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Entangled Stakeholder Roles and Perceptions in Health Information Systems: A Longitudinal Study of the U.K. NHS N3 Network

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Abstract:

The combination of pervasive and complex technology and an increasingly challenging healthcare environment is the setting for this research study. As a longitudinal case study, the research tracked the development and implementation of a large private information systems network in the U.K. National Health Service (NHS). Using stakeholder theory, we unpacked the story of a complex network of stakeholder roles and perceptions and how they changed over time. Our findings suggest that favorable and unfavorable positions held by multiple stakeholder groups become entangled and that even the same focal group may adopt competing positions that undermine the adoption of the health network. As this situation develops, the policy and implementation of the broader health IT program becomes confused and destabilized. This study makes three contributions. First, it expands the literature on stakeholder theory in the IS domain. Second, it extends the managerial focus of stakeholder approaches to include policymaking in the diverse multi-stakeholder setting of healthcare. Third, it demonstrates how IS research can employ stakeholder analysis by adopting a broader, dynamic approach to identify different stakeholder groups and by focusing on their varied roles and views during the course of a large-scale health IT program.

Keywords: Entangled Information Systems, Interpretive Stakeholder Analysis, Healthcare, NHS, N3 Infrastructure.

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1 Introduction

The U.K. health sector comprises a federated structure where many different organizations (general practices, hospitals, outpatient departments, clinics, laboratories, surgeries, specialist units) all use information technologies for clinical and non-clinical purposes. Integrating diverse technologies for patient-data sharing at the inter-organizational level is a contentious and challenging issue for policymakers, healthcare professionals, and other relevant stakeholders (Payton, Pare, LeRouge, & Reddy, 2011). At the intra-organizational level, organizations' (e.g., teaching hospitals) functional and specialist structure builds on this complexity as stakeholders compete for scarce financial resources for healthcare technologies (e.g., medical devices, monitoring equipment, IT applications) across and in departments (Wang & Huang, 2012).

We conducted a longitudinal case study to track the development and implementation of a national IT infrastructure in the U.K. health sector. The development of a common infrastructure "for secure sharing of information" was an integral part of the National Health Service (NHS) Information Management and Technology (IM&T) strategy's launch in the early 1990s (NHS Executive, 1994b). Part of the IM&T strategy was the NHS-Wide Networking (NWN) project, which aimed to implement efficient, secure, and cost-effective communication across the NHS. As a result, the NHS created the NHSnet network in the mid-1990s. As the government revised the NHS strategy and structure at the turn of the century, the NHS N3 network infrastructure superseded the NHSnet. This formed part of the National Program for Information Technology (NPfIT) to connect over 30,000 General Practitioners (GPs) in England to almost 300 hospitals, which potentially allowed 50 million English citizens (patients) to access their personal healthcare information online (Currie, 2012). Commencing in 2002, the NPfIT became the largest public health IT program ("the program") worldwide (Chantler, Clarke, & Granger, 2006). The NHS N3 comprised the "backbone" of the program, with other large-scale projects in the form of an Electronic Health Record (EHR), Electronic Prescription Service (EPS), and Picture Archiving and Communications System (PACs) being developed concurrently (NHS Connecting for Health, 2006).

Since the IM&T strategy and the NPfIT involved numerous stakeholders including politicians, clinicians, patients, hospital managers and administrators, patient groups, healthcare charities, health IT firms, and others, we adopted an interpretive stakeholder analysis to capture the diversity and complexity of the national information infrastructure in the NHS. Using stakeholder theory, we developed a conceptual model to analyze data collected over 15 years. Our findings suggest an evolving and entangled health information systems environment in which values, interests, and responsibilities among the various stakeholders serve to either enhance or challenge the NHS network infrastructure. As both an inter- and intra-organizational system, the NHSnet and then the N3 have been part of a wider political, economic, and social debate with different stakeholders expressing either their support or lack thereof to the infrastructure. Some have further challenged the network not simply as a technical initiative but as part of a large-scale public sector IT outsourcing contract that is "too big to fail" (Ritter, 2010) yet whose benefits "are yet to be delivered" (British Parliament, 2013). As the NHSnet transitions to become the NHS N3, our study contributes to the information systems literature on long-term, large publicly funded IT projects, builds on stakeholder theories that capture the diversity of the health sector, and offers policymakers and practitioners guidelines for introducing complex health IT.

This paper proceeds as follows. In Section 2, we discuss where stakeholder theory originates and how it has evolved in the management literature, and we review its use in the IS field. Stakeholder theory has become popular in social science, and corporate strategy and business ethics scholars have adopted it in the general management literature (Freeman, 1984; Arnold et al, 2012). As an inherently managerial and pragmatic theory (Donaldson & Preston, 1995), it provides a useful lens for analyzing the complex relationships between organizations, groups, and individuals. While it is relevant for analyzing large-scale, complex IT programs, such as the NHSnet and the N3, we suggest that its theoretical base needs further development. We believe that one can do so by positioning different stakeholders in their institutional, organizational, temporal, and spatial contexts.

To illustrate how stakeholder theory has shaped our conceptual framework, in Section 3, we present a set of theoretically grounded principles for studying stakeholders. In Section 4, we present our methodology. The challenge of capturing the views and perceptions of multiple stakeholders in large IT projects in healthcare supports an interpretive stakeholder analysis, and we show how the principles guided our approach. We supplemented our primary data with secondary source data from government reports, audits, and media coverage of the NHS IT programs and the NHS network infrastructure. In Section 5, we present our case data on the NHS network infrastructure. We examine how it has developed over time as a result

of new policy directives and many contractual changes. We employ a heuristic representation that captures the entanglement and perceptions of multiple stakeholders vis-à-vis the NHSnet and the N3, and we identify five ideal types to represent stakeholders, which we use as a point of reference for reviewing stakeholder “movement” over time. In Section 6, in concluding the paper, we discuss our theoretical and methodological contributions and make suggestions for IS research using stakeholder analysis.

2 Stakeholder Theory

The body of literature using the term stakeholder has grown considerably over a 30-year period. One can find the origins of stakeholder theory in strategic management (Clarkson, 1995; Freeman, 1984; Frooman, 1999) and more generally in organization theory (Donaldson & Preston, 1995; Rowley, 1997). A commonly used definition is: “A stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization’s objectives” (Freeman, 1984, p. 46). Despite this reference’s wide citation, a variety of stakeholder definitions (see, e.g., the list by Mitchell, Agle, and Wood (1997, p. 858)) and a variety of terms on how organizations can identify, analyze, or manage their stakeholders (stakeholder theory, stakeholder analysis, stakeholder mapping, stakeholder engagement, and stakeholder identification) exist.

In analyzing the extant literature on stakeholder theory, Laplume, Sonpar, and Litz (2008) identify three major periods: 1) incubation (1984-1991), 2) incremental growth (1991-1998), and 3) maturity (1999 onwards). Initially, scholars mainly discussed stakeholder theory in conference proceedings, workshops, and practitioner journals. As it became more established, seminal works began to appear in leading academic journals, such as the *Academy of Management Review* (e.g., Donaldson & Preston, 1995; Jones, 1995; Mitchell et al., 1997). Building on this work, the management literature has presented since the late 1990s a notable shift from the instrumental agenda on improving an organization’s strategic position to a normative rhetoric that acknowledges the value of the stakeholder concept for ethical management (Arnold, Beauchamp, & Bowie, 2012; Freeman, Harrison, Wicks, Parmar, & le Colle, 2010; Taschman & Raelin, 2013). In the same period, the stakeholder literature has expanded its theoretical repertoire in many areas including corporate strategy (e.g., Berman, Wicks, Kotha, & Jones, 1999; Harrison & Wicks, 2013; Hillman, Keim, & Luce, 2001; Frooman, 1999), business ethics (e.g., Garriga & Mele, 2004; O’Riordan & Fairbrass, 2014; Phillips, 2003), and policy (e.g., Balzarova & Castka, 2012; Lahdelma, Salminen, & Hakkanen, 2000; Rasche, 2012).

Common across this research is the view that stakeholder theory is “managerial”; that is, that attitudes, structures, and practices all constitute a stakeholder management philosophy (Donaldson & Preston, 1995, p. 87), and represent a pragmatist approach to management theory. For some, stakeholder theory’s paradoxical nature (Laplume et al., 2008) treats stakeholders as both means to ends and ends in themselves (Goodpaster, 1991). A more nuanced approach to stakeholder theory recognizes existing and potential conflicts among stakeholder interests whereby stakeholders may exploit the political process to appropriate value for themselves and control the value created for others (Freeman, Wicks, & Parmar, 2004). In this vein, Mitchell et al. (1997) contribute a theory of stakeholder identification and salience in which stakeholders possess one or more of three relationship attributes: power, legitimacy, and urgency. They suggest that one can identify stakeholders by their possession or “attributed possession” of characteristics including their power to influence a firm, the legitimacy of their relationship with the firm, and the urgency of their claim on the firm. Notwithstanding the magnitude and salience of the “stake”, a stakeholder is part of the nexus of implicit and explicit contracts in the firm, with managers in the heart of the contract nexus (Hill & Jones, 1992, p. 134). Mitchell et al. (1997) describe stakeholder theory as a “popular heuristic” for researching the management environment despite not having attained “full theoretical status”.

A consequence of the dominant managerial focus of stakeholder theory in this literature is that scholars have studied stakeholders in relation to a focal organization. Such an approach, however, overlooks the complexity of inter-organizational relations in the wider socio-political and economic context. The longitudinal study we present here captures the complexity around interpreting and implementing public sector health IT policy—the U.K. NHSnet/N3—in a federated NHS organization that employs over 1.3 million people. Notwithstanding the managerial and pragmatic theme of much of the stakeholder literature in business and organizational studies, we demonstrate stakeholder theory’s potential theoretical relevance and application for IS research.

3 Information Systems Stakeholders

The growing use of the term stakeholder in IS research supports the view that multiple stakeholders play a part—albeit at varying degrees of power, control, and influence—in the information systems mix of activities. In IS, there is a general trend towards acknowledging the roles and perceptions that a broad and heterogeneous set of interested parties or relevant social groups play and have, respectively (Wilson & Howcroft, 2005). Because the stakeholder concept invites the researcher to recognize multiple interests, stakeholder analysis encourages a broader approach to information systems development, implementation, and strategic planning (Bento, 1996; Lyytinen, 1988; Pan, 2005; Ruohonen, 1991; Vidgen, 1997).

Adapting Freeman's (1984) definition, we define information systems stakeholders as the individuals, groups, organizations, or institutions who can affect or be affected by an information system. This broad definition extends the scope of much earlier work in IS research. While researchers have previously located or studied IS stakeholders internally in the boundaries of a single department or organization, multiple constituencies across external entities comprising complex socio-political and economic relationships not easily depicted in a simple list also likely influence such stakeholders (Pouloudi & Whitley, 1997). Despite the (ongoing) predominant focus in the literature on the users, developers, and managers, IS stakeholders include other groups and individuals (Lyytinen & Hirschheim, 1987) such as, policymakers, activists, government agencies, professional and membership organizations, and others. This fact necessarily extends stakeholder's definition beyond the managerial remit. For example, a government policymaker may not be a direct user of an information system but will have a "stake" in making decisions on matters such as allocating resources and implementing policy. Similarly, a clinician may adopt an advocacy role to promote a health IT program to increase adoption rates, while other clinicians may resist such change (Currie, 2012). Thus, individual "stakes" may vary even though people may occupy the same professional or managerial role (Bourdieu, 1977).

Further, as noted by Pouloudi and Whitley (1997), few authors in the literature explain explicitly why certain parties are stakeholders and how they identified them in their study's particular empirical context (Howard, Vidgen, & Powell, 2003; McAuley, Doherty, & Keval, 2002; Shankar, Urban, & Sultan, 2002 are some recent notable exceptions). In the context of healthcare IS research, the literature using stakeholder analysis is relatively scarce despite the many stakeholder groups involved in introducing information systems into this complex and diverse sector. A notable exception is the extensive list of health IT stakeholders that Payton et al. (2011) provide. Mantzana, Themistocleous, Irani, and Morabito (2007) propose a method for identifying the role of actors in IS adoption that are both static and dynamic by which they identify 18 actors. While we elucidate the IS-adoption process in a particular healthcare setting and, more particularly, the key actors (or stakeholders) involved, we stress that one cannot generalize the data and observations from the case. A methodological challenge, however, is that identifying stakeholders is a complex process, particularly in the case of large-scale and long-term information systems programs. As such, this gap in the literature invites research that presents extensive and systematic illustrations of the relevant methodology that can serve as a reference for similar work.

Other work on stakeholder groups including hospitals (Palvia, Lowe, Nemati, & Jacks, 2012) and patients (Paul, Ezz, & Kuljis, 2012) has observed the varying degrees of stakeholders' power, interest (Boonstra, Boddy, & Bell, 2008), and engagement in large public-sector health IT projects (Rotomskiene, 2011; Cavazza & Jommi, 2012). Few studies, however, have traced stakeholder engagement and involvement over long-term health IT projects, particularly where shifts in policymaking stem from direct or indirect stakeholder actions and priorities. The health IT literature widely uses the "stakeholder" concept. However, in reviewing the literature, we found that most studies have largely used the term in a mechanical and "literal" sense to develop managerial tools and techniques to "engage" stakeholders in various health-program initiatives (Cresswell & Azis, 2009). Moreover, the U.K. NHS public documents contain numerous policy statements from healthcare organizations outlining their "stakeholder engagement strategy" with guidelines for identifying key stakeholders, for assigning roles and responsibilities. We note that this literature invariably describes stakeholders as either engaged and committed to a health IT program or not fully engaged or even resistant (Pagliari, 2005). The reference to stakeholders extends to government publications where the failure to "engage" key stakeholders in the NPfIT Program was depicted as a policy shortcoming which underplayed the importance of "winning the hearts and minds" of NHS staff (National Audit Office, 2006, 2008). Therefore, the academic and practitioner literature on stakeholder engagement in relation to large-scale, complex health IT projects seems largely unconcerned about addressing the deeper issues underpinning how and why identified stakeholders may become fully engaged or disengaged with such

programs. Further, these literatures barely (if at all) emphasize how clinical and non-clinical groups, for example, may shift their positions over time from being generally supportive of technical change to becoming resistant to change. While publications may discuss these issues at a superficial level, the solutions put forward to increase stakeholder engagement are usually to generate more information about the policy rationale for a new health IT program to “bring people on board” rather than a deeper analysis about how such change will affect different stakeholder groups.

To understand IS stakeholders in more depth, in Section 3.1, we propose a set of literature-based principles that characterize stakeholders, their roles, interests, perceptions, behavior, and relations. These principles serve as the basis for our interpretive stakeholder-analysis approach, which we discuss in Section 4.

3.1 Principles Underlying the Stakeholder Concept

Given stakeholder theory's diversity and multiple concepts, we pursue a more systematic and comprehensive use of the stakeholder concept in our theoretical and empirical work. Reviewing the vast literature on stakeholder theory, we group this work under a more coherent list of stakeholder characteristics, which we articulate as a set of principles (Table 1). The principles underlie stakeholder's definition (who counts as a stakeholder), stakeholder roles, interests, perceptions, behavior, and relations. We use these principles as theoretical anchor points for identifying and analyzing stakeholders.

