

# Machines and Machinations: the integrated care record service in the UK National Health Service

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## ABSTRACT

*This paper examines the use of Actor Network Theory (ANT) as a lens to get a better understanding of the implementation of the Integrated Care Record Service (ICRS) in the UK National Health Service (NHS). Actor Network Theory has been deployed in various environments to achieve a better understanding of the roles of not only the humans but also the artifacts that constitute, in this case, healthcare networks of services and organisations. The theory is used as a means of supporting real world interventions, providing a richer understanding of complexities involved and thereby helps management to make better decisions. This study also explores Latour's concept of machines as machinations, whose role is to translate other actors into the network. We propose ICRS as a fruitful empirical context for the use of ANT to support decision making for actors in health care provision. Actor Network Theory (ANT) is well-suited for use in the socio-technical evaluation of IS into the ICRS project because this approach treats human and non-human actors symmetrically. This approach facilitates a more thorough examination of the ways in which information technology is enabled or restricted in social processes.*

**KEYWORDS:** Actor Network Theory (ANT), Machination, Information Systems (IS), Integrated Care Record Service (ICRS) Implementation, UK National Health Service (NHS).

# 1. INTRODUCTION

Actor Network Theory has its origins from the work of Callon (1986 and 1991) and Latour (1987, 1992 and 1993) studying science in action and has emerged over the last two decades (Atkinson, 2002). According to the theory the human and machines interaction in a multiplicity of roles, together constitute what are “socio-technical” networks. These networks act as independent autonomous entities referred to as “actor networks”.

ANT has been used to explore real-life manifestations of actor-networks and to further develop the theory of relationships between human and the non-human actors. Within this paradigm the humans and non-humans are treated symmetrically together to constitute a duality as a ‘humachine’ network (Atkinson 2002).

In the Information Systems field, Walsham (1997) has specifically recognized that ANT can provide an understanding of these complex social interactions involved in IS implementation and contribute to the field in both theoretical and methodological terms. Since then there are a number of authors that have used ANT to explain the information systems phenomena (Bloomfield et al 1994, Berg & Bowker 1997, Sauer 2001, Atkinson 2002). For example Sidorova and Sarker (2002) have used ANT to explore how organisational actor networks involving IS fail to consolidate. The authors argue that ANT can provide a richer understanding of complexities involved in IS failure and therefore help management take better decisions. Giddens’ structuration theory (Giddens 1984), offers an alternative perspective of how technology shaping takes place through memory traces - (Orlikowski 1991) provides a similar example in IS studies. However, the theory’s inability to incorporate the technology as an actor discounts its use here. ANT incorporates technology through the inscription of these interests within a non-human actor like that of an Information Technology and Management Policy of the UK government.

This paper proposes the use of Actor-Network Theory (ANT) as a framework or lens to get a better understanding of the Integrated Care Record Service (ICRS), now called NHS Care Records Service (NCRS) being put into place within the United Kingdom National Health Service (NHS, 2004). The authors argue that Actor Network Theory offers the socio-technical vocabulary to explicitly express such an examination for several reasons. One of the key reasons being the fact that ANT serves not simply as a theory about how various dichotomies can be brought together and explained, but also as a means of supporting real world interventions in problem solving networks (Atkinson 2002). In addition ANT offers a conceptual apparatus, a theoretical framework, for understanding how artefacts, as machinations of a focal actor, do or do not convene other actors around themselves. We explore the ICRS in its role as such a machination within the NHS.

