Preface

ABOUT THE SUBJECT

Worldwide growth of telecommunications, arisen mostly from technology savvy populations, and the dawning awareness of the power of digital health information are fundamentally altering the face of global health. People now virtually live next-door to each other, and data exchange and services from even the most remote locales around the globe is a daily routine. Mankind has run hurdles of information and is now empowered with resources to transform data into actionable knowledge.

ICTs have the capacity to promote collaboration, transformation, and innovation within the health industry. If deployed successfully, ICTs also have the potential to endure the creativity and the persistence needed to drive human capital to solve the different problems that may occur in healthcare delivery. In order for the stakeholders who live worldwide to benefit, it is crucial to have the correct mindset… openness to ICTs and to education.

When it comes to the ICT component, it is necessary to improve communication and collaboration between global health institutes, foundations, public organizations, government agencies, and private organizations through the use of ICT tools, such as the Internet, portals, and telecommunication devices. The development of low-cost alternatives for useful technology, such as handheld devices, and tablet PCs, with an emphasis on global health as part of its usage is already being practiced in some countries. Investing in building hosted (Cloud) and federated (Grid) interoperable data warehouses that can be provided to the community in need with minimum investments is also much more than a trend!

As for education, it is natural to have certain resistances since there is so much to be covered… and all at once. Everybody seems to know a bit about everything. To begin with, it would be wise to educate local healthcare stakeholders to recognize that quality healthcare decisions are based on quality data—and that data is valuable if it can be shared, integrated, reported, analyzed, and acted upon in order to deliver insight and more advanced healthcare.

There should be a focus on improving education among patients, physicians, healthcare providers, communities, and governments by leveraging proven ICT mechanisms. Now there are many online education universities and education institutes that perform healthcare training at all levels. These online health education networks that continuously teach and train healthcare professionals for medical and research degree programs are what the near future holds (public health and nursing degree programs, certifications for health information technology, and healthcare support). After this is accomplished, health education through ICTs should begin in school, go through college/university, and then follow through to the post graduate advanced degree level.

Government leaders should also be involved in the ICT Healthcare Education of their countries in order to develop a healthcare-driven and socially aware population, which in turn will be self-served. The human productivity, process efficiency, organizational effectiveness, and improvement of the quality of healthcare will not only provide substantial improvement in local and global health, but also help build a sustainable economy.
Although games, the Internet, and social networks are creating a culture of health awareness across the population, the world is facing a global health crisis that requires vital attention. In time, ICT and education will disentangle this crisis by providing the right health information to the right stakeholders. Most importantly, quality healthcare and services must be delivered at the right time to the patient—the reason for all of it!

ORGANIZATION OF THE HANDBOOK

This handbook aims to stimulate the discussion and research on ICTs for human-centered healthcare and social care services. An overwhelming response to the call for papers illustrates the notorious level of interest in this particular topic. Forty-two papers, from savvy researchers worldwide, were chosen for publication in this handbook representing an impressive sample of the ongoing activity in the domain.

The organization of this handbook was quite a challenge; however, we managed to distribute the chapters into four different sections: Section 1 – Human/Psychological Aspects; Section 2 – Emerging Trends in the Social and Healthcare Sectors; Section 3 – Developments and Applications in Social Care Services; and finally, Section 4 – Enabling Technologies/Technological Developments.

In Section 1, there are eight chapters that address relevant research and developments about Human/Psychological Aspects and ICTs. It reflects many authors’ views on how technology may benefit the development of human well-being and psychological growth.

In chapter one, Andrew Targowski, discusses key goals and strategies that will improve the well-being and health of Americans. Issues such as wisdom and intelligence of the society will be evaluated in the context of mental health, prevention, and lifestyles. Special attention will be given to the issues of health-care quality and costs and the role and architecture of the Health Information Infrastructure. The conclusion will evaluate the chances for implementing proposed solutions.

The second chapter, by Stephen Schafer, explains why ICTs are altering the psychological parameters of human reality in the new media world. The premise of this chapter is that the psychological dynamics of interactive images projected as Media Dreams correspond with the psychological dynamics of dream images as defined by Carl G. Jung.

