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On Quality and Communication: The Relevance of Critical Theory to Health Informatics

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Abstract

Health information systems require long-term investment before they provide a socio-economic return, yet their implementation remains problematic, possibly because the claims made about them appear not to sit well with healthcare professionals' practice. Health informatics should address these issues from a sound conceptual base, such as might be provided by critical theory, which seeks to identify hidden assumptions and ideologies. This discipline can provide a better understanding of the inner workings of socio-technical systems, with a view to improving them through the promotion of emancipation (allowing people to fulfill their potential). Critical theory can also shed light on the problems with health information systems and offer insight into remedies, for example, by relating Habermas' theories about communication to feedback, a concept central to quality assurance (QA). Such analysis finds that QA's principal practices can be interpreted as emancipatory but requires organizations to substantially change their behavior. An alternate approach is to install health information systems designed to support QA. Applying critical theory to these systems shows that they could become an active part of service delivery rather than static repositories of data, because they may encourage standardized conversations between all stakeholders about the important features of health care. Success will depend on access for all participants to data entry and analysis tools, integration with work practice, and use by staff and management in QA. These ideas offer new directions for research into and the development of health information systems. The next step will be to implement them and observe their technical and emancipatory properties.

Keywords: *Critical Theory, Habermas, Emancipation, Quality Assurance, Health Informatics, Health Information Systems.*

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1. Introduction

The European Commission's report on the socio-economic impact of interoperable electronic health record and prescribing systems concludes that it takes between six and 11 years to realize a cumulative net benefit; but when they come, the benefits can be significant (European Commission, 2009).

Despite this, investment in health information systems appears to be beset with problems. The British House of Commons Health Committee (2007 p3) suggested that:

> *Electronic patient record (EPR) systems have the potential to bring huge benefits to patients and are being implemented in health systems across the developed world. Storing and sharing health information electronically can speed up clinical communication, reduce the number of errors, and assist doctors in diagnosis and treatment. Patients can have more control of their own healthcare. Electronic data also have vast potential to improve the quality of healthcare audit and research. However, increasing access to data through EPR systems also brings new risks to the privacy and security of health records.*

While the written clinical record may not provide adequate access to patient information (Tang, Fafchamps, & Shortliffe, 1994), these claims for health information systems ignore the fact that many of these functions exist without information technology (IT) and that increasing speed and improving the availability of information may serve organizational goals but not necessarily those of patient care.

Taking the medical doctor professional group as an example, some appreciate the benefits of health information systems (Hersh, 2002; Walsh, 2004) but most appear to resist their implementation, with reports in the literature being found from at least 1986 (Anderson, Jay, Schweer, & Anderson, 1986) up to the present (Ilie, Van Slyke, Parikh, & Courtney, 2009). The theme of these evaluations is that health information systems do not sit well with these clinicians' practices and that the interaction of different professional groups within an institution also plays a part in the resistance (Barley, 1986).

One explanation may be that health information systems have yet to impact the quality of care. The most frequently reviewed measure of quality is adherence to evidence-based guidelines (de Keizer & Ammenwerth, 2005). Evaluations show an improvement in compliance, but there is little effect on patient outcomes (Jamal, McKenzie, & Clark, 2009). The implicit assumption that better quality is achieved in this way may be problematic, because evidence-based medicine fails to take account of the collaborative nature of healthcare, presupposes the primacy of information and statistics, and is perhaps misused by managers and politicians in an attempt to change clinical behavior (Charlton & Miles, 1998; Timmermans & Mauck, 2005). Perhaps it is not surprising that clinicians resist the implementation of health information systems, when justified by management (those that pay for the systems) on these grounds.

Health informatics should address these issues from a sound theoretical base, particularly as it is a divergent discipline with different orientations and interests that lacks a self critical dialogue (Whetton, 2006). Information systems research, from which it could be argued that health informatics takes its lead, is dominated by the positivist paradigm (Chen & Hirschheim, 2004). The literature on decision support systems, for example, tends to ignore how and why health information systems are used, tends to focus on only one clinical group, and is permeated by a rationalist perspective (Kaplan, 2001).

This paper argues that there is a theoretical approach that could provide the study of health information systems with a strong foundation for research. Deliberately intended to be primarily conceptual in focus, the paper develops a novel conceptualization of how information technology and healthcare may be connected, using the critical tradition of enquiry. This tradition is characterized by its non-functional leanings and its underlying aim to change social reality and to promote emancipation. It is particularly well suited to healthcare because the two disciplines share the aim of allowing people to reach their potential.

Critical research seeks to identify hidden assumptions and ideologies in order to provide a better understanding of the inner workings of socio-technical systems, with a view to improving them. This paper applies these ideas to health information systems, with the aim of understanding beliefs about the effects of their use by examining the assumption of rationality, concepts of technology, politics and hidden agendas, and the social consequences of technology.

Most would accept that feedback in medicine is a routine part of a practitioner's way of managing patients' problems, but the concept can be applied more generally as a central tenet of quality assurance (QA). Under the assumption that processes transform inputs into outputs, healthcare providers can attain incremental improvements in performance by systematically seeking feedback from clients and implementers (Blumenthal & Kilo, 1998). We develop this theme by introducing an exemplar of a health information system, the British National Health Service's (NHS) National Programme for IT (NPfIT), after which, we discuss the main practices of QA and relate them to the healthcare environment.

In order to develop the argument that critical social theory can lead to a better understanding of the problems of health information systems, we interpret the main pillars of a good QA implementation – training, teamwork, leadership, feedback, and organizational stability – using a prominent critical theory: the Theory of Communicative Action proposed by Jürgen Habermas (Habermas, 2006).

