

INTRANET TECHNOLOGY AS AN ENABLER OF BPR; AN EXPLORATORY STUDY IN PUBLIC HEALTHCARE

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ABSTRACT

The growth and popularity of e-commerce has both challenged and enabled public sector organisations to redefine their levels of service. In the early 1990's BPR was proposed as a mechanism for change. However, after reports of successive BPR failures the momentum for BPR abated. This paper explores the relationship between Intranet Technology and BPR and, by means of case studies conducted in two organisations in the Irish public sector, investigates the potential of Intranet Technology to become an enabling technology for BPR.. The paper uses the Venkatraman framework for IT enabled change as the framework for the investigation. The paper demonstrates that in accordance with the framework BPR can be approached by top down strategic or bottom up evolutionary methodology. The main finding is that although each organisation took alternative approaches neither actually achieved BPR due to lack of open senior management commitment but that Intranet Technology was considered a key enabler of BPR.

INTRODUCTION

Many early BPR projects failed but these projects were initiated before Internet technologies became ubiquitous and as such, developers did not have the technology at their disposal for developing new systems to support BPR. Today there is a growing body of evidence, which suggests that many corporations are using Intranets to rescue their business process reengineering and that Intranet enabled BPR may provide a solution to surviving in the new economy (James 1996, 1998).

Scepticism in relation to the business benefits of IT was a result of the disappointing results and unfulfilled IT promises of the 1970's and 1980's (Lyons 1995 and Hammer 1990). Brynjolfsson (1993) and Brynjolfsson & Hitt (1996) concluded that investment in IT brought about increased productivity and increased value for the consumer but they could find little evidence of these benefits resulting in supernormal business profitability.

A new philosophy of IT enabled change began to occur around the beginning of the 90's. Prior to this, IT systems were primarily used to automate and speed up old processes but nobody thought to do anything about the processes themselves (Hammer 1990).

The 1990's demanded low cost, high quality with fast and flexible responses to customer needs. This put pressure on organisations to redesign the way in which they conducted their business and build information systems to support the new processes (Venkatraman 1994).

INTRANETS; THE WAY FORWARD

Since its introduction, Intranet Technology has proven to be an extremely popular technology that has been applied in four distinct waves 1) Information Publishing 2) Information Collaboration 3) Transaction Oriented Applications and 4) Formal Collaborative Applications (Curry and Stancich 2000). As the technology has matured, IS professionals have become more aware of the potential of Intranet Technology for use as a strategic tool (Curry and Stancich 2000). Intranets are giving rise to unprecedented levels of collaboration which in turn is promoting greater efficiency (Cortese 1996).

IT ENABLED CHANGE

Venkatraman (1994) identified five levels of IT-enabled business transformation. The central thesis of Venkatraman's work is that only marginal benefits will accrue from superimposing IT on existing organisational conditions (Venkatraman 1994). This was largely the case in the 1970's and 1980's when IT was primarily used to automate existing organisational processes. This is illustrated by the first two levels of Venkatraman's model (figure 1) i.e. localised exploitation and internal integration. These levels, according to Venkatraman, are evolutionary, as they require only minimal changes to the business processes.

The top three levels are revolutionary, as these levels require radical change to existing business processes. An organisation could redesign its processes and then go on to redesign its network stretching beyond the organisation and ultimately redefine the scope of the organisation. These change efforts are more characteristic of the late 1990's as organisations sought to embrace e-commerce. Venkatraman stated that it was possible for an organisation to start at either the top or the bottom of the framework. These two different starting points are illustrated in the model below.