ANT can generate a much “*richer and broader*” understanding of the layers and complexities involved in those real world systems, and thus provide managers with the means for achieving a much clearer, better, more participatory, more integrative record keeping and decision making (Atkinson et al, 2001). Hence, the use of ANT is extremely relevant to understanding the NCRS, which is an ambitious, complex system for use of advanced information technology systems with the aim in order to help in the provision of health care in the 21<sup>st</sup> century (Tatnall & Gilding, 1999). NCRS is a system with multidimensional aspects, involving numerous and shifting set of participants (“actors” and “actants” in ANT parlance), which may lead to changes in the way those various participants— patients, managers, medical professionals, and users in this case, go about performing their individual tasks and receive services. The shifting of the balance of power stems from the government reforms (NHS 2004); for example there have been seven major reforms since the NHS was formed in 1948. ANT provides a means with which to trace this trajectory, interwoven within actor networks of CIOs, IT Programme

Leads, NHS IT Strategy, National, Local Service Providers, Secondary Care, Primary Care GPs, System Suppliers, Network to Infrastructure Suppliers to Clinical Staff, interacting with Patients within the emergent NHS Care Records in order to examine and to explain “*why real time health-care is delivered or not*” in the present day NHS?”.

In order to better understand the role that Actor-Network Theory can play in appreciating NCRS implementation, part of the paper examines the theory itself, how it has evolved to its current status and previous examples of its use in health care settings, as well as its strengths and limitations. A description of the Integrated Care Records Service is included to provide a basic understanding of how the system is scheduled to work. The paper concludes with a discussion of the research results.

## **2. ACTOR NETWORK THEORY (ANT)**

Actor Network Theory (ANT) is especially promising as a basis for theories of information and communication technologies because this theoretical framework provides a vocabulary and a conceptual apparatus that allows us to analyse the role of technology and humans without resorting to simplistic and deterministic searches for causal connections. When we use actor network theory, we explore “*the act of doing*” the way in which the different factors form the network and in this sense the “individual” undertaking the task is the network (Hanseth, 2002).

Actor-Network Theory is particularly promising as it ignores the micro-macro dichotomy and includes all relevant entities irrespective of scale. This is particularly apposite to our explorations of the ICRS and NHS as they span from the individual patient encounter, via the multiplicity of organisational primary and secondary care services to the Ministry of Health and the Government itself.

ANT makes available to IS researchers this notion of the actor network(s) and the dynamics of their coming into being. Actor networks are heterogeneous congregations of humans and artefacts of all kinds. They convene together at the prompting of a focal actor, who problematises a situation in the real world then seeks to address it through the creation of an actor network. The network becomes the solution to the problematisation. The focal actor achieves this through a process of what is called translation. Humans and artefacts are persuaded, cajoled, prompted and beguiled into joining the network. In the case of artefacts, they may be designed and developed or procured. Technologies that have the focal actor’s interests inscribed in them are used, as Latour (1987) says, as machinations, strategies to translate other actors around themselves into and to further consolidate the network. They can be powerful in creating an *intéressement*, a closure around other actors, locking them in, through their functionalities and services, *enrolling* them into the network. Multiple actors, once enrolled, are then *mobilised* to address the problematisation. In doing so, the actors traverse the obligatory passage point originally envisaged by the focal actor. They constitute hybrid entities that act. This marks the irreversible convocation of the network. The network is further consolidated by addressing additional obligatory passage points. New alliance may form, and the network can become unstable. In turn these are also formed from objects or actors in other networks, in some instances another network may be ‘black boxed’ to appear as a single actor when it is actually a composite entity (Tatnall and Gilding, 1999).

ANT with its focus on its description of heterogeneous networks offers an ontological framework for understanding real world situations, here in health, as presented by Atkinson (2002). As for ANT’s epistemology, Lemke (2001) sees ANT as providing an “actantial-relational epistemology”, in which those who are seeking to understand a network become part of it. Latour also expounds on this position when he says “...*whenever you want to understand a network, go look for the actors, but when you want*

*to understand an actor go look through the network it has traced”* . In looking, we also become part of the network.

This study uses ANT’s ontology and epistemology for developing a theoretical sensitivity that allows us to extract data from disparate sources such as the 21st Century ICRS Strategy document as well as from unstructured interviews with number of NHS Trust managers and clinicians within the UK. A representative sample of interviews were conducted and recorded.

