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**Final program &
Book of abstracts**

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Book of Abstracts

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Final program

Time	Wednesday 09/09/2015		
8:00	Registration		
9:00	TPG Workshop: Web & Software Lifecycle End-to-End Accessibility Bartók Hall		
10:00			
11:00			
12:00			
13:00			
13:30			
15:00			
15:30			
16:00			
16:15			Global challenges in AT (open to all participants, registration is required) Mozart Hall
17:00			
18:00			
19:00			
20:00			
21:00			

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	Oystein Dale, Norway Mainstream ICT Can Support Children and Adolescents with ADHD and/or Autism in Their Everyday Activities p68	MyungJoon Lim, South Korea Usability of a new Writing Assistive Device for Persons with Cervical Spinal Cord Injury: a Pilot Study p71	Peter Cudd, UK Knowledge Exchange: Selecting research opportunities through estimation p73	Tibor Guzsvinecz & Veronika Szücs, Hungary Developing movement recognition application with the use of Shimmer sensor and Microsoft Kinect sensor p75
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20:00	Social event, banquet			

Time	Saturday 12/09/2015			
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9:00	Session 7			
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11:45	Closing of conference, awards
12:30	Lunch break
14:00	Additional events: excursion

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Abstracts

THURSDAY 10/09/2015
09:30 - keynote lecture

What Makes it Tick? Components of the Effective Use of AAC

Sofia L. Kalman

Eötvös Loránd University, Budapest, Hungary

AAC is still an emerging area of contemporary rehabilitation. It is a way for integrating persons with severe communication disorders into our societies. Most communication disorders are the result of the lack of speech. Life of a non-verbal person in a verbal society is unimaginable for the speaking majority. The more severe is the speech disorder the more expressed is the communication difficulty: complex problems call for complex solutions.

People with special communication needs need complex communication services.

- Complexity means well-trained AAC therapists. But who, how and where will train them? Where will they work? Who will pay for the extra costs for AAC?
- Complexity also means a broad range of available low tech and high tech communication aids, and an extremely high level of IT services. Where will be those informaticians who will understand the needs of a special teacher working with a person with a severe disability?
- Complexity involves a wide range of administrative, financial, social and emotional problems of families living with a non-speaking person. Are the AAC experts or the IT advisors willing to deal with these problems?
- Research is expected to ease the complexity by shedding light on dark areas. In this area certain problems cannot be approached through quantitative methods, so development of qualitative methods brought a tremendous development in AAC research. But are there enough enthusiastic researchers well trained in qualitative methods?

Thus it is easy to state that communication is a human right and nobody can be deprived of it just because of his/her physical condition, but to provide the adequate services needs much more than a simple act of goodwill.

THURSDAY 10/09/2015

11:30 - session 1

STS: Universal Teaching and Learning

Chairs: Andrea Petz / Petar Penaz

Track A: Bartók Hall

Usability of PDF based Digital Textbooks to the Physically Disabled University Student

Hidehisa Oku, Ph.D.¹, [Kayoko Matsubara](#)¹, Masayuki Booka²

¹ *Kobe Gakuin University, Kobe, Japan*

² *Hiroshima International University, Hiroshima, Japan*

Digital textbooks have been expected for providing multimedia information that the print textbooks could not handle. The original digital textbook can be fabricated relatively easily by using Epub or DAISY. Print textbooks are, however, employed as textbooks in the most of lectures in universities. Therefore, it is considered necessary to convert the content of the print textbook to the digital textbook simply and in a short time. In this paper, the digital textbook using PDF files of the print textbook was suggested as one of simple and practical solution to provide an alternative textbook for the physically disabled university student who has difficulty handling the print textbook. Then usability of the suggested method was evaluated experimentally from the point of workload. Result of the experiment indicates that the digital textbook fabricated as the alternative one for the print textbook by the suggested method has a potential to reduce workload for the physically disabled university students. In addition, the digital textbook with larger LCD display needs less workload than the print textbook. Then, there are not so much difference in the workload between the print book which is smaller than the print textbook and the digital book made from the print book.

Paper-Based Textbooks with Audio Support for Print-Disabled Students

[Akio Fujiyoshi](#)¹, Akiko Ohsawa², Takuya Takaira¹, Yoshiaki Tani¹, Mamoru Fujiyoshi³, Yuko Ota⁴

¹ *Ibaraki University, Hitachi, Ibaraki, Japan*

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Utilizing invisible 2-dimensional codes and digital audio players with a 2-dimensional code scanner, we developed paper-based textbooks with audio support for students with print disabilities, called “multimodal textbooks.” Multimodal textbooks can be read with the combination of the two modes: “reading printed text” and “listening to the speech of the text from a digital audio player with a 2-dimensional code scanner.” Since multimodal textbooks look the same as regular textbooks and the price of a digital audio player is reasonable (about 30 euro), we think multimodal textbooks are suitable for students with print disabilities in ordinary classrooms.

ICT Learning Technologies for Disabled People: Recommendations for Good Practice

Marion Hersh

Biomedical Engineering, University of Glasgow, Glasgow, Scotland

The use of ICT in education is becoming increasingly important and has potential advantages to disabled learners if the technologies are appropriately designed, including for accessibility and usability, and used. This paper presents the first sets of recommendations for learning technologies for disabled people aimed at disabled learners, teachers, developers and educational institutions respectively. They were developed as part of the work of the Enable Network for ICT Learning for Disabled People and involved input from both experts and end-users. The concise format facilitates production in a variety of formats and languages for accessibility and wide distribution. The paper discusses the recommendations and their relationship to existing guidelines.

Supporting Blind Students in STEM Education in Austria

Andrea Petz, Klaus Miesenberger

Institute Integriert Studieren, University of Linz, Austria

Equal access to education will foster a knowledge society for all. In particular for the ICT based information society a benchmark has been set to raise the numbers of graduates in science, technology, engineering and mathematics (STEM) study courses by 15% (748.000) per year, asking for increased efforts in Europe (http://ec.europa.eu/education/policy/strategic-framework/index_en.htm). This holds even more true for people with disabilities who a) participate in and graduate from STEM at a much lower number and b) face a much higher unemployment rate, in particular in STEM related fields. This asks for sound and well-founded education – first and foremost in math – for people with disability and here especially for blind people.

A Network of Peers and Practices for Addressing Learner Variability: UDLnet

Katerina Riviou¹, [Georgios Kouroupetroglou](#)², Nikolaos Oikonomidis²

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Grounded on new research in neuroscience and the Design for All principles, Universal Design for Learning (UDL) constitutes an educational approach that promotes access, participation and progress in the general curriculum for all learners. The difficulty is in all cases translating the UDL principles and guidelines into practice. Though the UDL policy context supports a shift to inclusion, professionals need more support to develop their practice. In order to bridge the gap between policies and practice the UDLnet network aspires to address this necessity collecting and creating good practices under the framework of Universal Design for Learning. This paper presents the UDLnet project, its aims, the methodological framework, as well as the envisaged themes. UDLnet is a European network that aims to contribute to the improvement of teachers' practice in all areas of their work, combining ICT skills with UDL-based innovations in pedagogy, curriculum, and institutional organization.

THURSDAY 10/09/2015

11:30 - session 1

STS: Technological and Human Assistance for People with Cognitive Disabilities

Chairs: Lajos Izsó / Cecília Sik-Lányi

Track B: Lehár I-II Hall

Innovative Methods and Tools for Professionals Working in Supported Living Services for Intellectually Disabled Persons

Katalin Gruiz

Hungarian Down Foundation, Budapest, Hungary

Autonomy of mid-seriously and seriously intellectually disabled persons is encouraged both by legislations on human rights and the modern social care and services. The process leading to the maximum possible autonomy is illustrated by a developmental spiral in our model. Specialty of the development is that the personal educational projects are realized during everyday activities. The process requires conscious professionals with an empowering and motivating attitude, with adult relationship to the intellectually disabled persons and versatile skills and tools. In this educational relationship the social professional and the supported person are equal partners moving together along the spiral of human development. An innovative tool-battery has been developed aiding support-staff in the 'pedagogical' task embedded into everyday social services. The tool-battery and its first application in supported living services of the Hungarian Down Foundation are introduced in this paper.

Evidence-based Development and First Usability Testing of a Social Serious Game based Multi-modal System for Early Screening for Atypical Socio-cognitive Development

Miklós Győri¹, Zsófia Borsos¹, Krisztina Stefanik²

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² *Institute of Special Education for Atypical Cognition and Behavior, ELTE University, Budapest, Hungary*

At current, screening for, and diagnosis of, autism spectrum disorders (ASD) are based on purely behavioral data; established screening tools rely on human observation and ratings of relevant behaviors. The research and development project in the focus of this paper is aimed at designing, creating and evaluating a social serious game based multi-modal, interactive software system for screening for high functioning cases of ASD at kindergarten age. The aims of this paper are (1) to summarize the evidence-based design process and (2) to present results from the first usability test of the system. Game topic, candidate responses, and candidate game contents were identified via an iterative literature review. On this basis, the 1st partial prototype of the fully playable game has been created, with complete data recording functionality but without the decision making component. A first usability test was carried out on this prototype (n=13). Overall results were unambiguously promising. Although sporadic difficulties in, and slightly negative attitudes towards, using the game occasionally arose, these were confined to non-target-group children only. The next steps of development include (1) completing the game design; (2) carrying out first large-*n* field test; (3) creating the first prototype of the decision making component.

Evidence-based Development and Evaluation of Mobile Cognitive Support Apps for People on the Autism Spectrum: Methodological Conclusions From Two R+D Projects

Miklós Győri¹, Krisztina Stefanik², Ildikó Kanizsai-Nagy³

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² *Institute of Special Education for Atypical Cognition and Behavior, ELTE University, Budapest, Hungary*

³ *Autism Foundation, Budapest, Hungary*

A growing body of evidence confirms that mobile digital devices have key potentials as assistive/educational tools for people with autism spectrum disorders. The aim of this paper is to outline key aspects of development and evaluation methodologies that build on, and provide systematic evidence on effects of using such apps. We rely on the results of two R+D projects, both using quantitative and qualitative methods to support development and to evaluate developed apps (n=54 and n=22). Analyzing methodological conclusions from these studies we outline some guidelines for an 'ideal' R+D methodology but we also point to important trade-offs between the need for best systematic evidence and the limitations on development time and costs. We see these trade-offs as a key issue to be resolved in this field.

Applicability of Standard Eye-tracking Technique in People with Intellectual Disability: Methodological Conclusions from a Series of Studies

Judit Csákvári, Miklós Győri

Institute for the Psychology of Special Needs, ELTE University, Budapest, Hungary

Although considerable amount of evidence suggest that info-communication technologies have important potential to promote higher level of adaptive functioning and more efficient learning in people with intellectual disability (ID), very little is known about how people with ID scan visually the visual user interfaces of digital tools. Eye-tracking technique is widely used to study visual scanning processes and is used more and more extensively in assistive and educational technologies, too. Therefore, it is important to explore and understand the limitations and potentials of applying eye-tracking technique in people with ID. The present paper aims this by analyzing data from 4 studies (n=38/38 and n= 15/30), via contrasting data from people with ID with data from neurotypical (NT) control subjects along 3 variables, indicative of the applicability of eye-tracking technique. Results strongly suggest that there are specific difficulties in using eye-tracking in people with ID, showing considerable individual variability but depending also on the nature of the actual task. Consequentially, using eye-tracking in this group expectedly requires special considerations and specific solutions.

Developing an Animal Counting Game in Second Life for a Young Adult with Down Syndrome

Miklós Boleracki, Ferenc Farkas, Attila Meszely, Zoltán Szikszai, Cecilia Sik-Lányi
University of Pannonia, Veszprém, Hungary

Down syndrome is caused by trisomy of all or part of human chromosome 21 (HSA21) and is the most common genetic cause of significant intellectual disability. It is the most common chromosome abnormality in humans, occurring in about one per 1000 babies born each year. It is typically associated with physical growth delays, characteristic facial features, and mild to moderate intellectual disability [1]. The average IQ of a young adult with Down syndrome is 50, equivalent to the mental age of an 8- or 9-year-old child, but this varies widely. The purpose of this study is to create a tool in the virtual world Second Life to develop basic counting skills for young adults with Down syndrome. Following an international literature review, our project explored and used pre-programmed equipment, Linden Scripting Language, tables and intellectual interfaces with educational intentions. The study suggests that the product will not only aid the development of counting skills for young adults with Down syndrome, but will also create an entertaining environment for all visitors, furthermore promoting imagination and motivation within a virtual community.

THURSDAY 10/09/2015

11:30 - session 1

AT Outcome, Transfer and Policy

Chairs: Claire Bentley / Renzo Andrich

Track C: Brahms Hall

**Delivering Beneficial Impacts in Assistive Technology:
Improving Government's Approach to Innovation**

Joseph P. Lane

University at Buffalo (SUNY), New York, USA

Society typically relies on the industrial sector to supply product and service innovations through the free market system. In some areas of free market failure deemed important to society – such as Assistive Technology -- governments intervene by applying alternative innovation systems. This paper contends that governments consistently and inappropriately support an exploratory grant approach led by academia which generates knowledge in conceptual and prototype states, and instead should shift to a procurement contract approach led by industry which designs, tests and deploys commercial products and services.

Cost-effectiveness of Powered Wheelchairs: Findings of a Study

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¹ CITT, IRCCS Fondazione Don Gnocchi, Milano Italy

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This study surveyed a sample of 79 wheelchair users who had obtained powered wheelchairs from the National Health Service in an Italian Region in the period 2008-2013. The wheelchair prescriptions had been done on the basis of an assessment protocol agreed with the Local Health Authority. Follow-up interviews were carried out at the users' homes, in order to collect information about the wheelchair use and its effectiveness, usefulness and economic impact. The instruments used in the interviews included an introductory questionnaire (describing the wheelchair use), the QUEST (measuring the user's satisfaction), the PIADS (measuring the psychosocial impact, in terms of perceived changes in ability, adaptability and self-esteem), the FABS/M (detecting environmental facilitators and barriers) and the SCAI (estimating the economic impact). Overall, positive outcomes were detected for most users, especially in relation to their satisfaction and the psychosocial impact. A number of barriers were identified in various settings (at home, in public places, in natural spaces, in public transportation) that sometimes restrict the user mobility and thus may claim for corrective actions. Several environmental factors acting as facilitators were also identified. In relation to the economic impact, the provision of a powered wheelchair generated remarkable savings in social costs for most of the users, on average about 36.000 Euros per person on a projected 5-years span. This estimate results from the comparison between the social cost of the intervention (sum of the costs of all material and human resources involved in the provision and usage of the wheelchair) and the cost of non-intervention (the presumed social cost incurred in case no powered wheelchair had been provided and the user had to carry on with just a manual wheelchair). The study was also an opportunity to develop and try out a follow-up method that proved applicable within service delivery practice.

Comparing Three Knowledge Communication Strategies – Diffusion, Dissemination and Translation – Through Randomized Controlled Studies

Joseph P. Lane, Vathsala I. Stone

University at Buffalo (SUNY), New York, USA

This paper describes a series of three randomized controlled case studies comparing the effectiveness of three strategies for communicating new research-based knowledge (Diffusion, Dissemination, Translation), to different Assistive Technology (AT) stakeholder groups. Pre and post intervention measures for level of knowledge use (unaware, aware, interested, using) via the LOKUS instrument, assessed the relative effectiveness of the three strategies. The latter two approaches were both more effective than diffusion but also equally effective. The results question the value added by tailoring research findings to specific audiences, and instead supports the critical yet neglected role for relevance in determining knowledge use by stakeholders.

Testing Usability of Mobile Shower Commodes for Adults with Spinal Cord Injury: Research Method and Overview

Emma L. Friesen, Trevor G. Russell, Deborah Theodoros

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St Lucia, Australia*

This paper provides an overview of research to develop a new questionnaire testing mobile shower commode usability. It describes the methodology used to develop the questionnaire, and reports significant findings that have been published in peer-reviewed journals. Implications of the research and recommendations for further research on mobile shower commode usability are discussed.

Level Of Knowledge Use Survey (LOKUS): A Validated Instrument for Tracking Knowledge Uptake and Use

Joseph P. Lane, Vathsala I. Stone, Amanda Nobrega, Machiko Tomita

University at Buffalo (SUNY), New York, USA

Researchers working in fields intending to generate beneficial socio-economic impacts are increasingly challenged to demonstrate evidence that the findings from their studies have value to audiences beyond the peer academic community. These diverse and diffuse target audiences may include clinicians, consumers, manufacturers and information brokers. This paper summarizes a project that designed, constructed and validated a web-based instrument for collecting and analyzing self-reported data on knowledge use. The Level Of Knowledge Use Survey instrument is valid and reliable for measuring uptake of new knowledge and for tracking changes in level of knowledge use over time.

THURSDAY 10/09/2015

11:30 - session 1

eAccessibility I

Chairs: Peter Cudd / Gill Whitney

Track D: Liszt II-III Hall

The Cooperate Assistive Teamwork Environment for Software Description Languages

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¹ *FZI Research Center for Information Technology, Germany*

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Versatile description languages such as the Unified Modeling Language (UML) are commonly used in software engineering across different application domains in theory and practice. They often use graphical notations and leverage visual memory for expressing complex relations. Those notations are hard to access for people with visual impairment and impede their smooth inclusion in an engineering team. Existing approaches provide textual notations but require manual synchronization between the notations. This paper presents requirements for an accessible and language-aware team work environment as well as our plan for the assistive implementation of Cooperate. An industrial software engineering team consisting of people with and without visual impairment will evaluate the implementation.

Are Mainstream Mobile Technologies Bringing about New Opportunities for People with Disabilities? Insights from Three Case Studies

[Valerio Gower](#), Claudia Salatino, Lucia Pignini, Antonio Caracciolo

IRCCS Fondazione Don Carlo Gnocchi, Milano, Italy

The market of mobile technologies has considerably increased in the past few years and the costs have consequently decreased. This rapid technological evolution can be seen in two different ways from the perspective of people with disability: on the one side it represents a great opportunity to create new solutions for improving independence; on the other it may represent a source of social exclusion if appropriate assistive solutions are not available to make technology usable by people with disability. This paper describe three case studies of persons with disabilities that have undergone an Assistive Technology assessment at the DAT service of Fondazione Don Gnocchi (Milan, Italy) involving the use of mobile ICT based Assistive Technologies. In all the three cases the appropriate solution for performing the desired activities is represented by a combination of mainstream products and assistive products. The three use cases described support the idea that mobile technologies can be powerful and versatile instruments to create assistive solutions for improving independence in daily life.

Can We Fix the Web?

Irena Kolar, Gill Whitney

Middlesex University, Design for All Research Group, London, UK

This paper reports on an innovative approach to facilitating the expedient reporting of web accessibility issues using volunteers. The aim of the Fix the Web website and project is not to replace existing formal methods of reporting inaccessible websites, but to provide an easy, informal way by which users with disabilities can report inaccessible websites quickly and can be assured that a volunteer on their behalf will take the issue up with the website owner or administrator. Fix the Web was launched in 2010 and from a small start has gone onto success in dealing with nearly 150 inaccessible websites. The results of an analysis of reports of inaccessible websites received by the Fix the Web are also presented and the practical benefits and limitations of using an informal approach to achieve accessibility are discussed.

Better Questions, Better Answers: Structured Web Accessibility Evaluations for Non-Experts

Christian Bühler¹ Helmut Heck¹, Annika Nietzio¹, Frank Berker¹, Mikael Snaprud²

¹ *Forschungsinstitut Technologie und Behinderung (FTB) der Evangelischen Stiftung
Volmarstein, Germany*

² *Tingtun AS, Norway*

Large scale benchmarking of web accessibility can benefit from human input to complement results produced by automatic evaluation tools. This paper presents a novel method that enables non-experts to provide input on web accessibility. The semi-automatic approach guides the evaluators through a structured process with clear instructions. We present a template to describe different types of user input and an out-line of the empirical validation.

Accessible Web Design – The Power of the Personal Message

Gill Whitney

Middlesex University, Design for All Research Group, London, UK

The aim of this paper is to describe ongoing research being carried out to enable people with visual impairments to communicate directly with designers and specifiers of hobby and community web sites to maximise the accessibility of their sites. The research started with an investigation of the accessibility of community and hobby web sites as perceived by a group of visually impaired end users. It is continuing with an investigation into how to best to communicate with web designers who are not experts in web accessibility. The research is making use of communication theory to investigate how terminology describing personal experience can be used in the most effective and powerful way. By working with the users using a Delphi study the research has ensured that the views of the visually impaired end users is successfully transmitted.

