

CyberTherapy & Rehabilitation

Issue 2 / 2012 The Official Voice of iACToR

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COVER STORY:

Positive Technology Improves Health and Well-Being

and
much
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Letter from the Secretary General and Editor-in-Chief

Professor Dr. Brenda K. Wiederhold

"As cybertherapy and rehabilitation professionals, our mission is to promote people's well-being in our product development efforts to produce 'positive technology.' Just as positive psychology can be defined as the scientific study of human functioning, so can positive technology be defined as the scientific approach to using technology to enhance human functioning."

Dear Reader,

If you are a happy child, will you be a wealthy adult? New research announced in March at the Royal Economic Society's annual conference at the University of Cambridge points in that direction. Investigators showed that a large sample of adolescents and young adults who report higher positive affect or higher life satisfaction grow up to earn significantly higher levels of income. In addition to other influences on income, a one-point increase in life satisfaction (on a scale of 5) at the age of 22 is associated with almost \$2,000 per year higher earnings at the age of 29.

There are neurologic mediators that may help explain this effect. Positive emotions help release dopamine, and dopamine stimulates cognitive functioning including memory tasks and attention span. Cognitive functioning is important in whether or not an individual aspires to attend college and find a well-paying job.

The new findings are important for several reasons:

- **For academics**, it suggests a strong possibility for reverse causality between income and happiness. This is in line with the recent *World Happiness Report*, which pointed out that the United States "has achieved striking economic and technological progress over the past half century without gains in the self-reported happiness of the citizenry."
- **For parents and other caregivers of children**, because emotional well-being of young adults is essential to their future success, these caregivers need to provide an emotionally stable and positive upbringing.
- **For policymakers**, promoting general well-being may yield positive economic effects. Conferences such as the June 2012 6th European Conference on Positive Psychology in Moscow help highlight the importance of this field of study to the media and other influencers of public policy.

As cybertherapy and rehabilitation professionals, our mission is to promote people's well-being in our product development efforts to produce "positive technology." Just as positive psychology can be defined as the scientific study of human functioning, so can positive technology be defined as the scientific approach to using technology to enhance human functioning. Examples of such technology include:

- **Using technology to foster positive emotions:** Physiological effects of temporarily detaching from a stressful situation and taking a moment to generate a feeling in the chest that all is well may be measured by heart rate variability using one of several affordable, portable monitors such as emWave.
- **Using technology to foster engagement and self-empowerment:** A recent evaluation of assistive technologies designed to enhance the quality of life and preserve independence for veterans returning from Iraq and Afghanistan identified eight technologies useful in assisting those with sensory, cognitive, and physical disabilities. Among these were readily available technologies such as the Wii, for cognitive fitness.
- **Using technology to promote social integration and connectedness:** A study of college students published last year in *CyberPsychology, Behavior, and Social Networking* suggests that the number of Facebook friends and positive self-presentation may enhance users' subjective well-being. Furthermore, honest self-presentation may enhance happiness rooted in social support provided by Facebook friends.

As a way to foster positive emotions, positive technology has a bright future, regardless of whether, as some predict, positive psychology is subsumed and integrated into psychology as a whole. Who among us wouldn't like to have technology available that helps us raise our children to be happier, and grow up to benefit both emotionally and economically?

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Brenda Wiederhold

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Our mission is to bring together top researchers, policy makers, funders, decision makers and clinicians, pooling collective knowledge to improve the quality, affordability, and availability of existing healthcare.

Ultimately, through international collaboration with the most eminent experts in the field, we are working to overcome obstacles and increase access to top-quality healthcare for all citizens. By enhancing public awareness of the possibilities that technology offers, we move toward changing and improving healthcare as it currently exists.

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Interreality in the Management
and Treatment of Stress-Related Disorders

INTERSTRESS
Is a European-funded project



The INTERSTRESS project aims to design, develop and test an advanced ICT-based solution for the assessment and treatment of psychological stress.

Objectives:

- Quantitative and objective assessment of symptoms using biosensors and behavioral analysis
- Decision support for treatment planning through data fusion and detection algorithms
- Provision of warnings and motivating feedback to improve compliance and long-term outcome

To reach these goals, INTERSTRESS will use a new e-Health concept: Interreality. What is Interreality? It is the integration of assessment and treatment within a hybrid, closed-loop empowering experience, bridging physical and virtual worlds into one seamless reality.

- Behavior in the physical world will influence the virtual world experience
- Behavior in the virtual world will influence the real world experience

These goals will be achieved through:

- 3D Shared Virtual World role-playing experiences in which users interact with one another
 - Immersive in the healthcare centre
 - Non-immersive in the home setting
- Bio and Activity Sensors (from the Real to the Virtual World)
 - Tracking of emotional/health/activity status of the user and influencing the individual's experience in the virtual world (aspect, activity, and access)
- Mobile Internet Appliances (from the Virtual to the Real world)
 - Social and individual user activity in the virtual world has a direct link with user's life through a mobile phone/PDA

Clinical use of Interreality is based on a closed-loop concept that involves the use of technology for assessing, adjusting and/or modulating the emotional regulation of the patient, his/her coping skills and appraisal of the environment based upon a comparison of the individual patient's behavioural and physiological responses with a training or performance criterion. The project will provide a proof of concept of the proposed system with clinical validation.

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Online Therapy for Regulating Stress and Emotion

An example of positive technology is an online, self-applied program to help people manage, identify and treat depressive and anxious symptomatology. According to the authors, the program has shown great potential to “improve the quality of the personal experience with the goal of increasing well-ness, and generating strengths and resilience in individuals.”



Human Computer Confluence in Healthcare

“The confluence between computers and humans has opened new ways to improve the quality of life of people, whether it is by providing new diagnostic tools, or developing innovative therapeutic approaches, improving and accelerating the rehabilitation process of the patients.”

International Association of CyberPsychology, Training & Rehabilitation (iACToR) Conference Participation Report Summer 2012

E Health

International Telemedicine and eHealth Forum

Vancouver, Canada / May 27-30

The e-Health 2012 conference in Vancouver featured 200 clinicians, nurses, physicians and allied health professionals. Its purpose was to identify how innovative models and solutions are supporting care integration across the healthcare system, describe innovative international models and approaches to care and strategies that are advancing readiness and capacity for the adoption of solutions by providers and consumers. The conference also highlighted the importance of workforce development, interdisciplinary care models, patient self-management, ground-breaking approaches to accelerate impacts, telehealth and performance measurement. The event included workshops, roundtable discussion sessions, poster presentations, plenary presentations, social events and keynote speakers. The opening keynote speaker was Dr. John D. Halamka, CIO of Beth Israel Deaconess Medical Center.

This conference brought together many key stakeholders involved and interested in furthering the development and implementation of telehealth practices, effectively playing a major role in providing resources for information and knowledge sharing.

The next e-Health conference will take place May 26-29, 2013 in Ottawa, Canada.

For more information, visit www.e-healthconference.com.

Games for Health

Boston, Massachusetts, USA / June 12-14

The 8th Annual Games 4 Health Conference took place in Boston Massachusetts on June 12-14. The conference evolved around the innovation of playing games to improve health and well-being. The Games for Health Project supports the development of the health games community, champions efforts to mainstream health games, and brings together researchers, medical professionals, and game developers to share information about the impact games and game technologies can have on health, health care, and policy. The panel consisted of three forward thinking game design companies: RallyOn, Mindbloom and Ayogo Games. Major issues discussed were how, in the future, games will no longer be an optional solution in the health world. Games will be fully integrated into how we live and work, as told by Jay Walker. Over the three days, more than 400 attendees participated in over 60 sessions led by an array of international speakers. Topics included exergaming, physical therapy, disease management, health behavior change, biofeedback, rehab, epidemiology, training, nutrition, and health education. The keynote speaker was Dr. Bill Crounse who leads health initiatives for Microsoft along with Jane McGonigal, who is one of the leading voices on games to make positive social impact and is co-founder of SuperBetter Labs.

Med E Tel

Luxembourg / April 18-20, 2012

The Med-e-Tel 2012 conference took place in Luxembourg and featured presentations of impressive business cases, research activities, pilot projects, practical experiences from health and social care providers, and panel discussions offering both local and international perspectives on telemedicine and eHealth opportunities and experiences. Major discussion points included: projects working on the development of Service Standards and Guidelines for Telehealth; TeleSCoPE's established relationships of trust between users, patients and providers and contribute to overall health and well-being; the quest for evidence of clinical effectiveness and economic efficiency of telemedicine; and eHealth addressed in sessions on Evidence of Telehealth Outcomes and eHealth Economics. A special focus on Innovative Technologies for Mental Healthcare provided background on virtual reality applications and telerehabilitation in health and psychological care and was presented in cooperation with the International Association for CyberPsychology, Training & Rehabilitation.

The next Med-e-Tel conference will take place April 10-12, 2013 in Luxembourg.

World of Health

Copenhagen, Denmark / May 7-9, 2012

The 2nd Annual World of Health Conference, which took place in Copenhagen, Denmark on April 7-9, was an impressive programme that distinguished itself as the crucial Health IT stakeholder platform from Europe. The programme included mHealth Symposium and Chronic Disease Care track, 98 exhibitors, 2,507 attendees, over 70 supporting partners, 2,500 delegates and as a keynote speaker, George C. Halvorson, CEO of Kaiser Permanente. Amongst the VIPs were Vice President of the European Commission and Commissioner for the Digital Agenda Neelie Kroes and Commissioner for Health and Consumer Policy John Dalli.

The World of Health agenda featured not only Chronic Disease Care, but also Diabetes with international delegates exploring innovative industry solutions and sustainable healthcare in Europe and ICT-based support for dignified and independent living. "The HIMSS Central (comprising of HIMSS Europe, HIMSS Analytics Europe and HIMSS Media) provided the latest information on current topics in the industry and showcased its extensive product portfolio comprising of the best practice awarded market reports on the European hospital IT deployment and the European hospital database."

The next World of Health will take place May 13-15, 2013 in Dublin. For more information, visit www.worldofhealthit.org.

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Positive Technology Improves Health and Well-Being

"To enjoy good health, to bring true happiness to one's family, to bring peace to all, one must first discipline and control one's own mind."

—Buddha

► By Brenda K. Wiederhold & Mark D. Wiederhold

In exploring the deepest meaning of this quote, some definitions are in order. Thefreedictionary.com defines health as "a relative state in which one is able to function well physically, mentally, socially, and spiritually in order to express the full range of one's unique potentialities within the environment in which one is living."

But what is the definition of happiness? Philosophy has identified two different meanings for happiness: 1) a state of mind (life satisfaction, pleasure, or a positive emotional condition), or 2) a life that goes well for the person leading it. To elucidate further this second meaning, "Happiness in this sense concerns what benefits a person, is good for her, makes her better off, serves her interests, or is desirable for her for her sake (well-being)."

This leads us to the question: What is well-being? There are three different theories of well-being according to Parfit: hedonism, desire theories, and objective list theories. Hedonism and desire theories are subjective approaches, with well-being grounded in the individual's subjective states. Objective list theories take an impartial approach, holding that there are some things that benefit us independent of our attitudes or feelings.

According to Riva and colleagues, these philosophical traditions have influenced psychological reflections about well-being. Specifically, in positive psychology (PP) we can find two different conceptions of well-being, namely "subjective well-being" (also called "hedonic well-being") and "psychological well-being" (also called "eudaimonic well-being"). In addition to these two forms of individual well-being, social and interpersonal well-being is important to the smooth functioning of individuals' lives within their communities and organizations. In this review, we will use these three constructs—hedonic, eudaimonic, and social and interpersonal—to explore the influence of positive technology on our lives.

