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BSCW for disabled teleworkers: usability evaluation and interface adaptation of an internet-based cooperation environment

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Abstract

TEDIS (Teleworking for Disabled People) is a research and development project of the research group on Human Computer Interaction at the German National Research Center for Information Technology (GMD). TEDIS is an assistive technology contribution to the promotional program "Telecooperation – Value Added Services" of the German Federal Ministry for Education, Science, Research and Technology (BMBF) and accordingly funded. The general goal of the project is to implement a generic human computer interface for accessing Internet, which can be adapted to a variety of different needs of handicapped as well as elderly people. As part of a field-trial, the internet-based telecooperation environment BSCW (Basic Support for Cooperative Work) was installed to manage the teleworking process for two severely physically disabled teleworkers. At present, BSCW is adjusted to their special needs based upon data gained by structured usability-interviews. As a result, complete accessibility of BSCW by keyboard will soon be available, since operating a mouse causes many problems for motorically-disabled, blind or visually impaired end-users. © 1997 Published by Elsevier Science B.V.

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1. Introduction

Actually, 10% of the whole worlds population falls under the group elderly or handicapped. This number is based on the [7] definition of handicapped and the convention to count everyone about 60 years as an ederly person. In Europe at present, there are about 100 million elderly and 50 million handicapped people. Recent official surveys reveal 6.4 million severely handicapped people only in Germany. This tendency increases. Modern telecommunication technologies offer many possibilties for special needs adjustment. Thus severely handicapped as well as elderly people can be enabled to live a self-determined life and take part in social and economic affairs. For example, telecommunication technology can compensate for an often prevailing lack of physical mobility, which is detrimental to the vocational integration of handicapped people.

Unfortunately technological progress does not necessarily imply enhancement of applicability of

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information technology. In general, special needs of handicapped end-users are not equally taken into consideration by system designers. Handicapped people are usually not included in design processes. Therefore, products are often inaccessible due to small but with regard to certain disabilities crucial shortcomings. In order to ensure the suitability of the teleworkstation developed within the TEDIS project, principles of participative systems design are applied. This refers to technical aspects as well as issues of usability. For instance, the internet-based telecooperation environment BSCW is adjusted based upon data gained by structured usability-interviews [11].

2. The TEDIS field trial

The adaptation of the teleworkstation is realized in cooperation with the FTB (Forschungsinstitut Technologie-Behindertenhilfe in Volmarstein) an internationally renowned rehabilitation center in Germany. Two physically handicapped end-users living in Dortmund, which is located 65 km away from Volmarstein, work for the FTB administration with support of BSCW (Basic Support for Cooperative Work), a telecooperation environment which has been developed by GMD's research group on Computer Supported Cooperative Work (CSCW). BSCW is available free of charge by common Internet browsers in the World-Wide-Web.

3. BSCW

The BSCW (Basic Support for Cooperative Work) project at GMD FIT is developing tools to support cooperative work over the Web. The basis for this work is the BSCW "shared workspace" system — an extension to a standard Web server which supports document upload, event notification, group management, communication and much more. BSCW provides facilities for collaboration over the Internet. It runs across the most commonly used platforms on PC, Macintosh and Sun. This serves as an integration platform onto which a variety of CSCW applications can be added. The emphasis is on integrating existing tools, rather than constructing new ones [2,5,6].

The BSCW system is based on the "shared workspace" metaphor: an object store for group work, with some simple awareness functionality that allows users to keep an overview of what is happening in the workspace. A workspace user can browse through a shared workspace (if he or she has permission to do so) with an unmodified WWW client on any platform. The BSCW workspace allows to (over)write objects by means of a small "helper" application that is provided with the system.

4. Usability

Before starting the actual telework by using BSCW, a usability test was conducted in order to evaluate the user front-end of that telecooperation environment. The goal was to investigate whether the two teleworkers had learned to handle the system successfully as well as to assess the usability of BSCW for end-users with special needs, since BSCW was not originally designed with regard to the special needs of disabled end-users.

4.1. Methodology

Methodologically usability investigations followed two different approaches.

- The first approach relied on active participation of the two end-users, who had to perform a predefined *standard-task*. Task accomplishment was then followed up by a *structured interview* to discover certain problems the disabled pilot-users encountered while using the system.
- The second approach relied on already existing *guidelines* [1,3,4,8,10,17–19] which focus on interface design for people with special needs. A special category of these guidelines related to motor-impaired people were taken to evaluate corresponding special needs usability of the user front-end of the BSCW system.

4.1.1. Usability evaluation by standard task and structured interviews

The predefined standard-task we asked the teleworkers to perform, was divided into three subsequent parts. During their course the main functional body of BSCW was tested. The content of the task