THURSDAY 10/09/2015

14:00 - session 2

Ambient Assisted Living I

Chairs: Reuven Katz / Pier-Lugi Emiliani

Track A: Bartók Hall

Smart Houses and Uncomfortable Homes

Norman Alm, John Arnott

School of Computing, University of Dundee, Dundee, UK

In order for smart houses to achieve acceptance from potential beneficiaries they will need to match the users' expectation that their house is also their home, with the sense of privacy and control that this implies. Designers of this technology will need to be aware of findings in this regard from fields such as architecture and design ethnography.

A Plug&Play Brain Computer Interface Solution for AAL Systems

Niccolò Mora, Ilaria de Munari, Paolo Ciampolini

Information Engineering Dept., University of Parma, Parma, Italy

We present a complete BCI-enabled (Brain Computer Interface) solution for Ambient Assisted Living system control. BCI are alternative, augmentative communication means capable of exploiting just the brain waveforms to infer intent, thus potentially posing as a technological bridge capable of overcoming limitations in the usual neuromuscular pathways. The module was completely developed in a customized way, encompassing hardware and software components. We demonstrate the effectiveness of the approach on a practical control scenario in which the user can issue 4 different commands, at his own pace and will, in real-time. No initial calibration is necessary, in line with the aimed plug&play approach. Results are very promising, especially in false positives rejection, well improving over literature.

Open Ambient Intelligence Environments

Laura Burzagli, Pier-Luigi Emiliani

*Institute of Applied Physics "Nello Carrara", National Research Council of Italy,
Sesto Fiorentino, Italy*

The present impact of ambient intelligence concepts in eInclusion is first briefly reviewed. Suggestions and examples of how ambient intelligent environments should be specified, designed and used to favour independent living of people with activity limitations are presented.

BRIDGEViz: Towards an Interactive Data Visualization Tool for Exploration of Indoor Daily Life of an Older Adult

Hassan Saidinejad, Diego Bogni, [Sara Comai](#), Fabio Salice

Department of Electronics, Information and Bioengineering, Politecnico di Milano - Como Campus, Como, Italy

Interactive data visualization could be beneficial to gain insight into the data concerning the inhabitant and the environment collected by an ambient assisted living system. In this paper we present BRIDGEViz that is a web-based interactive visualization tool for the BRIDGE AAL system. It is an effort to help caregivers, the main target users, to explore the daily life dynamics of the inhabitant in order to detect life trends, deviation from daily norms, and search for potential causes of a problem. BRIDGEViz provides two main views and visualizations: the overview visualization for a holistic view of long-term data and the detailed view for a day-level detailed exploration. The visualizations are enriched by interaction mechanisms and some analytic support such as searching for similar days. We also conducted a user study with a demo version of our tool with a positive overall feedback.

Assessing User Needs and Requirements for Assistive Robots at Home

[Katharina Werner](#), Franz Werner

Raltec – Research Group for Assisted Living Technologies, Vienna, Austria

‘Robots in healthcare’ is a very trending topic. This paper gives an overview of currently and commonly used methods to gather user needs and requirements in research projects in the field of assistive robotics. Common strategies between authors are presented as well as examples of exceptions, which can help future researchers to find methods suitable for their own work. Typical problems of the field are discussed and partial solutions are proposed.

THURSDAY 10/09/2015

14:00 - session 2

AT and Accessibility for People with Dementia and Cognitive Disabilities I

Chairs: Charles Willems / Miklós Győri

Track B: Lehár I-II Hall

**Designing an Assistive Learning Aid for Writing Acquisition:
A Challenge for Children with Dyslexia**

Seemab Latif¹, Rabbia Tariq¹, Shehla Tariq¹, Rabia Latif²

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² Department of IS, MCS, National University of Sciences and Technology (NUST), Islamabad, Pakistan

In Pakistan, the biggest challenge is to provide high quality education to the individuals with learning disabilities. Besides the well known affordance issue, there is a lack of awareness regarding the term dyslexia and remedial teaching training that causes the identification as well as remediation of the dyslexic individuals at early stages in Pakistan. The research was focused to exploit the benefits of using the modern mobile technology features in providing a learning platform for young dyslexic writers. Based on potential usability requirements of young dyslexic writers stated by remedial teachers of dyslexics, an android based application is designed and implemented using the usability engineering process model to encourage the learning process and help dyslexic children improve their fundamental handwriting skill. In addition, a handwriting learning algorithm based on concepts of machine learning is designed and implemented to decide the learning content, evaluate the learning performance, display the performance results and record the learning growth to show the strengths and weaknesses of a dyslexic child. The research was also aimed to assess the usability of the learner-centered application by the targeted population by conducting a user acceptance test to evaluate their learning experience and benefits of the developed application to dyslexic users. The results of the evaluation provided by the participants revealed that application has potential benefits to foster the learning process and help children with dyslexia by improving their foundational writing skills.

Using a Participatory Action Research Design to Develop an Application Together with Young Adults with Spina Bifida

Helene Lidström^{1,2}, Magnus Lindskog-Wallander³, Eva Arnemo³

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² Department of Women's and Children's Health, Faculty of Medicine, Uppsala University, Sweden

³ Health and Habilitation Centre, Uppsala County Council, Uppsala, Sweden

Introduction: Young adults with spina bifida often have cognitive difficulties. As a result, young adults with disabilities are facing challenges with respect to housing, education, relationships and vocation which increases risk of unemployment

Aim: The aim is to describe a method to develop a smartphone application together with young adults with spina bifida as an assistive technology for cognition.

Method: In a Participatory Action Research approach, young adults (n = 5) with spina bifida were individually interviewed with Canadian Occupational Performance Measure (COPM). The participants' restrictions in everyday life activities, identified by COPM, were discussed in a focus group formed by the young adults and the result was analyzed using qualitative content analysis. Developing the application the principles of Human-Centered-Design and Universal Design was followed.

Result: An application made for iOS with a focus on usability and worthiness, done by creating a clear and intuitive interface, with a calendar function useful for example to initiate and plan social activities was developed.

Conclusion: The method seems useful when the outcome from the project, a beta version of an application for iOS Smartphone, was achieved in agreement with the participants. The study highlights the importance of involving individuals with disabilities when developing smartphone applications.

Conceptual Design of Haptic-Feedback Navigation Device for Individuals with Alzheimer's Disease

Rosalam Che Me¹, Alessandro Biamonti¹, Mohd Rashid Mohd Saad²

¹ *Politecnico di Milano, Milano, Italy*

² *University of Malaya, Kuala Lumpur, Malaysia*

Wayfinding ability in older adults with Alzheimer's disease (AD) is progressively impaired due to ageing and deterioration of cognitive domains. Usually, the sense of direction is deteriorated as visuospatial and spatial cognition are associated with the sensory acuity. Therefore, navigation systems that support only visual interactions may not be appropriate in case of AD. This paper presents a concept of wearable navigation device that integrates the haptic-feedback technology to facilitate the wayfinding of individuals with AD. The system provides the simplest instructions; left/right using haptic signals, as to avoid users' distraction during navigation. The advantages of haptic/tactile modality for wayfinding purpose based on several significant studies are presented. As preliminary assessment, a survey is conducted to understand the potential of this design concept in terms of (1) acceptability, (2) practicality, (3) wearability, and (4) environmental settings. Results indicate that the concept is highly acceptable and commercially implementable. A working prototype will be developed based on the results of the preliminary assessment. Introducing a new method of navigation should be followed by continuous practices for familiarization purpose. Improved navigability allows the good performance of activities of daily living (ADLs) hence maintain the good quality of life in older adults with AD.

Applying Guidelines for Evaluating Digital Technologies for People Living with Dementia: A Case Study

Phil Jodrell, Peter Cudd

*Centre for Assistive Technology and Connected Healthcare (CATCH),
School of Health and Related Research (SchARR), University of Sheffield, UK*

Affordable solutions are needed to offer the growing population of people diagnosed with dementia support to maintain independence. Assistive technology has the potential to address this issue but devices should be tailored to the needs of this population. Previous work has focused on the design of such technologies and in new work evaluation(trial) guidelines are proposed to offer consistency

amongst researchers looking to test completed products with intended users. The guidelines are implemented as trial protocol guidance and are applied to an existing protocol as a case example of how the guidelines could be used. Differences between the protocol and the guidelines are highlighted and provide evidence as to the potential usefulness of the document in informing an evaluation. The need for further development of the guidelines is also discussed and the authors state their intention to collaborate internationally in order to evolve the framework to the stage where it can be published as an accessible resource.

Persons with Dementia and Their Caregivers Using GPS

Tone Øderud¹, Bjørg Landmark², Sissel Eriksen², Anne Berit Fossberg³, Sigrid Aketun⁴, May Omland⁵, Karl-Gerhard Hem¹, Elisabeth Østensen⁶, Dag Aussen⁷

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² *Municipality of Drammen, Norway*

³ *Municipality of Bærum, Norway*

⁴ *Municipality of Oslo, Norway*

⁵ *Municipality of Skien, Norway*

⁶ *University of Oslo, Department of Nursing Science, Norway*

⁷ *SINTEF ICT, Oslo, Norway*

The aim of the study is to generate knowledge on the use of Global Positioning Systems (GPS) to support autonomy and independence for persons with dementia. By studying a larger cohort of persons with dementia (n=208) and their caregivers, this study provides essential knowledge for planning and implementing GPS technology as a part of public health care services. Commercially available GPS technology was provided to the cohort of 208 persons with dementia from nineteen different Norwegian municipalities. The participants used GPS when performing outdoor activities as part of their daily life during a period of time between 2012 and 2014. Their family caregivers were instructed on how to use the GPS technology for locating the participants. The study documents that using GPS for locating persons with dementia provide increased safety for the person with dementia, their family caregivers and their professional caregivers. Furthermore the results confirm that by using GPS, persons with dementia may maintain their autonomy, enjoy their freedom and continue their outdoor activities despite the progression of the disease. Preconditions for successful implementation are that health professionals are trained to assess the participant's needs, that ethical dilemmas are considered, that caregivers have adequate knowledge about using the technology and that procedures and routines for administrating the GPS and locating persons with dementia are established. Early intervention and close collaboration between persons with dementia, family caregivers and professional caregivers are important for successful implementation of GPS in public health care.

THURSDAY 10/09/2015

14:00 - session 2

AT Practice I

Chairs: Niels-Erik Mathiassen / Andreas Richter

Track C: Brahms Hall

Guidelines and Options for Computer Access from a Reclined Position

Ray Grott

The RET Project, San Francisco State University, San Francisco, USA

Many people can benefit from working in a reclined position when accessing a computer. This can be due to disabilities involving musculoskeletal weakness, or the need to offload pressure on the spine or elevate the legs. Although there are “reclining workstations” on the market that work for some people, potentially better solutions tailored to individual needs can be configured at modest cost by following some basic principles.

Stepwise Approach to Accessible MOOC Development

E.A. Draffan¹, Mike Wald¹, Kate Dickens¹, Gottfried Zimmermann², Sebastian Kelle², Klaus Miesenberger³, Andrea Petz³

¹ *University of Southampton, Southampton, UK*

² *Stuttgart Media University, Stuttgart, Germany*

³ *University of Linz, Linz, Austria*

Developing resources for online learning in its many guises and more recently for MOOCs has been discussed across the educational sector, usually by individuals working for one institution or organisation. Rarely are there discussions that highlight the issues of collaborative working on content that is delivered over a period of weeks for a wide range of abilities and skills. In particular there is a reluctance to face the issues presented by barriers to access for those with disabilities and even the issues that could arise should an academic be unable to access the development platform to present content. This paper aims to approach these issues by providing guidance in a series of practical steps that highlight an inclusive design approach.

DigiPlace4all: An Online Peer Support Community for Digital Skills

Mark Magennis¹, Esther Murphy¹, Andrean Lazarov², Karel van Isacker³, Kinga Dumnicka⁴, Malgorzata Polak⁴, Bernadette Meagher⁵, Philip Penny⁵

¹ *NCBI, Dublin, Ireland*

² *Interprojects, Bulgaria*

³ *PhoenixKM, Belgium*

⁴ *Fundacja Instytut Rozwoju Regionalnego, Poland*

⁵ *Institute of Art, Design & Technology, Ireland*

The DigiPlace4all online peer support community supports people with disabilities in developing digital literacy skills needed to transition from Vocational and Educational Training (VET) to mainstream education & employment. It facilitates the development of informal one-to-one peer support relationships between members who can post and respond to requests and offers of peer support and share information on a range of associated topics. It is active in Ireland, Belgium, Poland and Bulgaria and is being spread internationally.

Maximizing Employment Outcomes through the Use of “Lower-Tech” Assistive Technology & Rehabilitation Engineering

Ray Grott

The RET Project, San Francisco State University, San Francisco, USA

For many people with disabilities, Assistive Technology tools and Rehabilitation Engineering principles are key to successful employment outcomes. At the same time, employers and service providers are often under the impression that accommodations and AT solutions require high-tech, complicated, and expensive technologies. This paper discusses how creative problem solving and a “keep it simple” mindset can result in very functional low-cost solutions.

Usability of RemindMe- an interactive web-based mobile reminder calendar: A professional’s perspective

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¹ *Department of Social and Welfare Studies, Linköping University, Norrköping, Sweden*

² *Department of Rehabilitation and Department of Social and Welfare Studies, Linköping University, Norrköping, Sweden*

Aim: The aim of the study was to examine the usability of an interactive web-based mobile reminder calendar (RemindMe) developed for supporting individuals in organizing, planning and executing activities in everyday life, from the perspectives of professionals.

Methods and material: Eleven professionals working in community services evaluated the usability of RemindMe in their clinical practice. Data were collected using semi-structured interviews and analysed with inductive qualitative analysis.

Results: The professionals perceived that RemindMe was useful, easy to use, and intuitive. There was a need among professionals for a web-based reminder calendar that requires the active acknowledgement of reminders. RemindMe's feedback system offering self-monitored information based on the user's interaction with the system supported the professionals in discussions, evaluation, and follow-up based on the needs of the persons with cognitive impairments.

Conclusion: The results indicate that RemindMe may be potentially useful to professionals who provide support to individuals with cognitive impairments. However, further research is needed to evaluate experience of using RemindMe from the perspective of individuals with cognitive impairments.

THURSDAY 10/09/2015

14:00 - session 2

eAccessibility II

Chairs: Gill Whitney / Steve Lee

Track D: Liszt II-III Hall

Ontology-based Semantic Support to Improve Accessibility of Graphics

Tomás Murillo-Morales, Klaus Miesenberger

Johannes Kepler University, Linz, Austria

We aim to ease the process of authoring accessible graphics as well as taking a first step towards the long-term goal of allowing blind persons to access graphics autonomously. We are developing and experimenting with a hierarchical set of knowledge bases related to the presentation of visual objects and cues in the form of ontologies that will act as the formal, axiomatic underpinnings of an accessibility layer or, later on, a graphics reader/browser for blind and visually impaired people. The concept and prototypes of smart (or communicative) graphics [1], in which readers obtain information about the syntactic and semantic content through the use of e.g. a natural language interface, should be expanded by exploiting the benefits of formal semantics supported by domain- and task-aware ontologies describing the elements, visual cues and relations used for visualization or visual display.

Magnetic, Angular Rate and Gravity Sensor System Fusion for Orientation Estimation

Manuel R. Alfonso, Anselmo Frizera Neto, Klaus F. Côco

Electrical Engineering Department, Federal University of Espirito Santo, Brasil

This paper presents the development of a fusion strategy to integrate and calibrate signals from magnetometers, gyroscopes and accelerometers to implement a magnetic, angular rate and gravity (MARG) sensor system. The aim of such algorithms is to capture signals from the individual sensors and identify, compensate and reduce external and internal errors such as bias, scale factor and drifts, which highly depend on the noise levels. The necessary calibrations to ensure the reliability of captured data are also presented. The orientation data obtained by the proposed algorithm will be compared with a commercial motion capture system, which are currently being used by researchers in biomechanical analysis and in clinical motor rehabilitation studies.

A Comparative Study on Java Technologies for Focus and Cursor Handling in Accessible Dynamic Interactions

Prajaks Jitngernmadan, Klaus Miesenberger

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For an interactive application, supporting and guiding the user in fulfilling tasks is most important. The behavior of the application that will guide users through the procedures until they finish the task has to be designed intuitively and well guiding, especially if the users has only restricted or no access to the visual and spatial arrangement on the screen. Therefore, the focus/cursor management plays an

important role for orientation and navigating through the interaction. In the frame of ongoing research on a software tool supporting blind people in more efficiently doing mathematical calculations, we researched how Java technologies support implementing an accessible Graphical User Interface (GUI) with an additional focus on usable accessibility in terms of guiding blind users through the process of solving mathematical calculations. We used Java Swing [1] and Eclipse SWT [2] APIs for creating a series of prototypes. We tested a) accessibility and usability of the prototypes for blind people when using screen reader software and refreshable Braille display and b) the implementation support to developers provided by both technologies. It turned out that Eclipse SWT API delivered best results under Windows operating system.

Designing GUIs for Low Vision by Simulating Reduced Visual Acuity: Reduced Resolution Versus Shrinking

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Westerdals School of Art, Communication and Technology, Oslo, Norway*

The visual uniqueness of information carrying icon and text elements has received little attention in the HCI research literature. The information carrying elements of graphical designs must be visually unique in order to be visually recognizable. This is increasingly important with the diversity of form factors and types of information displays. This paper explores two simple strategies for testing visual designs by simulating low visual acuity, namely by reducing the resolution and by shrinking. Two case studies demonstrate that low vision simulation by shrinking is more effective than reducing the resolution. Moreover, the case studies show how the low vision simulation can help identify design aspects that need attention. Design shrinking is not a substitute for user testing on actual user groups, but meant as a tool for early screening of designs and an aid for designers to help understand the effects of their design. The method can also be used as a tool for communicating design problems and justifying design decisions to stakeholders of a project through presentations and reports.

THURSDAY 10/09/2015

16:00 - session 3

Ambient Assisted Living II

Chairs: Pier-Luigi Emiliani / Reuven Katz

Track A: Bartók Hall

An Identification Procedure for Behavioral Analysis in a Multi-User Environment

Claudio Guerra, Valentina Bianchi, Ilaria de Munari, Paolo Ciampolini

Department of Information Engineering, University of Parma, Parma, Italy

As the average age of the EU population increases, ICT solutions are going to play a key role in order to find answers to the new challenges the demographic change is carrying on. At the University of Parma an AAL (Ambient Assisted Living) system named CARDEA has been developed during the last 10 years. Within CARDEA, behavioral analysis is carried out, based on environmental sensors. If multiple users live in the same environment, however, data coming from sensors need to be properly tagged: in this paper, a simple technique for such tagging is proposed, which exploits the same wireless transmission used for transmitting data, thus not requiring additional hardware components and avoiding more complex and expensive (radio)localization techniques. Preliminary results are shown, featuring a satisfactory accuracy.

Tele-care Robot for Assisting Independent Senior Citizens Who Live at Home

Reuven Katz

Technion, Israel Institute of Technology, Haifa, Israel

In the last twenty years most developed countries face dramatic demographic changes, and predominantly the rapid aging of their population. As the share of elderly people is climbing while the number of care providers is declining, the aging problem is becoming an increasingly important social and economic challenge.

The supply of care at home, utilizing affordable tele-care systems and smart home technologies, is one of the promising strategies to cope with challenges posed by these demographic changes.

The goal of this paper is to present a tele-care robot (TCR) aimed to assist Senior citizens who live independently at their home, that need assistance in daily life activities. The idea of the proposed system is that a caregiver, operating from a central location, will be able to service between 10 to 20 patients living at their home, by using the tele-care robot. The robot will possess motion control capabilities to move inside the house of each patient and alert in case that emergency events occur. The robot will allow the care provider to communicate remotely with the patient using audio and video equipment installed on the robot. By using the robot, the caregiver will be able to examine several times during the day the well-being of the patient, his medication consumption, and his overall functionality.