Hedonic Technologies

Hedonic technologies are those that we use to foster positive emotional states and pleasant experiences. The feeling of hedonism is associated with the mental states of excitement, relaxation, and happiness. In the hedonic approach, happiness is dependent on the amount of time one is in a predominantly positive emotional state, based on the individual's subjective experience.

European and U.S. projects have begun to capture this aspect of positive technology (PT). The EMMA (Engaging Media for Mental Health Applications) Project called Emotional Parks, combines mood induction procedures (MIPs) with virtual reality (VR) to produce positive emotions. Botella's team also developed a mood device called the Butler System, which is an online health system designed to improve the lives of elderly people: For example, one of its virtual environments presents the image of a park and nature.

What is positive technology?

Positive psychology (PP) can be defined as the scientific study of human functioning. A tool of PP is positive technology, which can be defined as the scientific approach to using technology to enhance human functioning. PP may have had its official birth in 1998 but the roots of PP date back at least to the concept of "healthy mindedness" at the beginning of the 20th century.

Riva's team developed a mood device using VR called Relaxation Island, which aims to support established relaxation techniques as part of interventions for specific anxieties such as examination stress. VR environments developed by the Wiederholds are being used in Iraq, Afghanistan, and U.S. military facilities to help service members practice combat breathing and reduce post-combat stress. Most recently, Repetto and colleagues showed that use of a campfire, beach, or waterfall VR environment on a mobile phone could significantly reduce anxiety in individuals with generalized anxiety disorder.

Using media created from familiar voices, family photos, and detailed patient histories, technology-assisted reminiscence creates happy moments in the lives of people with dementia. "John had advanced dementia and was very withdrawn, which made it difficult to interact and connect with him. Researching his life, we discovered he played football for a Big Ten school in the 1940s. By showing him pictures of the school's team and playing the school's

that all is well, may be measured by heart rate variability using one of several affordable, portable monitors such as emWave. To help people gain such temporary detachment and generate positive emotions, VR environments are available as smartphone applications.

Eudaimonic Technologies

We use eudaimonic technologies to heal ourselves in order to gain self-realization and self-actualization to reach a positive emotional state. Acting in accord with or realizing one's true self produces the eudaimonic aspect of happiness.

For example, although group therapy is a technique that can be empowering to some who are struggling to help themselves, it's not for everyone. Eudaimonic technologies fill the gap for those who are unable to reach positive estimations about themselves within a group environment. Some researchers believe that by constructing a system in which people can address their emotional turmoil or distress them-

using these introverted technologies our external feelings and thought processes may progress with persistent improvement. Recent evidence has demonstrated that positive emotions and the erosion of negative feelings can potentially lead to a positive emotional state. What eudaimonic technologies teach us is that we are sometimes able to attain that state by ourselves. Recent examples include the application called EARTH (Emotional Activities Related to Health), which within the framework of the MARS500 research project (www.esa.int/esaMI/Mars500/) is designed to help astronauts in a future mission to Mars. This project funded by Ministerio de Innovacion y Ciencia includes virtual reality MIPs and an application called the Book of Life, which includes several chapters that focus on significant events of one's life experiences and also one's future plans. Each chapter is designed to focus on people's psychological strengths. A range of media is used such as images, videos, and even personalized elements. After the user's positive ambitions have been recorded, the user is able to play them back and enjoy them at any time. To boost resiliency, Wiederhold and Wiederhold have been working with elite athletes and medical and military personnel in order to enhance and solidify their strong skill sets.

Self-actualization virtual environments are designed for children, too. For example, researchers designed an anti-bullying virtual intervention called FEAR NOT to enhance the coping skills of victimized children or children at risk for victimization. In a randomized clinical trial of this intervention enrolling 1,029 nine-year-old children in the U.K. and Germany, the researchers found a dose-response between time spent in the virtual learning environment and ability to escape bullying. Subsample analysis found a significant effect for U.K. children.

What eudaimonic technologies are moving from the lab to retail shelves? A recent evaluation of assistive technologies designed to enhance the quality of life and preserve independence for veterans returning from Iraq and Afghanistan identified eight technologies useful in assisting those with sensory, cognitive, and physical dis-

"What is well-being? There are three different theories of well-being according to Parfit: hedonism, desire theories, and objective list theories. Hedonism and desire theories are subjective approaches, with well-being grounded in the individual's subjective states. Objective list theories take an impartial approach, holding that there are some things that benefit us independent of our attitudes or feelings."

'fight song,' John engaged in limited conversation and would sing part of the song. This made him happy, and it easier for others to relate to him."

Some technologies are moving from the research lab to become commercial products available to the public. For example, physiological effects of temporarily detaching from a stressful situation and taking a moment to generate a feeling in the chest

selves, a more individualized, progressive approach to emotional recognition and stability may result.

Eudaimonic technologies focus on self-well-being and the conclusions one can come to by oneself about one's mental stability, progress, and mood. Our internal feelings have a profound effect upon the ways in which we perceive ourselves as persons, and some thinkers have discovered that by

abilities. Among these were readily available technologies such as the Wii, for cognitive fitness.

Social and Interpersonal Level Technologies

Finally, social and interpersonal level technologies are designed to improve what can be called the connectedness between individuals, groups, and organizations. The social and interpersonal level of PT concerns itself with the notion that individual happiness and positive notions may also need to be understood in the context of others. It is in this context that the term positive computing (PC) arises, as PC is the notion that the study and development of technologies are designed to support well-being, wisdom, and human development.

For example, Morris has recently described how social networking and PC technologies can be used to help reduce feelings of social isolation and depression in older individuals. Sensor data measuring phone calls and visits are used to derive public displays of social interactions with relatives and friends, which are introduced into selected elders' homes. These ambient displays, which reflect data on remote and face-to-face interaction gathered by wireless sensor networks, are intended to raise awareness of social connectedness as a dynamic and controllable aspect of well-being. According to findings, this strategy was effective in reducing the feeling of social isolation of elderly users.

At this writing, Facebook has 955 million—nearly one billion—users worldwide. Although this may appear to be just a number, it is in fact a measure of its great popularity and power in affecting the emotions of others. Positive characteristics (such as gratitude, flexibility, and positive emotions) can uniquely predict disorders beyond the predictive power of the presence of negative characteristics, and buffer the impact of negative life events, potentially preventing the development of a disorder. While individual decisions for using these websites vary, it is clear that they offer some kind of positive emotional stim-

ulation to integrate into individuals' lives—something that can be classified as a positive technological measure to improve people's well-being.

One study of 391 college students published last year suggests that the number of Facebook friends and positive self-presentation may enhance users' subjective well-being. Furthermore, honest self-presentation may enhance happiness rooted in social support provided by Facebook friends. An earlier study showed that 1,715 Texas college students joined Facebook Groups to obtain information about on- and off-campus activities, socialize with friends, seek self-status, and find entertainment. An important social result was that active Facebook Group users were more likely to participate in offline civic and political activities.

This leads us to briefly explore the boundless potential that is just beginning to be tapped: The use of social PT to advance humanity's health and well-being. For example, so-called "citizen scientists" formulated a structure for a key enzyme related to the development of the AIDS virus by using FoldIt, an online game in which volunteers can shake, wiggle, or pull apart different pieces of a protein molecule (<http://fold.it/portal/>). It took these gamers a mere two years to crack a code that had eluded scientists.

Such "crowdsourced" solutions have the potential to allow governments to redirect funding to promote such creativity, with potential cost savings (read: slower rise in taxes) as a payoff. What, then, is the appropriate role of government in researching and promoting PT?

Role of Government

Life satisfaction or well-being is currently a hot topic in both psychology and economics. In 2006, Christensen and colleagues analyzed World Health Organization data to create a global view of well-being. It turns out that Denmark is the happiest nation; the U.S. ranks 23rd. A nation's health levels were most closely associated with happiness, followed by

gross domestic product and education. Qualitative research conducted in 2011 by the European Commission in eight countries put the economy first, followed by society and community as the most important determinants of well-being. While these measures of happiness are not perfect, they are the best we have so far. Politicians are talking of using them to measure the relative performance of each country and changes in its happiness.

Governments are beginning to make investments in preventive and integrative health, but only a small percentage is devoted to these technologies compared to those that treat disease. Despite the fact that creating and maintaining social relationships is considered a major indicator of well-being and a protective factor for health, Western society is characterized by increasing levels of loneliness and lack of social integration. The need for social integration is higher in specific social groups, such as adolescents, disabled people, and older people. As a consequence, there is increasing interest in supporting mental health and rehabilitation programs aimed at overcoming social isolation. Information and communication technologies (ICT) can play a key role in improving these programs, and governments can create ICT programs to fund the most promising PT research.

Future Directions

Positive psychology and adjunctive positive technology are essential components of prevention and treatment of disease and enhancement of well-being. As a way to foster positive emotions, positive technology has a bright future, regardless of whether, as some predict positive psychology is subsumed and integrated into psychology as a whole.

The future use of PT is essential to our understanding of the self, with the technological world we are involved in and the obvious role that the Internet plays in our daily lives – on our laptops, tablets, and phones. All three elements—hedonic positive technology, eudemonic positive technology, and social and interpersonal positive technol-

ogy—improve the quality of the lives of individuals in Europe and the U.S. It is therefore very important that we continue our research in the field, as it is essential that we are constantly examining the obvious positive impacts that these technologies have on the lives of our citizens.

As proof, researchers concluded in a new study that “Positive attributes are associated with improved cardiac outcomes, and this connection is likely mediated by both behavioral and physiologic factors. Positive psychology and related interventions may represent a means by which positive states and strengths of character can be cultivated in patients with—or at risk for—cardiac disease.”

In addition, a recent study showed that a large sample of adolescents and young adults who report higher positive affect or higher life satisfaction grow up to earn significantly higher levels of income. This suggests a strong possibility for reverse causality between income and happiness, highlights the importance of an emotionally stable and positive upbringing for children, and submits that policy makers’ investment in promoting well-being will yield positive economic effects.

Through the use of positive technology, we can learn to control our minds, with the consequence of improved health and happiness. As the citizens of our countries espouse these practices, we are able to

step more lightly on the Buddha’s path “to bring peace to all.”

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Human Computer Confluence *Applied in Healthcare and Rehabilitation*

13

“The confluence between computers and humans has opened new ways to improve the quality of life of people, whether it is by providing new diagnostic tools, or developing innovative therapeutic approaches, improving and accelerating the rehabilitation process of the patients.”

► By Isabelle Viaud-Delmon et al.

