INTERPRETIVE FLEXIBILITY ALONG THE INNOVATION DECISION PROCESS OF THE UK NHS CARE RECORDS SERVICE (NCRS). INSIGHTS FROM A LOCAL IMPLEMENTATION CASE STUDY

Papazafeiropoulou, Anastasia, Brunel University, School of information systems computing and mathematics, Uxbridge, UB8 3PH, UK, anastasia.papazafeiropoulou@brunel.ac.uk

Gandecha, Reshma, Brunel University, School of information systems computing and mathematics, Uxbridge, UB8 3PH, UK, reshma.gandecha@brunel.ac.uk

Abstract

Interpretive flexibility is a term used to describe the diverse perspectives on what a technology is and can or can not do during the process of technological development. In this paper we look at how interpretive flexibility manifests through the diverse perceptions of stakeholders involved in the diffusion and adoption of the NHS Care Records Service (NCRS). Our analysis shows that while the policy makers acting upon the application of details related to the implementation of the system, the potential users are far behind the innovation decision process namely at the knowledge or persuasion stages. We use data from a local heath authority from a county close to London. The research explores compares and evaluates contrasting views on the systems implementation at local as well as national level. We believe that our analysis is useful for NCRS implementation strategies in particular and technology diffusion in big organisations in general.

Keywords: Healthcare, NHS Care Records Service, Innovation diffusion, Innovation decision process, Social construction of technology

1. INTRODUCTION

With medical errors becoming a cruel reality in the provision of healthcare worldwide, the role of information technology in preventing those errors becomes predominant. It is recognised that more people die every year due to medical errors than from vehicle accidents, breast cancer or AIDS (Kohn, et.al. 2000). The American Hospital Association CDER (2004) relates the vast majority of medication errors occurring to lack of appropriate information and processes such as:

- incomplete patient information

- unavailable drug information

- miscommunication of drug orders due to poor handwriting, similar name drugs, misuse of zeroes and decimal points, confusion of metric and other dosing units, and inappropriate abbreviations

- lack of appropriate labelling

- Environmental factors, such as lighting, heat, noise, and interruptions that can distract health professionals from their medical tasks.

One way to reduce medical errors is to make efficient, accurate, reliable medical decisions based on reliable and up-to-date information or patient record. Integrated patient records can reduce medical errors by using information technology (Booth 2002). Medical errors can be reduced with the provision of order entry systems with computerized prescriptions and using bar-coding for medications, blood, devices, and patients. In order to avoid the medical errors, medical centres are investing in computerized patient records bringing patients and clinicians within the ambit of an integrated health care system providing real-time patient records. Nelson (1998) cites American Medical Association (AMA) as stating that 30% of all patient visits are completed without access to the patient's chart. Access anytime anywhere to patient information by the concerned and authorized persons is the key concept of computerized patient records. Medical errors are reduced when all hospitals implement proven medication safety practices using computerized medication lists and health care providers can readily see patient medications and avoid duplications of tests.

In this paper we are a looking at the diffusion and adoption of the NHS (National Health Service) Care Records Service (NCRS) in the United Kingdom, which has the potential to support healthcare professionals by offering an integrated electronic patience record system that would potentially reduce medical errors. It is worth mentioning that the medical care in the UK is a social service and not fee-paid as in other countries such as the US. This has great implications for the modernisation of the health care system which is of high political importance and one of the main priorities in the UK government agenda. This service is one of the four key deliverables set out in the NHS IT procurement strategy "*Delivering 21st century IT support for the NHS*", published in June 2002. NCRS is a portfolio of services covering the generation, movement and access to health records, which includes electronic prescribing in hospitals and workflow capacities to manage patients care pathways through the NHS. Its benefits include convenience, integration of care, improving outcomes using evidence, supporting analysis and improving efficiency (NHSIA, 1998). With estimates that 25% of nurse and doctor time is taken up collecting data and the potential increase in speed and efficiency of communication the benefits appear very straightforward with the promise of "seamless care" (NHSIA, 1998).

The proposed system will work by assisting all healthcare professionals and other prospective users. Whenever they log on to the system, they will be presented with a personal home page permitting them to combine a number of screens. They will then be in a position to look for a patient by a 10-digit NHS number or a known detail such as name, date of birth, age, sex, phone number or their general practitioner's (GP) name. Also, patients will be in a position to view their own records and ultimately become involved in planning their treatment by the use of the 'My health space' feature on the NHS Direct website. The 'data spine' is planned to go live in three phases:

1. The first - core - service including some patient records is expected to be up and running by December 2004.
2. By the end of 2006, it is expected to be equipped to cover the entire population.
3. The final vision is expected to be accomplished by 2010.

