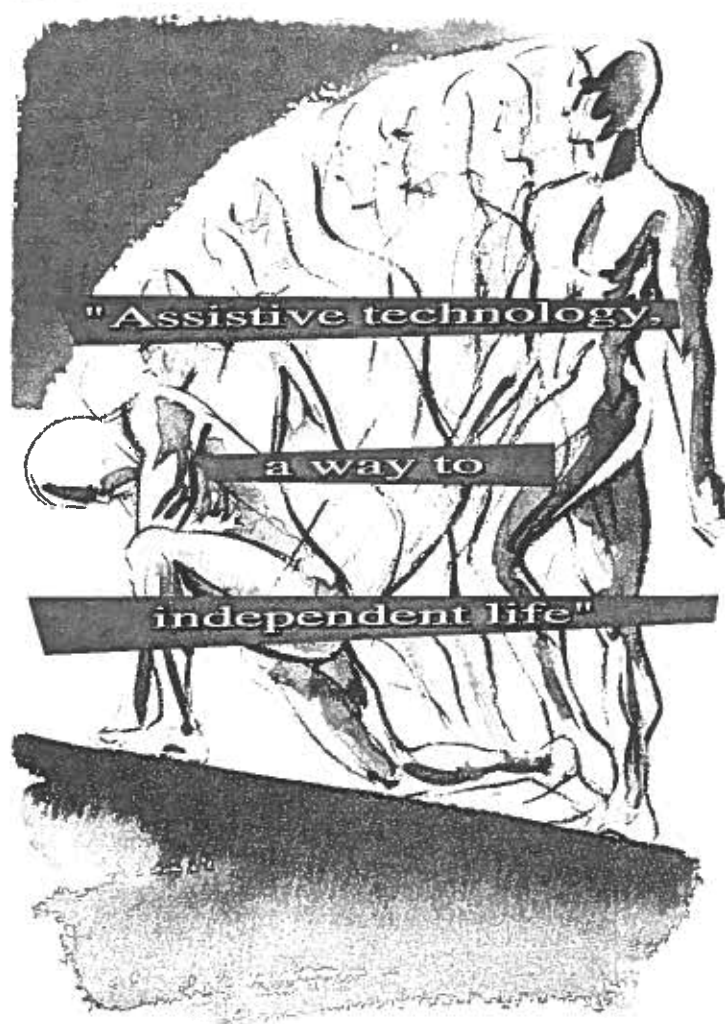




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Lisbon, 10-13 October 1995

Conference Centre of Caixa Geral de Depósitos

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PROCEEDINGS

# TELEPHONES AND TEXT COMMUNICATION: IS DESIGN-FOR-ALL POSSIBLE?

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## ABSTRACT

Text telephones enable persons with hearing or speech impairments to communicate via the common telephone network. Despite its late arrival (1960s), and although all the base technologies employed have reached a high degree of maturity, text communication has not yet been able to overcome some major problems, such as incompatible protocols, varying charging schemes, restricted access to relay services, etc. This paper introduces the main aspects of text telephones and relay services, discusses the relationship between user needs and design-for-all issues, makes a brief presentation of the current state in this field, and finally highlights the main aspects that will lead to a uniform text communication system.

## INTRODUCTION

Text telephones were initially developed in response to the needs expressed by deaf users and provide text communication facilities through a keyboard and display (in addition to voice telephony). Text telephones started in the US in the 1960s [1], initially based on obsolete TTY (teletypewriter) technology, also known as TDDs (telecommunication devices for the deaf), providing communication facilities similar to those of a telex machine. The development of dedicated equipment has taken place over the years and it is now common to find text telephone designs such as the one illustrated in figure 1.

A major requirement to allow equal access is the existence of a relay service, where an operator connects text telephone users to voice telephone users [2]. Regular relay services started to be available in the early 1970s, but to this day the services provided still vary widely from country to country [3,4].

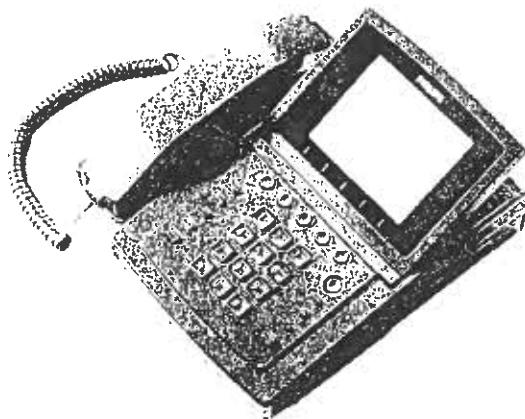


Fig. 1: A modern text telephone.

Among other initiatives in this area, the European projects COST 219 (Future telecommunications and teleinformatics facilities for disabled people) and COST 220 (Communication protocols and user interfaces for keyboard and display equipment intended for telecommunications used by disabled people) include nearly 20 signatory countries and have been working in collecting information and starting new projects where an opportunity for better access is identified. As members of the COST 220 project, the authors will in this paper present a summary of the current situation of text telephones in Europe and present actions for improvement in this field.