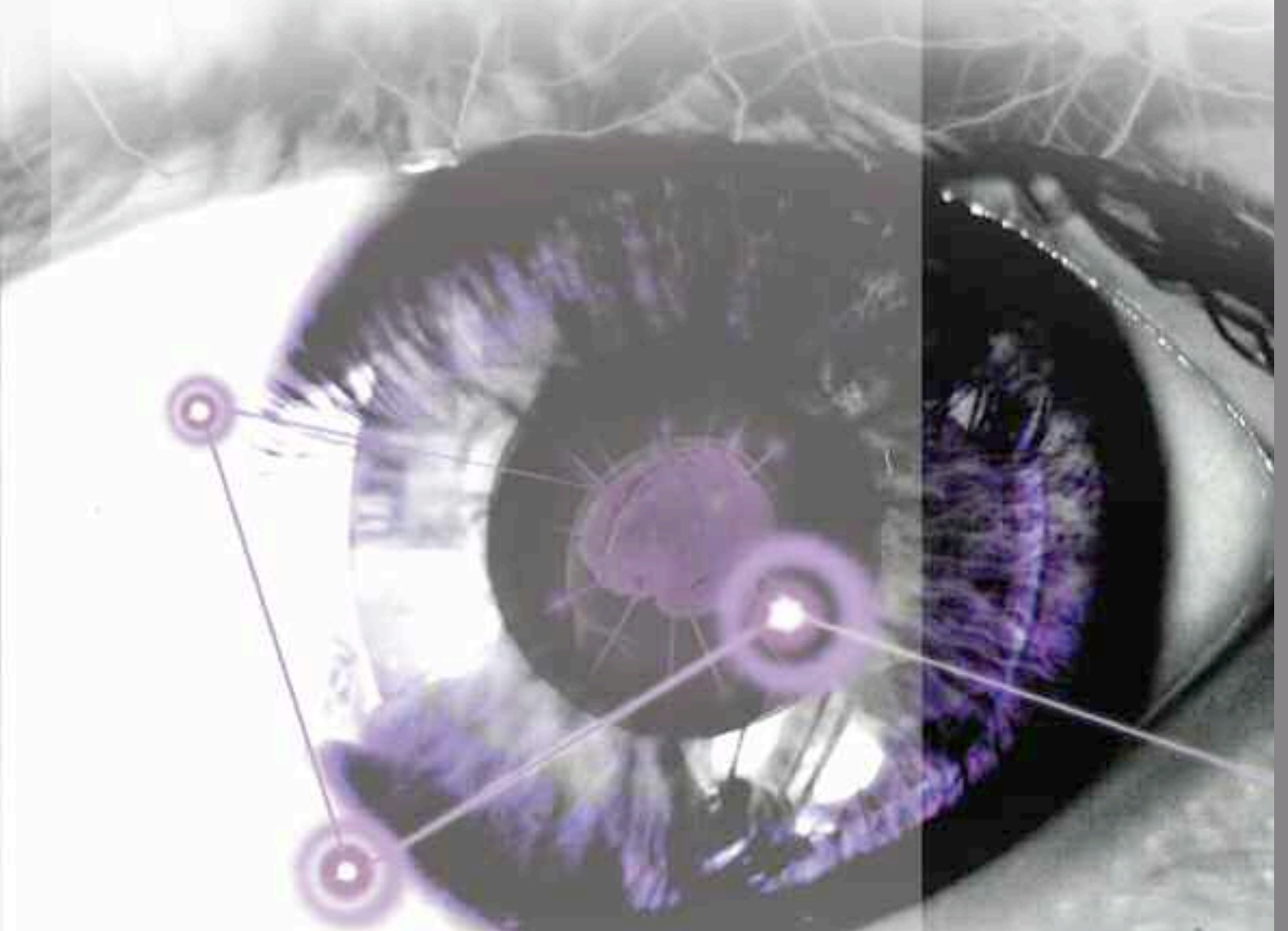
Nowadays, technological improvements have changed the way that people communicate, sense and interact. Undoubtedly, these technological improvements

have increased our capacities to understand the human brain and provided new ways to envisage healthcare.

A stronger integration between humans and technology represents an incredible

opportunity to investigate human behaviour and analyze all the potentialities and advantages when used in the field of healthcare and rehabilitation.

The confluence between computers and human has opened new ways to improve



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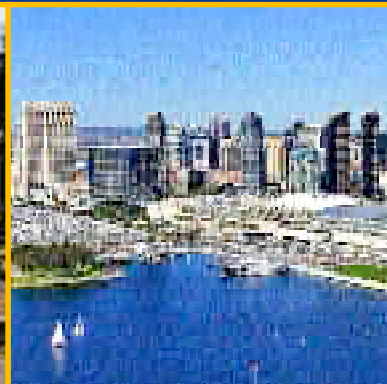
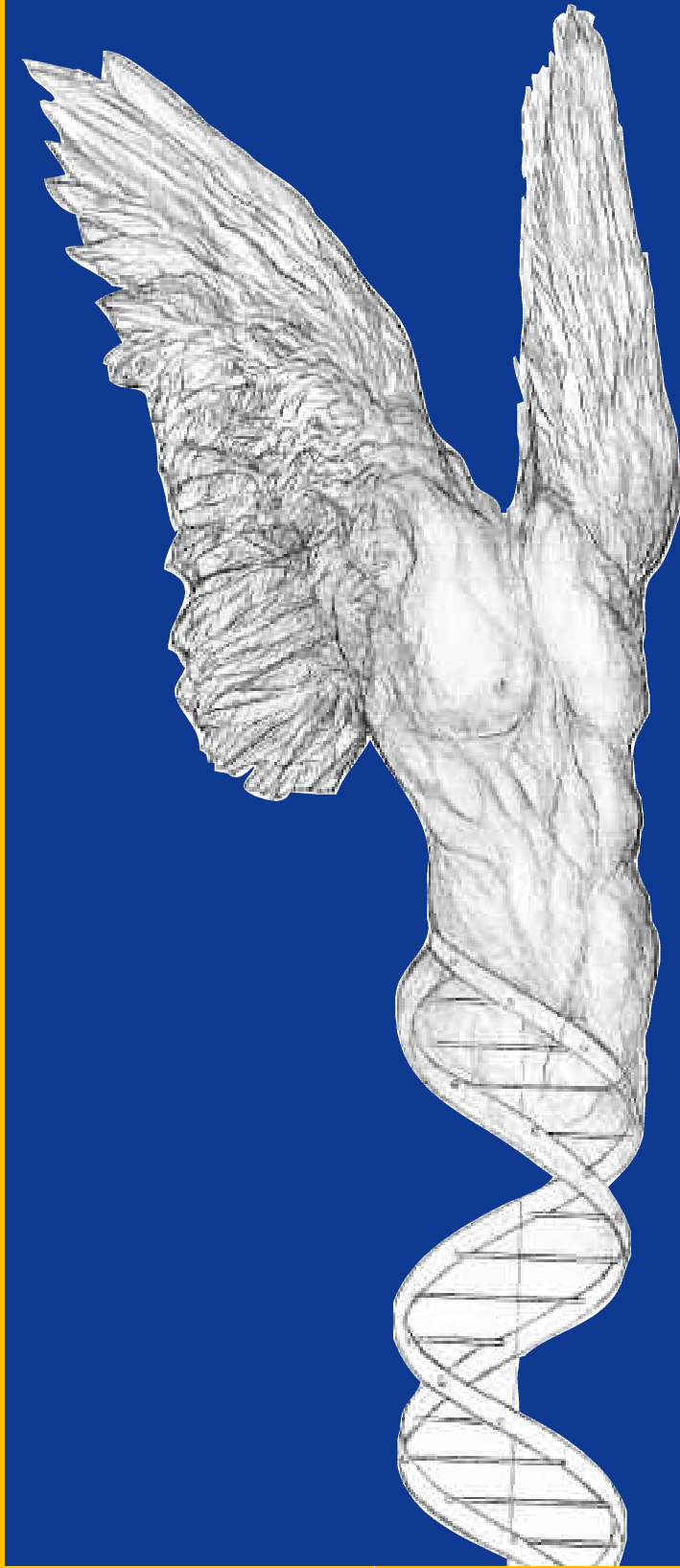
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Since 1992, NextMed / MMVR has promoted novel, interdisciplinary, data-enabled solutions to healthcare challenges. The conference fosters collaboration among scientists, engineers, physicians, therapists, educators, and students. Its outcome is tangible progress in clinical care, provider training, and patient-enabling technologies.

Next February's conference will feature a special half-day symposium, "VR for Therapy & Rehabilitation: Two Decades' Accomplishments and Future Directions," organized by Professors Brenda Wiederhold, Mark Wiederhold, and Giuseppe Riva.

The Call for Presentations is open through July 15, 2012. Researchers are invited to participate in NextMed / MMVR20 with papers, posters, and independent activities. Details at:

www.NextMed.com



the quality of life of the people, whether it is by providing new diagnostic tools, or developing innovative therapeutic approaches, improving and accelerating the rehabilitation process of the patients. Under the umbrella of Human Computer Confluence (HCC) there are several potentially interesting technologies for healthcare and rehabilitation, which are currently developed in the framework of European-funded projects.

For example, INTERSTRESS (<http://www.interstress.eu>) aims to design, develop and test an advanced ICT-based solution for the assessment and treatment of psychological stress applying an innovative paradigm for e-health – Interreality – that integrates assessment and treatment within a hybrid environment, bridging physical and virtual worlds. The patient is continuously assessed in the virtual and real worlds by tracking the behavioural and emotional status in the context of challenging tasks (customization of the therapy according to the characteristics of the patient).

Feedback is continuously provided to improve both the appraisal and the coping skills of the patient through a conditioned association between effective performance state and task execution behaviours (improvement of self efficacy). Within this conceptual framework, it is possible to set up and test psychological treatments that could be extended also beyond the traditional research and clinical setting by using more and more emerging mobile technology to deliver real-time interventions during daily activities and ecological contexts.

The VERVE project (<http://www.verveconsortium.eu/>) adopts a different approach, which aims at developing new technologies for clinical, home, and mobile platforms to support the treatment of and to improve the quality of life of people at risk of social exclusion. It concentrates on three use-cases: older adults and persons with Parkinson's disease who experience mobility problems, persons suffering from apathy due to Alzheimer's disease, and persons with anxiety disturbances.



Figure 1: One of the aims of the VERVE project is to develop solutions to use auditory and visual 3D simulations to improve fear of dogs with high-end virtual reality (here a CAVE like setting at INRIA, Sophia Antipolis, France).

The overall aim is to enable participants to undertake a set of daily tasks that could realistically be achieved in the setting of the observation room, in their home, or out in the environment through the use of the VR scenarios.

In the realm of HCC, non-invasive brain stimulation technologies provide a unique channel back to the brain with huge potential for interaction, communication and health in closed-loop systems. This technology has shown early promise in therapeutic applications for chronic pain, depression and stroke rehabilitation where neuromodulation has been shown to have positive effects. The HIVE project (<http://hive-eu.org/>) researches and develops a new generation of more powerful and controllable non-invasive brain stimulation technologies.

The project is developing improved electrical current distribution and multi-scale neuron-current interaction models to carry out stimulation experiments using Transcranial Current Stimulation (tCS) in different scenarios, and based on these develop multisite trans-cranial current stimulation technologies implementing real time EEG monitoring and feedback. HIVE will also explore high-level communication using stimulation, stimulation

during different states of consciousness, as well as 'sense synthesis', that is, the construction of new perceptions deriving from sensors interacting directly with brains through stimulation systems – all – with the goal of probing the limits of non-invasive computer-to-brain interfaces.

We believe that given the fundamental role of interaction in human experience, advances in HCC can deliver breakthrough health technologies of great value in addition to advancing the state-of-the-art in fundamental neuroscience research, neurology diagnosis and therapy.