Next, we use critical theory again to analyze the problems that implementers of health information systems, specifically designed to support QA, would face, allowing for the imperfect nature of organizational politics. On the basis of the critical analysis of the state of the art, we put forward a model that will allow the implementation of QA in healthcare, while at the same time remain sensitive to the concerns arising from critical theory. This model could be used as a conceptual basis and a practical starting point for the development of new healthcare information systems or the improvement of existing ones.

2. Background

This section provides a background for our critical analyses. We begin by briefly reviewing the challenges facing health information systems, drawing on the British NHS's NPfIT.[1] This is followed by a review of the fundamental tenets of QA.

2.1. An Exemplar Health Information System

The British NHS's NPfIT has promised to revolutionize the way healthcare is delivered in the UK. It is the largest outsourced IT project from the public sector ever undertaken. The key features of the program are national data and IT standards, procured and paid for nationally; local implementation via initially five geographic partnerships with industry; and supervision via a ministerial taskforce working in conjunction with an IT director general for the NHS. The main projects are the implementation of a national networking infrastructure; a patient data service, recording the identity of all NHS patients; a choose and book service supporting electronic booking of appointments; electronic prescribing; and a summary electronic patient record, recording care from "cradle to grave" (Hendy, Reeves, Fulop, Hutchings, & Masseria, 2005).

The main challenge facing the program is the replacement of local health information systems on a tight timetable in a wide variety of NHS institutions ranging from general practices (wherein general practitioners provide ambulatory care to a population of patients), acute hospitals, community hospitals (caring inter alia for the long term disabled and for those with mental health problems) to ambulance "trusts" (providing emergency and non-emergency patient transport).

[1] This paper relies heavily on the British NHS for examples and illustrations because of the personal experience of the authors. In some respects the NHS is unique, not least because of its monolithic structure, the idea of free healthcare at the point of delivery and its availability to all UK citizens. Whilst these may distinguish it from other healthcare organizations, the authors contend that most of their arguments on quality assurance, healthcare, information systems, and critical theory would be applicable elsewhere because analogues of the components of these alternate systems can be seen in the UK's health service.

According to oral evidence taken by the British Parliament's House of Commons Public Accounts Committee, the program has had limited success. Deployment of new care records systems is four years behind schedule due to the untested nature of the major suppliers' software. Of the proposed five geographic partnerships, only four industry partners could be found to start with, and contracts with two of these have since ended prematurely. The program's cost is at least £12.7 billion (at 2004/2005 prices), but best estimates of benefits from improvements to patient care are around £1.1 billion over the 10 years to 2013/2014. The limited clinical functionality deployed by 2008 has neither inspired the support of clinical staff nor met their expectations, and concerns over security remain unmet (House of Commons Public Accounts Committee, 2009).

2.2. Quality Assurance

While total quality management and business process re-engineering may appear to have superseded Deming's work, their constituent practices have become so broad as to preclude definition (Tuckman, 1994). It is appropriate to return to fundamentals.

W. Edwards Deming (2000) argued that quality is not an entity but derives from using feedback iteratively to seek improvement to processes. The result is an increase in productivity because better use is made of resources (people, places, and equipment). These ideas are based on one assumption and four fundamental principles. The assumption is that the activities of any organization can be viewed as a set of processes, each of which transforms inputs into outputs. The principles are:

1. All individuals go to work wanting to have pride in their workmanship. The definition of "pride in workmanship" is to know that skills have been deployed satisfactorily in delivering a product or a service.
2. No individual works entirely independently to deliver a service.
3. Coincidence is not proof of causation. Arguably the corollary of this is that proof of causation can only be derived from an association that always occurs or a randomized controlled trial where confounding factors are distributed evenly between case and control groups.
4. Failures resulting from a process may be due to random variation.

In order to implement QA in an organization, one can identify, from an analysis of Deming's work, five key practices that need to be realized. The following sections briefly outline the relationship of the practices to these principles.

2.2.1. Training

Principle 1 (pride in workmanship) implies that people must know when to deploy their skills during the delivery of a process and that they must be able to understand how to monitor their work and how to take appropriate corrective action. This implies that everyone in an organization needs training. Management must learn about the processes for which they are responsible, and staff must ensure they have the necessary skills required to carry them out.

Deming notes that successful functioning within a team derives not only from having the required skills but also from the often invaluable capabilities that people bring to their roles that lie outside the job specification. In appreciation of this, management should also encourage self-improvement and the attendance of training courses, even if they are not directed toward an immediate need (Deming, 2000, p86).

In the healthcare setting, the training of practitioners is well documented and regulated (General Medical Council, 2003). What is not so clear is the extent to which management and non-practitioner staff are trained for their roles.

2.2.2. Team working

Principle 2 (no individual works entirely independently) implies that a group of people is required to deliver a process. If one procedure is dependent on another, then in most situations, one group (client) will be dependent on another (supplier). In effect, all processes require a team to work together, the membership of which is defined by involvement in the process, not by position in a management structure. It follows that different departments and, possibly, different organizations must also cooperate.

In creating the relationship between these entities, the goal should be to minimize the overall cost of set-up, supply, and maintenance of the product or service. When considering with whom to collaborate, lowest price should not be the only deciding factor. The client should determine whether the supplier has adopted QA and whether the supplier can meet the client's requirements.

Management should break down barriers between departments and encourage long-term relationships among organizations. The outcome will be that a client and its suppliers become involved in QA. In principle, everyone should come out ahead because of improved quality and improved economy.