NCRS is one of the National Program for Information Technology (Npfit) targets and as with many healthcare IT projects, its evaluation will be difficult provided that government led IT projects in the NHS have a history of notable project failures. The complexity of such huge investments, currently £7.6 billion calls for a clear understanding of the environments in which healthcare networks exist.

The research focus here is the diffusion of the NCRS from the policy makers at a highest decision making level to the users of the system. We examine how diffusion receivers (users, such as doctors or nurses) perceive the NCRS implementation in comparison to policy makers. We argue that there is a gap between the demand and the supply side of the diffusion process, which reveals a broad barrier in the NCRS implementation. We use primary and secondary data to capture the perceptions of both diffusers and diffusion receivers in order to get a better understanding of the NCRS diffusion process. The primary data was collected through interviews with the managerial and technical staff as well as

future users of the NCRS within a specific county in the UK. These were supported by extensive literature review, and use of archival records such as NHS policy documents and county specific information through local press and staff newsletters.

Our aim is, by drawing a clear picture of the NCRS diffusion process, to identify existing barriers and perception gaps in order to offer recommendations towards a more efficient implementation strategy. With the allocation of £2.3bn to fund this project (NHS 2002), there is renewed optimism and genuine interest to bridge the gap between strategy and realisation to implementation of NCRS (Firth 2003).

The paper is structured as follows. Section 2 gives an overview of the diffusion of innovations theory highlighting its critiques while proposing the use of ideas from the social construction of technology theory to support our framework. The next section describes the methodology used for the collection of the case study data, while sections 4 and 5 include the analysis of the data. Finally, in section 6 we draw some general conclusions about the future on the diffusion of NCRS.

2. DIFFUSION OF INNOVATIONS THEORY AND ITS CRITIQUES

Diffusion of innovations is a complex longitudinal process, which in the case of individual adopters is mainly concerned with the process of decision making towards the adoption or rejection of the innovation. In the case of innovation adoption by organisations, once the decision to adopt has been made, implementation does not always follow directly (Rogers, 1995). The complexity of the diffusion process is becoming higher as a number of individuals with different interests and agendas are part of this process.

Rogers broadly defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p.10). The messages spread by diffusion are seen as new ideas or inputs to the system. The four main elements of diffusion are thus innovation, communication, time and social systems. In this model, innovation is defined as any object, idea or practice that is perceived as new. The technological, cultural and economic characteristics of innovation will determine how quickly it is adopted throughout the social system. Diffusion involves time in several different ways, firstly through the innovation-decision process. This is the mental process spanning the five steps involved in innovation-decision: knowledge, persuasion, decision, implementation, and confirmation of the decision to reject or adopt the innovation. Second, innovativeness refers to the amount of time individuals take to adopt an innovation relative to others in the social system. Third, the rate of adoption refers to the relative speed with which members of a social system will adopt a new idea. Rogers sees the social system as interrelated units that participate in problem solving in order to bring about a common goal. The diffusion of innovations can be impeded or facilitated by the communication and social structures of the system.

According to Rogers the innovation-decision process, in which a decision-making unit passes from first knowledge of an innovation to the decision to adopt or reject it, plays a crucial role for the diffusion of an innovation. In this process five steps are defined:
- *Knowledge* occurs when a potential adopter learns about the existence on the innovation and gains some understanding of how it is functions.
- *Persuasion* occurs when a potential adopter forms a favourable or unfavourable attitude towards and innovation.
- *Decision* occurs when a potential adopter undertakes activities, which lead to the adoption or rejection of an innovation.
- *Implementation* occurs when an innovation is actually put to use
- *Confirmation* occurs when an adopter seeks reinforcement of an innovation-decision that has already been made, but the adopter may reverse this previous decision if exposed to conflicting messages about the innovation.

