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ORIGINAL ARTICLE

TOWARDS STUDYING PUBLIC HEALTH INFORMATION SYSTEM DESIGN USING INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs)

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Abstract:

This paper introduces a user-centered approach to analyze and design a public healthcare system using ICT. It is a contribution of the work I have conducted within recent years in the field of healthcare and information and communication (ICT) technology research. Due to wide adaptation and current changes in the use and impact of healthcare technologies, there seems to be a growing need for a user-centered design approach. This need has been strongly supported by my experiences in researching information technology usage in the hospital environment, applying user-centered methodologies in research, observing and facilitating public health information system with ICT related web discussions, and participating in a number of project planning.

KEYWORDS:

Public Health, information System, ICT, Healthcare Technologies

INTRODUCTION:

In spite of the global economic recession, healthcare providers are continuously investing considerable resources in healthcare information and communication technology (ICT). Significant benefits are expected as the healthcare industry implements large-scale electronic health records, provides remote diagnostics via telemedicine, upgrades hospital information systems, and enables information sharing and distribution among key stakeholders through public networks (Beaver, 2003). Indeed, ICT is thought to have enormous potential to improve the quality of healthcare. Among other industries, healthcare has already profited extensively by the development of ICT. Today, electronic information systems have a key role in patient care. Both stand-alone and integrated applications are widely implemented and adapted. In the 21st century, many developed countries, including Finland, have invested considerable amounts of money in the development of electronic health record (EHR) systems and national health record infrastructure. In the near future, emerging ICT is expected to have the capacity to empower patients and enable them to become active participants in their healthcare. Although healthcare information technology benefits are obvious in theory, it seems that they are not clearly associated in the operating situations in the healthcare context of use. Studies have shown both positive outcomes and serious challenges in adapting and developing applications for healthcare purposes.

BACKGROUND TO THE STUDY:

The adoption of electronic information systems has in several ways influenced clinical work practices. Patients have noticed that instead of communicating with them, healthcare workers concentrate more and more on working with computers during the doctor's appointments . Among others, physicians have argued that information technology adaptation has dramatically increased the time dedicated for clinical documentation and supportive tasks (Lindqvist, 2008; Muuronen, 2008; Lindberg, 2008; Kaarto,

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2008; Strann 2007). Some have expressed their concern about reliability and patient safety issues related to these systems and their use in care delivery (Strann, 2008; Vuorenmaa & Kontio 2008). Furthermore, a recently published research report (Mykkänen, 2008) about information technology usage in healthcare organizations and related experiences describes findings with high concern. . The success of healthcare information systems has been questioned by a few researchers. Studies have indicated severe usability problems (Kjeldskov et al., 2008; Walldén et al., 2007a; Walldén et al., 2007b; Rose et al., 2005; Patterson et al., 2005) and pointed out increases in physician time related to computer use (Pizziferri et al., 2005; Overhage et al., 2001). One of the main concerns has been with the ease of use of electronic patient record systems and the amount of time taken up by clinical documentation and record-keeping (Häyrinen et al., 2008; McDonald, 1997; Spies et al., 2004; Reuss et al., 2007a; Poissant et al., 2005).

Problem Statement: The research problem is divided into following questions:

i.First, the public health system evolved organizationally to serve the population-health of communities, not to coordinate the health security of the nation;
ii.Second, the current public health system has been neglected for decades, leaving it ill equipped and undertrained to fill its new national security mission; and
iii.Third, governance for public health is primarily local, meaning that agencies follow orders of governors and boards, not national plans.

Preparing a Public health information system for country like India a new mission of national security poses extensive and complex challenges for a fragile, ill prepared and ill-equipped system that was never envisioned or organized to take on this level of responsibility.

RESEARCH QUESTION:

How can the lessons learned from the different early work study in public health information system design in other countries can helpful to propose and developing a national public health information system using ICT.

