Chapter 1
A Roadmap to the Introduction of Pervasive Information Systems in Healthcare

Fotis Kitsios
University of Macedonia, Greece

Thanos Papadopoulos
University of Southampton, UK

Spyros Angelopoulos
The University of Warwick, UK

ABSTRACT

Pervasive healthcare is an emerging research discipline, which focuses on the development of pervasive and ubiquitous computing technology for healthcare environments. Information and Communication Technologies have dramatically evolved during the last decade, laying a solid foundation for the future generation of Ubiquitous Internet access. As a result, current efforts in research and development in the areas of pervasive healthcare, promote the formation of inter-disciplinary international teams of experts, scientists, researchers and engineers to create a new generation of applications and technologies that will facilitate the fully automated information cyberspace systems. The authors discuss the current state-of-the-art in the world of Telecommunications and Internet Technologies as well as new technological trends in the Internet and Automation Industries, while promoting research and development in the interdisciplinary projects conducted by multinational teams worldwide.

INTRODUCTION

Over the last years, Information Technology (IT) has been implemented as a means to achieve competitive advantage for private firms, and provide better quality services to customers. The IT

artefacts have started to embrace all activities of human beings. They are embedded in more places than a desktop computer and provide innovative services in ways that have not been imagined in the past.

The paradigm shift (Kuhn, 1967) in the use of IT and Information Systems (IS) is usually referred to as ubiquitous or pervasive computing (Weiser,

2002). Ubiquitous Internet and pervasive IS are active research areas that have recently started to mature. Literature suggests many applications and systems on futuristic and pervasive computing for the 21st century, and discusses possible scenarios of adoption and implementation (Angelopoulos *et al.*, 2008).

In the healthcare context pervasive computing is used widely, for instance through blood pressure cuffs and glucose meters that can upload data to a personal computer for collection and dissemination to professional caregivers (Borriello *et al.*, 2007). However, there is still research to be done in terms of its implementation and the role of stakeholders in the construction of such tools. Literature has not explored thoroughly the necessity of adopting and implementing pervasive IT/IS.

Aiming to address this gap, the chapter aims to shed light upon the complex configurations of stakeholders that construct Pervasive Information Systems (PIS). The structure of the chapter is as follows: after a brief introduction to pervasive computing, the introduction of PIS to the healthcare is examined and in particular literature regarding the implementation of PIS to the specific context. Additionally, issues regarding the role of stakeholders during the implementation process are highlighted. The chapter concludes by an overview of the PIS and their application in healthcare and suggests further research avenues.

PERVASIVE COMPUTING

Omnipresence is the ability to be everywhere at a certain point in time. Ubiquity postulates the omnipresence of networking; an unbounded and universal network (Angelopoulos *et al.*, 2008). The widely used definition of ubiquitous computing is the method of enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user (Wang et al, 2007). Pervasive computing integrates computation into the environment, rather than having computers, which are distinct objects. Ubiquitous activities are not so task-centric while the majority of usability techniques are. It is not at all clear how to apply task-centric techniques to informal everyday computing situations (Abowd & Mynat 2000).

There is no clear definition of pervasive computing in the current literature (Orwat et al., 2008). Pervasive computing is considered roughly as the opposite of virtual reality. Where virtual reality puts people inside a computer-generated world, pervasive computing forces the computer to live out there in the world with people. Visualisation and interaction of pervasive services can be implemented using context-aware augmented reality (Van de Kar, 2005). Thus, pervasive computing is considered a very difficult integration of human factors, computer science, engineering, and social sciences (Weiser, 1991). On the other hand, augmented reality (AR), another type of virtual reality, is considered as an excellent user interface for pervasive computing applications, because it allows intuitive information browsing of location-referenced information (Lee et al., 2006; Schmalstieg and Reitmayr, 2005). Moreover, pervasive computing is also different from traditional general purpose computers. This is because IT is not in the foreground, triggered and manipulated by humans; instead, IS resides in the background, monitoring the activities of humans and processing this information to other sources (Kourouthanassis et al., 2008).

The vision of pervasive computing consists of unobtrusively integrating computers with peoples everyday lives at home and at work (Chen et al., 2007) and has inspired many researchers to work on new hardware, networking protocols, human-computer interactions, security and privacy, applications, and social implications (Weiser, 1991; Satyanarayanan, 2001). In the last decade, a number of researcher articles presented the vision and illustrated the scenarios of futuristic computing systems in the year 2005 (Babulak, 2005). Much of the research on Ubiquitous Computing

Related Content

Experience with a Functional-Logic Multi-Agent Architecture for Medical Problem Solving
Giordano Lanzolaand Harold Boley (2002). *Knowledge Media in Healthcare: Opportunities and Challenges (pp. 17-37).*
www.irma-international.org/chapter/experience-functional-logic-multi-agent/25405

Health in the Digital World: Transformational Trends
Kendall Ho (2010). *Healthcare and the Effect of Technology: Developments, Challenges and Advancements (pp. 1-12).*
www.irma-international.org/chapter/health-digital-world/42701

Efficient Learning From Two-Class Categorical Imbalanced Healthcare Data
Lincy Mathewsand Hari Seetha (2021). *International Journal of Healthcare Information Systems and Informatics (pp. 81-100).*
www.irma-international.org/article/efficient-learning-from-two-class-categorical-imbalanced-healthcare-data/267885

COVID-19 Outbreak Prediction and Analysis of E-Healthcare Data Using Random Forest Algorithms
Debabrata Dansana, Raghvendra Kumar, Aishik Bhattacharjeeand Chandrakanta Mahanty (2022). *International Journal of Reliable and Quality E-Healthcare (pp. 1-13).*
www.irma-international.org/article/covid-outbreak-prediction-analysis-healthcare/297075

Proposing and Testing SOA Organisational Structures: A Case Study Approach
Konstantinos Koumaditisand Marinos Themistocleous (2014). *International Journal of Reliable and Quality E-Healthcare (pp. 1-18).*
www.irma-international.org/article/proposing-and-testing-soa-organisational-structures/124945