Self-tuning Behavioral Analysis in AAL “FOOD” Project Pilot Environments

Niccolò Mora, Agostino Losardo, Ilaria de Munari, [Paolo Ciampolini](#)

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Behavioral analysis, based on unobtrusive monitoring through environmental sensors, is expected to increase health awareness of AAL systems. In this paper, techniques for assessing behavioral quantitative features are discussed, suitable for detecting behavioral anomalies in an unsupervised fashion, i.e., with no need of defining target reference behaviors and of tuning user-specific threshold parameters. Such technique is being exploited for analyzing data coming from a set of European pilot sites, in the framework of the EU/AAL-JP project “FOOD”, specifically focused at kitchen activity. Simple results are illustrated, suitable for proof-of-concept validation.

Combining Apps Targeting Professionals and Senior Citizens to Improve Housing Accessibility and Influence Housing Provision Policies

Tina Helle¹, Susanne Iwarsson², Tine Bieber Lunn¹, Mogens Holm Iversen³,
Oskar Jonsson², Knut Mårtensson², Tanja Svarre⁴, [Björn Slaug](#)²

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⁴ *deLearning Lab, Department of Communication and Psychology, Aalborg University, Denmark*

Two separate apps that address the increasingly important issue of accessible housing for senior citizens have been developed in different project settings. One of the apps was developed to facilitate the process for professional raters to assess housing accessibility in the context of individual housing adaptations. The other app was developed for senior citizens to raise their awareness of possible accessibility problems in their current dwelling and in other apartments within the available housing stock. Both apps were developed with a high degree of active user involvement in processes utilizing multiple state of the art methods. The results are two well accepted prototype apps perceived as user-friendly and appropriate for the intended user groups. By combining these two apps, our ambition is for the professional raters to benefit by gaining knowledge of their clients’ perceived needs and desires, and for senior citizens to benefit by getting access to a database of professionally rated dwellings. The ultimate goal is the generation of sound knowledge reflecting the needs and desires of senior citizens and professional requirements regarding accessible housing as a means to inform and influence housing provision policies.

How to Live Independently with or without Technology?

[Anne Kärki](#), Merja Sallinen, Jere Kuusinen

Satakunta University of Applied Sciences, Finland

This qualitative study aims to identify how Finnish elderly, aged 65 -82, consider technology as part of their life and how the learning of using technology is happening. Thematic interviews were carried out and transcribed to text. Content analysis was done and common elements were found. The analysis was done in researcher triangulation to enhance the reliability of the data extraction. Two main categories were named: lived life and the role of ICT/ICT AT, ICT support and education. We can

conclude that the results showed that there is a need to integrate ICT/ICT AT education into the daily life and rehabilitation of elderly. The most common need to use ICT is to be connected and to be able to follow the society. Also open discussion is needed concerning the divide between older and younger citizens. Based on the results the non-users who don't want to use technology also need to be considered in society by developing new service solutions for all. If being positive towards using technology this study showed that ICT skills can positively affect feeling of self-determination and quality of life.

Platform for Frail Elderly People Supporting Information and Communication

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² *School for Public Health and Primary Care (CAPHRI), Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands*

There is a growing need for technology to support the frail elderly living independently in home situations. Several telecommunication systems already exist. These systems are developed mainly from the perspective of healthcare professionals and focus on efficient delivery of healthcare services. They hardly meet the specific needs of the frail elderly. In this project a platform with specific needs of the frail elderly people has been designed, running on standard PCs. This system supports living independently, social participation, wellbeing, and asking for care services. The platform was evaluated and subjects assess the system as user friendly, and supportive for their independence and self-reliance. They recommend it to other users.

THURSDAY 10/09/2015

16:00 - session 3

AT and Accessibility for People with Dementia and Cognitive Disabilities II

Chairs: Klaus Höckner / Miklós Győri

Track B: Lehár I-II Hall

Distributed Cognition, Dementia and Technology

Norman Alm

School of Computing, University of Dundee, Dundee, UK

The devastating effects of dementia result from cognitive degradation, in particular, working-memory (short-term memory) and planning processes. In supporting people with dementia, carers must take over these cognitive functions on behalf of the other person. This is an exhausting job. Technology may be able to offer assistance here. Its development will be encouraged by viewing cognition as a distributed process, and not just as something that happens inside one person's head. This paper argues for this approach, with examples from existing technical and non-technical systems of support for people with dementia which have been proven to work.

Mobility: AT, Accessibility and Usability I

Mapping City Accessibility: Review and Analysis

Sara Comai¹, Daniel Kayange¹, Raffaella Mangiarotti², Matteo Matteucci¹, Secil Ugur Yavuz¹, Francesco Valentini³

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² *Dipartimento di Design, Politecnico di Milano, Milano, Italy*

³ *CRAiS, Italy*

The paper presents an analysis of prototypes, studies, and applications for the mapping of city accessibility, focusing mainly on sidewalks accessibility. Moreover, it presents the results of two focus groups that we organized both with electric and with manual wheelchairs to attain requirements and insights to design a user-friendly app for the collection and visualization of information about the accessibility of urban pedestrian pathways.

SIMON: Integration of Mobility and Parking Solutions for People with Disabilities

Alberto Ferreras¹, Ricard Barberà-Guillem¹, Juan Vicente Durá-Gil¹, José Solaz¹, Eva María Muñoz², Manuel Serrano², Antonio Marqués²

¹ *Instituto de Biomecánica de Valencia, Valencia, Spain*

² *ETRA Investigacion y Desarrollo, S.A., Spain*

Mobility and parking in urban areas are often difficult for people with disabilities. Obstacles include lack of accessible information on routes, transport alternatives and parking availability, as well as fraud in the use of the specific services intended for these citizens. The SIMON project aims to improve this

situation through the integration of different ICT solutions. SIMON is enhancing the European Parking Card for disable people with contactless technologies and integrates mobile solutions to support user unique identification in existing parking areas whilst preserving privacy. SIMON will also promote better mobility solutions for mobility including information, navigation and access to restricted areas.

Examples of the Application of the Cause-effect Ergonomic Evaluation Model to the Wheelchair Cushions

Ricard Barberà-Guillem, Álvaro Page, José Laparra, Juan V. Durá-Gil

Instituto de Biomecánica de Valencia, Valencia, Spain

This article highlights the potential of the application of the cause-effect model for the ergonomic evaluation in the field of cushions. User involvement in the prescription and development of assistive devices have been identified a key aspect for positive interventions, although the reality is that we lack of systematic approaches and examples of best practices. The potential benefits are identified for the development of new products and in the prescription process. Additional research would be necessary to better link the characteristics of the cushions and users with the biomechanical and physiological performance of the interface cushion-user and the consequences measured in health, user perception and activity performance. This article shows examples of the relationship in this three levels from the point of view of the user perception.

ODINS: On-Demand Indoor Navigation System RFID Based

Federico Bianchi, Andrea Masciadri, Fabio Salice

Department of Electronics, Information and Bioengineering, Politecnico di Milano, Como Campus, Milano, Italy

This paper presents an On-Demand Indoor Navigation System (ODINS) based on RFID technology. ODINS is a distributed infrastructure where a set of information points (Fixed Stations - FS) provides the direction to a user who has to reach the destination point he/she has previously selected. ODINS system is proposed for residencies hosting people with mild cognitive disabilities and elderly but it can be also applied to structures where people could be disoriented. The destination is configured at some reception points or it is a predefined (e.g. the bed room or a selected “safe” point). The destination is associated with a RFID disposable bracelet assigned to her/him. The path is algorithmically computed and spread to all FSs. Every time the user is disoriented, she/he can search for the closest FS that displays the right direction. FSs should be located in strategic positions and provide a user-friendly interface such as bright arrows. The complexity is “system-side” making ODINS usable for everyone.

THURSDAY 10/09/2015

16:00 - session 3

AT Practice II

Chairs: Peter Cudd / Sally Fowler-Davis

Track C: Brahms Hall

**Barriers and Facilitators to Uptake of Assistive Technologies:
Summary of a Literature Exploration**

E.A. Draffan¹, Abi James¹, Peter Cudd², [Claire Bentley](#)²

¹ *University of Southampton, Southampton, UK*

² *University of Sheffield, Sheffield, UK*

This paper aims to highlight some of the issues that arise with the uptake of assistive technology as found in the literature across four different domains: Telehealth; Telecare; Augmentative and Alternative Communication; and Education. The authors were not looking so much at service delivery models as user centred experiences and key words that were used to describe outcomes. The results showed remarkable similarities in the concerns of patients, families, users and other stakeholders. However, different terminologies across the fields highlighted the gulf between the fields, with professional 'silo-ing' of expertise occurring. There is a necessity for increased collaboration that could allow for knowledge sharing and enhanced assessment, uptake and continued use of assistive technologies for all potential users.

The Assistance Dog System in Finland. An Overview of the Current Situation and Suggestions

[Outi Töytäri](#), Sarianna Savolainen

National Institute for Health and Welfare, Helsinki, Finland

This paper describes the current situation of the assistance dog system in Finland; problems, development needs, benefits of assistance dogs and suggestions for a new system.

Progress of the European Assistive Technology Information Network

[Valerio Gower](#), Renzo Andrich

IRCCS Fondazione Don Carlo Gnocchi, Milano, Italy

The European Assistive Technology Information Network (EASTIN), launched in 2005 as the result of a collaborative EU project, provides information on Assistive Technology products and related material through the website www.eastin.eu. In the past few years several advancements have been implemented on the EASTIN website thanks to the contribution of EU funded projects, including a multilingual query processing component for supporting non expert users, a user rating and comment facility, and a detailed taxonomy for the description of ICT based assistive products. Recently, within the framework of the EU funded project Cloud4All, the EASTIN information system has also been federated with the Unified Listing of assistive products, one of the building blocks of the Global Public Inclusive Infrastructure initiative.

Collaboration between Industrial Designers and Design Engineers – Comparing the Understanding of Design Intent

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² *Department of Architecture, Design & Media Technology, Aalborg University,
Aalborg, Denmark*

This paper describes a case study comparing the understanding of design intent between industrial designers and design engineers. The study is based on the hypothesis that it is not all aspects of the design intent that are equally difficult to share between industrial designers and design engineers in the product development process. The study builds on five semi-structured interviews, where two industrial designers and three design engineers were interviewed about different aspects of the design intent. Based on our results, there seem to be indications that the more complex and abstract elements of industrial design knowledge such as the meaning, semantics, values, emotions and social aspects of the product are less shared by the design engineers. Moreover, the results also indicate that the different aspects of the design intent are perceived separately, rather than as part of a whole by the design engineers. The connection between the different aspects of the design intent is not shared between the industrial designer and design engineer making the shared knowledge less meaningful to the design engineers. The results of this study cannot be claimed to be conclusive due to the limited empirical material. Further investigation and analytically richer data are required in order to verify and broaden the findings. More case studies have therefore been planned in order to understand the area better.

Legal Framework of Universal Design on International, European and National Level

Erzsébet Földesi

National Council of Persons with Disabilities (FESZT), Budapest, Hungary

Universal Design Information and Research Center in Budapest, Budapest, Hungary

European Disability Forum, Brussels, Belgium

The Convention on the Rights of Persons with Disabilities (CRPD) and its Optional Protocol were adopted on 13 December 2006 at the United Nations Headquarters. One of the eight guiding principles that underlies the CRPD is accessibility, and a specific article, Article 9 provides for this very important theme. The definition of universal design is stipulated in Article 2 of the CRPD and is listed in the general obligations in Article 4 (f).

The Committee on Convention on the Rights of Persons with Disabilities (CRPD Committee) in its General Comment No. 2 addresses accessibility and advocates for the use of “universal design,” which makes society equally accessible to all persons. It ensures that all products, facilities, and services meet consistent accessibility standards.

In December, 2010 the CRPD was ratified by the European Union, meaning that undertakings contained in the CRPD are binding for the EU as well.

The presentation shows how legal instruments and standards can enhance universal design on European level.



The presentation introduces the activities of the Hungarian Universal Design Information and Research Center run by an organisation of Disabled People's to promote universal design among future engineers will be introduced.

THURSDAY 10/09/2015

16:00 - session 3

eAccessibility III

Chairs: Renzo Andrich / Surinder Bangar

Track D: Liszt II-III Hall

Balancing Game Universes for Playing without Sight or Hearing

Thomas Westin, Malin Furöstm, Roy Yasasindhu, Lena Norberg, Mats Wiklund,
Peter Mozelius

Stockholm University, Department of Computer and Systems Sciences, Kista, Sweden

Equal access to cultural activities is important for inclusion and computer gaming is one of the most common activities in digital culture. However, many people with impairments are excluded from participating. While parallel game universes (PGUs) provide a method to achieve equal access, the question is: how can a balanced collaborative real-time game be designed with the help of PGU for playing without sight or hearing? Balance is a central concept in game design and is important to avoid perceived cheating or disadvantages due to individual or environmental differences. The question was examined with a design science approach, where a game prototype was created in two iterations with a structured design method and evaluated using interviews and observations. In this first step of a more long-term study, ten experienced gamers without impairments were selected with purposive sampling to provide relevant data through simulation of temporary impairments or environmental issues, which can affect many or all gamers. By sorting out these issues first, later testing with actual blind and deaf gamers can focus on more specific issues for each group. The ten participants played either without sight or hearing. The results confirm the use of PGUs for creating a balanced experience but also finds that while multiplayer feel is not optimal, it is a reasonable trade-off for universal access for blind and deaf being able to play together. The results also show that a help system and equal understanding of the game play between the blind and deaf players are important aspects to achieve game balance. Further research should be done involving actual blind and deaf gamers, and similar evaluations of game balance should be conducted with users having other types of impairments.

Embedded Systems for Supporting Computer Accessibility

Davide Mulfari, Antonio Celesti, Maria Fazio, Massimo Villari, Antonio Puliafito

DICIEAMA, Faculty of Engineering, University of Messina, Messina, Italy

Nowadays, customized AT software solutions allow their users to interact with various kinds of computer systems. Such tools are generally available on personal devices (e.g., smartphones, laptops and so on) commonly used by a person with a disability. In this paper, we investigate a way of using the aforementioned AT equipments in order to access many different devices without assistive preferences.

The solution takes advantage of open source hardware and its core component consists of an affordable Linux embedded system: it grabs data coming from the assistive software, which runs on the user's personal device, then, after processing, it generates native keyboard and mouse HID commands for the target computing device controlled by the end user. This process supports any operating system available on the target machine and it requires no specialized software installation;

therefore the user with a disability can rely on a single assistive tool to control a wide range of computing platforms, including conventional computers and many kinds of mobile devices, which receive input commands through the USB HID protocol.

Emergent Application on Smart Phone for Deaf, Language Dysfunction and Foreigners

Communication method to perform swift rescue report by refined icons with GPS technology

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² *Chiba Prefectural University of Health Sciences, Chiba, Japan*

³ *Keio University, Tokyo, Japan*

This paper discusses the efficiency of the Emergent Application on Smart Phones (EASP). In an initial survey, hearing impaired people are asked to explain their difficulties in an emergency situation. With this survey as background, an application with five steps is implemented on Smart Phone touch panels using outcome icons and pictograms to communicate to a call centre in the fire brigade. The evaluation results with EASP application by deaf people found that it was about five times quicker to report an emergency using this tool, than it by using text message input.

AT for Blind and Low Vision People I

Versatile Text Extraction System for Text-to-Speech Reading Assistant Camera

Hideaki Goto

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Wearable camera device translating the text in the scene into speech is one of the most anticipated devices for the visually-impaired. The users would probably want to read any text using such a device. Although various scene text extraction methods have been developed so far, the target objects are most often limited to simple signboards, small memos, etc. We propose a versatile scene text extraction method that can handle a wide variety of targets including complex signboards with many text lines. Experimental results show that our system runs at a video rate and can extract densely arranged text lines even with some distortion and shading. A locally-adaptive binarization technique contributes to the better quality of extracted text images.

Validation of Mobility of Pedestrians with Low Vision Using Graphic Floor Signs and Voice Guides

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³ *KICTEC Inc., Aichi, Japan*

Some people with low vision or elderly persons tend to walk while watching a nearby floor, therefore, they often overlook or hard to read suspended signs. In this study, we propose two kinds of voice guides, and an experiment is conducted by participants with low vision using these voice guides and graphic floor signs in order to investigate effectiveness of these combinations. In clock position method (CP), each direction of near facilities are described in using an analogy of a 12-hour clock. Meanwhile, in numbering method (NU), near facilities are put the number in clockwise order, however, each direction are only illustrated in a crossing sign. As a result of an experiment, it is showed that both voice guides are effective for pedestrians with low vision. NU is used as a complement of graphic floor signs. Meanwhile, CP is used independently with graphic floor signs, however, there is a risk in the case of using in the environment where pedestrians are easy to mistake the reference direction defined by the sounding speaker.

FRIDAY 11/09/2015

09:30 - session 4

STS: Ageing, Disability and Technology: Creating Healthy Environments to Support Ageing and Disabled Persons

Chairs: Helianthe Kort / Veronika Szűcs

Track A: Bartók Hall

Visual Functioning of Aging Care Professionals and the Influence of Light, a Brief Literature Study

Efthymia Apodoulouianaki¹, Mirjam van Tilborg², Helianthe S.M. Kort^{1,2}

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² *Utrecht University of Applied Sciences, Faculty of Health Care, Research Centre for Innovation in Health Care, Research Group Demand Driven Care, Utrecht, The Netherlands*

Ageing is an important factor that affects visual functioning. In the Netherlands the average age in healthcare facilities is on increase. The current study is a preliminary literature review regarding the influence of light on the visual functioning of the aging workforce and their related tasks.

Creating Healthy Nursing Home Environment via Lighting Interventions: A Theoretical Approach

Emelieke R.C.M. Huisman^{1,2}, Helianthe S.M. Kort^{1,2}

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² *Eindhoven University of Technology, Department of the Built Environment, Eindhoven, The Netherlands*

In the Netherlands long-term care facilities made investments in order to improve the well-being of their residents and to support healthcare professionals in their daily task. Light is one of the technical solutions that might be contribute to support the well-being of older residents in long-term care facilities. This study investigates which possibilities are available to enrich the current situation to support the well-being, activities of daily living, and quality of life of older residents from lighting perspective. The light measurements show that the conditions are low and the value of 750 lux mainly reached on measurements points close to the window area. In this field study the light conditions are improved through a static lighting system. Further research is needed in order to investigate how the new light plan affect the quality of life and to define light guidelines for long-term care facilities.

Measurements of Speech Intelligibility in Common Rooms for Older Adults as a First Step towards Acoustical Guidelines

Jikke Reinten^{1,2}, Nicole van Hout², Constant Hak³, Helianthe Kort^{1,3}

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² *Level Acoustics, Eindhoven, The Netherlands*

³ *Eindhoven University of Technology, Eindhoven, The Netherlands*

Adapting the built environment to the needs of nursing- or care-home residents has become common practice. Even though hearing loss due to ageing is a normal occurring biological process, little research has been performed on the effects of room acoustic parameters on the speech intelligibility for older adults. This article presents the results of room acoustic measurements in common rooms for older adults and the effect on speech intelligibility. Perceived speech intelligibility amongst the users of the rooms was also investigated. The results have led to ongoing research at Utrecht University of Applied Sciences and Eindhoven University of Technology, aimed at the development of acoustical guidelines for elderly care facilities.

Development of the Environmental Observation Scale for the Visual Impaired

Marianne Sinoo¹, Helianthe Kort^{1,2}

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² *Eindhoven University of Technology, Eindhoven, The Netherlands*

In order to raise awareness of professional care, an Environmental Observation scale for the Visual Impaired (EOVI) was developed. It is the purpose of this tool that professional caregivers learn to observe the nursing home environment and consequently propose and discuss potential changes in the short and long term. The mean time of filling out the EOVI in eight wards of a nursing home by two student researchers was 17 minutes (min mean 12, max mean 22,5). All of 10 optometry students reported that the EOVI changed their awareness.

The Influence of Dry Eye and Office Environment on Visual Functioning

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¹ *Utrecht University of Applied Sciences, Research Centre for Innovation in Healthcare Research Group Demand Driven Care, Utrecht, The Netherlands*

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Environmental factors, such as high airflow and low relative humidity, are known to promote dry eye symptoms during reading tasks in office workers. These symptoms are associated with an adverse impact on daily activities at work. This study reports on the relationship between eye symptoms and environmental factors in 294 employees at one office location.