RESEARCH OBJECTIVE:

The goal of this research is to bring two interdisciplinary research areas, health informatics and user-centered design, closer to each other by improving the understanding of how a user-centered approach could be utilized in healthcare ICT development. The intention is to discuss a group of findings to support the need for such an approach, elicit a fresh perspective to the research areas already established, and introduce a work in progress. This thesis has the following objectives:

i. Find out how a good user-centered design approach can applied in public healthcare information system using information and communication technology (ICT) development. Acquaint ourselves with the domain of user-oriented research in the health informatics field by the following:
Describe the healthcare ICT development research domain and identify the main challenges underlying the healthcare ICT development, and Conduct a “state of the art” literature review and describe the current state of user-oriented research in the public healthcare and IT technology domain.
ii. Conceptually and thematically analyze the research domain of healthcare ICT development from a user-centered design perspective.
iii. Describe an initial conceptual framework for a user-centered approach to healthcare ICT development.
iv.Based on the findings, illustrate directions for further scientific contribution.

Present Work and Need for Public Health System: Healthcare information technology development has followed the general evolutionary trends of all information systems. This evolution has been characterized with a shift from an extensive use of central computer stations to microcomputers, connecting these into networks, and developing multimedia-enhanced workstations (PAHO, 1999). New technological advances are continuously occurring in healthcare. Consequently, health informatics is seen to have an important role in the future shaping of our healthcare delivery system (Berg, 2002). By the 21st century, information technology in healthcare has gained widespread usage. Today EHRs are widely adopted in rich countries. While nation-wide EHRs are still less common, various kinds of organization-wide and departmental record systems have now been in use for a long time. For instance, in Finland, EHRs are now in comprehensive usage both in hospitals and primary care, and electronic information exchange

between organizations has progressed rapidly (Winblad et al., 2008). Nation-wide healthcare information infrastructure projects and strategies are under development in many countries, including England (Health Committee, 2007) and Finland (Ruotsalainen et al., 2008; Iivari & Ruotsalainen, 2007).Many countries have invested significant resources in EHRs to provide clinicians with improved access to relevant patient data and decision support. But, what are the main reasons for adapting information technology in healthcare? What benefits are expected from healthcare information technology usage? The principal forces driving the adaptation of healthcare information technology are the transformation of healthcare delivery systems and productivity growth (Goldschmidt, 2005). Besides, promises and possible benefits underlying healthcare information technology adaptation are manifold (Goldschmidt, 2005): reduced experiences associated with record keeping, improved workflows, automated sharing of information among providers and patients, direct access and instant updates to records, more accurate and better structured clinical data and documentation, automatic sorting and summarization of data, fewer dangerous medical mistakes, and continuous improvement in clinical decision making. Healthcare information technology adaptation has inspired many researchers to explore this evolving area and associated benefits.

DATA ANALYSIS AND DESIGN OF PROPOSED SYSTEM:

The objective of designing systems for usability is to enable the users to achieve the goals and meet their needs in a particular context of use (ISO 9241-11, 1996). Probably the best known definition of usability is by the ISO 9241-11 standard (1996): Usability is the extent to which a system can be used by specific users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. The other, also widely quoted definition is presented by Jakob Nielsen (1993), who states that the two most important issues for usability are the users' tasks and their individual characteristics and differences: Usability has multiple components and is traditionally associated with the five usability attributes, which are learnability, efficiency, memorability, errors, and satisfaction. The framework presented in Figure 1 describes the components of usability and the relationship between them as presented by ISO 9241-11 and Nielsen.

