

# EVALUATION OF NHS INFORMATION SYSTEMS STRATEGY: EXPLORING THE ASP MODEL

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## ABSTRACT

*This paper evaluates the current information systems strategy for the NHS (UK's National Health Service) to determine the preconditions for web-enabling existing and new software applications for this vertical sector. It focuses upon the emerging application service provider (ASP) business model. An ASP is a third party service firm which deploys, manages and remotely hosts software applications through centrally-located services in a rental or lease agreement [2]. ASPs are currently targeting healthcare as one of the more lucrative vertical sectors for deploying, hosting and integrating web-enabled software applications. This paper discusses some of the key challenges that lie ahead. First, the NHS is a monolithic organization with multiple decision-makers across managerial and clinical levels and units. Second, the proliferation of web-enabled software applications will only enhance efficiency and operations if the role of IS in the NHS shifts from one of back office support to becoming an integral part of organizational processes. Against a background of conservatism and inefficiency, this paper argues that the NHS will need to adopt a revised model for IS strategy which takes into account additional complexities of remote sourcing via the ASP model.*

**Keywords:** ASP Model, IS Strategy for NHS, Integrating Organization and IS change.

## 1 INTRODUCTION

The term 'Information System' (IS) has been given many definitions over the years and by several authors. Allen Lee [13] defines 'Information System' as "an instantiation of information technology, where the same information technology can be instantiated in different ways." Though he justifies the rich organizational and political processes required for a given set of information technology to be instantiated, his definition relies greatly upon the continual managing, maintaining and changing of technology to sustain the instantiation. In a rather diverse environment like the NHS, a more comprehensive definition of IS may include relational aspects like the effectiveness of system design, the timely delivery of such systems, an appropriately obtained usability training by all users, and future impact of information technology in the organization and the entire society.

This paper does not accept that there is a single objective reality which all stakeholders of the NHS are working towards in terms of IS strategy [17]. The scale and scope of decisions on IS strategy are influenced by government regulation [10]. This was further reinforced through interviews with several members of the NHS executive, who were asked to describe their interests and concerns with respect to NHS reform and the part that IS can play in this transformation. Most, however, found it difficult to locate their particular section of the NHS - in terms of the process. Not surprisingly, very few claimed to have recognised any contributions from IS to the change process. Almost everyone expressed considerable interest and indicated that IS, as an instrument of transformation, was being actively debated in their organizations -both in terms of its meaning and of what it may contribute to increasing efficiency and operations. This paper is divided into three sections. First, it considers the prospect of reform in the NHS which is critical for improving services through the use of IT. Second, it considers how a remote delivery model using an ASP may be applied to the health

vertical. Third, it discusses some of the applications that are currently deployed in health, along with others which may be targeted to specific areas, such as patient records.

## 2 NHS REFORM – A MISSED OPPORTUNITY

Despite numerous opportunities for devising an NHS IS Strategy, the sector has been slow to adopt new IT-enabled methods and practices. This has been echoed in government circles as well as the NHS, as public sector reform has been met with an alleged unwillingness by many parts of the public sector to embrace change. Such a missed opportunity means that inefficient and outdated practices still permeate the NHS, as many IT vendors find it increasingly difficult to penetrate the various decision making hierarchies. Although a shortage of funds is often put forward as the reason for difficulty in reforming this monolithic organization, it is only part of the story. In government circles, the view is that a productivity-paradox exists between the amount of money invested in the use of IT in the NHS, and the level of productivity achieved [12]. So much attention has been used in creating what is termed, ‘the internal market’, whereby managers and professionals sell their services across the organization, thus emulating a private sector model between customers and suppliers. Such a model has not been a success, and has resulted in additional bureaucracy and confusion, with no discernable productivity gains. Furthermore, the emphasis upon financial data collection to evaluate the internal market has not been directly beneficial to patients, though it has provided many opportunities for NHS managers.

NHS Past IS Strategies		NHS Modernised Vision (White and Green Papers)
Strategic Objectives	Cause of Previous System Failure	
IS as Intervention	Infrastructure of Basic Standards; Intranet and Web-based document management proved multifarious;	Designed around the needs of patients, not institutions; Tackling the causes of ill health as well as treating it;
IS as a body of Knowledge	The concept introduced new ideas into NHS based on utilizing existing data; New challenges with the objective view of expertise within IS; Inappropriate working context and human usage;	A National Service; Of a Uniformly high Standard; Making good use of modern technology and know-how;
IS as a set of Process Skills	Unproven use of qualitative hypothesis building, rapid prototyping and action-oriented research to satisfy the need for clinical informatics skills.	Fast and Convenient; Efficient, so that every pound is spend to maximise the care for patients.

