls to emergency services. This would seem to be a service gap because the UK's Office of Communications (Ofcom) is consulting on introducing emergency video relay for British Sign Language users to contact the police, ambulance and fire services in BSL (Ofcom, 2019). Ofcom regulates communication services that people use every day in the UK, including broadband, home phone, mobile services, TV and radio.

Functionality

Platforms

nWise MMX is a data and communications platform widely used by the deaf community in the UK and worldwide. nWise MMX is a Total Conversation platform developed to handle video, audio and text for International Telecommunication Relay Services across Europe, Asia and the United States.

InterpretersLive! uses nWISE as its platform. Video calls are conducted through highspeed connections, using point to point encryption. The platform is configured to adjust its internet speeds to optimize picture and sound quality, starting at a low broadband speed of 1MB. The system can

deliver video conference calls for up to 9 participants. The VRS is compatible with major browsers used by Windows- and Mac-based computers, and with most video-enabled mobile devices including iPhones and iPads. A free app is available for the mobile devices. An app is not required for accessing the services through a browser from a PC or Mac.

InterpreterNow also uses nWISE/MMX. All data and services are hosted by Pulsant at a highly-secure UK-based Tier 4 data centre. Each centre has ISO 27001 (information security), ISO 9001 (quality management) and ISO 14001 (environmental management systems) accreditation. Pulsant supplies to Gov.uk, Microsoft, Cloud Agile and Cisco Partners. The servers have high levels of availability, e.g., with instant switch-over backup power supplies and internet gateways (nWise, 2020d; Pulsant, 2021). If provided login information before scheduled VRS/VRI sessions, InterpreterNow can accommodate other platforms such as Microsoft Teams, Zoom, WebEx, etc. (InterpreterNow, 2020e).

SignLive's technology has been developed and is regularly updated by an in-house team with years of experience working with VRS and VRI. SignLive can be accessed via web browser, iOS or Android app and can connect through 3G, 4G and Wi-Fi. Further details about the platform were not available from the website.

SignVideo shifted to Florida-based VTCSecure's SOLVES as its communications platform in 2017. VTCSecure promotes SOLVES as "a state-of-the-art Voice, Video and Real-Time Text communication platform used all over the world to bring equal access to communication for the Deaf and Hard of Hearing" (VTC Secure, n.d.). Detailed information about SOLVES was not available from the websites of SignVideo or VTCSecure.

Technology required

For InterpretersLive!, the minimum requirement for video calls is 192kbps. The service is accessible via a Windows Desktop and Apple Mac supported devices. The user needs a webcam, a broadband upload speed of 1mb, and Flash player. The service is compatible with the Google Chrome (version 65 and later), Firefox (version 55 and later) and Opera (version 50 and later) browsers. Users of Safari 9 or Internet Explorer 11 must download a plugin, which will install and take the user to the 'call' button. Connecting to InterperetersLive! Through an iPad/iphone/android phone requires downloading a free compatible app. The user guide that comes with the download provides further instructions. For businesses, on-demand BSL Interpreters are available via Skype or StarLeaf. StarLeaf is an online provider of video conferencing and secure messaging.

InterpreterNow can be accessed on a computer, smartphone or tablet. Users of a PC or Mac login through the InterpretersNow website to make a call. Users of smartphones or tablets download and use the free InterpreterNow app, which is available for Android and Apple devices.

SignLive can be used on a PC, laptop, Mac, tablet, iPhone or Android smartphone. The services can be accessed through a PC or Mac by Google Chrome, Mozilla Firefox, or Internet Explorer (versions 9 – 11). A free app is available for download for iPhone or iPad (iOS 9 or above) and for Android devices (version 5.0 or above).

SignVideo can be accessed by PC, Mac, tablet or smartphone on 3G/4G/5G networks. The organization can provide a dedicated video phone for people who need one.

Regulations and funding

VRS in the UK are currently unregulated. However, the *Equality Act (2010*) and the *Accessible Information Standard (2016)* impose obligations on some businesses and on healthcare, social service, and other organizations. Sign Solutions (2020b), InterpreterNow (2020c), and SignLive (2021d) promote their services as means for organizations to meet their obligations under one or both pieces of legislation for subscribing organizations. SignVideo points more generally to how employers that use its services are fostering equal communication and diversity in the workplace and with customers (SignVideo, 2020b; 2020c).

In addition, the organizations at the focus of this paper are voluntarily accredited by several standards. Those shown on the following table are based on information readily available from the organizations' websites.[54] A key that describes the standards is provided below the table.

Table 2: Table of accredited standards for each VRS provider in the UK

Standards	InterpretersLive!	InterpretersNow	SignLive Unlimited	SignVideo
ISO 9001:2015	X	X	X	**X**
ISO 14001:2015			X	**X**
ISO/ISEC 27001	X	X	X	X
UKCoD's standards for a national VRS	X	X	X	X

[54] An organization may be accredited for a standard but is not indicated as such on the table because the information was not readily available. Most of Switzerland east of Swiss Romande and north of Ticino is German Switzerland.

Cyber Essentials	X	X		
Data Security and Protection Toolkit		X		
NRCPD/SASLI	X	X	X	X

Key

- ISO 9001:2015 is an international standard that specifies requirements for a quality management system for consistently providing products and services that meet customer and applicable statutory and regulatory requirements, and which enhance customer satisfaction through system improvement processes (ISO, 2015a).
- ISO 14001:2015 is an international standard that specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance and responsibilities in a systematic manner for environmental sustainability (ISO, 2015b).
- ISO/ISEC 27001 is an international standard on information security management which details requirements for establishing, implementing, maintaining and continually improving an information security management system (ISO, 2013).
- The UKCoD's standards for a national VRS is a set of service standards developed by UK Council of Deafness (UKCoD). For a copy of the UKCoD's standards, see UKCoD (2014).
- Cyber Essentials is a government backed, industry supported scheme to protect businesses from cyber threats (National Cyber Security Centre, n.d.).
- Data Security and Protection Toolkit (previously the Information Governance (IG) Toolkit) is an online system developed by the National Health Service (NHS) which allows organisations to assess themselves or be assessed against Information Governance policies and standards (NHS Digital, 2018).
- The NRCPD (National Registers of Communication Professionals Working with Deaf and Deafblind People) is the national regulator of over 1,600 language service professionals including British Sign Language/English Interpreters and Translators, Lipspeakers, Notetakers, Speech to Text Reporters, and Interpreters for Deafblind People (NRCPD, n.d.).
- SASLI (Scottish Association of Sign Language Interpreters) is the only registration and training body for sign language interpreters in Scotland (SASLI, n.d.).

The websites of InterpretersLive!, InterpreterNow, SignLive and SignVideo are scant on financial details, including details about how they are funded. The chief sources of revenue seem to be private subscriptions and user

charges paid by individual subscribers and businesses. However, as discussed above, some employees may be eligible for funding for interpreter services through the Access to Work Program run by the Department for Work and Pensions (n.d.) and some individuals may qualify for financial assistance from the Direct Payments funding program for reasons not related to work (Ministry of Housing, n.d.).

Finland

We were unable to find information about which organization(s), if any, presently provide VRS in Finland, but were able to obtain information about VRI in that country. Kela is the government department that organizes interpreter services for d/Deaf individuals and others with disabilities (e.g., speech impairment) in Finland, including VRI. Kela is also responsible for funding individuals to use those services. Kela (short for Kansaneläkelaitos) is the Social Insurance Institution which is responsible for national social security programs. Kela's role was expanded in the 1980s and 1990s beyond retirement pensions to include child benefits, unemployment benefits, sickness benefits, health insurance and student financial aid (Socialprotection.org, n.d.).