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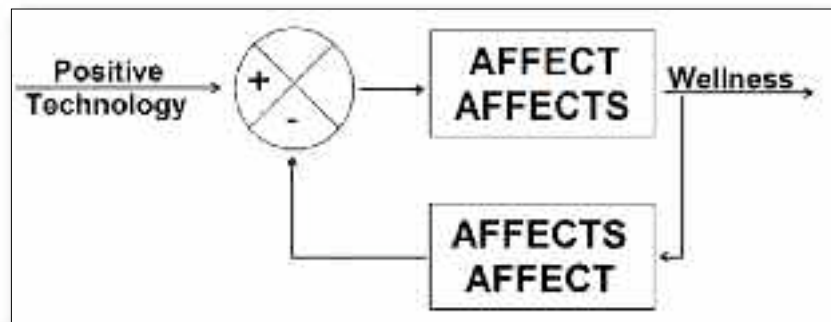
Do Affects Affect you or do you Affect Affects? A Closed-loop in Positive Technology

“An optimistic style leads subjects to positively affect affects. But do consequently these affects affect back? This question is at the heart of the ‘positive technology’ approach: the scientific and applied approach to the use of technology for uncovering and understanding people's strengths and promoting their positive functioning.”

► By Pietro Cipresso et al.

Positive psychology arises from Seligman, who coined the phrase “learned helplessness” to describe how negative thoughts can lead to clinical depression. A better explanation, however, derives from the “chain reaction” concept in the physics of complex systems, often defined as positive feedback that leads to self-amplifying effects. The same concept may justify helping technology to instill positive chains of behavior that then lead to well-being.

In this view, a first factor that can increase positive emotions is the explanatory style: the manner in which we routinely explain events in our



lives. An optimistic style leads subjects to positively affect affects. But do consequently these affects affect back? This question is at the heart of the “positive technology” approach: the scientific and applied approach to the use of technology for uncovering and understanding people's strengths and promoting their positive function-

ing. In fact, many different studies are providing convincing evidences that technology may be used to improve our well-being.

Following positive psychology we can distinguish between: a) hedonic technologies: mood-altering devices, used to induce positive and pleasant experiences; b) eudaimonic technologies: devices designed to develop positive human functioning, strengths and personal empowerment; and c) social/interpersonal technologies: devices that seek to collaboratively thrive and build the best in life for individuals, groups, organizations and society.

A closed-loop need to be considered as a consequence of two main questions arising: 1) how positive emotions

“... a first factor that can increase positive emotions is the explanatory style: the manner in which we routinely explain events in our lives. An optimistic style leads subjects to positively affect affects. But do consequently these affects affect back?”

Positive Technology is Arriving

“Positive Psychology is the scientific study of optimal human functioning and flourishing. Instead of drawing on a ‘disease model’ of human behavior, it focuses on factors that enable individuals and communities to thrive and build the best in life.”

► By Giuseppe Riva

A significant part of the discussions related to the use of technology in our life starts with the same question: “What is wrong with technology?” This question, in all its possible formats, has guided the reflections of technology developers, designers, ergonomists, HCI experts, and psychologists during the last sixty years. Given the many shortcomings of the available digital tools, this question has produced a never-ending discussion around technology’s “dark side.”

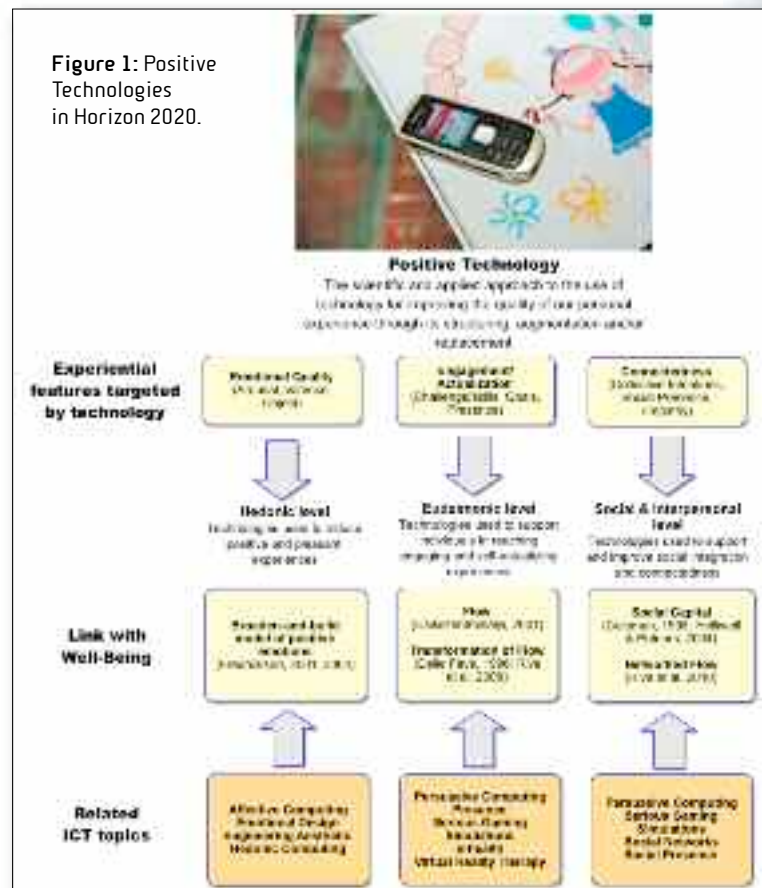
Here we want to introduce a different question: “What is right about technology?”. This question is at the heart of the “Positive Technology” approach, which is the scientific and applied approach to the use of technology for improving the quality of our personal experience.

The emerging discipline of Positive Psychology provides a useful framework to address this challenge. Positive Psychology is the scientific study of optimal human functioning and flourishing. Instead of drawing on a “disease model” of human behavior, it focuses on factors that enable individuals and communities to thrive and build the best in life.

Positive Psychology identifies three characteristics of our personal experience – affective quality, engagement/actualization and connectedness – that serve to promote personal well-being. We suggest that it is possible to use technology to influence the above characteristics that serve to promote adaptive behaviors and positive functioning. In the proposed framework, positive technologies will be classified according to their effects on these three features of personal experience (see Figure 1):

- **Hedonic:** technologies used to induce positive and pleasant experiences;

Figure 1: Positive Technologies in Horizon 2020.



- **Eudaimonic:** technologies used to support individuals in reaching engaging and self-actualizing experiences;

- **Social/Interpersonal:** technologies used to support and improve social integration and/or connectedness between individuals, groups, and organizations.

For each level it is possible to identify a set of critical variables – affect regulation for the Hedonic one, flow and presence for

the Eudaimonic one; social presence, collective intentions and networked flow for the Social/Interpersonal one – that can be manipulated and controlled to guide the design and development of positive technologies. Specifically, technology can be used to manipulate these variables in three separate but related ways:

- *By structuring it* using a goal, rules and a feedback system: The goal provides subjects with a sense of purpose focusing attention and orienting his/her participation in the experience. The rules, by removing or limiting the obvious ways of getting to the goal, push subjects to see the experience in a different way. The feedback system tells players how

close they are to achieving the goal and provides motivation to keep trying.

- *By augmenting it* to achieve multi-modal and mixed experiences. Technology allows multisensory experiences in which content and its interaction is offered through more than one of the senses. It is even possible to use technology to overlay virtual objects onto real scenes.

- *By replacing it* with a synthetic one. Using VR it is possible to simulate physical presence in a synthetic world that reacts to the action of the subject as if he/she was really there. More, the replacement possibilities offered by technology even extend to the induction

of an illusion of ownership over a virtual arm or a virtual body.

In conclusion, Positive Technology represents a new approach that tries to exploit the potential of new technologies to foster positive emotions, promote personal growth and support creativity, thereby contributing to social and cultural development.

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can change our life and the way to perceive the world and its interactions? and 2) how is it possible to change one's own emotions improving the life quality? Positive technology can foster a positive loop, beyond the theory, towards the practice. To make this possible technology needs to be part of the one's own sphere, needs to be perceived as intimate. For example, mobile phone often satisfy this requirement.

But, as recently highlighted by Cipresso et al in a recent article published by Neurocomputing: is your phone so smart to affect your states? If it is the case, then technology can really foster positive emotions and we can start to think to a future for a positive technol-

ogy, where a closed-loop of affection can become a sort of "positive addiction" that we could call "affiction" to indicate a positive experience of a subject addicted to affects in a continuous closed-loop devoted to wellness.

An increasing number of research fields is, directly or indirectly, connected to positive technology paradigm, in a way unimaginable few years ago. For example, sophisticated technologies, such as the mobile biofeedback, can further amplify the quality and quantity of the beneficial outcomes. Also, affecting computing field is exploring new opportunities to make use of human affects in a way that can affect humans affects back. And more recently, social network sites, such as Face-

book, are becoming more and more a tool to engage and increase positive emotions. "Facebook Use Elevates Mood" as showed in recent researches.

Future research needs to focus in more depth on the processes that makes technology a powerful tool for affecting affects.

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Telegenetics: A Systematic Review of Telemedicine in Genetics Services

"By enabling remote contact with health service providers, telemedicine can benefit rural populations by reducing geographical barriers to accessing specialist health services."

► **By Rachel Iredale et al.**

The new knowledge generated by the Human Genome Project will allow us to

apply genetics advances to healthcare more than ever before. 'Telegenetics' is the term used to describe the application of telemedicine to clinical genetics services.

The term telemedicine often refers to a real-time interaction between a patient and a health professional via videoconferencing, which would conventionally be conducted face-to-face. By enabling remote contact with health

service providers, telemedicine can benefit rural populations by reducing geographical barriers to accessing specialist health services. Telemedicine may be particularly effective in medical specialities where verbal interactions are a key part of the assessment process, such as in psychiatry and neurology. Research in these areas demonstrates that care via telemedicine produces comparable outcomes to face-to-face consultations.

Genetics services are often counselling based and, thus, may also represent a specialised field of healthcare where telemedicine may effectively be utilised as an alternative to standard face-to-face interactions between health professionals and patients. The standard procedure in genetic services often involves several visits to a genetics clinic to undergo genetic counselling, physical evaluation, receive genetic test results, and for any follow-up appointments. In Europe and the USA, access to genetic services often requires travel to an urban centre which means that remote populations may not benefit from the information, treatment and psychosocial support that genetic services can offer.

We systematically reviewed the literature to identify studies of genetic consultations via video-conferencing to determine whether we could draw conclusions about its value. 14 articles reporting data from 12 separate studies published between 2000 and 2011 met all of the study selection criteria. Studies were conducted in the USA, Canada, the UK and Australia. All of the studies utilised real-time videoconferencing via multiple high-speed ISDN lines (between 128 and 384 kbps) to provide clinical genetic services to remote or outreach areas. In a majority of studies, patients received their telegenetics consultation at a local clinic or outreach centre and often had a health professional such as a genetic counsellor or paediatrician present with them at the outreach clinic, whilst they communicated via synchronous video link with a geneticist or a genetic counsellor.

According to this review patients are generally highly satisfied with the use of telemedicine in genetic service delivery, including genetic counselling and paediatric genetic

diagnosis. Included studies also show that patients have comparable affective outcomes when genetic consultations are delivered via telemedicine or face-to-face, suggesting telemedicine is an effective means of providing genetic consultations/counselling to rural populations. Surveys of ge-

"Genetics services are often counselling based and, thus, may also represent a specialised field of healthcare where telemedicine may effectively be utilised as an alternative to standard face-to-face interactions between health professionals and patients."

netics practitioners were not always as positive and many expressed concerns about difficulty establishing rapport with patients via telemedicine and difficulties with using the technology. Many included studies concluded that with appropriate training and experience with telemedicine, practitioners will become more accepting of the technology.