The first and very important step of the innovation-decision process is that of knowledge. There are three particular types of knowledge: awareness knowledge, how-to-knowledge and principles-knowledge. The first of these types, awareness-knowledge is information that an innovation exist. Awareness-knowledge then triggers the potential adopter to seek information of how to use the innovation. When an inadequate level of how-to-knowledge is obtained then rejection and discontinuance are likely to result. Principles-knowledge consists of information regarding the functioning principles of the innovation. The innovation decision process is presented in figure 1.
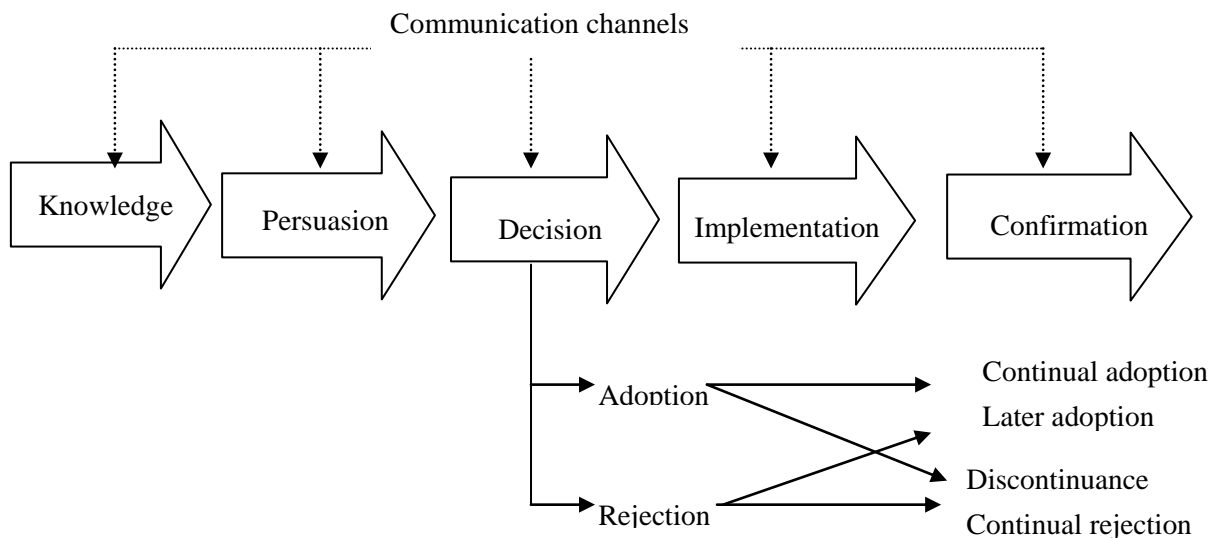

Figure 1.   The five stages of the innovation decision process

Diffusion of innovations theory is sought to explain reasons behind individual or collective adoption of an innovation but has been criticised as not taking in to consideration the particularities of complex information technologies (Lyytinen and Damsgaard, 2001). Thus it has been judged (e.g. (Kautz and Pries-Heje, 1996; Elliot and Loebbecke, 2000; Allen, 2000, Papazafeiropoulou, 2002) as poorly equipped to understand how different groups interact in the production and provision of innovation as well as lacking attention to reinvention and consequences of innovation. The use of other social theories such as stakeholder theory, social shaping of technology and economics of innovation theories have been proposed as supportive to DOI for the understanding of the diffusion and adoption of complex information systems phenomena. In the case of healthcare provision actor network theory has been explicitly used to compliment innovation diffusion theory for the examination of the factors affecting IT adoption by rural GPs in Australia (Wenn et.al. 2002).

In this paper we take a similar approach in criticising DOI theory and we are mostly concerned about the theory's lack of understanding of the different views, opinions and agendas involved in the innovation diffusion process. These are included in the communication channels but their description in Roger's work is very general and mostly related with the influence certain individuals have on others towards the adoption or the rejection of an innovation. In his work it is assumed that there is an objective understating of the stage were the technology under investigation is positioned at a certain point in time. We are nevertheless interested to examine how different groups involved in the diffusion process have different views about the same technology, its features and maturity level. Drawing insights from the Social Construction of Technology theory (SCOT) (Pinch and Bijker, 1984) we see how the *relevant social groups* view the implementation of the technological artefact (in our case the NCRS) along the innovation diffusion process. We argue that the notion of *interpretive flexibility* is relevant here as our data shows that different groups have different opinions about where NCRS lays within the stages of the diffusion process at the same point in time. We believe that the possibilities of a *closure* (resolve of conflicts and reach of an agreement) can be increased when policy makers get a more realistic picture of what the potential uses know about the system under development.

3. METHODOLOGY

A number of interviews were scheduled and carried out during the collection of data for this research, which started in April 2002 and a representative number of interviews have been carried out with stakeholders in the county. The name of the county is not revealed according to the interviewees wish, showing the sensitivity as well as the significance of the subject under investigation. A pilot study was conducted initially comprising a few unstructured interviews with the previous IT chair of the local implementation group in the county. This work addressed the structural technological changes that had taken place at the national and local level of the primary care organizations and Trusts.