Kela recently tendered for the interpretation services it will make available to Kela clients in 2021–2022 and will confirm the final service providers and interpreters in January 2021. Kela had chosen the Evantia group of companies to provide VRS under a pilot project. The Evantia group comprise a major competitive force in the Finnish interpreter market. Accordingly, we have provided details in the discussion which follows about Evantia's operations to provide a flavour of the kinds of video-based sign language service are available to d/Deaf people in Finland.

Previous research on VRS in Finland (Mission Consulting, 2012) listed Etätulkki as a VRS vendor in Finland. A VRS pilot project called Etätulkki was instituted by Kela and ran its course in 2010. A Google search for the term Etätulkki leads back to the remote interpreting function of Kela, and to several providers of interpretation and text-based services, but not to VRS for people who are d/Deaf or hard of hearing. The word "etätulkki" translates to VRI in English. Evantia Oy is a major provider of sign language interpretation services in Finland that provided sign language interpretation through VRS for the Etätulkki pilot.

The Evantia group includes the interpretation companies, HLS-Sosiaalipalvelut Oy (HLS-Social Services Ltd.) and Sign Line Oy (Honkalampi-säätiö, 2021a). Between them, these two companies have a presence in all regions of Finland. Eviantia is part of the Honkalampi Group (i.e., Social Enterprises Group), which comprises several housing, work-related, personal support, treatment, rehabilitation, and manufacturing enterprises (Honkalampi-säätiö, 2021b). Evantia promotes its group members as contractual partners with Kela (Honkalampi-säätiö, 2021c). While many other organizations also provide sign language interpreter services under contract with Kela, we have focused on Evantia in the discussion which follows as the kind of organization Kela has chosen for major sign language interpretation assignments such as the Etätulkki VRS

project. Evantia promotes itself as a "multi-expert in communication with more than 30 years of experience" whose core competencies are interpretation services and communication teaching, and the "largest employer in the industry in Finland" (Honkalampi-säätiö, 2021a). Evantia directs individuals who have received decision about eligibility for interpretation services from Kela to apply to Kela's Mediation Centre for access to the approved services.

Previous research (Mission Consulting, 2012) also listed TeliaSerona as one of the VRS vendors in Finland. Now simply Telia, this company is a major provider of telephone services and equipment. It does not feature video interpretation or VRS as one of its services (Telia Company, 2021).[55]

Services

The interpreter service that Kela makes available is intended for people with disabilities to use for work, studying, doing business, and hobbies (Kela, n.d.-a). People can obtain at least 180 hours on the basis of hearing or speech impairment, and at least 360 hours per year on the basis of hearing impairment. People can apply for more hours if needed (Kela, n.d.-b). Most people use the service for non-work situations, but about 4 in 10 use the service for work as well. The service is provided for individuals who have a hearing impairment, or a speech impairment who reside in a municipality in Finland, can express themselves through interpretation, and use some effective method of communication. Examples of communication include Finnish or Finnish-Swedish sign language, speech in Finnish or Swedish, speech interpretation, written interpretation, and other methods of communication for people with speech impairments, such as image communication (Kela, n.d.-c). Kela found through its own research that the use of its interpreter service has nearly doubled in the past 10 years from 210,000 to 510,000 hours per year, even though the number of people using the service has not dramatically increased. Kela offers video remote interpreting is a mode service. VRI has not been widely used in Finland but is being met with wider acceptance among d/Deaf people. As a result of the Corona virus, Kela has permitted organizations to provide VRI and has extended the hours of its own VRI services (Kela, 2020a).[56]

Evantia's services include interpretation, the teaching of communication and sign language, remote interpreting via video regardless of location, and online expert services to assist with implementing digital accessibility. Evantia provides interpretation services to municipalities, hospitals and

[55] See also https://en.wikipedia.org/wiki/Telia_Company#Sonera

[56] See also Viittomakielialan Osuuskunta Via. (n.d.) for one example of an organization that has expanded its VRI service

authorities and others, and arranges interpretation for various events (Honkalampi-säätiö, 2021c). It uses a range of video communication software to provide remote access for interpretation or teaching. Software includes Microsoft Teams, Zoom, TrueConnector, and Google Meet. Evantia provides remote interpreting and distance learning from studios that meet Eviantia's data security and data protection requirements (Honkalampi-säätiö, 2021d). Interpretation services include interpretation of sign language, interpretation for deafblind people, interpretation for people with a speech impairment, written interpretation, and remote interpreting.

Persons with hearing and speech impairments have the right guaranteed by law to have an Internet connection at their permanent residence, which can be used for video calling and remote interpretation services (Viestintävirasto Kommunikationsverket, 2014). The interpretation service provided by Kela is based on the *Act on Interpretation Services for Disabled Persons*. There is no right to the interpretation service from Kela if the person already receives sufficient interpretation service under another law, such as the Basic Education Act, the Early Childhood Education Act, the Patient Status and Rights Act (Patients Act), the Social Welfare Customer Status Act (Customer Act), the Accident Insurance Act, the Motor Insurance Act, or the Preliminary Investigation Act (Kela, n.d.-d). It is not immediately clear to what extent these laws ensure provision of VRS and/or VRI to d/Deaf people.

Due to growth in service usage in the past decade, Kela has allowed translation companies to provide interpretation at a distance and the opening hours of Kela's own remote service have been extended (Kela, 2020a). Kela describes remote interpreting as a service for which someone may qualify if the applicant is entitled to the interpretation service for people with disabilities and if the remote interpretation is deemed suitable for the interpretation situation. Kela points out that its remote interpreting is intended for short-term interpreting situations, such as telephone interpreting for making appointments and dealing with government matters and other services. Kela maintains that remote interpreting is not suitable for workplace meetings, other meetings and "club situations". Kela argues that such longer-term or demanding situations require high-quality, on-site interpretation (Kela, n.d.-e).

We were unable to obtain information about if and how Kela and Evantia provide or facilitate access to VRS where one of the communicants wishes to communicate by regular phone or smartphone.

People with a hearing, hearing or speech impairment who need an interpreter because of their disability must apply to Kela for the "right" to the service and can do so by means of online forms. The individual must

attach to their form the opinion of a social or health care expert or other expert (e.g., a speech therapist) stating the kind of injury or illness for which interpretation is needed, the methods of communication the applicant uses, and the writer's view of how the applicant would benefit from interpretation (Kela, n.d.-f). In addition, the applicant must have a working method of communication and reside in a municipality in Finland.

Hours of service

Kela provides two different sets of hours at its website for remote interpreting service. One set of hours says the service is available from Monday to Friday from 7:30am to 8pm and Saturday from 8am to 3pm. The service is not available on public holidays but does operate during the Christmas break (e.g., on December 28-30 in 2020) (Kela, n.d.-g). The second set of hours says the service is open on weekdays from 8 am to 6 pm and closed for public holidays (Kela, n.d.-h). There are a few discrepancies in the two lists of public holidays the service is closed, (e.g., May Day and New Year's Eve) and the second list indicates service unavailability on Midsummer's Day twice.

Languages supported

Kela's remote service in connection with its interpreter service provides service in the Finnish sign language as well as in spoken Finnish and Swedish. In certain situations, spoken English can be used.[57]
Evantia's basic service provides interpretation to and from the Finnish and Finnish-Swedish sign languages (Kela, n.d.-i).

Features

To use Kela's remote interpreting, the user contacts the remote service, makes any necessary first-time adjustments to settings on their device, and waits for an image to appear that will show a free Kela sign language service specialist. If the service is congested, the user will receive a written notification on their browser. They should wait for the service specialist to be released without closing the connection but can also leave the line and be contacted contact later (Kela, n.d.-h).