Table 1. Stakeholder Principles

Principles	Indicative supporting evidence in the management and IS literature
1. The set and number of stakeholders are context and time dependent	<p>“Within each perspective [of an IS] we may distinguish different groupings of IS stakeholders.... The ‘level of aggregation’ may vary from one situation to another: from distinguishing between individuals (one actor as a stakeholder), and groups (multiple actors as a stakeholder), to larger collectivities such as a company or a society” (Lyytinen & Hirschheim, 1987, pp. 262-263).</p> <p>“Actors come and go” (Mitroff & Linstone, 1993).</p> <p>“Stakeholders depend on the specific context and time frame” (Pouloudi & Whitley, 1997, p. 5).</p> <p>“Stakeholders change in salience” (Mitchell et al., 1997, p. 879).</p>
2. Stakeholders may have multiple roles	<p>Stakeholders “wear multiple hats” (Gilbert, Hartman, Mauriel, & Freeman, 1988, p. 111).</p> <p>“Individuals can belong to multiple stakeholder groups” (Rowley & Moldoveanu 2003, p. 212).</p>
3. Different stakeholders (even in the same “stakeholder group”) may have different values and perspectives, which may be explicit, implicit, or hidden	<p>One can better understand resistance to change, counter-implementation measures and workarounds by shedding light on organizational and political issues (e.g., Azad & King, 2012; Keen, 1981; Lapointe & Rivard, 2005; Markus, 1983).</p> <p>“The presence of multiple stake-holders with different perspectives means that the definition of use quality (the ‘ends’) is just as problematical as the management of quality (the ‘means’)” (Vidgen, Wood-Harper, & Wood, 1993, p. 110).</p> <p>Managerial hidden agendas constrain user participation and involvement in information systems development (Myers & Young, 1997);</p> <p>“Stakeholders may have a supportive influence versus conflictive influence” (Coakes & Elliman, 1999, p.10).</p> <p>“We know that developers and users are both important stakeholders in the design and development of information systems and that they often bring a different perspective to IT projects” (Keil, Tiwana, & Bush, 2002).</p> <p>“Stakeholders [are not] naively saturated by the discourse of a dominant mode of thinking to the point at which they cease to see the impact on their own lives” (McAuley et al., 2002, p. 253).</p> <p>“There are many stakeholder groups with divergent goals that are affected by e-government initiatives” (Fedorowitz, Gogan, & Culnan, 2010, p. 317).</p>

Table 1. Stakeholder Principles

Principles	Indicative supporting evidence in the management and IS literature
4. Stakeholder roles, perspectives, and alliances may change over time	<p>The literature on technological frames (Lin & Silva, 2005; Orlikowski & Gash, 1994) recognizes different stakeholder perspectives by making it a point to explore where and why key stakeholders' frames are incongruent to avoid difficulties in information systems implementations: "frames are likely to be both time- and context-dependent, and are always more valid when examine in situ rather than assumed ahead of time" (Orlikowski & Gash, 1994).</p> <p>"The position of each stakeholder may change over time" (Pouloudi & Whitley, 1997, p. 6).</p> <p>In the e-business literature, the discussion of cybermediation and re-intermediation (Giaglis, Klein, & O'Keefe, 2002) eloquently shows changes in stakeholder roles over time.</p> <p>Promoters of an information system may use resources to mobilize and engage previously inactive stakeholders (Boonstra, Boddy, & Ball, 2008).</p>
5. Stakeholders relations and power matter in the shifts in their roles, perceptions, and alliances	<p>The notion of expectation failure in information systems (Lyytinen & Hirschheim, 1987) reflects exactly this idea of a situation (or a system) being unsatisfactory for some stakeholders (even though others may consider it a success): "Feasible options may differ from the stakeholders' wishes" (Pouloudi & Whitley, 1997, p. 6).</p> <p>Stakeholder theory needs to be able to place firms in their proper context—that of multiactor relationships" (Frooman, 1999).</p> <p>"Stakeholders may have actual versus legitimate influence" (Coakes & Elliman, 1999, p. 10).</p> <p>Stakeholders may also act "against their interest" if that contradicts a fundamental value or belief (Introna & Pouloudi, 1999).</p> <p>"How a particular stakeholder group relates to the focal organization—whether and how a stakeholder attempts to influence the focal firm—depends on the surrounding context of relationships" (Rowley & Moldoveanu, 2003, p. 212).</p> <p>"Interest overlap (or divergence) across stakeholder groups affects stakeholder actions" (Rowley & Moldoveanu, 2003, p. 213; cf. Rowley, 1997)</p> <p>Stakeholders may exploit the political process to appropriate value for themselves and control the value created for others (Freeman et al., 2004).</p> <p>Boonstra et al. (2008) show how powerful players may resist IS implementation so that promoters of the project are unable to introduce a change; some stakeholders may even be unable to voice their expectations (Lyytinen & Hirschheim, 1987).</p> <p>"Stakeholders as influential actors possess power over the corporation and define the limits of responsibility" (Onkila, 2011).</p>

The first principle acknowledges the importance of context. We use context here in a broad sense; primarily, research context and the timeline marks stakeholders' salience (in our case, those who influence or are influenced by the NHSnet/N3). In a longitudinal research project, the set of stakeholders change as new players enter or leave the research scene. Additionally, the identified stakeholders bring on board their own views on who counts as a stakeholder. In this sense, one cannot treat predefined lists of stakeholders in extant research as a stable set, and such lists can only serve as a starting point for identifying stakeholders in any new empirical setting. The second principle is particularly relevant for IS research in which one considers stakeholder roles vis-à-vis the information system investigated (e.g., users, developers, resisters, and so on) and where stakeholders have one or more professional and social identities that are relevant to the research context (e.g., as defined by their expertise, hierarchical position in an organization, membership of a professional association, and so on). The third principle is at the heart of stakeholder analysis: we study stakeholders precisely because they have different stakes and views with which one can appreciate complex phenomena. The fourth principle refers to the fluidity of any research context: as conditions change (e.g., because a new information system is implemented), new roles and perspectives emerge in response to the change. Stakeholder relations and alliances change in tandem. The fifth principle marks the interdependence of stakeholders, stakes, relations, and the phenomenon under study. As stakes

and relations evolve, some stakeholders are in a more powerful position to serve their stake due to their formal role, the alliances they have formed, or the shape of the debate (powerful actors may shift relations across the stakeholder network and “translate” key issues in line with their interests (Latour, 1987)).

All five principles build on the extant stakeholder literature. However, as Table 1 shows, the supporting literature comes from varying fields in social science.

We do not claim that the five principles constitute a definitive and exhaustive list: instead, they serve as a theoretically grounded canvas that epitomizes our understanding of stakeholders and their roles, interests, values, and interrelations—particularly as they may take shape in the context of complex IS projects. In this regard, one may use the principles for abstraction and generalization (Klein & Myers, 1999). They constitute a powerful guide for systematically and dynamically identifying and analyzing stakeholders in specific contexts since it is important to identify various stakeholders based on generic principles and specific attributes (Mitchell et al., 1997, p. 871); that is, to have a theoretical basis that does not exclusively fit the specific characteristics of a single empirical context. In Section 4, we show how we operationalized these principles in our research, present our methodology in detail, and provide further context for our empirical work.

4 Methodology: Interpretive Stakeholder Analysis

Interpretive epistemology and stakeholder analysis both emphasize the need to study and be responsive to different perspectives. On the one hand, focusing on stakeholders prompts the researcher to recognize that there are different perspectives, different stakeholders, and different interests (“stakes”) (Freeman et al., 2004). Analyzing these interests can lead to interesting research results (e.g., a more nuanced understanding of the situation; a politically sensitized approach to information systems implementation). These results differ depending on who employs stakeholder analysis, in what context one employs it, and with what expectations and rationale one has to use it (Rowley, 1997). Thus, it would seem reasonable that stakeholder analysis is a research approach that fits well with the interpretive research paradigm¹.

On the other hand, interpretive research, because of its non-positivist epistemology, calls for attention to the different ways of understanding the research context. Indeed, one can find evidence for the need to consider different stakeholders’ perspectives in most interpretive rhetoric—even if the term stakeholder is not explicitly used (Chua, 1986; Orlikowski & Baroudi, 1991; Walsham, 1995; Rivard, Lapointe, & Kappos, 2011). Klein and Myers (1999), in their “principle of multiple interpretations” argue this point, which has prompted researchers to be sensitive to possible differences in interpretations among research participants. However, little evidence of information systems interpretive research explicitly addressing stakeholder issues as part of the adopted methodology exists. Rather, the information systems literature only discusses stakeholder issues as they arise from interpretive work. In other words, because complex relations characterize the research context, stakeholder issues emerge as important, but researchers have not used them explicitly to guide their research approaches (e.g., Walsham, 1993). Thus, most interpretive research provides an opportunity to identify stakeholders and highlights issues that are important to various stakeholders but does not guide the researcher in how to identify the stakeholders and how the stakes they hold may persist or change over time. Due to this lack of guidance, we reflected on our approach and, based on the stakeholder principles presented in Section 3, documented our methodological interpretive stakeholder-analysis approach. Table 2 explicates how the theory-informed stakeholder principles carry specific methodological implications in the interpretive research paradigm.

With our approach, we identified and analyzed stakeholders in the NHSnet/N3 using the data-collection methods we discuss in Section 4.1 below. We recognize the approach’s methodological challenge since interpretive methods and techniques used in interviewing capture the views and perceptions of multiple groups and individuals in the healthcare domain (broadly defined). However, through constructing a more rigorous set of guidelines for our empirical study, we collected rich primary and secondary data that identified multiple stakeholders with entangled interrelations and intertwined agendas. Having detailed our research approach, we provide a reference point for other interpretive researchers exploring stakeholder perspectives of an IS phenomenon.

¹ Interestingly, most stakeholder research has not made the underlying philosophical assumptions of the approach adopted explicit. Burgoyne argues that stakeholder analysis is not tied to specific ontological and epistemological assumptions (Burgoyne, 1994). He argues that this “middle-range” status of stakeholder analysis is one of its advantages and attractions, as well as perhaps being one of its sources of frustration” (p. 88), which is certainly consistent with the multiple ways in which researchers have employed the stakeholder concept in IS research (Flak & Rose 2005; Pouloudi, 1999).

We also acknowledge that our own interests (in our roles as researchers, journal editorial board members, citizens, and potential patients) also influence how we collected and interpreted our data; we are stakeholders of the NHS N3 as well. As interpretive researchers, we consider the fact that we are stakeholders to be a strength because it motivated us to study the network and the related strategy programs over the years. Our longitudinal engagement has also helped us recognize how debates on similar topics recurred over the years while the landscape of active stakeholders changed. The strength of the longitudinal interpretive stakeholder analysis is that we had the opportunity to delve into the “what” and “how” in depth while considering multiple perspectives. The rich secondary source material that the NHS, other government agencies, the media and professional organizations, such as those that represent both medical and computer fields, regularly published also strengthened our research inquiry. This material provided excellent factual data and journalistic accounts of the NPfIT, which supported our empirical data (see Appendices A and B).

Table 2. A Theory-informed Interpretive Approach for Identifying and Analyzing Stakeholders

Stakeholder principles	Methodological implications for interpretive stakeholder identification and analysis	Research agenda: themes and directions
1. The set and number of stakeholders are context and time dependent	Use relevant literature to identify stakeholder groups to target initially.	We used literature on IS, management, healthcare, and policy as anchor points to identify initial stakeholder groups (i.e., we noted the stakeholder groups identified by relevant papers in our literature review and considered their pertinence in our empirical context).
	Identify additional stakeholders when collecting empirical material.	We deliberately invited interviewees to identify those they considered relevant stakeholder groups for our research (cf. principle 5).
	Adopt a longitudinal approach.	We pursued our research agenda over 15 years. During this research, certain topics came to the foreground and then faded out over time. As this happened, we noted how the “protagonists” changed with some stakeholder groups coming to the foreground and others becoming less visible. We also invited stakeholders to talk about history and the future and used these responses to follow the changes in stakeholder salience.
	Review and update the set of relevant stakeholders as the research unfolds, new stakeholders appear (e.g., because of organizational restructuring), or new research in the area gets published.	Following from above, we noted the entry of new stakeholders. These stakeholders (e.g., committees) were occasionally formally “created” by other stakeholders. Stakeholders also “entered the scene” (e.g., were acknowledged as stakeholders by other stakeholders) as a certain topic of interest gained momentum or because they wished to raise awareness about an issue pertinent to a change, such as a new information infrastructure or policy. Conversely, we also noted that stakeholders disappeared when structural changes took place (e.g., at national level, bodies dissolved following NHS restructuring) or “exited the scene” when an issue was resolved or interest faded.
2. Stakeholders may have multiple roles	Consider stakeholder membership in different (professional, social) groups; note that membership in different groups may entail a conflict in vested interests.	One obvious “dual” identity for many of the stakeholders in this research was their professional role (e.g., doctor) vs. their role with respect to the NHSnet/N3 (e.g., user). We identified additional roles and identities as we considered organizational structures and hierarchies. This information prompted us to look at stakeholder groups for nuances in opinions and agendas and in (formal or informal) representation bodies (professional organizations or stakeholders identified as “speaking on behalf of” other stakeholders) (principle 3).

Table 2. A Theory-informed Interpretive Approach for Identifying and Analyzing Stakeholders

Stakeholder principles	Methodological implications for interpretive stakeholder identification and analysis	Research agenda: themes and directions
	Explore how (and why) stakeholders relate to the IS studied.	The NHSnet/N3 was central to our research agenda, so interviews explicitly addressed stakeholder views about it. Alongside, we noted general attitudes of stakeholders towards IS (e.g., awareness of issues about policy and practice of adopting information technology, and familiarity with using technology), and the role of local context in IS use (e.g., the turnover of patient population in a general practice influenced the use of electronic patient records).
3. Different stakeholders (even in the same "stakeholder group") may have different values and perspectives, which may be explicit, implicit, or hidden	Adopt an interpretive stance in eliciting and interpreting stakeholder viewpoints.	We followed an interpretive research approach drawing on Klein and Myers' (1999) principles. A stakeholder who holds strong views on a debate is often anxious to share and justify them in the interview setting; at times, interviewees can view the researcher as an ally, someone that will publicize (present or publish) the stakeholder's perspective. Clearly, this exchange of information depends on the relationship between interviewer and interviewee. Nonetheless, not all stakeholders will reveal their actual views and several may have hidden agendas.
	Invite stakeholders to comment on who shares/challenges their views.	Part of our research agenda included hidden agendas of stakeholders, which triggered responses (at times emotional) about contentious issues, such as not being fully informed about policy decisions.
	Acknowledge the interests that others attribute to the stakeholders.	Hidden agendas are difficult for a researcher to unveil but may be more transparent in longitudinal research.
	Explore how different stakeholder groups are represented (representation bodies are an additional stakeholder and may develop a separate agenda to the group they represent) and whether this representation is considered legitimate.	Similar to principle 2, we considered different types of roles and identities for each stakeholder. Divergence of perceptions in the same stakeholder group was also something we considered when analyzing the data.
4. Stakeholder roles, perspectives, and alliances may change over time	Adopt a longitudinal approach.	In addition to following the entry and exit of stakeholder groups (cf. principle 1), we noted changes in perspectives and alliances over time. While some changes were natural over time (e.g., maturing use of IS), some stereotypes and antagonistic stakeholder relations prevailed. With longitudinal data, one can identify such changes when analyzing the data.
	Ask stakeholders about how the phenomenon studied and the related perceptions have evolved.	The stakeholders' sensemaking of changes added to the richness of the data and interpretations.

Table 2. A Theory-informed Interpretive Approach for Identifying and Analyzing Stakeholders

Stakeholder principles	Methodological implications for interpretive stakeholder identification and analysis	Research agenda: themes and directions
5. Stakeholders relations and power matter in the shifts in their roles, perceptions, and alliances	Ask stakeholders to identify other relevant stakeholders and investigate why they consider them as such, what role they play and why.	See principle 1.
	Discuss if and why these change over time.	See principle 4
	Identify debates and arguments for (and against) specific issues related to the phenomenon studied.	Primarily stakeholders who felt strongly (unfavorably or favorably) about the NHSnet/N3 presented key debates and arguments. Key debates typically attracted public interest given the public nature of the network and were, therefore, also prominently portrayed in secondary data sources (see the end of Section 3 and Appendix A), such as the press, professional magazines and mailing lists.
	Interpret this data with an eye for alliances and histories (see previous principle).	In analyzing the data, we considered how stakeholders in and across groups positioned themselves in the prevailing debates about the NHSnet/N3.
	Explore why the particular stakeholder opinions and interests are reported.	As we note earlier, stakeholders are vocal about issues that matter to them. Eliciting honest responses, however, largely depends on the relationship built between researcher and respondent. The possibility to juxtapose responses from multiple stakeholders in and across groups and over time contributed to our better understanding stakeholders' motives.

4.1 Data Collection and Analysis

The setting for our interpretive stakeholder analysis was the U.K. NHS, a federated organizational structure (NHS Confederation, 2013). Respondents routinely described the NHS as “political football” because politicians constantly introduced policies to restructure and reconfigure patient care. In examining a large and complex organization, one should first identify key stakeholders when conducting a stakeholder analysis (Varvasovsky & Brugha, 2000). We examined the policy and implementation of a large-scale health IT initiative across the NHS over an extended period. We obtained the input of multiple stakeholders, including politicians, medical professionals and patient representatives, parties who worked outside the NHS, and management consultants and media representatives (both of whom exerted their influence to effect change in the U.K. NHS). As such, to gain a wider appreciation of the stakeholder landscape, we needed to identify the key stakeholder groups and examine their roles and perceptions while acknowledging (cf. principle 3) that these stakeholder groups need not be homogeneous.

Following our research approach (see Table 2 for a summary), we conducted a series of open-ended, semi-structured, and unstructured in-depth interviews with stakeholders as we incrementally identified them through the research process over a 15-year period (1995-2010). Interviews are instrumental in qualitative research approaches and are particularly appropriate for accommodating stakeholder views: “the goal of any qualitative research interview is to see the research topic *from the perspective of the interviewee*, and to understand how and why he or she comes to have this particular perspective” (King 1994, p. 14, emphasis added).

We used a topic guide to support the interview process. The topic guide included open questions inviting stakeholders to discuss their views on the NHSnet (our study's phase I: 1995-2001), on the NHSnet's transition to its successor, the N3, following the launch of the NPfIT (our study's phase II: 2002-2010), and on their involvement with the networks. We also asked questions about their views of who other stakeholders were and how they were involved; the networks' development and evolution; and the networks'

impact and related issues, efficiencies and inefficiencies, and successes and failures. We stress that we did not overly focus on the final outcome of the NHS N3 system or on offering healthcare managers a “stakeholder toolbox of techniques” to reflect stakeholder theory’s predominantly managerial perspective. Rather, we analyzed multiple stakeholders’ roles and perceptions and their entangled interrelations and intertwined agendas rather than individual stakeholders’ priorities, stakes, and preferences.

We invited stakeholders to identify other relevant stakeholder groups and present their views on their interrelations and to reflect on aspects of the National Program for IT and related policies that have changed over the years (see Table 2). Thus, although our study did not start out as longitudinal, the methodological approach we used ensured that we interviewed a range of stakeholders about the same IS project implementation (i.e., the virtual private network developed to support data exchange among all NHS organizations over a period of 15 years).

