Hospital Information Systems Replacement and Healthcare Quality

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ABSTRACT

The aim of this paper is to develop a methodology for deciding when a Hospital Information System (HIS) must be replaced and in addition to discuss how the decision for system replacement affects the quality of healthcare services. In the hypothesis, the Hospital IS has been in operation for a period of time and the Hospital managers have to choose between the replacement with a new Information System (IS) and the continuation of its use. Leaving aside the economic factors concerning the return of a possible investment, the decision is still difficult and will be based on scientific and technological factors. The proposed methodology employs confidential information from the Hospital, which relates to the system operation and usability, the satisfaction of doctors and patients, etc. It also examines the entire working environment and common factors that affect the choice of Hospital managers (e.g., financial constraints).

Keywords: Change Request, Hospital Information Systems, Maintenance, Replacement Factors, System Replacement

INTRODUCTION

The typical lifecycle of an Information System comprises several steps, starting from the feasibility study and the requirements analysis and ending with installation and maintenance. This last step is usually the longest and leads to a new system lifecycle. During the maintenance period, the software engineers attempt to improve the system by fixing inefficiencies and boosting performance (perfective maintenance), to expand the system by adding new services that include the changing needs of the organization (adaptive maintenance) and mainly to fix problems that surface while the system is in use (corrective maintenance). Information System Replacement is the result of a strong request for change and usually follows a long period of maintenance. Replacing an Information System is complex and costly and the decision for an organization is a difficult one. For this
reason, most organizations prefer the corrective maintenance solution instead of system replacement. However, after a long period of maintenance and a series of corrective actions, a lot of custom solutions have been attached to the original system. The custom solutions address specific needs but often conflict with each other and slowly disintegrate system stability. As a matter of fact, there is a critical point in the maintenance phase, after which the operational and maintenance cost of the system is bigger than the cost for replacement.

In the case of Hospital Information Systems, the balance between system maintenance and system replacement is even more difficult, since the final decision must be collectively taken by different bodies (managerial, governmental etc.) that use different criteria (financial, technical, organizational etc.). Moreover, it has to do with patient safety and proper operation of the hospital during and after the system replacement. A proper decision for replacement must examine all the different requirements and the respective cost for covering them with a new system or treating them with a short-term maintenance plan.

This paper attempts to list all the factors that affect the decision to abandon the maintenance actions and replace the hospital information system.

BACKGROUND

Research in Information Systems Replacement appears with many different terms in the literature such as software evolution, software maintenance, information system replacement etc. When talking about IS replacement, software is the first factor that comes into mind (Ng et al., 2002). Deprecated operating systems, software programs with inflexible user interfaces and legacy drivers that do not support new hardware and communication protocols, are some of the issues that a IS replacement analysis must examine and solve.

Apart from software, information systems also include people, procedures, data and hardware that gather and process digital information (Jessup & Valacich, 2008). As a consequence, a complete study on IS replacement must also focus on inflexible procedures, legacy hardware, data formats and communication protocols, which are not in use any more, and people who cannot further support the IS operation and need further training (Gupta & Raghunathan, 1988). The critical question that every replacement model tries to answer is: ‘Maintain or Replace?’ According to Gupta and Raghunathan (1988), system software maintenance includes defects’ correction, design enhancements and modifications to the system’s behavior. These maintenance actions affect the overall operation of the information system and propagate to all the other participants of the IS (hardware, people, data and procedures). The analysis of the maintenance cost (Lucas, 1975) and the justification of a replacement decision according to financial criteria (maintenance costs compared to the cost of investment in replacement and the expected return) is a difficult and complicated operation, which takes into account several factors (Bacon, 1992; Renkema, & Berghout, 1997).

The term evolution has been employed by researchers in order to bridge the two schools and put Maintenance and Replacement under a common strategy (Bisbal et al., 1999). Since, it is complex to replace an information system which is already in operation and is costly to maintain it forever, a practical solution is to evolve it in order to meet the current needs and adapt to the environment. In the context of a functional information system, evolution assumes that several attributes of the system are repaired, modified or replaced causing the information system to change, possibly through modifications to its’ constituent elements. For example, when the operating system changes, then the software modules change in order to adapt to their new hosting environment. In order to bind the three different terms, which are found in literature, it can be said that: A system evolves while being maintained; when certain factors arise then the “evolution” of a certain information system might be its’ replacement with a new one with “different,” “better” functionalities.
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