

Teleworking for the Disabled under the TEN-TREND framework

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ABSTRACT

The results of a real-life teleworking trial are presented. The main aim of the trial is to investigate the functionality and successfulness of the service both in terms of productivity and lessening of expenses as well as in social related issues and issues related to the impact of the services to the personnel, both disabled and not. We describe in this work the concept, material, methods and results of the trial.

I. INTRODUCTION

TEN-TREND is a project currently under evolution, running within EU DG XIII TEN-TELECOM programme on trans-European networks [1]. The framework developed [2] covers a full range of issues which must be dealt with before telework solutions can be deployed, and presents best-practice solutions to key issues, including social and legal issues.

The development of the TEN-TREND framework is based on different types of research. It aims on offering solutions for using trans-European telecommunications networks integrating both user requirements and available solutions as shown in figure 1.

II. TELEWORKING FOR THE DISABLED

In this work we present the results of a trial on teleworking for the disabled, entitled "*Groupwork and collaborative work of disabled software programmers and related occupations (e.g. software testing,*

documentation) via videoconferencing and application sharing over ISDN"

The application was based on previous experience [3],[4]. Six sites participated in the trial. All these sites were equipped with ISDN connections (either PRI or BRI), videoconferencing software and relevant equipment. Finally, two disabled participated in the trial working from their homes.

The service is quite simple in conception. The infrastructure is shown in figure 2. Five sites are connected through Euro-ISDN and are able to operate videoconferencing sessions using Intel Proshare and/or PictureTel. Ordinary PSTN (Public Switch Telephone Network) connection is provided to the workers' homes.

III. THE APPLICATION

A. Methods

The following steps were followed in establishing and testing the service

1. Identification of common projects among the sites during the trial period
2. Identification of communication needs
3. Videoconferencing for organising development and solving programming problems
4. Videoconferencing for managerial issues
5. Application sharing of software development packages
6. Videoconferencing for testing and evaluation
7. Market investigation on possible useful tools (whiteboard, group-videoconferencing)
8. Reporting of key actors on trials Cost-benefits analysis
9. Evaluation of the core application

Management and control of the trial followed the TEN-TREND internal

regulations. The trial begun on August 1997.

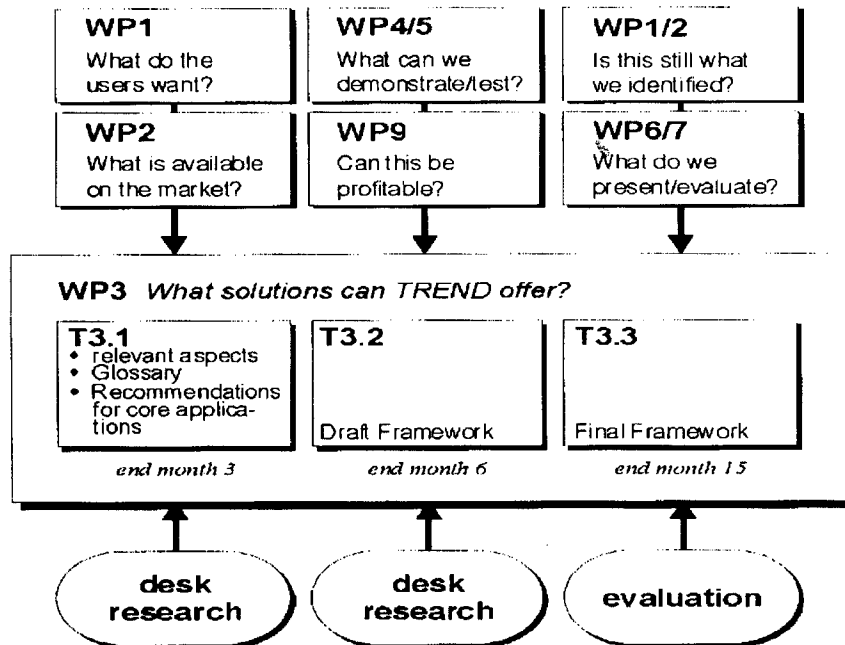


figure 1: main structure of TEN-TREND Framework development (WP stands for WorkPackage)

B. Rational of the application

The scope of the trial is to demonstrate the feasibility of videoconferencing in replacing unnecessary travel and expenses for software development. Currently, it is estimated that one fifth of the labour of software programmers is spend to transportation for meetings and is lost as a result of misunderstandings due to conventional techniques of communication and delayed delivery due to unproductive collaborative work. These problems are even more intense when work is to be carried out with personnel from other organisations, as for example the Aristotle University of Thessaloniki, with which Biotrast maintains close links and shares several projects and with collaborating companies, as for example Netsmart.