FRIDAY 11/09/2015

09:30 - session 4

Mobility: AT, Accessibility and Usability II

Chairs: Klaus Höckner / Luc de Witte

Track B: Lehár I-II Hall

PONS – Mobility Assistance on Footpaths for Public Transportation

Reinhard Koutny, Klaus Miesenberger

Institute Integrated Study of the JKU, Linz, Austria

This paper presents an ongoing project targeting mobility support for users of public transportation including people with limited mobility. Existing approaches in this field mostly offer non-continuous guidance during the whole journey including multiple rides with different vehicles and footpaths in between at transfer points. Especially people with limited mobility, like people with disabilities and elderly people, or travelers who are not familiar with the specific route or transfer point, like tourists, often struggle with public transportation. They crave for a seamless approach covering all links of the mobility chain – the sequence of sections of the whole route – and providing comprehensive assistance throughout the whole journey. Previous projects and widespread experiences of project partners revealed that especially footpath sections are lacking proper support. In particular, the consortium identified three problem areas in existing approaches when dealing with footpath sections: (1) A lack of information, (2) a lack of orientation and (3) a lack of provision of services. In order to bridge (lat. PONS) these gaps in the mobility chain, new paradigms and technology concepts are developed to tackle the shortcomings on footpaths and combined in a toolkit to help developers of applications with focus on pedestrian navigation and public transport to improve their solutions with sustainable and state-of-the-art approaches.

Biomechanics and Physiology for Propelling Wheelchair Uphill Slope

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⁵ *Nishikyushu University, Japan*

⁶ *Hiroshima International University, Japan*

A vertical slope of sidewalks significantly inhibits to the mobility of manual wheelchair users in their daily life. International guidelines of the vertical slope are specified approximately 4% or 5% (1:20) gradient or less as preferred, and allow 8.3% (1:12) as its maximum when it is impossible. Relevant research of the physical strain for wheelchair users with pushing on slopes, and the validity assessment of slope guidelines have been investigated. However, the analysis for the effect of a slope distance and their transient performance are still remained. The purpose of this study is to clarify the physiological and biomechanical characteristics of manual wheelchair users that propelling a wheelchair on an uphill slope. We measured these data by a metabolic analysis system, a heart rate monitor system and an

instrumented wheelchair wheel. Sixteen unimpaired subjects (non-wheelchair users) were examined to investigate the effect of a long slope with 120m distance and 8% gradient. And five wheelchair users with cervical cord injury were examined to evaluate the influence of different gradients (5%, 6.7%, 8.3%, 10% and 12.5%) with 3m length in laboratory. Our experimental results of the long slope showed that wheelchair propulsion velocity and power increased considerably at the beginning of the slope where the peak mean value of them were 0.96 m/s and 70.8W and they decreased linearly to 0.55m/s and 33.6W at final interval. A mean oxygen uptake and heart rate were increased as the distance increased and their results indicated the extremely high exercise intensity at a final interval that were 1.2liter /min and 152bpm. While wheelchair pushing cadence reduced after an initial interval, mean of strokes per10m increased to compensate the decrease of upper limb's power. The results of different gradients indicated that the normalized power of subjects with cervical cord injury was significant difference between each subject in the ability to climb a slope. Mean normalized power were 0.23W/kg on a 5 % slope, 0.24W/kg on 6.7%, and 0.26W/kg on 8.3% respectively. Based on these findings, we examined the relationship between the theoretical normalized power and the lowest velocity to climb a slope, and we might indicate the ability to push on an uphill slope for the persons with manual wheelchair user.

Agile Walker

Reuven Katz

Technion, Israel Institute of Technology, Haifa, Israel

The goal of the Agile Walker is to improve the outdoor mobility of healthy elderly people with some mobility limitations. It is a newly developed, all-terrain walker, equipped with an electric drive system and speed control that can assist elderly people to walk outdoors or to hike. The walker has a unique product design with an attractive look that will appeal to “active-agers” population. This paper describes product design requirements and the development process of the Agile Walker, its features and some preliminary testing results.

Way-Finding Support in Public Transport Environments provided by the NAMO Mobile Travel Assistance System

Christian Bühler, Helmut Heck, Annika Nietzio, Frank Reins, Frank Berker

*Forschungsinstitut Technologie und Behinderung (FTB) der Evangelischen Stiftung
Volmarstein, Wetter, Germany*

The NAMO travel assistance system is a mobile application providing support for elder travellers in public transport and on foot. The system combines technical and human support during the journey, especially in situations where many seniors experience orientation difficulties. Several approaches to way-finding and orientation support have been developed. This paper introduces the different approaches and presents the results of the extensive user evaluations, leading to recommendations for future development of mobile travel assistance applications for seniors.

FRIDAY 11/09/2015

09:30 - session 4

STS: Increasing independence of informal carers (IIC 2015)

Chairs: Martin Morandell / Miroslav Sili

Track C: Brahms Hall

Support Services for Informal Caregivers: First Results of Expert Interviews with Providers in the City of Vienna

Susanne Hensely-Schinking

*Vienna University of Technology, Institute for Design and Assessment of Technology,
Multidisciplinary Design Group, Vienna, Austria*

The burden of informal caregivers can be potentially reduced with support services targeting them primarily. But when it comes to the utilization of such services, there are still barriers on the side of suppliers and demanders that leads to the fact that too less concerned people are making use of it. Expert interviews were done with offering institutions in the City of Vienna to find out more about the types of offered support services, consideration of special circumstances, utilization behavior, awareness, benefit, costs and future development. This paper is presenting the preliminary results of the data analysis of the first round of interviews that shows the status quo of utilization of support services for informal caregivers in the City of Vienna.

Acceptance Criteria of Ambient Assistant Living Technologies

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³ *Technical University Vienna, Austria*

Ambient Assisted Living (AAL) is a growing field resulting from aging populations in the majority of the well-developed regions of the world. AAL technologies aim at supporting independent living at home and therefore, include a wide variety of innovations. However, even though AAL technologies are on the rise, the acceptance of them among the elderly population is still low. In order to elaborate acceptance criteria, the state of the art on opinions and perceptions of elderly people about AAL technologies, is summarized. A total of eleven acceptance criteria are excerpted from this and a diagram is created to show their connections. This information can be helpful for the developers of future AAL technologies, so that they have a better idea of aspects they have to consider to improve the acceptance of their technology. The excerpted criteria are illustrated based on the FEARLESS – life comfort system, which is an image-based fall detection system as an example for a recently developed AAL technology.

RelaxedCare – Connecting People in Care Situations: User Involvement to Collect Informal Caregivers Needs

Marcel B.F. Uhr¹, Bianca Redel¹, Martin Biallas², Aliaksei Andrushevich², Martin Morandell³, Sandra Dittenberger⁴, Andrea Koscher⁴

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⁴ *New Design University, St. Pölten, Austria*

“How is my mom doing right now?” Answering this question in a quick, clear way without the need of calling or stopping by could take away a lot of stress from informal caregivers. The RelaxedCare system aims to develop a solution built upon an existing AAL platform, using a multi-level pattern recognition approach to detect the current state of an assisted person, and then to communicate the state in a pervasive and unobtrusive way (i.e. lava lamp, smartphone widget, picture frame) to the caregiver. For the development of the RelaxedCare system a user centred design approach has been chosen applying especially the ISO 9241-210 [3] and the user-inspired innovation process [2]. A first technical prototype was evaluated with representative end users in lab trials via usability testing to find out, how the generated ideas match with the end user needs. The results show that the project is on the correct path. The majority of participants approved, that the RelaxedCare system supports the informal caregiver in a worry-free way to care for the assisted person (thus allowing the older generation to live longer in their own homes). 19 of 25 participants felt an advantage by using the system in their care situation in general. Overall 18 of them rate the advantage of the usage at home positively and 20 of them rate the usage positively, if they use it on the way. Also interesting is that in total 19 participants could imagine, that there would be an improvement of the care situation for their own family through the RelaxedCare system.

YouDo -We Help! -An Open Information and Training Platform for Informal Caregivers

Miroslav Sili¹, Daniel Bolliger², Jürgen Morak¹, Matthias Gira¹, Kerstin Wessig², Dominik Brunmeir¹, Johannes Kropf¹, Hilda Tellioglu³

¹ *AIT Austrian Institute of Technology GmbH, Vienna, Austria*

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³ *Vienna University of Technology, Multidisciplinary Design Group, Vienna, Austria*

The number of people in need of care increases constantly, and in the coming few years many seniors will depend on their close relatives for their care needs. These relatives very often need support to fulfill their role as informal caregivers. The YouDo prototype presented in this paper aims to provide special training programs for informal caregivers in order to help them to improve the quality of their nursing. This work illustrates first development concepts, used methods and techniques towards a modular, extensible and user adaptable multimodal information and training platform.

Modes of Independence while Informal Caregiving

Hilda Tellioglu, Susanne Hensely-Schinkinger, Aparecido Fabiano Pinatti de Carvalho

Vienna University of Technology, Multidisciplinary Design Group, Vienna, Austria

This paper is about understanding and conceptualizing the notion of independence in the context of caregiving. Based on the current studies and on our ethnographic and design research in an AAL project (TOPIC) we introduce a model of independence consisting of four dimensions: action, finance, decision, and emotion. These interrelated dimensions are described and discussed in the setting of informal caregiving. Some additional examples are shown to illustrate how to reduce the dependence of informal caregivers before concluding the paper.

FRIDAY 11/09/2015

09:30 - session 4

AT for Blind and Low Vision People II

Chairs: Andreas Richter / Dominique Archambault

Track D: Liszt II-III Hall

Proposal for SVG2DOT: An Interoperable Tactile Graphics Creation System Using SVG outputs from Inkscape

Kazunori Minatani

National Center for University Entrance Examinations (NCUEE), 2-19-23, Komaba, Meguro-ku, Tokyo, Japan

For this study, I developed a software that converts SVG outputs from Inkscape to tactile graphics. Inkscape is easy to learn because it can be manipulated like any other typical drawing application and has a layer function which enables robust support in the creation of tactile graphics. In a simple evaluation, it is confirmed that the method of drawing a master in Inkscape and converting it with SVG2DOT was nearly as efficient as using a conventional tactile graphics drawing application.

Visibility of LED Blocks Mounted on Crosswalk Boundaries for low Visual Capacity

Norihiro Ikeda², Kazuya Takahashi³, Tomoyuki Inagaki⁴, Katsuya Sato¹, Sin-Ichi Ito¹, Motohiro Seiyama¹, Kiyohito Takeuchi², Hiroshi Ogino², Shoichiro Fujisawa¹

¹ *Tokushima University, Tokushima, Japan*

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³ *General Support Co. for the Visually Impaired, Japan*

⁴ *Nihon University, Japan*

According to the WHO, about 80% of visually impaired persons in the world are with low visual capacity. It is considered that LVs' safe independent mobility will be improved as employing Tactile Walking Surface Indicators (TWSIs). In the night, guidelines for constructing warning blocks, a kind of tactile surface indicator, have not been well established. Therefore, crossing crosswalks is one of the most dangerous situations for visually impaired persons. We thus developed novel LED blocks that indicate crosswalk boundaries between sidewalks and roadways. This study addresses the LED blocks under various environmental illuminations and illumination from the opposite side of the crossing.

Development of a Portable Two-Way Communication and Information Device for Deafblind People

Oliver Ozioko, Marion Hersh

Biomedical Engineering, University of Glasgow, Glasgow, Scotland

This paper presents research on the development of a wearable two-way communication and information device for deafblind people who use tactile communications methods, namely the British deafblind manual alphabet and/or Braille. The device has two components: a glove worn by the deafblind person and a handheld display with keypad to be used by their hearing and sighted communication partner. Users can send messages using pressure sensors embedded in the glove and receive them by means of vibration on the palm. The two components are linked by Bluetooth and the use of Bluetooth to communicate with computers, mobile phones and other Bluetooth enabled devices is being investigated. The design was informed by feedback obtained from a survey of deafblind people and interviews with staff in two organisations for deafblind people. Research and development of the device is still ongoing.

Wearable Technology to Help with Visual Challenges –Two Case Studies

Viktor Kálmán¹, Csaba Baczó¹, Makis Livadas², Tamás Csielka¹

¹ *Ateknea Solutions Hungary, Budapest, Hungary*

² *Brunel Innovation Centre, London, UK*

Today as embedded computing technology and sensors become cheaper and smaller wearable technologies experience an unprecedented boom. This article presents two wearable systems that aim to help people with low vision and the blind in performing everyday tasks and doing sports. DIGIGLASSES is a project aimed at creating a pair of augmented reality digital glasses that present controlled light and contrast levels and marks selectable features on the field of vision to aid in everyday tasks. BLINDTRACK is guidance system that uses wireless localization and an innovative haptic feedback belt to guide blind runners along the running track. Both systems are briefly presented along with the most relevant technical details and user feedback where applicable. Both projects were funded by the EU FP7.

2D Presentation Techniques of Mind-maps for Blind Meeting Participants

Stephan Pölzer, Klaus Miesenberger

Johannes Kepler University of Linz, Institute Integriert Studieren, Linz, Austria

Mind-maps, used as ideation technique in co-located meetings (e.g. in brainstorming sessions), which meet with increased importance in business and education, show considerably accessibility challenges for blind meeting participants. Besides an overview of general aspects of accessibility issues in co-located meetings, this paper focuses on the design and development of alternative non-visual presentation techniques for mind-maps. The different aspects of serialized presentation techniques (e.g. treeview) for Braille and audio rendering and two dimensional presentation techniques (e.g. tactile two dimensional array matrix and edge-projection method [1]) are discussed based on the user feedback gathered in intermediate tests following a user centered design approach.

FRIDAY 11/09/2015
11:30 – keynote lectures

**Designing Dedicated Assistive Technology or Adapting Mainstream Technology?
Examples from Intellectual Disabilities**

Penny Standen

Nottingham University, Nottingham, UK

An increasing number of children with profound and multiple disabilities (PMID) are surviving to school age and beyond. Even special schools struggle to meet their educational needs. At the same time we are all living longer but can still expect to spend our later years with reduced ability. In spite of these increasing numbers, technology designed for those with a disability is expensive and people are reluctant to use it. In Nottingham, we have been exploring the use of adapted mainstream technology such as contact microphones, robots, eye gaze capture and brain computer interfaces to facilitate communication and access to electronic based learning materials in children with PMID. The presentation will describe some of this work to enhance learning in pupils with PMID, the challenges experienced evaluating its effectiveness and how future developments in technology might benefit those with disabilities as well as those without.

FRIDAY 11/09/2015

14:00 - session 5

Ageing, Disability and Technology

Chairs: Christian Bühler / Katerina Mavrou

Track A: Bartók Hall

Operational Assistance for Elderly People by Using Audio Rhythms

Hiroko Akatsu¹, Akinori Komatsubara²

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² *Waseda University, Tokyo, Japan*

Recently, Information Technology (IT) machines with complicated function are requiring better user assistance, particularly for elderly people. It is necessary to reduce the psychological load such as a sense of insecurity and impatience in operation, as well as the cognitive load. One approach to reduce psychological load is voice guidance. However many elderly people may become confused due to the speed of guidance. Sometimes it is too fast or too slow. Ideally it must synchronize to the user's operational pace reflecting context of use. This research focuses on enhanced operational rhythm to reduce psychological load on the elderly when using a Multiple Function Printer (MFP), which requires the user to navigate between quite a few settings. Evaluation was carried out by observing elderly subjects using an MFP interface whilst hearing a metronome at a tempo of 40, 60 and 120 bpm (beats per minute). The number of operational errors and overall time taken were recorded along with subjective evaluation via interviews with the subjects. The results showed that providing audio rhythm is effective, however a rhythm which is too fast produces a negative effect.

Beyond Qualitative and Subjective Techniques to Assess Usability of Banking Interfaces for Senior Citizens

José Laparra-Hernández, Enric Medina, María Sancho, Carolina Soriano, Juanvi Durá,
Ricard Barberà-Guillem, Raket Poveda Laparra-Hernández

Instituto de Biomecánica de Valencia, Valencia, Spain

Senior citizens can benefit from banking services but the lack of usability hampers this possibility. New approaches based on physiological response, eye tracking and user movement analysis can provide more information during interface interaction. This research shows the differences depending on user knowledge and use of technology, gender and type of interface.

Automatic Quiz Generation for the Elderly

Weiqin Chen^{1,2}, Jeanette Samuelsen¹

¹ *University of Bergen, Bergen, Norway*

² *Oslo and Akershus University College of Applied Sciences, Oslo, Norway*

According to the literature, ageing causes declines in sensory, perceptual, motor and cognitive abilities. The combination of reduced vision, hearing, memory and mobility contributes to isolation and depression. We argue that memory games have potential for enhancing the cognitive ability of the elderly and improving their life quality. In our earlier research, we designed tangible tabletop games to help the elderly remember and talk about the past. In this paper, we report on our further research in the automatic generation of quizzes based on Wikipedia and other online resources for entertainment and memory training of the elderly.

SHARON: a Simulator of Human Activities, ROutines and Needs

Fabio Veronese, Daniele Proserpio, Sara Comai, Matteo Matteucci, Fabio Salice

*Department of Electronics, Information and Bioengineering,
Politecnico di Milano, Como, Italy*

In a few decades, requests for assistance to the elderly will increase the already high health care costs. Within this context, a possible solution is represented by smart environments where services help dwellers' life. The development of smart technologies requires large datasets for training, validation or testing. Since the data collection from real smart homes has high costs the authors developed SHARON – a Simulator of Human Activity, ROutines and Needs. This software aims to support such projects, virtually reproducing environments and behaviors of the dwellers.

This work proposes and validates a behavioral model able reproduce decisions and human habits, starting from an available data set or an interview. Physiological parameters and habits are merged with a probabilistic approach, choosing the most likely activity. With respect to other behavioral simulators available in the literature, SHARON is focused on routines and activities generation, based on user defined high level parameters. Within the evaluation phase it was applied a cross-validation approach, by simulating 300 days starting from a training set of 23 days and testing with the remaining 7 days validation set. As expected, results prove the simulated data correctly reproduce the activities routine distributions, in particular the more regular ones.

Education and Training in AT, AAC (co-organised with the ENTELIS network) I

Deciding to Apply for, Receiving and Starting to Use Assistive Technology Devices – an Enigmatic Journey

A qualitative study of the experiences of older individuals

Astrid Gramstad^{1,2}, Sissel Lisa Storli¹, Torunn Hamran^{1,2}

¹ Department of Health and Care Sciences, Faculty of Health Sciences, UiT
The Arctic University of Norway

² Centre for Care Research North Norway

Providing assistive technology devices (ATD) is one of many interventions used to enable older individuals to age at home and has the promise to be a cost-effective and constructive part of the solution to future health care challenges (1, 2). However, previous research indicates that older individuals are ambivalent to the ATD, in that they acknowledge the ATD for its practicality and usefulness, while resisting the symbolic meanings of disability and old age that the ATD evoke (3-6). It has been theorised that this ambivalence may result in a delay to apply for ATD (7) or a resistance to use the ATD (8, 9). It has been argued that a client centred approach, in which the clients' values, expectations and needs are explored and acknowledged by the health care professionals, is necessary to ensure a successful ATD service delivery (10-13). Despite this, previous research have pointed out that clients are least satisfied with professional services related to follow-up and evaluations of the ATD (14-16). However, a study on client experiences also shows that some clients don't feel the need for follow-up on the ATD (14). It would be interesting to investigate any differences between clients' needs for follow-up. Thus, it is necessary to explore the experiences of older individuals throughout the ATD service delivery process.

Some qualitative studies on this subject have been done. For example, the Swedish researcher Skymne and her colleagues found that older individuals is going through a process of getting used to a new ATD, in which the social environment played an important role in facilitating or delaying the successful integration of the ATD in everyday life activities (6). Thus, the implementation of ATD should not be viewed as an isolated event, but studied as part of a complex process influenced by the actions and thoughts of the client as well as other parties such as health care professionals, friends and family. However, there are few studies on older individual's experiences of ATD service delivery and ATD use as they go through the process of deciding to apply for, receiving and starting to use ATD. Knowledge derived from such studies would enhance evidence-based and client-centred ATD service delivery.

The aim of this project was to close this knowledge gap by investigating the experiences of older individuals living in their ordinary homes as they decided to apply for, received and started to use an ATD. The project specifically investigated the process of deciding to apply for an ATD, the service delivery process as experienced by the older individual, and the meanings of a new ATD for the older individual. To allow for an investigation of the complexity involved in these processes, insights drawn from hermeneutics (17), phenomenology (18), occupational therapy theory (19) and critical psychology (20) were chosen as theoretical framework.

