

KNOWLEDGEBUTTONS IN HEALTH SYSTEMS

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Knowledgebuttons in Health Systems

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Abstract

Infobutton is an important concept from long time in use and much has been done with respect to its standardization and context supplementation. The concept is to create contextual links to information resources from within the information systems usually health information systems. The need which has been realized by the authors of this paper is the augmentation of Infobuttons from the level of only information links to the level of knowledge links. The authors proposed the concept of knowledge links named as "Knowledgebuttons" which complements the concept Infobuttons. It adds further capabilities of getting knowledge to the users instead of just connectivity to information resources. The better representation of the information retrieved with Infobuttons is the first and foundation step to achieve the goal of getting knowledge. This paper discusses about the concept and applicability of Knowledgebuttons in health information systems. It is envisioned that this concept will add to the overall quality of patient care. Both physicians and patients can benefit from this technique as per their needs. Physicians can help in patient diagnosis and treatment critical decisions while patients can educate them to know more about their health conditions by studying the right knowledge at right time. Knowledgebuttons are able to create a true learning environment for the users while using health information systems.

1. Introduction

Information and Communication Technology (ICT) is reshaping the healthcare domain by implying new tools and techniques to its various sub-domains. The sole objective is to gear the outcome of these tools and techniques towards the improvement of overall quality of patient care. Increase in global spending on health is observed recently persuading physicians to use computerized health information systems such as EHR. The increase in spending on health is linked to decline the preventable deaths [1]. Meaningful use [2] criteria have been defined to achieve the objective at different stages on different levels. Different tools and techniques are developed and under development including Health 2.0¹ and Infobuttons.

Infobuttons are tools that access information resources by creating contextual information from within health system such as EMR [3-6]. Infobuttons extends the capabilities of existing health systems providing access to the relevant and context oriented information. A lot of efforts are being put to enhance the capabilities of Infobuttons. **OpenInfobuttons** [7,8] and **Lite** [9] are the two initiatives taken to realize Infobuttons with Infobutton Manager component. The scope

of Infobuttons is the linkage of accessing health system to the information resource. A strong potential exists in this area to extend the research a step ahead by advancing *the access of information to information representation and knowledge generation*. Authors of this paper introduced the concept of Knowledgebuttons; knowledge links in health systems that transform the accessed information into knowledge using semantic technologies. We are introducing the term Knowledgebuttons for the first time. This concept can be used to enhance the capabilities of clinical decision support systems by supplementing the knowledge in the knowledge base. Patients can use Knowledgebuttons to learn more on their health condition.

2. Knowledgebutton Workflow Architecture

Knowledgebutton connects the online resources where the relevant information is found for a particular clinical context. The resources are filtered on the bases of more relevancies to the context. The information from filtered resources is transformed into a more readable format to present to the users. Rules are extracted from the final transformed information in order to add to the knowledge base. The knowledge base becomes the reusable component to be

