Understanding ERP system implementation in a hospital by analysing stakeholders

Albert Boonstra and Mark J.G. Govers

Implementing enterprise resource planning (ERP) systems requires significant organisational, as well as technical, changes. These will affect stakeholders with varying perspectives and interests in the system. This is particularly the case in health care, as a feature of this sector is that responsibility of services is shared between many autonomous units. In these and similar settings, it is essential to analyse stakeholders and to understand their expectations and attitudes towards the system. Such an understanding will help implementers to address stakeholder interests and to encourage acceptance.

Therefore, the purpose of this paper is to develop a theoretically based model to analyse how stakeholder attitudes and behaviours in a hospital setting affect the outcome of ERP implementation. This model is applied in an empirical study of a project to introduce an ERP system in medium-sized hospital in The Netherlands. The study shows how the ERP implementation impacts the interests of stakeholders such as physicians and administrators, which caused tensions. The paper examines the reasons of these tensions. In doing so, it contributes to our understanding of ERP implementation in health care and any other similar sectors from a stakeholder perspective, and it may help implementers to manage this more effectively.
The paper is organised as follows. First, we provide some background information about hospitals and ERP. In this section, we also discuss literature related to this theme and presents the conceptual model that we employ to analyse and interpret the empirical data. This is followed by a section detailing the qualitative research method chosen and a description of the research site. Thereafter, we describe the case study, which is analysed and discussed. Finally, the paper ends with implications for those implementing ERP in health care or similar sectors and pointers for future research.

Backgrounds

The major suppliers of ERP systems, like SAP and Oracle, strategically consider health care, and especially hospitals, to be a new and growing market. Therefore, special applications, such as patient management, patient logistics, hospital finance and general management, have been developed so that the ERP system fits with the hospital setting. There are a number of reasons why hospitals differ from other industries, and these may have implications for the implementation and use of an ERP in this setting. First, the objectives of hospitals are diverse, since they aim at curing and caring for patients, as well as training and educating new doctors and nurses. Second, hospital processes are different in that they are highly varied and more complicated than processes in many other industries (Arrow, 1963). Third, the workforce of hospitals is diverse and includes a large spectrum of professionals that can be characterised by possessing expertise, power and autonomy (Johnson, 1972; Scott, 1982; Mintzberg, 1983; Raelin, 1991; Yi et al., 2006). We assume that these specific characteristics impact the implementation and use of ERP systems. Differences in the nature of the processes may have implications for the implementation and use of IS within a hospital context. Heeks (2006: 127) argues that ‘hard design’ often conflicts with ‘soft design’. Hard design can be characterised by a top-down approach, with formalised communication flows and a ‘big bang’ implementation. Soft design, on the other hand, is more informal and involves a rather loose ‘muddling through’ approach. Heeks suggests that implementation failures are more likely when a highly structured and formal information system is introduced into a loosely coupled and complicated reality.

Given the diversity of the hospital workforce, the implementation and use of an ERP system requires the cooperation of a large spectrum of professionals, ranging from medical practitioners, such as doctors, nurses and laboratory assistants, to groups that provide non-medical services, such as hospital managers and IT departments. Heeks (2006) suggested that in this context, three different rationalities may collide, namely technical, managerial and medical. Technical rationality is associated with IT professionals and IT suppliers, who share a technical worldview on which they base their system designs. Managerial rationality applies to hospital managers who operate from legal, financial and control perspectives. Medical rationality typically refers to physicians, who prefer to put medical information and patients at the centre of the system. Since ERP systems are particularly directed at increasing the controllability of hospital processes by means of integration and standardisation, they can be considered examples of managerial rationality. This managerial rationality may collide with some of the other rationalities. Heeks (2006) argued that a collision of rationalities may easily lead to implementation and usage failure.

The purpose of the model (shown in Figure 1) that we develop in this paper is to analyse how stakeholder attitudes and behaviours in a hospital setting affect the outcome of ERP implementation. The model is informed by processual (Pettigrew, 1988), interpretive (Bennis, 1984; Walsham, 1993; McLoughlin, 1999) and integrationist (Orlikowski, 1992) models of change. These models emphasise that various groups of people in organisations may have different interpretations of IS, and that these interpretations may shape their actions and influence the implementation and evolution of such systems (Walsham, 1993; Boonstra, 2003).

