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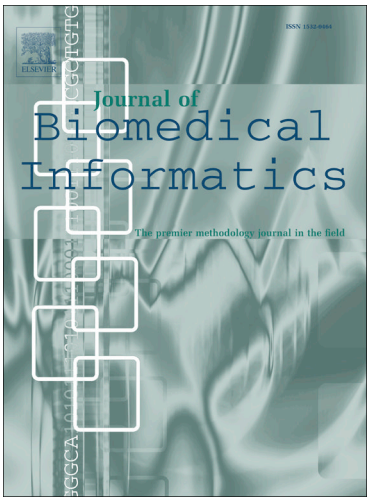

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PII: S1532-0464(18)30065-0
DOI: https://doi.org/10.1016/j.jbi.2018.04.001
Reference: YJBIN 2958

To appear in: *Journal of Biomedical Informatics*

Please cite this article as: Jimenez-Molina, A., Gaete-Villegas, J., Fuentes, J., ProFUSO: Business process and ontology-based framework to develop ubiquitous computing support systems for chronic patients' management, *Journal of Biomedical Informatics* (2018), doi: https://doi.org/10.1016/j.jbi.2018.04.001

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ACCEPTED MANUSCRIPT

ProFUSO: Business process and ontology-based framework to develop ubiquitous computing support systems for chronic patients' management

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Abstract

New advances in telemedicine, ubiquitous computing, and artificial intelligence have supported the emergence of more advanced applications and support systems for chronic patients. This trend addresses the important problem of chronic illnesses, highlighted by multiple international organizations as a core issue in future healthcare. Despite the myriad of exciting new developments, each application and system is designed and implemented for specific purposes and lacks the flexibility to support different healthcare concerns. Some of the known problems of such developments are the integration issues between applications and existing healthcare systems, the reusability of technical knowledge in the creation of new and more sophisticated systems and the usage of data gathered from multiple sources in the generation of new knowledge. This paper proposes a framework for the development of chronic disease support systems and applications as an answer to these shortcomings. Through this framework our pursuit is to create a common ground methodology upon which new developments can be created and easily integrated to provide better support to chronic patients, medical staff and other relevant participants. General requirements are inferred for any support system from the primary attention process of chronic patients by the Business Process Management Notation. Numerous technical approaches are proposed to design a general architecture that considers the medical organizational requirements in the treatment of a patient. A framework is presented for any application in support of chronic patients and evaluated by a case study to test the applicability and pertinence of the solution.

Keywords: Data architecture, chronic disease management, ubiquitous health (u-health) services, clinical decision support systems (CDSS), ubiquitous computing, interoperability

1. Introduction

The World Health Organization (WHO) defines chronic disease as "a disease that persists for a long time and of slow evolution" [1]. Chronic diseases or non-communicative diseases (NCD) are one of the leading causes of death in the world; they account for 70 % of the total diseases in 2016. More than 35 million

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