## **2.1 ANT METHODOLOGY**

ANT analysis can provide a much broader framework to clarify the complexities of the phenomenon under investigation within the context of the emergent ICRS. In this ongoing or retrospective analysis ANT can be used to identify potential stakeholder actors, their relationships and how and why they have or have not been translated into a network (Sidorova and Sarkar 2000; Atkinson 2002).

Actor-Network Theory was originally delineated by Michel Callon (Callon 1986) to study the embedding of non-human artifacts within social action in political and organisational environments. It has evolved into a powerful solution to escape from the two extreme positions of technological determinism and social reductionism or constructivism. The first position implies that technology simply goes about “doing its own thing”, follows its own logic, and determines its own use, with the further implication that humans are somehow merely led along or forced to go along (Winner 1977). The second position holds that we as individuals and as a society simply develop our own technology as we see fit, using it any way we wish to perpetrate some form of agency—while the technology has no role to play in that decision (Woolgar 1991). It is argued here that Actor-Network Theory provides a position between those extremes, one in which actors are in fact hybrids of the human and non-human: “humanchines” in which each both enable and constrain the other within any act or interaction. One of the developers of the theory, Bruno Latour, describes an automatic door opener as an “actant” (Latour 1998d).

In the context of advanced communications technologies, ANT allows a more complete understanding of the relationships entailed between technological and the human actors (Atkinson et al 2001). While other theoretical frameworks - structuration theory (Orlikowski 1991; Giddens 1984) , phenomenology, hermeneutics, or Habermas’ theory of communicative action (Gustavsen et al 1990) - do similar things with human agency, Actor-Network Theory takes this one step further, in the recognition of non-human artifacts as “actors” or “actants” within a network that acts (Gärtner et al 1996).

In essence, Actor-Network Theory does not distinguish beforehand between social and technical elements, or human and non-human elements, within a network. Rather, it provides detailed explanations of the “socio-technical web” (Atkinson et al 2001), so that concrete descriptions can be given of how, exactly, the network is holding together. This stems from the preceding assumption that humans are not the only ones with agency, or “acting” in these systems. Humans are, in this context, “humanchines” who are continuously interacting with technology to do something, here, in the form of information systems (IS). The basic premise of Actor Network Theory is that the “world is full of hybrid entities” (Latour 1998d). This model has been developed to analyze scenarios where there were both human and non-human actors; to separate the two would be difficult or impossible. Once there is a network formed, more actors may enter and leave, as networks are not static. New alliances may form and the network may become unstable. New networks are formed from objects or actors in other networks; in some instances another network may be ‘black boxed’ to appear as a single actor when it is in reality a composite entity (Latour 1998d). Actor Network Theory provides a paradigm by which to analyze computer based information systems and the clinicians who deploy them in providing care to patients (Ryder 2003).

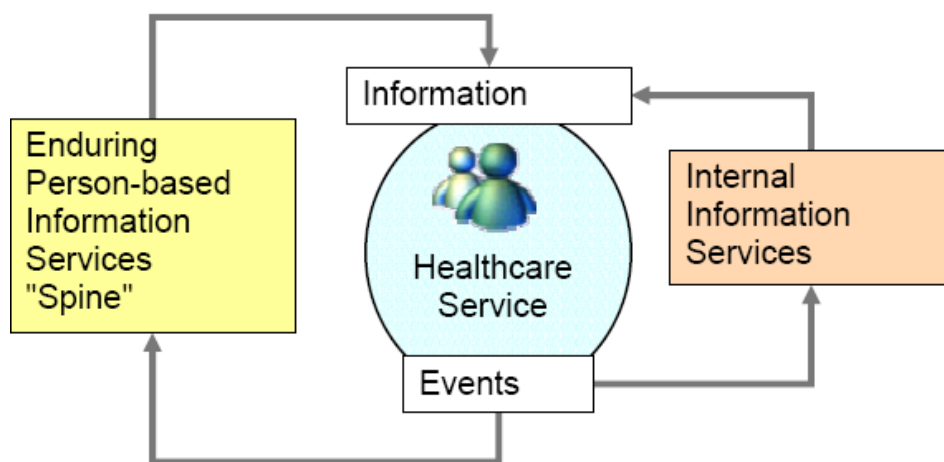
The initial analysis of the ICRS was carried out using the interpretive case study methodology (Walsham, 1995) as a guide to the collection and analysis of data. Data collection included obtaining documentary evidence such as documentation of the National Programme initiative, reports, and e-mail, and conducting a representative sample of interviews with organizational members at different levels and departments who had participated in (or had been affected by) the ICRS initiative to different extents. All interviews were fully taped and transcribed. Then, the next stage was to trace actor-network creation (Callon, 1986) in the context of ICRS as presented in the next section.

