GUEST EDITORIAL PREFACE

Special Issue on the International Conference on Health and Social Care Information Systems and Technologies 2012

Maria Manuela Cruz-Cunha, Polytechnic Institute of Cávado and Ave, Barcelos, Portugal

Rui Rijo, Polytechnic Institute of Leiria, Leiria, Portugal

Ricardo Martinho, Polytechnic Institute of Leiria, Leiria, Portugal

INTRODUCTION

This special issue of the International Journal of Healthcare Information Systems and Informatics integrates the enhanced versions of a selection of papers submitted and presented at *HCist'2012 - International Conference on Health and Social Care Information Systems and Technologies*, held in Algarve, Portugal last October 2012. It was the second edition of a conference where, under the *leitmotiv* of Healthcare Information Systems, academics, scientists, IT/IS professionals, managers and solution providers from all over the world had the opportunity to share experiences, bring new ideas, debate issues and introduce the latest developments.

INSIDE THIS ISSUE

This special issue includes five contributions to the discussion of the main issues, challenges, opportunities and developments related with Healthcare Information Systems and Informatics (HISI). These contributions present HISI solutions as tools for competitiveness, and were written by twenty-four authors including internationally renowned and experienced researchers in the HISI field.

In the first paper, "*Implementing a Pervasive Real-time Intelligent System for Tracking Critical Events with Intensive Care Patients*", Portela et al. present a new approach to the gathering and interpreting of data needed to support the decision making process in Intensive

Care Units (ICUs). Intensive care is a critical area of medicine where patients are considered too weak and/or undergoing serious life-risk (Bricon-Souf & Newman, 2007). Collecting data in ICUs presents big challenges, specially related with the number and the different types of available data sources. Even though in such a setting the values for some variables are easy to collect, data collection is still performed manually within particular instances. The proposed system in this paper allows for the calculation of critical events regarding five variables that are typically monitored in an ICU. Given the huge number of ICU variables to be tracked and the rate at which they may vary, automatic real-time data processing is of paramount importance to highlight value changes that may be medically relevant. The system aids the doctors to better understand specific patient conditions. Until now this type of ICU decision support has been generally unavailable. In order to further enhance decision quality and clinical outcome, a Critical Events (CE) tracking system was developed and deployed in the Electronic Nursing Record (ENR).

Also related with decision-making, but within a different context are the contributions presented in the second paper "*HTS-IA: High Throughput Screening Information Architecture for Genomics*". Here, Omta et al. present a work in the field of High Throughput Screening (HTS), based on the fact that it would simply not be practical, and would be error-prone, to investigate a large quantity of reagents manually (Persidis, 1998; Allan et al., 2012). HTS is a process in which large libraries of chemical or biological reagents can be tested for activity in assays using automated methods (Allan et al., 2012). The ultimate goal within HTS-IA is that every piece of information from the output of a particular screen should be rapidly organized in an appropriate biological and/or chemical context so as to enable decision-making and the generation of new hypotheses. Traditionally, this has been done manually by bioinformaticians, but if data is integrated within the appropriate ontology, it can be efficiently and effectively automated. Additionally, external data is eas-

ily added to the existing knowledge, which, consequently, enriches the processed data. This paper describes a high throughput screening architecture for functional genomics screens that use high content methods. This study shows that current information architecture lacks interchangeability and functionality. Data enrichment is carried out manually, and software is still deficient in terms of interoperability, as it should be able to successfully gather data from various external sources. This unveils the growing need of a real integrated laboratory information management system both in academia as well as small-to-medium-sized commercial organizations.

With the constantly growing elderly population in modern societies, it is not surprising that a large group of the elderly will have (or be affected with) some kind of dementia. Of all dementia diseases, the Alzheimer Disease (AD) is the most common (Alzheimer's Association, 2012). Involving patients with dementia within the community can aid them in maintaining their dignity and reduce the existent stigma (Hogg & Watt, 2012). Given the high costs of taking care of someone with Alzheimer´s, which many families simply cannot afford, unpaid cares are sometimes thought to be necessary. Thus, help and collaboration among all of the community people is therefore a precious contribution to both patients and caregivers. In this third paper, Paiva et al. propose a GPS-based tracking system to aid the development and managing of caregiving communities, comprising immediate family members, relatives, neighbors and healthcare professionals, to assist patients with Alzheimer's disease. The system was tested and the performed experiences confirmed its utility and ability to provide effective care to Alzheimer patients. Moreover, the system proves to be very useful to create and to manage the caregiving communities as well as to reduce the costs related with the care provided by the families to Alzheimer's patients.

Clinical decision-making is critical to achieve quality health care, but it is very difficult to help a clinician who makes decisions wisely. In the extant literature, Horton (1998)

and Dickinson (1998) proposed an approach to organize evidence supporting their diagnoses or treatment plans in the form of an argument. In the fourth paper, these proposals support Rijo et al. contention that it is appropriate to use an argument approach to provide medical explanations. Introducing the concepts of assurance case and importing Goal Structuring Notation (GSN) from safety engineering to the domain of clinical decision is one approach that the authors think to be of value, and is consistent with the growing move towards evidence-based medicine. Also, the complementary approach of using ontologies can bring more confidence to the results and create a knowledge base that can grow with real-world medical field experience. Supported by a case study example, the benefits and problems of adopting GSN and an ontology-based approach in clinical decision-making for Attention Deficit Hyperactivity Disorder (ADHD) patients are discussed and illustrated in this work titled "Multiple Approaches to the Diagnosis of Attention Deficit Hyperactivity Disorder".

