

## Chapter 1.23

# Process–Based Evaluation of Hospital Information Systems: Application of an Information Systems Success Model (PRISE) in the Healthcare Domain

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### ABSTRACT

Although there is limited research and evidence base, it is reasonable to expect that high quality information technology is an integral factor in the success of today's healthcare sector. However, the healthcare sector is considered to be low level investor in information technology (IT) when compared to other sectors. There are studies that look at the sums spent on health IT as a basis for determining how effective the IT systems are. We support the idea that the effectiveness of IT systems is not an exact measure and a more systematic approach needs to be taken when evaluating success of an

IT system. In this study, we have evaluated an assessment method, process based information systems effectiveness (PRISE), which is based on a novel model of information systems effectiveness in the healthcare domain. The results of our case series provide specific implications concerning the applicability of a general “information systems assessment” approach, in the medical context.

### INTRODUCTION

Health care organizations and patients can benefit greatly from the appropriate and effective use of information systems (hereafter IS) (Kaushal, Barker and Bates, 2001). Effective implementation of IT

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in health care has the potential to save billions of dollars while reducing morbidity and mortality (Chaudhry, Wang, Wu, Maglione, Mojica, Roth, Morton, and Shekelle, 2006). As Burke and Menachemi (2004) stated in the paper, in the recent years, health care investment in IT has experienced a significant increase, which in parallel results with an increase in IT capabilities. Empirical research has shown that effective information systems in healthcare organizations are associated with reduced costs and with better care and organizational performance (Chang and King, 2005; Li and Ye, 1999), which suggests a connection between IS process improvement and organizational effectiveness. However the impact of IS implementations are hard to measure and identify (Jayasuriya, 1997). Researchers also suggest that the impact of IS is usually accidental rather than planned (Borum and Christiansen, 2006).

While the effectiveness of information systems is recognized as an important issue, the definition of IS effectiveness in the information systems literature is not yet mature and consistent (Ozkan, Hackney and Bilgen, 2007). Various models such as Capability Maturity Model (CMM/CMMI) (SEI, 2007), Control Objectives for Information Technology (COBIT) (ISACA, 2007) and Information Technology Infrastructure Library (ITIL) (OGC, 2007), have been proposed and used by the IT industry (Ozkan et al, 2007). IS management and evaluation frameworks are not limited to the above mentioned and the list includes approaches that range from the generic ISO 9001 (Braa and Ogrim, 1995), Six Sigma (Schroeder, 2007), and EFQM (EFQM, 2006; Donahue and Vanostenberg, 2000) models through IT specific models such as SPICE (SEI, 2007), ISO 9126, ISO 20000 (ISO, 2007), to healthcare-IT specific models such as Q-Rec (Q-Rec, 2007), Joint Commission International Information Management Standard (Donahue and Vanostenberg, 2000) and HIS-Monitor (Ammenwerth et al, 2007). Each of these approaches has a distinct focus, and its own strengths and weaknesses.

In their seminal review paper, DeLone and McLean defined IS success in terms of success in six categories. These categories were system quality, information quality, user and user satisfaction, individual impact and organizational impact (DeLone and McLean, 2003). In 2003, they revised their model to include service quality as another quality category and they united individual and organizational impact into one “net benefits” category (DeLone and McLean, 2003).

Proper evaluation and assessment is essential for the ongoing improvement of information systems. Yet, a great number of studies that evaluate the organizational aspects of hospital information systems (hereafter HIS) are based on exploratory methods (i.e. do not test a pre-defined hypothesis) (Ammenwerth and Keizer, 2005). Objective and explanatory measurement methods are needed to better evaluate organizational aspects of IS, both in general IS and in HIS context. Another deficiency of the IS evaluation studies is that the evaluated system usually has a limited focus (Ammenwerth and Keizer, 2005), either in functionality or localization (i.e. departmental systems). Among the explanatory studies that utilize formal assessment and/or measurement data rather than user feedback or satisfaction, there are very few studies that have a wider focus and evaluate enterprise-wide systems (Ammenwerth and Keizer, 2005)

It is logical to think that there must be a strong relationship between “improvement in managing IS” and “overall performance of the organization” as measured by effectiveness. Systematic measurements are needed to test this hypothesis. The first step in attracting attention to this area is to review the current level and status of information systems management practices. As Eccles (1991) says, “What gets measured gets attention”. To improve the current status we need to measure IS management and IS effectiveness, although effectiveness is extremely hard to measure (Borum and Christiansen, 2006) because of the highly complex “sociotechnical systems” that make up an information system.

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