The core objective of this study has been to find out the perception about the implementation process among the policy makers and the potential users of information that will be generated from the implementation of NHS Patent Record Service (NCRS). The collapse of the previous local implementation plans in August 2002 was an incentive to study further the issues under investigation. Therefore, this paper is part of the work carried out over a 25-month period between August 2002 and September 2004.

A number of meetings were attended and interviews conducted such as:
- Extensive interviews with a chief pharmacist at the NHS information authority, chief information officer, programme lead of the county's local medical council clinician.
- Participation to local implementation group meetings in May- June 2004.
- Participation to NPfit Programme board meeting in October 2004

The approach that was taken for the interviews was to include views from both the policy makers and administrators as well clinicians in order to examine the diversity of opinions. More specifically we contacted staff who support the implementation of NCRS, but do not usually work in a surgery or at emergency scenes, for example, board directors and senior managers, members of the NPfit program board as well as doctors, pharmacists and nurses. Conversations were taking place, when circumstances permitted, with staff as they were attending the project board meetings which are part of their day to day work. Interviews were recorded and transcribed later, whereas notes were taken during meetings and periods of observation.

Additionally, this study draws upon various internal documentation sources, including meeting minutes, procedure manuals, project plans, corporate and technology strategies and project reports. The documentation also included copies of service plans, annual meetings, various internal communication emails, newspaper articles and radio programmers about the NPfit and the department of health. The NPfit has 'official' and 'unofficial' web sites and the researchers were given access to the latter where sensitive internal information of the delivery targets to achieve NCRS was outlined.

This work adopts a 'broadly interpretive' stance (Walsham, 1993), reflecting our efforts to identify multiple actors' interpretations of a specific 3-year period of information systems implementation and related organizational change of achieving the NHS Care Records in the county. The narrative is reconstructed from public inquiry reports and peoples' memories, and further informed by observations of the current electronic record systems in operation during the fieldwork efforts. This paper presents the case study narrative. It will trace the main events and initiatives that took place from the collapse of the Local Implementation Strategy (LIS) plans in March 2002 through to a National Programme Initiative (NPfit) announced in March 2003 into the plans for implementation of the national electronic spine by December 2004.

4. THE NCRS IMPLEMENTATION PLAN IN THE COUNTY

The county's strategic health authority consists of 21 organizations of which 13 primary care trusts and 8 are acute hospital Trusts. The implementation phase of the computerization of NHS records for

the patients in the county has been reported as part of an ongoing study. The need for NCRS implementation was recognized and the local Strategic Health Authority (SHA) was established to cater to this part of the country located in the northeast of London. The county is near London and many of its settlements function as towns or villages where London workers raise their families. Therefore, the fulfilment of health care needs of the county also caters indirectly to the health of economic labour for the city of London.

The county invested £11 million in 2003 to put workstations on clinicians' desks and to provide faster networks. The local implementation body is working closely with a consultant company to ensure that the county is at the forefront of the IT revolution which will transform the way patients are diagnosed, treated and cared for. Accenture (a private consulting company) has been announced as the Local Service Provider and BT has been awarded a 10-year contract to provide the infrastructure, which will enable the setting up and running of the electronic NHS Care Records Service. This means, for the first time, information about patients will be available to all clinicians involved in their treatment and care and not locked away in a filing drawer.

For materializing the implementation plan of the NCRS in the county, the local Strategic Health Authority (SHA) was established in order to make sure there is progress and improvement across the NHS providing the link with the government's department of health. It has been formed to ensure that there is a clear strategy for the county in terms of the role it needs to play in the changing trends in National Health Care strategy and program. The body has been formed to manage the performance of the NCRS in the county where each NHS trust and primary care trust is accountable to the strategic health authority. The body ensures that the county has the buildings, equipment, workforce and organisations to deliver the NHS Plan and to see whether all NHS organisations are working within the Government's plan to the same overall targets for improvement and to agreed national standards. It provides the link between national policy and local action which relies on the Strategic Health Authority. As part of the national program for information technology, the county will form part of a cluster of five strategic health authorities in eastern England who will work with one as yet to be chosen IT provider. The county has been seen as being in a very strong position to move ahead swiftly with NHS implementation program.

The national plan for NCRS implementation that the county has to follow in order to be compliant with the NHS targets (as they are listed in the introduction section of this paper) will be developed in several stages. These stages are:

- Stage 1 (to be delivered by the 31st of Dec 2004): The system will include email, browsing, ability to view radiology and possible medical records and other non-interactive elements.