Patrícia Arriaga, Francisco Esteves, and Sara Fernandes, in chapter three, consider electronic games as having great potential for improving health and social outcomes and also discuss the aspects that might be considered risk factors, by reviewing studies that have shown both positive and detrimental effects on people’s physical and mental health. The authors also debate some research questions that remain unanswered and suggest guidelines for practitioners, researchers, and game designers.

In chapter four, Iolanda Tobolcea recognizes that ICT is an important aspect in the field of education as it involves redefining the role of instructors within the educational context. Throughout the chapter, the author presents the research results of the psychosocial impact, found among specialists (instructors/speech therapists) and parents regarding the use and efficiency of ICT in the treatment of language disorders.

Cayley Guimarães, Diego Antunes, Sueli Fernandes, and Laura Garcia present “Information Challenges of the Deaf in their Health and Social Care Needs.” Chapter five focuses on this minority and its needs, including social, political, citizenship, strategies, and polices dimensions. It presents a Human-Computer Interaction architecture with which to inform the design of Information and Communication Technologies to aid Health and Social Care professionals in their work with the deaf.
Catherine Best, Brian O’Neill, and Alex Gillespie review, in chapter six, the use of assistive technology in health and social care for people with cognitive impairment. The review conceptualizes ATC in terms of function (reminding, alerting, micro prompting, distracting, storing and displaying, navigating, and biofeedback), as opposed to the type of technology (mobile phone, desk-top computer, etc.).

In chapter seven, Shiri Hassid, Iris Reychav, Joseph Pliskin, and Tsipi Heart study “The Effects of EMR Use in Primary Care on the Physician-Patient Relationship.” The authors suggest a research model based on theoretical frameworks derived from the IS and Medicine disciplines, describing factors affecting appropriate use of EMR which will lead to physician and patient satisfaction.

In the last chapter of section 1 (8), Hong Lin proposes the establishment of Chan science by applying modern experimental sciences to various models that have been used in traditional medicine and philosophical studies. Through these studies, the author believes Chan will be a beneficial practice to promote human’s life in modern society.

The seven chapters of section 2 focus on the emerging trends in the social and healthcare sectors by including chapters about social networks, security of ICTs, advisory services, and other related topics.

In chapter nine, Miguel Guinaliu, Javier Marta, and José María Subero introduce the theme of social networks and how they can partially help these new medical demands contributing to improve the life quality of chronic patients and their relatives through the modification of the ways of communication and interaction. In order to analyze the real value of social networks, this chapter studies a real case.

In chapter ten, titled “Community Networks: Infrastructure and Models for Therapeutic Support,” the authors, John Carroll and Mary Beth, present a socio-technical design that illustrates how a community network health intervention can mobilize human resources across social boundaries and enhance health and well-being for people on both sides of the boundary. They specifically address how to reduce the barriers to social engagement experienced by autistic individuals who want more supportive life opportunities.

In chapter eleven, titled “Security of ICTs Supporting Healthcare Activities,” José Gaivéo intends to identify the vulnerabilities that could be explored using an international security standard to support a proactive attitude in face of potential threats that explore the identified vulnerabilities, damaging organizational information assets. Another intention is the establishment of a basis of references in information security to define a level of risk classification to build a reference to the potential that a given threat has to exploit the vulnerabilities of an asset, preventing damages to personal and organizational property, including information and also activity continuity.

In chapter twelve, Marco Nalin and his co-authors define the nature of chronic disease management systems. They propose a model in which the citizen can become a co-producer of her own health, together with the traditional Healthcare Systems and with other entities that may find interesting business opportunities to enter in this game.

In chapter thirteen, “Emerging ICT Challenges on Provision of Online HIV/AIDS Advisory Services” are discussed by Simon Msanjila. This chapter addresses this aspect considering a multi-perspective approach and proposes a set of challenges for each perspective. It also considers the technological perspective of provision of HIV/AIDS advisory services and presents challenges towards designing the proposed system.

Chapter fourteen reviews the design, implementation, and customer experience with the OLDES SW tele-care platform developed within the EU project Older people’s e-services at home. Many researchers came together to answer the question “Does IT Bring Hope for Wellbeing?”

