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**Augmenting Successful UK Healthcare IS Adoption and
Diffusion: an analysis of inherent and emergent
organizational structures**

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Abstract

The evidence suggests that information systems (IS) continue to be designed, adopted and diffused within public sector organisations to support the ‘reform’ agendas of national governments with a particular emphasis upon improving the accessibility and transparency of services. It is argued that Actor-Network Theory (ANT) provides useful theoretical insights into how stakeholders are able to organise in this respect. This is to highlight structures where non-human actors adopt a mechanism to examine advanced technologies (inherent structures), and structures that actually emerge as human actions engage with the context, ie healthcare IS adoption and diffusion processes. The research in this paper is based on a qualitative approach analyzing data collected from more than hundred respondents in the UK National Health Service (NHS). An attempt is made to illustrate that technology is just one of a number of heterogeneous socio-technical elements that must be managed within a successful information systems project. The paper concludes by offering ideas and directions for future research in the health sector using ANT analysis.

Keywords: information systems adoption, public sector, actor network theory

1 Introduction

The UK National Health Service (NHS) faces unprecedented expectations upon its corporate governance. These demands are driven by government mandate to reform patients' and other stakeholders' experience. Critics of these agendas have argued that public sector IS projects are often based on narrow interpretation of good governance and have little effect in the absence of deeper changes in the institutional context as well as other necessary incentives shaping the behaviour of healthcare professionals (Currie & Guah, 2007). In this respect an analysis of the NHS indicates a conceptual ambiguity about the measures to be advocated to improve its management. Currie and Guah (2007) concluded that changes in institutions, procedures and attitudes inside and outside of healthcare organizations are needed in order to instigate long-term reform and efficiency in service delivery. There is, however, significant evidence of many failures and disappointments with IS-enabled business transformations (Gray, 2006; Hendy et al, 2005). There was an expectation of strategic value from innovation but have frequently experienced project cancellations, operational disruptions, rising patient care concerns, decreasing patient trust in the value of NHS, and many other disappointments with IS, including non-working systems. Corporate responsibility, business sustainability, and IS governance reform were very high on the strategic agenda in the NHS.

The interplay of the various actors, as the impact of existing systems is assessed, is frequently recognised by researchers. Those commissioning the projects, government sponsored the healthcare initiatives, the department of health central IS control team, the local hospital IS department, the IS service providers, the system implementation consultants, medical practitioners, academic researchers, the healthcare organizations and the general public in the form of user groups, mostly regard the projects primarily in terms of technological achievement rather than application and function.

A literature review of the healthcare arena identified a number of studies on policy issues, yet few which systematically and rigorously examined how change management programs were adopted and diffused throughout the healthcare sector. Whereas many studies considered the introduction of a change programme, usually involving IS, within a specific organisational setting (Brown, 2001), there were limited studies that examined vendor management between different constituents in the adoption and diffusion of IS systems (i.e. government agencies, NHS executives, hospital trusts, IS suppliers and patients). Most of the studies were descriptive and lacked an historical dimension. Further, many of the studies on the introduction of medical systems were not supported by a robust theoretical framework, and instead were more narrowly aimed to identify examples of best practice.

There is currently a growing scrutiny over private business interests, increasing costs of NHS operations, and corporate performance, which also prompted, renewed soul-searching and interest into the "transparent" and effective governance of healthcare IS. The question is whether it is possible to conceive general standards of good IS governance acceptable to NHS actors—both internal and external. Institutionally devised models for organizing structures tied to the supplier agendas of the IS industry cannot fully take into account specific healthcare service delivery mechanism and may have a negative rather than positive effect on the staff of the NHS (Guah, 2008). The

research in this paper considered these issues from both a theoretical and empirically determined perspective.

2 NHS IS Initiatives

The failure of many previous IS projects in the NHS is a real and practical problem not only because of the opportunity cost of the investment, particularly the outlay of scarce resources of capital and skilled labour, but also because, where the government is advocating such projects as part of a public sector reform programme. Failure or partial failure has a negative effect on the image of that particular government implementing the initiative. Currie and Guah (2007) report the single most cited reason for the NHS failure in achieving significant benefits from IS projects within the past few decades to be a financial logic of IS-based modernization efforts that are mostly based on private sector profit motives. This technique only allows for cost/benefit analysis that dictates calculations in which the cost of new technology must be greater than the benefit of savings in labour cost. While such economic benefits are delivered by IS diffusion is a matter of constant debate, the need of such benefits in the NHS cannot be compared to IS support for improvement in the quality of healthcare delivery.