- Stage 2 (to go live by on the 31st of Dec 2006): The system will become interactive including GP booking, e-booking, e-referral and the ability to transfer radiology pictures.

- Stage 3 (to be delivered by the 31st of Dec 2008): The non-interactive electronic patient record will be achieved and GPs would be able to log on and get test results etc from these medical records

31 suppliers will be selected after a biding process and the plan includes what is called 'penalty clause' in which if the suppliers don't deliver there will be penalties, while the NHS will be able to sue suppliers. Each local implementation has to deliver what is called an output based specification, which will have basic information about the users' needs. These documents will be on restricted circulation and a lot of the work will be done on a tendering basis therefore confidential. The suppliers have been short-listed through consortia and the selected suppliers that will be given the output based specification through national applications and local service provider applications. According to a chief pharmacist for the NHS information authority the structure of this delivery plan is in constant state with the national targets being the first priorities.

5. CASE STUDY ANALYSIS: PERCEPTIONS OF THE NCRS IN THE COUNTY

We asked the key managers at the county under investigation about their opinion on how realistic the plan is and how far the county has been in implementing it at local level. According to the chief information officer the current legacy systems in the county do not support the core business function and so they are a cost overhead, without actually applying any value. These systems do not have electronic prescribing, auto communications, care pathways or supervision support. They are a stretch on the administration systems, with some clinical coding but very little else. Therefore, these systems will be scrapped once the National Programme is implemented. He was very enthusiastic about the successful implementation of NCRS claiming that:

> The National Programme will be a single system pulling across the whole of the North East and Eastern cluster forming two fifths of the NHS. Accenture [the consults involved in the project] will be providing the patient record service and will be bound by the confidentiality agreements regarding sensitive patient data. There is a strong information governance regime that's layered onto the whole National Program. Patients will be allowed to secure elements of their data record that they cannot do at the moment. The whole new way of delivery of project in the NHS is by "new way" which is how it was done in the private sector. This way is to get suppliers to do it for you.

When asked about the previous failure of the NHS to implement such as system (the NHS Information Authority's Electronic Record Development and Implementation Program (ERDIP)) he said that one of the key reasons why ERDIP never took off the ground was because it was a bunch of small research programs who were delivering very little value; "they were just a waste of time". He said that the NCRS's success is a matter of the local systems being connected to the national spine.

Concerning the benefits that the system can offer to the clinicians he said:

> The national program aims to put the clinicians in a more informed environment. At the moment they are in an information dessert where they are surrounded by information. NHS will provide them with a system for using and managing information especially that of the patients. It will make sure that the information from the diagnostic services is provided in a format that will make clinical decisions in real time. There will be a lot less paperwork because everything will be done automatically. There will be huge sharing of information, so there will be no nurses' notes, and no dietetic notes and no medical and surgical notes, there will just be patients' notes. There will have all of that in a structured format that is easy to hand and easy to gain access to. You don't have to be close to the patient to get access to it you can be wherever you are. The information will be, and the systems will have an ergonomic that is focused on clinician as well as focused on the patient, which is a technical challenge in its own right, but it's not a difficult one.

Similarly to the chief information officer, the program leader in the south west area of the county was rather enthusiastic about the implementation plan. He said that the legacy systems will be removed and the clinicians working in a hospital or GP surgery will connect to the national spine while they will have access to the NHS network. According to him:

> Clinicians will have access, within normal security arrangements, access to anybody's record, at anytime wherever they are.

He also show confidence to the consulting company involved in the project (Accenture) saying that they are internationally recognized and have done work in the same areas many times.

The optimism showed by the top managerial staff was not nevertheless supported by the future users such as doctors, nurses and pharmacists. More specifically, according to a clinician at the local medial council:

> All we know is that the National system will provide a wonder solution. The existing system will no longer be used and the new system will take over.

We received the same reaction from all clinical staff we interviewed while they mentioned some clinical workshops being held as motivations to use the new system but they did not seem to have enough information about them. They knew that there was someone from their department involved with the national program for IT in the county, so he would refer us to him for further information. Additionally the newsletter distributed among clinicians was advertising awareness workshops, which were only started taking place at the time of the interviews in the summer of 2004 (ESHA, 2004).