Good performance for a team involved in delivering a process helps the organization, but probably at the cost of tangible results for the individual. This is because, as a result of Principle 3 (coincidence is not proof of causation), it is not possible to determine "who was responsible for what." Therefore, incentive schemes that benefit individuals are likely to stifle team working. Similarly, merit ratings for individual departments may hinder cooperation because any benefits for one may be to the detriment of another.

In the healthcare setting, patients refer themselves to healthcare practitioners for solutions to problems they see as health related. Clinicians may have the skills necessary to manage the situation, but more likely, the practitioner will need help from others. This help-seeking process is called "referral." Tracing the latter reveals that healthcare is delivered by an ad-hoc multi-disciplinary team that functions across departmental boundaries and includes the patient.

2.2.3. Feedback

When the reason for a problem can be assigned to a person, team, or machine, Deming named this a "specific cause" of failure. A "common cause" of failure occurs when the method of operation is at fault. Principles 3 and 4 (failures may be due to random variation) imply that management must have a procedure for handling failures of a process that avoids over-adjustment (ascribing chance effects to common causes) and avoids never doing anything (ascribing special causes to chance) (Deming, 2000, p314).

Deming proposes that statistical methods can be used to determine when to investigate for a special cause and when to seek a common cause, balancing the costs and benefits of over-adjustment and doing nothing (Deming, 2000, p319).

For common cause problems, the plan, do, check, act (PDCA) approach offers a method to improve processes by systematic means (Deming, 2000, p88). It makes explicit use of feedback from staff and clients as part of an iterative four-step procedure, implemented by staff and management in co-operation:

- *Plan:* Define the process and potential changes.
- *Do:* Implement the alteration on as small a scale as is necessary to provide meaningful results.
- *Check:* Gather data about the effects of the modification.
- *Act:* Examine what was learned and what can be predicted regarding future operations.

2.2.4. Leadership

For feedback to be effective, everyone within an organization must be willing to gather truthful data about his or her actions. The most important contributor to falsified data is insecurity of status or income. Management should avoid playing on such fears to motivate the workforce.

Taken together, Principles 2, 3, and 4 indicate that an individual cannot control the results of a process. Similarly, a department cannot control a process where elements are supplied by others. Setting numerical limits, and attaching penalties or bonuses to their infringement, means that peoples' incomes will change randomly, in a way they cannot control. Individuals will be tempted to falsify data or to employ gaming strategies to circumvent the problem (Bevan & Hood, 2006).

A related contributor to fear is to attach meeting budgetary constraints to management bonuses. Managers are likely to seek arbitrary ways of meeting the financial constraint, such as by cutting training, deferring equipment orders, or reducing access to services through arbitrary rules. These measures often fail to take account of the value of satisfied customers or of preventing expensive complications through inexpensive interventions (Deming, 2000, p76).

If an individual cannot control the results of a process, then management should not blame individuals or teams for problems because to do so promulgates fear. In the rare instance of a special cause of failure, managers should exercise their leadership by using appropriate remedial measures, such as training or working on QA with the supplier (Reason, Carthey, & de Leval, 2001).

2.2.5. Organizational stability

Creating a trained workforce that monitors its own actions, remedies errors, and seeks iteratively and continuously to improve processes requires taking a long-term view. An organization should have constancy of purpose if it is to support the PDCA cycle, which will only be possible if there is stability of management and stability of labor. This means changing the emphasis from day-to-day crisis management toward long-term planning based on research and education, aimed at improving the design of products or services.

The planning phase of the PDCA cycle requires that teams describe the existing process and then identify areas for change. Research and standards can have a role to play in helping the team determine what to alter. There are two caveats in regard to standards: First, the standard should set requirements in precise terms, and second, the standard should only be compulsory (made a regulation) if the benefit of strict adherence outweighs the cost. It must be born in mind that guidelines may inadvertently become regulations when attached to incentives. Where a guideline is based on research, this side effect may be desirable, but some may not be well supported by evidence (Shaneyfelt, Mayo-Smith, & Rothwangl, 1999).

2.2.6. The application of QA to healthcare

Deming proposed the use of control charts to help determine when to seek a special cause (Deming, 2000, p312). These graphs plot the failure rate per unit time:

In the simulated chart above, the failure rate exceeded the upper control limit at point A and the lower at point B. The limits would have been set prior to data collection using statistical methods (see above). A failure is defined in terms of an operational definition, which, in turn, is defined as comprising three parts: a specific test of the execution of a process, a criterion for judgment, and a decision.

It is quite possible to translate these ideas into a healthcare setting. Checklists have given individuals the necessary tools to monitor their own work as suggested by Deming. In anesthesia, they have been used to identify patients suitable for restarting normal breathing after mechanical ventilation (Walsh, Dodds, & McArdle, 2004). Study of checklists for the care of patients with stroke and myocardial infarctions has demonstrated improved adherence to clinical care guidelines (Wolff, Taylor, & McCabe, 2004) but as with evaluations of information systems, this research suffers from the weakness of not assessing patient outcomes. Other work has employed control charts to improve

the provision of brain imaging services, decreasing the time it takes to diagnose the cause of stroke and to prescribe aspirin (Henderson et al., 2008). Two signal disasters for British medicine, the failure of the cardiac surgery service for children in Bristol and the murders by Harold Shipman, could have been detected much earlier than was actually the case (11 years for the former and up to five years for the latter) had appropriate control charts been in use (Mohammed, Cheng, Rouse, & Marshall, 2001). Performance in arterial surgery has been assessed using CUSUM charts. In this context, the team introduced procedures for managing individual failure (the under-performing surgeon) as well as carrying out systems reviews when control limits were exceeded, using the PDCA cycle (see above).