Interviewees included stakeholders from multiple stakeholder groups that we incrementally identified while conducting this research. The “obvious” starting point was NHS bodies leading the initiative for the NHSnet/N3 and the NHS members (primarily GPs) that were key users of the network services. Others consistently recognized some of the stakeholder groups (including doctors, hospital management, and members of the British Medical Association) as primary stakeholders, so we interviewed multiple individuals. We conducted 30 formal and 40 informal interviews in total during the 1995-2001 period (phase I); we conducted a further 85 interviews during the 2002-2010 period, which included respondents in 10 NHS hospitals in the (original) five NPfIT regions of England, after the national program for IT’s launch in 2002 (phase II). Table 4 (see Section 5) lists the stakeholder groups. Table 4 also indicates where we used secondary sources to provide additional evidence for a stakeholder group’s role and views. We tape-recorded most of the formal interviews; on average, they lasted for one to one-and-a-half hours. We took hand-written notes for the interviews that we did not tape-record. We did not arrange informal interviews beforehand, and they were shorter in duration and usually conducted alongside events related to using information systems in healthcare. In all cases, we took care to transcribe or produce a report shortly after the interview (typically on the same day).

Because of the research domain’s complexity, we collected a variety of data sources to support the interview data, which allowed for richer insights into the research context (see Table 3). For example, we could not interview some of the identified stakeholders, such as political figures. In such cases, we used references in official documents, public speeches, and other stakeholders’ commentary (e.g., specialist mailing lists such as the GP-UK list). Appendix A provides sample extracts from secondary sources that we used to help identify stakeholders and collect data. Given the wide array of stakeholders involved in the NHS N3 network, we focused on showing how diverse views among different stakeholder groups are likely to interrelate and fluctuate over time depending on many factors, including political, professional, cost, and technical imperatives. We present our data and analyze the NHS N3 in Section 5 in which we begin with the network’s infrastructure.

Table 3. Secondary Data-collection Sources

Type of data	Data source
Government reports/websites	Department of Health (www.dh.gov.uk) NHS Executive Connecting for Health (www.connectingforhealth.nhs.uk) n3.nhs.uk UK Parliament (www.parliament.uk)
Independent reports	National Audit Office (NAO) British Computer Society Caldicott Committee
Hospital reports	Annual Reports (many are publicly available)
Newspaper articles	<i>Financial Times</i> , other “broadsheet” daily newspapers, local newspapers, NHS news.
Practitioner journals	<i>British Journal of Healthcare Computing & Information Management</i> <i>Network News</i> <i>Computing</i>
Mailing lists	GP-UK mailing list
Websites of patient representation groups	http://www.patients-association.com/ http://www.napp.org.uk/ http://www.npsa.nhs.uk/ http://www.npsf.org/

5 The NHS N3 Network Infrastructure

A key aspect of the NHS information management and technology (IM&T) strategy in the early 1990s was the NHSnet infrastructure, designed to enable information exchange among NHS members in a secure and efficient manner. As an NHS-wide networking project launched by the U.K. Government in 1993, it was operational by 1996. Since the National Program for IT (“NPfIT” or “the program”) replaced the IM&T strategy in 2002, the “national network for the NHS” or “the new NHS network” (“N3”) replaced the NHSnet as a fast, reliable, and secure broadband network to transfer data between all NHS organizations. An important feature was to ensure that, as the volume of traffic increased, the quality and reliability of each individual connection would not decrease. As one of the largest virtual private networks in Europe presently with over 50,000 connections (30,000 GPs to almost 300 hospitals in England), the NHS N3 would become the Internet gateway for the NHS and serve around 1.3 million employees.

The NHS N3 is a wide-area IP network (WAN) connecting many different sites across the NHS in England and Scotland. It also connects to other networks via “gateways”, mainly via the Internet. It is the backbone of the NHS IT infrastructure that supports the NPfIT’s major components, which included the National Care Records Service (NCRS), the Electronic Transfer of Prescriptions (ETP), Choose and Book (an electronic appointments service to connect GPs with hospital and other medical organizations), and the Picture Archiving and Communications System (PACs) for digital images (e.g., X-rays and scans). These systems would hold demographic data about every citizen in England (around 50 million people) such as their name, address, registered GP, and the unique NHS number given to every person at birth. This number would allow the NHS to anonymize medical records and to link records stored in different locations to facilitate quality of care and research activity (Chantler et al., 2006).

In Section 5.1, we illustrate the numerous relevant stakeholder groups that we identified in the course of our longitudinal research while the NHSnet and then the NHS N3 were developed and implemented.

5.1 NHSnet and N3 Stakeholders

In the context of the NHS, the stakeholder landscape has clearly constantly changed (principles 1 and 4) not least because, throughout the NHS's history, government ministers have sought to restructure the institution. For example, in the executive/managerial domain, primary care trusts (PCTs) and strategic health authorities (SHAs), introduced in 2002, underwent further restructuring in 2006. In 2013, they were abolished and replaced with clinical commissioning groups (CCGs). The plan was for NHS services to open up to further competition from providers that comply with NHS standards on price, quality, and safety. With the plan for the majority of hospitals and NHS trusts to become "foundation trusts", there was potential to expand stakeholders groups, particularly as the government encouraged patients to get involved and "have their say" about NHS services. Moreover, local authorities would adopt a larger role to become responsible for budgets for public health. Health and wellbeing boards would encourage integration between commissioners of services across health, social care, public health, and children's services, with democratically elected representatives to support local people. Local authorities would further work with other health and care providers, community groups, and agencies (Brennon, 2005; Currie, 2012, 2014).

Table 4 breakdowns NHSnet and NHS N3 stakeholders (which we refer to hereafter as NHS N3 stakeholders) that we identified by following and refining the research approach in Table 2 over the course of our 15-year research study. In the table, to enhance readability, we list stakeholder groups in eight broader categories related to their role in the healthcare context. We also indicate which stakeholder groups we interviewed in each of the two phases of the research (before and after the launch of the NPfIT). For simplicity, we present together some groups whose names and responsibilities we revised or restructured over the course of our study without influencing our study (e.g., the scope of geographical coverage and responsibilities of trusts and health authorities changed, but their stake in the N3 did not).

The distinction between respondents in the two periods shows stakeholder groups were added or removed (e.g., health and wellbeing boards were established recently, whereas the Information Management Group of the NHS Executive ceased to exist in 2002) or that the set of relevant stakeholders changed as different debates on the network came to the fore (principle 1). For example, a fierce debate on patient data confidentiality in the mid-1990s meant privacy activists, security consultants to the BMA, the Data Protection Registrar, and the U.K. Government Communications Headquarters (GCHQ) (i.e., one of the three U.K. intelligence agencies) became engaged with NHSnet but became less visible when the debate receded. Some re-entered the scene when new privacy concerns emerged. In contrast, the Caldicott Committee, which convened as a result of the concern about the use of patient information in the NHS and produced "The Caldicott Report" in 1997 (The Caldicott Committee, 1997), re-convened in 2012 in response to the changing infrastructure and renewed concerns over patient data confidentiality "to lead an independent from government review of the balance between protecting patient information and its sharing, to improve patient care" (Department of Health, 2012). Appendix B (second column) presents in detail the role of the stakeholders.

Table 4 also refers to the secondary sources we used. During each phrase, stakeholders' views were influenced by many sources, especially by their representative bodies and the media. For example, the press and practitioner journals referred to the conflict between the Information Management Group and the BMA; the GP-UK mailing list reported views of GPs and the Doctors Independent Network and commented on the role of patient associations, and so on. We studied and used secondary resources invariably throughout the research period (Appendix A), so we do not present them separately for the two research phases.

Against the backdrop of a complex NHS, the continuous ebbs and flows of the NHS N3 network infrastructure, under the auspices of a highly complex and ambitious national strategy for IT use in healthcare (articulated in the NPfIT since 2002), pointed to the need for a more nuanced approach to understand the roles and perceptions of different stakeholders and how their positions or stakes were likely to alter throughout the duration of the program.

Table 4. The NHS N3 Stakeholder Groups

Domain	NHS N3 stakeholders (Names of some authorities and groups have changed over the course of the research)	Access to stakeholder views via:		
		Phase I interviews	Phase II interviews	Secondary sources
Medical professionals	Primary care general practitioners (GPs) and hospital doctors (consultants)	✓	✓	✓
	Nursing staff	✓	✓	✓
Executive/managerial	Primary care trusts (PCTs_	✓	✓	✓
	Hospital trusts	✓	✓	
	Strategic health authorities (SHAs)	✓	✓	✓
	NHS Executive	✓	✓	✓
	Information Management Group (of NHSE)	✓	✓	✓
Health representative organizations	National/regional and local medical and pharmaceutical committees	✓	✓	
	National/local user representative groups	✓	✓	✓
	British Medical Association (BMA)	✓	✓	✓
	The Pharmaceutical Services Negotiating Committee (PSNC)	✓	✓	
	Patient associations and patient groups		✓	✓
Health industry and support	Pharmacists	✓	✓	✓
	Pharmaceutical companies		✓	
Government agencies	Department of Health/Connecting for Health	✓	✓	✓
	British Parliament/Members of Parliament	✓	✓	✓
Independent agencies, societies and associations	Privacy activists	✓	✓	✓
	British Computer Society	✓	✓	✓
Technology suppliers	Hospital ICT professionals	✓	✓	✓
	Contracted ICT suppliers	✓	✓	✓
Researchers and media (stakeholders reporting on the context)	Health industry researchers	✓	✓	✓
	Health industry publications	✓	✓	✓
	National/local newspapers	✓	✓	✓

5.2 Entangled Stakeholder Roles and Perceptions in a Contested N3

Prior research has focused on the difficulties of introducing large-scale IT into the public sector (Willcocks & Currie, 1997) with healthcare being no exception because multiple stakeholders hold varying positions of power and influence, which can sometimes derail IT projects (Boonstra et al., 2008; Currie, 2012). Our initial empirical data from the 1990s suggested there was general support for introducing new technology into the NHS, with the need to improve health service delivery, from the clinical, the managerial, and the government respondents.

Despite the need for better information management in the NHS, our data collection showed that the NHS N3 was not without controversy: stakeholder groups held different roles and perceptions of the network,

some favorable and others less so. Stakeholders, even those among the same group, expressed differing opinions about the NHS N3 (principle 3). For example, some clinical stakeholders, notably GPs, were among the most outspoken in their comments about the NHS N3. Representative organizations, such as the BMA, also raised concerns about the implications of its use. Still other groups, including patients and many sections of the medical community (e.g., hospital doctors), were unaware of the national plan to introduce the NHS N3 or its implications. Our interviews with clinicians across several hospital sites revealed a surprising lack of knowledge about the NHS N3 network and its intended use, which was to provide the technical backbone for the NCRS (electronic patient records). Even as late as 2008, clinicians often voiced the same comment:

I don't know much about the large computer project planned by central government. I regularly see consultants at this hospital, but I really don't know what they are doing. I have heard that we will be using more electronic patient systems, and I have some concerns about how this will work in practice.

A highly visible area of concern and debate where we observed such differences in our study concerned patient data privacy. Personal health data is a sensitive area in the NHS. More specifically, clinical data about mental and sexual health are extremely sensitive, with patients in our sample admitting to visiting private clinics to avoid discussing issues of “work-based stress” with their local GP. Equally, patients with a sexually transmitted disease (STD), especially HIV/AIDS, used private clinics for similar reasons; they did not participate in the NHS N3. This finding is interesting since it suggests a fragmented repository of patient data is not (cannot be) accessed through the network. The BMA, recruiting allies from the security consultancy field and privacy activists, strongly opposed the NHSnet's weak provisions in the mid-1990s: they stated that they were acting “in the interest of patients” (principle 2). Clinicians with less engagement with the network continued to express their concerns informally about “the need for security and confidentiality of patient data” and effective controls over who had access to the NHS patient database in the decade that followed. The government perceived the potential interest for gaining access to the NHS N3 network among stakeholders to view patient data to be very high, but security and confidentiality concerns among clinicians about patient data continued to grow over time. Further, clinicians and patient groups expressed concerns about the public-private intersection of accessing patient data and the possibility that patient data could be “co-mingled” with other data sources unless properly segmented.

Clinicians and patient groups also expressed concern about the potential for commercial firms to exploit patient data held on a private network. Interviews with clinicians pointed to serious reservations about IT companies' selling off patient data to other commercial firms. Again, these issues point to information governance, regulation and compliance, and, more crucially, who controls these areas. The potential increase in health tourism, especially in the European Union where patients seek faster and cheaper treatments for both chronic and acute conditions, further caused concern to clinicians. While the European Union has begun to implement new directives and laws on the cross-border transfer of European citizens' patient data, each of the 28 E.U. member states has its own laws and requirements that they continue to revise (Seddon & Currie, 2013). Currently, technology has surpassed the legal and regulatory landscape, so patient data is protected (or otherwise) under the jurisdiction of the country where it is collected (European Union, 2011). Several clinicians and hospital administrators noted these issues in expressing concerns about how patient data would be protected in the future.

A further complexity to the NHSnet and the N3 were the changes to the stakeholders, whether internal to the NHS and contractors, involved in developing and maintaining the network (principles 1 and 4). Internally, the government dismantled the Information Management Group (IMG) of the NHS Executive, and the NHS Information Authority replaced it in 1999 soon after the NHSNet became available. In 2005, Connecting for Health superseded the NHS Information Authority, but the former itself ceased to exist in 2013. The stakeholder landscape also included a large private company (British Telecom) and other IT subcontractors. Throughout the NPfIT, the letting of large government contracts to external firms was not without problems particularly because two firms (Accenture and Fujitsu) eventually pulled out of the program. Stakeholder interests in commercial firms were critically important particularly as clinical/patient incentives needed to be aligned with corporate/supplier incentives. Our data showed that much of Connecting for Health's focus in negotiating with commercial firms was targeted at technology procurement and cost reduction. While the value-for-money aspects are important to any large-scale IT project, medical staff interpreted such an emphasis to be detrimental to clinical and patient engagement. Indeed, the two National Audit Office reports (2006, 2008), which shifted the policymaking on the NPfIT towards more clinical involvement and benefits

realization from health IT, noted the shift away from procurement and cost reduction to clinical engagement and benefits realization.

Further, we observed that different stakeholder groups occupied varying positions during the design, development, and implementation of the NHS N3 system (principle 4). For example, politicians actively engaged with the program at the policymaking stage (i.e., when deciding to launch the NPfIT). However, their role would change post-implementation, with politicians from the various political parties occupying either an unfavorable or favorable disposition towards the NHS N3's or NPfIT's progress. Such political positions did not remain consistent as particular political circumstance influenced them (principle 5). Successive interviews suggested that policymakers often engaged in knee-jerk reactions as implementation delays led to the policy revisions (i.e., the need for more user engagement (i.e., of clinicians) and greater attention to realizing the program's benefits and selling its value proposition more widely) (see National Audit Office, 2006, 2008). The change in roles also applied to large professional bodies, such as the BMA who became concerned about patient safety issues, and to commercial firms who had to meet stringent implementation deadlines throughout the NPfIT's duration.

From our primary and secondary data sources, we noted that, as the NHSNet transitioned to become the N3 network, the varying array of positive and negative views and perceptions that multiple stakeholders expressed produced a complex and often-confusing picture of how this program was being implemented. The NAO reports (2006, 2008) were generally supportive, yet they expressed concern that more needed to be done to engage stakeholders. Ironically, many stakeholders were engaged but in a negative sense because they demonstrated high levels of resistance to the NPfIT program as a whole; most of their criticism targeted how the N3 network would guarantee security of health (patient) data. To capture the essence of this scenario, we present a heuristic representation of stakeholder engagement with the N3 in Section 5.3.

5.3 A Heuristic Representation of Stakeholder Engagement and Perceptions

From Section 5.2, we can see that stakeholders' roles, involvement with the N3, and perceptions about the network changed repeatedly over time in line with the stakeholder principles we propose in Section 3.1 To capture the range of potential stakeholder views to discuss stakeholder engagement in a more holistic sense, we developed a heuristic representation along two dimensions (see Figure 1). These two dimensions depict two important elements of the various debates that emerged alongside the network's evolution and use. The x-axis shows stakeholder engagement in the NHS N3 (i.e., to what extent stakeholders were involved in the evolution of, the use of, and the debates about the network), and the y-axis shows stakeholder perceptions of the NHS N3 (i.e., to what extent stakeholders were favorably or unfavorably disposed towards the network). Using these dimensions, we can group stakeholders into five distinct types forming a U-shaped curve. The circles in the diagram represent the position a stakeholder group may hold at a particular point in time. With the heuristic, we could make sense of and compare stakeholder positions at a certain point in time and depict simply how stakeholder engagement and perceptions may shift over time.

The relationship between stakeholder engagement and stakeholder perceptions is an important one both theoretically and empirically. In the IS field generally, scholars have focused on the role of the "user" of information systems. In particular, they have explored how users adopt and adapt to working with new technology. While such an approach contributes to the literature, it may not generate findings that explain why some people never become users. In health IT, a simplistic conclusion may be that clinicians are resistant to change. However, our research did not entirely support this finding. A common viewpoint we found was: "I am in favor of using IT, but I am not part of the decision-making, so I cannot comment whether the IT strategy will work or not" (Hospital Consultant, London Teaching Hospital, UK). Therefore, one could describe a person with this position as a potential user with conflicted views about an intended health IT program. Further, a range of government-sponsored reports well documented the fluctuations in policymaking, implementation deadlines, and revisions about the NPfIT (NAO, 2006, 2008).

We also observed that members of the same stakeholder group could demonstrate differing opinions: some held positive views about the NHS N3 network, and others voiced contradictory opinions. We did not capture every comment from the same stakeholder group, but the comments we did capture demonstrate how shifting positions and stakes across the health IT landscape change over time.