FRIDAY 11/09/2015

14:00 - session 5

AT for People with Motor and Physical Disabilities I

Chairs: Anne Kanto-Ronkanen / Gerhard Nussbaum

Track B: Lehár I-II Hall

ICT based technology to support play for children with severe physical disabilities

Renée van den Heuvel^{1,2}, Monique Lexis¹, Luc de Witte^{1,2}

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² *CAPHRI, School for Public Health and Primary Care, Maastricht University, The Netherlands*

Introduction: Play is important for a child's development. Children with severe physical disabilities experience difficulties engaging in play. With the progress of technology the possibilities to support play are increasing. The purpose of this review was to gain insight into the possibilities and availability of ICT based technology to support play in children with severe physical disabilities.

Methods: A systematic literature search within the databases PubMed, CINAHL, IEEE and ERIC was carried out. Three reviewers assessed titles and abstracts independently. Additionally, Google Scholar, conference proceedings and reference lists were used.

Results and conclusion: The included publications reported on 27 different technologies, which can be classified into three main groups; robots, virtual reality systems and computer systems. There are several options that may have great potential in supporting play for this target group.

4D-Joystick –New Possibilities for Persons with Motor Disabilities

Gerhard Nussbaum, David Thaller

Competence Network Information Technology to Support the Integration of People with Disabilities (KI-I), Linz, Austria

The 4D-Joystick is a new type of Assistive Technology which enables people with severe motor disabilities to fully control remote controlled (RC) toys i.e. models. In 2013 the authors started to develop a feasibility study and built the first prototype of the 4D-Joystick which allowed to control up to 4 analogue and up to 2 digital channels. The second prototype of the 4D-Joystick allows to control up to 4 analogue channels and 4 digital channels concurrently with very low latency. Furthermore the second prototype of 4D-Joystick supports functionality like Dual Rates, Expo, Invert and Dead Zone on each channel which offers additional adaptability to the users' needs. This is sufficient to control complex RC Models like airplanes, helicopters, multicopters, boats and cars. Furthermore the 4D-Joystick offers an interface to the open source software AsTeRICS. In combination with AsTeRICS the 4D-Joystick can be used as music instrument, a computer game controller and a computer input device. This paper discusses the second prototype of the 4D-Joystick and its functionality.

Sweet Cheese - Back to the Physical World

Jerome Dupire

CEDRIC, Conservatoire National des Arts et Métiers, Paris, France

Sweet Cheese (switches) is a physical device that brings back the virtual keyboards to the physical world. Although the virtual keyboards are useful for people with motor impairment, they require to be used in a windowed environment. This is sometimes impossible due to the imposed full screen mode. We present in this paper our solution that mixes advantages of both physical and virtual keyboards.

Human-computer Interface Using a Head Mounted Camera and IR Markers

Edwin Peter Walsh^{1,3}, Walter Daems^{1,3}, Jan Steckel^{2,3}

¹ *University of Antwerp, FTI - Cosys, Belgium*

² *University of Antwerp, FTEW ENM Department, Belgium*

³ *University of Antwerp, Centre for Healthcare Technology, Belgium*

This paper describes an alternative way to control the selection of items in computing devices. A survey of the issues of the current state-of-the art is performed and a solution is presented based on a cheap, head-mounted, IR sensitive camera tracking IR LEDs. Benefits related to this approach are indicated, initial performance results are presented from which we can conclude the feasibility of the proposed solution.

Supporting Shoulder Rehabilitation – Designing Simple Devices Aiding Physiotherapy

Ildikó Fiszter, Krisztián Sisák

Department of Orthopedics, University of Szeged, Hungary

The authors present simple devices which can facilitate and improve shoulder rehabilitation following various conditions. These commercially available and easily assembled functional aids improve patient experience and allow the bulk of the rehabilitation to take place in the patients' home environment.

FRIDAY 11/09/2015

14:00 - session 5

AT Service Provision, Organisation and Impact I

Chairs: Dominique Archambault / EA Draffan

Track C: Brahms Hall

How Assistive Technology Changes the Brain: The Critical Role of Hippocampal-striatal Interactions During Cognitive Training

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² *Nyíró Gyula Hospital - National Institute of Psychiatry and Addictions, Budapest, Hungary*

Recent studies found structural changes of the brain during cognitive training. These changes may be important when assistive technologies are used, for example, to boost memory and navigation abilities in patients with neurocognitive disorders. In this study, we show that extensive training with a platformer game simulating navigation and real-life spatial abilities, patients with Alzheimer's disease and amnesic mild cognitive impairment exhibit an increased volume of the caudate nucleus in contrast to healthy individuals who display increased hippocampal volumes. These results raise the possibility that cognitive training and assistive technology may induce compensatory changes of brain structure in memory disorders.

Can Disability Code Activation Promote Sustainable Development in Egypt... After the Arab Spring?

Prof. Dr. Safaa Mahmoud Issa Abdou

Department of Architectural Engineering, Faculty of Engineering, Menofia University, Shebeen El Kome, Egypt

In January 2011, Egypt followed Tunisia in its Uprisal against the ruling oppressive regimes in search for democracy, freedom and better living conditions. The movement, later known as the Arab Spring, had implications on the country's economic and political systems. Hence, the need to adopt Sustainable Development strategies and that in order to ensure all people well being, and the implementation of their human rights. This would only be realized when the built environment would become accessible to vulnerable people, as well as to persons with disabilities and would enable them to participate and be included in various living activities. This paper reviews the impact of the Egyptian disability code, that was published 2003, and how its activation could help to provide the environment that supports persons with disabilities, and allows their integration.

The Role of Emotional Intelligence in Vocational Rehabilitation with Special Respect to Physically and Cognitively Disabled Persons

Beatrix Séllei

Department of Ergonomics and Psychology, Budapest University of Technology and Economics, Budapest, Hungary

In the past several years we have done a research about the processes and the actors of workforce rehabilitation in Hungary. We have discovered some strengths and flaws of that processes, and based on that research we would like to see a turning point in the near future. We think that one of the keys of the success in the processes of the rehabilitation of workforce is the attitude of the positive psychology. Based on our researches the emotional competences and psychological immunity have been found to have very important and special roles in the personal side of the rehabilitation process. The attitude of the employers and the society to the rehabilitation is also important based also on the emotional awareness.

Service Composition towards Increasing End-user Accessibility

Nikolaos Kaklanis, Konstantinos Votis, Dimitrios Tzovaras

Information Technologies Institute, Centre for Research and Technology Hellas, Thessaloniki, Greece

This paper presents the Cloud4all Service Synthesizer Tool, a framework that enables efficient orchestration of accessibility services, as well as their combination into complex forms, providing more advanced functionalities towards increasing the accessibility of end-users with various types of functional limitations. The supported services are described formally within an ontology, enabling, thus, semantic service composition. The proposed service composition approach is based on semantic matching between services specifications on the one hand and user needs/preferences and current context of use on the other hand. The use of automatic composition of accessibility services can significantly enhance end-users' accessibility, especially in cases where assistive solutions are not available in their device.

A Qualitative Study to Evaluate Strategies for Changes in the Assistive Technology Service Delivery in Flanders

Jonas Verbrugghe¹, Loes Cardinaels², Mieke Haesen³, Ben Schouten⁴, Bianca Ceccarelli⁵, Wim Pinxten⁶, Annemie Spooren², Annick Timmermans¹

¹ *Reval - Rehabilitation Research Institute, Biomed, Hasselt University, Belgium*

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⁴ *VZW Stijn, Belgium*

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⁶ *Faculty of Medicine and Life Sciences, Hasselt University, Belgium*

Assistive technology (AT) is an important aid in the daily functioning of persons with disabilities. It can improve independence of the user by facilitating daily tasks, reducing the amount of personal assistance needed, and decrease caregiver burden.

Because of recent progress in the development and production of specialized AT in categories such as mobility and cognitive function, AT has the potential to support a very wide group of users. Also, in a population that is consistently growing older, more persons will require functional aid products to maintain an independent lifestyle. Previous research has already shown the cost-effectiveness of AT in community-based populations of elderly persons. Consequently, both the expansion of AT products and the growth in the number of users translates into a higher financial burden for the government to subsidize these new and often expensive products.

In the Flemish healthcare system new financial delivery models and improved efficiency of AT use are necessary to guarantee a good quality of care. One of the current problems is the nonuse of AT that are disposed to them. Previous research has already inventoried diverse reasons for users to not use their AT. A possibility to address nonuse could be the optimization of service delivery. In other countries, reuse and recycling of AT have been considered, and these concepts have proven to be effective. Also in a recent report of the Association for the Advancement of Assistive Technology in Europe (AAATE), it is advocated to study how service delivery can be optimized.

This study aims to inventory thoughts and opinions of various stakeholders and users in the service delivery process in Flanders concerning 1) the present model of AT service delivery, 2) possible future changes that can make this model more cost-efficient, such as reuse/recycling of AT, and 3) the registration and tracking of AT use.

FRIDAY 11/09/2015

14:00 - session 5

AT for Blind and Low Vision People III

Chairs: Peter Cudd / Miroslav Sili

Track D: Liszt II-III Hall

Walking Characteristics of Persons with Visually Impairment Crossing Intersections with Audible Pedestrian Signals

Shoichiro Fujisawa, Kyohei Hirono, Shin-ichi Ito, Katsuya Sato, Osamu Sueda

Institute of Technology and Science, Tokushima University, Tokushima, Japan

The authors have been continuously researching tactile walking surface indicators and audible pedestrian signals used for crossing intersections. A pedestrian walks to the opposite side of the crosswalk using audible pedestrian signals. The position where the audible pedestrian signal is set up clearly influences the pedestrian's path. We performed an intersection crossing experiment with road noise for different positions where the audible pedestrian signal was set up. Vehicle road noise is thought to influence walking pedestrians. However, we could not clearly separate the difference of where the audible pedestrian signal was set up from the influence of the road noise. We therefore conducted the experiment with no road noise in the intersection to determine the difference of the position where the audible pedestrian signal was set up. The research results were compared with and without road noise to specify the road noise influence.

Intuitive Tactile Algorithms to Guide Blind Runners by Means of a Belt With Vibrators

Juan V. Durá-Gil¹, Bruno Bazuelo-Ruiz¹, Fernando Moll¹, Ricard Barberà-Guillem¹,
Ágnes Jakab², Tamás Csielka²

¹ *Institute of Biomechanics of Valencia, Universitat Politècnica de Valencia, Valencia, Spain*

² *ATEKNEA Solutions Hungary Kft, Budapest, Hungary*

Visually impaired people do not have equal possibilities to practice sports. In the case of running they need a sighted guide. This paper compare different possibilities for indicating direction to blind people by means of a belt that transmits tactile messages, and defines design requirements based on anthropometric analysis. The results shows that intuitive tactile messages are achieved with tactile stimuli applied in the ventral section, from the iliac crests to the navel.

AT and Social / Health Care I

Validation of the ULCEAT Methodology by Applying it in Retrospect to the Roboticbed® using Development Process

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Background: In answer to the increasing demand for care by the Japanese oldest portion of the population, an extensive programme of life support robots is under development, advocated by the Japanese government. Roboticbed® (RB) is developed to facilitate patients in their daily life in making independent transfers from and to the bed. The bed is intended both for elderly and persons with a disability.

Objective: The purpose of this study is to examine the validity of the user and user's life centred clinical evaluation of assistive technology (ULCEAT) methodology. To support user centred development of life support robots the ULCEAT method was developed. By means of the ULCEAT method the target users and the use environment were re-established in an earlier study.

Method: The validity of the method is tested by re-evaluating the development of RB in retrospect. Six participants used the first prototype of RB (RB1) and eight participants used the second prototype of RB (RB2).

Results: The results indicated that the functionality was improved owing to the end-user evaluations. Therefore, we confirmed the content validity of the proposed ULCEAT method.

Conclusion: In this study we confirmed the validation of the ULCEAT methodology by applying it in retrospect to RB using development process. This method will be used for the development of Life-support robots and prototype assistive technologies.

Locating Assistive Technology Research in a Clinical Setting: an Occupational Perspective

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Peer research was used to identify the experience and perceptions of assistive technology and telecare adoption in a UK healthcare context. A narrative account of participation and learning is intended to provoke further dialogue. There have been a range of policy and implementation initiatives that are

within the direct experience of organisational actors over the last 15 years and this engagement allows for specific reflection on the service achievements and some of the barriers to implementation of technology changes in rehabilitation practice and service design. Insights are presented that suggest a reification of research priorities and a need to align technology, through patient and public engagement, to provider priorities. In addition, an improvement in adoption would be based on sustained capacity building within the Occupational Therapy workforce and a re-focus on specific knowledge sharing and learning about technology. Given the shared desire to promote the sustained adoption of appropriate technology for assistance and rehabilitation it is suggested the voice of practitioners is strengthened through research and knowledge exchange in the clinical setting.

ICT Services for Prolonging Independent Living of the Elderly with Cognitive Impairments - IN LIFE Concept

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Older people with cognitive impairment need support in their everyday living. IN LIFE an EC co-funded project aims to organize large-scale and multi-country pilot applications, by providing interoperable, open, personalised and seamless ICT solutions that support older persons in all key home activities, communication, health maintenance, travel, mobility and socialisation tasks, with novel, scalable and viable business models.

FRIDAY 11/09/2015

16:00 - session 6

Education and Training in AT, AAC (co-organised with the ENTELIS network) II
Chairs: Dominique Archambault / Charles Willems
Track A: Bartók Hall

A Conceptual Framework Related to ICT-AT Competence Development: The Theoretical Foundations of ENTELIS

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³ *Satakunta University, Pori, Finland*

This paper provides an overview of the construction of a conceptual framework regarding ICT-Assistive Technology (ICT-AT) competence development, designed to gain awareness of the elements involved and to facilitate the understanding and exchange among stakeholders of the ENTELIS (European Network for Technology Enhanced Learning in an Inclusive Society) project. The framework was designed based on the basic principles of Activity Theory, which however have been adapted and adjusted to the project's objectives. Hence, it includes a map of actors and other parameters functioning in a person surrounding "ecosystem", and it allows us to understand and map roles, expectations, barriers, as well as to devise solutions to tackle digital divide. Taking as a starting and central point the person and his/her wish to self-determination and fulfilment (quality of life) and the related needs, it provides a map of how the various concepts and variables interact within the theoretical and methodological perspective of the collection, description and assessment of experiences in ICT-AT education and competences development of persons with disabilities (PwD) of all ages. The conceptual framework represents two interacting learning activity systems: (a) the internal system of the end-user, which includes the end-user and his/her needs, the setting where learning takes place and the other actors involved, and (b) the external system, which embraces the internal system but also wider issues of policy and practice and experiences and 'actors' that contribute to the development and use of ICT and ICT-AT skills in all areas of life. The elements of these systems and their interaction provide the basis for analysing experiences and advancing knowledge relevant for bridging the digital divide.

Views and Considerations on ICT-AT Competences Development within the ENTELIS Project: The Case of Cyprus

Katerina Mavrou, Maria Meletiou-Mavrotheris

European University Cyprus, Nicosia, Cyprus

This submission presents part of the EU funded project ENTELIS (European Network for Technology Enhanced Learning in an Inclusive Society), which aims to address issues of digital divide and digital equity for people with disabilities of all ages, and to increase participation and social inclusion. This paper presents the main activities and outcomes of the research work package of the project (WP3), from one of the partner countries, Cyprus. The aim of the conducted research was to identify the conceptions and beliefs of end-users, trainers, and service/technology providers and professionals, on the multifaceted relation between ICT / ICT-AT (Information Communication Technology – Assistive Technology) and learning of technology. Data collection involved the development and administration of three semi-structured interview protocols, one for each group of participants, in five different European countries. Results have been compiled to develop a State-of-Art Report on ICT and ICT-AT education and learning, highlighting the main trends, as well the main present barriers, emergent and future needs in terms of analysis, acquisition and reinforcing of digital competences bridging the worlds of education and work.

Mainstream ICT Can Support Children and Adolescents with ADHD and/or Autism in their Everyday Activities

Oystein Dale, Lisbet Grut

SINTEF Technology and Society, Department of Health, Norway

This exploratory case study investigated how ICT can support children with ADHD and/or autism and their families in their daily activities. We focus in particular on the suitability of mainstream technology for such support. Two cases are presented, and implications for practice are discussed. The findings indicate that mainstream ICT can be of assistance, but that its implementation can be challenging in particular in regards to elaborate technological setup routines, vulnerability to malfunction, and time needed for assessment, training and followup. The work continues in the ongoing R&D-project *Is it possible?*.

E-inclusion: Digital Equality- Young People with Disabilities

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The United Nations' position is that digital access is a matter involving equality between groups of people, the securing of democratic rights, and equal opportunities for all citizens. This study investigates digital equality in school and leisure between young people with and without disabilities. A cross-sectional design with group comparisons was applied. Participants were young people (10-18 years of age) with disabilities (n=389) and a reference group in about the same ages. Data were collected by a survey focusing on access to and engagement in ICT activities in school and during leisure time. The results demonstrated young people with disabilities had restricted participation in computer use in educational activities, in comparison to young people in general. During leisure time young people

with disabilities had a leading position compared to the reference group with respect to internet use in a variety of activities. Beneficial environmental conditions at home (and the reverse in schools) are discussed as parts of the explanation for the differing engagement levels at home and in school, and among young people with disabilities and young people in general. Conclusion: Schools need to prioritise use of ICT by young people with disabilities.

Introducing LUDI: A Research Network on Play for Children with Disabilities

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¹ *Department of Social Sciences and Humanities, University of Aosta Valley, Aosta, Italy*

² *UCP – Católica Lisbon School of Business & Economics, Lisbon, Portugal*

This paper presents LUDI, an interdisciplinary network of research centred on the topic of play for children with disabilities. The primary aim of the network is to ensure the theme is given the widest recognition as an independent field of research and intervention. Currently, the network comprises over 80 researchers and practitioners from 27 European countries. It is funded by the EU COST Programme through the means of an interdisciplinary Action started in May 2014 and lasting four years. The present contribution will discuss the scientific and social background and their implications that lead to the creation of the network, activities carried out during the first year of the Action and introduces the expected results of the ongoing activities.

FRIDAY 11/09/2015

16:00 - session 6

AT for People with Motor and Physical Disabilities II

Chairs: Katerina Mavrou / Klaus Miesenberger

Track B: Lehár I-II Hall

Feasibility of Using MIRA with Adult Patients Presenting with Upper Limb Motor Dysfunction Post Neurological Damage

Mark McGlinchey, Alexandra Curtis, Rachel Ritchie, Gareth D. Jones

Guy's and St Thomas' NHS Foundation Trust

Computer-based technology is an emerging modality to facilitate upper limb rehabilitation post neurological damage. A feasibility project using MIRA technology in an adult outpatient neurophysiotherapy service was conducted. Ten patients trialled nine MIRA games that promoted discrete and continuous unilateral and bilateral upper limb movements. The effect of MIRA use on usual service operation as well as any adverse events was noted. Patient views of using MIRA were explored through self-reported questionnaires. For six patients, comparison of amount and frequency of active upper limb exercises using MIRA and typical prescribed upper limb exercises was made. Use of MIRA did not negatively affect service operation and was not associated with any adverse event reporting. The majority of patients enjoyed using MIRA and felt that it was a useful modality to supplement existing prescribed upper limb exercises. Those with previous experience of technology expressed the most positive feedback. There is evidence that MIRA tasks may facilitate intensive repetitive upper limb movements, although some patients reported in-exercise discomfort. In conclusion, it was feasible to use MIRA with adult patients post neurological damage presenting with upper limb motor dysfunction, particularly those patients with proximal upper limb motor dysfunction previously familiar with computer use or gaming experience.

Measuring Benefits of Telepresence Robot for Individuals with Motor Impairments

Jun Yamaguchi¹, Christian Parone², Deborah di Federico², Pierluigi Beomonte Zobel¹, Giorgio Felzani²

¹ *University of L'Aquila, L'Aquila, Italy*

² *Casa di Cura San Raffaele Sulmona, Sulmona, Italy*

The telepresence robot is a type of technology used to socialize with people in remote places. If this technology is efficient, it could be an alternative means to attend social activities such as going to school and work for people who have difficulty to go out because of motor impairments. The objective of this study is to investigate the effect of using a telepresence robot in the marketplace by individuals with motor impairments. Three participants were involved with trial use for attending university courses for a month and the initial results are shown.

