A Business Process Management Approach to Home Healthcare Processes:
On the Gap between Intention and Reality

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1. INTRODUCTION

E-health and telemedicine provide appropriate coverage of Information and Communication Technologies (ICTs) advances that offer practitioners, medical centers, and hospitals novel and innovative options for managing patient care. Special emphasis on the quality, cost effectiveness, and access to healthcare is given. They also offer crucial tools for home healthcare, remote patient monitoring and disease management. Telemedicine applications play nowadays an increasingly significant role in healthcare. Telemedicine was introduced by Thomas Bird in the 70s and designated "A delivery of healthcare and exchange of healthcare information in a distant way" (Hillestad et al., 2005). Telemedicine is the remote provision of healthcare services through ICT in situations where one or more healthcare professionals and the patient are not physically present at the same place (Ilahi & Ghannouchi, 2013). In order to maximize healthcare customer satisfaction (doctors and patients), a better care processes management is required.

To tackle and organizing healthcare processes, we adopt some process-based approaches. In fact, this orientation highlights the importance of the organizational aspects in the success of an ICT-home healthcare project (Arbaoui et al., 2012). In addition, existing research works on home healthcare (Koch, 2004) have dealt more with developing technologies for home healthcare, home monitoring, or home telemedicine, leaving process aspects questions unanswered (Arbaoui et al., 2012).Indeed, some recent observations (Hamek et al., 2005)show that the requirements of the homecare actors (nurses, physicians, home healthcare organizations, caregivers and patient's family members) are more oriented towards the improvement of the organization and management of the homecare system over a more intensive use of home telemedicine (Arbaoui et al., 2012). ICT tools do not replace the care providers but help to improve home care provision and management. In home healthcare, there are many and heterogeneous actors, as well as some old systems and hospital information systems. That is why the benefits of a BPM-based approach look very interesting to regard, since it offers integration, interoperability and evolution capabilities.

Healthcare processes are frequently documented in the form of medical guidelines (Mulyar et al., 2008, Arbaoui et al., 2007, and Quaglini et al., 2000). In fact, these guidelines are not restricted to doc-

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tors but also cover the involved actors (nurses and paramedical personnel). Some research works (Tan et al., 2002, Quaglini et al., 2005, and Quaglini et al., 2000) design these care processes with Petri nets. A Petri net (Hamek et al., 2005) is a bipartite graph whose nodes are called places and transitions. Transitions, graphically represented as rectangles, correspond to actions being taken. Places are represented as circles, and they are used to define the process flow (Van Hee et al., 2008).This formalism has been used for modeling healthcare workflows (Tan et al., 2002, Quaglini et al., 2005, and Quaglini et al., 2000), also known as careflows. In (Quaglini et al., 2000), the guideline system translates formalized guidelines to a hierarchical timed colored Petri net. The resulting net can be run to simulate the implementation of the guideline in clinical setting. However, this formalism misses adaptivity and separation of concerns (Van Hee et al., 2008).

Following the introduction, the remainder of this chapter is structured as follows: in section 2 we briefly describe the research field of BPM in healthcare, while in section 3 we focus on healthcare domain. In section 4, we review the main issues within healthcare information systems. Section 5 provides our approach, which relies on Business Process Management. Then, in section 6, we present our proposition of BPMo (Business Process Modelling) applied to home healthcare processes. Finally, section 8 summarizes the main conclusions of this research and outlines future work.

2. BPM IN HEALTHCARE

In our work, we adopt a BPM-based approach to organize home healthcare processes and tackle associated challenges. In fact, some research works highlight the importance of the organizational aspects in the success of an ICT-home healthcare project (Arbaoui et al., 2012). Other works on home healthcare (Koch, 2004) have dealt more with developing technical-based solutions for home monitoring or home telemedicine, leaving process aspects questions unanswered (Arbaoui et al., 2012). Indeed, some recent observations (Hamek et al., 2005) show that the requirements of the home healthcare actors (nurses, physicians, home healthcare organizations, caregivers and patient's family members) are more oriented towards the improvement of the organization and management of the home healthcare system over a more intensive use of home telemedicine (Arbaoui et al., 2012). ICT tools do not replace care providers but help to improve home care provision and management. In home healthcare, there are many heterogeneous actors, as well as some legacy systems and hospital information systems. That is why the benefits of a BPM-based approach look very interesting to regard, since it offers integration, interoperability and evolution capabilities.

Business process support has been a main driver for information systems in enterprise for a long time. Its overall goal is to overcome the drawbacks of functional over-specialization and lack of process control (Reichert, 2011). Given the competitiveness, rapid advancement and especially the expansion of communication techniques and new technologies in all research areas as well as the effectiveness of Business Process Management (BPM) tools to automate and better manage business processes of organizations, BPM represents a valuable asset in the healthcare domain (Stefanelli, 2004). It relies on process models to identify, review, validate, represent and communicate process knowledge (Künzle & Reichert, 2011, Müller & Rogge-Solti, 2011).

Regarding to several success stories on the uptake of PAISs (Process Aware Information Systems) in industry and the emergent process-orientation of enterprises, BPM technologies have not had an increase widespread adoption in the healthcare domain (Reichert, 2011, Lenz & Reichert, 2007). A major reason for this has been the rigidity enforced by first generation workflow management systems, which inhibits