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# Moving Towards an All-Encompassing Universal Design Approach in ICT

**André Liem**

Associate Professor  
Norwegian University of  
Science and Technology  
Faculty of Engineering  
Science and Technology  
Department of Product  
Design

Kolbjørn Hejes vei 2B  
N-7491 Trondheim  
[andre.liem@ntnu.no](mailto:andre.liem@ntnu.no)

**Sarah J. Swierenga, PhD,  
CPE**

Director,  
Usability/Accessibility  
Research and Consulting  
Michigan State University  
93 Kellogg Center  
East Lansing, MI 48824  
[sswieren@msu.edu](mailto:sswieren@msu.edu)

**Rama Gheerawo**

Deputy Director  
Helen Hamlyn Centre  
Royal College of Art  
Kensington Gore  
London SW7 2EU  
[rama.gheerawo@rca.ac.uk](mailto:rama.gheerawo@rca.ac.uk)

Information and Communications Technology (ICT) is an overarching term that includes all technologies for the manipulation and communication of information. It encompasses any medium to record information; technologies for broadcasting information using radio, television, and the Internet; and technologies for communicating through voice and sound or images. Based on the rapid growth in digital information, it also includes the wide variety of computing hardware, as well as personal electronic devices comprising mobile phones, personal devices, MP3 players, and many more.

ICT has become an essential tool in education, employment, lifestyle, and recreation. Most people rely on ICT products both in their daily routine, as well as for more specialised activities. For example, telephones and the Internet are used for making dentist appointments and airline reservations, ordering take-out food, calling relatives, communicating with customers and colleagues, participating in conference calls at work or in school, and making emergency calls. In addition, those concerned with specialised communication activities use ICT for distance learning, telecommuting, and videoconferencing, etc. The mobile phone used to be a simple voice-to-voice communication device, but has become a camera, music player, web browser, hard drive, and lifestyle accessory that many people have come to depend on in their everyday lives.

Designing any product or interface involves the consideration of many factors, including aesthetics, usability, engineering, environmental issues, safety concerns, industry standards, and cost. Typically, when including people in this process, designers only consider the average user and rarely include people of different abilities, ages, and backgrounds. In contrast, universal design (UD) is the design of products, environments, and communication to be used by the widest number of people, to the greatest extent possible, without the need for adaptation or specialized design. The concept is also known as inclusive design, design-for-all, lifespan design, or human-centered design.

In November 2008, André Liem conducted a 4-day external course for Norwegian companies who had an interest in extending their ICT knowledge and expertise towards universal design. The intention to make the results generated by the course participants known to a broader audience has led to a collaborative initiative with the Journal of Usability Studies (JUS) to develop a special issue around the theme: Universal Design and ICT. For the final examination, course participants were given the assignment to write and submit a scientific article for this special issue relevant to the following topics:

- Web design and accessibility for people of different ages or abilities
- Methods and processes for designing universal products, interfaces, and systems
- Methods for evaluating usability and accessibility
- Products and systems that go beyond an ergonomic approach to create accessible lifestyles and give greater choice
- Research methods in human-computer interaction with an emphasis on UD
- Assistive hardware and software tools for UD
- Designing for a specific target group and reducing stigmatisation
- Rethinking usability within the context of UD and ICT
- Universal design as a strategic tool for product or service innovation
- Universal design, standardization, and legislation
- The business and politics of UD and ICT

The course was organized in the form of lectures and workshops. On the first day, historical, political, legislative, and cultural aspects of UD were discussed in relation to ICT. The main questions were the following: What are the challenges for ICT specialists and planners when considering UD issues in their work? and What are the opportunities and limitations for strategic innovation when combining UD and ICT? The second day focused on the operational aspects of UD and ICT. Methods, guidelines, and examples of good and bad interaction/interface design were discussed. The third day addressed "Methods for evaluation of user-friendliness and accessibility as an assistive tool for making design decisions." For the final day, an ICT consultancy, specializing in UD, gave a demonstration of different types of media suited for people with weak eyesight. The course ended with a presentation and discussion unveiling new thinking and practices for knowledge creation, innovation, and business development around design and ICT.

For benchmarking and quality purposes, the call for articles was extended to authorities from both academia and non-participating companies. Surprisingly, the four articles in this special issue of JUS were written by non-course participants.

The article "Comparing Computer Versus Human Data Collection Methods for Public Usability Evaluations of a Tactile-Audio Display" discusses how two different study techniques can generate data to see how effective, entertaining, and usable a device that translates sound into tactile sensations can be for not only the general public, but for people with special needs, such as people who have low vision or are deaf or hard of hearing. Some of the considerations that the authors advocate are to use an automated computer survey to gather basic user experience feedback, augment lab experiment data by using public usability studies to provide real-world data, and try to use as many participants as possible to ensure the universality of a device.

Poore-Pariseau's article, "Online Learning: Designing for All Users," discusses the obstacles found with online learning environments that can severely limit opportunities to education and employment for people with disabilities. She discusses the positive impact accessible design has on improving motivation and understanding for all segments of the population—a true benefit for implementing universal design.

The article "Beyond Specifications: Towards a Practical Methodology for Evaluating Web Accessibility" assesses web accessibility tools and specifications and suggests a methodology to evaluate and improve web accessibility including identifying user requirements, determining accessibility goals, evaluating web accessibility, and establishing and enforcing an accessibility policy and design process. Human-computer interaction (HCI) researchers, interaction design practitioners, and usability professionals can incorporate this methodology into their processes

to effectively and efficiently design web applications and web sites—thus, ensuring that their products can be used by the widest possible audience.

In Vatrapu and Suthers' article, "Intra- and Inter-Cultural Usability in Computer-Supported Collaboration," an argument is made to extend the range of universal design to consider cultural differences. The study examined how different cultures work together using computer-supported collaboration and how each cultural group experienced the system as related to efficiency, effectiveness, and satisfaction.

All of the articles in this issue exemplify the importance of considering, evaluating, and implementing universal design practices to break down barriers that can affect how people, including people from different cultures and people with special needs, experience ICT. Both industry and academia should embrace the benefits of universal design to reach, educate, and aid as many people as possible.

### About the Authors



#### **André Liem**

Liem, a graduate of TU Delft, has been teaching at the Department of Product Design (NTNU) since January 2005. Research interests include design methodology, user-centered design, and transportation design. Liem has published widely and edited several special issues. Professionally, he has undertaken consultancy projects internationally and holds an advisory position within Design Insight.



#### **Sarah Swierenga**

Swierenga, Director of Usability/ Accessibility Research and Consulting (UARC) at Michigan State University, is a researcher and practitioner with over 25 years of experience in the scientific study of users in commercial, military, and academic environments. Her research areas include accessible website design, usability techniques, and health communication technology.



#### **Rama Gheerawo**

Gheerawo joined the Helen Hamlyn Centre at its inception in 1999 and is now Deputy Director. He leads a programme working closely with business partners on applied inclusive design projects. He is committed to people-centred design practice, the development of core methodology, and knowledge transfer to business.