“Low Cost T-Health and T-Social with Ginga: Experience with Mime TV, ImFine, and iFunnyCube Interactive TV Programs” is the fifteenth chapter, which aims to present the actual state of the art in t-health and t-social applications running in countries using Brazilian Digital Television System (SBTVD).
The authors make a historical, political, and technological review of the facts that were responsible for the decision of more than 10 countries that are now adopting SBTVD as their Terrestrial Digital Television standard, pointing to a unification of Ginga as the interactivity technology in those countries. As practical examples using Ginga, three case studies are presented: ImFine, Mime TV, and iFunnyCube.

Section 3 is composed of five chapters that concentrate on the developments and applications in social care services.

In the first chapter of this section (16), Patrik Eklund makes a suggested approach to socio-economic modelling based on strategic planning that is customer-centric with respect to information and process design as well as care-centric with respect to care management in his work dedicated to “Elderly Care Cost Control Using Observation, Assessment, and Decision-Making.”

In chapter seventeen, “Privacy and Data Protection towards Elderly Healthcare,” Ângelo Costa, Francisco Andrade, and Paulo Novais focus on an Ambient Assisted Living project towards assistance of an elderly population. The problems and possible solutions in the legal area towards loss of privacy and personal data and information are discussed.

In chapter eighteen, Cristina Albuquerque first discusses the boundaries and conceptions of social needs as a strategic dimension for innovation and evaluation on social intervention and, in second place, reflects about the key issues (difficulties and opportunities) associated with the use of ICTs in social work and in the social care system.

Chapter nineteen analyses the importance of resilience and psychomotricity and their impact in the learning of disadvantaged children at a preschool age. Lívia Andreucci, Maria de Lurdes Cró, Anabela Pereira, and Ana Mafalda Pinho explain how these children that are exposed to adverse social and personal factors may be supported with an intervention program based in psychomotricity and resilience.

Chapter twenty, written by Begona García Zapirain and Amaia Mendez presents a technological solution to promote and help independent access to work for disabled people using Smart Phones. A deep state of the art about smart phones technologies and examples of other projects is presented.

Section 4 is composed of twenty-two chapters that address relevant research and development contributions to the enabling technologies and technological developments of ICTs in healthcare and social services.

Shib Shankar introduces, in chapter twenty-one, a new theoretical framework, the Cyber Capability Framework to broaden discussions on ICT for development projects in developing countries from simple growth and access through information infrastructure to an understanding of the complexities involved in the social developments of ordinary citizens.

In chapter twenty-two, “A Review of Notifications Systems in Elder Care Environments: Challenges and Opportunities,” Sandra Nava-Muñoz and Alberto L. Morán identify the challenges and areas of opportunity for the implementation of notification systems in these environments, considering a technological perspective. First, a literature review of notification systems in the elderly care environments is presented. Subsequently, a taxonomy is presented in order to classify the reviewed works, and the authors discuss a set of challenges and areas of opportunity that technology can offer in these environments.

Luis Almeida, Paulo Menezes, and Jorge Dias propose, in chapter twenty-three, a study of a framework to support the socialization of elderly people when they are confined to their homes for some reason. It can be also be adequate for people following some neurological or physical rehabilitation treatment remotely or when monitoring behaviors in order to prevent potential diseases.

In chapter twenty-four, Getulio Igrejas, Joana S. Amaral, and Pedro J. S. Rodrigues propose several approaches to “Fall Detection Systems to be Used by Elderly People.” Special attention to the different strategies and technologies applied as for other sensor technologies that could be applied to this field
are referred to in this chapter. A new fall detection system based on a machine learning paradigm, using
neural networks, is suggested. A test set has included some particular examples, the obtained results
present good specificity (88.9%) and sensitivity (93.9%) rates.

Juncal Gutiérrez-Artacho and Maria-Dolores Olvera-Lobo, in chapter twenty-five, “Searching Health
Information in Question-Answering Systems,” present their findings of the research they have carried
out in order to evaluate the quality and efficiency of open- and restricted-domain QA systems as sources
for physicians and users in general through a monolingual and a multilingual evaluation. Their objective
has led them to use definition-type questions in order to evaluate QA systems and determine if they were
useful to retrieve medical information.

