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User-Centric Design of Telecare Services

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A Mass Market for Telecare?

Telecare has the potential to resolve many of the challenges faced by today's health . It can reduce institutionalisation of dependent people, giving and social care services them the freedom to move, more self-reliance, decreased anxiety and easier access to personal attention when needed. It can also be used to automate mundane, impersonal and repetitive tasks, thereby freeing up access to human resources. However, telecare systems are too often conceived and designed with a purely technical approach, whereas the end users may not be technologically adept or may have physical or mental impairments that make the use of ICT more difficult. As a consequence, people are still reluctant to use telecare. A recent study by Forrester that 74% of those asked were unsure or unlikely to deploy a wearable device transmitting data about unlikely to deploy a wearable device transmitting data about the well-being of a disabled or ill family member if it cost US \$100 (70) or more per year, and 80% were unsure or unwilling to pay the same amount for home monitoring.

To remedy this situation and make telecare more acceptable, consideration of human factors should be an integral part of the process of telecare service delivery –from service conception, research, design and development, to installation and deployment. The European Telecommunications Standards Institute (ETSI) has, in-house and through its members, extensive and detailed know-how and experience in human factors that can be applied to telecommunications and ICT. This experience has been drawn upon in the current work of developing Guidelines for Human Factors in Telecare Systems 3 , reported here.

Structuring Telecare Design Guidelines

Different approaches for structuring design guidelines are possible. The first is the life-cycle approach, based on the development and deployment of a telecare system, addressing successively the stages of conception: research, design and development, conception: research, design and development, manufacturing, installation and service deployment. The advantage of this approach is that specific stakeholder groups can easily locate the guidelines relevant to them. The disadvantage is considerable repetition, since one guideline may be applicable to many lifecycles and stakeholders.

The second approach is the human factors approach, addressing issues such as inter action with equipment, operational issues, reliability, privacy and service. The advantage of this approach is that human factor issues are central and highly visible. A disadvantage is that it may be cumbersome for a specific stakeholder to identify its most relevant guidelines.

A hybrid approach, and the one we have chosen for structuring the guidelines, uses a combination of the human factors and the lifecycle approach. At the top level, the guide is divided into sections covering different human factors aspects. Each section starts with a short discussion of the issue addressed, leading up to high-level generic guidelines that must be considered by all stakeholders. Detailed guidelines are then grouped according to research, design & development or service provisioning.

This structure emphasises the human factor and keeps redundancy to a minimum, while at the same time making it easy for the stakeholders to

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locate those guidelines most relevant to themselves.

Overview of Guidelines

Privacy and Confidentiality

We define privacy as the rights of an individual or group to keep their lives and personal affairs out of public view, and to control the flow of information about themselves. Confidentiality is the duty of a service provider to ensure this privacy.

Within the telecare domain, privacy can be achieved by the service provider adhering to a set of protocols agreed beforehand with the client and / or the client's representatives. These protocols should describe who may have access to the client's information and how detailed that information should be.

Ethics

Within the domains of health and social care, ethics revolve around two basic principles: the duty of good care to protect the well-being of patients / clients, and the duty to respect their autonomy. Health and social care professionals sometimes find that these two principles conflict, especially in situations where the patient is suffering from a mild cognitive impairment or early signs of dementia. The ethics section provides advice for helping stakeholders to address these and other ethical questions.

Legal Aspects

The legal aspects considered fall into one of three classes:

1. Respecting European and national laws;
2. Understanding the liabilities associated with telecare services; and
3. Contractual bindings.

Although the guidelines by themselves are not compulsory, they are based on current legislation and it may therefore be unwise to consider them as 'optional'.

Availability and Reliability

Availability describes the degree to which a system can be expected to function when it is required to be set into operation. The reliability of a system is its ability to continue to function, both in routine use and in case of unexpected, adverse circumstances. The guidelines address these two factors with a focus on those aspects that relate to human factors. Risk assessment is also addressed.

Integrity

Integrity is related to the confidence that data is not tampered with or accidentally changed during storage, transfer or retrieval. This is, again, related to the following properties: data consistency, repeatability of measurements and security of data against errors or attacks. The integrity guidelines are applicable not only to the technical parts of the system, but also to its human counterparts insofar as they have an influence on system behaviour and data.

Safety

In the guidelines document, safety is restricted to mean "non-harmfulness". The guidelines are directed towards making the equipment safe both in routine use (by minimising the chances of user error or minimising its adverse consequences) and during emergency situations (by helping the user make the right decisions and take the right corrective actions under stress).

Installation, Setup, Configuration and Maintenance

Guidelines for installation, setup, configuration and maintenance are also provided, although ideally, users should not have to deal with this. These processes should rather be addressed by service providers through either manual or automatic procedures.

User Interaction

The degree of interaction the end users have with the system will depend partly on their role as a patient / client, carer or coordinating agent, and partly on whether the telecare system monitors the patient / client, provides information/ assistance, or both. Particular emphasis is placed on the fact that the end users may have limited knowledge of information technology in general, as well as limited physical, cognitive or sensory abilities.

Normally, users must be able to perceive the information presented, operate the equipment efficiently and understand the purpose and functioning of the equipment. Because of the possible restraints and impairments of the user, multi-modal input and output techniques should be available, and it must be possible to use assistive technologies in conjunction with the telecare equipment.

Miscellaneous Human Factor Issues

Localisation refers to the provision of product and user-guide variants for different markets, taking into account market specific, local linguistic and cultural differences. Organisational aspects address procedures for the handling of care service provisioning. User education contains a set of guide-lines on how user instructions for telecare services ought to be provided, taking into account the requirements and abilities of different user groups. Interoperability between different telecare equipment, services and the Internet offers considerable potential for improving the services; however it also presents new and challenging user interaction and human factor issues.

Conclusion

The Guidelines for Human Factors in Telecare Systems is currently (Nov. 2006) in development. Briefly summarised here, it builds upon ETSI experience within human factors design in general and telecare in particular⁴. It will be useful as a checklist for researchers, designers, developers, suppliers and telecare service providers in order to ensure that telecare systems are easy and safe to use and can be trusted in terms of confidentiality, security and reliability. This will contribute towards making the services more readily accepted by the end users, and telecare more widespread.

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For a complete list of references contained in this article, please contact k.r@hitm.eu.

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