Evantia's remote interpreting is performed over a secure connection from the service provider's studio. The interpreter contacts the communicants via their computer or tablet (Honkalampi-säätiö, 2020). Evantia does not provide information about how a communicant would place a call to a user of a regular or smartphone.

Interpreter qualifications

In the most recent tender for translation services that Kela is reviewing, companies to be approved must provide a recruitment plan and information about interpreters graduating from their studies (Kela, 2020c).

Evantia provides its interpreters' qualifications on a person-by-person basis at its website (Honkalampi-säätiö, 2021f). While Evantia promotes its "solid expertise and long experience in providing interpretation and teaching services", and the professional development of its staff (Honkalampi-säätiö, 2021g), Evantia does not provide information about overall requirements for its interpreters in terms of the training, experience, and accreditation they must have.

User choice of interpreters

Kela clients can construct a personal list of interpreters to whom their order will be forwarded. About 60% of people who Kela recently surveyed indicated that personal choice of interpreter was an important service feature (Kela, 2020b). Clients compile their list with Kela. Information about interpreters is available from Kela to approved clients, and from the websites of the interpreting service providers (Kela, n.d.-j), which are organized at the Kela website according to type of disability and six geographic regions (Kela, n.d.-k). Presently, numerous organizations provide interpreter services to Kela clients. Concerning sign language interpretation for d/Deaf people, for instance, 114 organizations are listed: 27 in the Uusimaa region which includes Helsinki and surrounding areas, 37 organizations in the west, 12 in the central region, 7 in Ostrobothnia (Vaasa region), 19 in the eastern region, and 12 in the north.

Users can select Evantia's interpreters according to their professional group, skills, or the language to be interpreted. Users can also search for an interpreter by picture and name. Individual profiles provide more information about their educational history, personal skills, and locale. The search function also enables the user to select the locality (or Kela's relay area) in which the employee operates. These are the same regions as Kela provides at its website (Honkalampi-säätiö, 2021f).

Cost to the user

Interpreter service through Kela is free of charge (Kela, n.d.-a). However, there is no right to the interpretation service from Kela if the person already receives sufficient service under another law. It is not immediately clear to what extent these laws ensure provision of VRS and/or VRI for d/Deaf people. It appears that unless the service is funded by Kela or another organization under one of these laws, d/Deaf individuals who choose to use video relay or remote interpreting would bear the costs.

Evantia provides a range of hourly rates (excluding VAT) for its interpretation. Sign language interpretation has two rates: basic (€ 78.00 per hour) and demanding (€ 99.00 per hour). "Demanding" is defined as interpretation for conferences, seminars, theatrical interpretation, and foreign language interpreting, and interpretations in which the spoken language is other than Finnish or Swedish, or where International Sign is used.

Emergency calling

Kela's website says that people who need to make an emergency call mediated by a sign language interpreter can contact the service provider or the interpreter directly or can send an emergency message by text (Kela, n.d.-l). It is not clear from this information whether Kela's reference to "the service provider" means the organization that provides interpreter service or the emergency service provider. A recent report from the Prime Minister's Office (2017) flagged several concerns about access to emergency services for people who use sign language, and about the confusion d/Deaf persons and health care professionals experience about who is responsible for what (Prime Minister's Office, 2017). The Sign Language Act provides for sign language users' right to interact with public authorities. The Emergency Response Center Finland recently announced that, in the autumn of 2019, "Kela, the Ministry of the Interior, the Ministry of Social Affairs and Health and the Emergency Response Centre Agency will start a one-year trial where a person with an emergency can make an emergency notification using Finnish sign language via an interpreting service centre for the disabled" (Niemenen, 2019). It was beyond scope of this paper to search for further information about this initiative.

Functionality

Platform

In an announcement from 2013, Kela announced that its own computer software (MMX software) had been developed for remote interpretation. MMX can be used on a laptop, tablet or touch screen terminal. Kela reported that, while a wired broadband connection is recommended for MMX, it also works well on a 3G network (Kela, 2013).

Kela has acquired equipment, software and support services from Telia Sonera Finland Oyj.

Technology required

Remote interpreting through Kela can be used on a smartphone, tablet or computer. People who do not have a suitable device can order one from Kela. The device requires: a microphone, speakers or headphones, and camcorder; Safari or Google Chrome (version 64 and later); and a high-

speed (1,200 kbit / s) broadband connection to display video. The remote service can also be used on Apple devices running iOS (Kela, n.d.-h).

Regulations and funding

According to information available at the Finnish Transport and Communications Agency (TRAFICOM) (TRAFICOM, 2020), everyone in Finland is entitled to obtain a reasonably priced and functioning telephone connection to their home or place of business. As persons with hearing or speech impairment are often not able to use telephone as other people do, they have the right to access services corresponding to a telephone connection: text messages and broadband connection enabling a video connection.

To enable sign language video calls or remote interpreting services, the terminating and originating speed of a broadband connection services must be at least 512 kilobits per second. Data transmission delay must not exceed 150 ms. Persons with hearing and speech impairment are also entitled to obtain a telephone subscription for sending and receiving text messages to their home. Facilitating contact with the individual's emergency response centre in case of emergencies is a key consideration.

In areas with no commercial supply of services, TRAFICOM has designated a universal service provider, which is obliged to provide a functioning connection to the customer, if necessary. The user must be able to use the subscription at least in one spot at home or place of business. This may require that the user improve their reception by an antenna.

Finnish Sign Language was first recognised in the constitution in 1995. The new *Sign Language Act* was adopted in 2015 (Ministry of Justice, 2015). As explained by the then EUD President and the executive director of the Finnish Deaf Association, Markku Jokinen soon after the new Act was promulgated, the new Act aims to increase authorities' awareness of signers as a linguistic and cultural group, re-establishes signers' right to receive teaching in their own language and in sign language as a subject matter, the right to use sign language or interpretation and translation arranged by an authority, and clarifies the status of sign language as a language and users as cultural group (Hay, 2015). Specific rights of sign language users are specified in Section 4, which provide for "the right of a sign language user to be taught in his or her own language and to sign language classes" as laid out in various pieces of legislation pertaining to education, administrative and judicial procedures, criminal investigations and procedures, social welfare clients, patients, law enforcement, imprisonment, pre-trial detention, the handling of people in police custody, and other matters pertaining to public administration. Provisions of the Act on Interpretation Services for

Persons with Disabilities (133/2010) "apply to arrangement of interpretation services for a sign language user if he or she is not provided with sufficient and appropriate interpretation service under another act (s 4 (3)).

The interpretation service provided by Kela is based on the *Act on Interpretation Services for Disabled Persons (Laki vammaisten henkilöiden tulkkauspalveluista)* of 19 February 2010. The legislation provides that remote interpretation may be provided "if possible and justified". The Social Insurance Institution of Finland (Kela) "arranges for a person using remote interpretation the means and equipment necessary for the interpretation at a reasonable price and is responsible for the necessary costs arising from the use of the remote connection (s 8) (Finlex, 2010).

In early 2020, the cost of the interpretation service for people with disabilities was € 19.3 million, down from € 24.0 million the same time in the previous year (Kela, 2020a). Kela's interpreting service for people with disabilities is financed entirely by the state through general taxation (Official Statistics of Finland, 2019).

Switzerland

Switzerland has a universal telecommunications service that is intended to be available to everyone in the country. It consists mainly of the public telephone service, a broadband internet connection and specific services for people with disabilities. The Federal Council periodically reviews the scope of the universal service. Specific services intended for people with hearing impairments, who are partially sighted and with reduced mobility are provided as part of the universal service. These include transcription services, SMS for relaying short messages, a new videotelephone relay service and directory and switching services. The services must be provided in such a way that they can be used by people with disabilities under conditions which are qualitatively, quantitatively, and economically comparable to those offered to people without disabilities (OFCOM, 2020a).

