The Wi-INET Model for Achieving M-Health Success

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INTRODUCTION

Medical science has made revolutionary changes in the past decades. Contemporaneously however, healthcare has made incremental changes at best. The growing discrepancy between the revolutionary changes in medicine and the minimal changes in healthcare processes is leading to inefficient and ineffective healthcare delivery—one, if not *the,* significant contributor to the exponentially increasing costs plaguing healthcare globally. Healthcare organizations can respond to these challenges by focusing on three key solution strategies: access, quality, and value. These three components are interconnected such that they continually impact on the other, and all are necessary to meet the key challenges facing healthcare organizations today.

The application of mobile commerce to healthcare—namely, m-health—appears to offer a way for healthcare delivery to revolutionize itself and simultaneously address the critical areas of access, quality, and value. Integral to such an approach is the need for a robust wireless model. We propose the Wi-INET (wireless Internet, intranet, extranet) model as the way to deliver m-health excellence.

BACKGROUND

Currently the healthcare industry in the United States as well as globally is contending with relentless pressures to lower costs while maintaining and increasing the quality of service in a challenging environment. It is useful to think of the major challenges facing today's healthcare organizations in terms of the categories of demographics, technology, and finance. Demographic challenges are reflected by longer life expectancy and an aging population; technology challenges include incorporating advances that keep people younger and healthier; and finance challenges are exacerbated by the escalating costs of treating everyone with the latest technologies. Healthcare organizations can respond to these challenges by focusing on three key solution strategies: (1) *access*—caring for anyone, anytime, anywhere; (2) *quality*—offering world-class care and establishing integrated information repositories; and (3) *value*—providing effective and efficient healthcare delivery. These three components are interconnected such that they continually impact on the other and all are necessary to meet the key challenges facing healthcare organizations today. In short then, the healthcare industry is finding itself in a state of turbulence and flux (National Coalition on Healthcare, 2004; Pallarito, 1996; European Institute of Medicine, 2003; WHO, 2000, 2004; Wickramasinghe & Silvers, 2003). Such an environment, is definitely well suited for a paradigm shift with respect to healthcare delivery (von Lubitz & Wickramasinghe, 2005). Many experts within the healthcare field area agree that m-health appears to offer solutions for healthcare delivery and management that serve to maximize the value proposition for healthcare. However, to date, little if anything has been written regarding how to achieve excellence in m-health, nor does there exist any useful model for framing m-health delivery.

MAIN THRUST: INTEGRATIVE MODEL FOR M-HEALTH

Successful m-health projects require a consideration of many components. Figure 1 provides an integrative model for all key factors that we have identified through our research that are necessary in order to achieve m-health excellence (Wickramasinghe et al., 2005; Goldberg et al., 2002a, 2002b, 2002c, 2002d, 2002e; Wickramasinghe & Goldberg, 2004). What makes this model unique and most beneficial is its focus on enabling and supporting all areas necessary for the actualization of information and communication technology initiatives in healthcare. By design, the model identifies the inputs necessary to bring an innovative chronic disease management solution to market. These solutions are developed and implemented through a physician-led mobile e-health project. This project is the heart of the model to bridge the needs and requirements of many different players into a final (output) deliverable, a "Wireless Healthcare Program." To accomplish this, the model is continually updated to identify, select, and prioritize the ICT project inputs that will:

- Accelerate healthcare system enhancements and achieve rapid healthcare benefits. The model identifies the key healthcare system inputs with the four Ps: ***people*** that deliver healthcare, ***process*** to define the current healthcare delivery tasks, ***platform*** used in the healthcare technology infrastructure, and ***protection*** of patient data.
- Close the timing gaps between information research studies and its application in healthcare operational settings.
- Shorten the time cycle to fund an ICT project and receiving a return on the investment.

IT Architecture and Standard Mobile Environment

By adopting a mobile/wireless healthcare delivery solution, it is possible to achieve rapid healthcare delivery improvements, which impact both the costs and the quality of healthcare delivery. This is achieved by using an e-business acceleration project which provides hospitals a way to achieve desired results within a standardized mobile Internet (wireless) environment. Integral to such an accelerated project is the ability to build on the existing infrastructure of the hospital. This then leads to what we call the three-tier Web-based architecture (see Figure 2).

In such an environment, Tier-1 is essentially the presentation layer; which contains the Web browser, but no patient data is stored within this layer, thereby ensuring compliance with international security standards/policies like HIPAA. Tier-2, shown as the HTTP Server, provides the business logic including but not limited to lab, radiology, and clinical transcription applications; messaging of HL7, XML, DICOM, and other data protocols; and interface engines to a hospital information system (HIS), lab information systems (LIS), radiology information systems (RIS), as well as external messaging systems such as Smart Systems for Health (an Ontario healthcare IT infrastructure project). This latter messaging feature may also be included in the third tier, which consists of the back-end database servers like Oracle, MySQL, or Sybase.

Mapping Case Study to Model

During the past six years, INET has used an e-business acceleration project to increase information and communication technology (ICT) project successes (Goldberg et al., 2002a, 2002b, 2002c, 2002d, 2002e). Today INET is repurposing the e-business acceleration project into a mobile e-health project to apply, enhance, and validate the mobile e-health project delivery model. Such a model provides a robust structure, and in turn serves to ensure excellence in the m-health initiative. INETs data provides the perfect opportunity to examine the components of our model (Figure 1), as it is both rich and longitudinal in nature. In mapping the data and specific business case, we have drawn upon many well-recognized

Figure 1. Wi-INET business model