Usability of a New Writing Assistive Device for Persons with Cervical Spinal Cord Injury

MyungJoon Lim¹, Jiyoung Park¹, Kuem Ju Lee¹, Hyosun Kweon¹, Byungchul Kim²,
Kyujin Cho², Hyun Choi¹

¹ *Korea National Rehabilitation Research Institute, Republic of Korea*

² *Department Of Mechanical Engineering, Seoul National University, Republic of Korea*

The hand function for persons with cervical spinal cord injury (PCSCI) is most frequently cause difficulties in leading normal lives. The purpose of this study was to test the usability of a new writing assistive device (NWAD) for PCSCI. To access its usability, the authors design usability testing method and test the NWAD to five individuals with cervical spinal cord injury. From the usability testing, we have found number of issues that lead us to key design concept about developing the NWAD. The NWAD will be redesigned based on the result of the present study. We expect that the NWAD will help PCSCI use their affected hand better and improve the level of independence and quality of life.

Assistive Technology as an Artificial Intelligence Opportunity: Case Study of Letter-based, Head Movement Driven Communication

Brigitta Miksztai-Réthey, Kinga Bettina Faragó

Faculty of Informatics, Eötvös Loránd University, Budapest, Hungary,

We studied an artificial intelligent assisted interaction between a computer and a human with severe speech and physical impairments (SSPI). In order to speed up AAC, we extended a former study of typing performance optimization using a framework that included head movement controlled assistive technology and an onscreen writing device. Quantitative and qualitative data were collected and analysed with mathematical methods, manual interpretation and semi-supervised machine video annotation. As the result of our research, in contrast to the former experiment's conclusions, we found that our participant had at least two different typing strategies. To maximize his communication efficiency, a more complex assistive tool is suggested, which takes the different methods into consideration.

FRIDAY 11/09/2015

16:00 - session 6

AT Service Provision, Organisation and Outcome II

Chairs: Sally Fowler-Davis / Evert-Jan Hoogerwerf

Track C: Brahms Hall

Development of Integrated Public Administration Custom Services in Hungary

Tamás Laki, PhD. Habil.

chief rehabilitation engineer, Project Office for Development of Integrated Customer Services, Office of Public Administration and Justice, Hungary

The paper is a case-study introducing a national project in Hungary establishing a countrywide public administration customer service system where accessibility was a key issue. Starting from the concept the paper describes the methods and organisational background how accessible design was integrated in the planning method and gives a feedback of site experiences

Assistive Technology: Creating and Engaging Collaborative Communities

Surinder Bangar, Gail Mountain, Peter Cudd

SCHARR, University of Sheffield, Sheffield, UK

This paper outlines the remit of the UK Engineering and Physical Sciences Research Council KT-EQUAL (Knowledge Transfer for Extending Quality of Life for older and disabled people) programme.

Case examples drawing on the range of activities undertaken by KT-EQUAL highlight where assistive technology developments have been facilitated, the value of network activities and an underpinning model of engagement and collaboration.

Given an increasing emphasis on the impact of research the model and innovative approaches deployed by KT-EQUAL are even more crucial in future developments which aim to ensure that research can be used to benefit society.

Knowledge Exchange: Selecting Research Opportunities through Estimation

Peter Cudd¹, Sally Fowler-Davis², Laura Evans², Sue Mawson^{1,2}

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² *Occupational Therapy, Professional Services Directorate, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK*

A systematic way to select new ideas for research and development between two organisations is reported. It was applied to ideas that were generated from acute clinical settings by Occupational Therapists with a view to collaborate with nearby university academics from many disciplines. The process, assessment factors, use of ordinal scales with thresholding and an arbitrary formula are described. Challenges in the approach are discussed. Suitability for use by others in the AT field, other care related or even very different contexts is noted with some adaption and caveats.

A Unified Semantic Framework for the Description of Assistive Technologies

Aggeliki Konstadinidou, Nikolaos Kaklanis, Konstantinos Votis, Dimitrios Tzovaras

Information Technologies Institute, Centre of Research and Technology Hellas, Thessaloniki, Greece

This paper presents the Semantic Alignment Tool, a unified, classified, ontological framework, for the description of assistive solutions that comprises information from different sources automatically. The Semantic Alignment Tool is a component of the Cloud4All/GPII infrastructure that enables users to add and/or modify descriptions of assistive technologies and align their specific settings with similar settings in an ontological model based on ISO 9999. The current work presents the interaction of the Semantic Alignment Tool with external sources that contain descriptions and metadata for Assistive Technologies (ATs) in order to achieve their synchronization in the same semantic model.

Building an Effective Ontology for Assistive Technology

Alexandra Danial-Saad^{1,3}, Tsvi Kuflik², Patrice L. (Tamar) Weiss¹, Naomi Schreuer¹

¹ *Department of Occupational Therapy - University of Haifa, Nazareth, Israel*

² *Department of Information Systems - University of Haifa, Nazareth, Israel*

³ *The Academic Arab College for Education - Haifa, Nazareth, Israel*

The aim of this paper was to develop and validate an ontology for one class of assistive technology (AT), namely physically controllable pointing devices, using the Delphi method. Six occupational therapists with AT expertise identified important items and categories to the pointing device prescription through a three-round, structured process consisting of responses to a series of questionnaires. The intraclass correlation coefficient (ICC) was used to assess the interrater reliability of items included in categories related to the pointing devices and to the user profile. During the first round, the ICC ranged from 0.19 to 0.97; this improved to ICCs ranging from 0.72 to 1.0 during the second round. A full consensus was reached by the experts during the final round which included 218 items, divided into five categories, for the pointing device list, and 168 items, divided into six categories, for the user profile list. This ontology is expected to help achieve a more systematic regulation of the AT field, leading to greater standardization and increased knowledge sharing.

FRIDAY 11/09/2015

16:00 - session 6

AT and Social / Health Care II

Chairs: Luc de Witte / Iosif Klironomos

Track D: Liszt II-III Hall

Hybrid Instruction Method of Brush Strokes with Haptic Device

Yoshihiko Nomura, Hirotsugu Kato, Ryota Sakamoto

Mie University, Tsu, Japan

This paper proposes an instruction method of brush strokes utilizing haptic devices. Focusing attention to the magnitude difference between the horizontal and the vertical in brush strokes, we introduced a position/force hybrid scheme for determining traction forces to be fed back to users: the horizontal component of the force was given to reduce the horizontal position deviation of a learner from an expert, and the vertical component was given as reaction forces of the expert-exerted forces. As an example, a brush stroke experiment was conducted for some Brahmi characters.

Improving Quality of Life through ICT for the Facilitation of Daily Activities and Home Medical Monitoring

Iosif Klironomos¹, Margherita Antona¹, Constantine Stephanidis^{1,2}

¹ *Foundation for Research and Technology – Hellas (FORTH) Institute of Computer Science, Crete, Greece*

² *University of Crete, Department of Computer Science, Crete, Greece*

The potential of Information and Communication Technologies to improve the overall quality of life of all citizens cannot be underestimated. In particular, in the context of Ambient Intelligent environments, technological developments provide a great opportunity for the integration and the improvement of quality of life of people from vulnerable groups (patients, elderly, people with disabilities). In this context, the paper presents the aims, objectives and preliminary results of a National research project in Greece, named KRIPIS “Quality of Life”, implemented by three research Institutes of FORTH, targeting post-heart attack elderly patients at their home environments.

Developing Movement Recognition Application with the use of Shimmer Sensor and Microsoft Kinect Sensor

Tibor Guzsvinecz, Veronika Szücs, Cecília Sik-Lányi

University of Pannonia, Veszprém, Hungary

Nowadays the development of virtual reality-based application is one of the most dynamically growing areas. These applications have a wide user base, more and more devices which are providing several kinds of user interactions and are available on the market. In the applications where the not-handheld devices are not necessary, the potential is that these can be used in educational, entertainment and rehabilitation applications. The purpose of this paper is to examine the precision and the efficiency of the not-handheld devices with user interaction in the virtual reality-based applications. The first task of the developed application is to support the rehabilitation process of stroke patients in their homes. A newly developed application will be introduced in this paper, which uses the two popular devices, the Shimmer sensor and the Microsoft Kinect sensor. To identify and to validate the actions of the user these sensors are working together in parallel mode. For the problem solving, the application is available to record an educational pattern, and then the software compares this pattern to the action of the user. The goal of the current research is to examine the extent of the difference in the recognition of the gestures, how precisely the two sensors are identifying the predefined actions. This could affect the rehabilitation process of the stroke patients and influence the efficiency of the rehabilitation. This application was developed in C# programming language and uses the original Shimmer connecting application as a base. During the working of this application it is possible to teach five-five different movements with the use of the Shimmer and the Microsoft Kinect sensors. The application can recognize these actions at any later time. This application uses a file-based database and the runtime memory of the application to store the saved data in order to reach the actions easier. The conclusion is that much more precise data were collected from the Microsoft Kinect sensor than the Shimmer sensors.

Developing Movement Therapy Application with Microsoft Kinect Control for Supporting Stroke Rehabilitation

Flavian A. Mintal, Veronika Szücs, Cecília Sik-Lányi

University of Pannonia, Veszprém, Hungary

The topic of this article and work was to create an application for movement therapy, which can help the rehabilitation of stroke patients. The application makes it possible to make unique exercises for different patients, adapting to the special personal needs. The developed real time gesture analyzing algorithm works in the background of the application, which has not yet spread on the field of medical devices. I deal with one part of this wide field in my dissertation, with the rehabilitation gesture analyzing. The data received from the Kinect sensor is processed by a location based gesture analyzing algorithm, and the results show that the software is suitable for the improvement of the rehabilitation process. It was a key aspect to create a simple interface. I achieved this with the use of the C# language and WPF technology.

Users' Perception and Readiness of the eChez-Soi In-Home Telerehabilitation Platform

Hélène Moffet^{1,2}, Claude Vincent^{1,2}, Didier Saey^{1,3}, Valérie Coats³, François Routhier^{1,2},
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This longitudinal preliminary study aims to describe the components and features of the eChez-Soi home-based telerehabilitation platform, and present preliminary results on practitioners' readiness for and perception of its usability. Four patients receiving chemotherapy treatments for lung cancer followed an 8-week home-based telerehabilitation program with the new eChez-Soi platform and four healthy adults used it for 2 weeks. The users' perception was very good, with an overall satisfaction rate of 4.6 ± 0.4 (max. score=5) for the patients, 4.8 ± 0.2 for the healthy adults and 4.4 ± 0.3 for the practitioners. Total practitioner telehealth readiness was 73.5 ± 9.1 (max score=85), suggesting that certain items, for at least one practitioner, may adversely impact the use of telehealth. These preliminary results support the usability of this new platform and suggest that practitioner telehealth readiness is reinforced with experience.

SATURDAY 12/09/2015

09:00 - session 7

Education and Training in AT, AAC (co-organised with the ENTELIS network) III

Chairs: Klaus Miesenberger / Emma Friesen

Track A: Bartók Hall

Structures, Snacks, Sprints, and Socialising: Strategies to Increase Writing Output for AT Practitioners

Emma L. Friesen

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St. Lucia, Australia*

Assistive Technology Practitioners are often engaged in research, evaluation and other reporting activities, but struggle to complete publications reporting the work. This paper presents three evidence-based strategies for increasing writing output: write to a structure; use snacks and sprints, and get social. These strategies may be useful for AT Practitioners wanting to increase their writing output.

Developing User-Centered Continuous Professional Education for ATD Service Personnel

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² *Metropolia University of Applied Sciences, Metropolia, Finland*

³ *Tampere University of Applied Sciences, Tampere, Finland*

Background: Finnish Assistive Technology Device Service centers raised the question about education to the full-time workers of ATD Services. They nominated a group which included representatives of universities, ATD Service centers and national authorities. This small group drew up background questionnaires concerning the education, its content and length. Three universities started the education, the aim of which was to learn new methods to develop their own work, learning by doing at work with their superiors. This continuous professional education corresponded to 30 ECTS credits and lasted 10 months.

Results: Based on the feedback from the guiding group of CPE, students and their superiors, this type of education is needed. It met its goals by giving students methods to develop their work and broaden their view on ATD service when having discussions with other experts. Continuous professional education needs to be developed further and it could also be part of joined European education with national elements.

Augmented and Alternative Communication (AAC)

A Participatory Research Approach to develop an Arabic Symbol Dictionary

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² *Speech Therapy Department, Hamad Medical Corporation, Qatar*

³ *Mada, Qatar Assistive Technology Center, Qatar*

The purpose of the Arabic Symbol Dictionary research discussed in this paper, is to provide a resource of culturally, environmentally and linguistically suitable symbols to aid communication and literacy skills. A participatory approach with the use of online social media and a bespoke symbol management system has been established to enhance the process of matching a user based Arabic and English core vocabulary with appropriate imagery. Participants including AAC users, their families, carers, teachers and therapists who have been involved in the research from the outset, collating the vocabularies, debating cultural nuances for symbols and critiquing the design of technologies for selection procedures. The positive reaction of those who have voted on the symbols with requests for early use have justified the iterative nature of the methodologies used for this part of the project. However, constant re-evaluation will be necessary and in depth analysis of all the data received has yet to be completed.

Development of Augmentative and Alternative Communication Assessment Tools for Patients with ALS

Jiro Yonezaki¹, Maki Ikeda¹, Takuya Tsubaki², Katsuya Sato², Sin-Ichi Ito², Osamu Sueda², Shoichiro Fujisawa²

¹ *Osaka City Rehabilitation Center Assistive Technology, Osaka, Japan*

² *Tokushima University, Tokushima, Japan*

ALS patients usually use augmentative and alternative communication tools to communicate with other people, but the assessment tools, including the selection of an input switch, are very difficult to operate. In this study, we developed a novel device to measure the physical ability of patients to operate the input switch with a push lever. The study focused on the amount of pushing and the power required to operate the input switch, and the effectiveness was verified.

A User and Their Family's Perspective of The Use of a Low-Tech Vs A High-Tech AAC

Sharon Borg, M. Agius, L. Agius

*Access to Communication and Technology Unit, Student Services Department,
Ministry of Education, Hamrun, Malta*

This qualitative case study describes a 9-year-old child, diagnosed with homonymous hemianopia, left side weakness and seizures that has been followed by Access to Communication and Technology Unit in Malta for 5 years. The child previously used a communication book and now uses an iPad as a speech generating device. A semi-structured interview was utilised with the parent to explore preference for each AAC system and the reasons for it. The impact of each AAC system on the family and on the child's communication skills, and perceived barriers in the implementation of the AACs were also explored. The child's own experience using the AAC systems was also investigated using a structured interview format. Talking Mats was used to support the child's understanding of the questions and to explore her perspectives on the two AAC systems using Yes-No responses. The parent interview was analysed thematically and represented visually using a thematic network. This was compared with child responses. Four organising themes emerged including barriers, benefits, facilitators, and expectations. Specific barriers included self-funding in order to provide the child with the best fit high-tech AAC. Perceived benefits for both AAC systems were that it increased her communicative intent. The child's mother perceived access to increased vocabulary and capacity for sentence building, operational autonomy as well as voice output as a benefit of the SGD. The child's results indicated a preference for the high-tech AAC because she found it easier to navigate than the low-tech AAC.

SATURDAY 12/09/2015

09:00 - session 7

AT for People with Motor and Physical Disabilities III

Chairs: Lajos Izsó / Cecília Sik-Lányi

Track B: Lehár I-II Hall

Daily Activity Patterns of People Provided with a Dynamic Arm Support

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² *School for Public Health and Primary Care (CAPHRI), Maastricht University, Maastricht, The Netherlands*

Dynamic arm supports are provided to support activities of daily living in people with limited upper extremity function. A cross-sectional study was performed in the Netherlands involving people who were provided with a dynamic arm support in 2012-2013. An adapted version of the Life-Habits questionnaire was used to assess daily activity patterns. Twenty-three subjects filled in the questionnaire. Tasks people perform themselves in daily life include tasks as eating, drinking, and communication tasks. Participants vary in the need for assistance in order to perform certain tasks. This individual character of daily activity performance is important to bear in mind during the provision of dynamic arm supports. More complex tasks in the field of personal care and household are often performed by caregivers. These are regarded a challenge for the field of assistive technology and/or robotics.

Possibilities of the ErgoScope High Fidelity Work Simulator in Skill Assessment, Skill Development and Vocational Aptitude Tests of Physically Disabled Persons

Lajos Izsó¹, Ildikó Székely², László Dános²

¹ *Budapest University of Technology and Economics, Department of Ergonomics and Psychology, Budapest, Hungary*

² *National Office for Rehabilitation and Social Affairs, Budapest, Hungary*

The aim of this paper – based on the extensive experiences of the authors gained by using one particular work simulator – is to present some promising possibilities of the application of this (and any other similar) work simulator in the field of skill assessment, skill development and vocational aptitude tests of physically disabled persons. During skill assessment and development, as parts of the therapy, the focus is on the disabled functions. During vocational aptitude tests, however, the focus is already on the functions that remained intact and therefore can be the basis of returning to work. Some factual examples are provided to realize the proposed possibilities in practice.

The Importance of Technical Devices in the Self-care of Upper Limbs Amputees

Gabriella Mészáros, Ildikó Vén

National Institute of Medical Rehabilitation, Budapest, Hungary

The National Institute of Medical Rehabilitation (NIMR) is engaged in the rehabilitation of posttraumatic patients, including also attending traumatic cases with amputated upper limbs. The lack of upper limbs is a great obstacle in essential functioning for the injured, and that is why we give high priority to planning, constructing and individually adopting appliances for aiding everyday life. Special literature gives distinguished attention to operative techniques and the possibilities of prosthetic devices, but no professional articles present any special devices needed for discharging everyday vital functions. The purpose of this lecture is to present the results of our follow-up examination aimed at upper limbs amputees reeducated since 1994 at the NIMR (9 patients). Case studies conclude that the prosthetic care plays a surprisingly small part in the self-sufficiency of the injured. Claims to individual appliances are already more considerable but these cannot be obtained in normal commerce because of unprofitable production in view of users so few in number.

Eye-tracking and EMG Supported 3D Virtual Reality – an Integrated Tool for Perceptual and Motor Development of Children with Severe Physical Disabilities: A Research Concept

Márk Ágoston Pulay

Budapest University of Technology and Economics, Department of Ergonomics and Psychology, Budapest, Hungary

Letting children with severe physical disabilities (like Tetraparesis spastica) to get relevant motional experiences of appropriate quality and quantity is now the greatest challenge for us in the field of neurorehabilitation. These motional experiences may establish many cognitive processes, but may also cause additional secondary cognitive dysfunctions such as disorders in body image, figure invariance, visual perception, auditory differentiation, concentration, analytic and synthetic ways of thinking, visual memory etc.

Virtual Reality is a technology that provides a sense of presence in a real environment with the help of 3D pictures and animations formed in a computer environment and enable the person to interact with the objects in that environment. One of our biggest challenges is to find a well suited input device (hardware) to let the children with severe physical disabilities to interact with the computer. Based on our own experiences and a thorough literature review we have come to the conclusion that an effective combination of eye-tracking and EMG devices should work well.

Service Dogs for People with Spinal Cord Injury: Outcomes Regarding Functional Mobility and Important Occupations

Claude Vincent^{1,2}, Dany H. Gagnon^{3,4}, François Routhier^{1,2}, Frédéric Dumont²,
Lise Poissant^{3,4}, Hélène Corriveau⁶, Michel Tousignant⁶

¹ *Université Laval, Department of Rehabilitation, Québec City, Canada*

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No research using standardized tests based on direct observations along with longitudinal studies have shown the effects of service dogs on persons with mobility impairment. Our research objectives were to document the consequences of the use of the service dog on wheelchair propelling, grasping objects, shoulder pain, occupational performance, reintegration into normal living and psychosocial impacts for people with spinal cord injury (SCI). A cross sectional study was conducted with 45 males and 21 females with SCI (average age = 41.2). They were assessed in their homes and their communities, two to five years after they received their service dogs. Observations were based on four testing methods. An ongoing longitudinal study is reported, based on 9 months (n=8 to16) of data from four standardised questionnaires. Results demonstrate that services dogs are an efficient assistive technology for persons with SCI.

