Chapter 8
Predictive Modeling as guide for Health Informatics Deployment

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ABSTRACT

The present research work shows the main steps conducted towards the exploitation of the LUMIR project, aiming at realizing an EHR framework in the Italian Region of Basilicata (also known as Lucania). It relates to a structure of network–enabled services capable of integrating the ICT solutions used by the operators of the Healthcare System of Basilicata Region. The adoption process of the LuMiR system was meant to address the issues connected to the design features as well as to the EHR diffusion and the acceptance aspects. The mathematical modeling approach introduced aimed at making possible to get to a measure "ex–ante" of both adequacy and significance of the adoption process itself. The final intent is to work out a scalable and exportable model of advanced management of clinical information, towards a stronger cooperation among the provider organizations and a better governance of care processes, as crucial element within the more general path of modernization of the healthcare sector.

1. INTRODUCTION

The LUMIR project (Italian acronym for: network of physicians in Lucania Region), run from 2008 to 2013 under the direction of the Institute of Biomedical Technologies of the Italian National Research Council (ITB-CNR), aimed at the realization of a network–enabled services (the LuMiR system) that integrates all the local information systems deployed in the Healthcare System of the Basilicata Region (also known as Lucania). The scope was to support the integrated management of the care paths as well as to share useful information concerning patients in the territorial assistance dynamics [Contenti *et al*., 2010a]. A participative approach was adopted for both the planning and realization phases of the project: many end-users of the LuMiR system were directly involved and a cyclic process was performed, meaning that the final objective was reached through the continuous verification of end-users' exigiencies and

needs. A first prototype of the LuMiR system (called LuMiR p0) was then tested for healthcare operators to gather all the available information allocated so far inside a number of local information systems. The support structure for the system implementation was tested too (help-desk, Lumir group, etc.).

The experimentation of the LuMiR p0 system allowed moreover to highligh all the issues related its diffusion and reception among the users: the systems showed in fact new ways of care delivery, based on the models of continuity of care [e.g. Larma e Basil, 2003; Morosini, 2004], disease management [e.g. WHO, 1978, Wagner, 2004] and patient empowerment [e.g. Maceratini e Ricci, 2000; Pinna Pintor, 2005]. This made necessary to design a specific plan for GPs recruitment for the trial stage period, so that a more succesful diffusion of the system could be guaranteed for the next future among healthcare operators and citizens as well.

The chapter is structured as follows: the LuMir system is introduced in Section 2; in the Section 3 the issues connected to the adoption of the system are described; Section 4 deals with the enrollment plan (for GPs and citizens) during the trial stage period; in Sections 5 and 6 the set up and implementation of a mathematical model of the system are described and discussed. Some conclusions and future prospects are described in Section 7.

2. THE LUMIR SYSTEM

The LuMiR system is a network-based systems infrastructure that allows healthcare operators (GPs, specialists, lab analysts, nurses, social operators, pharmacists, etc.) to exchange via an electronic support both clinical and administrative information about citizens. In particular, the LuMiR system:

- Gathers socio-sanitary information concerning the entire citizen's life from all the healthcare organizations the citizen deals with;
- Facilitates the information exchange between information systems and healthcare operators, and can be accessed anytime from anywhere;
- Supports the security management policies as to the access control. The citizens who make use of the LuMiR system can actively control the status of their information. More in detail, every citizen can decide which information can be accessed, by whom, and in what circumstances;
- Guarantees the respect of transparency policies, since every user can visualize who provided his/ her information to whom, where the information come from, and who requested them.

The service infrastructure of the LuMiR system allows the connection between organizations via the connection of their local information systems, by means of specific algorithms of information sharing and access control. Figure 1 shows the entire architecture of the LuMiR system.

The LuMiR system also includes:

- A specific module for the management of the clinical events (infoBroker);
- A set of universal wrappers to oversee that the information generated in the local organizations (hospitals, GPs' offices, etc.) are correctly delivered to the central system;
- The LumirWeb system (web navigator) to get access to the information concerning citizen's health events and related documents, according to the existing privacy policies.

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