Until recently the NHS governance structure for IS was decentralized or division-based, although decisions about organisational-wide projects remained centralized at the level of the government and NHS Executive. IS divisions were spread across several regional authorities, with medical functions centrally controlled. This precluded many small IS service firms from gaining a foothold in the NHS, as only their larger counterparts had the political, organisational and technical capacity to deliver large-scale systems. In the late 1990's, the UK government increasingly recognized an opportunity to use IS to improve the delivery of service within the NHS (Heeks, 2003). After a series of reviews of NHS IS service delivery, a more integrated and seamless organisation was recommended (Department of Health, 2000; Wanless, 2002).

The Nationwide Programme is structured around regional clusters following consultation with Strategic Health Authorities. England was split into five geographic regions - each cluster comprising between five to seven SHAs – to would work together on the procurement and implementation of the National Programme services at local level. Five LSPs deliver applications at a local level. The LSPs work closely with local NHS IT professionals and are overseen by a Regional Implementation Director (RID) from the National Programme. The LSPs ensure that existing local systems are compliant with national standards and that data are able to flow between local and national systems. To do this, the National Programme plans to deliver upgrades or replacements to hardware and software as appropriate and implement core local training for NHS staff. All RIDs lead the implementation process across their individual areas. RIDs manage the National Programme support team and the relationship with the supplier, as well as coordinating deployment. A RID is part of the National Programme team and reports to the National Programme implementation director, but is also responsible to the cluster board for delivery. This arrangement, however, created difficulties for the IS vendors. The magnitude of the National Programme suggested the need for a formalised governance structure.

The on-going changes in the formal structure of the NHS only exacerbated these problems with two identifiable negative outcomes. First, NHS staff described the situation as ‘change management fatigue’ as they sought to interpret new and revised government policy. Many staff were concerned that structural changes did little to increase efficiency and performance, and instead contributed to low morale. Second, structural changes produced confusion and contradictions, as NHS staff struggled to interpret new institutional logics against existing institutional logics. The move from a less formal governance structure to one which emphasised market mechanisms through the continuation of policies which set up the ‘internal market’ was not interpreted by NHS staff as a positive outcome. Rather, NHS staff described their working practices as being imbued with the values of service and compassion. To undertake roles and tasks on the basis of cost and efficiency criteria were against these core values.

The interplay of the various actors as the preliminary impact of the National Program is assessed holds no surprises for researchers with experience in government IS projects. Those enacting this e-government program—the political party sponsoring the healthcare reform initiative, the NHS central IS control team, the local hospital IS department, the IS service providers, the system implementation consultants, medical practitioners, academic researchers, the NHS staff, and the general public in the form of user groups—mostly regard the projects primarily in terms of technological achievement rather than application and function. The National Program’s limited success is benchmarked in technical terms with very little regard being given to the less tangible outputs, such as improvements in hospital management, transparency of healthcare process and patients’ active participation in such process, or to the societal outcomes incorporating notions of increase value to public health.

3 Theoretical Stance and Research Design

3.1 Theoretical Stance – Actor Network Theory

The use of Actor Network Theory (ANT) is widespread (Latour, 2005) although mainstream literature continue to emphasise its predictive and prescriptive characteristics, aimed at influencing top management behaviour. As IS becomes “enabler” of desirable organisational change, the effect on projects will depend on the organisation’s circumstances (Currie & Guah, 2006) conceptualised by ANT. In this respect the analysis of heterogeneous relations involved in IS adoption and diffusion in the healthcare industry was considered. ANT is a well-known theory from within the field of science and technology studies that has developed conceptual constructs to deal with the processes through which technologies are developed and influence societies. Though ANT has a relatively short history, it is a multi-disciplinary field and unlike the field of IS, it allows a deeper devotion to theoretical and explanatory studies, without assuming an intellectual responsibility for guiding professional practice (Teubner, 2006).

Translation is the mechanism in ANT by which the networks progressively take form, resulting in a situation where certain entities control others. Such repertoire is not only designed to give a symmetrical description of a complex process that constantly mixes together a variety of human and non-human entities (Wickramasinghe, 2007). Using

Callon (1986) theorising method the following four “moments for translation” to the NHS National Program are noted in Table 1.