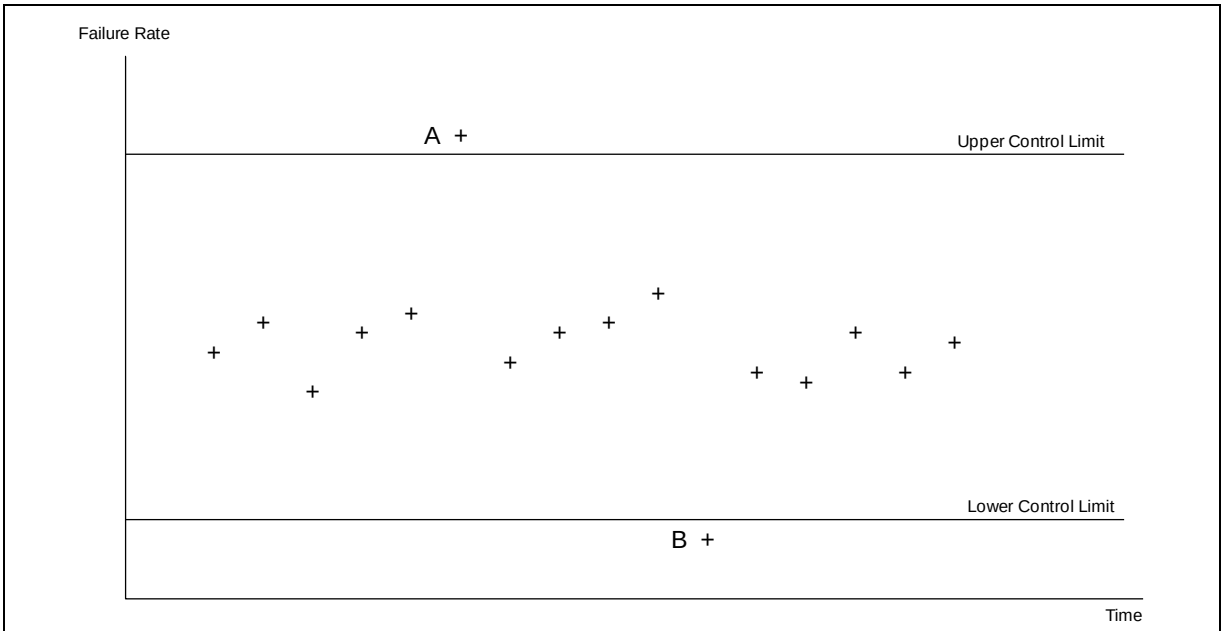

Figure 1. A Simulated Run-Chart Showing Failure Rate per Unit Time

Continuous quality improvement (CQI) is the attempted application of Deming's form of QA in healthcare organizations. It has been used to improve cardiac care in a hospital over a ten-year period (Brush et al., 2006), as well as in an emergency department to reduce complaints and to increase patient satisfaction (Welch & Allen, 2006). Data collected before and after the CQI implementation of a number of care pathways showed that most lead to better treatment (Panella, Marchisio, & Di Stanislao, 2003). A randomized controlled trial demonstrated that CQI had no effect on the care delivered to patients with asthma in two geographic areas of the United States (Homer et al., 2005). In contrast, a second trial examining the effect of CQI on the management of depressed patients demonstrated modest improvements in the process and outcome of care: More completed the required program, and more functioned better socially (Rubenstein et al., 2006).

These results show a mixed picture, which may be expected in that the research methods have been criticized on the grounds that the evaluations often fail to meet basic standards for conduct, and the choice of CQI intervention lacks any compelling theory predicting success or informing specific features of its development (Shojania & Grimshaw, 2005). There are also a number of other challenges facing the implementation of CQI in healthcare: maintaining organizational interest, handling professional autonomy and a lack of education in QA methods, changing technical knowledge, and reconciliation with patient outcomes (Whittaker, 1999; Blumenthal & Kilo, 1998). CQI has been described as being very demanding of organizations and individuals and in need of a receptive management providing sustained leadership, training, and support of staff (Shortell, Bennett, & Byck, 1998).

Significant in the current context is the need for adequate measurement and data systems (Shortell et al., 1998). Many clinical information systems have not been formally studied (Chaudhry et al., 2006).

Purchasers most often make their decisions based on demonstrations and untested promises about performance and effects (Tierney, 2001). It is, perhaps, unsurprising that researchers report difficulties in obtaining relevant and timely data as being a barrier to engaging healthcare professionals (Panella et al., 2003).

Traditional methods and approaches to healthcare tend to focus on the concept of quality rather than the implementation of quality assurance, discussed in this background. This is exacerbated by the fact that medical research often ignores issues related to information technology and information systems. The use of a different theoretical approach is required to assess, contextualize, and evaluate QA in healthcare and, in particular, its implications for health information systems. Such an approach should be sensitive to the social interactions implied by QA and should accommodate the findings of investigations into information systems, so building on prior knowledge. A suitable body of work is that of critical research in information systems, which we introduce next.

3. Critical Theory and Critical Research in Information Systems

In this section, we briefly review the conceptual background of critical theory before applying it to health information systems. There is much debate about what exactly counts as critical research and about the roots and background of the discipline. Critical theory (or critical social theory) stands for a range of theoretical approaches that can be traced back to antiquity. It is strongly associated with the Frankfurt school of social research. Other theoretical influences are pragmatism, postmodernism, post-structuralism, post-colonialism, and related approaches (Harvey, 1990; How, 2003). The main distinguishing feature of critical theory is its intention to promote emancipation (Horkheimer, 1970), which can also be applied in information systems-related research (Howcroft & Trauth, 2005). The emancipatory agenda draws attention to certain topics, such as the pathologies of capitalism, and establishes a link between critical research and ethics (Stahl, 2008).