"*Risk Management Information System Architecture for a Hospital Center – the Case of CHTMAD*" is the work presented in the fifth paper by Costa et al. The idea of clinical risk is an emerging concept and is defined as an event that has a (direct or indirect) negative effect on the quality of health care, which may further threaten the safety of patients, cause high operational costs, or affect the image of the involved institution(s). In healthcare organizations, clinical risks may relate to many activities and challenges, including the provision of care (acts, materials and products, ethical and information risks), the security of the hospital's infrastructure (fire occurrence, electricity failures, computer failures, lack of water), the sound organization of the institution (loss of human resources, lack of protocols, nonconformities, patient transport, accidents, strikes and frauds), and more (Judson, 1998). This article proposes a risk management information system (RMIS) architecture and prototype for the CHTMAD hospital center. This presented case description offers CHTMAD-like institutions a systematic step-by-step approach to a RMIS vision in order to position themselves strategically. On one hand, the development and implementation of a RMIS can be a major undertaking for a hospital because of the complexity of existing systems and of the challenging integration requirements; on the other hand, it can be one of the most rewarding and compensating efforts as it is a critical system for the ongoing survival of the healthcare entity and for future expansion and growth.

ACKNOWLEDGMENT

Maria Manuela Cruz-Cunha
Rui Rijo
Ricardo Martinho
Guest Editors
IJHISI

REFERENCES

Allan, C., Burel, J.-M., Moore, J., Blackburn, C., Linkert, M., Loynton, S., et al. (2012). OMERO: Flexible, model-driven data management for experimental biology. [10.1038/nmeth.1896]. *Nat Meth, 9*(3), 245-253.

Association, A. (2012). 2012 Alzheimer's disease facts and figures. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 8*(2), 131–168. doi:10.1016/j.jalz.2012.02.001 PMID:22404854

Bricon-Souf, N., & Newman, C. R. (2007). Context awareness in health care: A review. [10.1016/j.ijmedinf.2006.01.003]. *International Journal of Medical Informatics, 76*(1), 2-12.

Dickinson, H. D. (1998). Evidence-based decision-making: an argumentative approach. *International Journal of Medical Informatics*, *51*(2), 71–81. doi:10.1016/S1386-5056(98)00105-1 PMID:9794324

Hogg, L., & Watt, A. (2012). *Overcoming the stigma of dementia World Alzheimer Report 2012*.

Horton, R. (1998). The grammar of interpretive medicine. *CMAJ: Canadian Medical Association Journal*, *159*(3), 245. PMID:9724981

Judson, N. (1998). *Guidelines for clinical risk assessment and management in mental health services*. Retrieved May 15, 2012, from http://www.moh.govt.nz/notebook/nbbooks.nsf/0/2FE380C25ED2F1B34C25668600741EBA/$file/mentalra.pdf

Persidis, A. (1998). High-throughput screening. [10.1038/nbt0598-488]. *Nat Biotech, 16*(5), 488-489.

Maria Manuela Cruz-Cunha is currently an Associate Professor at School of Technology – Polytechnic Institute of Cavado and Ave, Portugal. She holds a Dipl. Eng. in the field of Systems and Informatics Engineering, an MSc in the field of Computer Integrated Manufacturing and a PhD in the field of Production Systems Engineering. She teaches subjects related with Information Systems, Information Technologies and Organizational Models to undergraduate and postgraduate studies. She supervises several PhD projects in the domain of Virtual Enterprises and Information Systems and Technologies. She regularly publishes in international peer-reviewed journals and participates on international scientific conferences. She serves as a member of Editorial Board and Associate Editor for several International Journals and for several Scientific Committees of International Conferences. She has authored and edited several books and her work appears in more than 120 papers published in journals, book chapters and conference proceedings. She is the co-founder and co-chair of several international conferences: CENTERIS - Conference on ENTERprise Information Systems and ViNOrg - International Conference on Virtual and Networked Organizations: Emergent Technologies and Tools. She is editor-in-chief of the International Journal of Web Portals.

Rui Rijo is a full Professor of Computer Science at the Polytechnic Institute of Leiria. He received his PhD in Computer Science from the Trás-os-Montes University and his Engineering degree from Instituto Superior Técnico (Technical University of Lisbon). He has more than ten years of experience as senior information systems consultant in, among others countries, Tokyo (Japan), Macau (China), Hong-Kong (China), São Paulo (Brazil), Kuala Lumpur (Malaysia), Amsterdam (Holland), Madrid (Spain) and Lisbon (Portugal). His publications include book chapters and papers in refereed national and international conferences and journals. He is general chair of HCist - International Conference on Health and Social Care Information Systems and Technologies and associate editor of the International Journal of Web Portals. *He is the coordinator of the Master on Healthcare Information Systems Management. His current research interests include project management, software engineer, and health information systems. He is a researcher at Institute for Systems Engineering and Computers at Coimbra (INESC Coimbra).*

Ricardo Martinho is a full Professor at the School of Technology and Management – Polytechnic Institute of Leiria, Portugal. He teaches several subjects related to enterprise information systems, enterprise application development, software engineering and healthcare computer programming and information systems. He graduated in Electrical Engineering – Computer Science at University of Coimbra, received his MSc in Computer Science - Information Systems Programming from IST - Technical University of Lisbon, and his PhD from University of Trás-os-Montes e Alto Douro. He is currently the Head of the Healthcare Informatics BSc. degree, and participates as a consultant in several enterprise and healthcare-related research projects. He supervises several MSc and PhD theses in the Computer Science – Healthcare Informatics research areas. He serves as editor-in-chief, member of editorial board and reviewer for several books and international journals, and has served in several committees of international conferences. He is a co-founder of HCist – International Conference on Health and Social Care Information Systems and Technologies (http://hcist.eiswatch.org)