### ***3. THE INTEGRATED CARE RECORDS SERVICE AS AN ACTOR***

The Integrated Care Records Service (ICRS) is one of the four key deliverables set out in the new NHS IT procurement strategy 'Delivering 21st century IT support for the NHS', published in June 2002. The ICRS which is also called the NHS Care Records Service (NCRS) is intended to be a “broad, continuously expanding and maturing portfolio of information services covering the generation, movement and access to health records,” including electronic prescribing in hospitals and workflow capacities for the management of patients’ care pathways through the NHS (NHS, 2002). The whole initiative seeks to make individual patient information available to enhance the provision of care any where at any time at the point of need across the UK NHS. This will seek to be accomplished through a secure network, guaranteeing the confidentiality of information related to patients and healthcare professionals. ICRS is a multidimensional system involving various volatile and shifting set of participant actors, stakeholders and artefacts.

The benefits of ICRS include convenience and confidence, 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). It is seen by the government as a powerful machination for convening a multiplicity of services together for the benefit of the patient and the care service providers.

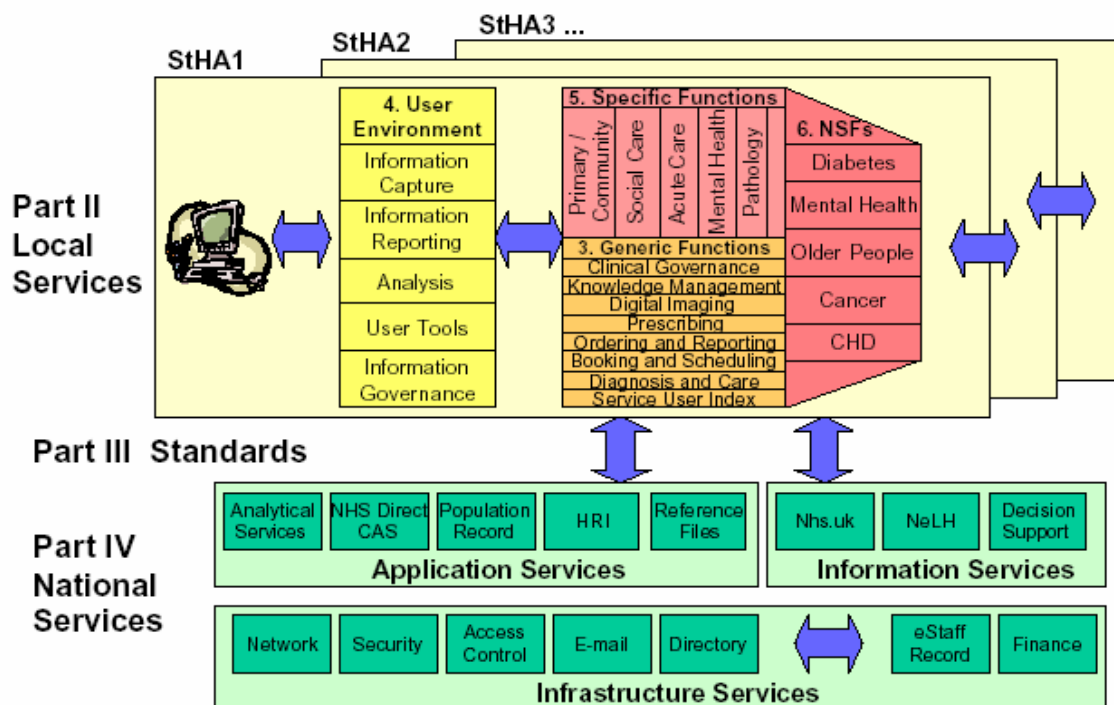
#### **Part I ICRS cycles of information:**