## USER NEEDS AND DESIGN-FOR-ALL

As in many other areas of assistive technologies, accessible cost to a particular solution will only be possible when the same products / technologies developed for the wide consumer electronics market are used to meet the requirements of people with special needs. Universal access through this design-for-all philosophy is however not always possible, leading to the need for a careful analysis of the relationship between specific

user needs and its acceptability by the general consumer market. A summary of the main user needs is presented in the following paragraphs [5]:

1. A dialogue established through text telephones should be similar to a voice dialogue, namely in terms of communication delay and richness of expressions. Any combination of voice and text communication should be possible.
2. A call must be possible regardless of technical discrepancies between text telephones, which should not be dealt with, or even perceived, by the users. Text telephone operation must be kept nearly as simple as the common voice telephony communication.
3. The range of services provided should include emergency services, relay services and information services.
4. A wide choice of cost and portability alternatives should be made available. Alternative choices for input and display should be available as add-on options.

A design-for-all approach assumes that any voice telephony user would perceive these features as an added value (e.g. combined voice and text telephony could frequently be useful, such as when trying to spell a name or address during an international call). The one issue which remains to prevent a design-for-all approach to telephones and text communication is its higher cost, essentially due to the additional circuitry required to enable text communication. Notice that the provision of a relay service is essentially meant to support the requirements of users with special needs and that more than one solution is in practice to cover its operating costs. It is therefore an independent issue which is not related to the design-for-all aspects being considered.

The cost of adding text communication to a telephone is basically due to the cost of a keyboard and (larger) display. There is no way to avoid a more expensive solution, but cost is certainly the wrong problem to

address. The real issue is that if a significant number of directory services, useful for everyone, is made available, then text communication will become a requirement for a much broader range of users (a stimulating example is the Minitel in France). In this case, telephones restricted to voice communication would then be perceived as a much less useful device, although at a lower cost. Since telephones are made by the millions, only market requirements will dictate changes in technology and these could be deployed by a large offer from service providers. An interesting example to refer is a screen phone recently introduced in the US market, which is a competitive device to be used at home for remote transactions [6]. Unfortunately, there is a vicious loop which works against the progress in this direction, since a more general acceptance will not take place while the underlying technology is still plagued by such major problems as many incompatible protocols (even in the same country).

## STATE-OF-THE-ART

A major problem faced by text telephone users is the number and variety of systems and protocols currently in use, frequently preventing communication because of incompatibility [7]: European Deaf Telephone (EDT), Dual Tone Multi Frequency (DTMF), French Minitel, V.21 and Baudot are all methods in use throughout Europe.

Different solutions are also in use concerning the provision of relay services [2,3], namely in terms of charges / funding, services provided and period of operation. In some countries the charging rates are slightly higher for relayed calls, but the rule should be that the user is charged at the normal origin-to-destination rate. The cost of running a relay service has therefore to be met by funds from different sources (telecom operators, government funds, etc.). While in some countries a 24 hours / 7 days-a-week service is provided (Sweden, for example), there are other countries where only an emergency service is provided (Austria), or even no service at all.

The differences referred naturally lead to widely varying access opportunities from country to country. It is interesting to refer that while in some European countries text telephone users can only communicate among themselves, in Sweden there are approximately 700.000 text telephone calls relayed per year.

## THE WAY AHEAD

Assuming that the provision of adequate relay services is a problem solvable at the legal / social level, it becomes clear that the technical issues are of primary importance to enable a universal access to text communication and consequently enable a design-for-all approach to telephones and text communication. The push for standardisation is a key effort in this direction and is actively accompanied by such organisations as the WFD (World Federation of the Deaf) and EUD (European Union of the Deaf), besides the already referred COST 219 and 220 projects. The ETSI TE4 (European Telecommunication Standards Institute) standardisation group, through the Human Factors committee, has recently started a general standardisation of text telephony [8] and the ITU-TS recently standardised the V.18 modem with automatic interworking capability [9].

The standardisation strategy is to assure interworking among all text telephones and a universal service. This strategy is itself under the influence of the main development trends in technology, namely in what concerns ISDN voice telephony, multimedia communication and GSM / future mobile telephones.

## CONCLUSION

The standardisation work previously referred, combined with improved and more aggressive policies at several levels (and namely through the EU universal service provision and the UN standard rules on equal opportunities), hold the promise of a near future where text communication will cover areas of application much wider than those solely related to serving the requirements of users with special

needs. Telephones with text communication capability will then represent a wider market segment, leading the way to a design-for-all philosophy that will certainly contribute to a more universal access.

This trend towards universal access and design-for-all is certainly in the right direction, but it is important to stress that user involvement in this process is indeed the key to a successful outcome.

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