Critical theory seeks to set up a general frame of mind in which particular theories can be evaluated. This opens up the possibility of making observations and analyzing them in the Kantian tradition of establishing the conditions that permit research. As such, it has been reflected in the field of information systems (IS), where there is a stream of research, loosely based on critical theory, called Critical Research in IS (CRIS). Information systems literature often defines this as a third paradigm - an alternative to positivism and interpretivism (Chua, 1986; Orlikowski & Baroudi, 1991). CRIS scholars tend to share the critical intention to change reality and further emancipation (Hirschheim & Klein, 1994; Klecun & Cornford, 2005). CRIS has been a possibly underestimated aspect of IS research for well over 20 years (Richardson & Robinson, 2007), but recently it has gained prominence with several conference tracks, workshops, special journal issues, and books being dedicated to it. Papers building on critical theory are now published in top IS outlets (Avgerou & McGrath, 2007).

4. The Application of Critical Theory

In this section, we apply critical theory to health information systems and the concept of feedback as embodied in the practices of quality assurance.

4.1. Health information systems

There is a rich literature that applies critical ideas to health information systems (Klecun & Cornford, 2005; Doolin, 1998; Bloomfield, 1991; Adams & Blandford, 2005; Hanlon et al., 2005). While the authors of such work do not always use the label of "critical theory," they tend to utilize the arguments here presented.

4.1.1. Rationality

A good point to start a critique of mainstream information systems is their assumption of rationality. A clear example of this complex concept is the autonomous individual on whom neoclassical economic theory is built. Such persons are rational because they have a complete set of preferences that they use to govern their actions, with the aim of maximizing expected utility. This has been criticized on a

number of grounds. It may not be possible for humans to be rational in the sense described. Individual preferences are not complete and are often contradictory, and humans lack the knowledge and cognitive capacities to make optimal decisions.

Translated into a healthcare setting, it is expected that individuals, be they patients, doctors, or any other stakeholders, will act in a way that maximizes the overall utility of their actions. This breaks down at the point where preferences are not identical. The patient may want a maximum of healthcare, whereas the doctor may view this as medically unwarranted and the manager as too expensive. Also patients may be described as irrational when their actions do not contribute to their health.

A system based on the idea that people will behave rationally is likely to face problems that may be worsened when IT is introduced. Consider the issue of competing demands: The implementation of healthcare information systems may be viewed by management as a way of saving money. Whilst this is a legitimate aim, it may well conflict with the equally valid but different goals of other stakeholders (Adams & Fitch, 2006). Questioning the rationality of these others, when, for example, they reject the information system's legitimacy or do not follow organizational goals, may be seen as a way of promoting a particular agenda.

Empirical evidence suggests that the irrational nature of human interaction does not change with the introduction of information systems. In fact, this may create new irrationalities, especially when the system fails to integrate with the complex and messy nature of work practice (Berg, 1999).

A further problem is that there are different types of rationality that determine our social reality. Information systems tend to use abstract concepts, which are arguably not compatible with the practical views of healthcare practitioners. Hanlon et al. (2005) give an example of NHS Direct, a nurse-based 24-hour health advice system, the technical base of which represents a rationality that is not compatible with that of the nurses operating it. A different example is developed by Klecun & Cornford (2005), who show that a traditional view of rationality, when used for evaluating healthcare systems, fails to pick up relevant issues.

4.1.2. Concepts of Technology

A central question in critical discourses revolves around the conceptualization of technology. Critical scholars often draw on other discourses such as the social construction of technology as well as traditional critical theory to develop an account of how the very concept of technology affects social outcomes (Feenberg, 1991; 1999). Technology is not a neutral tool that can be used for the purpose the purchaser decides. Instead, it is seen as endowed with certain values and affordances that favor certain uses over others.

The non-neutrality of the tool is linked with questions of technical determinism. Much mainstream work on IT seems to assume that technologies have only the uses for which they were built and that users will utilize the technology in the way that was intended. On the other hand, there are numerous examples either of non-use or of misuse for purposes other than those envisaged. This has to do with what has been termed the "interpretive flexibility" of technology (Doherty, Coombs, & Loan-Clarke, 2006) (or interpretative flexibility (Cadili & Whitley, 2005)).

An important aspect of the concept of technology is the capacity of IT to capture reality. Technologies are much better at capturing some aspects of reality than humans and vice versa. Healthcare information systems are likely to favor observations where a machine will provide the same account of what its sensors detected to multiple independent observers because they are easier to integrate in technical contexts. This is likely to lead to reductionist perspectives on healthcare that can blend out the immeasurable, which, arguably, is often an important aspect of medical practice (Hanlon et al., 2005).

A naïve reliance on an intuitive understanding of technology is not likely to lead to the success of a new approach. If health information systems are to be successful, then design and implementation should be aware not only of competing demands but also of different users' conceptions of technology.

4.1.3. Politics and Hidden Agendas

Rationality and concepts of technology are relevant to the use of technology for political purposes, which may stem from organizational as well as national politics. The primary example is the growing influence of finance.

One possible benefit of health information systems is that they allow a more detailed breakdown of costs and a clearer charging structure for different stakeholders, which may lead to an over-emphasis on financial considerations.

The UK government has promoted the Choose and Book part of the NHS NPfIT on the grounds that it facilitates more choice for patients. This can be seen as a positive aim because few would dispute that the ability to choose one's doctor is good. However, this rhetoric of choice can also lead to a fundamental restructuring of healthcare provision and change the balance between market and state allocation of resources (Mol, 1999).