The differences in perceptions between policy makers and users that is apparent in this case study is further manifested at national level as demonstrated through secondary resources and it is not surprising that the IT plan has been criticized for lacking support from clinical staff. A survey conducted in 2003 by the Association of ICT Professionals in Health and Social Care (Assist) found considerable scepticism about the programme. Only 49 percent of those surveyed thought that real benefits would be delivered to their organizations. Scepticism also abounded concerning workload, resources, timescales and the ability to deliver on the part of the companies that win the big contracts. Another survey recently conducted found that most doctors have not yet been informed about the national programme, despite the fact that leaders have warned that the programme will fail without the full involvement of the doctors. Some doctors are likely to be won over by improved access to tests and services, but others may be alienated by the push toward team working and protocol-delivered care (Whitfield, 2003).

6. DISCUSSION

Similarly to previous examples of promising innovations such electronic commerce (Papazafeiropoulou, 2002), the NCRS implementation has not been as efficient as expected. Being an *authority innovation-decision* (Rogers, 1995) where the choice of its adoption or rejection has been made by a relatively few individuals in a system that possess power, status and technical expertise, a number of barriers hiding the realisation of the government's strategy (NHS 2002) have been reported.

In the case of the UK NHS the diffusion of new technologies such as the NCRS takes a political disposition, as this is part of the national healthcare programme. The NHS consists of 28 autonomous Strategic Health Authorities and related agencies that need to cooperate towards the adoption of the new technology. With the IT project undertaken by the NHS, technology is moving into the political arena. "For the first time, big IT projects are critical to the success or failure of the government," said Liberal Democrat IT spokesman Richard Allan. "When things go wrong in the Passport Agency, for example, it might be annoying for a lot of people but it is not make or break for the government. The National Programme is a sink or swim issue" (Arnott, 2003). In other words the "desire" of the policy makers, acting as changes agents, to diffuse the system with success becomes a matter of professional survival for them. This "urge" for success does not always bring the desired results. For example the NHS Information Authority is currently working out the details of patient confidentiality and addressing the issue in ways that may be problematic. In this process, the patient is to specify what confidential information is to be made available to pre-specified institutions or clinicians, or certain individuals. The information will be sealed and can only be accessed by specific institutions or individuals. Two problems associated with this approach are that patients may not be able to predict who might need to see their data. In addition, health professionals may find it time consuming to maintain a cross-referenced database for each patient. Additionally, the British Medical Association protested that the encryption technology chosen would also allow the Government Communications

Headquarters to access electronically transmitted data, an apparent intrusion into the doctor-patient privacy and privilege.

According to the data collected during our case study the relevant social groups have very diverse opinions about the maturity of the NCRS along the innovation diffusion process (figure 1). Although the decision to adopt the new system has been made and the government has put plans in place for implementing the system, potential users seem to lack essential knowledge about the new service and its functionality. Looking at the innovation decision process, which includes the stages of knowledge, persuasion, decision, implementation and confirmation, the potential users of NCRS appear to be at the first stages of the innovation-decision process, such as the stages of knowledge and persuasion. Policy makers on the other side are making plans for the system implementation, which is one of the latest stages of the process. The representation of the *relevant social groups* as only policy makers and potential users is clearly very simplistic and is there to symbolise the diversity of views (*interpretive flexibility*) on the innovation decision process. The innovation-decisions pertaining to the implementation of the NCRS have been made by the policy makers within the system who have decision making power. Innovation diffusion may be succeed or fail depending on the degree of success that the policy makers has persuading clinicians and other diffusion receivers that the innovation is for the good of the greatest number of actors in the system. The *closure* can only then be achieved when all relevant social groups position themselves at the same stages within the innovation decision process. This is depicted in figure 2 where we have extended the innovation decision process as presented in figure 1 to include the different perceptions of the relevant social groups.
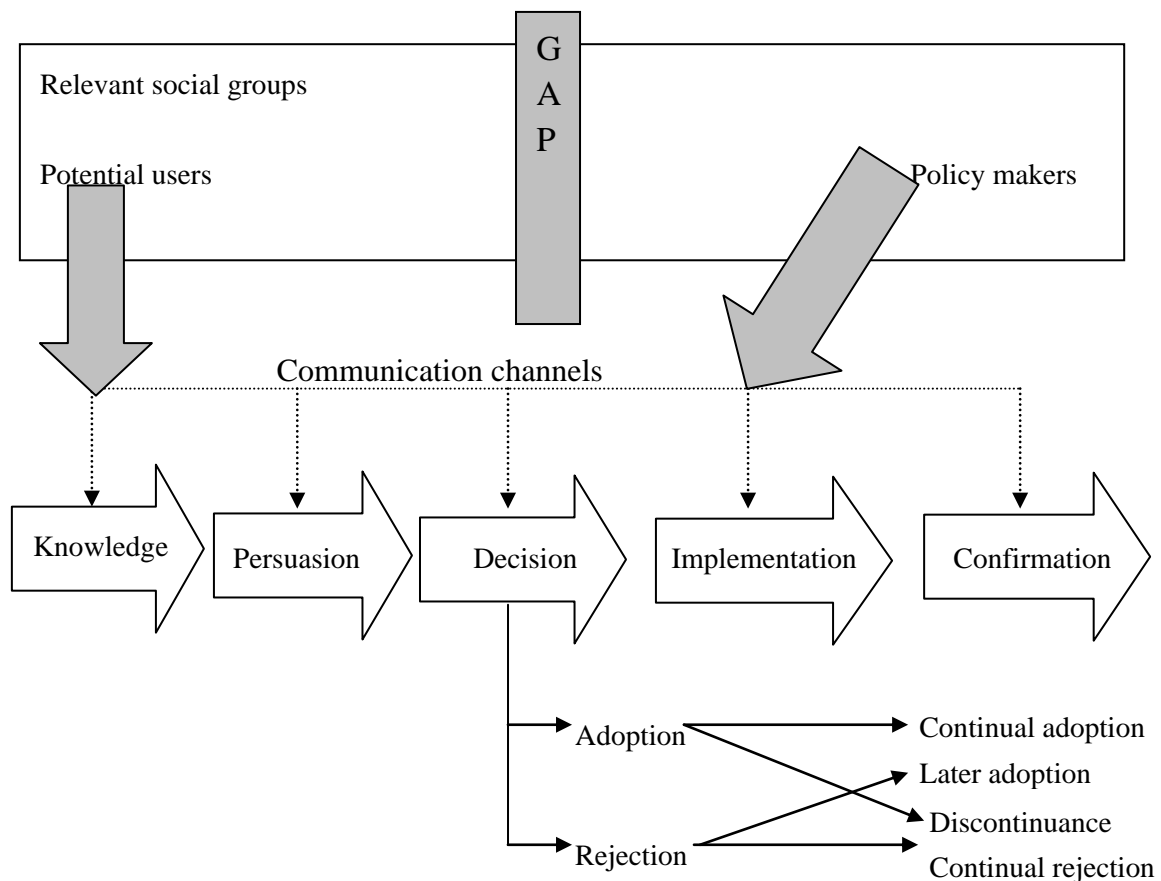