**Table 1: Comparison of a modernised NHS—being perceived within the UK Government’s ten-year programme’s White Paper ‘The new NHS’ and the Green Paper ‘Our Healthier Nation’—with old strategies: [11].**

These changes (see Column 3 above) must not only be interwoven and symbiotic but also be managed so that they grow together in stages towards a vision created and shared by all clinical professional staff, and managers in that process. Increasingly, the providers of IT products and services are being viewed as both arms-length suppliers of cost-effective technology and as vibrant business partners with an unlimited potential to enhance the IT and service capabilities of the organization. This can be seen as an opportunity by many IT service providers to reinvent themselves as specialists in offering strategic outsourcing services from IT consultancy through to applications management and development [4]. As a monolithic organization, NHS—in its IS strategy—will need to address how new web

enabled software applications may facilitate wider managerial and organizational change to enhance efficiency and improve business and clinical processes to achieve timely and useful data and information. By collaborating with private sector, NHS IS strategy may utilize ASPs to take advantage of the benefits of remote software applications delivery, although issues of scale, scope and integration will be relevant [9], as business process outsourcing aims to integrate disparate IT platforms and applications to provide a seamless service across organizational hierarchies and levels

The driving force behind the NHS strategy is a political one, of providing socialised medicine to all, within a fixed national budget. The NHS is a national institution, but is not a single corporation. It is funded mainly from general taxation and national insurance contributions. The NHS is therefore cash limited at a total annual budget for 2001-02 of around £59 billion, about 6.8% of the GDP (gross domestic product) [5]. There is an expectation for this government to match the UK's European neighbours' spending on health. Following the last budget, UK health spending was set to rise to 7.6% of GDP by 2003-4, rather close to the European average of 8% of national wealth or GDP. Few of UK's target are France with 9.6%, Germany with 10.7% and USA with 13.9% of their national GDP.

### **3 NHS INFORMATION SYSTEMS STRATEGY**

Information systems, apart from clinical technologies, have had a short history in the NHS. The professionalisation of the information function has also been slow to emerge and has often been linked to finance. General practice has the most extensive computerisation and use of IS. Hospital and Community Trusts and commissioning authorities have until the advent of the internal market made little use of information systems. Typically they have had a Patient Administration System and few support systems, such as accounting general ledger, pathology and theatre systems.

The first-generation nursing systems were not very successful. A number of major centrally funded initiatives in IS have not achieved the expected results. This is partly due to the projects being costly in both capital expenditure and running charges, and partly because IS was deployed in ways that decrease employee involvement in their work. Those early systems provided information to managers or quality inspectors but not to a wider reach of NHS employees thereby reducing involvement by the suspicion that the employee is not really responsible. These projects have also involved major organizational changes which have not always been managed effectively in tandem with the IS implementation. The latter in some cases have, in fact been switched off [3].