In chapter twenty-six, Carla Farinha and Miguel Mira da Silva propose the identification of the require-
ments for Healthcare Information Systems using Focus Groups. The authors have evaluated this method
with experiments, applying a variety of techniques and encouraging preliminary results. In particular,
they have verified that stakeholders can reach a consensus on high-level requirements by showing dif-
ferent perspectives about the system scope. They conclude that Focus Groups are really effective.

Sherifa Al Dossary and her co-authors address “Organ Donation and Transplantation.” Chapter twenty-
seven reviews the literature around organ donation and transplantation and introduces the different types
of consent and registries available from different parts of the world as a solution for enhancing the process
of donation and increasing organ donation rates. It also explores the organ donation process, the role
of the SCOT program, and the social and public factors that influence organ donation in Saudi Arabia.

In chapter twenty-eight, Juanjo Bote introduces a model approach to long-term digital preserva-
tion of Electronic Health Record (EHR). The long-term digital preservation is an emerging trend in
the environment of digital libraries as well as two appropriate methodologies, Trustworthy Repository
Audit and Certification Criteria (TRAC) and a Reference Model for Open Archival Information System
(OAIS). These methodologies can widely be adopted by health care organizations to preserve EHR on
the long-term.

In chapter twenty-nine, Agostino Poggi, Federico Bergenti, and Michele Tomaiuolo describe why
multi-agent systems have been importantly contributing to the development of the theory and the prac-
tice of complex distributed systems and, in particular, have shown the potential to meet critical needs
in high-speed, mission-critical, content-rich, and distributed information applications where mutual
interdependencies, dynamic environments, uncertainty, and sophisticated control play a role.

“A Conceptual Framework for the Design and Development of AAL Services” is explored by Alexandra
Queirós and her co-authors. Chapter thirty presents a comprehensive model based on the International
Classification of Functioning, Disability, and Health (ICF) to characterize users, theirs contexts, activi-
ties and participation, and to structure a semantic framework for AAL services.

In chapter thirty-one, Manjula and Sunilkumar present “A Survey on Health Care Services Using
Wireless Sensor Networks.” The authors highlight the importance of WSNs with respect to health care
services and discuss some of its challenging applications for diseases like Parkinson’s, Alzheimer’s,
asthma, and heart disease. They delineate the challenges that researchers face in this area that may lead
to future research.

Liliana Ferreira, António Teixeira, and João Paulo Cunha describe in chapter thirty-two MedInX, the
Medical Information eXtraction system, which is designed to process textual clinical discharge records
in order to perform automatic and accurate mapping of free text reports onto a structured representa-
tion. MedInX components are based on Natural Language Processing principles, and provide several
mechanisms to read, process, and utilize external resources, such as terminologies and ontologies.
In chapter thirty-three, the authors, Juliann Scholl and Bolanle Olaniran, discuss ICTs in the medical field as well as identify the advantages and disadvantages of their use. By applying Retchin’s (2008) conceptual framework for interprofessional and co-managed care—one that considers the impact of temporality, urgency of care, and structure of authority—they provide guidelines and recommendations for how physicians and other crucial health practitioners can use technology to work with each other. More importantly, they explain how information communication technologies can impact overall patient health care and delivery.

Orientation and mobility are two fields of applications of the so-called Assistive Products, in which we can find a high growth in the last ten years. Chapter thirty-four, written by Pablo Revuelta Sanz, Belén Ruiz Mezcua, and José Sánchez Pena, provides an introduction to this field and a taxonomy of the available assistive products for the orientation and mobility. It details the advantages as well as the disadvantages of several paradigmatic proposals to provide a global point of view of the state of the art in orientation and mobility technology for this group of users.

Chapter thirty-five describes the assistive technology project named Electronic Long Cane, which has been developed as a mobility aid for blind or visual impaired people in open urban spaces. The approach includes an ergonomic design along with embedded electronics placed inside the grip of a traditional long cane. There is a discussion about experimental methods carried out by voluntary blind people along with experts on mobility techniques and future research of white cane design.

The aim of chapter thirty-six is to review the most recent advances in electro-optical technologies applied to visually disabled people. In this chapter, Ricardo Vergaz Benito and his co-authors review how disabled people receive the real world information using these new technologies, how the recently developed electro-optical technical aids can improve visual perception, and how these LV aids do work from a technological point of view.

