A Co-evolution Design Approach for Implementing Telehealth Homecare Support Systems

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Abstract and Objective

Telehealth homecare support systems are a rapidly growing area for eHealth, but their development has been hindered by their complex nature which makes it difficult to adopt standardized business processes or systems structure characteristics. Here we identify some of those difficulties and advocate the use of a co-evolution design approach. We show how this approach can be used to represent a generalised telehealth homecare support system, for direct implementation.

Keywords:

Systems analysis and design, Telemedicine, Workflow

Introduction

eHealth solutions are fast becoming recognized as a promising mechanism for dealing with the growing burden of health care needs and costs currently being experienced by our society. One particularly beneficial aspect of eHealth is that it can easily support emerging new "decentralized" and "care team" based models of health care delivery, which can be run disconnected from the conventional acute care or primary care sectors. By continuously collecting and providing information related to a patient's health status and care processes, the patient, health professionals, and other carers can make much more informed decisions on health care, and a much more personalized and fine-grained levels of care can be achieved. The development of eHealth systems for these new models-of-care has been hindered by their complex nature, such as the wide range of significance and relevance of different data elements in monitoring and decision making processes. This complexity makes it difficult to adopt standardized business processes or systems structure characteristics.

Method

This paper describes an approach for the generalized design and implementation of new eHealth systems for telehealth homecare support. This approach is based on a meta-model paradigm that has been developed to facilitate co-evolution. Central to this work is the view that a software system is a medium to capture knowledge, rather than a fixed product [1]. This approach follows the principle that the introduction of an information system results in changes to business processes, which in turn force changes to the implemented information system. All these changes lead to a cyclic process of evolution of aspects of the business processes, users and the information system [2]. Realisation of system designs based on co-evolution are achieved by use of a generic meta-model for web-based business applications, which combines information-centric and process-centric components. This meta-model can be used to represent eHealth systems, to be implemented directly from the representation using the Component Based E-Application Development Shell (CBEADS©) [3].

Results

A typical telehealth homecare support system scenario involves monitoring vital signs for a patient: data is stored by the patient in the system and retrieved for inspection by the carer (who would make separate contact for followup). Using the combined model environment, we identify fundamental telehealth business process activities for each component:

Shell level: access control instances for patient users, carer users, and system administrators; presentation instances for the above users with only fixed level of details; navigation instances for above users, with sequential page linkage options.

Application level: action instances for data store, data retrieve, data display; workflow instances for user data entry, physician/carer data retrieve, physician/carer data display.

Function level: provision of supporting atomic functionality for tasks performed by instances in above levels; data schemas for user access, presentation, navigation; data schemas for vital signs variables store, retrieve, display.

Conclusion

The example provides a simplistic initial version of the system. The resulting web application may initially be feasible only for a consumer level user environment, due to regulatory and clinical acceptance restrictions. However, the ability to rapidly build such systems allows market niches of this type to be addressed by providing a baseline system to

collect further evidence of efficacy with a view to future clinical adoption.

References

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