Figure 1. A Heuristic of Stakeholder Roles and Perceptions of the NHS N3

Figure 1 helps one explore and explain social phenomena. Our heuristic representation embeds our assumptions derived from extant empirical research. Methodologically, using ideal types sets out a social phenomenon's defining characteristics (i.e., its salient features, which we present as clearly and explicitly as possible and which form our preliminary analysis). This approach is particularly helpful in studies of social change in that it defines benchmarks around which one can situate variation and differences. Therefore, we present our heuristic of stakeholder roles and perceptions for analytical clarity and possibly for explanatory value as a model (Gerth & Mills, 1958).

As Figure 1 shows, each of the categories (A to E) represent an ideal-typical position where stakeholder groups at any given time may be located. This framework is not a static representation because stakeholders may shift their position depending on the ebbs and flows of implementing the policy driving the NHS N3 program. As a high-level illustration, the diagram captures the aggregated views of stakeholder groups rather than individual perceptions relating to the program. We present the most significant shifts in engagement and perceptions aggregated across the various stakeholder groups and show that, in line with principle 4, the stakeholders we identified were in positions A to E but that they changed throughout the program's introduction. Similarly, stakeholder groups were not homogenous in the positions and stakes they held (in line with principle 3). Thus, we focus here on empirically determining how the five positions may shift over time. We provide further explanation of each ideal type below.

A-type stakeholders were those actively opposed to the NHS N3: they expressed dissatisfaction about the program's policy, development, and implementation. Stakeholders in this category increased over time and ranged from privacy activists, the media, technology suppliers, medical professionals, and health representative organizations. We found that, as the NHSNet transitioned to become the NHS N3 and attracted much larger government funds, the increased budget appeared to attract more heated discussions among different stakeholder groups about the program's "value for money" and whether the government should be spending large amounts on "computerizing the health service".

One observation from carrying out this research was that medical professionals were both part of and represented by powerful professional bodies. For example, the British Medical Association and the British Computer Society were actively engaged in working with health and IT professionals, respectively, with the

shared concern about using and transferring patient data over a private network. Our interview data suggest that much of the medical professionals' concern resulted from their perceived lack of involvement with the policy and decision making for the NHS N3. One clinician said:

The electronic storage and transfer of clinical patient data has all sorts of implications. In the USA, the lawyers are waiting for electronic health records (EHRs) to take shape, mainly because they see an increased market for professional misconduct in healthcare, particularly as everything will be documented. In the UK, we are less concerned about these issues, but more concerned about the patient safety aspects of using electronic systems and who has access to the network.
(Clinician, London teaching hospital)

Other stakeholders who actively opposed to the NPfIT included various independent research and advocacy groups. These voices of dissent largely focused on the potential lack of data privacy, security, and confidentiality. In some cases, medical professionals and medical researchers surveying doctors' opinions came together for a common cause to express concern about patient data being misused by commercial firms or even individuals working in the NHS with direct access to electronic patient files. While it is outside our scope to adequately cover the complex issues of the current privacy debate in the European Union, the legal and regulatory framework was very much behind technological change. Confusion about patients' rights over their data and who should own patients' records continued to be discussed across all stakeholder groups. However, stakeholders expressed their concerns about the introduction of new technology more vocally rather than about health policy and legal matters. At very extreme, some stakeholders called for terminating the uploading of patient records on the "spine" (i.e., the NHS N3 network) despite the obvious benefits of using such a network for less politically contentious activities (i.e., the PACs for transferring x-rays and scans between health professionals).

After the first National Audit Office report of the NPfIT appeared in 2006 (NAO, 2006), dissent among clinicians, their representatives (BMA), patient groups, and the media increased. The media published open letters about the "scandalous" waste of money spent on the program. Media reports often referred to the NPfIT as a "computer failure" and were tardy in their attempts to delineate the various IT systems under this umbrella term (for which NHS N3 was only one of five). Further, NAO (2008, 2011) reports did little to assuage stakeholders' dissent, with many calling for the entire program's termination.

B-type stakeholders were large groups of stakeholders who did not exercise their rights or positions as active dissenters. Many groups, including NHS executives/managers, health representative organizations, medical professionals, and even some sections of the media were generally ill-disposed to the NPfIT as a whole and to the NHS N3 (to a lesser extent) on the grounds that it was a waste of money and did not properly secure patient data. The media alerted stakeholders to the government decision to prioritize expenditure on "computer systems" rather than on direct services to patients (i.e., reducing patient waiting times, giving patients access to expensive medicines, keeping open local hospitals, etc.). While these stakeholders rarely expressed direct dissatisfaction with the NHS N3, they generally expressed their unfavorable views to health policymakers and politicians and NHS executives.

Other stakeholders voiced their concerns about the poor technical infrastructure, particularly the speed with which traffic could flow over the network. Some clinicians expressed dissatisfaction about the speed of the network and questioned the wisdom of "having to join a network with such poor performance and functionality" (Statement by a GP in the GP-UK mailing list). Throughout the period from the late 1990s to the end of 2010, the IT infrastructure (Internet and broadband) speeds vastly increased, which suggests that those with unfavorable user perceptions of the NHS N3 became more positive or sought alternative arguments to justify their negative predisposition to the network.

Further, we observed that B-type stakeholders included some people who were ill informed. In the first four years of the NPfIT, we observed that the users of the NHS N3 and the various applications that would run over this large IT infrastructure were likely to be the least informed. Medical professionals and their representatives, without detailed knowledge of the NPfIT's aims and objectives, more often formed a negative perception of how health IT policy would translate into practice as opposed to those who were fully informed. Again, the media played out negative views as clinicians' voicing their opinions against the development of a computer project rather than about how it would either improve or adversely affect patient safety and outcomes. One hospital doctor said:

It's not that doctors are against the introduction of IT in healthcare. We just haven't been informed about the clinical or business case for the NPfIT. Some doctors are worried about uploading

patient data on a large computer network. My concerns are not just about security but how these records may be used, and possibly changed by health professionals and even patients. (Hospital Doctor, Local Hospital, NW England).

This group of stakeholders was a “silent majority” of the N3 users throughout the research period. While they did not actively call for the NPfIT’s termination through their medical representations or even as we collected empirical data, they often expressed their reservations in conjunction with other factors. For example, one hospital consultant said: “The NHS should be spending money on other priorities” (GP, London, SE), “I am concerned about patient data security using a national network” (Hospital consultant, Midlands), and a nurse said: “I don’t really know enough about it and it may increase our workload” (Nurse, London teaching hospital).

C-type stakeholders occupied a neutral position in the NHS N3 and more often had an indifferent view about the program. The perception that “I’m not entirely aware...” was commonplace. In an interview, the pharmaceutical advisor of a health authority stated, “We don’t follow their stuff; ...[it’s] outside my own league” (Chief pharmacist in a large London hospital trust).

A revealing finding was that health representative organizations, particularly those representing patient groups, commented that patients knew little about the program. Out of a possible 50 million potential patient users in England, clinical leads representing government agencies, such as Connecting for Health, confirmed that patients were not the main stakeholder group to be “won over”; instead, efforts focused on winning over medical professionals. Patient groups expressed concerns that, while the government promoted the NPfIT as a leading IT innovation in healthcare, its expected beneficiaries—the patients—had little or no knowledge of how they could benefit from the initiative, which is ironic given that the government increasingly encouraged patients to become “actively engaged” in their healthcare. In interviews with patients and patient groups from 2002 to 2010, we found that they completely lacked information about the NPfIT. For example, most did not know that patients in England could access their electronic health record (EHR) (using HealthSpace).

On a related issue, a GP stressed, “the issue is whether the patient actually knows what is happening with their data, where it is being kept. At the present there appears to be no formal attempt to inform the patient of where the information is going” (Statement by a GP and chairman of the IT committee of the general medical services committee).

Nurses and their representative organizations were also “in the dark” about the benefits and risks of the NHS N3. One nurse said, “Even though we (nurses) are active users of computers, we are the last to find out about new systems and the last to be trained. I don’t really know much about the NHS N3 system so I can’t really comment” (Nurse, SE England GP practice).

To move towards a more favorable outlook on the NHS N3, politicians and NHS executives needed to “manage expectations”. While Connecting for Health was keen to promote best practice in procuring and contracting IT systems, they needed to do more to convince stakeholder groups about the NPfIT’s prospective benefits. A fast, reliable, and secure IT infrastructure was an important innovation in a healthcare sector characterized by years of under-investment in IT (compared with finance and manufacturing) (Wanless, 2002), but how the government positioned the message to stakeholder groups was just as important as getting the technical factors right.

D-type stakeholders, while not being actively engaged in the NHS N3, generally supported the drive to introduce new technology into healthcare. Many voiced comments such as, “you should weigh the risks against the benefits that patients would be receiving, and that is my view—the benefits for the patients outweigh the risks” (Statement by a GP in the GP-UK mailing list).

By the mid-2000s, it was apparent that the NPfIT was undergoing some serious delays and setbacks (NAO, 2006, 2008). These delays activated many politicians to voice “serious concerns” about the entire program. Delays to the choose and book, electronic transmission of prescriptions (ETP), picture archiving and communications systems (PACs) and the NHS care records service (NHS CRS) inextricably delayed the NHS N3. Politicians continued to express their support of the NPfIT yet recognized that Connecting for Health needed to do more work to “get the clinicians on board”.

The agency in charge of the NPfIT, Connecting for Health, published favorable literature about the NPfIT, which it sent to NHS organizations. Even though stakeholders from some quarters supported the approach, many others (who labeled the approach as passive) did not. The European Union expressed general support for the “digital economy” and “health innovation” with large-scale funding opportunities to research

health and IT. U.K. Government ministers also expressed support for the NPfIT, although a sizable number from other political parties expressed negative views. The IT industry also expressed support for “more investment” in health IT. Notably, the Wanless (2002) report gave examples of how financial services spent vastly more money on IT compared with public health. D-type stakeholders often supported the concept of innovation in healthcare if not the policy and planning. These stakeholders described IT as “progress” and “important for modernizing the health sector” (Clinical lead for Connecting for Health, London). However, stakeholders in this category did not follow up such bland statements with active participation in the NPfIT.

E-type stakeholders largely included the initiators of the NHS networking program in phase I (notably the NHS management executive), the politicians who supported the program, and the many clinical leads that the government appointed to act as the program’s ambassadors. The Connecting for Health staff designed the various roadshows and events to win stakeholders’ hearts and minds. However, our observations showed that vast number of medical professionals continued to be unaware of the NPfIT in spite of greater interest to move healthcare from diagnosis, treatment, and cure towards preventive health and wellbeing. E-type stakeholders became less influential over time. We derived the empirical evidence to support this conclusion over several years of interviews and close attention to documented sources, such as NAO publications, media reports, statements to the media from the BMA, patient groups, and other sources. One clinical lead for the NPfIT noted, “I know that many of my clinical colleagues are against the NPfIT, but it is my job to ‘sell the policy’. Doctors can be very conservative with a small ‘c’ and they don’t like change” (Clinical lead, interview carried out in the Midlands). This group of stakeholders decreased over time with some acceleration up until 2010 when the conservative government introduced policies to make cuts in public spending. The third NAO report (2011) further pointed to the program’s failure to meet implementation targets set earlier and an additional problem of lack of stakeholder engagement. In fact, the failure to engage key stakeholders had beset the NPfIT since its inception.

5.4 Shifting Positions and Stakes: Phase I

To illustrate how one can use Figure 1 to depict stakeholder groups’ dynamic movement, we summarize our findings in three diagrams covering the two important phases of health IT policy implementation. The program was initially called the NHSNet and was renamed after the launch of the NPfIT in 2002 as the NHS N3. Each diagram presents our eight main stakeholder groups and illustrates how their respective positions altered over time. Our theorization does not extend to detailed causal explanations about why a particular stakeholder group shifted its position. Rather, we demonstrate the importance of identifying different key stakeholder groups and how they engaged (or disengaged) with a large-scale, government-funded IT program over an extended period. This methodological point is important since research enquiry that covers a limited period (e.g., the launch of a program) may not reveal the potential for some stakeholder groups who are initially not engaged to become actively vocal in their concerns about a program.

Figure 2 presents the stakeholder groups at the launch of the NHS-wide networking project in phase 1, which covered the 1993-1995 period. Here, key stakeholders, notably the government agencies who spearheaded the NPfIT, engaged the services of the various technology suppliers to bid for large contracts to develop health IT networks. The NHS-wide networking project promoted health IT as a means to improve health service delivery. Not surprisingly, its outlook was optimistic and the relevant NHS literature formally articulated the project as enabling the NHS to communicate with each other efficiently, securely and cost-effectively (NHS Executive, 1994). At the time, the intended users of the system, notably GPs, adopted a “wait-and-see” attitude, which our interviewees’ mixed views show: GPs recognized the need to improve the exchange of information in the NHS while also maintaining some skepticism about a new initiative “led from the center”.

During this initial phase, other stakeholder groups adopted mixed positions: some medical professionals, for example, favored the NHSNet, other remained neutral, and still others voiced some concerns. Privacy activists comprised one of the most vocal stakeholder groups: they continued to caution against developing electronic networks to house medical records.

Stakeholder perceptions of the NHSNet (1)

1993-95: NHSnet “launch” as a network to improve efficiency in healthcare information exchange

Figure 2. Perceptions of the NHSNet at Launch

The media largely did not negatively cover health IT and the NHSNet more specifically. Medical personnel expressed some reservations about increasing health IT budgets, but the overall stakeholder response was generally positive in that technological progress would bring benefits to healthcare organizations and patients alike. B-type doctors tended to voice their opinions in a passive way rather than complaining formally to senior health managers or other groups (e.g., the media or medical professional associations). Some of the negative comments concerned rising health budgets and the need to carefully prioritize expenditure on either (among other things) patient care or technology investment.

However, as the project developed, members of the medical community gradually raised more questions about the network. They were concerned about the technology procurement progress and, more specifically, about the use and sharing of medical data. The privacy of patient data took prevalence in the debate, which resulted in the British Medical Association's (BMA) (the doctors' representative body in the debate) becoming actively engaged. Further, security consultants, privacy activists, and other doctors' representative bodies (e.g., GMSC, Doctor's Independent Network (DIN)) entered and dominated the scene as A-type stakeholders (i.e., they actively resisted the NHSnet). Privacy and security remained perennial issues for several years (especially in 1995-1998). Groups as diverse as NHS management bodies and GCHQ formed alliances to support the NHS Executive's propositions, whereas various stakeholder groups gradually joined forces in the name of patient rights and doctors' interests to act against the NHSnet in general and the security mechanisms in place in particular.

However, as the NHSNet progressed throughout the 1990s, a change of government in 1997 saw the shift in political opinion and information technology became linked to progressive ideologies. The “New Labour” government of 1997 heavily promoted technology as a means to improve the NHS. Multiple parliamentary parties supported promoting health IT, which technology suppliers who saw a real commercial opportunity to win large government contracts further enabled.

Yet, our interviews with hospital doctors and consultants revealed contradictory stakes: many criticized the centralized nature of government policy for health IT. During this period, no one had yet envisaged the prospect of Internet-based technology so the conflicted stakes were more about “not being informed” about health IT policy rather than fears about major changes to working practices. Medical professionals began to adopt more polarized positions (B and D) as they either held an unfavorable position but did not voice it publicly (feeling they were more effectively represented by the BMA) or maintained a “wait-and-see” attitude and passively accepted the network. As a stakeholder group, hospital doctors, who did not have a central role as “gatekeepers” of patient information, tended to remain neutral or passive to a network that would provide them with faster access to patient data (C-type stakeholders).

During the 1995-2001 period (see Figure 3), most medical professionals did not actively voice their approval or disapproval about government plans to develop a “21st century health IT strategy”. For example, organizations such as the BMA relied on the advice and input from leading medical professionals, who both influenced and were influenced by the BMA’s positions. On the issue of privacy and security concerns, some hospital consultants were influenced by some of health IT’s negative aspects—particularly those concerning a perceived lack of control not just at the policymaking stage but also at post-implementation, where patient data could become vulnerable. This dynamic resulted in a shift towards A-type stakeholders, and some began to mobilize their support among health representative organizations and the media. The concern about privacy and security issues was greater than concerns about lack of health funding and changes to working practices.

During this time, the privacy/security debate continued to gain momentum and featured largely in the news reporting in practitioner journals (see Appendix 1) and the national press. The debate only receded (though without being resolved) once the Caldicott Committee engaged stakeholders from all sides to agree on a set of principles:

The Caldicott Committee failed to lay down hard and fast rules for patient confidentiality but because it produced a list of “good intentions” it certainly made it harder for BMA and other concerned organizations like DIN to continue to breathe fire and brimstone about matters. In this the commission probably served its purpose well. (Chairman of the Doctor’s Independent Network)

Conversely, E-type stakeholders also influenced hospital doctors and actively recruited them to become government “advocates” for the network. Overall, this group maintained a lower profile in their role as advisors or reference points for the NHS Executive and the Information Management Group.

IT suppliers increasingly adopted E-type positions as they saw growing potential in working with the NHS as providing a new revenue stream. Interviews with this stakeholder group revealed their many frustrations in working with the NHS not least because procurement processes tended to favor large IT supplier firms rather than small providers. One supplier said:

Computer firms of medium capacity find it difficult to understand the labyrinth of NHS procurement. It is very difficult to win contracts unless you are a large computer firm. We therefore work with the leading companies as sub-contractors. We support these firms but our knowledge of how the NHS works is limited.

Interviews with large IT suppliers reinforced the comments of hospital consultants and doctors in that negotiations between these firms occurred at the very senior levels of the NHS with little information trickling down to medical professionals and administrators.