SATURDAY 12/09/2015

09:00 - session 7

AT Service Provision, Organisation and Impact III

Chairs: Laura Evans / Tamás Laki

Track C: Brahms Hall

How to Accomplish the Assistive Technology Service Delivery Process for Adults in Order to Obtain the Best Outcomes – A Literature Review

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¹ *The National Board of Social Services, Odense, Denmark*

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In order to gain knowledge about which methods in the assistive technology service delivery process or parts hereof that result in positive outcomes, a literature review was accomplished. 20 publications were included. Some evidence was found that user involvement in the service delivery process and training in assistive device use had a positive impact on outcomes. Also professionals' higher assistive device expertise seems to result in better outcomes. More research within the field is needed, especially studies that compare the effectiveness and cost-effectiveness of specific methods applying controlled study designs.

Assessing Service Delivery Systems for Assistive Technology in Brazil using HEART Study Quality Indicators

Tullio Maximo, Laurence Clift

Loughborough Design School, Loughborough University, Loughborough, UK

Background: recently in Brazil, there have been investments and improvements in the service delivery system for assistive technology provision. However, there is little documentation of this process, or evidence that users are being involved appropriately.

Objective: to understand how assistive technology service provision currently functions in Belo Horizonte city, Brazil, in order to provide context-specific interventions and recommendations to improve services.

Method: Qualitative research design, including visits to key institutions and semi-structured interviews with key stakeholders. Interview questions were divided with two purposes: 1) Exploratory, aiming to understand present service functioning; 2) Evaluative, aiming to assess staff difficulties in applying best existing best practices.

Results: Assistive Technology services in Belo Horizonte fall under the 'medical model' definition of service delivery developed by AAATE. It was also found that staff lack training and knowledge support to assess user requirements and involve them during the decision process. Additionally, there is no follow up stage after the device is delivered.

Conclusions: The study clearly defines the service provision function and the staff difficulties at Belo Horizonte city, providing information for further studies.

The Relationship between the Key Elements of Donabedian's Conceptual Model within the Field of Assistive Technology

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Previous research has suggested that there is a relationship between the three key components of Donabedian's conceptual model for quality assessments: *structure of care*, *process*, and *outcome of care*. That is, structure predicted both process and outcome of care, and better processes predict better functional outcomes and user satisfaction. The results in this study involving samples of Danish and Norwegian scooter users indicate that structure predicts what goes on in the service delivery process. However, the results do not support that structural differences or differences in the service delivery process predict the outcomes of the scooter interventions.

Implementing UNCRPD - Barrier Free Access to Buildings in NRW – Database and Signet “NRW Inklusiv”

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³ *Disability Council of NRW, Münster, Germany*

UNCRD [1] has reemphasized the relevance of barrier free accessibility to infrastructures. Article 9 deals with accessibility of the manmade environment including buildings. Although accessibility has been required by people with disabilities for decades the existing built infrastructure often lacks adequate accessibility. If at all, it addresses requirements for users of wheelchairs but not for users with sensory or cognitive challenges. In this paper the development of a survey and publication of data from buildings is reported. The methodology is based on user participation and inclusion and follows a civil society approach, embedded in the overall strategy for inclusion in North Rhine-Westphalia (Germany). The internet portal presenting the information to the public is a first step to improve accessibility. An award on this data basis is proposed as incentive.

Developing Deep Water Exercise Equipment for Low Back Pain (LBP) Patients: Medical Validation Experiences

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² *University of Pécs, Department of Rheumatology and Immunology, Pécs, Hungary*

Authors describe a joint work of practicing physicians and rehabilitation specialist engineers. In our work we wanted to prove the efficacy of deep-water physiotherapy among the hydrotherapy treatments in patients with degenerative chronic low back pain, by monitoring both objective and subjective parameters. On the other hand, we are also seeking the possibilities of developing a water exercise tool which can spare the shoulders, can be used in deep water and is suitable for helping the three-dimensional movements of the spine without burdening the upper limbs and shoulders.

SATURDAY 12/09/2015

09:00 - session 7

AT and Social/Health Care III

Chairs: Renzo Andrich / Iosif Klironomos

Track D: Liszt II-III Hall

**Goal Setting for Cerebral Palsy Children in Context Therapy:
Improve Reliability when Linking to ICF**

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The linking process of information to ICF is a common task in different strategies used in rehabilitation practise but is a time consuming process mainly due to reliability issues. This work aims to developed additional rules to those already published in order to improve reliability of the linking process to ICF. The results are encouraging and this work could help to develop information technologies tools for facilitate this process.

Bioimpedance based Monitoring System for People with Neurogenic Dysfunction of the Urinary Bladder

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³ *The Biorobotics Institute, Scuola Superiore Sant'Anna of Pisa, Italy*

Patients with impaired bladder volume sensation have the necessity to monitor bladder level in order to avoid urinary tract infections and urinary reflux that can lead to renal failure. In this paper the the effectiveness of an embedded and wearable solution for bladder volume monitoring using the bioimpedance measurement is tested. Data are streamed real-time using Bluetooth wireless technology. The bioimpedance measurements on a healthy subject prove the effectiveness of the proposed solution. In the future the system will be evaluated in real world scenarios with patients affected by spinal paralysis and bladder neurogenic dysfunction.

Advancing Telemedicine Services for the Aging Population: The Challenge of Interoperability

Lex van Velsen^{1,2}, Javier Solana^{3,4}, Wendy Oude-Nijeweme D'Hollosy², Francisco Garate-Barreiro^{3,4}, Miriam Vollenbroek-Hutten^{1,2}

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- ² *University of Twente, dept. of Biomedical Systems and Signals, Enschede, The Netherlands*
- ³ *Biomedical Engineering and Telemedicine Centre, ETSI Telecomunicación, Universidad Politécnica de Madrid, Spain*
- ⁴ *Centro de Investigación Biomédica en Red, Biomateriales y Nanomedicina (CIBER-BBN), Zaragoza, Spain*

We reflect on our experiences in two projects in which we developed interoperable telemedicine applications for the aging population. While technically data exchange could be implemented technically, uptake was impeded by a lack of working procedures. We argue that development of interoperable health technology for the aging population should go accompanied by a thorough study into working protocols by consulting all end-users and stakeholders.

PUMA Project: Active Involving of End Users to Achieve a Smart Solution to Prevent Pressure Ulcer

José Laparra-Hernández¹, Juan Carlos Chicote², Enrique Medina¹, Ricard Barberà¹, Juan V. Durá-Gil¹, Vicente Lozano³, Ángel Gil³, Ignacio Bermejo¹

- ¹ *Instituto de Biomecánica de Valencia, Valencia, Spain*
- ² *Ilunion, Madrid, Spain*
- ³ *Hospital de Paraplégicos de Toledo, Toledo, Spain*

This paper shows the benefits to include spinal cord injury users and the other stakeholders during the development of a new system to prevent pressure ulcers. The complementary of information has been key and has enhanced the possibility to achieve market acceptance and introduction.

Effectiveness of IPMS Tool for Handling Chronic Low Back Pain with Sitting Workplace Employees

Hille Maas, PT, MSc

Tartu Health College, Tallinn, Estonia

Effectiveness of IPMS tool for handling chronic low back pain with sitting workplace employees.

Introduction: The number of prevalence of occupational low back pain (OLBP) is demonstrating rapid and extensive increasing during last decades. It reported already on the year 2000 that for 100 million workdays lost in the United States each year because of OLBP. Therefore, health-promoting activities should closely linked to scientific research in the field of public health and employment. The prevention of musculoskeletal disorders (MSD), including OLBP, as well as the related monitoring and

evaluation systems for working places should be more intensive and detailed in order to be effective. Van Dillen and many other authors have declared that exercise is one of the primary interventions used with people with chronic, mechanical low back pain, but in many cases do not long-term LBP respond to traditional physical therapy exercise-based interventions. The causes of OLBP have been handled with great attention already more than several decades, but the figures of extent of prevalence of OLBP demonstrates constant increase. Therefore, high technology options and highly qualified professional knowledge needed to explain and handle today challenges of work-related MSD-s, including OLBP.

SATURDAY 11/09/2015
11:00 – keynote lecture

Assistive Technology in Rehabilitation; Have We Lost the Plot?

Laura Evans, Sally Fowler-Davis

Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Practitioners are still question the use of telecare (‘friend or foe?’) and there remains a policy/practice gap in relation to the wide deployment of advanced assistive technologies as a key requirement in living with a disability, across the lifespan. We will argue that commissioners and providers need to consider the drivers to sustained system level improvement in the deployment of technology and work much more closely with clinical /academic practitioners to deliver health outcomes.

Accepted poster presentations

P-01

Example of the Application of the PERSONA Methodology in the Definition of NEEDS and requirements for the WeTakeCare System

Ricard Barberà-Guillem¹, Raket Poveda-Puente¹, Silke Neumann², Heidrun Becker², Miguel Ramírez³, Arno Wienholtz⁴, Inge Schaedler⁵

¹ *Instituto de Biomecánica de Valencia, Valencia, Spain*

² *ZHAW*

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In user-centred design and marketing, personas are fictional characters created to represent the different user types that might use a site, brand, or product in a similar way. As in other projects, the main application and use value of the persona approach in WeTakeCare project has been to depict and thus make “vivid” the characters and the milieus created and selected. It has helped to better understand and communicate the differences among the potential users. It has also helped to understand the heterogeneity and diversity of the users’ lives and to focus on how to meet their actual needs.

P-02

On the Use of Dance as a Rehabilitation Approach for Children with Cerebral Palsy: A Single Case Study

Patricia Morén Pascual¹, Esther Mortes Roselló¹, Amparo Domingo Jacinto¹, Juan Manuel Belda Lois^{2,3}, Ignacio Bermejo², Enric Medina², Ricard Barberà-Guillem³

¹ *Escuela de Danza Esther Mortes, Valencia, Spain*

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Cerebral Palsy (CP) is the most common motor disability in childhood. It is a group of permanent disorders that affect child development causing disorders of movement and posture and activity limitations. The impairment of psychomotor skills of children with Cerebral Palsy is attributed to a permanent alteration occurred in non-progressive brain development of the fetus or nursing infant. Some motor related symptoms can be treated using proper physical therapy. However, one of the biggest problems of the usual physical therapy is adherence to therapy. Ballet can be an alternative or a complement to physiotherapy, with the added attraction of not being part of a therapy, but a fun activity with the extra reward associated with the realization of an artistic activity. For some years the ballet is used as therapeutically valuable for both children with cerebral palsy: Intensive ballet training can generate changes in the sensorimotor cortex. Ballet is characterized by a complex process of movements that have to be in a musical rhythm (hence have to be precise), in which there is an overall

coordination of the muscles. It is also a highly motivating and rewarding activity that allows many children with CP sharing the activities of their peers without special needs. Objective measurements of the Full Port de Bras movement has been chosen as an index of improvement. The results shows progressive improvements of the execution in a single case.

P-03

Effect of Tire Pressure to Physical Workload at Operating a Manual Wheelchair

Masayuki Booka¹, Ikuo Yoneda², Tsutomu Hashizume³, Hokyoo Lee⁴, Hidehisa Oku⁵, Shoichiro Fujisawa⁶

¹ *Hiroshima International University, Hiroshima, Japan*

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⁴ *The Hyogo Institute of Assistive Technology, Japan*

⁵ *Kobe Gakuin University, Japan*

⁶ *The University of Tokushima, Japan*

It is often experienced that low tire pressure of the wheelchair not only increases running resistance, but also reduces parking brake performance. In this study, the required driving forces for different tire pressures were experimentally measured and evaluated. It was indicated from the result that the wheelchair with proper tire pressure could be run with less workload of wheelchair-user. Then it was also indicated that the wheelchair with a lower tire pressure needed more workload of wheelchair-user even on hard level surface.

P-04

Conceptualizing Everyday Mobility of Older People as Basis for the Development of a Pedestrian Assistance System

Florian Breitingner, Janna Protzak, Rebecca Wiczorek

Department of Psychology and Ergonomics, Technische Universität Berlin, Germany

For older persons, everyday mobility is an important aspect of living an independent and self-determined life. Especially with increasing age most of the everyday ways in urban areas are covered by foot. The more severe is the fact that older pedestrians are among the most vulnerable road users. This is the starting point of the research group FANS aiming for developing a pedestrian assistance system for older road users. Therefore, it is necessary to understand the difficulties older pedestrians encounter. In order to do so, everyday mobility of this group will be conceptualized using the *Constraints Approach* by Hägerstrand and the *Theory of Structuration* by Giddens. Currently, two focus groups have been carried out that have been analyzed according to Hägerstrand's and Giddens' considerations. Hereinafter, the category system that has been derived from the theoretical considerations will be presented and an outlook will be given.

P-05

Advanced Work Capacity Testing

Károly J. Bretz, László Dános, Szilvia Smudla, Adrienn Pálosi

National Office for Rehabilitation and Social Affairs, Budapest, Hungary

The aim of this study is to describe an accurate work capacity testing which can be used in the industry, as well as in rehabilitation process. The first part of this paper is dealing with the NIOSH lifting equation, which is a tool used by occupational health and safety professionals. The second part of this paper summarizes the features and applications of the „ErgoScope” work simulator. Static and dynamic strength of upper and lower limbs, as well as whole body efforts can be measured. The equipment makes it possible to evaluate pushing, pulling, lifting and carrying activities comprising reaching, bending and stooping movements. In the third part of this paper we demonstrate handgrip force data recorded using the „ErgoScope” work simulator comparing with handgrip force data published in the literature. „ErgoScope” work simulator is capable to measure handgrip and pinch forces, suitable to evaluate fine motor skills, hand and finger dexterity, as well as reaction times.

P-06

A Functional Analysis Of An Assistive Device Information Database in Flanders: A Qualitative Study

Loes Cardinaels¹, Jonas Verbrugghe², Mieke Haesen³, Ben Schouten⁴, Bianca Ceccarelli⁵,
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⁵ LifeTechLimburg, Belgium

Since 1989-1990, Vlibank is the Flemish AT information database managed by the Flemish government and aims to have a complete overview of AT devices in Flanders. The growing AT market increases the need for unbiased information on AT. However, maintaining and keeping a database up-to-date is a very challenging task. Because of recent changes in policy, the Flemish government needs to be able to reimburse a bigger group of AT devices, but also the changing needs of a larger group of people, regardless of their age. Because the crucial role of an AT information database in the selection of AT devices and the effectiveness of the service delivery, a functional analysis of an online information database is made. This paper describes the qualitative part of the study, in particular the focus groups that were held to gather views of three groups of stakeholders. Preliminary results indicate that there is consensus on the information needs next to product information and on the use of generic questions as a selection tool for AT devices. The biggest issue raised is the difficulty of keeping an information database up-to-date, especially for individualized devices. All participants, except one, are very wary of the use of user ratings and reviews.

P-07

Virtual Reality in Assessing the Supportive Environment that Promotes Navigability of Persons with Alzheimer's Disease

Rosalam Che Me, Silvia Maria Gramegna, Alessandro Biamonti

Politecnico di Milano, Milano, Italy

Spatial cognition and representation in persons with Alzheimer's disease (AD) is usually impaired, alongside with cognitive impairment. It is important to provide the supportive environments that support their ability of wayfinding to maintain the daily activities and autonomy. The aim of this paper is to emphasize how Virtual Reality (VR) system is used to assess the improved environmental design that promotes spatial navigability in persons with AD. The importance of supportive environments and significant studies that used VR in the wayfinding interventions is presented. The paper proposed a strategy to use Virtual Environment (VE), replacing the traditional assessment in the design development phase of supportive environment. Results from the preliminary valuation using interview show positive feedback by the medical experts, since immersive VE allows the experience being in actual environment. Also, the proposed strategy may reduce the costly and time-consuming design process. An evidence-based validation involving persons with AD will be conducted to investigate the effectiveness of this assessment strategy by comparing the individuals' navigational performances in both real and VE.

P-08

Bridging the Gap between High School and University Studies for Student with Disability

Luca Ciampi², Alfonso Curreri¹, Massimiliano Donati², Luca Fanucci², Federica Gorrasi¹, Stefano Landucci¹, Paolo Mancarella¹, Fiammetta Savoia¹

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The choice of the university program represents an important and difficult step for a large part of high school students, especially for those who have to change city and lifestyle to follow their ambitions. In particular, for students with disabilities this choice is even more complicated due to their specific needs concerning both their educational and everyday life. In order to bridge the gap between high school and the University of Pisa, supporting the students during the selection of the program and their stay in Pisa, this paper presents a new model for matching the needs of the students and the existing services in Pisa, with particular attention to those with disabilities. It is based on questionnaires to assess the needs of the students and an accessible website to make available information about places and services offered in Pisa and its surrounding.

P-09

Real-time Pedestrian Crossing Recognition for Assistive Outdoor Navigation

Simone Fontanesi^{1,2}, Alessandro Frigerio^{1,2}, [Luca Fanucci](#)¹, William Li²

¹ *University of Pisa, Pisa, Italy*

² *Massachusetts Institute of Technology, Cambridge, USA*

Navigation in urban environments can be difficult for people who are blind or visually impaired. In this project, we present a system and algorithms for recognizing pedestrian crossings in outdoor environments. Our goal is to provide navigation cues for crossing the street and reaching an island or sidewalk safely. Using a state-of-the-art Multisense S7S sensor, we collected 3D pointcloud data for real-time detection of pedestrian crossing and generation of directional guidance. We demonstrate improvements to a baseline, monocular-camera-based system by integrating 3D spatial prior information extracted from the pointcloud. Our system's parameters can be set to the actual dimensions of real-world settings, which enables robustness of occlusion and perspective transformation. The system works especially well in non-occlusion situations, and is reasonably accurate under different kind of conditions. As well, our large dataset of pedestrian crossings, organized by different types and situations of pedestrian crossings in order to reflect real-world environments, is publicly available in a commonly used format (ROS bagfiles) for further research.

P-10

Occupational Therapy Research on Technology in Scandinavia. A Research Proposal

Astrid Gramstad

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Centre for Care Research North Norway, Tromsø, Norway

Introduction: Technology and assistive technology devices (ATD) hold promise to be a part of the solutions to what has been called the "double demographic" challenge, or the expectation that there will be a labour shortage in the public sector and at the same time, a growing number of people who will need help. Position papers targeting the ATD service delivery emphasise that the ATD should be viewed as a part of the user's life trajectory, to ensure that the ATD is relevant and meaningful in the contexts of the person. Occupational therapists are alleged to be competent of assisting clients in the process of assessing ATD needs, choosing an ATD suitable for the clients' situation and evaluating the outcome of the ATD to facilitate the occupational performance of the client.

This current study will investigate the assumptions and perspectives regarding a) technology, b) client using the technology and c) the ATD service delivery which shows itself in research published in the Scandinavian journal of occupational therapy (SJOT) during a period of 14 years. Specifically I seek to identify whether the critique against occupational therapists mechanistic thinking concerning ATD and technology, as shown in previous literature reviews is still relevant. The results of this literature review will be important towards developing client-centred, relevant and evidence based occupational therapy services and theory.

Occupational therapy theorist Gary Kielhofner claimed that the occupational therapy profession has evolved through three paradigms. During the first paradigm the significance of occupation for achieving and sustaining good health was emphasized. This paradigm was replaced by a mechanistic

paradigm in which the functional subsystems of the body were the focus of therapeutic attention (8). Kielhofner claimed that the mechanical paradigm has been replaced by a more occupation based and client-centred focus. This notion is supported by several of the premise suppliers of the occupational therapy profession, for example the associations of occupational therapists in Scandinavia, where "meaningful occupations", "occupation and participation for all" and "facilitating mastering of everyday occupations" are frequently mentioned as falling within the scope of occupational therapy (9-11). However, the occupational therapy profession has still been criticised for having a mechanistic attitude toward occupational performance difficulties, emphasising function over activity and participation. For example, Hocking and Wilcock concluded after reviewing Australian occupational therapy literature during 1954-1995, that the therapists were strongly influenced by mechanistic thinking in their views on use of object. Another literature review which examined how assistive technology and physical environment issues have been studied by occupational therapists during 1997-2001 concluded that the occupational therapists still focused on the individual rehabilitation perspective characterised by the medical paradigm. What are the current relations between technology and occupational therapy? Have the occupational therapy researchers adopted a more occupation based and client-centred focus in their research on ATD?