A different example is the distribution of power in organizations. Traditionally, healthcare in Western countries tends to be very much centered on doctors. They hold the knowledge, they make decisions, and they allocate the resources. Doctors' autonomy is a highly valued tradition. However, in complex modern healthcare organizations, power is increasingly taken away from doctors and moved toward managers. Such power struggles are normal and can be found in most sectors. What is important is that technology can be used as a tool in such struggles. This can lead to the acceptance or rejection of a technology.

4.1.4. Social Consequences of Technology

One possible outcome of the introduction of IT into healthcare is that it leads to altered procedures. The mere fact that data is to be recorded changes the way doctors interact with patients. This is, of course, usually intended and not necessarily to be lamented. However, the modifications may go beyond what was envisaged. For example, if a system captures the number of patients a doctor sees, this is likely to affect management's view of the doctor. As a consequence, clinicians are likely to pay attention to the number of patients seen and may make choices about which to see based on their estimate of the time needed. Treatment of shorter cases may be preferred over longer ones because they improve the doctor's apparent performance. Zuboff described this as "informating," a property of IT that not only captures but also produces information, which then changes the original processes (Zuboff, 1988).

While the nature of interaction between stakeholders can change, the very practice of medicine can also be changed. Whilst this may be appropriate, there may be a danger that it will lead to increased bureaucracy and the practice of medicine "by algorithm." The danger of "cookbook medicine" based on standards and protocols developed on the basis of collected data is not to be underestimated (Berg, 1997).

4.2. Quality Assurance

Due to the broad range of possible theories that can be counted as part of the critical approach, a choice needs to be made concerning the theoretical position for the analysis of quality assurance. Jürgen Habermas has dominated the CRIS literature; is a leading proponent of the Frankfurt school of social research; and has developed the originally Marxist theorizing of the school in new directions. His main work, the Theory of Communicative Action (Habermas, 2006), informs this analysis and has been vastly influential in the CRIS field (Brooke, 2002). Habermas proposed that collaboration is emancipatory when it allows all individuals to engage in free and open discourses that allow them to voice their arguments. Participation in such conversations is based on the counterfactual assumption of the ideal speech situation, where everybody has a chance to be heard, with the best argument winning the day, and implies that participants accept each other as equal and possessing unalienable human dignity. The approach also recognizes the socially constructive nature of knowledge and the social nature of human beings.

While quality assurance may be seen as a means to promote particular properties of products or processes and as a value-neutral tool, critical analysis suggests a different view. Quality assurance,

as a mindset or paradigm, has significant emancipatory implications, as the critical interpretation of the above-mentioned practices of team working, training, feedback, leadership, and organizational stability will show.

The central idea of team work is congruent with Habermasian discourses. The purpose of discourses is to clarify contested validity claims (claims to truth, acceptability, or authenticity) with the aim of facilitating collaboration. The same is relevant for team work. The reason why humans work in teams is that they are social beings, and the division of labor allows them to achieve goals otherwise unattainable. Team work requires functioning communication, and Habermas' ideal speech situation can give an indication of how such communication should be structured to lead to acceptable outcomes. At the same time, the Habermasian ideals offer criteria for evaluating teams that do not conform to emancipatory ideals, e.g., where there are strong power differences or some members of the team are marginalized. Discourses are not confined to individual teams, and the QA approach aims at facilitating communication across team boundaries, which, again, is conducive to wide-ranging discourses.

The second practice of QA, training, is also conducive to emancipation. Training leads to higher levels of ability to engage in processes and improved abilities to communicate and collaborate. The Habermasian view suggests that training is not just about skills acquisition but also about facilitating a broader range of capabilities, something that might be considered to be "education." This wider view dovetails with the QA requirement of encouraging training that goes beyond immediate knowledge needs. The idea of self-improvement outside the job specification is almost synonymous with emancipation.

Feedback is another aspect of discourses and the ideal speech situation. As outlined in the background, it should be provided in an environment that is free from fear of negative consequences. In conjunction with organizational stability, feedback in QA stands for the attempt to establish a discursive regime that emulates the ideal speech situation. The central idea is to encourage members of the team to challenge validity claims that arise from extant processes and their interpretations. Just as Habermasian discourses can be active at different levels simultaneously and can challenge different validity claims, so the feedback process in QA is about openness to new interpretations of situations and data and the development of collectively shared views on relevant aspects of reality.

Leadership is possibly the most problematic practice from the critical perspective. Critical researchers tend to be particularly suspicious of power relationships as realized by hierarchical structures in organizations. Such management configurations are often equated with leadership. The critical perspective would underline that they are often not conducive to emancipation and are a core cause of alienation. However, leadership and position in a managerial hierarchy are not identical. When leadership is understood as the ability to allow other team members to contribute in the best possible way to a shared project, it can be positively emancipatory. In Habermasian terms, leadership is about the most convincing contributions to discourses that structure views of problems and solutions. Such leadership can, but does not have to, be linked to formal power relationships and is the form intended when implementing QA.

In summary, the core practices of QA can be interpreted in the light of critical theory to be substantially emancipatory. They not only improve processes but do this by enabling individual and collective emancipation. No doubt, this is an idealized description, but it is reasonable and plausible.

In the light of this analysis, quality assurance is likely to be demanding on organizations and their management because the required leadership skills may be difficult to permit and the necessary stability hard to achieve. An alternate approach is to install health information systems that support QA. We consider this in the next application of critical theory.

4.3. Health information systems supporting QA

One approach to designing health information systems that support QA directly is to carry out an object-oriented analysis of Deming's form of QA (Shaw & Stahl, 2009). This results in a class model (see Figure 2) of data types that has some useful characteristics. It is able to store data about medical

and non-medical events, to save descriptions of procedures, and to represent the QA process itself. With software based on the model, organizations can have a memory of previous attempts at making improvements as well as data about feedback from patients and staff to drive future change.