Stakeholder perceptions of the NHSNet (2)

1995-2001: confidentiality/security become key concerns about the NHSNet

Figure 3. Changing Perceptions of the NHSNet during Phase I

5.5 Shifting Positions and Stakes: Phase II

Towards the end of 2001, a major new initiative launched: NPfIT. The change of government in 2001 provided the impetus to revisit NHS health IT policy. During this phase, we note that health IT as both a policy and an implementation plan fuelled even more interest than in the first phase. Technological developments during this phase accelerated with accompanying publicity about how new health technology would transform healthcare.

Importantly, in phase II, we observed that some stakeholder groups were replaced (e.g., the NHS Executive Information Management Group (IMG) was superseded by the NHS Information Authority in 1999 and in 2005 by Connecting for Health). Stakeholder groups became more actively engaged in this phase largely because of the increasing technological infrastructure which enabled stakeholders to engage in discussion about health IT policy issues and practices (e.g., the Internet, mobile phones, flexible news media, etc.). NPfIT would become one of the largest non-military government IT programs worldwide with estimated expenditure likely to exceed £12 billion (Currie, 2012). Stakeholder groups also become more fragmented, which the contradictory positions and stakes that emerged depict. While it was important to capture the conflicted views of stakeholder groups about the NHS N3 in terms of their relative positive or negative statements and the extent to which they actively or passively engaged in the program, our empirical challenge was how best to present our findings clearly and concisely. A further methodological challenge in depicting the complexity of the empirical field was that our research enquiry spanned more than a decade. In reviewing our empirical data, we concluded that presenting a snapshot of differing stakeholders views over two phases was more fruitful as a theoretical and empirical exercise than digging deep to reveal a detailed picture of how and why a specific stakeholder group (e.g., hospital doctors) held positive or negative views about patient data privacy and security. We do not underplay the importance of this type of research enquiry but recognize that the strength of our approach was looking at the “big picture” of health IT policy implementation using a broad stakeholder analysis over an extended period.

Thus, while Figure 3 illustrates key stakeholder groups' perceptions covering from 1995-2001, Figure 4 illustrates stakeholders' changing perspectives from 2001-2010. Here, we see that roles and perceptions of all stakeholders shifted significantly throughout the program's duration, with many adopting and occupying conflicted positions and views about it. Importantly, as the program developed, there was a distinct move from relatively positive stakeholder perceptions about the NHS N3 to increasingly negative perceptions as more stakeholders became disillusioned with it.

Stakeholder perceptions of the NHS N3 (3)

2002-2010: Activists become more vocal and NHS N3 more politicised among stakeholder groups

Figure 4. Changing Perceptions of the NHS N3 during Phase II

Representative bodies such as the BMA (listed under health representative organizations) became actively engaged in questioning government policy on the NPfIT largely because of data privacy and security concerns of transitioning patient records to online systems using the NHS N3 network. The media regularly voiced these concerns, which tended to produce a snowballing effect whereby clinicians and other NHS employees also expressed their opinions about the shortcomings of putting patient records on a large database. Ironically, BMA members were also appointed as “clinical leads” (E-type stakeholders representing government agencies), a position that involved traveling the country to promote the NPfIT’s benefits. Some medical professionals saw these roles as “selling out”, and clinical leads often found themselves harangued at public promotional events. Thus, in line with Principle 3, stakeholder group members did not necessarily unanimously share stakeholder positions.

In Figure 4, we map the group positions that were dominant during phase II. We noted that GPs (medical professionals) increasingly criticized the program, with growing concerns about on the use of digital technology in the handling of sensitive patient data. As a means of providing the technological infrastructure to facilitate electronic health records, the NHS N3 network was not politically neutral, although most criticism

focused on the IT software (e.g., the EHR application) rather than the technological infrastructure. A common concern that GPs expressed at this time was:

Our patient data is highly sensitive and GPs are increasingly concerned about who will have access to this data. Over a million people work in the NHS so the potential access could be very large, and this poses serious security issues.

GPs expressed concerns about the “ownership” of patient data and claimed it was a grey area. Some GPs expressed the view that patient data is the medical profession’s preserve, while others believed that patients own their medical records. Still others thought that such data belonged to the government, so views and opinions differed among the same stakeholder group. However, because the NPfIT was beset with so much bad publicity in the media, GPs visibly hardened their views and more actively opposed the program.

At the same time, health representative organizations, acting for patients, demonstrated some ambiguity about the program. Many adopted A- or C-type positions. One patient group based in Brussels noted that “Most people don’t know anything about electronic health records. Our job is to educate patients about their rights. We are very concerned about data privacy, but we think this is unknown territory to many people right now.” (Interview with Head of a Patient Group, 2009).

One clinical lead said that “keeping patients in the dark” was a deliberate strategy on the part of the agency running the NPfIT (Connecting for Health) since patients would become informed about the technical changes once the implementation program was well under way. This strategy fueled much debate among privacy and security stakeholders who argued that patients should be fully informed about how the NHS would use and manage their data. During this phase, privacy activists became increasingly active in their concern about patient data security. Interestingly, other stakeholders (notably health representative organizations (the BMA) and independent associations such as the BCS) increasingly adopted such concerns. Even industry and support organizations, such as pharmacists, increasingly adopted B-type positions in that they expressed concerns about the cost of adopting the NPfIT, although they did not actively engage in campaigns to abandon the program.

One of the more significant shifts up to 2010 when we stopped collecting data was the actively open hostility towards the NPfIT by large sections of the media. National newspapers, health publications, IT (print and online) magazines, and other “e-health” or health IT offerings all began to report on the program as “a computer fiasco”, “IT failure”, or a “waste of public money” (see Appendices 1 and 2). The interaction between different stakeholders tended to create an incendiary situation in which medical professionals could voice their growing concerns about the program with journalists who were keen to publish “a good story” on the “government’s waste of public funds”.

6 Discussion and Conclusion

From our study’s beginnings in the 1990s (when NHSnet launched) to its end in 2010, the NHS N3 program, under the NPfIT umbrella, generated significant publicity and media coverage, which gave all stakeholders a platform to express their opinions. Despite various NAO reports (2006, 2008) calling for more “user engagement” to win the hearts and minds of NHS staff (particularly clinicians), the increased publicity about the NHS N3 produced the opposite effect since much of it highlighted policy implementation problems (e.g., two leading IT contractors pulling out of their NHS contracts, repeated missed deadlines, data privacy concerns, increased workloads for clinicians and administrators moving to electronic health records, potential system downtime, and the program’s growing cost). From analyzing the data, we found that stakeholders’ roles and perceptions were becoming increasingly entangled and polarized.

For our 15-year study, we employed stakeholder theory not as a managerial tool to identify successful policy decisions or otherwise on a large scale IT program but to broaden the research landscape to include multiple stakeholders with different levels of power and influence. Power relations are particularly relevant in stakeholder theory. Our study shows that power relations are embedded and entangled in policy directives as different stakeholder groups engage with health IT depending on their perceptions of whether such initiatives support or detract from their positions or stakes (Bourdieu, 1977).

Concepts of legitimacy and urgency are used in stakeholder identification and the influence of stakeholders (Mitchell et al, 1997). However, the literature on stakeholders remains relatively under-theorized: whereas most studies use the term stakeholder as a static and mechanical concept, our research suggests stakeholder groups are complex and dynamic in that their interests and values change over time. Even in the same stakeholder group, the notion of what its members see as a “legitimate” reason for action or

behavior is subject to the influences of other stakeholder groups. For example, in our study, some of medical professionals who initially adopted a favorable stance towards health IT policy actively withdrew their support, and others became government advocacy representatives (e.g., clinical leads for Connecting for Health). We needed to theorize and understand such conflicted views among the same stakeholder group, so future research could help policymakers understand how and why stakeholders shift their positions from supporting health IT policy initiatives to adopting less-favorable positions.

Our interpretive stakeholder analysis reinforces prior work that shows that interests and values shape and are inseparable from how the stakeholders' understand the world (Introna & Pouloudi 1999; Introna, 1997). These interests and values clearly influence a stakeholder's stance at a particular point in time but only partly explain their position. Power is a key attribute alongside stakeholders' interests for determining the visibility of certain stakeholders and helps to identify possible "allies" and "enemies" to management strategies (Boonstra et al., 2008; Eden & Ackerman, 1998; Freeman, 1984). We embed power relations in the wider context of policymaking rather than confining it to a managerial agenda in health service organizations. We believe a wider approach is more fruitful since stakeholder groups comprising NHS executives were just as likely to adopt an anti-managerial agenda in which they disagree with top-down initiatives to restructure managerial and professional roles and responsibilities, which is more in line with the positions and stakes of other stakeholder groups (e.g., medical professionals). Thus, stakeholders' power does not only affect their participation and visibility but also how different stakeholder groups exert their influence not only at the organizational level but also at the political (government-agency) level.

Our empirical data demonstrate the intricate ways in which stakeholders are interrelated and, thus, how they shape and change the way each consider an information system (i.e., which influences a stakeholder's position on the vertical and horizontal axis of Figures 1 to 4). Stakeholder interrelationships are visible in the ways in which stakeholders go about defending and strengthening their position. Consequently, one can largely understand the landscape for adopting an information system in an entangled context by following the stakeholders' efforts to create alliances and mobilize sympathetic stakeholders while reducing the credibility and participation of stakeholders with conflicting views.

Our findings show that stakeholders can create alliances with other groups; for example, they can inform and consequently mobilize C-type stakeholders from their passive and neutral position. Therefore, stakeholders attempt to shape or change the views of potential allies by presenting a (legitimate) viewpoint that matches the latter's interests and values. Ironically, in the NHS N3 case, patients, the "silent" and arguably less informed stakeholders, gave legitimacy to the views of others because all stakeholders claimed to act in the interest of the patients. Yet, our data shows that patient groups underrepresented patient interests in both of the phases of the NHS N3 that we identify in our research. But patients as a stakeholder group were and are clearly the most important in terms of what the NPfIT policy is trying to achieve (e.g., improve patient care). Therefore, it was ironic that policy-makers and NHS professionals largely overlooked patients.

Many of the stakeholders against the NHS N3 (A- and B-type stakeholders), for example, were concerned that patients lacked information about the NPfIT's vision and purpose, made wrong assumptions about the confidentiality of medical data, and, consequently, did not understand the implications of what it means for their health data to be stored and transferred over a computer network infrastructure. A- and B-type stakeholders capitalized on fears about lack of patient data security using digital technology, and these fears increased over time. E- and D-type stakeholders countered these fears by praising the benefits of the NHS N3 in providing patient care or introducing new stakeholders to defend this position. We observed that these actions and the resulting media debate about privacy and security influenced the views and involvement of several stakeholders, which led to an increase in negative views about the entire NPfIT (see also National Audit Office, 2011).

Delineating stakeholder groups by professional, managerial, and technical categories or groups clarifies the presentation of our research. Our heuristic of stakeholder roles and perceptions found that several stakeholder groups (e.g., medical professionals, NHS executives, and health representative organizations), were spread across all five (i.e., A-E) positions. Over time, some positions expanded and others contracted, which suggests that we needed to more vigorously examine stakeholder groups because individuals located in the same group often held different "stakes" depending on how they perceived the program would affect their interests. This finding has important implications for policymakers since the public appointment of clinicians in advocacy roles, for example, was seemingly at odds with their professional roles as potential users of the technology. Government-sponsored reports did not recognize such variation in the views of individuals occupying the same

stakeholder group: these reports tended to lump the issue of resistance to the NPfIT as a “lack of stakeholder engagement” that Connecting for Health could resolve by appointing clinicians to better sell the program to their NHS colleagues. These clinicians would communicate the program’s benefits to ensure that NHS staff would fully realize the program’s aims and scope (NAO, 2006, 2008).

While our extended interviews with multiple stakeholders did not result in a tidy set of findings from a single case or stakeholder group, we argue that our stakeholder analysis of the stakeholder groups’ roles and perceptions provides a richer understanding of entangled contexts around the NHS N3. Future research and practice in the IS field faces the methodological challenges of studying and understanding how health IT is depicted in success and failure stories and appreciating how diverse stakeholder views may influence a program’s outcome one way or another. In this spirit, we propose some themes from our developing interpretive stakeholder analysis that we believe one can transfer to other contexts.

Based on the case study presented in this paper, we argue that using interpretive stakeholder analysis can be a useful approach to understanding information systems contexts. We call for a broader understanding of stakeholders that embraces different units of analysis to include the political, organizational, and departmental levels as stakeholders are represented by individuals, members of teams, representatives of professional bodies, and even government advisors. Stakeholders can become conflicted in their interpretation and involvement in large-scale health IT programs. While we did not explore conflicted views and perceptions among individual stakeholders, future research could consider how such conflict may affect public sector IT programs, particularly because the legitimacy attributed to senior medical professionals in providing advocacy and support to government initiatives in healthcare may also conflict with the legitimacy of others who also occupy senior roles. While we found medical professionals had contradictory positions about and stakes in the N3 network, we need more research to explore such entanglement to further develop stakeholder theory as a set of concepts that go beyond identification and engagement.

Our using interpretive-stakeholder analysis highlights issues such as personal and professional interests and values, roles and responsibilities, and power and legitimacy. While one could attempt to operationalize and isolate the effects of particular factors, our heuristic of stakeholder roles and perceptions using the U-shaped curve suggests that one can gain a deeper understanding only by accepting that one cannot find no simple or straightforward explanation for such entangled contexts. Although it seems counterintuitive, the heuristic representation we present is powerful not just for showing stakeholder movement over time but also for challenging researchers to appreciate that they cannot neatly position or categorize stakeholder groups. Positions and stakes change over time, so it is not feasible to attribute favorable or unfavorable views of stakeholders using a static approach. As such, researchers can use heuristic devices for identifying stakeholders and apply additional stakeholder concepts and techniques such as stakeholder mapping and engagement for both a static and dynamic analysis.

While IS research has used the stakeholder concept for more than two decades, it is not without its dissenters. As a managerial approach, many would not dispute that stakeholder analyses can help “frame issues that are solvable in ways that are technically feasible and politically acceptable and that advance the common good” (Bryson, 2004, p. 21). Many scholars have also used stakeholder analysis to evaluate the effectiveness of policy (Varvasovsky & Brugha, 2000). However, some have criticized Freeman’s (1984) seminal stakeholder theory in that it: 1) inadequately explains the process, 2) incompletely links internal and external variables, 3) pays insufficient attention to the system in which business operates and the levels of analysis within the system, and 4) inadequately assesses the work environment (Key, 1999, p. 321). We recognize that our research shares some of these limitations. However, we did not track all the relevant periods in which, for example, isolated stakeholder groups’ views may have changed. Rather, we demonstrate through identifying multiple stakeholders over a long period how one can more appropriately understand large-scale IT programs in complex organizations, such as health systems, as politically driven processes rather than as technical factors alone. Thus, to dismiss the NPfIT’s problems as a “computer fiasco” seems to miss the point. As we demonstrate, the technology slice of the N3 was only a bit part player in the much wider context of competing and conflicted stakeholder groups because these groups focused on much wider health- and IT-related issues, including health budgets, patient safety, data security, privacy and private sector contracting, among others.

While we deployed stakeholder theory to analyze our data, we suggest that its usefulness is more as a guiding framework rather than to show concepts as a rigidly defined set of theoretical tools (Bourdieu, 1977). To some extent, the strength of stakeholder analysis is also its weakness in that it encourages researchers to look beyond the narrow focus of single stakeholder groups or communities (e.g., the “user”) by including multiple stakeholders with competing agendas. Such a broad focus introduces more challenges in the

research process to identify stakeholders and to understand their complex social relationships. These limitations are unavoidably present in our study since the NHS N3 network infrastructure has never been a single technology implemented in one organization but a nationwide government-led initiative involving multiple stakeholders in a healthcare setting.

Notwithstanding these theoretical and methodological limitations, we believe that stakeholder theory offers a fruitful approach to broaden the scope of IS research. This study builds on prior research that shows that introducing large-scale new technology in the NHS is not simply a “managerial” or “technical” activity but an enactment of government policy, which may be highly controversial and infused with political, managerial, and technical agendas (Currie, 2012). Indeed, a recent “post-mortem” of the dismantled NPfIT (British Parliament, 2013), observed “failures to understand the complexity of the tasks, to recognize the difficulties of persuading NHS trusts to take new systems that had been procured nationally, and to get people to operate the systems effectively even when they were adopted”. Such a statement underpins our concept of stakeholder entanglement as the multi-faceted nature of the NPfIT gradually unraveled not because it was a “computer failure” (as the media characterized it) but because conflicted stakeholder positions and stakes conspired to destabilize the original government health IT policy. Stakeholder entanglement played out at all levels. First, the lack of cross-party (political party) support for the NPfIT meant that media organizations could exploit the lack of political consensus and expose all the program’s shortcomings, such as missed deadlines, failure to agree procurement contracts, clinical resistance, and so on.

Second, mirroring the lack of political consensus, entanglement also emerged as stakeholder groups adopted conflicted positions and stakes. Clinicians expressed varying views about the viability of moving patient records online, which the rapid pace of technology exacerbated because health IT policy quickly became outdated. This type of entanglement grew more complex because clinicians occupied multiple roles (e.g. as medical professionals, as advocates for/or against the program, as information privacy advisors, as representatives on patient committees, as media commentators, as board members for IT companies, etc). A clinician could, therefore, “wear many hats” at the same time, which could result in potential conflicts of interest. Therefore, narrowly focusing on one stakeholder group (e.g., the end user, which IS research uses frequently as the dominant stakeholder) was less relevant in our research since the failure to introduce a fully working EHR in the NHS meant that this group had relatively minor influence compared with other stakeholders (i.e., politicians, hospital executives, media, IT suppliers, pressure groups, consultants, etc). Third, stakeholder entanglement occurred across organizations, particularly as external (non-NHS) organizations increasingly came to play a larger part in realizing government health IT policy. Our interviews revealed some discontent from hospital managers and doctors about management consultants, brought in by NHS executives to change health processes and technologies. Clinicians were able to mobilize their powerful representative organizations to feed stories to the media about why the NHS computer system was a waste of public money with too many resources consumed by external firms.

