
Requirement and input collection: Development of guidelines to allow people with cognitive disabilities to exploit the full potential of mobile ICT

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Abstract

There is an urgent, real need to better understand how mobile ICT products and services can be designed to better meet the needs of persons with cognitive disabilities (including older users), and to develop and update standards to ensure that they recommend solutions that are beneficial to this group of users to exploit the true potential of mobile information and communication technologies (ICT).

An ETSI (European Telecommunication Standards Institute) expert team is currently developing such guidelines, in collaboration with other standardization bodies (including ISO and W3C), during an 18-month period. The work started in March 2015.

At the Mobile HCI 2015 Workshop#3 focused on Mobile Cognition, we intend to present, share and discuss our topic, approach, classification, insight and early draft design recommendations that extend over all five workshop topics. Additionally, we plan to raise issues and topics of common interest with expert colleagues working in the field and invite those interested to collaborate with us during the later phases of the work, to exploit the true potential of mobile ICT, to support people with cognitive disabilities.

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Last but not least, we would also like to invite leading researchers to guide and assist our work, possibly through direct participation in a reference group.

Author Keywords

Human factors; accessibility; cognitive; mobile; human factors;

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

1. Introduction and background

Persons with cognitive disabilities form a diverse group, with limitations in one or more types of their mental tasks including conceptualizing, planning, remembering and understanding numbers and symbols. It has been recognized that current ICT accessibility guidelines provide only limited support for these persons and that more work is required to better exploit the potential of mobile ICT technologies and their services.

The number of people with a learning disability currently ranges between 1-3% of the EU population (according to a study from DG Employment and Social Affairs¹), corresponding to 5 - 15 million people in the EU and EFTA. Considering the fact that older people typically present some form of age-related cognitive disability (dementia, memory loss, lack of orientation, Alzheimer, etc.), this percentage becomes even more significant. By 2030, the currently active and ICT-literate (and, to some extent, ICT-dependent) people in

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ec.europa.eu/information_society/activities/einclusion/docs/workshop_at_09/barnard.pps

their mid-forties may experience unprecedented digital exclusion, unless the topic of ICT for cognitive disabilities is addressed seriously.

There is a considerable risk that people with learning disabilities may be excluded not only from the digital society, but also from the heavily ICT-based information society. These people will also not be able to benefit from or meet the requirements of the rapidly evolving mobile technology, expected to exceed desktop technology in terms of Internet usage by this 2015.

It is of paramount importance that proper guidance is developed and provided to the stakeholders involved in mobile technology development (manufacturers, mobile application developers, e-services developers, etc.) as early as possible in order that they consider the needs of people with learning disabilities and older people in their development stage and allow them to exploit the significant benefits of the emerging mobile technology.

An ETSI (European Telecommunication Standards Institute) has recently set up an expert team, see https://portal.etsi.org/STFs/STF_HomePages/STF488/STF488.asp, to develop such guidelines, based on available deliverables such as [1]- [5], results from numerous European 6th and 7th Framework research projects, work in the World Wide Web Consortium (W3C) and ISO, and other sources and requirements including those of the addressed user groups, during an 18-month period since March 2015.

2. Cognitive disabilities

The concept of cognitive disabilities is broad and it can be stated that a person with a cognitive disability has more difficulties with one or more types of mental tasks

than the average person [6]. Braddock et al. describe cognitive disabilities as "*a substantial limitation in one's capacity to think, including conceptualizing, planning, and sequencing thoughts and actions, remembering, interpreting subtle social cues, and understanding numbers and symbols.*" [7].

Cognitive disabilities can include learning disabilities (difficulty in learning in conventional ways), language disabilities (difficulty in understanding or producing language), or some form of ageing-related cognitive disability (e.g. dementia, memory loss, lack of orientation, Alzheimer, etc.). Individuals with cognitive disabilities can face unique challenges that are often pervasive and change throughout phases of their lives.

3. Objective and scope of the work

Mobile technologies are evolving and maturing rapidly and open the way to development of personalized assistive technologies, location-aware services, and enhanced person-to-person communications – as well as societal services.

People with cognitive disabilities may face difficulties in performing or completing even very simple tasks (e.g. reading or writing text or processing auditory information), if left to figure things out by themselves in conventional ways, without some assistance or adaptations.

During the past decade, the need to study cognitive disabilities and their possible impact on and benefits from ICT has been identified (e.g. during the development of the WCAG 2.0 Recommendations in W3C and the European accessibility guidelines suitable for public ICT procurement [1] developed by CEN, CENELEC and ETSI) and acted upon. The area has been under consideration in European and other research activities (see clause 5 for details), some of which have finished or are about to finish. Therefore, it is the right

time to initiate applicable standardization activities, to best exploit the synergies, in the interest of all.

Critical human factors issues for people with limited cognitive abilities in using mobile ICT technology for which we intend to examine and provide recommendations for include profile-based configuration of user interfaces and functionality, support for spoken presentation of text content, support for viewing web content on devices with small screens, and support for remote assistance, so that users can get help when they face difficulties. During the work, we will identify functionalities needed and initiate standardization activities in order to avoid fragmentation in mobile technologies that will also address tablet PCs and smartphones, strongly penetrating the market.

