

Architectural Approach to eHealth for Enabling Paradigm Changes in Health

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Summary

Objectives

For improving safety and quality of care as well as efficiency of health delivery under the well-known burdens, health services become specialized, distributed, and therefore collaborative, thereby changing the health service paradigm from organization-centered over process-controlled to personal health (pHealth).

Methods

Personalized eHealth services provided independent of time and location have to be based on advanced technical paradigms of mobile, pervasive and autonomous computing, enabling ubiquitous health services. Personalized eHealth systems require a multidisciplinary approach including medicine, informatics, biomedical engineering, bioinformatics and the omics disciplines but also legal and regulatory affairs, administration, security, privacy and ethics, etc. Interoperability between different components of the intended system must be provided through an architecture-centric, model-driven, formalized process.

Results

In order to analyze, design, specify, implement and maintain such an interactive environment impacted by so many different domains, a formal and unified methodology for system analysis and design has been developed and deployed, based on an overall architectural framework. The paper introduces the underlying paradigms, requirements, architectural reference models, modeling and formalization principles as well as development processes for comprehensive service-oriented personalized eHealth interoperability chains, thereby exploiting all interoperability levels up to service interoperability. A special focus is put on ontologies and knowledge representation

in the context of eHealth and pHealth solutions. Furthermore, EHR solutions, security requirements, existing and emerging standards, and educational challenges for realizing personalized pHealth are briefly discussed.

Conclusion

For personal health, bridging between disciplines including ontology coordination is the crucial demand. All aspects of the design and development process have to be considered from an architectural viewpoint.

Keywords

Ontology, Knowledge Representation, semantic interoperability, Personal health, system architecture, universal logic, ubiquitous care

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