An alternative strategy proposed by Staccini et al. bases the design of the software on dividing a process into its component actions, for each of which quality measures are obtained from stakeholders (Staccini, Joubert, Quaranta, Fieschi, & Fieschi, 2001). This can be seen as complimentary to the approach of Shaw and Stahl in that the results can be stored in the data structure they propose.

If used correctly, information systems based on these ideas could also make a positive contribution to the critical aim of emancipation. This view may be surprising to readers who have studied the class model in Figure 2. The reasoning behind the statement becomes apparent when one moves away from a technical interpretation of the system toward a visualization of its use in a clinical environment.

Quality assurance-based health information systems will have to facilitate continuous feedback and be open to input from all sources that make meaningful observations and contributions to the healthcare process in question. In Habermasian terms, this could be interpreted as a technically mediated discourse, which could raise problems that go beyond the immediate discussion. However, for this purpose, the discourse is a purely formal idea, which reflects Habermas' view of these systems as forums in which validity claims can be tested by rational arguments. These claims might be existing standards or guidelines about medical practice. Recognition that the data model will be used to support the PDCA cycle, described in the section titled Feedback as Part of Quality Assurance, above, means that stakeholders will be allowed to question any aspect of the process and will not prejudice the outcome of the discussion. The discourse, itself, will be held in terms that are familiar to its participants, by relying on measures that are acceptable to them.

For this to succeed, health information systems should be open to any participant without the privileging or exclusion of any voices so that it can facilitate the resolution of disputes by means of rational argument. The question of what line of reasoning would be admissible is not addressed by the technical models, but typically, would involve clinical measurements. Disagreements on the meaning of such data can be fed into the system. QA-based health information systems can be interpreted as a way to implement a goal-oriented discourse and facilitate exchanges that emulate the ideal speech situation. Such an open understanding pre-empts much of the critique discussed in the section titled The Application of Critical Theory to Health Information Systems. It would not make assumptions about appropriate standards of reality and would allow for a questioning of implied standards. It would be open to different concepts of technology, including the means of collecting, formatting, and storing information. Larger contextual issues, such as those that derive from the political and social consequences of technology, may be impossible to include in the technical models proposed above. However, the QA process as a whole will have to be sensitive to them, given that they are arguably important not only for user acceptance of technology but also for the entire QA process in healthcare. Arguably, this may require something like a second order PDCA process that continually ensures the healthcare delivery QA process meets its operational definitions. Again, there is a question about whether this can be technically implemented and in what way it will require organizational changes.

A final issue has to do with the development and the implementation of a QA-based health information system. It is unlikely that the same implementation of the same system in different contexts will lead to comparable results. This is where the socio-technical approach to systems design and development (Mumford, 2003) is likely to be able to address many of the challenges, by allowing for the participation of a range of stakeholders and most importantly, of end users.