Furthermore, Biotrast has been very active in fostering the Greek framework for providing equal opportunities to people with special needs [5] and is also itself making it practice by employing in more than 10% of its personnel disabled people.

The aim of the trial is not mainly technological, standard ISDN connection and videoconferencing will be used although newer tools is intended to be tested. The main aim of the trial is to investigate the functionality and successfulness of the service both in terms of productivity and lessening of expenses as well as in social related issues and issues related to the impact of the services to the personnel, both disabled and not.

IV. RESULTS

A. Evaluation methodoly

The trial was monitored while running in order to:

- confirm benefits,
- focus problem issues,
- validate the process and consequently,
- allow revision of the teleworking scheme if necessary.

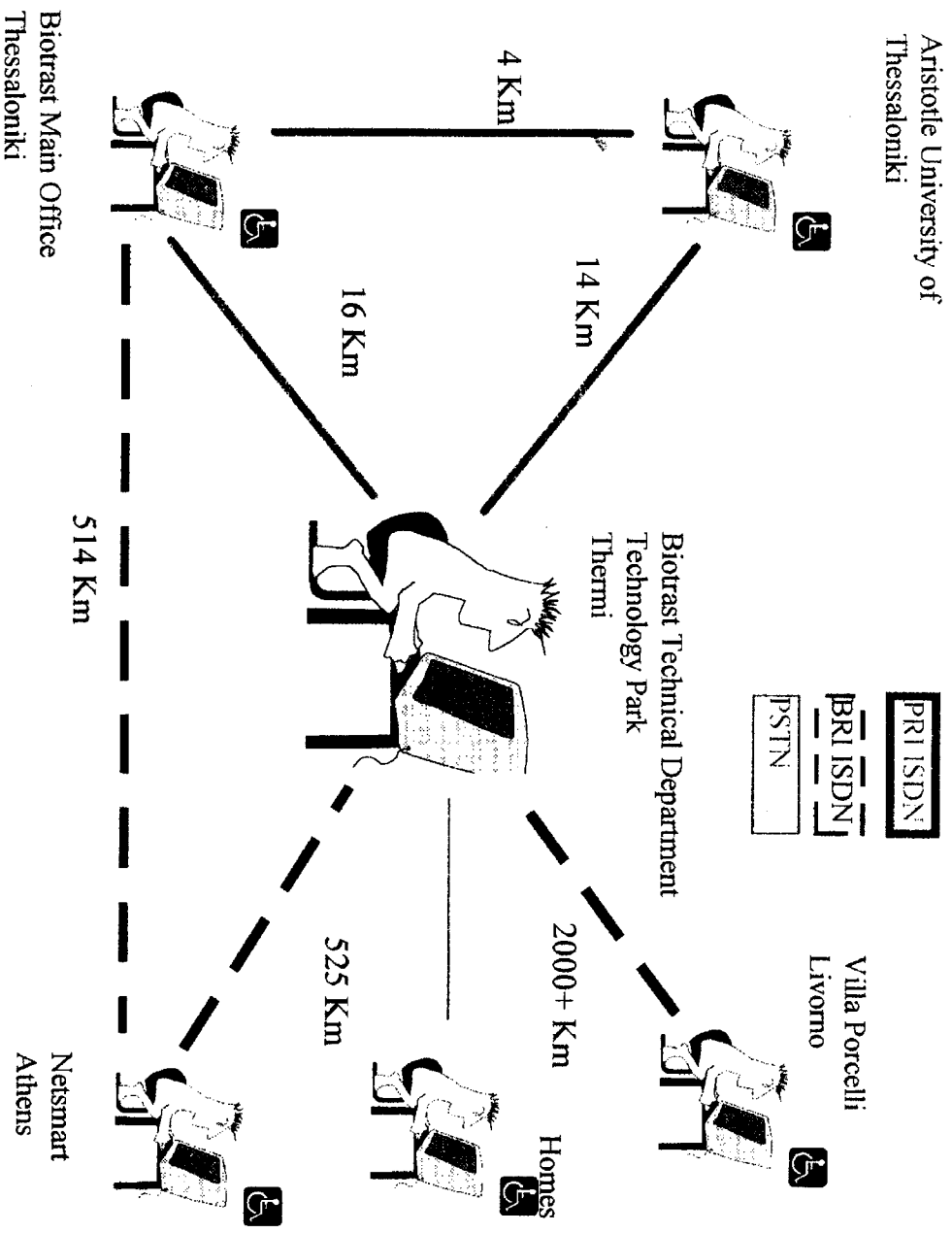


Figure 2: The teleworking for the disabled trial set-up

In order to proceed in the trial evaluation we defined the following evaluation criteria:

- extensions of the work,
- technical feasibility,
- usability,
- effectiveness,
- users acceptance and satisfaction.