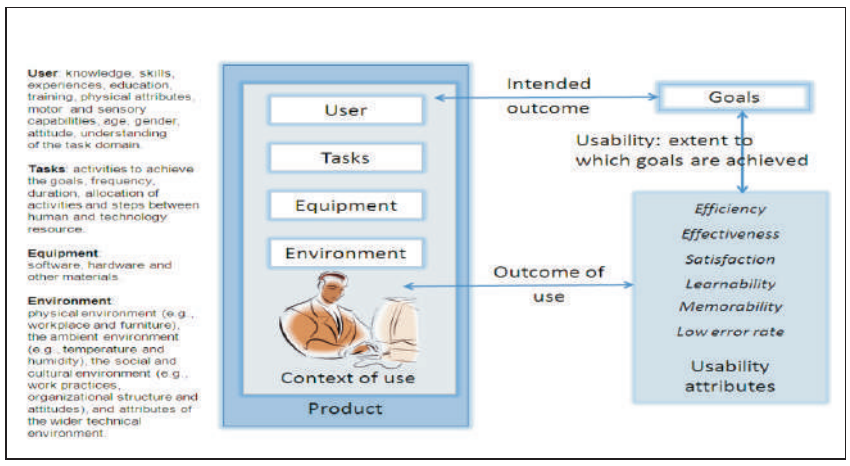

Figure 1: The components of proposed PHIS

ITERATIVE DESIGN PROCESS:

According to Gould and Lewis (1985), iterative design can be described as a cycle of design, test, and measure, and redesign, repeated as often as necessary. The ISO 13407 standard describes a model to support the iterative design. The model incorporates four activities that are intended to accomplish the following: 1) understand and specify the context of use; 2) specify the user and organizational requirements; 3) produce design solutions; and 4) evaluate the design against requirements. When combined with active user involvement, iteration provides an effective means of minimizing the risk that a system does not meet the necessary requirements (ISO 13407, 1999). The design process model is presented in Figure 2.

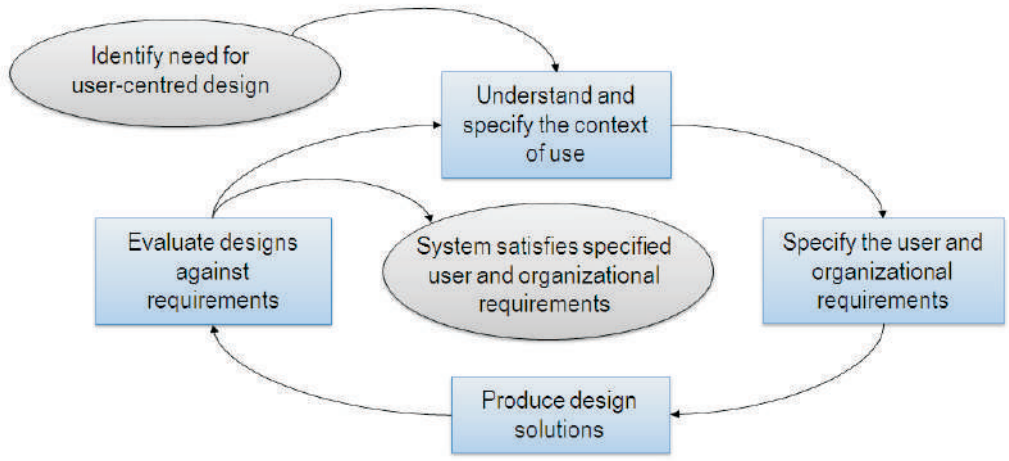

Figure 2: DFD for proposed PHIS

RESEARCH FINDINGS:

This thesis reported a literature review which aimed at analyzing the current state of user-oriented research in the health informatics domain (Chapter 3). Surprisingly few studies were found to describe healthcare ICT use and development from the user's perspective. The review findings indicated that the main reasons for conducting user-oriented studies in health informatics domain are:

a) To explore user acceptance and experiences,
b) To develop healthcare information systems and tools for healthcare professionals,
c) To research the usability of new technologies. As expected, most of the studies were conducted from healthcare workers' viewpoint.