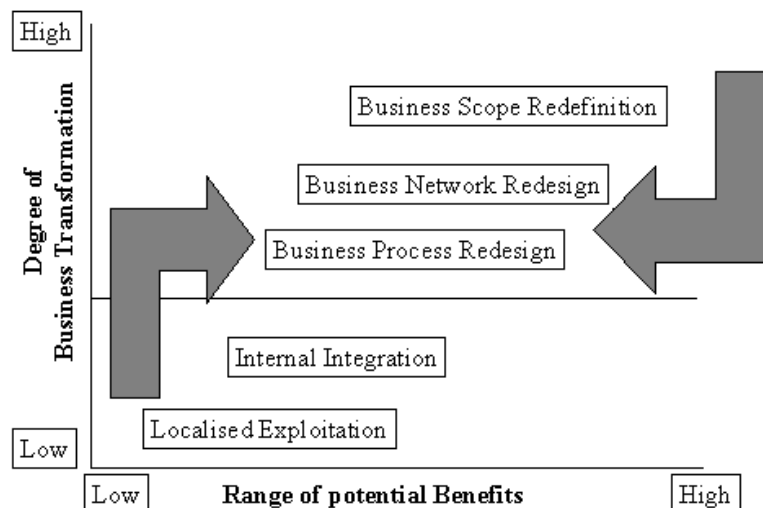


Figure 1: Alternative Approaches to BPR Source: Venkatraman 1994

The organisation moving up the framework is seeking efficiency. Initially, this begins with localised exploitation and then moves up to internal integration. As the organisation moves up each level the range of

potential benefits increases. However, each higher stage requires a greater degree of organisational change. Eventually, in order for the organisation to achieve more dramatic results, it will need to move up to the first revolutionary level and engage in Business Process Reengineering.

The organisation starting at the top of the framework is approaching its change effort from a strategic focus with the organisation attempting to redefine its scope. The focus is therefore on enhancing capabilities through IT. According to Venkatraman, to achieve this the organisation will identify the need to redesign the business network. However, before it can attempt this, the organisation will firstly have to engage in business process reengineering.

INTRANETS AND REENGINEERING

The difficulties of BPR projects have, in many cases proven to be so overwhelming that the whole project failed (Hammer and Champy 1993). Web technology in the form of an Intranet offers organisations the flexibility to embrace the core concepts of BPR that until now were causing organisations in general and IS departments in particular so much difficulty.

From the IS departments perspective, Intranets offer the opportunity to reengineer processes without sacrificing legacy databases (James 1998). In addition to this, the relatively quick roll out time of an intranet, including design, development, implementation and end-user training is better suited to the timeframe pressures of a BPR project than traditional solutions (Stanton 1995).

From the organisational perspective, BPR has tended to be treated suspiciously by employees who fear job loss as a net result (Merriden 1996). Employees can also be reluctant to work in a collaborative environment and to learn new processes (Grover et al 1995). Finally, a collaborative environment often requires the merger of different information systems. However, the emergence of Intranets has improved the situation because: 1) Intranets tend to sprout from the grass roots within an organisation 2) Intranets are ideal for sharing the information and ideas necessary for employees to learn new processes 3) Intranets provide multi-platform access.

The net result is that Intranets are creating a resurgence of interest in process reengineering (James 1996, 1998). The most compelling argument for Intranet technology as an enabler of BPR is that Intranets address two of the main reasons for BPR failures: 1) Human resistance and 2) Delays in IS development (Stanton 1995).

In terms of overcoming end user resistance, Intranets tend to be greeted favourably by end-users due to their familiarity with and the ease of use of web browsers. The Intranet also provides the channel through which employees can share information, provide feedback and learn the new processes. However, such benefits do not automatically occur, as successful intranets require local ownership of content which may not be achieved regardless of the familiarity and ease of use (Damsgaard and Scheepers 2000). In addition Intranets face the added problem of achieving a critical mass of both users and content at the same time (Damsgaard and Scheepers 1999).

From the IS perspective Intranet technology offers formidable advantages over traditional technologies which tend to only support well defined tasks (Damsgaard and Scheepers 1999). These include: rapid scalable development across a range of platforms (Betts 1997), access to corporate legacy systems and data warehousing capabilities (Scott 1998), and development on existing networks with lower implementation costs compared to traditional client server solutions (Hill 1997). Thus, Intranets are providing organisations with far more flexibility than traditional information systems.

RESEARCH METHOD

This research paper investigates the role of Intranet Technology as an enabler of BPR. The literature review highlighted the main issues relating to Intranets, BPR and IT related change. The Venkatraman (1994) model of IT enabled change was adopted as a framework for the research.