Although most patients appreciated having reduced waiting times and/or travelling shorter distances, there is a need to be cautious when interpreting data from patient surveys for telegenetics consultations. Telegenetics patients have received a service they ordinarily would not have and may give 'obliged endorsements'. However, many studies have stated that telegenetics is not intended to replace existing services but may be a useful adjunct to traditional service delivery for dysmorphologic evaluation and/or genetics consultations. Telemedicine may therefore extend access to remote populations, reduce waiting times to see genetic specialists, and thereby increase the capacity to provide genetic services to those who require them, and not just those fortunate to live close to genetics centres.

The cost-utility of providing telegenetic services including costs of equipment, transmission lines, training and personnel has not been formally evaluated, and is therefore a vital area for further research. High quality evidence on the efficacy and cost-effective-

ness of telegenetics will encourage the expansion of these services within the National Health Service (NHS) in the UK. In the United States, reimbursement of telegenetics needs to be sufficient in order to provide sustainable telegenetic clinics. This involves ensuring that approaches have the support

of health insurers, from private insurance companies to Medicare and Medicaid, the federal health insurers for the elderly and poor. To date, Medicaid does not universally reimburse for telemedicine in all 50 states, nor do private payers. Under Medicaid programs there are also wide variations in service coverage, payment policies and other stipulations, which are considered to be barriers to the long-term sustainability and expansion of telemedicine services.

In conclusion, telemedicine technology is being utilised by most medical specialities (e.g. teledermatology, telepsychiatry and telerradiology) and may also be of use in the delivery of genetic services. Further prospective, fully powered, and well-designed studies of telegenetic services which look at the accuracy of diagnoses, diagnostic impact and patient outcomes are needed to make informed decisions about the appropriate use of telemedicine in genetics service delivery.

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An Internet-based Program to Cope with Regulating Stress and Emotion: An Example of Positive Technology

“Emotional disorders are one of the most common health problems worldwide. It’s very important to design tools to identify people at risk who are exposed to high levels of stress or are in a difficult situation. Here we present “Sonreír es Divertido” (Smiling is Fun), an online and self-applied program to help people with the prevention of depressive and anxious symptomatology along the line of “Positive Technology (PT),” that is the scientific and applied approach to improve the quality of the personal experience with the goal of increasing wellness, and generating strengths and resilience in individuals.”

► By Adriana Mira et al.

Emotional disorders are prevalent mental disorders associated with significant disability and economic costs. According to the World Health Organization, depression will become the second most important cause of disability in 2020. These people, who are suffering from emotional disorders often use maladaptive emotion regulation strategies and have low coping behaviour. For this reason, it is important to develop strategies for monitoring coping, to promote emotion regulation and personal well-being in people exposed to high levels of stress. ICTs (Virtual Reality, the Internet, etc.) can help us in this task, specially technology designed to improve the quality of the personal experience, which in turn serves to promote wellness and generate resources and strengths in individuals (PT). PT will be classified according to their effects on three features of personal experience (Figure 1).

Very few applications exist that can be included within the PT conceptual framework. Sonreír es Divertido is an example on these applications focused on the second level of the PT (Eudaimonic level). It is an internet-deliv-

Figure 1 (right): Positive Technology: Levels of positive human functioning using ICT tools and Positive Psychology goals.





Figure 2:
The Home
module.



Figure 3: The Calendar.

ered, multimedia, interactive, self-help program for emotional disorders that tries to combine the most effective existing psychological procedures for stress management with strategies to promote emotion regulation, coping capacity and resilience. It is based on classical CBT techniques, as behavioural activation. However, it also includes other psychological strategies to im-

prove positive mood designed to support individuals in reaching engaging and self-actualizing experiences.

The program includes a Home module (Figure 2), a Welcome module, and eight treatment modules designed to help learning various psychological techniques that allow users to learn and practice adaptive

ways to cope with depression and daily problems, focusing on the importance of generating positive emotions, promoting the involvement in pleasant and significant activities, contact with other people, understanding the importance of identifying and boost the individual's psychological

“ ... it is important to develop strategies for monitoring coping, to promote emotion regulation and personal well-being in people exposed to high levels of stress.”

strengths, and selecting meaningful activities linked to values and goals in life.

The program uses three essential transversal tools: 1) Activity report. It helps the user seeing that his mood, coping, and stress are related to the activities performed. 2) “How am I?” That offers a set of graphs to chart the user's progress along the whole program. 3) The Calendar. That provides feedback to the users regarding homework and tasks already achieved (Figure 3).

Currently, the efficacy of this program is being evaluated in a between-group design study. We hope to provide data regarding the efficacy of this program and the role of the modules designed to promote positive affect contributing to the new PT paradigm.

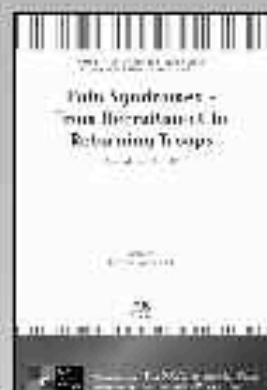
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Wounds of War

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**NATO Science for Peace and Security Series - E:
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**Pain Syndromes – From Recruitment to Returning Troops
Wounds of War IV**

Vol. 91: NATO Science for Peace and Security Series - E: Human and Societal Dynamics
Editor: B.K. Wiederhold
July 2012, 252 pp., hardcover
ISBN: 978-1-60750-985-1
Price: €120 / US\$174

It has been shown that those who have served in both combat missions and peacekeeping operations are at increased risk for pain syndromes. Research suggests that this may result from their "wounds of war." Some wounds may be "invisible," such as depression, stress, and chronic pain, while others, such as physical disabilities, are more obvious. In October 2011, twenty-seven scientists and representatives from NATO and partner countries met in Südkärnten, Austria for a three-day NATO Advanced Research Workshop entitled "Wounds of War: Pain Syndromes – From Recruitment to Returning Troops."

The aim of this publication, which presents papers from that workshop, is to critically assess the existing knowledge and to identify directions for future actions. The book addresses four key questions:

1. **Vulnerability to Pain syndromes:** Are certain types of people at a higher risk for pain syndromes (background, ethnicity, childhood trauma, etc.)?
2. **Diagnosis and Assessment issues of Pain Syndromes:** Which methods are used to diagnose and assess pain?
3. **Treatment of Pain Syndromes:** What are the latest treatment and therapy opportunities for soldiers who experience pain syndromes?
4. **Clinical Updates on Pain Syndromes:** What can we learn from recent clinical updates on pain syndromes?

**Coping with Blast Related Traumatic Brain Injury in Returning Troops
Wounds of War III**

Vol. 86: NATO Science for Peace and Security Series - E: Human and Societal Dynamics
Editor: B.K. Wiederhold
November 2011, 224 pp., hardcover
ISBN: 978-1-60750-798-3
Price: €120 / US\$174



It has been shown that those who have served in both combat missions and peacekeeping operations are at increased risk for Traumatic Brain Injury (TBI). Research suggests that this may result from their "wounds of war". Some wounds may be "invisible", such as depression, stress, and chronic pain, while others, such as physical disabilities, are more obvious. In February 2011, 35 scientists and representatives from NATO and Partner countries met in Vienna, Austria for a three-day NATO Advanced Research Workshop entitled "Wounds of War: Coping with Blast Related Traumatic Brain Injury in Returning Troops".

The aim of this publication, which presents papers from that workshop, is to critically assess the existing knowledge and to identify directions for future actions. The book addresses four key questions:

1. **Characterization of TBI:** Which characteristics make up and help to classify TBI?
2. **Diagnosis and Assessment issues Surrounding TBI:** Which methods are used to diagnose and assess TBI?
3. **Treatment of TBI:** What are the latest treatment and therapy opportunities for soldiers after they have been diagnosed with TBI?
4. **Quality of Life:** How are the lives of TBI patients affected and in what ways can their quality of life be increased?



**Coping with Posttraumatic Stress Disorder in Returning Troops
Wounds of War II**

Vol. 55: NATO Science for Peace and Security Series - E: Human and Societal Dynamics
Editor: G.J. Winderhold
August 2010, 312 pp., hardcover
ISBN: 978-1-60750-570-9
Price: €135 / US\$195

Military post traumatic stress disorder (PTSD) is a common and disabling consequence of war, terrorism and natural disasters which presents an increasing problem for service men and women around the world. It has been shown that those who serve in both combat missions and peacekeeping operations are at greater risk of developing PTSD as a result of the 'wounds of war'. These wounds may take the obvious form of physical disabilities, but 'invisible' wounds, such as depression, anxiety, stress and chronic pain may also lead to an increased risk of PTSD. This book presents full papers, focused on the key presentations from the NATO Advanced Research Workshop, Wounds of War: Coping with Posttraumatic Stress in Returning Troops, held in October 2009. These papers critically assess existing knowledge in the field and identify directions for future action. The book addresses the five key issues of PTSD: vulnerability, diagnosis and assessment, prevention, treatment and associated disorders. While PTSD may be an invisible illness, its effects are certainly not invisible. Countries must work together to develop prevention and treatment strategies which ensure that service men and women everywhere are able to assimilate back into society to lead productive lives and enjoy the freedom they fought to protect. The purpose of this book is to contribute to this process.

**Lowering Suicide Risk in Returning Troops
Wounds of War**

Vol. 42: NATO Science for Peace and Security Series - E: Human and Societal Dynamics
Editor: G.J. Winderhold
August 2006, 224 pp., hardcover
ISBN: 978-1-56603-629-2
Price: €135 / US\$167



Lowering Suicide Risk in Returning Troops: Wounds of War discusses the topic of increased suicide risk in service men and women around the world. Research has shown that those who have served in both combat missions and peacekeeping operations are at an increased risk for suicide. Research suggests that this may result from their 'wounds of war'. Some wounds may be more 'invisible', such as depression, posttraumatic stress disorder, and chronic pain, while others are more visibly apparent, such as physical disabilities. Whatever the wound, however, it seems they may all lead to an increased risk of suicide. In this book, many aspects of military suicide and how to effectively deal with this issue are discussed. Specifically, some of the questions raised are: How do we detect those who are vulnerable to increased suicide risk, possibly due to a combination of genetics and past environmental insults? How do we most appropriately assess for increased risk? Once detected, how do we help to decrease that risk? Are there pre-deployment training methods we can employ to help 'inoculate' individuals against increased risk? Are there in-theater and post-deployment methods most appropriate for dealing with this risk?