In summary, we argue for applying and developing an interpretive stakeholder-analysis approach to study entangled information systems contexts. This approach, which we grounded theoretically on a set of stakeholder principles, defined in an interpretive epistemology, and illustrated empirically through a case study, constitutes a significant contribution to earlier work on information systems stakeholders. We identify stakeholder entanglement around the NHS N3 and raise broader stakeholder issues, including different stakeholder groups’ values, interests, power, legitimacy, and representation. Our work has lessons for policymakers not least to show that introducing high-profile, public sector health IT at such an ambitious level does not guarantee a successful outcome despite the large sums of money used for not only technological infrastructure and applications but also public relations and advocacy. At a theoretical level, we broaden stakeholder theory through applying our concept of stakeholder entanglement to the complex NHS organization to interpret our empirical data on the NHS N3 network. We encourage IS researchers to embrace the notion that stakeholder analysis extends beyond a narrow focus on single stakeholder roles and perceptions. Rather, our study points to complex power relations in and across stakeholder groups, which are potentially unstable and, therefore, subject to change. The empirical challenges in further developing the concept of stakeholder entanglement poses several problems, not least that research enquiry needs to focus on relevant stakeholder groups, which may extend beyond the more traditional focus on managers or users. One cannot adequately study health IT policy implementation, however, in complex organizations such as the NHS without understanding the influence of key stakeholders, such as political agencies, professional bodies, and others. Therefore, we encourage IS researchers to develop and apply the concept of stakeholder entanglement in other information systems contexts.

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Appendix A

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
Government reports/websites		Formal stakeholder role description(s)—relations with other stakeholders
Department of Health website	“The Department of Health (DH) helps people to live better for longer. We lead, shape and fund health and care in England, making sure people have the support, care and treatment they need, with the compassion, respect and dignity they deserve. DH is a ministerial department, supported by 25 agencies and public bodies.” (Department of Health, n.d.)	The DoH leads all U.K. Government actions related to providing healthcare. In addition to its formal role and structure (as its website presents), the DoH issues publications on matters of public health. The NHS Executive (see next) is part of the DoH.
NHS Executive reports	NHS-Wide Networking (NWN) Programme: “initiated in early 1993. This is a major programme of several inter-related projects whose overall aim is to improve the quality and responsiveness of local and national health care services by enabling all parts of the NHS to communicate with each other efficiently, securely and cost-effectively. It will provide a key part of the infrastructure to support the national IM&T Strategy” (NHS Executive, 1994a, p. 28).	Formally states the purpose for the project leading to the NHSnet.
	<p>“The Information Management Group (IMG) is part of the NHS Executive. Its aim is to improve the ability of the NHS to harness and exploit the potential of information and information technology. One of the key objectives of IMG is to support the NHS Executive in promoting the national Information Management and Technology (IM&T) Strategy for the NHS in England” (NHS Executive, 1994b, p. 4). “The National Health Service Executive (NHS Executive) is the top management tier of the NHS. It is part of the Department of Health and is responsible to Ministers. The Information Management Group is part of the NHS Executive. ...Ray Rogers is the Executive Director of IMG and is responsible for the day to day management across the whole group” (NHS Executive, 1994b, p. 5).</p> <p>“During 1993 the NHS Executive agreed the need for an NHS-Wide system of electronic communications and centrally managed arrangements to oversee its implementation. Although the NHS-Wide Networking organization does to formally comprise a branch of IMG, the staff report to the Executive Director of IMG and work closely with IMG Branches. Tony King took up the post of Head of Networking on 1 July 1994. Tony leads a Communications Management Group and eight Local Communication Management groups corresponding to the boundaries of the NHS Executive’s regional offices. The local Communication Management groups co-ordinate networking services on behalf of users in their area to meet the strategic requirements under the guidance of their Local User Representative Group which have been established in all eight regions. The Central Communications Management Group is the central body coordinating the networking requirements of national applications.... It also ensures conformance to national communications and security standards and policies to enable inter-regional connectivity of services” (NHS Executive, 1994b, p. 17).</p>	Formal definition of role and structure of the Information Management Group (IMG), the initiator and key promoter of the NHSnet and its relation to other stakeholders (DoH, Central Communications Management Group, Local Communication Management Groups, Local User Representative Groups).
Connecting for health website	“N3 is the National Network for the NHS. It provides a robust and reliable broadband network, supporting IT infrastructure, world-class networking services and sufficient, secure connectivity and capacity to meet current and future NHS IT needs. ...The N3 provides the essential technical infrastructure through which the benefits to patients and staff from the new systems and services will be fully realized and sustained in the future. N3 helps to speed up essential communications within the NHS” (Connecting for Health, n.d.).	Formally states the purpose for N3. (Note: NHS Connecting for Health ceased to exist on 31 st March, 2013)

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
N3 website	“N3 is one of the largest Virtual Private Networks in Europe with in excess of 51,000 connections (September 2012), 63 points of presence and employing over 12,000 km fibre. N3 provides the NHS Internet Gateway serving 1.3 million employees. N3 benefits more than 60 million citizens through the NHS. N3 underpins the NHS National Programme for IT, the world's largest civilian IT programme and enables all National Applications including: The electronic booking service, Choose and Book..., Electronic Transmission of Prescriptions (ETP)..., Picture Archiving and Communications Systems (PACS)...and The NHS Care Records Service (NHS CRS)” (NHS, n.d.).	Presents current status and services of the N3.
U.K. Parliament publications and website	<p>“Launched in 2002, the National Programme for IT in the NHS (the National Programme) was designed to reform the way that the NHS in England uses information. The vision of the Department of Health (the Department) was to implement modern information technologies to improve the way the NHS delivers services, and ultimately enhance the quality of patient care. The National Programme comprised a number of component programmes including a broadband network, electronic appointment booking and prescription services, and local care records systems...”</p> <p>“While some parts of the National Programme were delivered successfully, other important elements encountered significant difficulties. In particular, there were delays in developing and deploying the detailed care records systems. Following three reports on the National Programme by both the National Audit Office and this Committee, and a review by the Major Projects Authority, the Government announced in September 2011 that it would dismantle the National Programme but keep the component parts in place with separate management and accountability structures. That process has now taken place. In June 2013, the Department published a statement on the benefits to date and in future from the programmes that made up the National Programme” (Public Accounts Committee, 2013).</p>	NHS policies (the IM&T strategy, subsequently the NPfIT) have often been debated in the UK Parliament—see also the following entries. The Parliament's website provides access to bills and legislation, committees, publications and records. Reports of the Public Accounts Committee (which, for example, concern the NPfIT) are available through the Parliament's website (www.parliament.uk).
Independent reports		Formal reports on current state of affairs; evaluation reports and policy reports.
National Audit Office (NAO) reports and websites	““The scale of the challenge involved in delivering the National Programme for IT has proved to be far greater than envisaged at the start, with serious delays in delivering the new care records systems. Progress is being made, however, and financial savings and other benefits are beginning to emerge. The priority now is to finish developing and deploying care records systems that will help NHS Trusts to achieve the Programme's intended benefits of improved services and better patient care” (Tim Burr, head of the National Audit Office, cited in National Audit Office, 2008).	Reviews progress of NPfIT.
British Computer Society	“The BCS Health Informatics Forum is a broad church of those working in and with the NHS in the field of informatics....The BCS shares the vision of the NPfIT. We believe the introduction of effective, usable and ubiquitous electronic patient records will be a significant advance in direct patient care” (British Computer Society, 2005).	States the view of the stakeholder.

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
Caldicott Committee	<p>"This Review was commissioned by the Chief Medical Officer of England owing to increasing concern about the ways in which patient information is used in the NHS in England and Wales and the need to ensure that confidentiality is not undermined. Such concern was largely due to the development of information technology in the service, and its capacity to disseminate information about patients rapidly and extensively. ...It is clearly important that confidentiality does not impede the provision of prompt and effective patient care. But at times there is a tension between the needs of the service for patient information and the expectation of patients that information about them will be kept confidential. It is not uncommon for the NHS to have to balance conflicting needs of this kind; this can be done by adhering to explicit and transparent principles of good practice which we have outlined...." (The Caldicott Committee, 1997).</p>	<p>Committee membership [= formal stakeholder groups]: representatives from:</p> <ul style="list-style-type: none"> - the Department of Health - NHS Executive (including the IMG) - Hospitals and NHS Trusts (consultant, nurse, chief executive) - Health authorities - GPs - Royal College of Pathologists <p>Key (absent) stakeholder acknowledged in the report: patients.</p> <p>Stakes: maintaining confidentiality (vs. effective information exchange and effective care); confidentiality debate resolution (implicit)</p>
Newspaper articles		Reports on contemporary issues and debates
Financial Times, other "broadsheet" daily newspapers, local newspapers, NHS news.	"BT's dominance of health service IT has been revealed by government figures showing the firm received more than two-fifths of NHS Connecting for Health's 2009-10 £1.1bn supplier budget" (The Guardian, 2010).	Reports on financial stakes and power of technology suppliers (for example)
Hospital reports		Hospital policy and data; hospital IT policy.
Annual reports (many are publicly available)	<p>Relevant reports are usually found under the heading "IM&T strategy", NHS. Examples:</p> <p>A DoH report that was the precursor to the NPfIT: "The national strategic programme is concerned with major developments in the deployment and use of Information Technology (IT) in the NHS" (Department of Health, 2003, p. i).</p> <p>"2011/12 was a challenging year for the Trust and the Trust Board addressed some key issues. These included:...</p> <p>Development of information technology systems to support more efficient and effective services delivery" (The Mid Yorkshire Hospitals NHS Trust, 2012).</p>	Report on role of and expenditure on IT.
Practitioner journals		Articles for practitioners, including news
<i>British Journal of Healthcare Computing & Information Management</i> (BJHC&IM)	<p>"The British Medical Association (BMA) renewed its criticism of the NHS Information Management Group's (IMG) approach to patient confidentiality and data security during a heated debate at the HC 96 conference in Harrogate last month. Their security advisor, Ross Anderson, told a crowded conference session that the IMG's IM&T strategy 'threatens to permanently destroy the privacy of the doctor-patient relationship', would lead to inefficient centralization of all information flows in the system, and discriminates 'against vulnerable members of society...'. 'We have to take a long hard look at the IM&T strategy and rewrite it so that it is centered on clinical concerns rather than administrative concerns; so that it is oriented towards patients rather than administrators and optimized for the delivery of healthcare rather than as a means of enforcing bureaucratic power and control from the centre,' he said" ("The data confidentiality", 1996a, p. 6).</p>	<p>Stakeholders identified: BMA, IMG, BMA security advisor, patients, doctors, administrators</p> <p>Stakes: patient confidentiality, data security, doctor-patient relationship, centralization, discrimination, clinical vs. administrative concerns, delivery of healthcare vs. bureaucracy & control</p>

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
	<p>"John Horam, Parliamentary Secretary at the Department of Health, has announced that the NHS Executive is to carry out pilot study to explore the feasibility of introducing encryption services across the NHS-wide network (NHSnet). The decision follows the publication of a report about the implications of using encryption commissioned by the NHS and undertaken by the information security consultants, Zergo. Zergo concluded that the benefits of introducing encryption could be considerable.... It also recommends the use by the NHS of the <i>Red Pike</i> encryption algorithm, which... would enable the NHS to implement a practical solution without becoming locked into a single supplier or system. <i>Red Pike</i> was devised by the Communications-Electronics Security Group (CESG), the information security arm of the GCHQ and the government's national technical authority on IT and security matters" ("Red Pike", 1996b, p. 6).</p>	<p>Stakeholders identified: Department of Health, NHS Executive, security consultants (Zergo), IT suppliers, CESG/GCHQ</p> <p>Stakes: encryption, security, supplier lock-in, government control (implicit)</p>
	<p>"An unexpected glimmer of hope has emerged in the data confidentiality 'debate' between the British Medical Association (BMA) and the Department of Health. ...It seems that the publication of the recent Zergo report on data encryption could be viewed as a key.... While the BMA security consultant Ross Anderson criticised the Zergo report as being 'highly unimpressive' and containing 'a number of serious mistakes', he also said he 'took comfort from the fact that the NHS was clearly prepared to spend sensible amounts of money...to remedy the data security problems'. However, he also said the architecture proposed in the Zergo report, using the <i>Red Pike</i> encryption algorithm, was 'politically unacceptable, technically way out of data and won't command public confidence'" ("BMA says", 1996c, p. 6).</p>	<p>Stakeholders identified: Department of Health, BMA, BMA security advisor, security consultants (Zergo), public</p> <p>Stakes: confidentiality, security, encryption, security problems, report quality (reliability, political and technical quality)</p>
	<p>"If the BMA and the NHS Executive do not agree, we do not have consensus. ...Healthcare professionals and managers are naturally risk averse.... Lack of consensus over healthcare information security implies that the risks involved are difficult to manage.... One way to avoid such risks is to choose not to acquire electronic systems, even though they might greatly improve the efficiency and effectiveness of the services provided. This would be bad news for system developers..." (Benson, 1998, p. 40).</p>	<p>Stakeholders identified: BMA, NHS Executive, healthcare professionals, managers, system developers</p> <p>Stakes: risk, security, efficiency and effectiveness</p>
	<p>"Asked about the reliability of NHSnet, he [DoH spokesperson] said: 'We are currently improving the technical aspects of NHSnet, which provides a secure messaging system for use strictly by the NHS. We are working with our suppliers on ironing out any technical problems – which follows extensive consultation with representatives from the British Medical Association over the past months.'" ("Use of X.400", 1999, p. 4).</p>	<p>Stakeholders identified: Department of Health, IT suppliers, BMA</p> <p>Stakes: technical problems, reliability, consultation with representatives</p>
Network news	<p>"All network projects at the NHS are in jeopardy after it emerged that two thirds of health authorities are in the red, with a overall national deficit of £300m.... The NHS's largest and most pressing project is linking all health authorities to the NHSnet.... The Labour Party hit out at the Government over the issue, claiming that too much money is being wasted on bureaucracy" (Jones, 1997). /</p>	<p>Stakeholders identified: health authorities, Government/opposition</p> <p>Stakes: cost, bureaucracy</p>

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
	<p>“... On the face of it, the NHSnet is to the public sector IT projects what Stanley Kubrick’s forthcoming <i>Eyes Wide Shut</i> is to Hollywood—years late, way over budget, and everyone has forgotten what it was supposed to be about in the first place.</p> <p>To be fair, nobody ever thought it was going to be easy. The NHS is made up of more than 100 health authorities, 429 hospital trusts and 10,000-odd GPs, not to mention 56 million or so customers. Sewing this lot together under on IP-based communications infrastructure was always an ambitious idea.</p> <p>Two years on from the infrastructure supposedly being ready, and a full five years after blueprints were drawn up, few people are seeing any real benefits. Instead, many authorities that were advised to expect major savings are grappling with implementation costs they cannot afford. And GPs, without whose involvement the project is worthless, are signing up in dribs and drabs, put off mainly by connection costs said to be at least £5,000 per practice.</p> <p>The NHS’ own Information Management Group (IMG) has this year unveiled a radical strategy to the NHSnet idea moving ahead once more. The strategy is multi-part and highly complex, but in essence it aims to promote the benefits of electronic communication, showing it as a boon and a money- and time-saver.</p> <p>Mary Friel, business development manager for the public sector with Cable & Wireless—the joint provider, along with BT, of access services for the NHSnet—is both philosophical and optimistic.... ‘It is taking time to galvanise all these disparate interests, and for them to get funding. We will only really see all the promised benefits when everybody is connected, and that’s going to take another couple of years at least.’</p> <p>Puzzling to many outside observers is the variety of roles taken by what seems to be a multitude of cooks stirring the same broth. BT, responsible for the backbone of the project, shares responsibility for access services with Cable & Wireless, acting in competition so that buyers have a choice.</p> <p>Also involved until recently was AT&T, which was running—among other things—the Prescription Pricing Authority network until it sold out its interest in the health market to US-based healthcare IT specialist, HBO.</p> <p>Racal, likewise, has a historic interest in the project, and is still the name behind many of the existing X.25 links to the NHSnet from GP surgeries, predating the upgrade to an X.400-based infrastructure...” (Matthews, 1998, pp. 40-41).</p>	<p>Stakeholders identified: health authorities, hospital trusts, GPs, ‘customers’ of healthcare, IMG, IT/network suppliers (BT, Cable & Wireless, AT&T, HBO, Racal), Prescription Pricing Authority.</p> <p>Stakes: project management (time, cost, scope), perceived cost, perceived benefits (or lack thereof), ‘disparate interests’, multiple suppliers, competition and customer choice</p>