The NHS Data-Spine is a lifelong record of care events for each individual available to the patient and future care providers. This equates to Part I of the ICRS service in the Output Base Specification

outlined as part of the 21<sup>st</sup> Century IM/T Strategy as seen in the above diagram (NHS 2002). The process to deliver the NHS data spine, i.e. the infrastructure (Part I of the ICRS service above), supports the NHS vision that every person in England would have their own life-long electronic health record (EHR). The Integrated NHS' Care Records Service (ICRS) incorporates concepts of both the organization-specific EPR and also the 'cradle-to-grave' Electronic Health Record (EHR) (NHS 1998(NHS Plan 2000) (NHSia 2005). NCRS offers a technological benefit in health delivery that is broader than narrow clinical applications. Used with a unique patient ID number, this would provide a single source of reliable up-to-date information for all health professionals, and hence help reduce errors, delays and fraud and provide a rich data source to monitor health trends.

## Part II: Integration of the Data-Spine to Local Services, Standards and to National Services



This will integrate Part II which incorporates the local services with clinical governance, national service frameworks so that these Part III Standards are compatible with that of the Part IV National Service requirements. This will ensure seamless health provision across the Strategic Health Authority (StHA), Local Primary Care Trusts and Acute Foundation Trusts within the counties both locally and nationally. Such an integrated healthcare actor network, when consolidated, would provide an NHS patient healthcare at any point of need, anywhere, any-place and anywhere 24/7 within the UK. So, irrespectively of whether the patient resides in Birmingham or Leeds or London, the same standard and quality of care can be provided for. The complexity of integrating these automated islands of functionality from Part IV National to Local services to include user environment, specific functions and delivery within these National Service Frameworks NSF is tremendous, not excluding the influences of volatility of government reforms

**Figure 1: The ICRS structure (adapted from NHS 2002)**

When looking at the implementation one of the outstanding factors is the lack of standard EHR implementation procedures (NHSIA, 1999). The department of Health have recognised the need for the service to be fast and efficient with care records, but that these should not only be just standard health service records, but integrated with social care records, and focusing on the patient in an holistic manner, not designed around the institutions (Department of Health, 2002). Looking at the changes that have been proposed, the main factor is the need for a single national system, rather than a collection of smaller local systems that are then linked up (Department of Health, 2002). This will allow local flexibility, but integrated health records will be accessible and shared by healthcare professionals across the different health regions.

Thus the implemented integrated care records services (ICRS) records service will be:

- Integrated across all health and social care settings;
- Designed around the patient, and not around individual institutions;
- Able to support the implementation of care pathways as part of National Service Frameworks (NSFs).

The proposed ICRS moves away from the model of a number of separate information systems based primarily around organisational structures to one in which care professionals in many organisations are provided access to the one patient integrated record service. The services will include access to records and the functionality needed to support clinical practice and the provision of social care. The ICRS, if realised, would have a powerful role in convening the necessary care givers around the individual in need. ICRS incorporates concepts of both the organisation-specific Electronic Patient Records and also the cradle-to-grave Electronic Health Record and supersedes the Information for Health Strategy (NHS 1998) (see Schematic Layout for ICRS in **Figure 1**). The ICRS is required to realize a central health strategy aimed at addressing the Department of Health's problematization of the need for seamless patient care, which entails access to the patient record anywhere within the NHS at any time. This paper presents some initial findings of analyzing the ICRS to date using the ANT approach, which given the stage of the project will be in retrospect.