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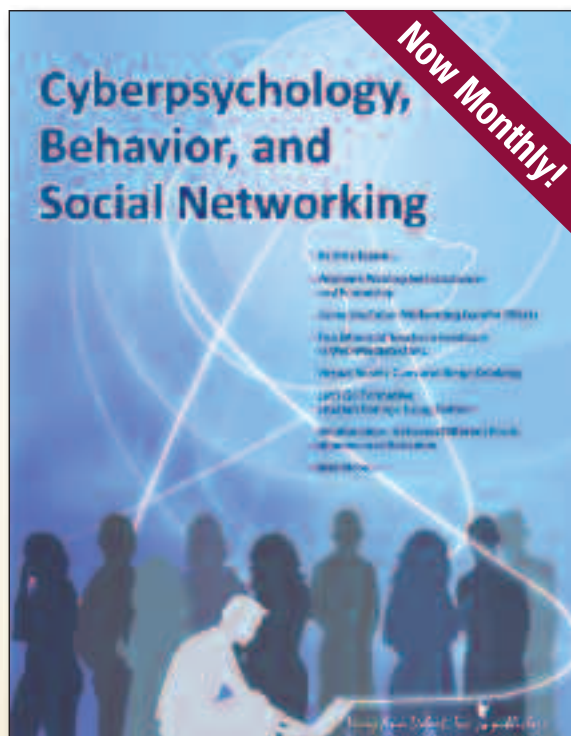
Product Comparison Chart:

Positive Technology

RESEARCHERS:

Tanisha Croad
Editorial Department, C&R Magazine
www.vrphobia.eu, editorial@vrphobia.eu

PRODUCT	DESCRIPTION	MANUFACTURER
DirectLife	Activity Monitor tracks your body motion every time you move up and down, forwards and backwards and sideways, calculating how much energy was used to make these movements, also measures what you've done against your personal daily target; theUSB element of the Activity Monitor allows you to connect your Activity Monitor to your computer and update your goals on your own personalized website	Phillips
SleepTracker	SleepTracker® uses SmartSmart Technology to monitor your sleep stages throughout the night and uses that data to determine the exact moment when you should be awoken helping you feel refreshed and energetic; SleepTracker® also comes with comprehensive software allowing you to see how you slept and ways to improve your sleep and your overall sleep score	Innovative Sleep Solutions
Withings Wi-Fi Body Scale	each time you weigh yourself the Wi-Fi Scale measures your lean and fat mass automatically, which allows you to concentrate on the origins of your weight variations; the wweb dashboard offers a rich graphical interface with easy browsing over time and allows you to zoom in on the date ranges of your choice; take pleasure in observing the evolution of your fitness in a simple, intuitive environment	Withings
Nike+ SportWatch GPS	the Nike+ SportWatch GPS keeps track of your location, pace, distance, laps and calories burned, and with the Polar Wearlink+ it also keeps track of your heartrate; stores all your run history and keeps tabs on your personal records	Nike
Withings Smart Blood Pressure Monitor	the Smart Blood Pressure Monitor is an easy fit armband that you can attach to your arm and it will monitor your blood pressure including your systole, diastole and heart rates pressures; data is then sent to your SmartPhone and your results are displayed immediately. with advice and answers; each element is automatically saved, so you are able to track your progress over time	Withings
WakeMate	the WakeMate is a wristband that you wear when you're asleep – simply set the WakeMate on your phone, then put on the wristband, and go to bed; the WakeMate then uses scientific technology to track your sleep andwill then wake you up at the optimal time to ensure that you wake up refreshed; you can later look at your sleep anyalsis on the WakeMate website and receive advice	WakeMate
iBody	the iBody is a health and fitness manager, which includes Wahoo Fisicia integration so that you can use your iBody to track your heart rate; includes a fitness journal to track your sporting performance and complete documentation of your weight and blood pressure	Apple
Adidas miCoach	MiCoach collects your movement and cardio data during training or competition and helps you build up a specific training plan to aid your sport and your goals even of-fereing audible coaching in real time; sync, share and compare your data online	Adidas



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Editor-in-Chief

Brenda K. Wiederhold, PhD, MBA, BCIA

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Advanced Technologies in the Behavioral, Social and Neurosciences

Editors: B. K. Wiederhold, S. Bouchard, and G. Riva

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Virtual Healers

Brenda K. Wiederhold, Ph.D., MBA, BCIA

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Virtual Reality in the Mental Health arena is barely over a decade old. Because VR is still such a young and focused field, the members of its community have come together as a tight-knit family. In Virtual Healers, Dr. Brenda K. Wiederhold, herself a pioneer of VR, sits down in casual one-on-one interviews with more than a dozen of the top researchers of this select group.



Virtual Healing

Brenda K. Wiederhold, Ph.D., MBA, BCIA

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Along with aliens and time travel, virtual reality (VR) is often thought of as a science fiction dream. Though it was developed nearly five decades ago, the use of VR in the private sector, particularly in the field of patient care, has become a possibility only in the past decade. As programmers are creating more detailed and interactive environments, the rapid advancement of technology combined with decreasing costs has turned VR into a promising alternative to traditional therapies.

Virtual Reality Resources

By Brenda K. Wiederhold, PhD, MBA, BCIA

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We, at the Interactive Media Institute, realized early on that it was relatively difficult for professionals wanting to break into the Virtual Reality (VR) field to locate relevant information. While the material was out there, there was no clear organizational structure or database to link it. To solve this problem, we have put together Virtual Reality Resources, a relevant compilation for researchers and clinicians alike.



CyberTherapy Conference Archives 1996-2005

A Collection of all abstracts from the past 10 years of CyberTherapy

By Brenda K. Wiederhold, PhD, MBA, BCIA

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A decade ago, CyberTherapy, then still in its infancy, only existed as a specialized Virtual Reality and Behavioral Healthcare Symposium at the Medicine Meets Virtual Reality (MMVR) Conference. It is now clear that in 1996, we had only begun to realize what promise might lie ahead for both VR technology and the CyberTherapy Conference.

iACToR Resources



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Ask the Expert:



&

Grace Napolitano

Congresswoman, 38th District of California

"I believe we will see more openness to new technology and more acceptance of mental health as a priority issue in the coming years. To what degree will largely be determined by how effectively we in the mental health community can work together."



Brenda K. Wiederhold: You recently received an award from the National Association of County Behavioral Health and Development Disability Directors for your outstanding efforts to reduce cuts to national mental health programs. Upon receipt of this prestigious honor, you said, "Mental health continues to be a critical issue that does not receive the attention or financial support it deserves." Firstly, can you please discuss how we can go about changing this?

Grace Napolitano: All of us in the mental health community have to devote more energy to networking and working together instead of just working in our own worlds, because there's power in numbers. Once we have a solid foundation we can all support, we will be able to get more attention for mental health.

BKW: As the head of the Congressional Mental Health Caucus, you have a

history of supporting and hosting congressional briefings on children's and veterans' mental health and suicide prevention. Can you please discuss why you feel these particular issues are in need of attention?

GN: Mental health has been an issue that we, as a country, have not given

"We are only just beginning to understand that we have a responsibility to provide services and assist our veterans and their families with becoming as functional as possible when they have been affected by the trauma of war."

our attention to, because the stigma makes many people afraid to raise the topic. For example, the need for mental health services in our military was ignored for decades, dating from the Vietnam War and before.

We are only just beginning to under-

stand that we have a responsibility to provide services and assist our veterans and their families with becoming as functional as possible when they have been affected by the trauma of war. Similarly with our young people, children don't vote, and their families sometimes do not speak up for them because of stigma. This is a

shame, because childhood is often when we can do the most good by treating mental health issues.

BKW: You successfully introduced the Mental Health in Schools Act in an attempt to catch potentially serious mental illnesses earlier in life. Can

you please discuss how you foresee this legislation improving the lack of awareness and available information on mental health?

GN: The Mental Health in Schools Act creates grant funding so that more schools will be able to partner with nonprofits and provide mental health services for students. When schools have an on-site professional, that person can see when a child is suffering from mental health issues and guide them to treatment.

Because youth who are treated early are less likely to get involved with crime, drug use, imprisonment, suicide, and other social problems, preventing these tragedies also ultimately saves money for the taxpayer.

BKW: The national suicide rate currently far exceeds the homicide rate. Do you think we could do something to slow suicides in this country?

"[To effectively reduce suicide rates] first, we must reduce the stigma associated with mental health. Second, we must make teachers, social workers, military officials, and everyday people aware of the warning signs of suicide. Finally, we must support mental health services and make them available, so we can ensure that a suicidal person gets help."

GN: Definitely. First, we must reduce the stigma associated with mental health. Second, we must make teachers, social workers, military officials, and everyday people aware of the warning signs of suicide. Finally, we must support mental health services and make them available, so we can ensure that a suicidal person gets help.

BKW: Do you think rising rates of PTSD have contributed to this increase?

GN: As you know, the U.S. military currently loses 25 veterans to suicide for every soldier lost in combat. We must provide state-of-the-art treatment for our troops and vets, and provide professionals who can determine the level of posttraumatic stress and the right course of treatment.

BKW: Can you please speak to the ways in which you feel advanced technologies can improve healthcare?

GN: Technology can play a critical role in providing new therapies and treatment. We have seen many new advances in mental health treatment in recent years, and we need to continue encouraging that trend at the federal level.

BKW: What do you think we should do to move this mental health research forward?

GN: Fund it! Because of the stigma, few people want to deal with the issue or give it the financial support it deserves. We have to change this attitude and provide more funding for mental health.

BKW: What are you most proud of in your career?

GN: I am glad that I was able to begin opening the doors and shedding a little light on an issue that so often goes ignored. When I brought back the Congressional Mental Health Caucus in 2003, we had very few members of Congress who were on board. We have grown bigger every year, and I am encouraged by the increase in interest from my fellow members of Congress. They are beginning to see that mental health is not something to be afraid of, and that it is a critical part of our overall health and well-being.

BKW: Any predictions on new trends for technology & healthcare for the next decade?

GN: I believe we will see more openness to new technology and more acceptance of mental health as a priority issue in the coming years. To what degree will largely be determined by how effectively we in the mental health community can work together.

BKW: Do you feel most people are willing to embrace new technologies?

GN: Like anything else, it takes time to accept new methodologies and technologies. But with up-and-comers making new technological advances all the time, both here and abroad, I think the outlook is improving.

BKW: Anything you'd like to add?

GN: Make advocacy a priority. Reach out to your association, your local elected officials, and make your voice heard. It is only by working together that we will be able to make significant progress on mental health.



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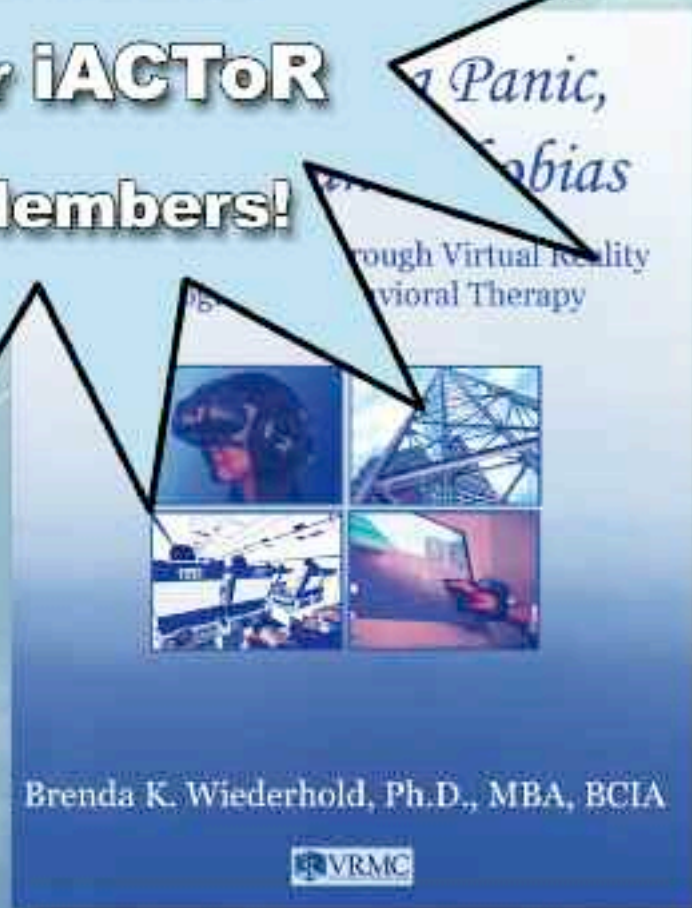
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Achieving Success Through Virtual Reality and
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By Dr. Brenda K. Wiederhold, PhD, MBA, BCIA

This book is written as a starting point toward helping the large portion of our population that suffers from anxiety disorders to overcome their fears and control their anxiety. It is a resource to enable those suffering from anxiety to take control of their lives and become an active participant in their own recovery.

