Organizational and Implementation Issues of Patient Data Management Systems in an Intensive Care Unit

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Since the National Health Service reforms were introduced, the NHS has moved towards a greater emphasis on accountability and efficiency of healthcare. These changes rely on the swift delivery of IT systems, implemented into the NHS because of the urgency to collect data to support these measures. This case study details the events surrounding the introduction of a patient data management system into an intensive care unit in a UK hospital. It shows that its implementation was complex and involved organisational issues related to the costing of healthcare, legal and purchasing requirements, systems integration, training and staff expertise, and relationships with suppliers. It is suggested that the NHS is providing an R&D environment which others are benefiting from. The NHS is supporting software development activities that are not recognised, and the true costs of this task are difficult to estimate. It is also argued that introducing PDMS crystallises many different expectations making them unmanageably complex. This could also be due to PDMS being a higher order innovation that attempts to integrate information systems products and services with the core business.

INTRODUCTION

The National Health Service (NHS) costs the UK approximately £38 billion a year (James, 1995) of which £220 million is spent on IT (Lock, 1996). New IT applications not only support administrative functions and medical diagnosis, but are increasingly used to support resource management and medical audit (Metnitz and Lenz, 1995; Sheaff and Peel, 1995). One such application is patient data management systems (PDMS) in intensive care units, where nurses’ main task of planning and implementing patient care requires an awareness of a set of physiological parameters which provide an overview of the patient’s general condition (Ireland et al, 1997). The collection of patient data is also a legal requirement of the NHS Executive. The implementation of these new technologies is not proving easy for the NHS. Healthcare professionals involved with IT projects often lack in experience of IT development. Risks are higher in clinical applications which require strong user involvement. These technologies are also being implemented into the NHS at a fast rate, because of the urgency to collect data to support accountability measures.

The NHS has changed quite dramatically over recent years, not least with the introduction of ‘competitive market forces’ (Peel, 1996; Protti et al, 1996). The current healthcare reforms come from various government White Papers, moving the philosophy of the NHS towards emphasising business themes and client choice, and they rely on the ‘swift’ delivery of IT systems (Willecocks, 1991). All chief executives of health authorities and NHS Trusts are now ‘accountable officers’, responsible for the efficient use of resources, and are personally responsible for performance (Warden, 1996). Sotheran (1996) argues that using IT in the NHS entails new work structures and changes in activities performed, and that re-distribution of control and power will occur as a result. Bloomfield et al (1992) found a diversity of interpretations by those involved, that the intended focus of the systems varied from management responsibility, medical speciality, doctor to patient group levels, and that views from one peer group could be imposed upon another. Lock (1996) advocates that “the impact of computer systems on patient care as well as on the business objectives of hospitals should be considered”. The ‘benefits realisation’ approach (Treharne, 1995) is recommended to quantify and document benefits. Donaldson (1996) claims that this process can help justify the investments. However, it seems that the ‘benefits realisation’ methods are not being implemented or are failing for the following reasons (Treharne, 1995): an over emphasis on IT relative to other critical issues; a lack of focus; a shortage of skills; ineffective business/IT partnership; absence of benefit management process.

Generally, the rapid movement of information technologies into healthcare organisations has raised managerial con-
cern regarding the capability of today’s institutions to satisfactorily manage their introduction. Indeed, several healthcare institutions have consumed “huge amounts of money and frustrated countless people in wasted information systems implementation efforts” and there are “no easy answers as to why so many health informatics projects are not more successful” (Pare, Elam and Ward, 1997). In this light, the aim of this study is to provide a deeper understanding of how clinical information systems are being implemented, using a case study methodology.

OBJECTIVES AND METHODS

From a theoretical standpoint, it is suggested that adoption and diffusion of information systems (IS) depends on the type of IS innovation concerned. Swanson (1994) and McMaster et al (1997) suggest there are three IS innovation types:

- Process innovations which are confined to the IS core.
- Application of IS products and services to support the administrative core of the business.
- Integration of IS products and services with core business technology.

PDMS are innovative computer systems, which attempt to integrate administrative functions and clinical decision-making. Introducing this third type of innovation tends to have far broader ramifications across the overall business domain. Our research objective is to illustrate the resulting complexity of the relationship between this type of technology and organisational change through the investigation of as many facets as possible of the implementation of a PDMS in an intensive care unit (ICU).

The case study explores these implementation issues and is based on an in-depth examination of the introduction of a PDMS in an ICU in order to offer insights to those who have responsibility for managing complex and risky information system implementation projects. Intensive fieldwork was carried out with members of a PDMS project in an intensive care unit (ICU) in a Northwest hospital over a period of one year (July 1996 to July 1997). This corresponded to the introduction of a commercial PDMS and its early adaptation to this particular context, which was an interesting opportunity as PDMS were still rare in the UK in 1996. An online PDMS system was being introduced to help with the enormous amount of data that is produced from advanced monitoring equipment.

The case study approach was chosen because it allows the researcher to ask penetrating questions and capture the richness of organisational behaviour. A case study approach is also generally recommended in order to gain insight into emerging and previously unresearched topics and when it is difficult to control behavioural events or variables (Benbasat, Goldstein and Mead, 1987; Kaplan and Maxwell, 1994). This qualitative approach seemed particularly appropriate since incorporating computers into all aspects of daily ICU operations is a “formidable task” both technically and logistically, which requires “close cooperation between physicians, nurses, basic scientists, computer specialists, hospital administrators and equipment manufacturers” (Nenov, Read and Mock, 1994).

Given the research has a descriptive and exploratory focus, a combination of data collection techniques was utilised, as recommended by Marshall and Rossman (1989): observation of everyday practices, attendance at meetings and training sessions, informal participation and in-depth interviews with all members of the PDMS project (software suppliers, hospital information systems staff, medical physicists, nurses, medical consultants, hospital administrators). Of particular importance at the time were the legal, purchasing and administrative constraints specific to the NHS that were placed on the ICU. These were also researched using secondary internal sources to gain an understanding of the broader organisational set up and also because they affected how the software was purchased, modified and implemented. The commercial PDMS had to be dramatically modified to suit its users, and this transformation is currently still continuing.

This combination of qualitative techniques has been used in other IS studies in healthcare (Kaplan and Maxwell, 1994); they enable the elicitation of organisational members’ views and experiences in their own terms about sensitive matters and issues of their own choice, instead of collecting data that are simply a choice among preestablished response categories. Additionally, research of this kind is appropriate for unravelling the complexities of organisational change, for providing rich insights and generating an understanding of the reality of a particular situation, and can provide a good basis for discussion. On the other hand, relying on organisational members’ qualitative interpretations and complex associations between events, facts and a range of organisational issues makes it more difficult to separate ‘data’ from findings.

The evolution of information systems in healthcare and their introduction in intensive care is first briefly described. The case study events are then presented covering: the history of the project, the initial specifications, the choice of software, the hardware requirements and difficulties, the programming changes performed, the training carried out, the practical problems experienced, the continuing issue of software upgrades, user satisfaction, organisational practices and the role of suppliers. The main findings about implementation and organisational issues are identified as: time and cost constraints, underestimation of labour effort, the perception of IS implementation as a one off event, the power of suppliers, the lack of project management, the difficulties in managing expectations, the issues of IT expertise and internal conflicts. Discussion points centre on the vision of IS as a technical fix, the difficulty in transferring technical solutions to different contexts, the problem in estimating benefits, and the institutional barriers and politics. Finally, it is concluded that these implementation difficulties are symptomatic of a complex IS innovation which attempts to integrate technology to core business processes.