The Federal Communications Commission (ComCom) is the independent regulatory authority for the telecommunications market in Switzerland. It consists of 7 independent specialists nominated by the Federal Council. Established by the *Law on Telecommunications (LTC) of 30 April 1997*, one of ComCom's key responsibilities is to award universal service licences. Swisscom was awarded the universal service license for 2018 – 2022 (ComCom, n.d.). Swisscom is responsible for upgrading the service from traditional analog and digital connections to multi-functional connection based on IP (Internet Protocol) technology. In addition, for people with disabilities, Swisscom must maintain SMS transcription and relay services, and voice access to directory services, and implement a new sign-language relay service for conversations via video telephony. Responsibility for overseeing and administering Switzerland's universal service for telecommunications falls to the Switzerland Federal Office of Communications (OFCOM) (OFCOM, 2021). Under contract with Swisscom, the Procom foundation provides specific components of the universal service for d/Deaf people (Swisscom, 2021a).

Procom's stated Vision is

> guided by the conviction that deaf, hearing impaired, visually impaired or otherwise communication-impaired people have an unrestricted right to communication and is committed to ensuring that it is enforced. The activities of Procom are aimed at achieving and ensuring the greatest possible equality of disabled and non-disabled people in the field of communication. (Procom, 2021a).

The purpose of the organization is "… to promote communication opportunities for the hearing impaired, both among themselves and between the hearing impaired and the hearing", which includes "… the

organization of telephone switching services for the hearing impaired and of interpreting services." The organization can also provide "… financial and organizational support for new and existing projects that contribute to solving the communication problems of disabled people." Procom has been providing video sign language interpreting via the Internet since 2009 (Procom, 2021a).

Services

In addition to its translation services, Procom provides three relay services to d/Deaf and hard of hearing people: Text Relay and SMS Relay, both of which are available 24 hours a day, 7 days a week, and Video Relay. Times of service for VRS depend on region of the country and are provided below under "Hours of service."

Users of the free apps that can be downloaded from Procom's website need to register with the company to use the apps. Login details are provided by email (Procom, 2021b). Video relay (switching) is also available without registration or Procom apps (Procom, 2021a).

Procom promotes its VRS as useful "[w]herever a telephone call is more efficient than ordering an interpreter… Deaf people can call the doctor, the insurance company or their children's school at short notice. In VideoCom, interpreters help both sides to make a direct conversation possible immediately" (Procom, 2021c). With the advent of its VRS VideoCom in 2018, the use of Procom's text-based relay services showed signs of declining in 2019 compared with the previous year (Procom, 2020a). The chart from the 2019 Annual Report (available in German only) shows the pattern for the month of January from 2010 to 2020.

The chart indicates an increased usage of VRS in comparison to Text and SMS relay services in Switzerland over the past decade. It is not clear based on the information available at the Procom website whether it provides VRI in addition to VRS.

Hours of service

Hours of service for video relay vary according to region of the country, as shown on the following table.

Table 3: Hours of video relay service in Switzerland through Procom

Region	Available days	Hours available
German Switzerland	Mon-Fri:	8am to 9pm
	Sat-Sun:	10am to 5pm
Suisse Romand	Mon-Fri:	8am to 9pm
	Sat-Sun:	11am-4pm

Ticino	Mon-Fri:	9am to noon

The Procom website does not provide information about whether VRS must be booked. The general promotional tone of the information Procom does provide, however, suggests that the service can be requested on short notice and even on demand. The web-based information on interpreters says that they work "on demand" (Procom, 2021d). Information about VRS says, "A call is now also possible in sign language and in real time. Wherever a telephone call is more efficient than ordering an interpreter, the video telephone operator comes into play… In VideoCom [which is Procom's video relay service], interpreters help both sides to make a direct conversation possible immediately" (Procom, 2021c).

Languages supported

Procom provides video relay between communicants in spoken French, German and Italian and the French, German and Italian sign languages.

Features

To make a call through Procom's video relay service, the d/Deaf person uses their videophone to call the videophone operator for their region. This process is how "[a] sign language interpreter makes the desired connection with a hearing person" (Procom, 2021c). Procom does not provide information at its website about how a hearing person would contact a d/Deaf person. However, Procom does provide a directory of the names and contact numbers for about 340 videophone users (Procom, 2021b). Presumably, a hearing individual could use this list to connect through Procom with a d/Deaf or hard of hearing individual who has one of these numbers.

Interpreter qualifications

At its website, Procom provides a list of its interpreters, with their pictures and brief personal information about their gender, occupation, and interests (Procom, 2021e). Interpreters are required to have matura (high school graduation), vocational qualification or the equivalent, along with resilience, good concentration, a good memory, and a broad general education. While formal training in sign language interpretation does not seem to be a requirement for employment with Procom, the organization provides a link to where job applicants can obtain more information about such training. Interpreters are required to abide by a code of ethics, which stipulates no participation in the topic of conversation, confidentiality, and neutral behaviour (Procom, 2021d).

User choice of interpreters

While the Procom order form for interpreters does allow service requesters to specify the interpreters they would prefer or do not want for an assignment (Procom 2021e), Procom does not provide information about whether people using the VRS can chose (or not use) a particular interpreter for video calls.

Cost to the user

Some services forming part of the universal service are subject to ceiling prices. From 1 January 2018, the maximum amounts (excluding VAT) are as follows:

- Connections: putting a connection into service: CHF 40.00 (a one-off charge) [X 1.45 = CAD $58];
- Public telephone service with one telephone number and one or two entries in the subscriber directory (including connection): CHF 23.45 per month;
- Public telephone service with three telephone numbers (including the connection): CHF 16.55 per month in addition to the amount charged for the public telephone service with one telephone number (CHF 23.45 per month);
- Internet access service (including the connection): CHF 45 per month;
- Public telephone service with one telephone number and one or two entries in the subscriber directory and internet access service (including the connection): CHF 55 per month; and
- Calls (billed by the second and rounded up to the next 10 centimes):
    - CHF 0.075 per minute for national calls on the fixed network.
    - CHF 0.034 per minute for transcription services for people with hearing impairments [CAD 0.05 per minute]. (OFCOM, 2020a).

Emergency calling

Service providers are not regulated to provide emergency service to people with disabilities in Switzerland. However, Procom has put in place a voice service with a specific and prioritized phone number at which the operator will see a blinking red incoming call, and a voice or message service through an emergency button for Android and iOS applications (BEREC, 2018). Procom points out at its website that, outside of regular video interpreter service hours, "…we cannot guarantee that an interpreter can always be found!" and provides information about Procom's text, which can be used at any time to report emergencies (Procom, 2021f).

Functionality

Platform

Procom uses the MMX platform developed by nWise. MMX is a Full Conversation platform designed for use on computer browsers, smartphones

and tablets. MMX is capable of facilitating simultaneous communication by video, real-time text and audio for people who are d/Deaf, hard of hearing, blind, and deafblind, and is adaptable for Braille display, screen magnification and screen readers. nWise promotes its apps as WAI and VCAG certified, designed to be as user friendly as possible, and "the most popular communication products in Europe for people with impaired hearing and those who are deaf or deafblind" (nWise, 2020c).

Technology required

The myMMX tc Procom apps and user manuals can be downloaded free of charge for iPhone or iPad (iOS 9 or higher), mobile phones or tablets with the Android operating system (version 6 or higher), and for browsers on computers (Windows 7 or higher, and CPU Intel i3 or better) (Procom, 2021b). Information on using and configuring myMMX is available in an Adobe Acrobat PDF file (Procom, 2020b) and in International Sign Language (Procom, 2021g). Video relay (switching) is also available without registration or Procom apps (Procom, n.d.-a).