Table 1: ‘Moments of Translation’ (Callon, 1986)

Actor	Type	Moment	Observation
Connecting for Health	Principal Actor	Problematisation	By making itself indispensable to the service providers and local IT departments, Connecting for Health defined the nature of the problem and forced other actors to accept a single way forward (LSP model)
NSP	Principal Actor	Interessement	By interposing themselves, the NSPs lock the other actors into place and define the linkages between the others creating certain recognised obligatory points for the project.
Local Regional Hospital Chief Executives	Principal Actor	Enrolment	As principal actors here they define the roles that are to be played and the way in which the other will relate to one another within this part of the local network, considering they must approved of the final products before any LSP or NSP get paid for job done.
Patient Groups & Trade Unions	Passive Actor	Mobilisation	At certain point in time these minor players borrow the force of their passive agent allies and turn themselves into their representatives or spokespersons.

Central to ANT is the concept of translation in which innovators attempt to create a *forum*, a central network in which all the actors agree that the network is worth building and defending. Callon (1986) (noted in Table 1) defined 4 moments of translation as follows:

Problematisation: What is the problem that needs to be solved? Who are the relevant actors? Delegates need to be identified that will represent groups of actors. During problematisation, the primary actor tries to establish itself as an obligatory passage point (OPP) between the other actors and the network, so that it becomes indispensable.

Interessement: Getting the actors interested and negotiating the terms of their involvement. The primary actor works to convince the other actors that the roles it has defined them are acceptable.

Enrolment: Actors accept the roles that have been defined for them during interessement

Mobilisation of allies: Do the delegate actors in the network adequately represent the masses? If so, enrolment becomes active support.

Connecting for Health has constructed a global network of relations between themselves and others – and between the others – that generated a space, a period of time and a set of resources in which innovation is taking place. Within the space provided by this

global network, a local network of heterogeneous actors has dedicated themselves to the successful implementation of satisfactory nationwide patient information systems. Again using Callon (1986) principles, Figure 1 shows how Connecting for Health has established itself as an obligatory point of passage (OPP) to control all transactions between the global and the local network.