Following this model, ANT can be used to analyse the rationale behind the successful or unsuccessful implementation of the ICRS. The key human actors in major ICRS implementation include board members, senior management, clinicians, particularly doctors and nurses, technical staff project managers, administrative, clerical staff and the patients. There are also non-human actors such as the structure of the local health economy, Information for Health Strategy, models such as the 21st Century Strategy paper, Medical records and the capabilities of the ICRS suppliers. On reflection, what can be discovered is a complex organisational/contextual dynamic, where the Government's current political agenda mediates organisational forms and performance with respect to external changes such as shifting the balance of power Information For Health Strategy 1998-2005 (NHSIA 1998) from institutes to patient's and their carers.

## 4. DISCUSSION

Latour (1987) describes the role of machine actors tying actor networks together: “The simplest means of transforming the juxtaposed set of allies into a whole that acts as one is to tie the assembled forces to one another, that is to build a machine. A machine as its name implies, is first of all, a machination, a stratagem, a kind of cunning, where borrowed forces keep one another in check so that none can fly apart from that group”. (p. 128-129).

The ICRS, in Latour’s terms we would argue, can be seen as a machination on behalf of the UK government, a machine to convene disparate individual, organisational and institutional actors associated with healthcare together at several levels to form a greater machine with multiple machinations. These levels within healthcare can be seen as: firstly those of the individual in need; secondly those disparate carers who need to communicate with each other about both individual and numbers of patients; thirdly, are the organisations that manage and deliver care to groups of patients; fourthly those organisations that plan and orchestrate care at a regional level; and finally, within the government itself, those Ministries under whose disparate aegis these care services come.

The ICRS is intended, initially, to be a machination, working on behalf of the patient/client as the focal actor within a patient episodic network. Its role, firstly, is to enable the person, the patient in healthcare and client in social care, in convening and coordinating a number of care givers around themselves to provide the episode or ongoing care in an integrated fashion. The ICRS, is also the virtual place where a corporeal patient/client is embodied electronically within a set of case notes and services, accessible to all health and social care providers in secondary care and community primary care settings. So secondly it is a machination of the case manager, or care team who is seeking to provide care through orchestrating and communicating across multiple care givers, clinicians and social workers, at one time for the individual and groups patient/clients. It consolidates the care team, by having their interests as well as the patients inscribed within it.

Thirdly, the ICRS is a machination of the government to bring what have been traditionally disparate care sectors and organisations together: social services, hospitals, general practices, mental health services, and so on. To get them to talk and work together, using case and aggregated data, on the delivery of care, its standards and how to integrate them across agencies in the future (Johnson McManus 2005). Fourthly, to enable social and health services at local and regional levels to have joint plans and set targets for and monitor the delivery of integrated patient care services so as to address and improve the health and social well being of large groups of patients/clients, as well as manage resources (Rao 2005). Finally fifth is, we conjecture, a cunning stratagem of the Ministry of Health to bring social care back under its aegis. Social care services have been within the remit of the Department of Work and Pensions for many years. Anything that can assist in bringing it back into the health fold, such as the ICRS, is a machination of the Minister of State for Health of the highest order and therefore priority.

All these machinations are encapsulated within the ICRS as exemplified the government’s Ministry of Health National Specification for Integrated Care Records Service (NHS 2002) when they say: “There is a core set of generic functions, to operate across the whole health community. These include the patient/service user index, diagnosis, treatment and care management, booking and scheduling, ordering and results reporting, prescribing, digital imaging, access to knowledge (developing into decision support), clinical governance and operational service management. It is important that such services are provided within a common user environment that enables the capture of information, the reporting and analysis of such information, and the provision of flexibility and user tools to support local development. It is vital that the services are based around a robust framework of Information Governance, addressing security, confidentiality and data quality issues”.