Regulations and funding

Art. 92 of the Swiss Federal Constitution requires that the Confederation ensure an adequate universal telecommunications service is provided at affordable prices in all regions of the country (OFCOM, 2020b).

The *Telecommunications Act (TCA)* provides for the universal service and specifies that the licensee responsible for delivering the service is to provide one or more of services listed in the Act. Art. 16 specifies that, among other services listed,

> the universal service must be ensured in such a way that persons with disabilities are offered comparable terms and conditions with respect to quality, quantity and prices as those without disabilities. In this respect the universal service licensee must ensure in particular that:
> a. public call boxes meet the requirements of the sensory impaired and those with reduced mobility;
> b. a relay service is provided for the hearing impaired; and
> c. a directory enquiry and operator service is provided for the visually impaired. (Federal Assembly of the Swiss Confederation, 2018, p. 9)

The *Ordinance on Telecommunications Services (OTS)* further states, in (Section 2) Art. 15 pertaining to obligations of the Universal Service Licensee, that the universal service comprises services listed in the Article, including:

> d.1 an internet access service with a guaranteed transmission rate of 10/1 Mbit/s;
> e. the following services for the hearing impaired:
> 1. provision of a transcription service for the hearing impaired including emergency calls and an SMS relay service, both of which are available round the clock; and
> 2. provision of an operator service by video telephony that is available from Monday to Friday from 8am to 9pm, and on Saturday, Sunday and on public holidays recognized by federal law from 10am to 5pm. (The Swiss Federal Council, 2007).

In 2019, the Federal Council increased the minimum transmission bitrate to 10/1 Mbit/s as of 1st January 2020 (OFCOM, 2020b).

Art. 33 of the *OTS* on "Services for the hearing or visually impaired or persons with limited mobility", further specifies that

> 1. The services for the hearing or visually impaired and persons with limited mobility must be free of charge, regardless of whether they are provided by providers of services of the universal service themselves or via access to third-party services.
> 2. The connection charges charged to the hearing or visually impaired and persons with limited mobility within the framework of these services shall not be discriminatory in comparison with the standard tariffs. (OFCOM, 2021).

Responsibility for Switzerland's universal service for telecommunications falls under the Switzerland Federal Office of Communications (OFCOM). As stated at OFCOM's website, the purpose of the universal service is to

> … guarantee that a basic telecommunications services offering is made available to all categories of the population and in all the regions of the country. These services must be affordable, reliable and must be of a certain quality. The universal service includes the public telephone service, broadband internet connections and the provision of special services for the disabled. (OFCOM, 2021).

The universal service licensee is required to analyze and report on the quality of the universal service it provides. Technical and administrative targets for quality are regulated and are reflected in the licensee's annual report for OFCOM. The technical and administrative regulations are based on Art. 17(1) of the *Telecommunications Act (TCA)* and on Art. 21(2) of the *Ordinance on Telecommunications Services (OTS).* Technical and administrative regulations for universal

service interfaces at the network termination point (NTP) are based on Art. 62(2) of the *TCA* and Art. 16(5) of the *OTS.* The regulations apply only to the universal telecommunications services the licensee provides, as well as to the format and precision of the licensee's report to OFCOM on service quality (OFCOM, 2020a).

Individual payments for video relay are covered under some provisions of Switzerland's Disability Insurance scheme, or IV (for Invalidenversicherung in German) (Procom, 2020d).

All the above regulatory and funding provisions are buttressed by the *Disability Discrimination Act* or *DDA*, also known as the BehiG in German (for Behindertengleichstellungsgesetz) (Federal Assembly of the Swiss Confederation, 2002). It is beyond the scope of the present paper to provide a detailed analysis of the DDA's provisions. However, it does single out prohibited actions and inactions by public and private entities which render it "impossible or only possible with difficulty for persons with disabilities to obtain a service" (Art. 4). The Act aims to prevent, reduce or eliminate discrimination against people with disabilities (Art. 1(a)) and "lays down general conditions that make it easier for people with disabilities to participate in society and in particular to cultivate social contacts independently, and to have access to basic and advanced education and training and to employment" (Art. 1(b)). The *DDA* specifically prohibits the discriminatory organization of courses and examinations in general and advanced education and training that create difficulties people with disabilities in using aids or obtaining necessary assistance specific needs of persons with disabilities (Art. 5). Concerning people "with speech, hearing or visual disabilities" in particular (Art. 14), the Federal Council is required to issue technical regulations to ensure accessible online services provided by public authorities, and may issue regulations that pertain to private entities (14(2)). The Confederation may also "support cantonal measures to promote the academic and professional education and training of persons with speech or hearing disabilities in sign and spoken language and to promote the language skills of persons with visual disabilities" (14(3.a) and "support non-profit organisations and institutions of national importance that address the problems of language and understanding faced by persons with speech, hearing or visual disabilities" (14(3.b). Article 20(3) requires the Cantons to "ensure that that children and young people with perceptual or articulation disorders and persons close to them can learn a communication technique appropriate for the disability." People with disabilities are accorded a right to appeal against rulings by the federal authorities on the granting of licences

under Article 14 of the *Telecommunications Act* (Art. 9(d)). If none of these provisions amount to a clear a "right" to video relayed interpretation for people who are d/Deaf or hard of hearing, the provisions create ample room for the Federal Council to make VRS available without being open to the charge of unequal treatment or reverse discrimination under Art. 1(8) of the *Constitution* (*DDA,* Art. 5(2)).

While the Swiss German, French and Italian sign languages are used in Switzerland, and there are also five regional sign language dialects, sign languages are not yet legally recognized as official languages in Switzerland (Guggenbühler, 2020).

Procom's interpreting service is financed in part by operating contributions from the Federal Social Insurance Office. Interpreting work is also financed through individual IV (public Disability Insurance) orders for training, further education, and the workplace. Some assignments are charged directly to the ordering party (e.g., courts, police, authorities, event organizers). The monthly earnings of interpreters depend on their assignments (Procom, 2021d). We were unable to obtain information on the amount Swisscom pays Procom to deliver video relay services. This information may be in Procom's Annual Report for 2019 but was not readily identifiable in its financial statement and balance sheet (see Procom, 2020).

Swisscom (the universal service licensee) is 51% Confederation-owned and generates around 80% of its net revenue and operating income from business operations in Switzerland. To the end of the 3rd Quarter 2020 about 19,000 employees generated sales of CHF 8,201 million (Swisscom, 2021b). To date, Swisscom has not applied to the state for further financial compensation for providing the universal service. However, if the universal service were to involve costs which the licensee cannot cover despite efficient management, the licensee may request financial compensation. If awarded, the compensation would be financed by levying a charge on all telecommunications service providers with a defined turnover (revenue). The amount of financial compensation would be split between the telecom operators on a pro rata basis, according to their turnover in telecommunications services (OFCOM, 2020b).