We collected data distributing questionnaires to the teleworkers, observing teleworkers at the trial sites and collecting teleworkers' self reports.

The questions addressed the interoperability issues in a broad sense, encompassing both the technical and the human issues. Interviews were carried out as well. Teleworkers collaborated on giving interview but were quite unwilling on completing the questionnaires.

B. Usability

More than 13 teleworkers participated in the trial. Most of them had a University degree and a high computer literacy. Therefore, even though they had not a long experience in teleworking, they found it quite easy to use the new applications for one-to-one meetings. Neither of those that had some kind of disability (two of them had serious mobile disability) had any particular problem in using the application.

After a brief period of time, they get used to interact with more than one parties, interfere between tools and tasks and they found it easy to avoid misunderstandings due to the number of participants.

C. Technical Problems

ISDN network installation is still in a pilot phase in Greece. That caused a low level of support by the network provider and consequently a delay on our application installation.

Interoperability problems were encountered while the trial was running using videoconferencing applications.

While using the application we had quite often problems with the ISDN connection.

Most of the time they were caused due to an overload of the network. Other times were due to unknown reasons. We had to test each time the connection through all the sites to find out what the problem was and often we asked our network provider support. Once or twice that problems caused the reinstallation of the software applications.

Some times the connection was simply lost, probably due to network overload and obtained again by repeating the call. Loosing the connection caused significant inconveniences and reduced quality of work during application sharing and especially during white board sessions in which case a lot of data were lost.

The trials from the home sites proved that Netmeeting had not problems running even under the 486 PC and could be easily installed on any employee's PC without any problem.

C. Effectiveness

External sites

The use of videoconferencing in testing and documentation solved a lot of problems we had experienced in the past when communicating with our Italian partners through other means (e.g. e-mail) and increased work effectiveness. Due to our different hours of work and different projects on which we were working it was quite difficult to obtain immediate answers to each others questions. Once or twice we had proceeded in wrong software implementation due to a lack of communication. Application sharing and white board solved poor understanding issues. Videoconferencing applications were much more useful considering the long distance between our partners site and the impossibility of having frequent face-to-face meetings.

Home Sites

That kind of communication was quite useful to teleworkers increasing their work flexibility in respect of working time and space. Due to a project deadline they had to work hard even during weekends.

Using the teleworking opportunity, they saved valuable time.

Biotrast sites

A large number of face to face meetings were avoided increasing work efficiency. That was more evident between the senior programmer and the company manager. Usually the senior programmer needed to reach Biotrast headquarters twice a day. Technical department is 15'-30' min distant by car depending on street traffic and the difficulty to park the car into the town center. The most useful application was application sharing. The senior programmer could show work progress and ask for confirmation sharing a Delphi application without having to move.

Disabled Teleworkers

Telework proved especially useful for the disabled teleworkers offering them work flexibility in respect of working space and enabling them to work in the testing and documentation groups collaborating with the programmers without moving at all to the technical department.

This was more evident in the case of the one that was working in the programming team at the Aristotle University site. Having serious mobile disability and being distant from any of the Biotrast sites the best way for him to communicate and contribute to the project implementation was to use the PictureTel and Netmeeting Videoconference systems.

V. CONCLUSION

Participants found the teleworking framework suitable to support their work without reducing their concentration on the work task. They considered that

- **whiteboard** is a very effective tool for helping groups collaborate and changing ideas (analysis, design, work splitting phases) having the added benefit of having written records of those interchanges
- **application sharing** is a powerful tool if used in the implementation,

integration, debug, testing and documentation software phases and

- **videoconferencing** is a useful tool for jobs that require visual elements and for those meetings that require face-to-face contact for a better comprehension.

They were satisfied with the amount of work output, the time and money saving, the work flexibility in respect of working space and time (especially in the case of home sites and disabled workers) that they obtained by applying the teleworking scheme and wanted to keep it using in the future and, if possible, extend it to every other project.

The described application trial focused on investigating possible pitfalls and benefits of utilising teleworking approaches to assist disabled participants actively and on equal grounds within the working force. Based on the experience drawn from it, a set of further service trials will be investigated to provide a full list of well documented solutions of teleworking applications for the disabled. The final set of results is expected to be produced by the end of the TEN-TREND project in June, 1998.

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