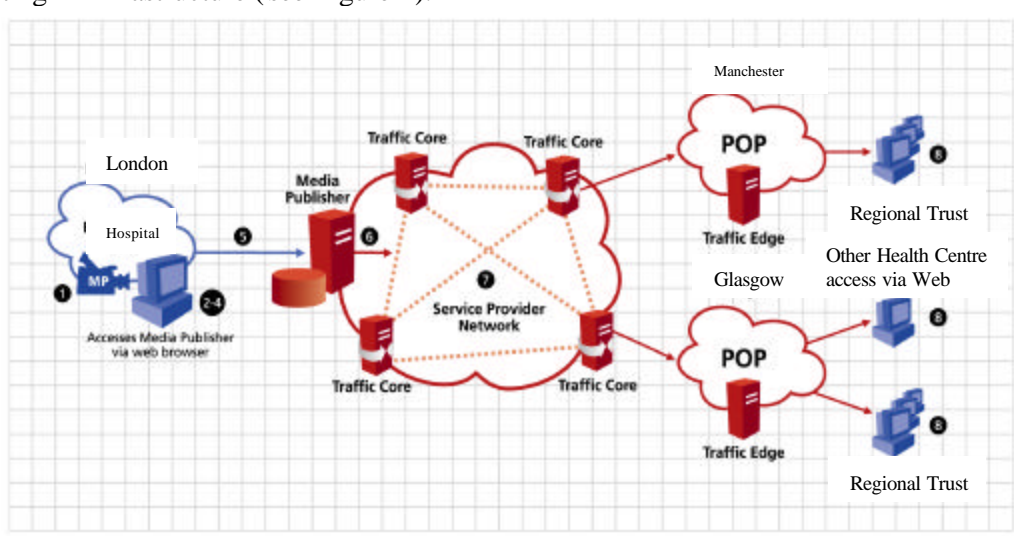
### **4 ASP MODEL FOR NHS**

An important debate surrounding all ASP models is the extent to which application outsourcing is different from traditional outsourcing [7]. Probably the most noticeable difference between the two is within the relationship with the customer. Unlike traditional outsourcing, the ASP model is about remote delivery of software applications, which alters the focus on relationship-building to one of managed contracts with vendors which may only be part of a wider consortium-based approach [6]. An appropriately targeted ASP model (figure 2) could provide a more useful metaphor that may be of "growing" a progressively more united, unified IS and health care organization. It could target individual health centres and Trusts, within the NHS. The ASP model could be replicated into an appropriate mixed economy for healthcare. There is an issue of not only trying to persuade and convince both internal and external stakeholders about the value of current capabilities but also to ensure

their participation in a somewhat relational architecture. The usefulness of IS to various stakeholders in the NHS depends on a combination of information quality, accessibility and presentation. A stakeholder, like National Institute of Clinical Excellence, would express quality in terms of accuracy, timeliness, and completeness. While for other stakeholders, doctors and nurses, high quality may not ensure usefulness if the information is difficult to access. At the same time, accessibility may not ensure usefulness for stakeholders at the Department of Health unless the information can be presented appropriately. Arguably, the most important stakeholders are employees whose active participation in system performance can ensure the system improves service processes.

#### 4.1 CONTENT DISTRIBUTION: CURRENT ASP SHORT-FALLS

Over the past few years, the IS strategy for most organizations has been in a state of evolution toward a form of 'federal governance architecture'(18). These are instances where, the authority for the management of IT infrastructure is vested with a central IT unit but the authority for the management of IT application and use is vested with individual business units, or Regional Trusts, in the case of the NHS. Such a situation has promoted the importance of a variety of coordination mechanisms, such as IT councils, IT steering councils, service level agreements, and charge-back internal accounting systems, as structural overlays to supplement the hybrid 'federal governance architecture'. The potential for current ASPs to satisfactorily provide such a service to the NHS does exist without certain concentrated improvement needed to be made to their services. The critical nature of NHS services requires the ASP to provide higher value and managed service. The ASPs would need to be prepared to offer an intelligent 'content aware' architecture that complements the existing IP infrastructure ( see Figure 1).



**Figure 1: Improving Reliability in Health Data Distribution using ASP**

A major form of visibility and control is demonstrated through content and performance. The monitoring of such control is seen through real time feedback. A formal reliability check must be put in place to assure that the distribution of any type of content to the various NHS edges safely takes place without disrupting other critical network operations. To improve reliability, the content and services of the ASP infrastructure would need to be moved 'closer' to the users. Such actions would not only significantly reduce requirement on network performance, but also result in the creation of a session and content aware routing

architecture (see Figure 1). A large organization like the NHS would need visibility and control at all levels of service and quality of delivery. By so doing, an undoubtedly high level of satisfaction can be maintained which requires a significant reduction to current network problems and bottlenecks. One NHS Trust Executive assessed that content distribution competence of most ASPs would need to improve in terms of static content and on Demand Streaming. The NHS needs a significant amount of small and large objects to be delivered promptly and accurately. By demand of the services there are continuous needs to issue similar content at differing times of the network. A significant amount of live streaming is required in NHS institutions. Such systems require an extremely high quality feed over a very reliable network (1). As a result of NHS multiplicity, various points would require the use of edge relay over the ASP network with a very delicate stream management and scale optimisation (figure 1).

The fundamental goal of the ASP in terms of content provision can be summarized into one phrase: 'getting the right information to the right place at the right time'. Thus the NHS demands a faster access, more reliable access, and accountable and secure system with guaranteed synchronisation with other internal systems.

#### 4.2 HEALTH SECTOR VERTICAL ASPs

Due to ASP being a relatively new concept, large members of the health sector react to the model with confusion. Though an ASP manages and delivers applications capabilities to multiple entities from data centres across a wide area network, a virtual private network or an intranet, there are also vertical ASPs who target a specific market/sector. An ASP could be a commercial entity, providing a paid service to customers or, conversely, a not-for-profit organization supporting end users (8). The vertical ASP model would be critical for those researching into NHS IS strategy and outsourcing since they could become a major force within the software and computing services industry. The model would include these four key factors:

- The supporting technological framework, including cameras, scanners, telephones, fax machines, computers, switches, disks, CD, video and audio, platforms, cable wires, satellites, optical fibre, microwave nets, televisions, monitors, etc.;
- The available information whether in the form of text, sound, images, data, stored in the many different archival facilities, and the applications and software needed to access, manipulate, organize and digest;
- The governance, management and use of information, including the standards to ensure interoperability, interconnectivity, reliability and security of systems, and the physical, technological and legal means to protect the privacy, confidentiality and security of personal information (see Figure 2); and

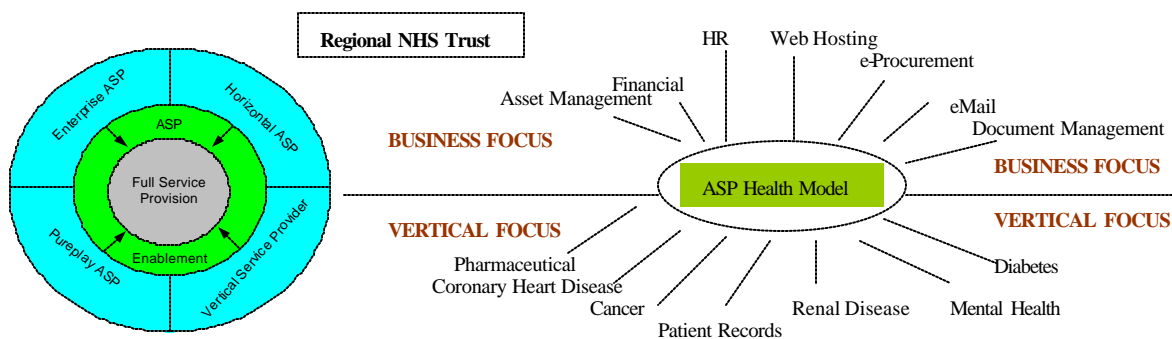


Figure 2: Evolutionary Healthcare ASP Aggregator Model (adapted from Currie 2000)

- The people and organizations involved in creating the information, developing the applications and systems, constructing the facilities, and those using this model to deliver, maintain and improve health-related services for the benefit of all.

ASP vendors targeting the healthcare sector include large independent software vendors (ISVs) offering business-focused software applications such as CRM, HR and financials, and vertically-focused systems for patient records and diabetes, etc. In some cases, internal IT departments may be able to develop software applications more cheaply than external service providers, though the ongoing maintenance and management of these systems may be better handled by an ASP.

## 5 CONCLUSION

As this paper is based on an on-going research, several questions remain. Are there sufficient signs to encourage major IT consultancies/service providers to enter into joint ventures to consolidate their strength and position within this vertical market? If large IT service providers do consolidate their positions in this vertical market by entering into large multi-dimensional outsourcing arrangements, will significant changes occur in the structuring and shaping of the NHS information system strategy? What new models of outsourcing can be used to gain greater efficiencies in NHS IT? How can we apply strategic outsourcing methods and practices to the NHS [15]. This will extend previous research on tangible and intangible benefits from outsourcing (16). Beyond examining and prescribing organisational solutions for IS activities in the NHS, research is also needed to ascertain senior IT and Trusts' executives views and should navigate the transformation journeys in sections of the NHS.

Various reviews on developing contracts exacerbate fears that particular forms of data were being emphasised, particularly cost data (14). Can ASP model prevent service providers from emphasising the cost control element of IS at the expense of service quality? The research will further consider three alternative models used in the transformation journeys (4):

- 1 align the pace of the IT transformation with NHS service/management transformation (aligned transformation);
- 2 transform the IT function in advance of the service/management transformation (anticipatory transformation); or,
- 3 switch periodically between aligned and anticipatory transformations (dynamically switched transformation).

In conclusion, we argue that the adoption of web-enabled solutions using the ASP business model will offer many benefits and advantages over time to the NHS. However, early indications from field research show that the NHS is unlikely to adopt mission-critical ASP solutions until issues of data security and reliability are overcome. At the present time, the inhibitors of the ASP model for the NHS are twofold. First, software vendors need to understand the decision-making hierarchies and levels within the NHS and within government before they can successfully target their solutions to specific business or vertical areas. Second, the software applications will need to be evaluated through measurable performance indicators, as a web-enabled delivery does not, in itself, add any additional business or operational advantage. Over time, the NHS will need to pursue ASP aggregation strategies, which fully integrate disparate software applications, yet this will require an NHS IS strategy, which fully captures the complexity of using multiple vendors. Outsourcing will therefore not only be evaluated on cost and quality measures, but also on the basis of how the different capabilities and resources of each vendor contributes to the complex and confusing processes, systems and applications which make up the UK NHS.

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