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Appendix: Summary Table of Findings

Country	Providers	Services	Features	Functionality	Costs and Funding	Regulations
Canada	Canadian Administrator of Video Relay Service (CAV), Inc.	• 24/7, 365 days a year • ASL, LSQ, English & French interpretation • Primary, business and Deaf youth accounts available • Raise awareness of VRS & help customers use the app	• Voice Carry Over • Emergency 911 calls go directly to first place in the call centre's queue and answered with top priority • Users register and download a free app available & compatible with Blynclights • Video mail • Caller ID & Caller ID hide	• Windows, Mac, iPhone and Android devices. Recommended devices for VRS include Windows PCs and tablets (Windows 10 and above); Apple computers (version 10.13 and above); Android tablets (5.0 Lollipop and above); iPads (iOS10 and above); Android phones (5.0 Lollipop and above); and iPhones (iOS10 and above)	• Funded nationally by telecommunications service providers via the National Contribution Fund. • $30 million annual funding cap for all VRS-related costs. • Centralized funding & administration model	• *Regulatory authority:* Canadian Radio-television and Telecommunications Commission • Considered a basic telecommunications service that enables persons who are Deaf, deafened, hard of hearing or have a speech disability who use sign languages to communicate with voice telephone users.
United States	Convo Relay (Convo Communications, LLC)	• 24/7, 365 days a year • ASL, English and Spanish • Customized work bundles will work with businesses, professionals, organizations, & schools • Interpreters and connections to the Deaf community through access to resources for Deaf-owned businesses, Deaf professionals, and other organizations for the Deaf	• Priority for 911 emergency calls • Deaf-owned company • Announce VRS • Voice Carry Over • Customizable settings	• 100% app-based (updated automatically); • Sign-Centric Design; • Toll-free number to use Convo interpreters. • For Android 5 or later; iOS 11 or later; macOS High Sierra or later; Windows 7 or later	• Per-minute rate for VRS is not assessed to the caller. VRS providers are compensated for their costs from the Interstate Telecommuncations Relay Service (TRS) Fund, which the FCC oversees • TRS Fund is a revolving fund financed through contributions by providers of interstate telecommunications services	• *Regulatory authority:* Federal Communications Commission (FCC) • 80% of calls must be answered within 120 seconds. • Service must be offered 24/7 • VRS providers must provide their users with a 10-digit telephone number, so users will be able to make 911 calls and have their location data routed to the appropriate emergency agency. • Preferential treatment of calls is prohibited. • VRS providers must handle calls in the order in which they are received which means that they cannot selectively answer calls from
	Purple Communications (A Division of ZP Better Together, LLC)	• 24/7, 365 days a year • ASL, English and Spanish • Employs over 300 Deaf employees	• Priority for 911 emergency calls • VRI • Voice Carry Over • CART Services • POP integration • 3-way calling	• SIVO app • For PC: Windows 7/8/10 with DirectX 9.0c or higher. For Mac: OS X 10.10 Yosemite or higher. Recommended CPU for PCs: Intel® Core™ 2 Duo class, 2.33 GHz or faster. Ideal CPU for PCs: Intel®		

Country	Providers	Services	Features	Functionality	Costs and Funding	Regulations
			• Chat function • Call waiting • Online booking	Core™ 2 Quad class, 2.66 GHz or faster Recommended CPU for Macs: Core i5 or Xeon, 2.0 GHz or faster Memory and disk: 2 GB RAM and 250 Mb hard disk space Must have administrator rights to your computer		certain consumers or certain locations. • Equipment distributed by a certified VRS provider must be interoperable with the technology of other certified VRS providers. •
	ZVRS (A Division of ZP Better Together, LLC)	• 24/7, 365 days a year • ASL, English and Spanish • Enterprise solutions including accessible videoconferencing technology • VRI	• Priority for 911 emergency calls • Bluetooth flasher • Call Alert Package including alerts via email and/or text. • Calls can be placed to more than 45 countries. • Voice Carry Over • Contacts, • Video Mail, • Private Keypad, • Caller ID, • Digital Whiteboard, • Address Book Importer, • Incoming Call Block, • Change Ring Time, • 3-Way Call, • TVM - Conferencing Solution	• Sivo app works with all ZVRS and Purple apps (iOS and Android) and devices such as OneVP, P70, and Z70 • From a ZVRS • phone, dial the number of the hearing person and automatically connect to a video interpreter from Z. • Can still make calls using our ZVRS interpreters from any videophone.		
	Sorenson	• 24/7, 365 days a year • ASL, English and Spanish • Founded on the premise that access to communication is a fundamental right for all people.	• Priority for 911 emergency calls • Multi-colour LightRing on ntouch VP2 videophone. • N11 dialing. • VRS announce. • Call waiting. • Call transfer. • Group call. • Don't accept anonymous calls. • Signmail	• Wavello app • Through a high-speed internet connection, Deaf individuals using a videophone, computer or mobile device, place SVRS calls to hearing people, who receive the calls on a standard phone. Calls are routed through an interpreting center, where an interpreter, fluent in ASL and spoken English or Spanish, appears on the device. The Deaf caller signs the message to the		

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			• Contact photos. • Push notifications. • Video centre • Voice Carry Over. • myRumble. • Bluetooth compatibility.	interpreter, and the interpreter relays the conversation between the two parties.		
	Sprint (Internet and Telecommunications Relay Service Provider for the Federal Government)	• Hours of service are Mondays from 7 AM - 11:59 PM ET; Tuesday through Thursday: 24 hours; Friday: 12 AM - 11 PM ET; Saturday and Sunday: Closed. The service is also provided on Federal holidays excluding those Federal holidays occurring on weekends. • Available in ASL, English and Spanish • Provides an array of telephonically based and internet-based services for the government. VRS is provided for federal employees	• Voice Carry-Over. • Dialing instructions	• High-speed internet connection, WiFi or LTE is required. • Computer with built-in webcam, videophone or external webcam, and some brand of VRS software or app.		
	ACE (Accessible Communications for Everyone), an FCC initiative	• FCC initiative seeking to break down barriers to communications services through collaborative efforts with software developers, engineers, technologists, and organizations in the disabilities community.	• The open source video prototype developed through the FCC, called ACE Direct, can enable businesses and government entities to communicate directly with their customers, constituents, and beneficiaries using ASL over broadband facilities. This	• CE Direct Utilizes Open Source Technology • Asterisk Open Source PBX • Node.js • Angular.js • Neustar iTRS • Linux/MySQL/PHP Server Stacks • Real Time Text Messaging • Web Sockets		

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		One of its primary purposes is to ensure that people who rely on telecommunications relay services (TRS), including VRS, have access to communications services that facilitate their ability to reach family, friends, businesses, and government services through seamless communications across TRS providers.	ensures greater accuracy, privacy, and efficiency for the individuals making calls and for the recipients of such calls. • * Direct Video Calling (DVC) is one-to-one video communication provided by a call center to allow conversations to occur between two callers using American Sign Language (ASL).	• Apache ServiceMix Enterprise Service Broker • WebRTC		
	Global VRS	• 24/7, 365 days a year • ASL, English and Spanish	• Priority for 911 emergency calls	• Users must register and complete a one-to-one interview before service is activated		
	Malka Communications Group, Inc.	• 24/7, 365 days a year • ASL, English and Spanish • Promotes awareness & inclusion of Deaf and hard of hearing communities • VRI • Visual Communication System • In-person interpreting • Captioning	• Voice Carry Over • Visual Communication System (in development)	• Not available		
Australia	National Relay Service (NRS) via Concentrix	• Hours of service are 7am to 6pm (ET in Australia); closed on public holidays • Calls must be pre-booked through a Relay Officer.	• NRS Chat (i.e., Internet Relay) • SMS Relay • SMS Relay (Text and Listen) • Voice Relay • Voice Carry Over (i.e., NRS Captions)	• NRS can be accessed at a dedicated number directly through Skype from the user's own device or through the NRS app, which routes the call through Skype	• No cost to the user • Funding is gathered through levies on telecommunications companies with eligible revenue of more than $25 million, and certain other entities. The Australian Communications and Media	• *Legislative authority: Telecommunications (Consumer Protection and Service Standards) Act, 1999* • VRS must be "reasonably accessible" to all persons in Australia who are deaf; have