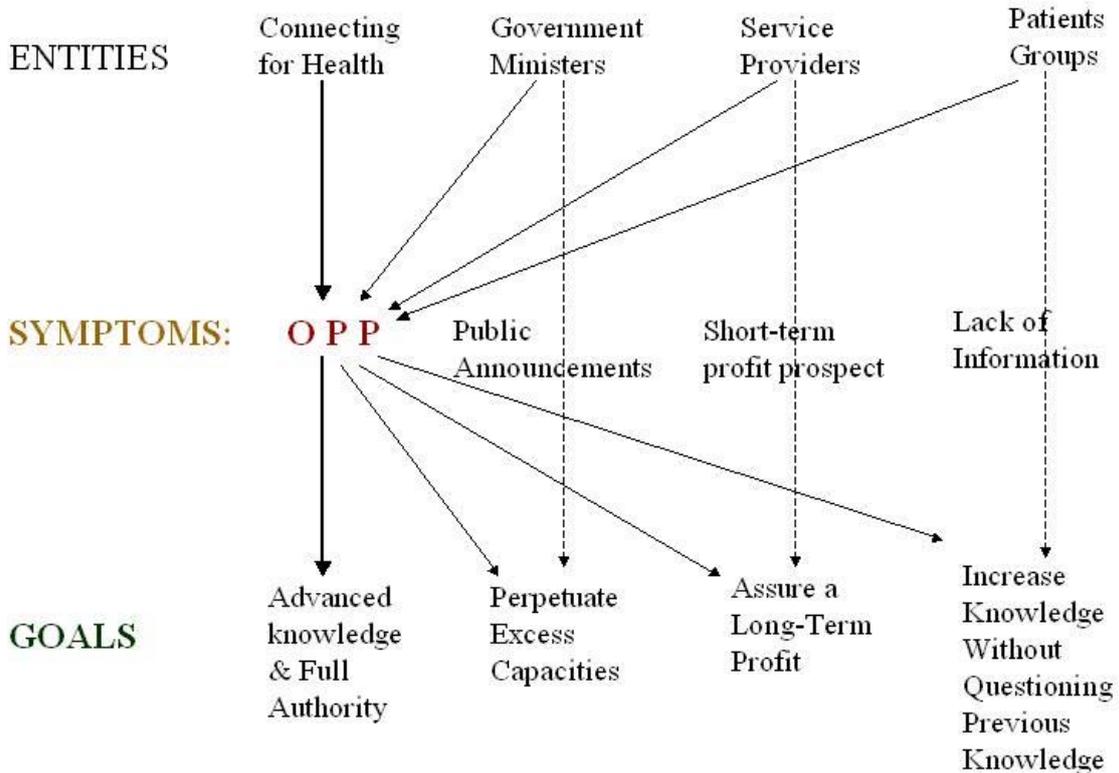


Figure 1: Translation in Action (Callon, 1986)

The final products are intended to support and enhance communication between patients and medical practitioners, thus, enhancing access, navigation, and comprehension of information on urban planning is meant to provide a basis for better-informed medical decisions by the medical practitioner for the public.

3.2 Research Methodology

The research had a major objective to identify the fundamental issues concerned with the adoption and diffusion of IS within the healthcare sector. The repertory grid technique was used, which requires several essential elements of IS, project planning and implementation for comparison during the interview (Walsham, 1997). The outcome of the analysis was the generation of core personal constructs about the perception people use to evaluate the success of IS systems.

Our reason for interviewing non-medical practitioners and IS service providers was to compile elements that represent the discrete processes/activities being done in the

process of healthcare IS adoption and diffusion. The usual formal practice of building business systems is as follows:

- First, the senior management commitment (possible with the involvement of the IS executive) to formulate a business strategy based on the outcomes of the systems “*Analyzing Industry and the Environment*” (Lederer and Sethi 1988, Earl 1993) and other related business analyses.
- Second, SWAT analysis, *Analyzing IT strengths / weaknesses of the business*” (Lederer and Sethi 1988) will come into place; the organization may thus come up with an IT strategy along with several possible IS initiatives.
- Third, the senior management commitment, certainly with the IS executive, will evaluate the initiatives according to their business value. This corresponds with the activity “*Evaluating the IS initiatives*” (Earl 1993).
- Fourth, certain IS initiatives will be selected and “*Prioritizing and Allocating Resources for the System*” (Galliers 1994).
- Fifth, the detail of the IS adoption plan will be formulated which includes the responsibilities of different level of staff in the diffusion process, the time schedule and the milestones, etc as “*Formulating a Strategic Information System Plan*” (Lederer and Sethi 1988, Earl 1993).
- Sixth, the corresponding IS will be diffused accordingly and “*Implementing a Strategic Information System*” (Gottschalk 1999) will represent this step.

As a longitudinal study on the UK healthcare system, it was imperative that a research method was compatible with the objective to identify and understand the institutional environment of healthcare delivery. The adopted perspective to develop this research is a qualitative and interpretive approach, by inductive research, using the case study strategy through multiple cases, with crossed time horizons. In terms of data collection methods, due to the recent development of the National Programme concept within global healthcare sector, in-depth interviews were the chosen technique, as it seemed to be the most suitable exploratory approach. More specifically, it was necessary to explain the observed changes in the diversity of supplier base, the vendor management issues, and also the governance systems designed to facilitate the introduction of the National Programme. The interviews included, government ministers, professional groups within healthcare, NHS clinicians and administrators, and external IS suppliers involved in the National Programme.

3.3 Data Collection and Analysis

Three methods of data collection were adopted. First, the researchers assembled a range of academic, government and industry studies on the healthcare sector. These studies were not restricted to the UK only, but included articles and reports on healthcare services in many countries, regions and locations. This material proved invaluable for understanding some of the societal, economic, political, cultural and technical differences in healthcare nationally and internationally. Second, we attended various trade fairs, conference, workshops and exhibitions on healthcare. The purpose of

attending NHS conferences and trade fairs was to establish specific research contacts, which became very useful when making appointments for interviews. Some of these events were focused on general topics (i.e. IS in healthcare, patient services, hospital management and professional best practice), with others more focused upon specific activities (i.e. the National Programme, presentation of the Wanless Report, IS strategy for NHS). These events generated many useful research contacts. Third, we engaged in primary data collection, where 120 interviews (see Table 2) were conducted with a range of constituents (i.e. health service professionals and administrators, clinicians, doctors, patients, IS service providers, and politicians). Research methodology used included participant observation, semi-structured interviews and document analysis. Interviews with respondents took place over a three-year period. Most of the interviews lasted around two hours. All respondents were interviewed at least twice, with some respondents being interviewed 3-4 times. The interviews at the NHS hospitals were tape-recorded and the tapes were transcribed. Respondents were sent a transcript of the interview to verify it was a true account of what was discussed. Any errors were corrected. Since some of the interview content is politically contentious, the interviewees asked for themselves and their NHS hospitals to retain their anonymity.