This book is essentially divided into two parts: a discussion of anxiety and its physical and emotional effects on sufferers. While Virtual Reality Therapy is described, its use is not necessary in order to follow the suggestions in this book. The lessons and worksheets included can help in a variety of areas, not just anxiety, but anger, mild depression, and feelings of helplessness.

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FROM WHERE WE SIT: The Possible Role of Positive Technologies in Horizon 2020

► By Giuseppe Riva



The 21st century represents a new era in which psychology and technology can interact synergistically. Curiously, existing psychology manuals do not include a single

chapter on the important impact ICTs may have in this field. On the technology side the situation is not different: the recent book "Technology and Psychological Well-being" which discusses the relationship between technology and wellness, does not explore how psychology - and in particular positive psychology - may contribute to this field.

So, the main goal of this column is to highlight the urgent need to harness the power of both areas by addressing the emerging area of study - Positive Technology: the scientific and applied approach to the use of technology

for improving the quality of our personal experience through its structuring, augmentation and/or replacement - that we introduced and discussed in this issue.

may play an important role. Horizon 2020 will focus resources on three distinct, yet mutually reinforcing, priorities: Excellent Science, Societal Challenges and Industrial Leadership.

"Positive Technologies may improve the quality of life of millions of people through:

- The improvement of their treatment and the prevention through accurate and engaging real time activities and feedbacks;

- The increase of their reassurance and motivation to a more active participation in illness prevention and care processes."

Obviously, it is not an easy task. As underlined by Kanis and Brinkman: "Naturally, most practitioners in the field of HCI [human-computer interaction] aim to give the user a high-quality experience with technology, but designing technology that actually contributes

to people's happiness in their everyday lives is a more complex challenge. There is clearly an opportunity to employ technology for positive change, but how this can be achieved is more difficult to determine."

In this challenge Horizon 2020

Specifically, inside the Excellent Science priority Horizon 2020 will fund collaborative research to open up new and promising fields of research and innovation through support for Future and Emerging Technologies (FET). More, inside the Societal Challenges priorities Horizon 2020 will fund research addressing the key theme of Health, demographic change and well-being.

The concept of Positive Technology may be a bridge between them - Excellent Science and Societal Challenges - with the goal of achieving scientific breakthroughs into innovative technologies that provide business opportunities and change people's lives for the better.

In particular, the possible outcomes of the actualization of the Positive Psychology paradigm within Horizon 2020 may be:

1) A better communication and exchange between the psychology and the technology areas- The potential of this

"Inside the Excellent Science priority Horizon 2020 will fund collaborative research to open up new and promising fields of research and innovation through support for Future and Emerging Technologies (FET) ... The concept of Positive Technology may be a bridge between them - Excellent Science and Societal Challenges - with the goal of achieving scientific breakthroughs into innovative technologies that provide business opportunities and change people's lives for the better."

Continued on page 35

ACROSS THE POND: Benefits of Positive Technology

► By Ashfaq M. Ishaq



In his remarkable book, *A History of Knowledge*, Charles Van Doren used a dew drop on a leaf to explain the discovery of the telescope and the microscope. Since a dew drop magnifies the leaf's surface, this simple discovery is reflected in the invention of the magnifying glass. When similar convex lenses are placed on each end of a tube, distant objects appear nearer and larger—the telescope is born. When a telescope is turned around to observe a microbe, the organism appears far larger—microscope is invented. These two instruments made it possible to observe what unaided eyes never could before. The enhanced capacity to understand the world and oneself sparked the scientific revolution. At that time, one would have assumed that modern medicine and the discovery of space would develop in tandem. Yet, we reached the moon much earlier than discovering our own DNA and microbes.

The idea of positive technology implies that innovations can bear negative consequences. Nikola Tesla, inventor of radio and electricity transmission and generation, stated that, "science is but a perversion of itself unless it has as its ultimate goal the betterment of humanity." Any innovation can be used for purposes other than what the inventor envisioned. A latest imaging technology that detects cancer in an unborn could also monitor our every move like a Big Brother in a world that we gingerly cohabit with 19,000 nuclear warheads.

Although technology alone may not guarantee a brighter future, it can still help equip the next generation to build a better world. Consider the example of a small

school in Wichita, Kansas, which was founded in 1912 for about 300 mostly African-American pupils and named after the famous French Negro General of Haiti, Roussaint L'Ouverture. Following desegregation in the early 1970s, the school grew in size and diversity. In 1992, it became L'Ouverture Computer Technology Magnet Elementary School, with a computer network television station and telecommunication connections. Technology was upgraded in 2007 to provide a 2:1 student-to-computer ratio, a laptop for every teacher and a projector and SMARTboard for every classroom as well as digital and video cameras. Students began participating in global collaboration projects through the use of a video conferencing Polycom Unit. Third-graders began designing and publishing their own websites. They also began teaching web skills to about sixty adults and seniors every year.

Digital technologies can indeed provide opportunities that foster children's creativity and broaden young people's horizons. Therapeutic innovations become neces-

John Werner have found that eighteen different areas of human brain process vision, far more than what is devoted to language. Screens and vivid optics now continuously remake young people's landscapes, exposing them to panoramas unseen before. Images, 3D and virtual reality have become a part of their visual vocabulary. The future of positive technologies like cybertherapy has never been brighter or more colorful.

VCP for Children

The Internet, the Web, and the related computer and communication systems have indeed profoundly changed the way we now live and work. Meanwhile, our understanding of discovery and innovation has been deepened by research on creativity—a quintessential human attribute, which along with our ability to grow and apply accumulated knowledge makes us the highest-order species. These two tsunamis of change engulf the young, resulting in a reinvention of childhood at the hands of positive technology and recognition of

"The International Child Art Foundation is developing a Virtual Creativity Platform (VCP) to leverage the Internet to foster children's creative development. Because the full promise of the digital revolution lies in a worldwide creativity revolution, the VCP can become a good example of positive technology."

sary when students suffer from maladies such as cyberbullying, which arises from interconnectedness. Cybertherapy can be a student-friendly intervention that lifts psychological burdens by making restructuring possible. This positive innovation is effective because virtual reality enchants the mind. Neuroscientists Leo Chalupa and

childhood creativity as prevenient to invention, innovation, and discovery.

Consequently, the International Child Art Foundation is developing a Virtual Creativity Platform (VCP) to leverage the Internet to foster children's creative development. Because the full promise of the digital rev-

exchange is great: it opens totally new scenarios in which technological development is directly linked to the expression of the human potential. In this view technologies may become not only useful tools but also tools that are able to activate and sustain the personal change and improvement.

2) A general understanding of how interactive technology can be used to transform our personal experience in a tool for building new and enduring personal resources. In particular, a critical goal will be to identify a series of guidelines - describing how it is possible to use technologies to influence three specific features of our experience - affective quality, actualization, and connectedness - that serve to promote adaptive behaviors and positive

functioning (Technology Engagement).

3) Improved links and interaction between patients and doctors facilitating more active participation of patients in care processes. The project realizes a "continuum of care" where the interaction between the patient and his doctor is not limited to the short ambulatory visits or to the therapeutic sessions periodically done in a clinical setting. Moreover, Positive Technology will motivate the patient to adapt his habits, how to manage daily situations at home, at work, interrelations with the other people; above all, the system will empower the patient to manage his own health..

4) Better quality of life. Positive Technologies may improve the quality of

life of millions of people through:

- The improvement of their treatment and the prevention through accurate and engaging real time activities and feedbacks;

- The increase of their reassurance and motivation to a more active participation in illness prevention and care processes.

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"Digital technologies can indeed provide opportunities that foster children's creativity and broaden young people's horizons. Therapeutic innovations become necessary when students suffer from maladies such as cyberbullying, which arises from interconnectedness. Cybertherapy can be a student-friendly intervention that lifts psychological burdens by making restructuring possible."

olution lies in a worldwide creativity revolution, the VCP can become a good example of positive technology. While the measurement of creativity has its own complexities, what's crystal clear is that creativity is not a zero-sum game, where the winner takes all; instead any spark of creativity can produce a virtuous cycle of ideation, invention, and collaborative innovation. Enhancing creative capacities is the defining challenge of the 21st century for individuals, organizations, communities, and governments. A creative cluster can grow into a creative community, even a creative state or nation, and perhaps a creative global community. Joy Paul Guilford (1897-1987), a pioneer in creativ-

ity research, was among the first to envision a worldwide creativity revolution and the global community it would create. "A world population of creative solvers should be more productive and happy as well as more self-confident and more tolerant and, therefore, more peaceful," he argued. Fostering a global creative community is what the VCP aims towards.

World Children's Festival

Positive technologies like the Internet and the Web offset the constraints imposed by time and space. Any festival takes place in a bounded physical location, like the World Children's Festival (WCF) on the

National Mall in Washington, DC. Through the VCP this festival could become virtual as well, spawning co-creation activities between festival participants and VCP users. Held every four years as the Olympics of children's imagination and co-creation, the festival honors the winners of the Arts Olympiad—the world's largest and most prestigious art and sport program for 8- to 12-year-olds. While the Arts Olympiad introduces children to the Artist-Athlete IdealSM of the creative mind and healthy body—mens sana in corpore sano, the World Children's Festival has become a global showcase for STEAMS EducationSM which integrates the Arts (and culture) and Sport (and play) with STEM disciplines for children's holistic development. Promotion of STEAMS EducationSM through the VCP could become another good example of positive technology.