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		• Auslan and English	• no queue priority for VRS calls to emergency services; NRS encourages people to use an alternative NRS call option in emergency situations		Authority (ACMA) assesses company revenues and sets levies according to the *Telecommunications (Consumer Protections and Service Standards)*	a hearing and/or speech impairment; and/or communicate in Auslan wherever they reside or carry on business; • a software application must be reasonably available to assist all users of NRS in communication with emergency call services
New Zealand	New Zealand Relay (NZ Relay) via Concentrix	• Limited hours Monday to Friday and weekends; unavailable after 8pm local time; closed on public holidays (difficult to determine exact hours of service)	• Mobile Text Relay • Internet Relay • TTY to Voice • CapTel NZ (phone & web-based captioning service). • Voice Carry-Over • Speech to Speech • Hearing Carry-Over • Speech to Speech (Video-Assisted) • VRI • VIs are qualified with a diploma in New Zealand Sign Language/English Interpreting as a minimum and are members of the Sign Language Interpreters Association of New Zealand • NZ Relay advises against using VRS for emergency calling (advised to call Deaf emergency call centre)	• NZ Relay uses Skype as its operating platform. • NZ Relay app to be launched in Feb. 2021 and compatible with tablets and iPads with iOS version 12 or greater; Android version 7 or greater.	• No cost to the user • Funded by the New Zealand Government through the Ministry of Business, Innovation and Employment (MBIE). • Commerce Commission New Zealand determines the total cost to the Government to provide Telecommunications Relay Service each year	• *Legislative authority: Telecommunication Act 2001* • NZ Relay operated by Ministry of Business Innovation and Employment, with the participation of the Accident Compensation Corporation, Ministry of Education, Ministry of Health, and Ministry of Social Development. • telecommunications relay services are to be made available so that people who are deaf, hearing impaired, or speech impaired can communicate with other telephone users. Telecommunications service providers must comply with the terms of the telecommunications service obligations (TSO) instrument
France	Elioz	• 24/7, 365 days a year • For business & organizations to make their telephone & l	• Connects users with about 120 affiliated companies/organization in various sectors (e.g., mutual	• Available on all media such as smartphones, touch pads and desktop or laptop computers under any Android or iOS operating system	• Subscribing businesses / organizations pay subscription fee	• *Regulatory authority:* CNIL (French Data Protection Authority)

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		reception services accessible to people who are d/Deaf or hard of hearing • Langue de Signes Français (LSF), French Language Completed Spoken (LPC), and Text Transcription (Texte).	Insurance, banking, transport / travel, telecom, public body, energy, agribusiness, territorial community [for local governments]) • Interpreters are graduates in LSF interpretation and have on average more than 10 years of telephone relay experience. Relay operators receive compulsory training, renewed every 5 years.			• Since October 7, 2018, the French law for a Digital Republic requires companies with more than 250 million euros in turnover, and public services managed by the State, to bring telephone accessibility into conformity for deaf people and people with hearing impairments
	Tadeo-Acceo	• 24/7, 365 days a year • Aimed at meeting needs of business & public authorities to communicate with d/Deaf and hard of hearing individuals • French and Langue de Signes Français (LSF). Tadeo-Acceo also claims ability to facilitate communication between non-French speaking “hearing” people in more than 100 languages	• Tadeo’s directory includes 516 subscribing organizations. The contact information can be obtained from a single page with all the listings, or through a search function which filters the links according to 20 categories, some of which are the same as or similar to those in Elioz’s system. • Tadeo-Acceo recruits for qualified LSF interpreters. If hired, they will be provided up to two months of further training in work tools and the basics of video-interpretation, and over the course of a year will develop a gradual increase in competence in trinomial, then in pairs, on meetings	• Works on Windows, Android, iPhone, iPad and Mac operating systems	• Subscribing businesses / organizations pay subscription fee	
Germany	Tess Relay-Dienste	• Personal, professional, and business accounts	• Sign language interpreting service (TeSign)	• nWise MMX platform	• For individuals' private use, there is no monthly basic fee to use TeSign.	

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		are available 24/7, 365 days a year for private use; Monday to Thursday from 8 a.m. to 6 p.m. and on Fridays from 8 a.m. to 5 p.m. for professional use. • On national public holidays, Tess reserves the right to make the services available for professional use at limited times. • German spoken and sign language	• Written interpreting service (TeScript) • Voice Carry Over • Tess transfers emergency calls to emergency control centres free of charge nationwide. A Tess interpreter will translate the emergency call. The service is available to registered Tess users and to people who want to use Tess only for emergency calls. Tess points out that it has neither a legal nor a contractual obligation to receive and make emergency calls	• Users require MMX software, which Tess provides as a free download for people using Microsoft Windows need versions 7, 8.1 or 10. The MMX software is not usually compatible with the Mac operating system. However, it may in some cases be possible to use the MMX software on an Apple PC by installing the Windows operating system. • PCs with 2 GHz or more can generally be used for Tess Relay services. Sufficient RAM of at least 512 MB is usually required. Tess usually works with notebooks currently available on the market but requires installation of the MMX app for iOS or Android devices.	The cost of connecting to and using Tess TeSign for d/Deaf and hearing persons from the landline network is € 0.14 per minute. The price for calls from the cellular network is a maximum of € 0.42 per minute. • For professional use, the monthly Tess subscription fee is € 261.80 (and € 392.70 if bundled with TeScript). The cost of interpretation Tess for d/Deaf and hearing persons for professional calls is € 2.02 per minute. • Tess customers who use its services for professional purposes may be eligible for public financial support	• *Regulatory authority:* Federal Network Agency (BNetzA) is responsible for electricity, gas, telecommunications, post, and railways, and works within the department of the Federal Ministry of Economics • BNetzA determines hours of service • VRS users must pay a share of the costs of service. However, the law says that the operator service should be offered at an affordable price
	Telesign	• Serves d/Deaf individuals who work for employers or are self-employed, who can use the interpreting service and can request the purchase of technical equipment from their integration office as part of the work assistance mandated by Social Code IX • German spoken and sign language; English interpretation is available on request	• New TeleSign's interpreters are individually trained for three months by TeleSign's experienced interpreters and receive an offer for training once a year. All TeleSign interpreters must take part in a training course at least once every three years. • Will field calls to two emergency numbers. Instead of providing details, a link to the Tess website is shared for information on how calls to those numbers are handled	• TeleSign uses the Tess platform (nWise MMX) • People wishing to use TeleSign interpreters need either a PC or laptop with a webcam and the myMMX software (available as a free download), or a smartphone or tablet with the Tess app. The Internet connection should have an upload of at least 256 Kb per second. Other technological requirements are the same as for Tess.	• For individual use by one person, TeleSign's monthly basic fee is € 220 and calls are € 1.70 per minute • For multiple use by several people but not all at the same time, the monthly basic fee is € 900 and calls are again € 1.70 per minute, regardless of whether the caller is a d/Deaf or hearing person. • An alternative pricing package for multiple callers is € 350 for a monthly basic fee and calls charged at € 3.40 per minute. If the integration office pays for TeleSign, then the service may only be used for work. • TeleSign's cost for institutions is € 100 for an annual account plus € 3.40 per minute for calls.	