The open-ended and semi-structured interviews were conducted during the first four years of the National Programme project implementation, part of which was the negotiation of contracts to the service providers. Multiple informants were interviewed both within the NHS hospitals and with other constituents. During the first year of interviews, the scope of the study was extended as it was important to elicit data and information from a wider range of respondents engaged in the implementation of the National Programme. These included, IT service firms bidding for public sector IT contracts and doctors in general practice (external to the NHS hospitals). Respondents from IT service firms offered critical insights into the political and procurement processes within the NHS and public sector more generally. GPs offered useful insights about the communication channels underpinning the National Programme.

Table 2: Five NHS Organizations

Cases	ONE	TWO	THREE	FOUR	FIVE
Type of Institution	Local Health Community	General Hospital	Primary Care Trust	Foundation Trust	Primary Care Trust
Classification	PCT	PCT	PCT	Foundation Trust	PCT
Cluster	Midlands	South	North	Midlands	North
Star Rating	***	***	**	***	*
No. of Staff	>5,000	>7,500	>2,000	>5,000	>2,000
Population Served	1,500,000	500,000	146,000	553,000	91,000
No. of Interviews	22	20	24	26	18

Following the first year of interviews, the researchers evaluated the data and refined the semi-structured interview schedule. It was recognized that given the range of

constituents involved in the National Programme, the questionnaires needed to be more closely targeted to the professional and personal situation of the individual, as generic questions were less meaningful. The comments and insights from respondents were further compared with the policy documents and reports from government sources.

4 Application of ANT to the National IS Program

It is useful to apply the ANT to the National Program for IS in the NHS. Table 3 indicates an analysis of the key groups of stakeholders, a summary of their main interests in participating in this project and their current perception of the project direction.

Table 3: Classification by Function of the Key Human Stakeholder Groups

Group	Sector	Summary Interests	Current Perception
Connecting for Health	Public	Delivery value to a critical industry	Highly Motivated
Government Ministers	Public	Monitoring systems	Neutral
NHS Directors	Public	Maintaining professionalism	Interested
Regional Health Authorities	Public	Relinquishing power and control to central office	Neutral
Local Hospital Trusts	Public	Relinquishing power and control to central office	Neutral
Local IT Department	Public	Access to more funds	Interested
Medical Doctors/Consultants	Public	Giving up valuable professional ethics	Hostile
British Medical Association	Independent	Forum for expression of opinion	Interested
Nursing Staff/	Public	Reference point	Neutral
Nursing Association	Independent	Forum for expression of opinion	Hostile
Various Auxiliary NHS staff	Private	Valuable resource	Neutral
Hospital Administrators	Public	Managing medical practice	Interested
Private Healthcare providers	Private	Source of contributing to patient care in the UK	Interested
Patients Association	Independent	Forum for expression of opinion	Highly Motivated
University/Researchers	Independent	Source of research evidence	Hostile
Selected Service Providers	Private	Profit & Healthcare Experience	Highly Motivated
Sub-contracted Service Providers	Private	Profit	Neutral

In a global network, actors are heterogeneous: there were the institutional actors and a number of influential individuals but, in addition, there are, for example, geopolitical forces (the interest of political leaders), technology diffusions and workers union representatives (British Medical Association, Nurses Association, etc). At the local network level too, the actors were heterogeneous: for example, private sector

contractors, public sector managers, investments in computer hardware and software, design documents, reports.

The behaviour of the human actors was influenced by the other elements within the networks, including the technology itself. The local service provider (LSP), for example, became a symbol of success for the local network that developed it but also for the global interests in UK healthcare system as a role model for the national European IS industry.