Masakazu Ohashi and his co-authors make their contribution in chapter thirty-seven with a theoretical study of Social and e-Health Data secure exchange methodology. Their chapter is titled “Technical Perspective of Authentication Policy Extension for the Adaptive Social Services and e-Health Care Management.”

“On the Development of a Multi-Modal Autonomous Wheelchair” is the title of chapter thirty-eight. According to Matteo Matteucci and his co-authors, it is twofold: on one hand, it aims at defining a clear framework for the design and implementation of autonomous wheelchairs, highlighting the main challenges; on the other hand, it presents a complete and working system of such type, called LURCH. This incorporates technology from autonomous robotics, and interacts with its user through a multi-modal user interface, including joystick, touch screen, electromyographic control, or brain-computer interface. The result is an autonomous wheelchair capable of supporting user mobility while adapting its level of autonomy both to the abilities and to the requirements of the user.

In chapter thirty-nine, “Interoperability of Medical Devices and Information Systems,” Lenka Lhotska and her co-authors discuss the issues of standardization and interoperability that are crucial for correct interconnection of medical and other devices and information systems. They present several examples of partial solutions of communication and data format definition in dedicated areas.

Chapter forty presents an experience carried out in an occupational center from the south of Spain, in which a formal research was essayed related to the use of Information and Communication Technologies (ICTs) by people with a variety of intellectual disabilities as a mean for increasing their autonomy in Activities of Daily Living (ADL). Yolanda de la Fuente and her co-authors measured an increase of up to 10% in autonomy in some categories of ADL; therefore, the free online software they designed for the training program proves to be effective.
In chapter forty-one, Konstantinos Koumaditis and Marinos Themistocleous and Vincenzo Morabito introduce Service Oriented Architecture (SOA) governance as a paradigm to integrate Healthcare Information Systems (HIS) and e-health services. It is their belief that Healthcare professionals, patients, policymakers, and business partners increasingly require the utilization and enhancement of e-health services at a global scale. This chapter presents SOA governance aspect in a healthcare perspective and provides useful insights of an emerging issue.

The last chapter of this book (42), “Design of an ICT Tool for Decision Making in Social and Health Policies” is a valuable contribution made by Francisco Grimaldo and his co-authors, since governments require technical support to aid them in the complexity of deciding health policies to assist people who require long-term care. The authors propose the foundations and guidelines of SSIMSOWELL, a new scalable, multiagent simulation tool that will increase the prediction capacity in the long-term care policies, improving decision making in different European regions. The simulation tool will implement a previously validated Social Sustainability Model (SSM).

**EXPECTATIONS**

As editors, we were marveled by the many discussions, reviews, state-of-the-art of enabling technologies, developments/applications, and case studies that we received. The original title of this handbook was supposed to be *Handbook of Research on ICTs for Healthcare and Social Services*; however, due to an overwhelming response to the call for papers, we had to split the book. The title of the second book, which is dedicated to the developments/applications and case studies is *Handbook of Research on ICTs and Management Systems for Improving Efficiency in Healthcare and Social Care* (it is comprised of 64 chapters). This book split only confirms our initial belief in the success of this book.

Albert Einstein once said, “To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.” Creative minds worldwide are using ICTs to challenge and change the current methods of healthcare and social services. Along these 42 chapters, the reader will learn that the reach and the power of ICTs for human-centered healthcare and social care services is becoming a preponderant global issue amongst researchers (both academic and industrial) and health providers.

This handbook is expected to support a professional audience of top managers, IT professionals, and technology solution providers, as well as an academic audience (teachers, researchers, and students, mainly of post-graduate studies). As an academic book, it can support post-graduate studies on IT/IS.

We hope you find it useful.

*Maria Manuela Cruz-Cunha*
Polytechnic Institute of Cavado and Ave, Portugal & CGIT Research Centre, Portugal

*Isabel Maria Miranda*
Câmara Municipal de Guimarães, Portugal

*Patrícia Gonçalves*
Polytechnic Institute of Cavado and Ave, Portugal & CGIT Research Centre, Portugal