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					• The service is exempt from VAT.	
Sweden	Bildtelefoni.net	• 24/7, 365 days a year • Swedish and Svenskt Teckenspråk (SSL)	• VIs follow the Chamber of Deputies' guidance Good interpreting practice • Users can provide the interpreter any background information that may help in the interpretation of the call, and provides tips on introductions, who to address in the calls, minimizing background noise and other distractions, and ending calls. • Deafblind persons can use sign language to communicate with the interpreter and can let the interpreter know if they would prefer the interpreter to use sign language or text when responding. The interpreter can adapt their interpretation to the individual's needs. • Emergency calling in prioritized.	• nWise MMX platform uses free app from Bildtelefoni.net • Web app for the user's computer browser, and mobile apps for Apple iOS (iPhone and iPad) and Android devices. The web app is designed for use with the Firefox, Chrome, Safari (Mac) and Internet Explorer (PC) browsers • Communicants can type and receive text during their call in Bildtelefoni.net's mobile apps for Android and iOS	• No cost to the user except for callers for voice calls from abroad to Bildtelefoni.net's 0771 number	• *Regulatory authority:* Swedish Post and Telecom Authority (PTS) • PTS is also responsible for ensuring the availability of call transfer services so everyone in Sweden can call each other, regardless of functional ability. • To secure interoperability of models and brands that are distributed in Sweden, Videophones that are eligible for provision through public authorities must be compatible with other models.
United Kingdom	InterpretersLive!	• 8am to midnight 7 days a week (interpreters can be booked within 30 minutes outside these hours) • Caters mainly to businesses and other organizations that want to use VRS to	• Provider of interpreting, training and other language services for businesses, individuals, medical and legal providers • VRI	• nWise MMX platform • A free app is available for the mobile devices. An app is not required for accessing the services through a browser from a PC or Mac. • Minimum requirement for video calls is 192kbps. The service is accessible via a Windows Desktop and Apple Mac supported devices.	• Subscribing businesses / organizations pay subscription fee.	• Unregulated • *Equality Act (2010),* and the *Accessible Information Standard (2016)* impose relevant obligations on some businesses and on healthcare, social service, and other organizations.

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		communicate with d/Deaf individuals. • Registered users can call organizations that are also registered with the service. • Deaf Awareness training • British Sign Language (BSL), ASL, English		• Compatible with the Google Chrome (version 65 and later), Firefox (version 55 and later) and Opera (version 50 and later) browsers. Users of Safari 9 or Internet Explorer 11 must download a plugin. • Through an iPad/iphone/android phone requires downloading a free compatible app. • For businesses, on-demand BSL Interpreters are available via Skype or StarLeaf (online provider of video conferencing and secure messaging).		
	InterpreterNow	• 8am to 6pm, 7 days a week for individuals and, with prior arrangement, up to midnight. • Businesses services available 8am to midnight, 7 days a week, 365 days a year • Registered users can call organizations that are also registered with the service • BSL, English	• Social enterprise that invests its profits back into the deaf community • VRI • VIs include at least a minimum level of training and qualification based on the Codes of Conduct of the Scottish Association of Sign Language Interpreters (SASLI) and/or the National Register of Communication Professionals working with Deaf and Deafblind people (NRCPD).	• nWise MMX platform • If provided login information before scheduled VRS/VRI sessions, InterpreterNow can accommodate other platforms such as Microsoft Teams, Zoom, WebEx, etc. • Accessed on a computer, smartphone or tablet. • Users of a PC or Mac login through the InterpretersNow website to make a call. • Users of smartphones or tablets download and use the free InterpreterNow app, which is available for Android and Apple devices.	• Subscribing businesses / organizations pay subscription fee.	•
	SignLive	• 24/7, 365 days a year • Offers a Community Directory of subscribing organizations that d/Deaf people can call for free • BSL, English	• Established by entrepreneur from Deaf community • VRI	• Accessed via web browser, iOS or Android app and can connect through 3G, 4G and Wi-Fi. • Accessed on a PC, laptop, Mac, tablet, iPhone or Android smartphone. The services can be accessed through a PC or Mac by	• Subscribing businesses / organizations pay subscription fee. • Individuals living in England or Wales may qualify for financial assistance for personal calls through the Direct Payments program.	•

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				Google Chrome, Mozilla Firefox, or Internet Explorer (versions 9 – 11). • A free app is available for download for iPhone or iPad (iOS 9 or above) and for Android devices (version 5.0 or above).	• For work-related service, the individual may qualify for financial assistance through the Access to Work program, (Government scheme to support Deaf people and others with disabilities at work) • SignLive provides free advocacy support for individuals who experience difficulties obtaining Access to Work funding.	
	SignVideo	• 8am to 8pm Monday to Friday, and Saturday from 8am to 1pm. Closed on Bank Holidays • Business services available 8am to 6pm Monday to Friday • Serves government, NHS, councils, UK banks, telecommunications providers, helplines, and other organizations. • Raises awareness among partners and alliances about the BSL community and its core values to promote direct, positive interactions and relationships. • BSL, English	• Predominantly deaf-led organization • VRI • VIs are fully registered, qualified and certified (NRCPD or equivalent), have native or bilingual proficiency in BSL and English, at least 5-7 years of training before joining the organization, at least 5 years community interpreting experience, a current DBS Enhanced Disclosure certificate, Professional Indemnity Insurance (PII), have signed a Non-Disclosure Agreement at the start of their employment, and are required to complete 24 hours of continuing professional development annually	• VTCSecure's SOLVES • accessed by PC, Mac, tablet or smartphone on 3G/4G/5G networks	• Individuals may be able to qualify for financial assistance for its services through Access to Work and Direct Payments. • For individuals' use at work or for personal reasons, the cost of service will depend on the amount of time their service package allows for. • People receiving Access to Work or Direct Payments funding negotiate the amount of time (and cost) they are eligible for.	•
Finland	Kela	• Hours of service are unclear. • Government department responsible	• One year trial of emergency calling may be available via VRI	• nWise MMX platform • Remote interpreting through Kela can be used on a smartphone, tablet or computer. People who do not	• In early 2020, the cost of the interpretation service for people with disabilities was € 19.3 million, down from € 24.0 million the same	• Persons with hearing and speech impairments have the right guaranteed by law (*Act on Interpretation Services for*

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		for interpreter services & national social security programs • VRI provider (DOES NOT PROVIDE VRS) • Finnish sign language, spoken Finnish and Swedish. In certain situations, spoken English can be used.		have a suitable device can order one from Kela. The device requires: a microphone, speakers or headphones, and camcorder; Safari or Google Chrome (version 64 and later); and a high-speed (1,200 kbit / s) broadband connection to display video. The remote service can also be used on Apple devices running iOS	time in the previous year. Kela's interpreting service for people with disabilities is financed entirely by the state through general taxation.	*Disabled Persons)* to have an Internet connection at their permanent residence, which can be used for video calling and remote interpretation services. • Legislation provides that remote interpretation may be provided "if possible and justified".
Switzerland	Procom	• Hours of service varies by region. • Appears available on-demand. • Supports French, German, & Italian; & French, German, & Italian sign languages.	• Text & SMS relay also available. • Relatively minimal interpreter qualifications • Free app available with registration. • Provides directory of names and contact numbers for about 340 videophone users. • Does not guarantee service for emergency calls; encourages text to report emergencies. • Users can indicate interpreter preferences.	• MMX platform by nWise (WAI and VCAG certified) • iPhone or iPad (iOS 9 or higher), mobile phones or tablets with the Android operating system (version 6 or higher), and for browsers on computers (Windows 7 or higher, and CPU Intel i3 or better).	• Possible cost to user is unclear. • Financed by Federal Social Insurance Office, public Disability Insurance orders for training, further education, and the workplace. Some assignments are charged directly to the ordering party (e.g., courts, police, authorities, event organizers). • Individual VRS payments covered under some provisions of Switzerland's Disability Insurance scheme	• *Regulatory authority:* Federal Communications Commission; Federal Office of Communications. • Constitution requires universal telecommunications service provided at affordable prices in all regions of the country. • Regulatory and funding provisions are buttressed by the *Disability Discrimination Act*