Chapter 1
Identifying the Emerging e-Health Technologies:
To Ubiquity 2.0 and Beyond

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ABSTRACT

Achieving improvements and optimum healthcare delivery has become a bipartisan top priority for several governments and institutions. The ability to meet this goal depends on the exchange of information within and across healthcare communities. The real challenge for any healthcare initiative is at the application level, where patient data may be stored on hundreds of different clinical systems such as lab, radiology, or pharmacy systems, and various clinical applications such as electronic medical record (EHRs), that use different protocols and schemas. In an attempt to overcome these challenges, many organizations have used enterprise-oriented integration platforms to transform and translate information so that disparate systems could exchange information internally and externally. However, the development and ongoing maintenance of such healthcare systems has become extremely expensive due to the growing complexity of healthcare organizations as they acquire more systems to meet clinical and business needs. As a result, healthcare communities continue to face the same challenge: how to achieve a level of interoperability for accessing all relevant information about a patient from a single point, which is universally becoming the Web, as well as to ensure accuracy, security, and privacy of all the relevant data. This chapter provides a roadmap solution based on the emerging web technologies that hold great promise for addressing these challenges. The roadmap is termed as the "ubiquity 2.0 trend." This chapter also highlights the security challenges and the emerging web-oriented identity management technologies to provide a single, common user credential that is trusted, secure, and widely supported across the Web and within the healthcare enterprises.

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THE XMALIZATION TECHNOLOGIES: THE ROADMAP OF UBIQUITY 1.0

During the last decade, a number of health initiatives have been undertaken to address various issues related to the e-health quality of service. In spite of the technical improvements, the current healthcare systems often lack adequate integration among the key actors, and commonly fail to consider variety of social aspects. Actually, there is a misconception that e-Health is just about the usage of the Information and Communications Technologies (ICT). Dealing with e-health applications, requires measures and technologies beyond the mere qualified communication networks infrastructure. The challenge will be to make the e-health technology as invisible and as possible to attract widespread use. This means, it will need to be ubiquitous (i.e. present in every place) and widely accepted. For that to true, there will need to be social as well as technological changes. Thus, ubiquitous healthcare technologies become an emerging and challenging paradigm that is gradually reshaping the old disease-centered model, where treatment decisions are made almost exclusively by physicians based on clinical experience, into a patient-centered model where patients are active participants in the decision making process about their own health. Although the Internet has played a drastic role in this movement by giving people access to an extreme amount of health information and providing access to variety of e-health services, it fails short to present an effective media of participation and collaboration. With the other emerging unprecedented technological innovations (e.g. Wireless communication, Sensors Technology), many aspects of the e-health and health care systems are in need of serious modernization and fundamental shift. These current e-health systems are ripe with inefficiencies, inequities, and errors. If we study the changing trend in the demographic and health profiles of the population, we can anticipate the challenges that we need to face over the next 20 years in the management of chronic and multiple diseases in an aging population. At present, about 80% of ill health, disability-caused, and premature deaths are due to chronic diseases (Vitacca, Mazzù and Scalvini; 2009). Due to people's concern for a healthy life, there is a rising need for e-health systems available anytime, anywhere; this causes a paradigm shift from reactive care to preventive care, and thus enhancing our quality of life.

In general, e-health is a highly fragmented and heterogeneous enterprise, with complex processes and few standards for either the processes themselves or the data they generate. Obstacles in the path of e-health are numerous and include legal, ethical, economic, social, medical, organizational, and cultural aspects as well as the fact that a further market downturn may choke development resources. However, the lack of ubiquity and interoperability in systems and services, such as electronic health records, patient summaries, and emergency data sets, has been identified as a major obstacle to the widespread take-up of the e-health applications in the world. The full benefits of e-health services and tools will not reach patients unless a high level of ubiquity and interoperability is integrated at the heart of their design and deployment. Fortunately, Internet-based integration frameworks have helped solve similar problems in other industries and paradigms (e.g. eBusiness), and there is good reason to believe that they will be equally effective in healthcare. The optimism stems from a belief that healthcare faces integration challenges similar to those in other domains:

- Sharing data and information among heterogeneous systems that were never designed to interoperate;
- Automating and integrating ad hoc paper-based processes within and across organizations;
- Managing identities and authorizations across trust boundaries; and