5 Discussion

The findings highlight the increasingly complex organisational field that comprises the healthcare environment (Ramiller, 2006; Wickramashinghe et al, 2007). Such complexity employs what is now described as a 'kaleidoscopic workforce' with about one quarter of primary care delivered by agency staff (Gray, 2006) with only the patient seen as a constant within the NHS. Like other initiatives within healthcare, the National Programme is designed and implemented by more than one bureaucracy, which suggests that delineating roles and responsibilities becomes increasingly difficult.

Against a backdrop of continuous change in the NHS, the National Programme is currently halfway through its planned implementation. It is too early to predict whether it will achieve its overall aims and objectives, but the findings suggest that while certain actors have narrowly focused upon its technical deliverables, a significant challenge is to win the hearts and minds of another important actor—those who are expected to adopt the various technologies of the National Programme. As a large-scale IS project, the National Programme is consistently missing the original performance targets (Hendy et al, 2005; NAO, 2006). While this is not unusual for IS-enabled projects, the National Programme is not simply about installing new hardware and software, but requires a significant change in the working practices of clinicians and administrators. Politicians describe the National Programme as a knowledge-based programme, where information sharing is a fundamental outcome measure. However, the findings suggest that such a goal is naïve as professional groups such as clinicians and IS firms perceive knowledge as something to be protected and secured, not available for public or competitor consumption.

Considering the density of ANT which often necessitates that an integral part of the theory must be placed in context, the idea of organizational capabilities is being placed at the heart of the model. The organizational capabilities of healthcare providers have been described as the collective physical facilities and a skill of medical and non-medical employees, especially the abilities of the hospital administrators (Clegg & Shepherd, 2007). More specifically, organization capabilities of the NHS can be thought of as marketing skills, distribution skills, service delivery skills, political skills and more.

In overall terms, analysis of the national programme from an ANT perspective, does seem to score relatively well on the obvious research tests. ANT permits an explanation of how a few individuals can obtain the right to express and to represent the entire group. The case study material provides industry and policy practitioners with a clearer sense of the forces at play in IS adoption and diffusion in the UK healthcare sector. By

explicitly recognising the inclusion or exclusion of various groups, it facilitates discussion on how the networks can be re-engineered to include potential users able to demand public value targets for e-government initiatives, such as increased public information and debate.

Using ANT to analyse the situation with IS in the NHS, the research has limitations that are germane to this theoretical perspective. Further research may usefully focus upon the individual role of specific vendors in delivering the aims and objectives of the National Programme for the purposes of comparative analysis of different vendor performance outcomes. This is likely to become increasingly relevant where further fragmentation of healthcare results in highly differentiated IS healthcare diffusion.

6 Conclusions

Despite current financial challenges facing the UK government, NHS must continue to provide high quality healthcare with organizational integrity, which requires inevitable structural change. ANT can contribute to a public health care systems operating according to business requirements because the business baselines in developing health care systems are cost efficiency, patient-orientation, high quality at all operational levels and accessibility of services. ANT can also bring improvement to NHS systems through real-time functions into health care systems access. As human resources are decreased, a leading strategy is to develop technological solutions and preventive health care.

The research in this paper has suggested that the use of non-human actors is a mechanism to examine the change process in a given organization by looking at the type of structures provided by advanced technologies (inherent structures), and the structures that actually emerge in human actions as people interact with IS adoption and diffusion processes. It is argued that the interplay between the structures provided by system implementation and healthcare delivery structures, within which they are embedded, should emphasize how the features and properties of IS are acquired and constructed. The focus of the research was on the application of network analysis in IS adoption and diffusion in this respect. This is a significant element of ANT where the challenge is to produce useful research in the field of IS adoption and diffusion that takes a comprehensive approach and makes significant contributions to theory and practice.

ANT in healthcare may be seen here to suggest the tailoring of information for particular purposes and their outlook may be tempered to the detriment of healthcare consumers who do not have the time or expertise to evaluate multiple informational sources. The National Programme may be customized to contain different purposes or specific deficiencies while overlooking factors that are either too expensive or not correctly factored at the moment. Our approach represented an independent assessment of the programme's completeness that may serve to enlighten and assist service providers of healthcare systems in developing nameable concepts they can use to frame the information the programme is perceived to deliver.

Our qualitative assessment of the NHS systems implementation, using ANT, does not guarantee the correctness of information system for all users of healthcare information but it might increase the level of confidence UK residence have in the NHS. Other healthcare providers might seek to use ANT to evaluate system implementation with users being more informed and able to more fully understand the situation with healthcare systems.

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