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
Computing	<p>"The NHS-Wide Network, set to go live next year, will ultimately link thousands of GPs, hospitals and health authorities. The system is designed to speed up NHS bureaucracy, bring faster and more effective patient care, and save millions of pounds. But the network, being prepared by BT and Mercury and expected to complete trials in November, lacks encryption to protect data and security is restricted to sever passwords and user-authentication.</p> <p>Ray Rogers, executive director of the NHS Executive's Information Management Group (IMG), which is responsible for the network initiative, only added fuel to the debate when he described the future of the infrastructure as an 'NHS Internet'...</p> <p>The British Medical Association (BMA), the organization for medical professionals, stepped up its campaign to get the DoH to introduce encryption to the network after meeting on 5 October with other groups which share its fears. Concerned parties include nurses' unions and the Data Protection Registrar. ...Privacy International, a watch-dog made up of academics and computer experts, this month called for GPs to boycott the network. ...'Basic data has to include details identifying you, where you live and your medical conditions. This isn't a matter of confidentiality—we are talking human rights and privacy.' Horner [Chairman of the BMA's medical ethics committee] points out that the threat from hackers attempting to break into the NHS-Wide Network through its fir-walled link to the Internet, is secondary to the greater potential for abuse of confidential information by NHS employees themselves. ...if the general public becomes aware that information they give to their GP could be abused, then they might be less likely to seek medical advice and treatment. Dr Paul Steventon, vice chairman of the special interest group Doctors Independent Network (DIN), agrees that the real danger comes from within.... 'To date, very little notice has been taken of the ethical requirements of NHS clinicians because the system has been designed and specified mainly to ease the task of NHS managers – who naturally do not wish to be excluded by the health professionals from direct access to any data they may see fit to extract. This apparently includes confidential patient records, which clinicians are bound to protect from improper disclosure.'</p> <p>Rogers believes the medical profession is panicking unnecessarily about confidentiality and says he was 'saddened' by the BMA's stance, which he described as 'blinkerred'. ...Rogers admits it is up to individual hospitals to decide how they offer online access to patient data.</p> <p>Murray Bywater, analyst at NHS IT market research firm Silicon Bridge, claims the fears of loss of confidentiality are largely exaggerated...because the use of the NHS-Wide Network will remain limited for some time. ...Bywater believes the NHS should look at the systems within hospitals before trying to build the mother of all networks" (Willcox, 1995, pp. 28-29).</p>	<p>Stakeholders identified: GPs, hospitals, health authorities, IT suppliers (BT, Mercury), IMG, executive director of the IMG, BMA, BMA's medical ethics committee, DoH, nurses' unions, Data Protection Registrar, Privacy International, Doctors Independent Network, NHS employees, general public, analysts, NHS IT market research firm</p> <p>Stakes: bureaucracy, speed, access, confidentiality, security, encryption, public perception, hospital readiness</p>

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
	<p>"The infrastructure has been in place for over two years, yet is use has been anything but uniform. ...The Department of Health (DoH) seems to have taken this on board, judging by its recent actions to promote the use of electronic communication throughout the whole health service.</p> <p>...Frank Burns, the current head of the IMG is as aware as anybody of the unwieldy nature of the health systems monster. One dilemma he faces is how far to impose central IT standards.</p> <p>John Aird, information management and technology head at United Bristol Hospitals NHS Trust, argues: 'There is so much reinventing of wheels all over the place. There's little financial alternative but to move towards a more central direction'. But centralization will bring nightmares of its own. Aird points out that the more organizations are judged by performance, the more they are pushed away from the centre as they seek to make their own decision on how to maximize their efficiency.</p> <p>Currently, only 310 out of 10,000 GPs are connected to NHSnet – compared with 295 of 429 hospital trusts and 96 out of 100 health authorities.</p> <p>London's Hammersmith Hospital Trust, one of the biggest in the country, has just streamlined the computer systems of its four hospitals, a process that took one year to procure and six months to implement.</p> <p>... [Howell Huws, Hammersmith's head of IT] also sees confidentiality and security as prime concerns. He added: 'The NHS hasn't agreed what is appropriate security yet'." (Carew, 1998, p. 20).</p>	<p>Stakeholders identified: DoH, IMG, NHS Trusts, information management & technology/IT heads of NHS Trusts</p> <p>Stakes: cost, standards, centralization (vs. local control), performance, internal IT projects/priorities of Trusts, confidentiality and security</p>
	<p>"The BMA is already advising doctors not to sign up to the NHS intranet NHSnet, a cornerstone of the [NHS IT] strategy. Dr Grant Kelly, chairman of the information management committee, describes the network as neither secure nor financially attractive. The NHS Executive has tried to calm doctors' security fears by appointing an expert on confidentiality and security as chairman of its new information authority. Professor Alastair Bellingham will head a new agency, the NHS Information Authority, which replaces the discredited Information Management Group" (Cross, 1999, p. 3).</p>	<p>Stakeholders identified: BMA, BMA's information management committee, NHS Executive, doctors, NHS Information Authority [new stakeholder], IMG [exiting stakeholder]</p> <p>Stakes: security, cost, role of management</p>
	<p>"Only one third of GPs have signed up for NHSnet and only one half of those have used it in the last month.... As well as cost, another stumbling block is that hospitals are even less IT-literate than GPs. ...Another problem was that the network was based on the X400 legacy protocol, which requires users to handle a complex and unwieldy addressing system" (Ranger, 2000, p. 2).</p>	<p>Stakeholders identified: GPs, hospitals [BMA, medical IT provider also noted in the article]</p> <p>Stakes: cost, IT-literacy, technical issues</p>
Mailing lists		<p>GPs (primarily) and other stakeholder exchange views on matters of interest; of interest are discussions on the NHS network, confidentiality and security, the role of GPs and patients, and use of IT in healthcare more broadly.</p>

GP-UK mailing list	<p>Subject: Security of NHS network "It has been suggested that I copy this to the mailing list: Press Statement – British Medical Association 11 December 1995 BMA WARNS DOCTORS ABOUT GOVERNMENT GUIDANCE ON COMPUTER SECURITY The BMA today warned doctors that new guidance by the Department of Health on computer security had been issued without the agreement of the BMA. Dr Fleur Fisher, Head of Ethics, Science and Information at the BMA, commented: "Doctors need to be aware tat this guidance does not have the full support of the BMA and clearly has been issued as a pre-emptive move in the coming negotiations between ourselves and the NHS Executive officials. ...The guidance will, we understand, be sent to GPs shortly and we would urge any doctor receiving such a document to contact the BMA first before being beguiled by the Department's talk of the advantages of such a Network. We believe that, once the Department has addressed properly the questions of compartmentalising the system and including encoding or encryption for sensitive information, we can welcome such a Network as a major step forward for communication throughout the NHS. ...It remains the BMA's policy that it is not acceptable to connect any computer containing identifiable clinical information to the NHS Network or to any other network outside clinical control."" (Post by Ross Anderson, Security Consultant to the BMA, 14 Dec 1995)</p> <p>Subject: re: Security of NHS network "Congratulations to the BMA team who have worked so hard on this. ...If doctors simply won't contribute confidential patient data to the NWN, the NHS management will certainly recognize it to be in their bet interests to alter the system until we are happy to use it. ...If we don't win this one the profession will have opened an era" (Post by vice-Chairman of the Doctor's Independent Network, 14 Dec 1995)</p> <p>Subject: re: Security of NHS network "It is my opinion that all around the globe (and the UK) doctors are responsible for what they write, how they write and what will be done by others with what they have written. It is of the outmost importance that patients trust their doctors. And that what the doctors write down is strictly confidential. ...By all means doctors around the globe should stick to this ethically justified stance. And should seek international support." (Post by a doctor based in the Netherlands, 14 Dec 1995)</p> <p>Subject: re: Security of NHS network "The hot topic on everyone's lips is "privacy". And, as usual, the computer industry is in the process of confusing and disrupting the issue beyond recognition.... We have factions all over the place each arguing passionately for its own most beloved encryption scheme, and some of the rhetoric is getting pretty heated...." (Post by a GP, NE England, 14 Dec 1995)</p> <p>Subject: re: Security/BMA: NWN – the storm clouds are gathering "Ross [Anderson] (and the BMA) argue a strong and persuasive case. I have the following points to make:</p>	<p>These sample extracts show variety of stakeholders that are engaged in the debate about the NWN (NHS-Wide Networking) and the NHSnet, the variety of stakeholders they each name in their posts (bolded), the interests they explicitly state for their stakeholder group, and the interests they attribute to others. It is also interesting to note the writing style, occasionally characterized by humor, irony, or passionate statements.</p> <p>Stakeholders identified (collated, from all the extracts in this list): BMA, BMA security consultant, Department of Health, doctors/medical profession/GPs/doctors around the globe, NHS management/senior officials/NHS Executive, the computer industry, Doctor's Independent Network, patients/public/people/"Joe Public", government, DTI, GCHQ, FBI, NSA, Zergo</p> <p>Stakes and issues (all extracts): confidentiality, security, encryption, (fair) stakeholder representation (for doctors and for patients), consent, trust (patient/doctor relationship), nature of doctor's work, network efficiency, cost of connecting, government control agenda, centralization.</p>
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	<ol style="list-style-type: none"> 1. Please do not bring ethics into it before knowing the views of those whose confidentiality is going to be potentially compromised. But that's democracy for you, The BMA shall speaketh for all! (come back Ivan Illich, all is forgiven). 2. There are millions of bits of data about almost everybody in the land. I know, [another mailing list participant] landed in hot water over this. But, health data is no exception under current arrangements (work out the examples yourselves). 3. It is after all a question of consent. The act of consenting to something completely and utterly destroys almost all of the argument. 4. So, I say, let the people speak and let us abandon our insistence that we are the only custodian of confidentiality and the only repository of wisdom.... 6. This is my "alternative" policy: I will ask my patients. If they don't mind, I'll implement, if they do, I won't. Simple. And not a committee in sight!" <p>(Post by a GP, SE England, 14 Jan 1996)</p> <p>Subject: re: Security/BMA: NWN – the storm clouds are gathering</p> <p>[in response to the post above]</p> <p>"Consent should be INFORMED. It's OK to tell the Doc on the assumption (often wrong but never clearly stated) that it goes no further. If Joe Public fully understood the implications of where his medical records could end up, do you think he'd tell us?</p> <p>Another fallacy is that you only need confidentiality if you've got something to hide... rather like saying you wouldn't object to all your mail being opened.</p> <p>Confidentiality should be assumed as an integral part of the design of any decent medical system..."</p> <p>(Post by a GP Computer Adviser & GP Trainer, NE England, 15 Jan 1996)</p> <p>Subject: re: Security/BMA: NWN – the storm clouds are gathering</p> <p>"I am a patient and one who is aware of the UK's professional standards relating to confidentiality. Please do not be so arrogant as to believe that ONLY the [medical] profession can take decisions in this area. There is, in my view, a difference between privacy and confidentiality. I decide what information I impart about myself (privacy) and may *or may not* decide to place a duty of confidentiality upon the recipient of that information (confidentiality). In the absence of an understanding of these matters then the default may be to let the clinician decide and protect, but when you can (and if you will), please discuss it with me. That is, after all what will happen if the BMA's policy/principles are enacted anyway.</p> <p>Are patients so ignorant or incapable of grasping these concepts that we should leave it all to the doctors to decide regardless? I, for one, think not."</p> <p>(Post by a patient, 23 Jan 1996)</p> <p>Subject: re: Spooks and encryption</p> <p>"...The government would like to read people's medical notes, and they are building a number of systems (Such as the Clearing service) that will let them do just that. Why on earth mess about with intercepting communications? It's expensive and unreliable. Far better to just centralize the processing of all relevant records on the excuse that this will make payments more efficient and facilitate audit, research and management generally....</p> <p>On the encryption side, the agenda is driven by GCHQ whose priority is to placate the American intelligence community. The</p>	
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Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
	<p>FBI and NSA are now engaged in their third attempt to grab control of civilian crypto (for details on all this, see http://www.epic.org).</p> <p>The current initiative was conceived by the NSA.... It was introduced in the UK via the Zergo report – which I now understand was preceded by a briefing at GCHQ for equipment suppliers, to which the BMA was not invited.</p> <p>After the Zergo report received a muted response, the DTI [Department of Trade and Industry] went ahead with their announcement of a plan to regulate trusted third parties.</p> <p>Very senior officials in the NHS have denied that their policy is being driven by the intelligence community, and have even expressed distaste at my mentioning GCHQ in their presence. However, these are the same officials who assured us categorically on the 2nd May that doctor's keys would be escrowed, and then completely changed their tune after the DTI announcement. So anyone who believes that the NHS Executive is in charge of their crypto policy needs his head read (as they say in Glasgow). So does anyone who thinks that these manoeuvres will help build the necessary patient and professional confidence in NHS networking."</p> <p>(Post by Ross Anderson, Security Consultant to the BMA, 25 Jul 1996)</p> <p>Subject: re: NHSnet/Internet gateway</p> <p>"What is it for??? A very good question. NHS.net is the big idea of having a secure, private wide area network, or more specifically, intranet (a WAN using internet technologies) for all folk who work for the NHS or with the NHS or are at all connected in any way with the NHS and can conform to the Code of Connection and can fund the equipment and can fund the maintenance and the training and the time to read the details and then assess its value, and see a benefit and NOT be out of pocket at the end of the day, and yet somehow deliver better patient care over the desk at 9am on a Monday morning. Because we have better access to information. Hmmmmmm...</p> <p>It could work but it is horribly, horribly, complicated so far.</p> <p>"Why" is because it *could* bring substantial benefits, if it works, and if we use it. With secure networking (and I mean SECURE (you have to keep shouting it)) we could be able to grab patient records of the net of our new patients, say or arrange out patient appointments in a surgery that day, there and then, or find out the latest protocol for treating athletes foot, or hear about OCP scares at the same time as the press....</p> <p>So that is why. Of more relevance, I feel, is do GPs want it? Certainly seems difficult to convince my colleagues of the potential benefits. Also the ongoing security saga is spoiling the party, somewhat....</p> <p>The scariest thing, I find, is that this is a "huge" project, that could (will?) substantially change how we work, and yet so many folk seem to know so little about it...."</p> <p>(Post by Health Center doctor, Scotland, 2 Oct 1996)</p>	
Websites of patient representation groups		Provides information for various organizations involved in patient representation and support

Table A1. The Role of Secondary Data-collection Sources: Sample Extracts and their Relevance

Type of data/data source	Sample data extract(s) (Note: bolded text denotes our emphasis)	Relevance to the research
The Patients Association	<p>"The Patients Association's motto is 'Listening to Patients, Speaking up for Change' [emphasis in original]. This motto is the basis on which we build all our campaigns. Via our Helpline, we capture stories about Healthcare from over thousands of patients, family members and carers every year. We use this knowledge to campaign for real improvements to health and social care services across the UK. In addition, our Helpline provides valuable signposting and information for patients and supports them as they navigate the Healthcare services" (The Patients Association, n.d.).</p>	<p>Public debates about NHSnet/N3 typically treat patients as the silent stakeholder. The websites of different patient association/representation/participation groups present their formal roles and provide evidence of activities and services offered to interested patients, their families, and carers.</p>
National Association for Patient Participation (NAPP)	<p>"Patient Participation Groups (PPGs) work in partnership with their practices to:</p> <ul style="list-style-type: none"> • Help patients to take more responsibility for their health • Contribute to the continuous improvement of services and quality of care • Foster improved communication between the practice and its patient • Provide practical support for the practice and help to implement change... <p>Established in 1978, NAPP is uniquely placed as the only UK umbrella organization for patient-led groups in general practice. We provide essential support to GPs and practice teams through a comprehensive range of evidence-based high quality specialist resources developed from over thirty years experience and formation of hundreds of Patient Participation Groups. We also provide essential support to Clinical Commissioning Groups (CCGs)" (National Association for Patient Participation, n.d.).</p>	
National Patient Safety Agency (NPSA)	<p>"Patient Safety was a division of the National Patient Safety Agency (NPSA). The NPSA was an arm's length body of the Department of Health. It was established in 2001 with a mandate to identify patient safety issues and find appropriate solutions and abolished in 2012. ...On Friday 1 June 2012 the key functions and expertise for patient safety developed by the National Patient Safety Agency (NPSA) transferred to the NHS Commissioning Board Special Health Authority" (National Patient Safety Agency, n.d.).</p>	
National Patient Safety Foundation	<p>"The National Patient Safety Foundation's vision is to create a world where patients and those who care for them are free from harm. A central voice for patient safety since 1997, NPSF partners with patients and families, the health care community, and key stakeholders to advance patient safety and health care workforce safety and disseminate strategies to prevent harm. NPSF is an independent, not-for-profit 501(c)(3) organization" (National Patient Safety Foundation, n.d.).</p>	

Acronyms

BCS	British Computer Society
BMA	British Medical Association
CCTA	Government centre for information systems
CSM	Committee on Safety of Medicines
DIN	Doctors' Independent Network
DH/ DoH	Department of Health
DTI	Department of Trade and Industry
FHSA	Family Health Service Authority (predecessor of health agencies)
GMSC	General Medical Services Committee
GP	General Practitioner
GPEP	General Practice Electronic PACT
HISS	Hospital Information Support Systems
IMG	Information Management Group (of the NHS Executive)
LMC	Local Medical Committee
LPC	Local Pharmaceutical Committee
LURG	Local User Representative Group
MCA	Medicines Control Agency
NHS	National Health Service
NWN	NHS-Wide Networking
OPCS	Office of Population Censuses & Surveys (currently Office of National Statistics)
PPA	Prescription Pricing Authority
PACS	Picture Archiving and Communications System
PSNC	Pharmaceutical Services Negotiating Committee

Appendix B

Table B1. Roles and Stakes of NHSNet and NHS N3 Stakeholders

NHSNet and N3 stakeholders (Names of the following Selected bodies and organizations have changed over the course of the research)	Role(s)	Stake(s) in N3 ((E)xplicit/expressed (voiced), (A)tttributed, (I)ndirect)	Examples from primary data and secondary sources
Medical professionals 1.Primary care – general practitioners (GPs)	Provision of primary care, “gatekeepers” between primary and secondary care, IT users, some are members of professional and activist groups, some subscribe to the GP-UK mailing list.	Efficiency in data exchanges among healthcare professionals (E). Patient data confidentiality (E, A). Compliance with national requirements for IT use (resistance) (E). Concern about cost implications (A). Adopt IS that meet needs of practice and expertise of doctors (I). Ownership of patient data they are unwilling to share (A).	“GPs, without whose involvement the project is worthless, are signing up in dribs and drabs, put off mainly by connection costs said to be at least £5,000 per practice” (Matthews, 1998, p. 40). Computerization varied across GP practices in the 1990s, as did the expertise of staff. “...part of the reason for the debate with the medical profession it could be argued is that they like to hold on to their information they don't like others having access to it; it might raise certain questions as to the way that they work; that's a rather negative view but it's possibly one of the reasons, although on the face of it the reasons are very noble (they are acting in the interests of) the patients but there is also a narrower interest in keeping the information hidden” (PSNC interview, 1996).
2.Hospital doctors (Consultants)	Providing secondary care, senior and junior consultants.	Efficiency in data exchanges among healthcare professionals (E). Lack of awareness (E). Level of involvement (E, A). Time pressures (I).	Levels of hospital computerization varied across hospitals in the 1990s, as did the change agents (senior doctors vs. junior doctors vs. administrators/IT staff) Overworked doctors in a hospital would disclose their passwords to nurses with lower access rights to patient data, so that the latter could do some of the data entry for the doctors. The hospital eventually responded with more severe clauses on security in the clinicians' contracts (Interview with hospital pharmacist, 1996).
3. Nursing staff	Providing support care—in hospitals, general practices, and the community.	Support in documentation of health records (I). Stakes aligned with clinicians (I).	“We work with new technology but we don't feel we know much about the IT strategy. Nurses are very busy so we tend to share passwords, which is not a good idea, but we do this because at handover times, nurses want to continue treating patients without time delays” (Interview with Senior Nurse, London-based hospital, 2007).

