

# Chapter 5

## A Bounded Health Information Technology System Design Approach to Support Community– Based Care Delivery

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### ABSTRACT

*Health information technology (HIT) offers great potential for supporting healthcare delivery, particularly collaborative care delivery that is provided across multiple settings and providers. To date much of HIT design has focused on digitizing data or processes on a departmental or healthcare provider basis. However, this bounded approach has not scaled well for supporting community based care across disparate providers or settings because of the lack of boundaries (e.g. disparate data and processes) that exist in community based care. Cloud computing approaches that leverage mobile form applications for developing integrated HIT solutions have the potential to support collaborative healthcare delivery in the community. However, to date there is a shortage of methods that describe how to develop integrated cloud computing solutions to support community based care delivery. In particular there is a need for methods that identify how to incorporate boundaries into cloud computing systems design. This paper uses a three year case study of the design of the Palliative Care Information System (PAL-IS) to provide system design insight on cloud computing approaches that leverage mobile forms applications to support community care management.*

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## **1. INTRODUCTION**

Governments continue to spend large amounts of money on the adoption of health information technology (HIT) (Borycki, Newsham & Bates, 2013; Coiera, Aarts & Kulikowski, 2012; Blumental, 2009) to support the electronic exchange of health information (Fontaine, Ross, Zink & Schilling, 2010), continuity of care (Steward, Koester, Collins, Maiorana & Myers, 2010), and collaborative care delivery where patients are seen across a variety of settings and providers (Ellingsen, Monteiro & Røeda, 2013). These spending initiatives are in response to studies such as the Institute of Medicine report published in 2011 that concluded that the present healthcare trajectory has become too complex and costly and that digital technology will be a key aspect of healthcare delivery (Institute of Medicine, 2011). HIT has been purported to be a solution that will better provide services in the context of a shrinking workforce and an increased need for services (Coiera, 2009; Bates & Gawande, 2003).

However, while the need for HIT to enhance healthcare delivery is well described it has been far more challenging to develop systems that bring about needed change while minimizing adverse impacts (Pare & Sicotte, 2010). HIT implementations frequently cause unintended consequences including communication issues, creation of new work or more work, and even adverse events such as medical errors (Harrison, Koppel, & Bar-Lev, 2007). Unintended consequences occur for several reasons including poor fit with clinical workflow, differences in needs between different user groups (i.e. clinicians and administrators) or the co-existence of manual and automated processes (Novak, Brooks, Gadd, Anders, & Lorenzi, 2012). Unintended consequences can occur because of a gap between how HIT is used in practice versus what was intended by design, referred to as the “design-reality” gap (Heeks, 2006). To close this gap we will require new perspectives on HIT design to meet specific requirements. More specifically, new approaches to healthcare delivery such as collaborative care in the community will require the need to consider the needs of multiple users who may have very different process and information needs. Therefore the development of new approaches for systems design may be needed rather than just re-configuring existing systems (Karsh, Weinger, Abbott & Wears, 2010).

While we have made reasonably good progress on the development of hospital based systems, such as electronic health record (EHR) systems, we have not made as much progress at developing systems to support care across multiple settings where patients move between hospital and the community (Campion, Edwards, Johnson, & Kaushal, 2013). Care delivery in chronic illness and domains of medicine such as palliative care is a longitudinal process where patients frequently move between settings. Supporting care delivery across these varied settings is complex because of the dispersed nature and sheer number of processes that are provided (Bodenheimer, Wagner, & Grumbach, 2002). It is essential that we effectively integrate processes and data exchange across different settings or adverse events can occur (Health Quality Ontario, 2013).

In order to provide effective and continuous community based care delivery we need to coordinate care across complex networks of providers and various data sources (Health Quality Ontario, 2013; Brown, Lewis Ellis, Stewart, Freeman, & Kasperski, 2009; Bodenheimer, 2008; Kripalani, LeFevre, Phillips, Williams, Basaviah, & Baker, 2007). Cloud- based computing approaches offer great potential for providing the infrastructure to support continuous and collaborative care delivery. Cloud computing approaches can be particularly useful for providing the integrated architecture needed to support community based care across different settings (Kaur, & Chana, 2014; Bahga & Madiseti, 2013). Cloud-based approaches for HIT design offer advantages over traditional HIT applications in that data

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