SCALEABLE TELE SUPPORT FOR ENHANCING SERVICE DELIVERY OF REHABILITATION TECHNOLOGY

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Abstract: This paper outlines a tele support system which is able to provide remote support to disabled users of PC based Assistive Technologies (AT). The system is scaleable in a wide range and allows integration of the tele support feature into existing AT devices according to the interface definition developed in the EU funded RESORT project. A software prototype was implemented and tested. For evaluation purpose a part time service centre was established at Vienna University of Technology which delivered remote support to disabled users located in Vienna and the eastern part of Austria. More than 50 tele support sessions were carried out successfully in a real life setting. As a network connection cable and ADSL was used.

Introduction and Aim

Nowadays a large variety of PC-based assistive devices for persons with disabilities are available. Despite this remarkable progress in rehabilitation technology the actual usage of such devices much too often is far away from the optimum. Partly this is due to a lack of continuous support. When disabled users are receiving a powerful and actually needed assistive device they are often *not* receiving sufficient accompanying support for tailoring and optimising the new device to the individual needs. The research at hand has its focus on development and evaluation of a tele support system which allows providing this missing support in a cost effective way from remote.

Methods

Based on previous work [17] the prototype of a tele support system has been implemented. Important features of this system are the Remote Control Interfaces (RCI) which allow easy integration into existing PC-based rehabilitation technology (RT) software products (see Fig.1).

The user interface of the remote support system is scaleable and thus can be tailored to be very easily be handled by a disabled user and/or his/her carer (see Fig.2). Privacy issues can be configured individually ensuring that only predefined parts of the user's PC will be accessible for the service centre remotely. The above mentioned RCI allows a synchronisation of RT programs even for single switch users over narrow bandwidth channels. The prototype uses existing sub systems for video conferencing (H.323) and data sharing (T.120) but provides a unique scaleable user interface which hides these sub systems from the user. Thus a consistent, intuitive interface is provided which is of great importance for the target user groups as it helps avoiding getting confused from too many different user interfaces from different software on the screen [8].

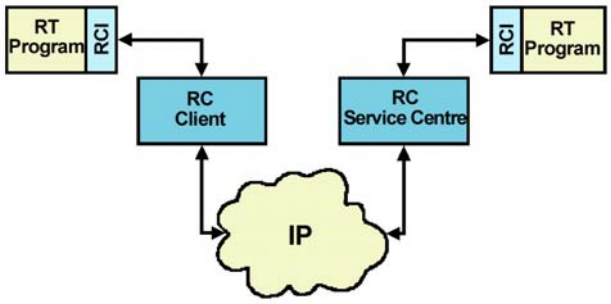

Figure 1: Structure of the distributed remote support system with the Remote Control Interface (RCI).

Functionality of the Client Software

The user interface software at the client side is scaleable in order to be tailored to the needs of the users it is also possible to integrate the remote support features via the RCI definition into the user interface of an existing AT device. A standard version of the user interface contains:

Simple *intuitive graphical user interface* with two buttons for calling the service centre and for terminating the current tele support session.

Selection of service centre which the user wants to make a service request call to.

Graphical *Indicators* to show the current status (active / not active) of video, audio and chat channel; indication of called service centre.

Figure 2: Tele Support Client

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Functionality of the Service Centre Software

The software at the service centre side is more complex. It contains the following main controls:

Communication: Allows switching on/off the video channel and the text (chat) channel.

Cooperation: Provided that a tele support connection has already been established a *student teacher mode* can be switched on/off. When this mode has been activated, it can be decided if the client or the service centre will take over the role of the teacher.

Sharing: This feature allows making visible an application which is actually running on the disabled user's PC for the operator who sitting at the service centre PC. All "shareable" applications are shown in a list and can be selected by the operator.

Figure 3: Service Centre: Control of video and chat channel.

Figure 4: Service Centre – Remote Applications

Remote Applications: All applications installed at the client PC which are equipped with a RESORT interface are listed here. Version information can be displayed; launching and stopping of these applications are possible with the tele support system (provided that the application supports the RESORT interface specification).

Local Applications: Applications which are installed at the service centre and are supporting the RESORT interface are listed here. Version information can be displayed; launching and stopping of these applications are possible with the tele support system (provided that the application supports the RESORT interface specification).

