

# Chapter 20

## Organizational Implementation of Healthcare Information Systems

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### ABSTRACT

*Health-care information systems (HCIS) intervene in medical reasoning and function. In a continuously changing environment health-care professionals find themselves overwhelmed with fast pacing advances both in information technology (IT) and in medical practice. Use of evidence-based medicine (EBM) is flourishing and the coupling between HCIS and EBM opens new frontiers for both. Yet the problems that relate to HCIS development and implementation remain the same. The problems of today have been problems of yesterday and are likely to stay, or evolve, in the future. The chapter takes the reader to a journey around the factors that are involved in HCIS development and implementation. Discussion is mostly non-technical and focuses on organization and individual readiness to adopt HCIS technology in the workplace. Discussion formalizes to a concrete framework, which is accompanied by a formal statistical methodology on how to apply the framework in practice. The proposed framework integrates existing formal models related to technology readiness and acceptance, EBM, organization climate and computer knowledge and skills.*

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## INTRODUCTION

Health-care information systems (or HCIS for short) represent system federations, which encompass heterogeneous (and often distributed) components aiming toward the support of clinical functions. HCIS are part of Hospital Information Systems (or HIS for short); the latter capture non-clinical, yet critical, functions that support resource management and logistics. Health-care professionals are the [main] users of HCIS; here the term professional refers to both medical and nursing personnel. HCIS field has expanded, diversified and often lead to the creation of new fields, such as nursing informatics, which is now accepted as a separate field (ANIA, 2008; HIMSS, 2008) while a variety of resources about HCIS can be accessed via numerous public websites—for instance (Pohly, 2008).

This chapter takes a step back from technology or specialized HCIS components and focuses on what lies behind the scene. It focuses on people, specifically to health-care professionals and overviews and discusses the concepts, which are the prerequisites to successful HCIS implementation. Presentation takes the form of a journey from early research and key principles to evolving measures of human behavior in relation to the introduction of new technology in the workplace. The journey is taken with the vehicle of EBM – Evidence Based Medicine. EBM marks a major shift in the practice of medicine, alludes to “the wise use of the best evidence available” (Sehon and Stanley, 2003), and involves both the individual as well as the community – Jenicek and Stanchenko (2003) elaborate on the processes involved in the diffusion of EBM to evidence-based public health.

HCIS design and implementation implies existence of a formal architecture, which embraces elements and associations between elements. Based on the work by Mason and Mitroff (1973) the architectural model of a HCIS encompasses at least one *person* of a certain *worldview value structure* who is confronted with a *clinical problem*

within a *clinical context* for which he /she needs *supportive evidence* to arrive at a decision and that evidence is made available to her through some *mode of presentation* which, in turn, is implemented via a *computing system* developed and installed by a team of *HCIS specialists*. (Emphasis is placed on the key variables and follows authors’ practice) – see Figure 1. Architectural ingredients are associated to each other and associations are briefly marked along the links.

The definition, although generic for information systems and more than 35 years old, captures the essential elements of any modern HCIS and can be used to steer modeling of system components and associative relationships between components. Architecture couples clinical context, clinical decision-making style and technology with a range of psychometric parameters, which encapsulate perception about, intention to, and usefulness of HCIS in everyday clinical practice.

EBM occupies the midst of all associations and it is purposefully embodied in the architecture. It is acknowledged that EBM and HCIS interact since the former needs HCIS to access evidence resources and the latter must be re-engineered to serve EBM (Georgiou, 2001). Atkins and Louw (2000) take the argument a step further calling for the necessity of a framework toward evidence-based information systems while in the guide for evidence-based organizational implementation proposed by Kresse et al (2007) information systems hold a prominent position.

In the following section we delineate a model of HCIS architecture based on the original Mason and Mitroff (1973) proposal (section 3). Presentation defines the key variables. Section 4 specializes around intention to use. Section 5 expands architecture and intention to a formal model of HCIS implementation, which integrates salient psychometric dimensions and organizational parameters (see also Figure 3), which influence HCIS adoption. The model incorporates 206 questions (or items), which are assessed over Likert-type scales – a Likert-type scale includes

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