Table B1. Roles and Stakes of NHSNet and NHS N3 Stakeholders

NHSNet and N3 stakeholders (Names of the following Selected bodies and organizations have changed over the course of the research)	Role(s)	Stake(s) in N3 ((E)xplicit/expressed (voiced), (A)tttributed, (I)ndirect)	Examples from primary data and secondary sources
Primary care trusts (PCTs)	Primary care trusts (PCT) were part of the NHS in England from 2001 to 2013. PCTs were largely administrative bodies and responsible for commissioning primary, community, and secondary health services from providers.	Obtaining value for money for the NHS (E). Collectively, PCTs were responsible for spending around 80 percent of the total NHS budget.	"The PCTs are responsible for commissioning. There is a big debate which continues in the NHS about private/public sector contracts. My background is from industry and I don't really see a major problem with contracting out to the private sector. However, one of the problems about health IT is who has access to the data, particularly patient data. Some people, including many doctors and nurses are worried that patient records will be obtained and even sold by commercial firms, without the patient's consent or even their knowledge." (Interview with Head of PCT, London Based, 2008)
Hospital trusts	Providing specialized care Relevant roles in hospital trusts: medical professionals (see above), managers/admin staff, hospital pharmacists, nurses (see above) IT management staff	Access to information (A).	"NHS managers—who naturally do not wish to be excluded by the health professionals from direct access to any data they may see fit to extract" (VC, Doctors Independent Network, cited in Willcox, 1995, p. 29).
Strategic health authorities (SHAs)	SHAs have responsibility for enacting the directives and implementing fiscal policy as dictated by the Department of Health at a regional level.	National health policy implementation (E). Using IT to increase patient safety (E). Resource allocation (A, I).	"I think the role of the SHA is to get the PCT to take resources from healthcare organizations that are succeeding, and give it to those that are failing. One thing I have learned from working in healthcare, it that it is a battle of turf wars and resource allocation. The NPfIT is the same. The battle is who can win in a system that is constantly restructuring" (Interview with NHS Executive, Midlands Hospital Trust, 2009).
NHS Executive	Implement Department of Health Policies	Improve IT support (E, A). Cost-efficiency (E, A).	"The IM&T strategy & the NWN project The rationale is 'let's see how cheaply we can get away with' and then if it doesn't work we'll continue to pay more until it does work rather than paying more, possibly up front and make sure that the system is compatible and right" (LPC interview, 1996).
Information management group (of the NHS Executive)	Develop and Advise on IM&T Strategy and Implementation in Healthcare	Promotion of the IM&T strategy of the NHS (E).	"We meet every month to discuss IM&T issues. The Chair of the Hospital Trust attends the meetings. We act as an advisory group and try to link the business side with the IT" (Interview at Hospital in West of England, 2004).

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National/regional and local medical (LMC) and pharmaceutical (LPC) committees	Represent and negotiate on behalf of doctors and pharmacists LPCs: also liaise with the health authorities locally and with other national bodies who represent the interests of pharmacy	Mistrust between government and pharmacy representatives (I). Lack of awareness (due to lack of information) (E).	<p>"I don't think they are particularly well geared up to handling the technology. Certainly not at local level. Certainly, I'm sure central links are quite good -I think- but there doesn't seem to be much exchange of data from local to central or central to local, which is sad, because there is a lot of data and it would be extremely useful. Now, you need to dig very hard to find it."</p> <p>"There is too much of an 'us and them' situation; they keep hold of their information very very tightly; they think it could be misused by us, but they don't seem to realise that they could actually pay us to do some of the work to utilise the data that they've got then they would save so much more money."</p> <p>"...it may be difficult to get the government to spend the money, again, to enable the long term project to be undertaken, there are generally small projects that are undertaken and the thing is they don't tell anybody about them, that's the real problem. You'd really have to wheedle the information out of the people to find out exactly what's going on in your area" (LPC interview, 1996).</p>
National/local user representative groups	Focus on 'users' of ICT in healthcare organizations	Variable awareness among user groups about the strategic and operational plans to use ICT (E).	<p>"The notion of 'users' is an interesting idea. The range of skills and knowledge about ICT variables tremendously at national and local levels in healthcare" (Interview with IT Professional with responsibility for sitting on a National ICT Representative Committee, 2006).</p>
British Medical Association (BMA)	Trade union and professional body representing doctors locally and nationally	<p>Representation of doctors' interests (E, A).</p> <p>Resist NHSnet (E).</p> <p>Use NHS skills and capabilities (E).</p> <p>Restrict use of private sector in NHS (E).</p> <p>Ideological re-positioning (A, I).</p>	<p>"We provide peace of mind in the workplace with our expert employment support; We are the voice for doctors and medical students throughout the UK; We promote the medical and allied sciences and the aims of quality healthcare...."</p> <p>"We are for doctors, because we are doctors. Our insight and understanding helps us defend your interests when it matters most and fight hard to champion the profession" (British Medical Association, n.d.).</p> <p>"Dr Grant Kelly, chairman of the information management committee, describes the network as neither secure nor financially attractive" (Cross, 1999, p. 3).</p> <p>"One of the leaders of the BMA described the NHS IT program as 'the worst case of planning blight across the NHS' and called for it to be ended. ...The BMA launched a campaign to 'save' the NHS from 'commercialization' and suggested it should remain 'publicly funded, publicly provided, and publicly accountable'. Dr Fielden said the Private Finance Initiative and Independent Sector Treatment Centre (ISTC) deals should be scrapped. Private management consultants should be "ditched" and that the health service would do much better to rely on the experience and expertise of its 1.2m staff. ... [The NHS has] 40,000 hospital consultants, 1.3 million employees, 250 'top leaders'" (Digital Health Intelligence, 2009).</p>

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The Pharmaceutical Services Negotiating Committee (PSNC)	Negotiation with the DoH, support for LPCs, advice, checking the pricing of prescriptions, liaising with other pharmaceutical bodies	Voicing implications of IMG projects (incl. NHSnet) for pharmacy (E). Expectation/ interest in involvement (E). Reactive stance (E). Issues of representation (E)	<p>"If there are going to be links between pharmacies and the PPA it has to be through the NHS Network.... Many of these [NHS IMG projects] will affect pharmacy and it's the job of the pharmaceutical bodies to say 'What about the pharmacy? Have you thought about the pharmacy?'"</p> <p>"The key thing about pharmacy is that pharmacy must have access to those parts of the medical record which are vital for giving some advice on the usage of drugs."</p> <p>"You do try to move from being reactive to being proactive but that's difficult because...the initiative is coming from the centre, from NHS Management Executive.... We usually find out about developments at the Information Management and Technology forum, each year and we either react at the meeting or if it is important we would write to them to emphasize the point."</p> <p>"The PSNC, RPSGB [Royal Pharmaceutical Society of Great Britain], NPA [National Pharmaceutical Association]...overlap in many areas; we have a dialogue, at least one person in this office will be speaking to one person in either of the two bodies on a daily basis. [These bodies] have a multidimensional overlap, which isn't particularly helpful because it means that the pharmacy isn't acting as one or doesn't appear to be one body, unlike the British Medical Association" (All interview extracts: PSNC, 1996).</p>
Patient associations and patient groups	Advocacy and representative roles	Access to care in a trusted environment.	<p>"If the general public becomes aware that information they give to their GP could be abused, then they might be less likely to seek medical advice and treatment" (Willcox, 1995, pp. 28-29).</p>
Pharmacists	Pharmacists are linked to the NHS N3 network, primarily as part of the wider National Program for IT (NPfIT) to facilitate the development and application of the electronic prescription service (EPS)	Integral part of NPfIT (A). Concern about funding for EPS (E). Potential issues about integration with hospital/GP systems (I).	<p>"Pharmacists are very open to developments in IT and that's been proved as I said earlier the developments in pharmacies have taken place with their own money and by themselves and they there's a lot of compatibility between pharmacists, now one would need to make it compatible between the GPs and between pharmacists, between the pharmacists and the PPA. I think that would be very useful" (LPC interview, 1996).</p> <p>Pharmacist (becomes a key) player "...because he's got a friendly image being in the high-street, being available. For someone who goes out to buy a pair of shoes or baked beans or whatever it is so easy to go into the local pharmacy and say look you dispensed this last week, is it possible that it is causing that problem? And the pharmacist will look at the information. They haven't got much time but perhaps a little time to say it in a language that you will understand. You don't have to make an appointment. You know you can meet in an informal environment. (And the pharmacists may look at it and sat you are right). it happens all the time. I do some freelance work in a pharmacy and it's amazing. People come in and ask questions" (LPC interview, 1996).</p> <p>"As we run our own small businesses, pharmacists are concerned about the cost of introducing electronic prescription services for patients. We have to buy our own IT and the cost of printing electronic prescriptions is high. We think the government should provide more funding for this" (Pharmacist, London-based, 2006).</p>

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Pharmaceutical companies	Research and develop (ethical) drugs	Division of labor between GPs and pharmaceutical companies (A, I).	"Until recently I think the drugs industry looked at GPs, paid particular attention to GPs because they were the main tool obviously for achieving their profits - hospital to a certain degree, although the vast majority of prescribing takes place in primary care, so it was always a good idea for the pharmaceutical industry to go to the source of prescriptions. It's become more difficult to see GPs whereas at the same time they are noticing it's becoming more easy for pharmacists to see GPs. Now they seem to be told to see pharmacists." (LPC interview, 1996)
Department of Health/Connecting for Health	Lead government agency to oversee strategic implementation of NPfIT (including NHS N3).	Implement government policy on the NPfIT, N3. Promote the use of electronic communication in the NHS (E, A).	Connecting for Health aims to "put in place through the use of new technology, information systems that give patients more choice and health professionals more efficient access to information and thereby ensure delivery of better patient care" (NHS Connecting for Health, 2005, p. 2).
British Parliament/ Members of Parliament	Scrutiny of government work, legislation, debating, check and approval of government spending	Short-term political view about expenses (A).	"...it's all about year-in year-out budget and what you can do within the life time of one Parliament or one government and there does not seem to be a lot of interest in let's say well, let's have a 10-year policy, 'cause if you do this now, what the results would be in 10 years time. They are not interested because they may not be in power in 10 years item. It's how much money hey can save of this year's budget; how much of that can be fed through from the Treasury to the government to pay for tax cuts. It's all political; it's all linked with political initiatives, which is wrong" (LPC interview, 1996).
Privacy activists	Advocacy groups which emphasis the issues and threats associated with citizen/patient data infringement.	Desire to protect citizens'/patients' privacy and security (E). Calls for 'explicit consent' about patients' rights to have their medical record uploaded on NHS N3 database (E). Labelled as "anti-technology" by those who promote NPfIT (A).	"Privacy and security about electronic patient data is an important issue. The planned IT changed in the NHS may threaten patient interests, particularly where the government wants to follow an 'implied consent path— which means that, if the patient does not object to having their medical record uploaded on the 'spine' (e.g. national database), it will be done automatically. We don't think this is right and so we call for a policy of 'explicit consent' – where all citizens must either agree or disagree as to whether their record is available electronically" (Interview in 2008 with Independent Privacy Activist).

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British Computer Society The BCS is now, the chartered institute for IT	A membership organization set up in 1957 as a leading body for people working in information technology (IT).	To promote the study and practice of computing and to advance knowledge of, and education in, IT for the benefit of the public. BCS is also a registered charity (E).	<p>"The N3 network and aspects of the Spine provide essential infrastructure which are working and are probably capable of meeting future requirements" (BCS, 2006, p. 6).</p> <p>"The NHS Connecting for Health should continue with N3, as it delivers and will deliver significant benefits" (BCS, 2006).</p> <p>The BCS calls for key parts of the £11.4 billion NHS National Programme for IT to be retained where, in spite of its failures, the technology foundation is good, particularly the rollout of the NHS data spine and N3 broadband network (Computer Weekly, 2011).</p> <p>"While we recognise that for example, the delivery of applications into acute hospitals has proved problematic and painful, there have also been a number of successes.... The key now is to concentrate on the future—the National Programme must now position itself as a platform on which to build innovation" (Ewan Davis, Treasurer at the BCS Health, reported in Computer Weekly, 2011).</p>
Health ICT professionals	Employed by NHS to develop ICT for health service delivery.	<p>To develop a career in the burgeoning health IT field in the NHS, funded by the increased expenditure on the NPfIT and other IT&M activities (A).</p> <p>Building IT capabilities in healthcare (E).</p>	<p>"Ten years ago, I would not have considered a career in health IT. But with the funding for IT and the career progression, it is better than banking, which has suffered after the financial crisis of 2008" (IT professional working in a London-based hospital, 2009).</p> <p>"It has been a learning curve for me, working with doctors and nurses. I would not say they are anti-technology, but they are reluctant to learn new IT systems—probably because many of the doctors have not grown up with technology. Many of the hospital consultants are in their 50s so are not used to working with electronic records. But I think the training could be better" (IT professional, working in the West of England, 2006).</p>
Contracted ICT suppliers	Contracted in by NHS and IT vendors to develop ICT for health service delivery.	To continue working under contract to deliver the NPfIT (E).	"Although I only came for 6 months, I have now been working here for 3 years. The contract IT staff become quite knowledgeable about the hospital systems, but I am not sure it is good to have too many contractors. I now feel part of the furniture." (Contract IT professional, working in the West of England, 2006)
Health industry researchers	Presentation/debate of issues of interest to the health industry	<p>Reporting on developments (E).</p> <p>Newsworthy stories (E).</p>	Medix found 56% of GPs in England were at least fairly enthusiastic about the health service's National Program for IT (NPfIT), but, during polling in the last week of January, that fell to 21%. Among hospital doctors, support fell from 75% to 51%. The Medix poll, co-sponsored by the Guardian and Computer Weekly, found doctors were anxious about the confidentiality of the proposed NPfIT system for transferring electronic patient records. NPfIT would allow authorized medical staff throughout the NHS to access a patient's medical history. The poll found 70% of GPs and 42% of non-GPs think records would be less secure than current systems. Only 2% of GPs believed the new system would be more secure. (Carvel, 2005).

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Health industry publications	Targeted reporting on health IT issues.	To report on the progress and lack of progress of the NPfIT and N3 network (E). Newsworthy stories (E). Exposing political and contractual "conflicts of interests" (A).	"N3's contribution to modern healthcare should not be underestimated. It has been a quiet revolution behind the scenes and made a lasting difference to the NHS. N3 is transforming the way people work, increasing efficiency, saving the NHS money and, most importantly, helping improve patient care" (Nick Earl, Chief Executive, N3SP, cited in BT, 2013). "The Department of Health is set to extend its N3 contract with BT for another two years; but is starting to consult on what will replace it" (Digital Health Intelligence, 2010).
National/local newspapers	Independent reporting of the progress of the NPfIT. To call to account all those "stakeholders" responsible for the policy, design, and implementation of the NPfIT.	To report on the progress and lack of progress of the NPfIT and N3 network (E). Newsworthy stories (E). Exposing political and contractual "conflicts of interests" (A).	"BT's work as part of the NHS National Programme for IT (NPfIT) continues to gain momentum. In London, where it is rolling out new IT systems to Hospitals, clinics and GP surgeries, BT has now delivered significant capability to 75 per cent of Trusts. ...BT has also delivered a further three software releases on the Spine, the central database and messaging service it is building and managing for the NHS. This has further built on BT's record of reliability, delivering major enhancement releases to the Spine." (Ritter, 2007) "I have been writing about the NHS IT strategy for over ten years. The story has always been interesting to our readers, but in recent years, it has become something of a scandal, especially after the two National Audit Office Reports." (Editor of national IT paper, Interview, September 2009)

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