Figure 2. The perception gaps along the innovation decision process of NCRS

The lack of knowledge from the users' perspective points to the known problem user representation. In the case of large systems such as NCRS nevertheless, the desirable involvement of users is not always and easy task. Pouloudi and Whitley (2000) note that representing the stakeholders in the UK NHS is problematic Actors, who have been assumed to be the most easily defined, also are not always clearly represented because vital information is easily overlooked during the filtering of apparently unrelated information. Additionally, although the patients are important stakeholders, they are less involved than any others in the discussions about healthcare delivery. The doctors as stakeholders typically claim to speak for the patients; other stakeholders suspect that the doctors need an issue such as this, in order to maintain control over their own roles and the subordinate position of their patients.

The difficulties in stakeholders' representation are further deteriorating with uncertainty and instability, coming from structural changes within the NHS. The NHS has made many changes between 1980 and 1991, and each time it paused to redefine aims and re-examine boundaries. The IT systems will doubtless affect the workings of the NHS in a radical way, and in the current environment of uncertainty, the change will probably not be wholeheartedly welcomed. In addition, the tension between centralisation and decentralisation will fuel further structural change, given the centralisation of functions in IT. The state of the organisation is still fluctuating; relationships are still being hammered out, new institutions are appearing on the scene, and centralisation becomes tempting.

7. CONCLUSIONS

It is essential that responsibility for successful health care systems implementation rests with the chief executive and not delegated down the management line. Chief Executive Officers (CEOs), Chief Information Officers (CIOs), NHS Information Authority staff and Program Leads may be ignorant of ICTs or of dealing with complex information projects. They also manage heavy workloads and may not enthusiastically embrace difficult and time-consuming projects. CEOs and CIOs are also de-motivated by fear. Managers are expected to pursue innovative solutions to health care, but at the same time, audits loom, over-expenditures and missed goals are scrutinised (Fairey, 2003). And finally, the clinicians who are the users of the system are only beginning to be aware of the national spine and the new computerised IT system. The findings in the this case study confirm the fears raised in the Computer Weekly that this gap between the perception of the programme by ministers and IT managers on the front line could add to the problems inherent in managing such a large programme.