In order to complete the research, a substantial in-depth analysis was required within the organisations that agreed to participate in the study. As a consequence, it was necessary to adopt exploratory research methods and the case study method of research was identified to be the most suitable method of research for the completion of this study. Two similar public sector organisations that had chosen to implement Intranet Technology were selected for the case studies. Data collection consisted of personal and telephone interviews with the IT Managers and Assistants in both organisations and with one of the medical doctors on the team in St. James's. Onsite visits and a review of internal documentation were also conducted. The interviews took place in June of 1997 with repeat interviews in June of 2000. The interviews were conducted according to a preformatted questionnaire and were recorded. While it would have been beneficial to survey the end users, it was not possible to obtain the necessary permission to do so and as such this is a recognised limitation of the research.

CASE STUDIES

Organisational Comparison

The organisations under study were Beaumont Hospital Dublin and St. James Hospital Dublin. Both organisations operate in the public sector and both began the planning and implementation stages of their respective Intranets within months of each other.

	Beaumont	St. James's
Activity		
Inpatients	21,600	21,000
Outpatients	110,000	140,000
Day patients	20,000	25,000
Accident & Emergency	56,000	54,000
Resources		
Beds	720	760
Specialities	48	46
Budget	£100m	£110m
Staff	2,200	2,500

Table 1: Organisational Comparison

Table 1 shows that both hospitals are approximately the same size as measured by their key activities. In addition, both organisations are Dublin hospitals operating in the public sector. Table 2 provides an overview of the main uses and the number of years that each Intranet has been in use.

	Beaumont	St. James's
Initial Conception	October 1996	February 1997
Pilot Project	Yes: Publishing and Distribution	No
Years in Operation	3 Years	2.5 Years
Main Uses	Theatre List On Call List Staff Locator Newsletter Email	HIV Unit Cancer Unit

Table 2: Intranet Overview

Finally, each organisation has web technology in place for an almost identical time period. These similarities provide sufficient justification for comparing the two organisations.

The Need for Change

Both organisations identified the need for change and the subsequent benefits that would accrue for both the hospital and the patient. Each recognised that inefficient processes were hindering the performance of key functions resulting in delays for the patient and inefficient use of resources. Several paper-based processes were identified as suitable for deployment in an Intranet environment. By reengineering these processes the IS departments were confident that they could achieve significant improvements in efficiency and effectiveness. Thus, both Beaumont and James’s recognised the need for change and the opportunity for BPR.

Each organisation acknowledged that IT would play a fundamental role in enabling change. In Beaumont, this was largely because it was the IS department themselves who were driving the change effort. By comparison in St. James’s the web development team was driving the change effort. Although, the decision to establish a team in the first place was made by the IS department. Both department managers classified the technology as an enabler of change and felt that only people and not technology could drive change.

Planning the Change

In St. James’s, a considerable effort was put into the planning phase of the project. The team strategically analysed the needs of the hospital and mapped these needs to the functions of the technology using an adaptation of Porters value chain. The team prepared working papers and presentations in order to brief management on the potential of the technology and to acquire the necessary funding. Participation from non-IS members was openly encouraged and training was offered for those willing to champion the technology. Four core customer groups consisting of patients, GP’s, healthcare professionals and management were identified and their needs were to be addressed by leveraging the advantages of web technology. The ultimate goal was to develop a friction free healthcare environment stretching across the entire continuum of patient care. This environment was to be supported by utilising Intranet, Extranet and Internet technologies.

In contrast, there was little evidence of any formal planning procedures in Beaumont. The IS department identified the potential advantages of the technology and then set about implementing it. No attempt was made to develop a strategy by utilising modelling techniques. Furthermore, there was no evidence of reports or presentations being made to management in order to win support or gain additional funding. In short, the entire project was handled entirely within the IS department. As the project developed, training was offered to speciality members who would champion the technology.