The ongoing work is expected to advance the ETSI strategic standardization areas of mobile communications and human factors and may provide specific support to the uptake of e-services. The expected result will consist of two documents:

- A Technical Report (ETSI TR 103 349) that will describe the functional needs of persons with limited cognitive, language and learning abilities for an improved user experience when using mobile ICT devices and their related applications; and
- An ETSI Guide (ETSI EG 203 350) that will provide design guidelines for mobile devices and applications that will enable people with cognitive impairments to obtain the maximum benefit from the use of mobile ICTs. The recommendations of the ETSI Guide will be based on a "Design for All"-approach.

In order to perform the work, a Reference Group will be established to allow invited experts to collaborate with

the expert team. These experts will be from related areas such as relevant research projects, consumer associations, user and disability organizations and older people associations, industry representatives and experts from other standardization bodies. The Reference Group will be invited to review the work and provide comments throughout the 15-month development work.

A consultation workshop will be organized in Stockholm, on the 2nd September 2015.

4. Time plan

The time plan for the work is as presented below:

Result	Dates
First draft of the TR and EG (including Table of Contents and Scope)	30/06/2015
Intermediate drafts of the TR and EG	31/10/2015 29/02/2016
Stable drafts of TR and EG for TC HF review (prior to Remote Consensus)	30/06/16
Draft EG approved by TC HF by RC and accepted by the ETSI Secretariat for Member Vote	31/07/2016
Draft TR approved by TC HF#72 and accepted by the ETSI Secretariat for publication and free availability through www.etsi.org	31/10/2016

5. Approach and model

The most important initial work of the expert team is to establish a model for describing cognitive disabilities, the needs of these persons when using mobile ICT and the guidance that can be derived from their needs to design accessible mobile ICT.

We have agreed on a standards-based approach for defining cognitive disabilities and user needs.

The major sources of information for identifying the cognitive disabilities we have decided to use are ICD-10 [7] from the World Health Organization (WHO) and DSM-5 [8] from the American Psychiatric Association (APA).

Both documents include information about cognitive disabilities, as part of a wider collection of mental and behavioral disorders and impairments.

A subset of cognitive disabilities will be selected based on the following three relevant criteria:

1. Prevalence (how many individuals have a particular cognitive impairment)
2. Availability (is it possible to get first-hand information from persons having a particular cognitive impairment)?
3. Potential use (whether persons having a particular cognitive impairment can use mobile technologies, with the support of the required assistive technologies).

These criteria may change, as the work progresses.

At the time of writing this, it is our intention to consider cognitive including Down syndrome, dyslexia, attention deficit and hyperactivity disorder, autism spectrum disorder and age-related impairments such as dementia.

Once the major cognitive disabilities have been selected, the next step will be to describe them using the vocabulary of another document of the WHO: ICF, the International classification of functioning, disability and health [9]. The main items of ICF that will be used to describe cognitive disabilities will be body functions (physiological functions of body systems, including psycho-logical functions) and activities (execution of tasks or actions by an individual). At the moment a subset of 51 functions and 47 activities has been selected as candidates for describing cognitive disabilities.

Detailed examples will be presented at the workshop.

The cognition-related body functions and activities will be the basis for identifying user needs, that is, what users with cognitive disabilities need from mobile ICT so that it becomes accessible to them.

We expect to identify some user needs that will be common for several cognitive disabilities (such as a need for a clear easy-to-read language) and also, others that might be contradictory: helpful for some types of disabilities and harmful for other types. One example of this second type of user need is the use of multimedia for complementing text content. It can help persons with Down syndrome and low reading abilities, but will distract persons with attention deficit disorder.

The last step in the process will be to produce guidelines and design recommendations to support designers and mobile ICT developers in the process of creating mobile devices and applications that can be successfully used by persons with a variety of cognitive disabilities. In the case of contradictory user needs, the expectation is that the guidance will provide individualization strategies, so that the mobile ICT can be personalized to the needs of the individual users.

6. Coordination and harmonization

Currently, there are several relevant international activities (e.g. in ISO and W3C) within the field of cognitive accessibility. It is our intention to collaborate and produce a common understanding of cognitive disabilities and to develop relevant and consistent accessibility guidance for the most important technical areas and the widest relevant user population.

These will be presented as they develop at the Mobile HCI 2015 workshop #3 in August, at the September workshop in Stockholm, to the Reference group and a conclusive workshop (with details to be announced), probably in May 2016.

7. Impact

It is evident that critical human factors issues for people with cognitive disabilities in mobile ICT must be addressed and preferably be included in the mainstream accessibility standardization. Relevant topics include design recommendations and development guidelines addressing areas such as profile-based configuration of user interfaces and functionality, support for spoken presentation of text content, support for viewing web content on devices with small screens, and support for remote assistance, so that users can get help when they get stuck. Such functionalities and many others will be identified, examined and addressed through guidelines, in order to avoid fragmentation of emerging mobile technologies and provide this significant population of people with learning and cognitive disabilities that currently lacks the benefits of dedicated accessibility solutions and design the best possible support.

8. Next steps

Information about the time plan, the workshop and the timeline for the standardization documents has been provided and is available through [8]. This will be further detailed and presented at the workshop, together with the available collaboration and review options.

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