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Qualitative Evaluation of IoT-Driven eHealth:
KM, Business Models, Deployment and Evolution

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ABSTRACT

This article explains that eHealth has major potential, and its adoption may be considered necessary to achieve increased ambulant and remote medical care, increased quality, reduced personnel needs, and reduced costs potential in healthcare. In this paper, the authors try to give a reasonable, qualitative evaluation of IoT-driven eHealth from theoretical and practical viewpoints. They look at associated knowledge management issues and contributions of IoT to eHealth, along with requirements, benefits, limitations and entry barriers. Important attention is given to security and privacy issues. Finally, the conditions for business plans and accompanying value chains are realistically analyzed. The resulting implementation issues and required commitments are also discussed. The authors confirm that IoT-driven eHealth can happen and will happen; however, much more needs to be addressed to bring it back in sync with medical and general technological developments in an industrial state-of-the-art perspective and to recognize and get timely the benefits.

KEYWORDS

Business Models, Deployment, Entry Barriers, Evolution, IoT-driven eHealth, Knowledge Management (KM), Limitations, Potential Opportunities, Privacy, Requirements, Security

1. INTRODUCTION

There are high expectations for eHealth as a major tool to achieve the following improvements in healthcare:

- A further shift from clinical to ambulant treatment.
- Reductions in the per user/patient workload of medical and care staff.
- Improvements in the quality of medical and care services for users/patients.
- And finally, significant reductions in the medical treatment and care cost per user/patient.

The attention, and hype, around the Internet of Things (IoT) (Durkin & Lokshina, 2015; Lokshina, Durkin & Lanting, 2017a; Lokshina, Durkin & Lanting, 2017b; Lokshina, Lanting and Durkin, 2018), and IoT-driven eHealth (Lokshina & Lanting, 2018a) has further increased the visibility and expectation of eHealth.

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In this article the authors try to give a reasonable, qualitative evaluation of what can be expected of IoT in eHealth and IoT-driven eHealth itself. They look at the possible contributions of IoT to eHealth, the requirements that need to be met, the benefits and limitations of eHealth, and the entry barriers (Kiel et al., 2016; Liu & Jia, 2010). Important attention is given to security and privacy, representing an important set of issues (NCR, 1997; Gaunt, 2001; Waegemann, 2002). However, the authors conclude that these are not the first issues to be addressed: first there needs to be a joint understanding between the users/patients and health and care providers that there are benefits for both the users/patients and health and care providers in applying eHealth (Ricci, 2002). The conditions for business plans and accompanying value chains are realistically analyzed, and the resulting implementation issues and commitments are discussed (Osterwalder & Pigneur, 2010; Sun et al., 2012). As a result, the paper contributes to the literature by reviewing, innovatively, business models, strategic implications and opportunities for IoT-driven eHealth, as well as its deployment and evolution.

The remaining of this article is organized as follows:

- Section two provides a theoretical view on the IoT-driven eHealth in the context of knowledge management.
- Section three focuses on contributions of IoT to eHealth, considering IoT as enabler and discussing IoT-based medical-relevant eHealth systems.
- Section four provides an analysis of requirements for IoT-driven eHealth.
- Section five considers the limitations of eHealth.
- Section six defines the entry barriers.
- Section seven outlines security and privacy issues; however, it confirms these issues are not the first topics to be addressed, but instead, the benefits of applying eHealth.
- Section eight analyzes the conditions for business plans and accompanying value chains and calls attention to the associated implementation issues and commitments.
- Section nine offers summary and conclusions, followed by acknowledgement and references.

2. THEORETICAL VIEW ON IOT-DRIVEN EHEALTH IN CONTEXT OF KNOWLEDGE MANAGEMENT

2.1. Views on eHealth

Everybody talks about eHealth these days, but few people have come up with a clear definition of this term. The term was apparently first used by industry leaders and marketing people rather than academics, and they used this term in line with other "e"-words such as eCommerce, eBusiness, eTrade and so on.

So, how can the authors define eHealth in the academic environment? It seems quite clear that eHealth encompasses more than a technological development.

The authors can define the term and the notion as follows: eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the communication technology, i.e., the Internet, and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology. As such, the "e" in eHealth does not only stand for "electronic", but implies many other "e's," which together, perhaps, best describe what eHealth is all about, or what it should be (Eysenbach, 2001; Lokshina & Lanting, 2018a).