Planning Phase	Beaumont	St. James’s
Team Members	IS Department	Cross Functional
Framework	None	Porter’s Value Chain
Scope	Incremental	Strategic
Funding	Existing IS Budget	Additional Funding Sought

Table 3: Summary of Planning Phase

Table 3 highlights the different approaches to IT enabled change adopted by each organisation. Classifying these approaches according the Venkatraman framework, Beaumont pursued the bottom up, evolutionary approach of seeking efficiencies; on the other hand St. James’s adopted a top down, revolutionary approach by seeking to enhance capabilities. Ultimately, both organisations were approaching BPR but their

approaches and consequently their results were different. These results are best illustrated by comparing each organisation with the five levels of the framework.

In the framework, the first two levels are evolutionary in that they are characterised by the incremental improvements enabled by IT. The first level occurs on a decentralised local basis while the second level exhibits more centralised control and expands across the organisation. The top three revolutionary levels in the Venkatraman framework are business process reengineering, business network redesign and business scope redefinition. The framework argues that even with BPR the benefits are limited unless the scope of the project extends beyond the enterprise.

Level One: Localised Exploitation

Venkatraman describes localised exploitation of the decentralised application of IT within an organisation. In other words, it is IT implemented in individual areas. This individualistic deployment results in marginal benefits. Given the top down approach adopted by St. James's, localised exploitation might not be expected to have occurred. However, localised exploitation is clearly evident in St. James's. Speciality departments, in particular the HIV and Cancer units are making extensive use of the Intranet to support best practices in clinical care. This finding is not contrary to the predications of the framework per se as the framework does not prescribe a strict level-by-level evolution. The occurrence of localised exploitation is explained by two factors. First, the technology was put in place before BPR actually began and was therefore ready to be exploited. Second, the level familiarity and the user friendliness of the technology ensured its rapid uptake. These factors may not be present in a non-Intranet enabled BPR project.

Beaumont clearly followed the evolutionary approach and as such localised exploitation, although not essential, would nonetheless be expected in the case. Although, there is clear evidence of some localised exploitation it is not as prevalent as might be expected. The Infection Control department has exploited the benefits of technology for information distribution but the uptake by other specialities has been considerably slower. This lack of localised exploitation does not contradict the framework, as the attainment of a lower level is not a prerequisite for the next level. The lack of localised exploitation is primarily due to the issues regarding content ownership issues and the lack of individual champions for change within the specialities.

Level Two: Internal Integration

Internal Integration is the logical extension of localised exploitation and is characterised by a more systematic attempt to leverage IT capabilities throughout an organisation. Given the evolutionary approach adopted by Beaumont and the small amount of localised exploitation achieved, internal integration is the next occurrence to investigate. Internal integration is clearly being achieved in Beaumont, the publication of the theatre list and the on-call list on the Intranet and the subsequent removal of the old paper based methods is a highly significant attainment of internal integration. They provide an excellent example of organisational wide integration yet retaining centralised control. Day to day functional information is now being distributed via the intranet. This has proven both the capability of the technology to support this type of information and perhaps more importantly, the willingness of end users to accept the system in favour of the traditional methods. The organisation has benefited by improvements in both the efficiency and the effectiveness of the Theatre Lists and the On-Call Lists and as such Beaumont is setting an example of e-business innovation in public sector healthcare.

In contrast to Beaumont, no internal integration has been achieved in St. James's from the deployment of Intranet technology. This finding is consistent with the framework as the approach adopted by St. James's places the emphasis on achieving BPR before internal integration. Nonetheless, this raises a question. Why did localised exploitation occur but not internal integration?

The case illustrated that in St. James's the Intranet site was significantly slower at developing than the Internet site. As a result, the St. James's Intranet is not as mature as the Beaumont Intranet and has not as yet achieved level two, internal integration in the Venkatraman model. The adoption of a business scope

redefinition and the lack of local champions were identified as the main factors responsible for the lack of internal integration in St. James's.