Pettigrew (1973; 1985; 1988) argued that organisational change can be understood by considering the interactions between the content, context and process of change within the organisation. The implementation of change is an ‘iterative, cumulative, and
reformulation-in-use process’ (Pettigrew, 1988: 63). Successful change is a result of the interaction between the content or ‘what’ of change, the process or ‘how’ of change (implementation), and the organisational context or ‘where’ of change (the internal and external environment). He also suggested that the change agent must be willing to intervene in the political systems of the organisation, and to legitimate the change in spite of competing proposals and ideas.

Bennis (1984) suggested that management of change is actually ‘management of meaning’, and therefore involves an attempt to: (1) convince others of the credibility and legitimacy of particular problem definitions and solutions; and (2) gain consent and compliance (Boddy, 2002).

Furthermore, Orlikowski (1992) proposed that the results of IT investments are dependent on interactions between technology and people over an extended period of time. IS are both a product of human action and an influence on human action. People initiate, design, implement, and use an IT system. Orlikowski suggested that people can modify technologies during design, implementation, and use since people and technology interact. This continuous interaction means that the actual system implemented will be different than that system originally expected (Buchanan, 2000). It also means that different people react differently by welcoming, rejecting or adapting to the system.

It is well documented (Levine and Rossmore, 1995; Buchanan and Badham, 2000; Markus et al., 2000; Boddy, 2002; Yi et al., 2006) that the development of IS requires the participation of the parties interested and that the willingness and effectiveness of this participation influences the success of the resulting system. Normally, these participants include developers, intended users and managers. However, when it comes to ERP systems in hospitals, this range of people and parties is much broader. It crosses organisational functions, which means that the stakeholders are more loosely coupled. Identifying these stakeholders and exploring their perspectives in terms of their interests in the system and their power to ‘make or break’ the system is therefore essential.

Within the framework of this study, we adapted Freeman’s classical definition of stakeholders to ERP: ‘A stakeholder is any group or individual who can affect or is affected by the ERP’ (Freeman, 1984, adapted to ERP by the authors). McLoughlin
(1999) argued that stakeholders are: ‘those who share a particular set of understandings and meanings concerning the development of a given technology . . . Each group will be identifiable through the different views they have (about) the artefact, or even whether it is a desirable technology at all. They will thus each perceive different problems and potential solutions to them’ (p. 92). McLoughlin is right in arguing that these cannot be properly defined on the basis of prior assumptions about the likely interests of pre-defined groups, but only ‘by the empirical device of asking the actors themselves’ (p. 93).

An ERP system does not depend solely on the interests of stakeholders, but also on the power relations among the parties involved. A powerful party with a clear interest in ERP implementation can force less powerful parties to use it, regardless of their perceived interest in the system (Standifera and Wall, 2003). On the other hand, it might be rather difficult for parties with a great deal of interest in a particular ERP system to use the ERP if they lack the power to implement it and if the other parties are not really interested. In this paper, we define power as the capacity to exert one’s will over others in order to realise certain intended goals (Boddy, 2002). Since power is a capacity to exert one’s will, it is possible to indicate the source of this capacity. In relation to ERP, parties may possess different sources of power to force others to cooperate and use (or not use) an ERP. The power and interests of stakeholders may change over the course of a project and may affect the role each stakeholder plays.

To characterise stakeholder roles, we refer to the stakeholder typology of Mitchell et al. (1997). They identify seven types of stakeholders, based on three features. These three features are the possession of power, urgency and legitimacy. This lead to dormant, discretionary, demanding, dominant, dependent, dangerous and definitive stakeholders. Dormant stakeholders have the power to influence, but this power remains unused for a certain period of time. Discretionary stakeholders possess legitimacy, but do not have the power to influence the project. Demanding stakeholders have urgent claims, but lack the legitimacy or the power to materialise these claims. Dominant stakeholders are both powerful and legitimate. Their influence in the relationship is assured, since their power and legitimacy allows them to form the dominant coalition. Dependent stakeholders are characterised by a lack of power, despite having urgent and legitimate claims. These kinds of stakeholders depend on others to carry out their will. Dangerous stakeholders possess urgency and power but no legitimacy, and may therefore be coercive or even dangerous. Definitive stakeholders possess power, legitimacy and urgency.