¹http://en.wikipedia.org/wiki/Health_2.0#cite_note-jmir.org-4

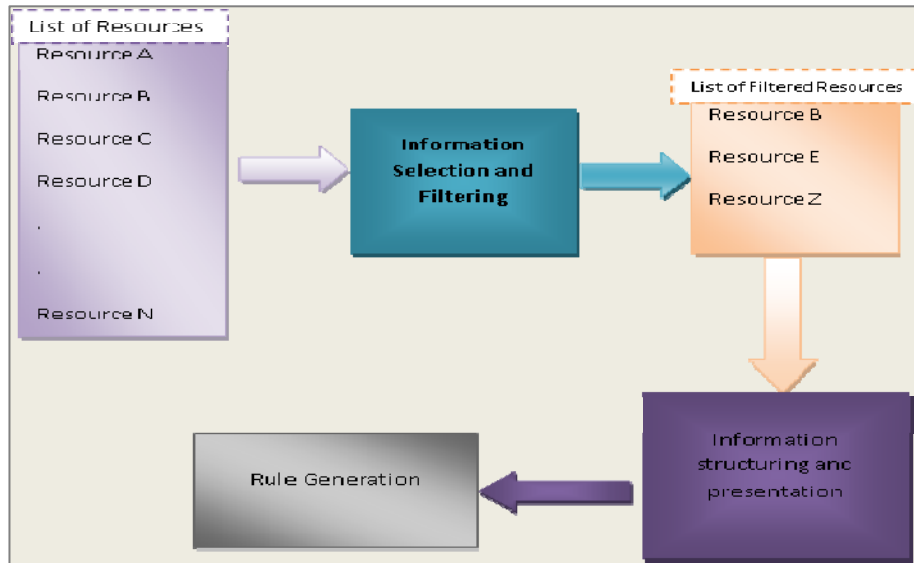


Figure 1: Knowledgebutton Workflow Architecture

associated with CDSS systems and patient portals. This is often the case that physicians refer to the same information again and again even the same day by putting unnecessary efforts and time. By converting the filtered information into knowledge eliminates the second time efforts to connect to online resources which not only maximizes the computational proficiency but also the chance of reusability. Patient can subscribe the knowledge base service established with the help of Knowledgebutton and can use the application as a learning tool.

3. Knowledgebutton Realization

Knowledgebutton can be realized to seek support from the physicians and patients as users. Physicians know what kind of resources they often acquired in a particular scenario. The resources need categorization in order to access correctly in a given context. We arranged several meetings and interview with physicians to understand the pain they face during the course of patient care. We consider the Head and Neck Cancer (HNC) disease as a case for our study. Additionally we fill up questionnaires to know about the credible information resources in the area of HNC. We compiled the list of these resources and investigated its structure, purpose and developer APIs. During research we came to know that not all resources are having searching API options available for the developers and researchers to connect comprehensively to the information resources. The information resources can broadly categorized into three categories; guidelines, clinical trials and published research. Clinical trials are experiment oriented results and physicians are normally hesitating to consider them as a final result. Guidelines are the best options for knowledge rule generation but often they are not available for free. So the only options left with us to consider the published research from credible medical research journals. In meetings with expert oncologists of HNC disease, we enlist three top credible journals; New England Journal of Medicine, Journal of Clinical Oncology (JCO) and Internal Journal of Radiology, Oncology, Biology and Physics. Our job is to link these

journals with the help of Knowledgebuttons in order to get right knowledge at right time.

4. Conclusion

During the course of patient care, clinicians need enormous need for information resources that are relevant to the clinical context. In current scenarios, they spent a lot of time on searching for required information from online information resources in a disintegrated fashion. Infobuttons helped to fill this gap but we need a more comprehensive approach. Knowledgebutton is new concept introduced in this paper as an enhancement to Infobuttons in order to complete the scenario from accessing information to knowledge generation.

Acknowledgement

This work (Grants No. 00048272) was supported by Business for Cooperative R&D between Industry, Academy, and Research Institute funded Korea Small and Medium Business Administration in 2011.

References

- [1] Mays, Glen P., and Sharla A. Smith. "Evidence links increases in public health spending to declines in preventable deaths." *Health Affairs* 30.8 (2011): 1585-1593.
- [2] Meaningful Use, <http://www.healthit.gov/policy-researchers-implementers/meaningful-use>, (Accessed: 18 March 2013).
- [3] Cimino, JJ.; Del Fiol, G. Infobuttons and Point of Care Access to Knowledge. In: Greenes, RA., editor. *Clinical decision support: the road ahead*. Academic Press; 2006.
- [4] Del Fiol G, Rocha R, Clayton PD. Infobuttons at Intermountain Healthcare: Utilization and Infrastructure. *Proc AMIA Annu Fall Symp* 2006:180-184.
- [5] Maviglia SM, Yoon CS, Bates DW, Kuperman G. KnowledgeLink: Impact of context-sensitive information retrieval on clinicians' information needs. *J Am Med Inf Assoc* 2006;13:67-73.
- [6] Cimino JJ. Use, usability, usefulness, and impact of an infobutton manager. *Proc AMIA Annu Fall Symp* 2006:151-155.
- [7] Del Fiol, G.; Kawamoto, K.; Cimino, J.J. Open-source, standards-based software to enable decision support. *Proc. AMIA Annu. Fall Symp.* 2011, 2011, 2127.
- [8] Openinfobutton Project Webpage. Available online: <http://www.openinfobutton.org> (accessed on 20 March 2013).
- [9] LITE (Librarian Infobutton Tailoring Environment) Webpage. Available Online <http://lite.bmi.utah.edu> (accessed on 20 March 2013).