The primary factor is undoubtedly the scope redefinition. The team focused on the continuum of care and identified the three technologies of Intranets, Extranets and the Intranet as playing a vital role in the provision of seamless patient care in an e-healthcare environment. Thus the overall emphasis of the project was strategic as opposed to incremental. Conversely, Beaumont approached their project with a focus almost solely on the internal. Attention was given to both attracting and training champions for change in the speciality areas and this resulted in the achievement of localised exploitation. However, no evidence was found of a champion for internal integration. In other words, there was no individual actively promoting the use of the Intranet to automate or improve existing hospital wide procedures. The exact opposite was the case in Beaumont. The drive towards internal integration was strongly championed by the project manager who assumed total responsibility for implementing the theatre and on-call lists processes on the Intranet.

Level 3 Business Process Reengineering

BPR is the third and first revolutionary level of IT enabled business transformation in the Venkatraman model and can be arrived at by either a top down or bottom up approach. This level is described as revolutionary as attainment of this level requires a fundamental overhaul of an organisation's routines. The organisation does not use IT to improve an existing process but rather, uses IT as a lever for designing new processes and ultimately a new organisation.

Although both organisations clearly identified the need for BPR, the studies produced no evidence of the achievement of BPR. Prior to discussing the reasons for this, it is necessary to explore the alternative approach to BPR and examine the top two levels of the framework.

Level 4: Business Network Redesign

Both hospitals have plans for creating web based business-to-business links with suppliers. This network enhancement in the form of an Extranet is likely to proceed quite rapidly since a major healthcare supplier has indicated its preference for establishing this kind of system. However, to be revolutionary the Extranet needs to go beyond enabling more efficient procurement, as this is just another form of EDI. For the Extranet to be regarded as business network redesign it must enable value-added services that lead to more effectiveness.

St. James's are further down the line towards achieving this level of business network redesign. Their goal is to support excellence across the continuum of patient care as detailed by their healthcare value chain. The incremental approach at Beaumont is not focused on business network redesign per se as the primary purpose of the extranet at present, is to enhance procurement efficiencies.

Level 5: Business Scope Redefinition

The top level of the framework is both revolutionary and strategic. It addresses how IT can influence the scope of a business and the logic of partnerships in an extended network. This was the starting point for St. James's. They approached their change effort by conducting a strategic analysis of the type of healthcare they wanted to provide. Within this analysis, the need for BPR was identified and the capabilities of Intranet, Extranet and Internet technologies as enablers of BPR were recognised.

In contrast, Beaumont did not approach its change effort from this strategic position. As stated, their approach was based on seeking internal efficiencies and at present there are no plans for considering business scope redefinition.

DISCUSSION

Achieving BPR

Although both organisations in the study identified the need for BPR, each pursued different paths, which are analogous to the approaches identified in the framework. As a result of the change effort significant improvements in both efficiency and effectiveness have accrued to each organisation. The internal integration achieved in Beaumont is an attainment of e-business procedures in public healthcare that serves to illustrate the potential of the technology to revolutionise the level of service in public healthcare.

At present however, when comparing the achievements to the Venkatraman framework they fall short of what is possible, as BPR was not actually achieved. The Intranet in Beaumont has enabled business process improvement but not actually BPR and as the Venkatraman model suggest marginal benefits have accrued as a result, as the actual process itself has not been reengineered. St. James's have also achieved marginal results from localised exploitation. However, the reengineering of processes is required if either hospital hopes to achieve more radical results from its Intranet. All the indications are that both organisations desire such radical results as both hospitals have plans for BPR projects.

Beaumont Hospital has plans in place for a patient diary that will be distributed throughout the hospital via the Intranet. Thus from the moment the patient enters the hospital to the cessation of their care the diary will track, monitor and record their treatments. St. James's also have a similar concept, which they call the Electronic Patient Records System (EPRS). Functionally, there appears to be little difference between the systems except that from the planning stage in St. James's the EPRS was to form the backbone of the IT enabled friction free healthcare value chain.

Intranets and BPR

The focus of IS support in each organisation prior to the advent of web technology was to support hospital functions largely on an individual basis. IS support for collaborative information sharing consisted primarily of using bar code systems to share minimal patient data. While the need for better methods of information sharing clearly existed the IS departments felt restricted by the complexity, cost and suitability of the available technologies to support new processes. However, Web technology and Intranets were quickly identified as a cost effective technology that was capable of supporting new processes.