P-11

Development of Communication Assistive Technology for Persons with Deaf-Blindness and Physical Limitation

Takuro Hatakeyama¹, Takashi Watanabe², Kiriko Takahashi³, Kouki Doi⁴, Akiko Fukuda⁵

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⁴ National Institute of Special Needs Education, Japan

⁵ The Japan Deafblind Association/World Federation of the Deafblind

The purpose of this study was to develop a system that will provide communication assistance to persons with deaf-blindness and physical limitation, so that they will be able to communicate with others without the help of an interpreter.

With this communication system, a person with deaf-blindness and physical limitation uses a control switch to perform input operations based on the duration of the operating time and combination of long and short pulses. When the input is correctly performed, the user receives a feedback from the tablet computer as vibratory stimuli. Similarly, the message that other person's input with a Bluetooth keyboard is transmitted to the user as vibration stimuli. Following the development, we conducted a one-year assessment of the developed communication system in an actual environment with the cooperation of one person with deaf-blindness and physical limitation. We confirmed that our developed system was useful for such a person, and understood that we must improve upon several aspects. We shall pursue further study, and will aim at providing a better communication environment for persons with deaf-blindness and physical limitation in future.

P-12

Communication Robots for Elderly People and Their Families to Support Their Daily Lives

Case study of Two Families Living with the Communication Robot

Kaoru Inoue¹, Chihiro Sasaki², Mio Nakamura³

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² *Tokyo Welfare College, Tokyo, Japan*

³ *International University of Health and Welfare, Ohtawara, Japan*

The aim of this project is to analyze how two families (one is living with a senior with physical disabilities and the other is living with seniors) feel about using the human-type communication robot “Palro” and what they demand for the improvement through their 3 weeks usage. All of them liked Palro and its programs, but needed some new programs. They pointed out that Palro sometimes had problems in the facial or voice recognition systems. Palro is useful in the area of self-care and social isolation.

P-13

Development of Safety Concept of Electric Wheelchair Driving Support System based on Assessment of Risk

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In this research, we pay attention to the electric wheelchair driving support. We look at the functional safety of the electric wheelchair. Based on intrinsically-safe electric wheelchair, we add driving support system to increase functional safety. The driving support system processes the environmental information sensor data including the 3D laser Range scanner and biological monitoring sensor data including electrooculogram, and assists avoidance of dangerous objects. We have developed safety concept that based on assessment of risk.

P-14

Technologies Closely Connected to Citizens' Health - Methodology, User Involvement and Health Care Technologies

Tina Helle, [Jette Bangshaab](#)

University College Northern Denmark (UCN), Aalborg, Denmark

Introduction: This presentation depicts the interdisciplinary research program labelled “*Technologies Closely Connected to Citizens' Health* (TCCCH), founded at University College Northern Denmark. The broad scope of the program is to investigate user-oriented health care that involves the use of a range of different technologies to support health, care and rehabilitation. TCCCH is based on a bottom-up, interdisciplinary approach, striving to involve the end-users during the research process and determined to implement the results in clinical health care practices.

TCCCH involves researchers, clinicians, students and actors from public sector and private companies. That is, this research program is about attracting new areas and building bridges at several levels. The specific aim of the presentation is to portray and exemplify some of the research conducted within TCCCH, with the intention to increase the understanding of: How to use technology to reduce inequality in health. How technology can empower and engage citizens in one's health. How technology can facilitate communication among health care professionals and patients. What characterizes the everyday technology use landscape and what are the competencies in using these technologies in different patient groups. When is it appropriate and essential, along the development process of any technology, to involve the users.

P-15

A Brief Introduction of Assistive Technology Service Delivery System in Republic of Korea

[MyungJoon Lim](#), [SungMin Jung](#)

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Social participation of People with Disability in Republic of Korea has been grown last few years. Also demand of Assistive Technology has been increased as well. Responding these needs, the public benefits of Assistive Technology Device in Republic of Korea in 2014 was USD 1.7 billion which had been increased by 27 percent during the last five years. Despite an increase in the budget, effort to build Assistive Technology Service Delivery System (ATSDS) was not enough. Therefore, Ministry of Health and Welfare in Korea decided to build ATSDS in Republic of Korea in 2009. In this paper, the process of establishing ATSDS and 2014 outcomes of ATSDS are presented in details. For more than six years efforts of establishing national-wide ATSDS, nine Assistive Technology Centers were actively running in their delivery of service in 2014. As of 2014 outcomes of ATSDS, 14,056 cases were delivered through nine Assistive Technology Centers. The presence of ATSDS proved increase in accessibility for Assistive Technology for People with Disability followed by improvement of the quality of life of them.

P-16

Comfort, Stability and Body Posture in Wheelchair Cushions: A Preliminary Study with Able Bodied Subjects

Diego D. Gonçalves, Ana E. Franchini, Adrieli Sardella, Gabriel H.C. Bonfim,
Fausto O. Medola, Luis C. Paschoarelli

UNESP – University Estadual Paulista, Bauru, Brazil

Long term wheelchair usage has been related to a number of problems, among which pressure ulcers are one of most concern. The design of wheelchair seat cushions has been of increasing interest among researchers, as it can influence seat interface pressure and user's comfort. The aim of this study was to investigate the subjects' perception comfort, stability and body posture of six different commercially available wheelchair cushions. The evaluation was through a questionnaire, where the subjects rate their perceptions on a ten point visual analog scale after staying seated in the cushion for two minutes. The results shows that the Roho™ aircell cushion was preferred by the users, while the least preferred one was the water cushion. Individuals' subjective perceptions may compliment objective data on seat interface pressure, thus contributing to a more complete view of the users' experience during wheelchair cushion usage.

P-17

Development of the SORRI-Bauru Posterior Walker

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This study aimed to report on the design and development of a low cost Reverse Walker through a participative development cycle with people undergoing rehabilitation. The creation and fundamentals of the concept are described, as well as the development of prototypes and their provision to subjects with mobility problems. The Reverse Walker benefits the user by promoting a more upright posture and favoring the development of postural balance. Enhancing the mobility of people with disabilities may benefit their independence, social participation and quality of life.

P-18

Using a Pressure Mapping System to Evaluate Contact Pressure on Hands During Use of Axillary Crutches

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The aim of this study was to evaluate different handles used in axillary crutches with a Pressure Mapping System. The Grip Versatek system from Tekscan Inc. was used to measure the levels and the distribution of contact pressure in the hands during a simulated activity of ambulation with crutches. The sample included ten able-bodied subjects: five men and five women. The results show that the different models of handles appear to have influenced the pressure levels measured during the activity. Therefore, the measurement equipment provides parameters that allow the comparison among different designs and assess their contribution to the comprehension of the demands of ergonomic handles.

P-19

Use of Robotic Pets in Providing Stimulation for Nursing Home Residents with Dementia

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Trial experiments utilized robotic pets to facilitate self-reliance in nursing home residents. A remote-control robot modeled clear and meaningful behaviors to elderly residents. Special attention was paid to its effects on mental and social domains. Employing the robot as a gaze target and center of attention created a cue to initiate a communication channel between residents who normally show no interest in each other. The Sony AIBO robot in this study uses commercially available wireless equipment, and all its components are easily accessible to any medical or welfare institution interested in additional practice of these activities.

P-20

Multiple ANN Recognizers for Adaptive Recognition of the Speech of Dysarthric Patients in AAL Systems

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People suffering from neuromuscular disorders are one of the main target groups of speech-controlled Ambient Assisted Living systems. However, the speech of these patients is often distorted because of the dysarthric symptoms of the disease. The dysarthria is known to become worse as the disease progresses. We propose a framework for an adaptive speech recognition system that may be able to follow the slow deterioration of speech quality without risking the accuracy of the system from incorrect data.

P-21

Experiences of Using Powered Wheelchair or Powered Scooter and Accessibility in Housings

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Objective: To describe powered wheelchair (PW) and powered scooter (PS) users' experiences of accessibility and housing adaptations in their homes.

Method: A qualitative research approach with focus group methodology was used. Four focus groups were created, with men and women as well as PW and PS users in different groups. Applying a descriptive approach, data were analysed according to the principles described by Krueger and Casey.

Findings: With a specific focus on how PW and PS and housing adaptations operate together, the findings of this paper formed two categories: "Possibility of receiving housing adaptations according to individual needs" and "Importance of receiving the correct type of PW and PS in relation to individual needs".

Conclusion: It is vital to acknowledge the characteristics and requirements of PW and PS as well as housing adaptations in order to optimize the use of such devices in the home, as a prerequisite for independence, activity and participation. The provision of PW and PS and housing adaptations should be considered and planned simultaneously, applying an explicitly user-centred perspective. Additionally, the collaboration between the different actors involved should be improved.

P-22

AAL@MEO: Interactive Digital-TV to Support Home Care

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This paper presents the evaluation of the AAL@MEO, an application to aggregate technological solutions supporting home care. This application is intended to be integrated in the MEO service, which is a Portuguese commercial service of Internet Protocol TV. The use of a TV set at home as the central interaction and communication system is advantageous for elderly users that do not have a close relationship with technological advances but are used to control their TV set. The results of the evaluation of the AAL@MEO show that elderly users are willing for new services and have a milder rejection towards the interaction with the TV set. However, the interaction mechanisms based on a remote control with multiple functions need further developments.

P-23

BrailleEasy: One-handed Braille Keyboard for Smartphones

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The evolution of mobile technology is moving at a very fast pace. Smartphones are currently considered a primary communication platform where people exchange voice calls, text messages and emails. The human-smartphone interaction, however, is generally optimized for sighted people through the use of visual cues on the touchscreen, e.g., typing text by tapping on a visual keyboard. Unfortunately, this interaction scheme renders smartphone technology largely inaccessible to visually impaired people as it results in slow typing and higher error rates.

Apple and some third party applications provide solutions specific to blind people which enables them to use Braille on smartphones. These applications usually require both hands for typing. However, Braille with both hands while holding the phone is not very comfortable. Furthermore, two-handed Braille is not possible on smartwatches, which will be used more pervasively in the future. Therefore, we develop a platform for one-handed Braille consisting of a custom keyboard called **BrailleEasy** to input Arabic or English Braille codes within any application, and a **BrailleTutor** application for practicing. Our platform currently supports Braille grade 1, and will be extended to support contractions, spelling correction, and more languages. Preliminary analysis of user studies for blind participants showed that after less than two hours of practice, participants were able to type significantly faster with the BrailleEasy keyboard than with the standard QWERTY keyboard.

P-24

Development of a Daily Life Support System for Elderly Persons with Dementia in the Care Facility

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³ College of Systems Engineering and Science, Shibaura Institute of Technology, Japan

Taking care for dementia persons with BPSD is burdening on caregivers. To reduce caregivers' burdens and improve dementia persons' quality of life, monitoring and communication intervention system has been proposed. A part of the system, wandering and falling down detection system has been developed. It is designed based on the requirement of the caregivers working in the care facility. Functional test was carried out and had positive impressions from the caregivers.

P-25

Checking Dwelling Performance for Aging-in-Place

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³ TNO, Strategic Business Analysis, Delft, The Netherlands

About 90% of persons aged 55 and older would prefer to stay in their current residences as long as possible because older adults value their independence. However, aging-in-place is not always a choice. Recently, the Dutch government tightened the criteria for older adults to be admitted in a nursing home. Throughout the past 5 years TNO was requested by the trade association for building service contractors in the Netherlands to develop a number of tools for building service professionals. The 'dwelling check' was developed as a 'basic' check on the possibility for aging-in-place. A pilot study was conducted to assess the added value of the dwelling check for older adults. During this pilot study the occupants of over 200 dwellings were interviewed by 11 building services contractors using the dwelling check. Based on these interviews a personal advice was written. After which the interviewees were asked to evaluate this service, comprising the interview and written advice. The dwelling check contributed most to the awareness of and interest in possible alterations for aging-in-place. In a few cases the decision (17%) or even action (5%) was taken to make alterations. Overall the dwelling check was rated 8 out of 10 by the interviewees and may therefore be considered of added value.

P-26

Improving Assistive Technology Service by Using 3D Printing: Three Case Studies

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² Faculty of Human Sciences, Waseda University, Japan

³ Foundation for Nagoya Rehabilitation Services, Japan

Assistive technology services are essential for adapting assistive devices to the individual needs of users with disabilities. In this study, we attempted to apply three-dimensional (3D) printing technology to three actual cases, and to study its use, effectiveness, and future applications. We assessed the usefulness of 3D printing technology by categorizing its utilization after reviewing the outcomes of these case studies. In future work, we aim to gather additional case studies and derive information on using 3D printing technology that will enable its effective application in the process of assistive technology services.

P-27

Education in Care and Technology, a Facilitator of Interdisciplinary Research and Development

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⁶ University of Beira Interior, Covilha, Portugal

Objective: Application of technology in care is hindered by two factors; a critical attitude of care professionals towards the use of technology as part of care delivery and a lack of knowledge of care practice by technology developers. Technological developments may provide adequate solutions to support care provision. The principles of user centred design and development, traditionally used in the development of assistive technology, may provide powerful tools to support care provision. Interdisciplinary research will be needed to take full benefit. Educational programs to support this development are lacking.

Main content of this paper: Six organisations of higher education have taken the initiative to organize a training program to support professionals active in the care or in the technology domain that enables them to become involved in interdisciplinary research and development.

Results: A European program to educate a professional master in Care and Technology has been developed and is described in this paper. Accreditation of the program is initiated.

Conclusion: Alumni of such a program may form a European network of professionals that are active in developing new solutions to support people with special needs and contribute to the generation of new business.

P-28

New Tools to Convert PDF Math Contents into Accessible e-Books Efficiently

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New features in our math-OCR software to convert PDF math contents into accessible e-books are shown. A method for recognizing PDF is thoroughly improved. In addition, contents in any selected area including math formulas in a PDF file can be cut and pasted into a document in various accessible formats, which is automatically recognized and converted into texts and accessible math formulas through this process. Combining it with our authoring tool for a technical document, one can easily produce accessible e-books in various formats such as DAISY, accessible EPUB3, DAISY-like HTML5, Microsoft Word with math objects and so on. Those contents are useful for various print-disabled students ranging from the blind to the dyslexic.

P-29

Study on the Good Level of Legibility of Japanese Characters in Graphic Floor Signs

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² *The Hyogo Institute Assistive Technology, Japan*

In order to guarantee the right of mobility, standardization of sign system in public transport facilities is going on as part of a promotion of barrier-free space. Guideline of the sign system in Japan describes desirable font type, font size, pictograms, color combinations. This guideline covers such as suspended signs and self-standing signs.

On the other hand, some low vision or elderly people walk while watching floor, and they often overlook or hard to read suspended signs. Therefore, they have requests for new sign system which makes good use of floor for way finding. However, graphic floor signs are not covered in this guideline.

We have investigated the validity of the graphic floor signs for persons with low vision and persons with normal vision. As a result, it was found that graphic floor signs got favorable reviews and effective at readability. However, the viewing distance of the graphic floor signs was different from persons with low vision and persons with normal vision, and a legible font size was different. This study examined legibility of the graphic floor signs for persons with normal vision.

P-30

Profiting from the Experience of a Lifetime

Csilla Szentiványi

Andrássy University Budapest, Budapest, Hungary

Current demographic trends bear enormous societal and economic challenges for Europe. Many older adults lack opportunities of staying active and maintaining a professional meaning in their third and fourth life phases, often leading to weak social integration and interaction and a growing danger of poverty. The wealth of experience of the generation 55+ represents a considerable asset that has so far not been available to and used by the society and the industrial base in Europe to a sufficient extent. Since the internet is growing more and more important as a platform where employers and job seekers meet, it is important that elderly people are attracted to using the internet for searching for employment opportunities. With support from the EU, Andrássy University Budapest is implementing the international research project “ExpAct – Experience keep people active” (www.expact.eu) together with Swiss, Italian, German and Austrian partners. In order to realise the vision of novel markets evolving around assets supplied by older adults and stimulating demand within societies and economies, a software application framework (white label SaaS solution) fostering the development and operation of online platforms will be developed, based on scientific research, with the involvement of stakeholders in five countries and tested in seven pilot applications. The ExpAct solution excels by high usability and a broad portfolio of modules and processes that allow for a fast and easy implementation of a platform adapted to the specific target group’s needs.

P-31

Increasing Awareness and Take up of Electronic Aids by Providing a Library of these Devices

Rene Hansen, [Warren Goodland](#)

DLF, UK

Despite evidence of the benefits of standalone electronic assistive technology, e.g. memory prompts, there is relatively low take-up of this equipment. With a three year funding grant from the UK Department of Health DLF created a loan library of electronic aids that can be borrowed for free for two weeks across England to raise awareness of the technology and allow end users to trial equipment, thus reducing their fear of making an inappropriate purchase.

Demonstrations of the library and a range of its content were completed across England to approximately 5000 individuals (approximately 1300 professionals and 3700 members of public). Over 100 individuals borrowed items from the library. Most loans were by people attending demonstrations, and the majority (77%) borrowed for a friend/relative/partner rather than for themselves. 97% of attendees at demonstrations stated they were introduced to equipment they did not know was available. Of those borrowing equipment one third found it was not suitable for their needs and thus potentially saved money compared to if they had purchased the product.

The project highlighted the low awareness of the availability of this technology but also the need for an opportunity to trial equipment before purchase.

General information

Venue

Budapest Congress Center (BCC)
Address: H-1123 Budapest, Jagelló u. 1-3.
Phone: +36 1 372 5400
Fax: + 36 1 466 5636
www.bcc.hu

Registration desk opening hours

08:00 – 21:00 Wednesday, 9 September 2015
08:00 – 18:00 Thursday, 10 September 2015
08:00 – 17:30 Friday, 11 September 2015
08:00 – 14:00 Saturday, 12 September 2015

Meals

Please note that registration fees include Get together party, banquet, lunches and all coffee breaks.

WELCOME COCKTAIL

Lobby of the Venue (BCC)
17:30- Thursday, 10 September 2015

BANQUET

Lázár Equestrian Park, Domony-valley – organized transportation is provided
Gathering at 18:30 Friday, 11 September 2015 in the parking lot of the venue (BCC)

Shopping in Budapest (opening hours)

Food shops are open from 7 AM – 6 PM Mon – Fri, 8 AM – 1 PM Sat. Other shops are open between 10 AM – 6 PM Mon – Fri, 10 AM – 1 PM Sat.

Shops larger than 200 sqm cannot be open on Sunday. So shops, supermarkets, stores are closed on Sunday, only smaller ones (less than 200 sqm) and family owned shops where family members work will be open on the last day of the week.

Office hours: generally from 8 AM – 4 PM Mon – Fri.
Post offices: Mon – Fri: 8 AM – 6 PM, Sat: 8 AM – 1 PM
Banks: Mon – Thu: 8 AM – 3 PM, Fri: 8 AM – 1 PM.

Taxis in Budapest

Budapest taxis are coloured to yellow, with yellow number plates and a taxi sign in yellow. Any vehicle without these features is operating illegally. It's a good idea to avoid drivers who volunteer their services but don't have a registered taxi sticker on their car. This can prevent unpleasant surprises when it comes time to pay. All cars must have a taximeter installed, and these also print out a receipt. Taxi drivers are required to give an invoice on request. Tipping: in general 10% of the fare is acceptable. The total charge that has to be paid by the passenger is made up of three separate parts: the basic charge, which is irrespective of how far the journey is, presently HUF 450 during day and night, a per kilometre charge which depends on how many kilometres are covered during the journey HUF 280/km, and the waiting charge which is HUF 70/min. From 1 September 2013 a new regulation came to force which regulates the taxi fares. No fixed, shuttle or pre-agreed prices are available any more.

Telephone

The international code for Hungary is 36, the area code for Budapest is 1. To call a number within Hungary, first dial 06. Budapest telephone numbers have seven digits, all other areas have six digits (in addition to the area codes). To make an international call from Hungary, first dial 00, then the country code followed by the area code and the subscriber's telephone number. To call a (Hungarian) mobile phone, from a public telephone first dial 06, followed by the subscriber's seven-digit number starting with 20-, 30- or 70-.

Important phone numbers

English is usually spoken at the emergency numbers listed below. In case English is not spoken, dial 112.

Ambulance: 104

Fire brigade: 105

Police: 107

Central help number: 112

Inland enquiries: 11818

International enquiries: 11824

Hungarian Automobile Club help number: 188

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