This research sought to demonstrate the importance of realising the lack of common understating along the innovation decision process of the NCRS. We showed that innovation of diffusions theory can not be applied without taking into consideration diverse viewpoints concerning the innovation under investigation. There is no objective reality when it comes to the interpretation of the maturity and applicability of a technology especially when a very large number of stakeholders are involved. The use of socio-technical theories and approaches such as social construction of technology theory can be useful in giving a more realistic and holistic view of the technology adoption reality. We believe that this research can help policy makers to realise their own position from one hand but also get a more realistic view of the users' perspectives on the other. This way the users' needs can be better cater and the seamless systems implementation and quicker *closure* can be a reality. Researchers in the technology adoption field can also benefit by this study after realising the need to emphasis the socio-technical approaches to innovation diffusion studies. Future research will include the detailed identification of all relevant social groups and their perceptions with the view to get a better understanding of the NCRS diffusion process. The framework will also be used in the implementation of technologies in the healthcare domain in different geographical settings and cultural settings.

References

Allen, J. P. (2000). Information systems as technological innovation. *Information Technology and People*, 13(3), 210-221.

Arnott, S. (2003). NHS reform makes IT a political issue, *Computing*, accessed 04.01.2004 online at http://www.computing.co.uk/Analysis/1137926

Booth, N (2002). Sowerby Centre for Health Informatics, University of Newcastle. "*Making the right choices- using computer consultation*" accessed 04.01.2004 online at http://www.ncl.ac.uk

CDER (2004). FDA/Centre for Drug Evaluation and Research , Medication Errors accessed on line 11.11.04 at http://www.fda.gov/cder/drug/MedErrors/default.htm

Elliot, S. and Loebbecke, C. (2000). Interactive, inter-organisational innovations in electronic commerce, *Information Technology and People,* 13(1), 46-66.

ESHA (2004). <county> Strategic health authority Internal NPfit Staff Bulletin Issue 2 July 2004

Fairey, M. (2003). Barriers to the success of delivering 21st century IT support for the NHS, *British Journal of Healthcare Computing & Information Management*, 20(2), 28-31.

Firth P. (2003). Preparing for healthcare and social care integration: some current barriers to ICT based sharing of information, *The British Journal of Healthcare Computing & Management,* 20(5), 21-24.

Kautz, K. and Pries-Heje, J. (1996). *Diffusion and adoption of information technology,* London: Chapman & Hall

Kohn, L. T., Corrigan, J.M., Donaldson, M.S. (Eds). (2000) '*To Err Is Human: Building a Safer Health System*', Chicago : Institute of Medicine

Lyytinen, K. J., & Damsgaard, J. (2001). What's wrong with the Diffusion of Innovation Theory. Paper presented at the Diffusing software product and process innovations, Banff, Canada, 7-10 April 2001.

Nelson R.(1998) Computerized patient records improve practice efficiency and patient care. *Health Care Data Systems*, 52(4):86, 88

NHS (2002). The NHS explained The NHS IM/T 21st Century Strategy, accessed 29.01.2003 online at http://www.nhs.uk/thenhsexplained/how_the_nhs_works.aspNHS

NHSIA, (1998). An Information Strategy for the Modern NHS 1998-2005, A national strategy for local implementation, accessed 29.01.2003 online at http://www.nhsia.nhs.uk/def/pages/info4health/contents.asp

Papazafeiropoulou, A. (2002). *A stakeholder approach to electronic commerce diffusion*. (unpublished PHD thesis) Brunel University, London.

Pinch, T.J. and Bijker, W.E. (1984), The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other, *Social Studies of Science*, 14 (1), 399-441

Pouloudi, A., & Whitley, E.A. (2000), Representing human and non-human stakeholders: on speaking with authority. *Organisational and Social Perspectives on Information Technology. Department of Information systems London School of Economics and Political Science Working Paper Series 88*. accessed 04/01/2004 online at http://is.lse.ac.uk/wp/pdf/WP88.PDF

Rogers, E. M. (1995), *Diffusion of innovations (fourth edition).* New York: Free Press.

Walsham, G. (1993), *Interpreting Information systems in organisations.* Chichester: Wiley

Wenn, A., Tatnall, A., Sellitto, C., Darbyshire, P. and Burgess, S. (2002). A Socio-Technical Investigation of Factors Affecting IT Adoption by Rural GPs. IT in Regional Areas, ITiRA conference, Rockhampton, Australia, 26-29 Aug 2002.

Whitfield, L. (2003), NHS staff buy-in is essential for project success, *Computing*, accessed 04/01/2004 online at http://www.computing.co.uk/News/1143868