The approach taken in this case study was based on theoretical perspectives mentioned above, leading to the model as shown in Figure 1. We have used the model to structure the case description and analysis around the following questions:

1. What was the content, the process and the context?
2. How did the implementation process develop and what outcomes and solutions were achieved?
3. Who were the stakeholders, what meaning did they attach to the ERP system, and how can they be characterised in terms of power, urgency and legitimacy?
4. How did the stakeholders’ different positions promote or inhibit the implementation?
5. How did the successive actions taken by the stakeholders modify the context and affect the process?

The case history section addresses the first two questions, and the analysis section addresses question 3–5.

**Method**

We took a qualitative, single case study approach. In our view, this was the most suitable method for dealing with the issue of ERP implementation in hospitals. The research questions were exploratory (Yin, 1999; Dubé and Paré, 2003) and aimed at identifying the stakeholders, the meaning they attached to the system, and the methods they used to either promote or inhibit implementation. Given that the issues under study had not been extensively researched earlier, we choose to study these issues in
their natural setting in order to gain insight into their exact nature and the complexity of the research proposal and its context (Benbassat et al., 1987; Gerring, 2004). In addition, we adopted an interpretive approach (Walsham, 1993) by assuming that each stakeholder had his or her own subjective view on the systems and their contexts (Freeman, 1984).

To ensure construct validity, we used a broad set of qualitative methods, including in-depth interviews, participant observation, physical artefacts and documentary research (Ammenwerth et al., 2003). Interviewees were not only managers or consultants that were directly involved in the ERP implementation, but also other parties that were in some way involved (see Table 1).

Initial access to data was negotiated with a staff member of the IS department in 2005. Over the course of six months, the authors visited the hospital five times and interviewed stakeholders and the hospital’s general manager. During the early interviews, respondents identified other stakeholders who were likely to be affected by the system. These stakeholders were then contacted for an interview. Additionally, others who were directly involved in this stage of the project were asked to participate as well. It was an ‘iterative process, in which a broad range of stakeholders was progressively revealed’ (Pouloudi, 1997: 88). The interviews took place between August and November, 2005. Almost everyone who was approached agreed to participate. They authors conducted the interviews and observations together.

The interviews were in part aimed at reconstructing relevant events, interpretations and meanings of the past. While it was possible that the reconstruction of events, opinions and meanings by interviewees was done in the light of later events, we attempted to neutralise this potential bias by also referring to written materials, such as minutes and notes.

The interviews lasted approximately one to two hours, and the respondents included the general management, IT staff, administrative staff, medical staff and external consultants. The interviews began with some generic questions about the goals, realisation and implementation process of the ERP system. At that time, the interviewees were encouraged to express how they experienced the ERP implementation process. After that, more specific questions were asked about critical incidents, the specific interests of the stakeholders and the meaning they attached to the system (see Appendix 1). We deliberately choose to ask open-ended questions, as this encouraged the respondents to provide their reasons for acceptance or otherwise. Handwritten notes were taken, and individual reports of the interviews were made. The accounts based on these notes were presented to the interviewees for feedback, and then revised slightly on particular points of detail if necessary.

The researchers also studied physical artefacts like screen layouts. They also observed how employees used the ERP system in practice. Various forms of documentary evidence, such as implementation plans, user manuals and minutes of meetings were used to supplement the data. These sources reduced the possibility of systematic error and incompleteness, and therefore ensured that the interviewers were well

<table>
<thead>
<tr>
<th>Interviewees</th>
<th>Number of interviewees</th>
<th>Number of interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board of managers</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>External consultancy</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>External project leader</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physicians</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Administrators</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Information technology staff</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 1: Number of interviewees and interviews

© 2009 Blackwell Publishing Ltd
informed during the interview sessions. They also ensured that the interview time was used to discuss issues that could not be derived from other sources.