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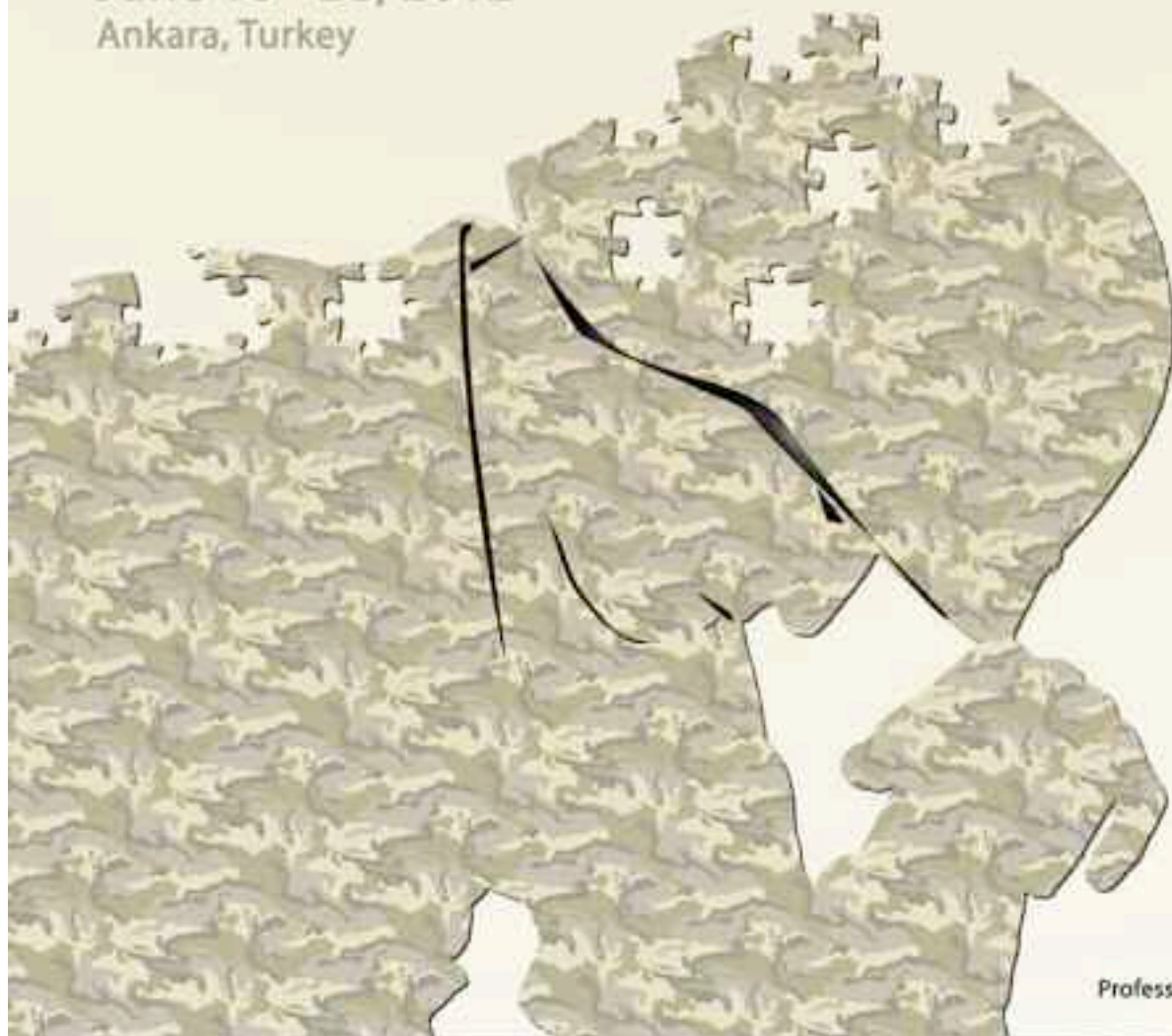
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Volume 167 Studies in Health Technology and Informatics

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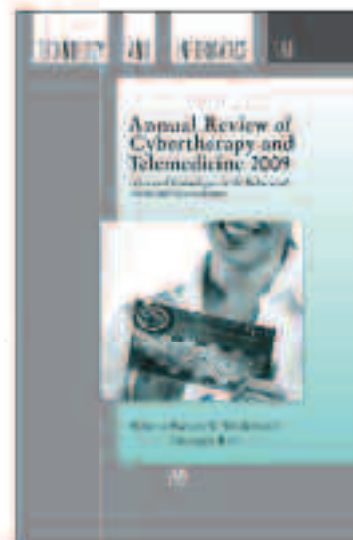
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"ICT's leading research in Human Computer Interaction based in New Zealand paves the way for next generation research in areas such as Clinical Psychology and Forensic Psychology. With the help of New Zealand's government and the resources of good buys for treatment programmes, HIT Lab's research helps open doors for international collaboration with the rest of the world to acknowledge and address these issues."

New Zealand's Human Interface Technology Laboratory (HIT Lab) is one of the leading centers in the country and internationally acclaimed for its Human-Computer Interaction (HCI) research and Interaction Design (ID) with emerging interactive technologies.

This lab applied toward ICT research focuses on Internet sexual offenders along with other areas in a community-based treatment programme. Innovative technologies such as Augmented Reality, Next Generation Video Conferencing, Immersive Visualization and Human-Robot Interaction are all part of the developing and commercialized emerging technologies. These technologies and research projects are applied in a variety of areas including education, training, entertainment, engineering, and healthcare. They facilitate in adapting the needs of end users and solve real world problems with an end goal of improving the user experience with technology.

The University of Canterbury houses cutting-edge research facilities and resources in New Zealand. The University hosts the BlueFern high performance e-research computing service facility made available via KAREN (Kiwi Advanced Research and Education Network) advanced research network. The BlueFern state of art supercomputers feature an IBM Blue Gene/L, IBM Blue Gene/P, and an IBM POWER7 cluster.

Other state of the art technologies and resources include:

The Virtual Reality and Visualization facility known as VisionSpace enables end-users to view and intuitively interact with 3D virtual data in real-time. It features a three-screen immersive stereo projection system with a state-of-the-art 6D tracking equipment. It can be used to show in stereo both 2D and 3D content in a wide field of view environment (120 degrees) and allow groups of people to interact with

data using body and hand gesture inputs. High-end spatial sound (or tracked high-end audio headset) completes the immersive multimedia experience. This facility can be used for research purposes (user studies, prototypes, applications), development, reviews or industrial projects.

The HIT Lab is also one of the best equipped labs for doing augmented reality and mixed reality research with access to a large range of HMDs, alternative display technologies (e.g., MagicBook Hand-held device, smart phones, tablet computers), electronic equipment, different high end and consumer based tracking technologies. The lab is also equipped with Next Window touchscreen technology software for multitouch/tabletop/screen research.

Steps Forward and Milestones in Research

HIT Lab has been collaborating with several international research partners includ-



Population (Million)	4.27
Life Expectancy (Years, Male/Female)	79/83
Fertility Rate	2.1%
Population Median Age (Years)	37
Population Density (Persons Per Sq Km)	17
Annual Population Growth Rate	0.8%
Unemployment Rate	6.5%
Hospital Beds (Per 10,000)	6.1
Suicide Rate (Per 10,000)	13.2
(Percentage of General Population)	
Lifetime Prevalence of Mood Disorders	8%
(Percentage of General Population)	
Total Expenditure on Health	8.3%
(as Percentage of GDP)	
Private Expenditure on Health	2.0%

ing those in Europe as it is important in research agenda. "Collaboration projects include CALLAS, IPCity, European funded project (FP6) and the MARCUS/IRSES researcher exchange programs.

Andreas Duenser, Research Scientist at HIT Lab NZ, states, "The HIT Lab NZ is part of the Kiwi Advanced Research and Education Network (Karen) which provides flat, unconstrained network capacity optimised for the needs of the research, education and innovation communities. This enables us fast and high quality broadband connectivity with national and international research centers."

To that, Ian Lambie, Professor at The University of Auckland states, "I am also part of a UK based Internet listserve for professionals involved in fire risk management. This also links me into many folks from around the world who are involved in arson." HIT Lab engages in projects with national and international industrial partners, academic partners, a large and diverse group of mar-

ket-leading companies. Partners are among of a variety of fields ranging from academia to software development, most notably, HIT Labs in the US (University of Washington) and Australia (University of Tasmania).

As stated before, the HIT Lab NZ focuses on HCI research and Interaction design with emerging technologies with focus on: Augmented Reality (AR), virtual reality, next generation video conferencing, human-robot interaction and immersive visualization. AR is technology involves seamless overlay of virtual images on the real world with a variety of fields including entertainment, education, medicine and manufacturing. The HIT Lab NZ has been involved with AR research for almost 10 years and is one of the largest AR research groups in the world. "We have been and are collaborating with several international research partners including Europe," says Professor Duenser. "Collaboration projects include CALLAS, and IPCity both collaborative European funded project (FP6), and the MARCUS/IRSES researcher ex-

change programs. Collaborating with international partners is an important part of our research agenda.

The Accessible AR project (funded by FRST) aims to develop Accessible AR systems; technology that can run on common consumer devices such as, mobile phones, PDAs and desktop PCs to provide rich AR experiences on a consumer level hardware in a way that is user friendly for people with no special training.

Much progress has been made in AR research and development (tracking, registration, interactive techniques, etc.). However, bringing AR from the laboratory to the end-users is challenging. The purpose of this project aims at leveraging current constraints and overcome challenges to make AR accessible for end users. The target three subject areas are Education, Entertainment and Engineering.

"I think it would be immense and I would be very interested in any partnerships with



overseas countries,” says Professor Lambie. “What we have as a country is an immensely strong indigenous population (Maori) who provide a unique and rich perspective culturally. We also have a ‘can do it’ mentality when it comes to doing research and getting things done. This

focus. These research fields accessible to mobile AR, Human-Robot Interaction, generation video conferencing, and immersive visualization hold great potential. Creating these compelling end-user experiences with interactive technologies by the use of interactive technolo-

multiple disciplines including computer science, engineering, psychology, sociology design or arts. This collaborative and multidisciplinary research focus is also reflected in Master’s program in New Zealand. The program incorporates topic areas including User-Centred Design, the development of new interface devices and technologies (hardware and software). All collaborative measures evaluate technologies within the application context and use the study the broader impact of interface technology on human behaviour and society. “I think there are some really interesting fields of children learning to manage their emotions and also giving parents skills to better manage their children’s behaviours,” Professor Lambie states. Academics from other departments and international visitors provide lectures to underpin the multidisciplinary focus.

“What we have as a country is an immensely strong indigenous population (Maori) who provide a unique and rich perspective culturally. We also have a ‘can do it’ mentality when it comes to doing research and getting things done.”

can cut through much of the red tape that often plagues other countries. In addition, New Zealand is such a lovely country to visit that by having collaborative internationally funded projects we would hope that researchers from overseas could visit New Zealand. Finally, the University of Auckland where I work is internationally recognized and well respected.”

Future for Research

Researching these technologies, investigating and setting future technology trends are integral parts of our research

gies merging more into people’s daily lives, a strong focus on user experiences is important. “Thus, we are interested in creating compelling end-user experiences with interactive technologies. With more technology entering people’s everyday lives, a strong focus on user experiences is increasingly important,” says Professor Duenser.

The research done by HIT Labs is multidisciplinary by nature, heavily involved in collaborations with other academics and constantly building new relationships. These include staff, students, interns and academic visitors ranging from

Sources:

Personal communication with Ian Lambie, Ph.D., P.G.DipClinPsych, Andreas Dünser, Ph.D., World Health Organization and the Mental Health Foundation of New Zealand.



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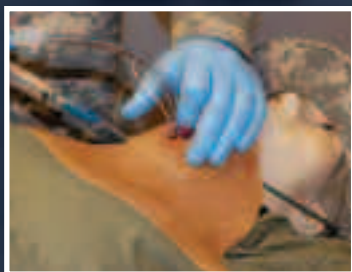
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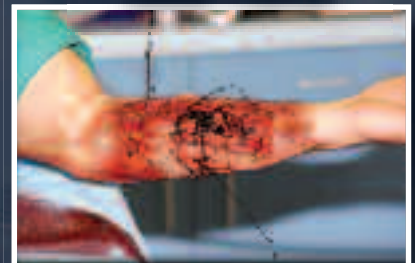
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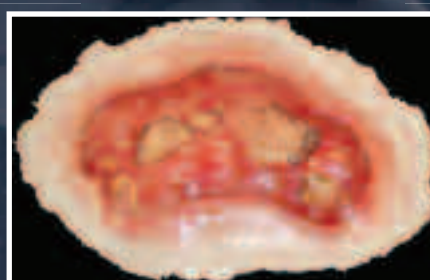
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