Editorials

I am honored to welcome you to the fourth volume of Annual Review of CyberTherapy and Telemedicine. This year’s theme, “Virtual Healing: Designing Reality,” acknowledges the importance of two related types of scientific studies: clinical applications of virtual reality (VR) and other technologies, and experimental research on why it has such a powerful impact on behavioral healthcare, medicine, and neuroscience. The theme also highlights changes that have occurred in the past decade; that which was once in the realm of science-fiction has now increasingly become part of our reality. As readers, you will therefore have the opportunity to play a role in designing the future. By utilizing technology for training and therapy, we are able to improve existing protocols, and disseminate care to a wider segment of the population.

Much has changed over the past eleven years since the inception of the CyberTherapy Conference. We have now tapped further into the potential of VR than many of us could have ever imagined. An exciting body of research regarding the utilization of advanced technologies in behavioral healthcare has emerged over the past decade, revealing the continuous advances and discoveries made by over 450 investigators to help patients with both mental and physical disorders. I am proud to report that as VR’s use in behavioral healthcare has grown, so have submissions to the Annual Review of CyberTherapy and Telemedicine. For the first seven years, CyberTherapy was represented by a specialized symposium at the Medicine Meets Virtual Reality (MMVR) Conference featuring presentations that dealt primarily with conceptual matters and future possibilities. Over the years, the symposium continued to grow in both size and scientific evidence. In 2003, the symposium spun off into a separate three-day conference. The 10th Annual CyberTherapy Conference, held in June 2005, highlighted the largest program ever presented on controlled clinical trials of VR and other cutting-edge technologies in the areas of mental health, rehabilitation, disabilities, training, and education. It involved representatives from 21 countries, reflecting its truly international character.

I sincerely hope that you will find this year’s volume to be an interesting and intellectually stimulating read. I continue to believe that together we can change the future of healthcare.

Sincerely,

Brenda K. Wiederhold, Ph.D., MBA, BCIA
Co-Editor-in-Chief
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According to recent reports presented by IST Advisory Group (ISTAG) - the Unit within the European Union providing independent advice concerning the strategy, content, and direction of research work to be carried out in Information and Communication Technologies (ICT) (http://cordis.europa.eu/ist/istag-reports.htm) - the evolution of technology in support of the Knowledge Society of the 2010s will be rooted within three dominant trends:

- Pervasive diffusion of intelligence in the space around us, through the development of network technologies and intelligent sensors toward so-called “Ambient Intelligence” (AmI);
- The increasingly relevant role of mobility through the development of mobile communications, moving from the Universal Mobile Telecommunications System (UMTS) to “Beyond 3rd Generation” (B3G);
- Increase of the range, accessibility, and comprehensiveness of communications, through the development of multi-channel multimedia technologies.

The convergence of AmI, B3G, and multi-channel multimedia technologies manifests itself as the next frontier of ICT. This convergence stimulates a change in the way health care is carried out, making it a globally distributed process in which communication and collaboration between geographically dispersed users plays a key role.

In reaching this goal, "Immersive Virtual Telepresence" (IVT) will be essential. In IVT tools, distributed virtual reality (VR) systems are combined with wireless multimedia facilities (real-time video) and innovative input devices (tracking sensors, biosensors, brain-computer interfaces).

In general, the IVT perspective is reached through:

- Widening of the input channel through the use of biosensors (brain-computer interface, psycho-physiological measurements, etc.) and advanced tracking systems (wide body tracking, gaze analysis, etc.).
- Induction of a sense of “presence” or “telepresence” through multimodal human/machine communication in the dimensions of sound, vision, and touch-and-feel (haptics). Typically, a sense of presence is achieved through multisensorial stimula, such that actual reality is either hidden or substituted via a synthetic scenario, (i.e. made virtual through audio and 3-D video analysis, and modelling procedures). In high-end IVT systems, multimedia data-streams, such as live stereo-video and audio, are transmitted and integrated into the virtual space of another participant remotely, allowing geographically separated groups to meet in a common virtual space while maintaining eye-contact, gaze awareness and body language. A sense of presence with other people who may be at distant sites is achieved through avatar representations using data about body movement streamed over a high-speed network.

Since distance learning and e-health are principally involved with handling and transmission of medical information, **IVT has the potential to enhance their user experience through the expansion of human input and output channels.** The two principle ways in which IVT can be applied are:

- as an interface, which enables a more intuitive manner of interacting with information, and
- as an extended communicative environment that enhances the feeling of presence during the interaction.

These approaches will be strengthened by the development of 3rd generation IVT systems including biosensors, mobile communication, and mixed reality. Introducing IVT in cybertherapy will provide significant advantages:

- IVT-based treatment differs from traditional therapy in that computer graphics and various display and input/output technologies are integrated to provide the patient with a sense of
presence or immersion. In more detail, IVT provides a new human-computer interaction paradigm in which users are no longer simply external observers of images on a computer screen, but are also active participants within a computer-generated three-dimensional synthetic world. In this world, the patient has the possibility to learn to manage a problematic situation.

− Moreover, IVT offers a high level of control over the experience without the constraints usually found in computer systems. IVT environments are highly flexible and programmable. They enable the therapist to present a wide variety of controlled stimuli, such as a fearful situation, and to measure and monitor a wide variety of responses made by the user. This flexibility can be used to provide systematic restorative training that optimizes the degree of transfer of training or generalization of learning to the person's real-world environment.

− Finally, IVT systems open the input channel to the full range of human expressions: in rehabilitation it is possible to monitor movements or actions from any body part or many body parts at the same time. On the other hand, with disabled patients, feedbacks and prompts can be translated into alternate and/or multiple senses.

It is interesting to note that this issue of ARCTT reflects this trend. Biosensors, augmented reality, and eye tracking are broadening the typical tools of cybertherapy. The critical challenge, however, is moving from preliminary studies to real-world applications.

In this context it is critical that the pioneers in this field share both information about their experiences and examine the results of the preliminary trials so that suitable development work will speed up. For this reason, the goal of this publication is to provide a forum for presenting and discussing the emerging processes and tools by which cybertherapy applications will contribute to the delivery of state-of-the-art health services. A critical aim of this journal is to stimulate more clinicians and technical professionals to design and test these tools, improving the overall outcome of cybertherapy interventions.

Giuseppe Riva, Ph.D., M.S., M.A.
Co-Editor-in-Chief
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When planning for CyberTherapy 2006, I set up four goals: (a) increase attendance to the conference and workshops by researchers and students, (b) implement a web-based submission/registration system and database, (c) maintain (or improve if ever possible) the high standards of innovation and quality that have been the hallmark of past CyberTherapy Conferences, and (d) offer all of this at the lowest registration rate possible. I think we achieved these goals, with 131 scientific communications and 174 people registered (58 students) at the time this volume went to press. The electronic submission/registration and database system is working efficiently and should be very useful for future conferences, despite a few glitches initially encountered when sending reviews back to the authors. These accomplishments were made possible by the financial support of our sponsors.

I hope that you will enjoy the scientific aspects of this year’s volume. As you will witness, the field of cybertherapy is evolving at an increasing pace, thanks to the rigorous empirical work of all of our authors.

Stéphane Bouchard, Ph.D.
Co-Editor-in-Chief