We sought to achieve internal validity by looking for particular patterns, dominant themes and recurrent explanations in the material. We attempted to avoid bias by asking respondents to comment on our interpretation. Additionally, we obtained external validity by interviewing several people if they belonged to a group of stakeholders. We did not find disagreement on essential points of this project among the different interviewees.

The data were analysed by reviewing the respondents’ comments, placing them on a time line, and dividing them into categories based on the interviewees’ attitudes toward the ERP system. The data are presented in the following section, in which we address the first research question by describing the content, process and context of the case history.

Case history

The hospital studied was a medium-sized general hospital located in the western part of the Netherlands. It has 375 beds and 1,250 employees. The hospital is divided into six main units: (1) clinical care, (2) ambulant care, (3) physicians, (4) facilities, (5) personnel, and (6) IT and finance. The physicians are largely remunerated through a service-based fee, and they normally use IS that function separately from the hospital systems to manage their practices and support their medical treatments.

Phase 1: start

The initial motive to implement an ERP system was the conclusion of a contract with the former vendor of the hospital information system (HIS). The former HIS was a set of loosely linked separate systems. IT management felt that it became increasingly difficult to maintain the systems. Additionally, the hospital management was unsatisfied with the communication with the vendor. As a result, both the board of managers and the IT department were interested in a different and more modern product that could help them to establish an integrated, modular and adaptive hospital system. The management also had the ambition of being the first to combine the billing process of the hospital with that of the physicians. In the former system, medical treatments involved two separate types of invoices: one from the hospital and one from each relevant physician. A member of the board of managers argued:

We were struggling with a set of outdated systems that each supported particular business functions separately. We lacked the proper management information and were in need of a system that had the potential to support all hospital processes in an integrated manner.

The hospital wanted a system that could be adapted to the operational processes of the hospital, rather than vice versa. Based on this requirement, a long list of potential vendors was reduced to a shortlist, and a multidisciplinary team selected a number of SAP modules, offered by the SAP-business solution hospitals, to be implemented by an external implementer. SAP is a major provider of ERP systems that delivers its products to various industries, including the health care sector. The hospital made the long-term decision to implement six hospital-specific ERP modules over the course of five years. These modules included:

- patient management (appointments, registration, admission, discharge and transfer);
- financial management (accounts payable, accounts receivable, general ledger and fixed assets);
- materials management (inventory and purchase);
- human resource (scheduling, training and payroll);
- ancillary services (dietary, laboratory and pharmacy); and
- management information (reporting on and providing statistics on various issues).
in the early stages. One such individual said: ‘it is a management thing’. Even in retrospect, the head of the medical staff believed that their involvement would have remained minimal had management done their job correctly: ‘because they failed, we were forced to save the hospital’.

This statement reveals the third issue, namely the lack of willingness among managers and doctors to work together in an effort to realise common goals. As Mintzberg (1983) stated, management and medical professionals prefer to maintain their power status quo. They accept each other’s autonomous playgrounds and choose not to interfere as they do not wish to be interfered with. However, given that ERP are a set of integrated modules, it is practically impossible to maintain this status quo (Kallinikos, 2004). Consequently, the ERP in this case study created a clash between managerial and medical rationalities (Heeks, 2006). It became a matter of controlling the whole hospital with a closely coupled approach (managerial rationality) versus autonomy based on a loosely coupled approach (medical rationality).

Furthermore, the failure of the new system provided the medical staff with a valid reason for delaying the integration of their billing processes into a closely coupled system and maintaining their old systems. However, both sets of definitive stakeholders realised that eventually consensus on the objectives and scope of the ERP had to be reached. This meant that managerial and medical rationalities had to come together in a mutually acceptable manner.

**Conclusions**

This paper has shown how a hospital, which implemented an ERP system, failed to involve powerful stakeholders throughout the project. The board of management, which was initially involved, became dormant, and physicians were dormant right at the start. Only after a crisis did they become active and tried to influence the implementation process. We used a theoretically based model to analyse the implementation process in its context, with a focus on the meaning stakeholders attached to the system.