Only some of the studies had researched both healthcare workers and patients' experiences. The findings suggested that some research had already been conducted in the field of consumer health informatics; however, in general this branch of health informatics that strives for analyzing the consumers' needs for information and integrating the consumers' preferences into medical information systems seems to be rather young. Many of the reviewed studies pointed out the increasing demand for incorporating user perspectives in design and development. However, the academic researchers have not proposed concrete suggestions of actions or approaches, let alone how to systematically analyze the research area and established challenges. The described review and analysis suggested that in general, user-oriented research in the field of health informatics is characterized with certain aspects, such as short-period research projects, narrow focus on user issues, and isolated system development. These findings indicate that the importance of user considerations are widely recognized and there is a growing need for more systematic and extensive adoption of a user-oriented approach both in research and development.

CONCLUSION:

In general, the development of healthcare ICT applications seems to follow the traditions of system-centered design. In the healthcare domain, information technology has been adapted in an effort to increase the effectiveness of care and processes. In many cases this has yielded to a situation where information systems are designed to serve patient safety by efficient information delivery and management, and administrative perspective of care by increased clinical documentation. Indeed, wouldn't it be important to consider how these systems could be used to support healthcare professionals' operative work with patients? The described findings of user-oriented research raise the concern of which goals the adaptation of information technology in healthcare is striving for; is the most modern technology developed to serve their users or to determine how the healthcare work is to be performed? In a non-systematic manner, we searched through several relevant research forums. Since there are no special

forums for publications about user-oriented healthcare ICT development, the articles were searched from both health informatics and usability research related forums. As a result, I found an unexpectedly small group of studies.

REFERENCES:

1.Abraham, Thomas. Twenty First Century Plague: The Story of SARS. Baltimore: John Hopkins University Press, 2004.
2.Asch, Steven M., Stoto, Michael, Mendes, Marc, Valdez, R. Burgiaga, Gallagher,Meghan E., Halverson, Paul, and Lurie, Nicole. "A Review of Instruments Assessing Public Health Preparedness." Public Health Reports 120, no. 5 (September-October 2005): 532-542.
3.Association of State and Territorial Health Officials. Public Health Preparedness: How Do We Measure Success? Washington, DC: ASTHO, 2006. http://www.astho.org/pubs/Preparedness-MeasuringSuccess.pdf (accessed August 22, 2007).
4.Awofeso, Niyi, "What's New About the 'New Public Health'? American Journal of Public Health 94, no. 5 (May 2004): 705-709.
5.Basrur, Sheela V., Yaffe, Barbara and Henry, Bonnie. "SARS: A Local Public Health Perspective." Canadian Journal of Public Health 95, no. 1 (January/February 2004): 22.
6.Beitsch, Leslie M., Brooks, Robert G., Grigg, Meade, and Menachemi, Nir. "Structure and Functions of State Public Health Agencies." American Journal of Public Health 96, no. 1 (2006): 167-172.
7.Beitsch, Leslie M., Brooks, Robert G., Menachemi, Nir, and Libbey, Patrick M. "Public Health At Center Stage: New Roles, Old Props." Health Affairs 25, no. 4 (July/August 2006): 911-922.
8.Centers for Disease Control and Prevention. "Frequently Asked Questions about SARS." April 26, 2004 http://www.cdc.gov/ncidod/sars/sars-faq.pdf (accessed April 26, 2008).
9.Centers for Disease Control and Prevention. "HHS What We Do: The Department of Health and Human Services." http://www.hhs.gov/about/whatwedo/html/ (accessed July 19, 2008).
10.Centers for Disease Control and Prevention. "MMWR Report Update: Outbreak of Severe Acute Respiratory Syndrome – Worldwide." Morbidity and Mortality Weekly Report 52 (12): 243
11.http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5212a1.htm (accessed May 9, 2008).
12.Centers for Disease Control and Prevention. "Notice of Embargo of Civets (Family: Viverridae)." January 13, 2004
13.http://www.cdc.gov/ncidod/sars/civet_ban_exec_order.htm (accessed April 27,2008).
14.Centers for Disease Control and Prevention. "The Laboratory Response Network: Partners in Preparedness." http://www.bt.cdc.gov/lrn/pdf/lrnhistory.pdf (accessed July 18, 2008).