One of the highly significant features of the technology highlighted by both organisations and the literature was the ease of use of web browsers and the level of familiarity that end users had with these browsers. Thus, each IS department felt confident that any new system using web browsers as the interface would enjoy greater acceptability amongst the end-users than another available technology.

Furthermore, both organisations were confident that Intranet technology was sufficiently robust for deployment, was capable of enabling many different processes and was scalable throughout the organisation and beyond. In terms of particular process requirements both organisations were confident that Intranet technology would enable process integration & communication, process co-ordination & control, information storage & access and documentation & documentation management. Thus, Intranet technology was chosen by both organisations as the technology that would enable their BPR effort.

Why BPR Was Not Achieved

The literature review highlighted human resistance, inadequate information systems and lack of open commitment by senior management to a BPR effort as the three most common reasons for BPR failure (Hammer & Champy 1993, Carr & Johansson 1995, Stanton 1995). Resistance to change was evident in both organisation under study. However, the resistance was primarily only apparent to ownership of Intranet

content with only a few people willing to champion the technology locally. There was no evidence of human resistance towards using the Intranet itself once the content was present. Furthermore, there was no evidence in either case of human resistance to the BPR concepts proposed by the IS departments. Therefore, at present the non-achievement of BPR cannot be attributed to human resistance. Although that is not to say that human resistance will not be present when BPR becomes active.

Neither case produced any evidence to suggest that the technology chosen would in any way inhibit BPR. As both IS departments were confident that Intranet technology was more than sufficient for enabling the level of BPR envisaged. The key reasons the technology was chosen was its ease of implementation, ease of use and range of application particularly the ability to access legacy systems. Therefore, inadequate information systems, does not explain the non-occurrence of BPR.

The third highly significant factor highlighted in the literature was senior management commitment. Interestingly neither case exhibited any open senior management commitment to the BPR effort. There was evidence to suggest that senior management were in favour of BPR, which manifested itself in their willingness to allow the implementation of the technology to proceed. However, no serious open commitment backed up by increased funding was present in either organisation. This lack of senior management commitment to BPR appears to be the single biggest factor explaining the non-occurrence of BPR in both organisations.

CONCLUSION

Both organisations adopted Intranet technology for the same fundamental reasons, the range of potential benefits, the low cost and the ease of use of web browsers. More efficient publishing and distribution, access to legacy systems and the provision of information on demand were regarded as significant advantages of Intranet technology by both organisations.

The introduction of Intranet technology in St. James's hospital has enabled localised exploitation, which has resulted in marginal benefits. In Beaumont the Intranet has enabled both localised exploitation and internal integration. As in St. James's the localised exploitation has resulted in marginal benefits. In addition, however the internal integration achieved has afforded the organisation significant gains in efficiency and effectiveness.

The absence of a champion for internal integration in St. James's and the contrasting focus of business scope redefinition at St. James's versus the evolutionary approach adopted by Beaumont are the main factors that explain the differences between the two Intranets. The Beaumont case shows that the introduction of Intranet technology does enable the attainment of the first two levels of Venkatraman's framework of IT enabled change and hence Intranet technology can be justifiably classified as a process enactment technology.

As a result of the implementation of Intranet Technology Beaumont has achieved business process improvement and has demonstrated the potential of the technology for supporting business process reengineering within the hospital. The business scope redefinition approach adopted by St. James's and the subsequent modelling of public healthcare in a friction free value chain has resulted in the development of a framework that purports an e-healthcare environment, which offers substantial benefits not only to the individual hospital but to the healthcare system as a whole.

When analysed according to the Venkatraman framework both approaches are found to be consistent with the approaches to BPR as detailed in the framework. However, neither organisation actually achieved BPR. In the Beaumont case the non-achievement of BPR is explicable by the fact that the BPR effort was being driven solely by the IS department and suffered from the lack of senior management commitment. Although lack of senior management commitment was also found to a highly significant factor in the St. James's case it must be stressed that the scope of the proposed change would necessitate a significantly longer timescale.

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