The research confirms the value of identifying and assessing stakeholders in implementing ERP in hospitals and similar environments. We developed and applied a model that explicitly addresses stakeholders’ power by using the stakeholder salience model. The model also pays attention to the meaning they attach to the system, the interests they have and the problems they perceive in relation to ERP implementation.

The paper confirms research that shows that ERP implementation is not only related to the technical features of the system, but also to the way it is implemented and how it affects processes, power, culture and finance. It illustrates that ERP systems are not only technical artefacts, but that they reflect management philosophies, which may or may not correspond with existing organisational arrangements (Light and Wagner, 2006). This implies that ERP implementations challenge vested interests, and often lead to the explicit display of opposing views as held by the various players. Especially in hospitals, where physicians possess discretionary power to organise their own processes and to manage their own practices, the implementation of an ERP system may clash with their interests and viewpoints. ERP systems are designed to integrate functions and to standardise business processes that were previously disperse and diverse. At the same time, the physicians affected have the power to choose whether they wish to adopt or reject such a system.

This research also provides some implications for practitioners.

First, managers must be aware of the ways in which ERP socially affects the established institutional settings. During the initial stages of the implementation process, decisions have to be made about necessary changes to either the system or the organisation, or both. These changes must meet the needs of stakeholders if the implementation of an ERP system is to be successful and effective. Clearly, the case study has shown that co-operation from and participation of the stakeholders is essential. Potentially influential players cannot remain passive until the actual use phase starts. They must be involved from the very beginning. Markus (2004) has provided a number of useful principles to combine technology with organisational change.
Second, this study illustrates that aggressive resistance after implementation can lead to a counterproductive crisis. In this case study, the crisis could have been prevented had a thorough analysis of the interests of the key players been conducted at the very beginning of the project. Such an analysis could be followed by a discussion among the most important stakeholders in which agreement is reached on how to implement the system and how to adapt and integrate business processes. Such an agreement could reconcile the various contrasting interests and objectives and point the way to either a ‘hard’ or a ‘soft’ design in which medical, managerial and technical realities are equally consolidated (Heeks, 2006). This observation agrees with the study of Light and Wagner (2006), who state that it is important to recognise ‘that vendors, senior management and end-users might have differing interpretations of what it means to be sociotechnically integrated. These perspectives need to be negotiated if a working system is to be integrated’ (p. 222).

Third, the study shows how dynamic the implementation of an ERP system can be. The interpretations made by stakeholders often change during a project for various reasons, be they cognitive, political and/or opportunistic. In the case discussed here, the physicians and administrators remained relatively passive until problems arose during the use phase. This indicates that implementing an ERP in a hospital is a very complex and dynamic venture. To succeed, opportunities and limitations of the system have to be aligned with the existing and constantly changing organisational arrangements and must also take the following into consideration the various perceptions held by stakeholders, quests for power, leadership, and subtle processes to gain support for the project (Dixon, 1999; Berg, 2001).

Fourth, it became clear that the promoters of the organisation-wide ERP system took an overly optimistic, ambitious view of the system’s power to realise organisational strategy and to improve the operation of the business processes. While the implementation was being rushed, no attention was paid to the complexities of the internal processes, the stakeholders’ interests and their mutual relations. The rational image of system implementation could not conceal its poor understanding of the deeper organisational realities, such as history, culture and power. Therefore, we recommend that projects aim be realistic and in line with organisational realities. Projects must also have adequate and capable change managers that lead and guide the implementation process.

This paper has provided an analysis of an ERP implementation in a hospital from the perspective of multiple stakeholders. It can be seen as part of a body of interpretive and critical research on IS implementation in organisations. It shows the usefulness of analysing the relationship between features of IS and characteristics of organisations. A limitation of this study was that it is a ‘revelatory case study’ (Yin, 1999). It investigated a historical sequence of events and cannot be repeated elsewhere under the same circumstances. For that reason, we suggest that conducting longitudinal cross-case studies on the effects of ERP implementation will further increase our understanding.

Acknowledgements

We are indebted to the hospital administrators, staff, physicians and others who participated in this study for their willingness to share their experiences with us.

References