Transfer: When a tele support connection is active, files can be transferred from centre to the client and vice versa.

About: Shows the version number of the tele support software and allows activating an automatic update process for the tele support software.

Evaluation

For evaluation purpose several test sites have been set up in Vienna and Lower Austria. Private persons with a disability and institutions like a school and a hospital have been provided with some RT programs and with the prototype tele support system.

The base of the remote support system is a properly working IP oriented network. The client PCs of some of the disabled users were connected via broadband (ADSL, cable) to the internet. Alternatively, connections can be built up via ISDN channels from the client to the dial in of the university or to the dial in of the service centre (Fig.5). An advantage of the ISDN is that the bandwidth is guaranteed.

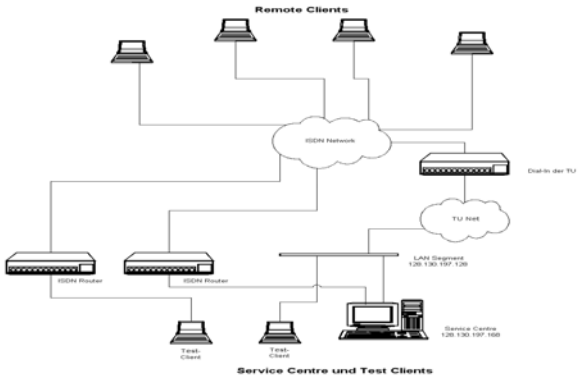

Figure 5: Network structure with remote clients and local clients at TU Vienna using ISDN

Structure of a Tele Support Session

The tele support sessions carried out during the evaluation phase have had the following rough structure:

Welcome

Small talk (also useful to verify the quality of the audio connection)

Arrangement of the remote support activity which is requested and shall be carried out during the session (e.g. training session, trouble shooting, upgrade of software version).

Carrying out of the tele support activity which was negotiated in previous phase

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Feedback and mutual agreement regarding the level of success this support session had had from point of view of the disabled user and of that of the operator (to what degree could the job be completed successfully).

Arrangement of a *date and a time for the next* planned tele support session

Farewell

Documentation of the Support Sessions

After completion of the tele support session a protocol was written by the operator. Additionally, the tele support software is generating a log file. This log file contains data regarding:

Date and time of establishing the tele support connection

Name of the client PC

Time of disconnecting the tele support channel

Time stamp of *dedicated actions* of the user (e.g. activation of the chat channel, file transfer, remote launch of an application

Technical error logging

As far as possible a questionnaire will be filled by the participants of the evaluation or an interview will be carried out. Data triangulation will be done in order to correlate the different data sources (users' opinion, operator's statement, data from log files, etc), to check consistency and to document the findings.

Figure 6: Tele support session for the EMU predictive typing assistive technology software product

First Results

Preliminary analyse of the data collected from evaluation shows that the tele support prototype is working stable and is able to fulfil its tasks - to provide remote continuous support especially in the weeks directly after the installation of a new assistive device. More than 50 tele support sessions were carried out. Most of them were successfully to a high degree. Detailed evaluation is currently being done.

The EU funded research project "FRR - Friendly Rest Room" (QLRT-2001-00458, 01/2002-03/2005) developed and evaluated prototypes of an innovative toilet which are able to adapt to the different needs of old people and persons with functional limitations. In the framework of the evaluation phase of the FRR project one of the toilet prototypes which also was equipped with a control PC was installed at a toilet room in a day care centre for MS patients in Vienna [18]. This toilet prototype was evaluated by the clients and the nurses of the day care centre. This offered a perfect possibility to evaluated the tele support software in this setting. Thus, the control and monitoring PC of the toilet prototype was also equipped with a version of the tele support software. Between December 2004 and March 2005 the tele support software was used to remotely maintain the toilet PC.

In the morning of each working day the tele support software was used to transfer the log data from the toilet system to the laboratory. The tele support system worked stable and met all expectations. It could contribute to the successful completion of the toilet field trial.

Conclusions

The prototype is stable and it actually can contribute to the improvement of service delivery process. The detailed final data from the different remote test sites are being analysed for publication end of 2005.

More information including an evaluation version is to be found on http://www.fortec.tuwien.ac.at/aia

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