However given the history of public service Information Systems and Technology initiatives (Fitzgerald 2000; Finkelstein and Dowell 1996; Jones 2002) within the UK health service, we would see the ICRS as a machination that would have to forge alliances at local and government levels and with many other human and IS&T actors if it is to be successfully implemented and its benefits realised. The NHS Information Authority (NHSIA 1998), which is responsible for the ICRS, does not have the national or local power to affect the politics of organisational change necessary to convene the people and organisations around the ICRS into the care networks envisaged. Only if the government and its alliances associate with its proxy organisational actors of the Regions, Local Health Authorities and Primary Care Trusts as well as the numerous clinical professions who provide care, the latter notorious for their non-compliance with government machinations, will this be achieved. The individual patient alone is politically too weak; collectively though they can vote out the government, so they too must be politically translated into accepting and forming an alliance with the ICRS. The patient is the main 'stakeholder actor' within the so-called patient centric and episodic electronic care record NHS care, but the interests inscribed in the ICRS strategy are that of organisational and national level actors within the government. To achieve all these interests of Regions, Local Health Authorities, Primary Care Health care professionals and the patient- public inscribed within the ICRS so as to translate them will be a machination in its own right. Whether the government will accomplish those necessary translations and alliances to take advantage of the ICRS as a machination working on behalf of the patient and all the other institutional actors within healthcare; only time will tell; though history seems to be against it.

## 5. CONCLUSIONS

It is argued here that the use of ANT analysis in the ICRS UK NHS environment can provide a vision of what the future will hold for ICRS when this actor network comes into being. This ANT lens will look at organisational /IS actors and how that integrates together and the role of ICRS within the new emergent network. Given the level of complexity as well as the mix of human and non-human ingredients within the ICRS, Actor-Network Theory is a strong candidate for the type of examination that will highlight the complexities in implementing ICRS. ANT here in this paper reveals ICRS as a machination on behalf of the government. This research in progress paper has proposed and sought to demonstrate how, using the ICRS project as an example the powerful notion of translations in ANT, coupled with stakeholder analysis, can contribute to a richer understanding of complex phenomena. Further research, in addition to studying the translations of ICRS as it evolves, could consider extensively the different interests and values that underpin this evolution. With reference to the case of the ICRS or Integrated Care Records Service in the NHS, the paper has demonstrated how this can take shape in practice. Following from this exercise, a further detailed research can be beneficial in that it can provide a retrospect and prospective perspective of the importance of all actors chosen in the analysis discussed, arguing that there are multiple perceptions of how a project evolves and is translated.

The challenge for the ICRS is to align diverse interests such as the following: advance social responsibility within the context of providing improved levels of healthcare; ethically implement an electronic record-keeping system; carry out an implementation approach that utilizes a systematic, well-thought-out national plan; improve healthcare delivery by using a system for data dissemination that is relevant, timely, and easily accessible whilst taking security and confidentiality issues into account. The findings will have implications for the way information management and strategy groups channel NCRS implementation or other ambitious projects in the NHS and may contribute to better implementation practices. Beyond the specific ICRS context, the study of interests and values can also lead to a discussion of better informed ways of managing ethical issues, an area of research that has ample scope for further development in ANT literature, while it remains critical for IS practice. Such a detailed study is required to explain inscriptions and translations that occur or not over time.

ANT does not have a long history; its roots are in the science studies rather than information systems, but it has been extended by its progenitors to encompass the later. If the theory can be successfully used for analysis in an environment such as the ICRS implementation process, the findings may also have implications for how Information Management and Strategy Groups think about implementation in general of the futuristic Electronic Patient Record System. This focus has the potential to contribute to better information systems, development practices and organisational development by underpinning complementary strategies and informing future integrated research in the healthcare field. ANT, as this case illustrates, offers, on the one hand, an opportunity to move away from the anthropocentric nature of organisational development approaches, the majority of which have no way of encompassing information systems. On the other it offers a means of accommodating the human within information systems that does not reduce them to the technocentric term as that of the information technologies 'user'. Rather it accommodates both within the concept of the 'humanchine' actor network that is an information system.

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