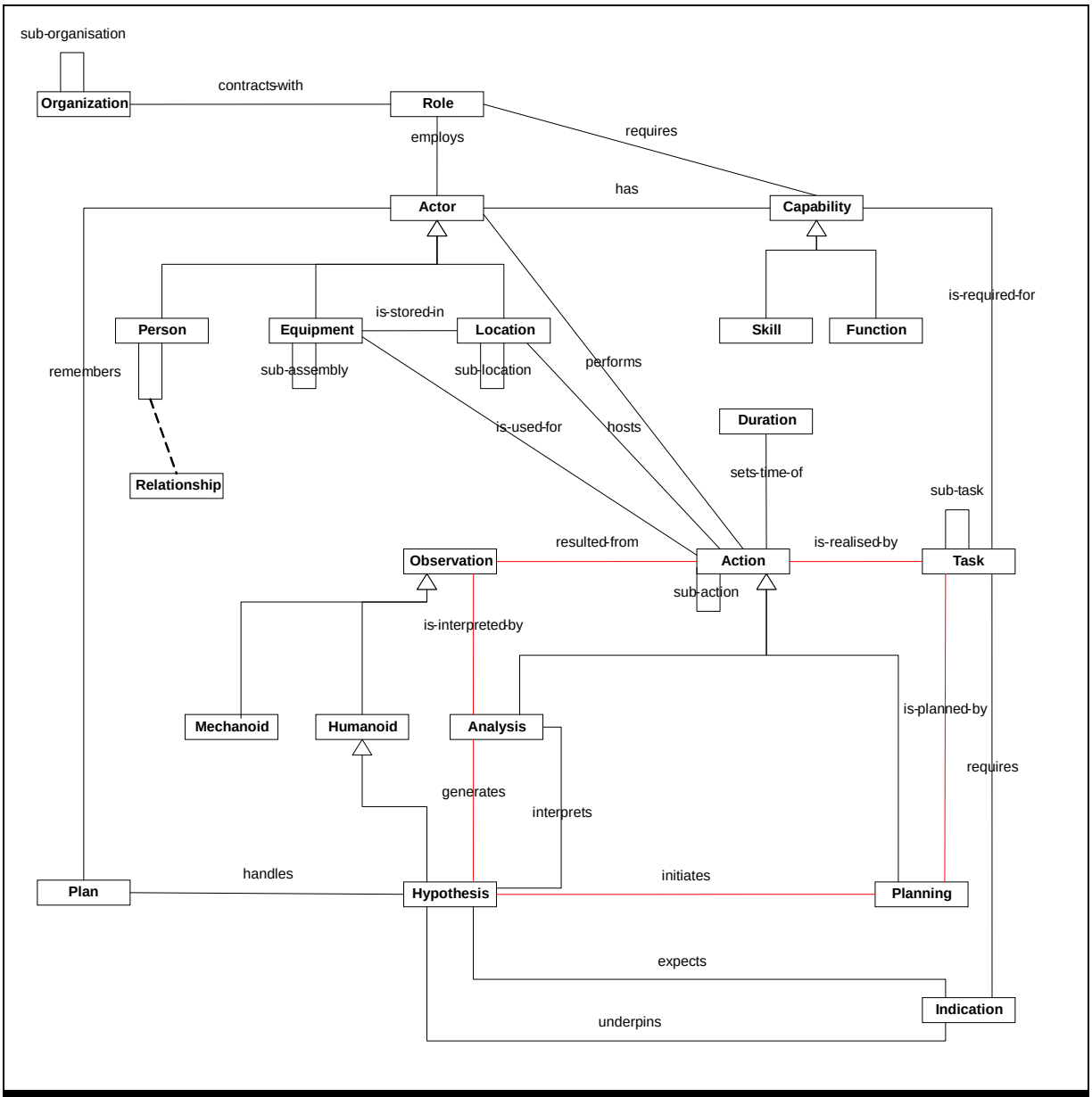

Figure 2. Class Model of Health Information System Data Supporting Quality Assurance from Shaw and Stahl (2009)

5. Discussion

The ideas presented herein are intentionally purely conceptual, with the aim of showing how critical theory, when applied to heath information systems, can provide new directions for research and development.

This use highlights a number of factors that implementers of health information systems have to take into account. There will be conflicts of value systems between the professional groups in healthcare organizations that will impact their acceptance of software systems. There will be different concepts of technology, especially about its intended usage and the consequent understanding of the data therein. Failure to integrate with work practices risks employing workarounds that may render data meaningless. Over-emphasis on single professional groups or on enforcing particular work practices may have unintended and undesirable side effects.

These are problems that proponents of CQI will recognize, and the analogy is to be expected when health information systems are used with the intention of improving quality of care by enforcing guidelines. Perhaps less expected are the socio-technical aspects, which have been identified as a significant stumbling block following the implementation of the British NHS's National Programme for IT (Eason, 2007) and may have resulted in the reported failure to engage healthcare practitioners (House of Commons Public Accounts Committee, 2009).

Given the difficulties encountered by CQI practitioners, it is perhaps surprising that critical theory finds most of the ideas behind the pillars of QA emancipatory, with the caveat that leadership is to be interpreted as the ability to allow others to contribute in the best possible way to a shared project. The difficulty would appear not to be with the ideas, themselves, but with the context in which they are applied. The analysis suggests that for QA to be a success, organizations will have to adopt the emancipatory ideal of encouraging individuals to fulfill their potential. This may be a rather difficult goal to achieve in healthcare, where incentives in favor of preferring quick fixes may be high (Blumenthal & Kilo, 1998) and where a blame culture may hinder adopting the PDCA method of improving methods of working (Reason et al., 2001).

If it is accepted that the organizational politics will almost always be imperfect, then it is reasonable to question what would happen if health information systems that deliberately supported QA were implemented. The application of critical theory to such systems suggests that there is no reason why, in principle, their use could not be emancipatory. Advantageous to the implementation will be review by a second order QA system, data entry by all stakeholders, access to all data entry and analysis tools for all participants, and context sensitivity in relation to integration with work. Perhaps the most important feature, however, should be collaborative use to work through Plan-Do-Check-Act cycles, examining a particular healthcare process.

There is, nevertheless, the danger that a sound theoretical basis may not be enough to develop a successful system in practice. There are a number of questions relating to the social reality after implementation of health information systems that support QA, leaving aside the problems of building and integrating them. Whether and to what degree they will be successful in improving healthcare delivery or in improving patient outcomes relies on factors that are outside their control. Success in facilitating healthcare-oriented discourses will depend on not only the incentive structures but also the idiosyncrasies of the organizational culture and structure as well as the legislative environment. These can affect their operation in unforeseeable ways.

These limitations beg the question of whether there are alternate approaches in the critical literature. One archetypal form of research used Habermas' theories to reconceptualize participation in IS implementation and to develop common ground in order to enable free and open dialogue (Byrne & Sahay, 2007). Another used the critical approach to manipulate healthcare professionals into using a software system by improving the perceived legitimacy of the information, providing customized user interfaces to legitimize the technical messenger, using independent healthcare professionals and influential members of staff to legitimate the human messenger, and providing environments where the healthcare practitioners can engage in discussions informed by management information (Kohli & Kettinger, 2004). These approaches sought to manipulate the political environment in which a health information system is implemented and, as such, could be considered complimentary, rather than contradictory to the analysis presented here.

5.1. Research Roadmap

The critical analysis presented herein suggests that a quality assurance-based healthcare information system has merit if it encourages participants in care processes to make meaningful contributions that will be treated with respect. A possible design for such a system has been proposed (Shaw & Stahl, 2009), about which a number of technical questions may be asked. Is it possible to represent all clinical and non-clinical processes without needing continuously to create new classes of information or new data fields? Under which circumstances does the system's proposed separation between person-identifying data and clinical data provide a mechanism for preserving patient confidentiality?

Can a user interface be designed for management and healthcare practitioners that collects enough data to support QA? Can sufficiently rapid analysis of sets of objects be performed to permit reporting of aggregate patient data? Whilst these specific questions are important, there is also a more general issue: What are the implications of the socio-technical approach to systems design (Mumford, 2003) for how health information systems are purchased and developed?

Assuming that these technical problems have answers that result in adequate software, further questions arise about the systems' value to and effect on the owning organization. It could be argued that healthcare practitioners are best deployed using their skills in face-to-face interactions with patients and that waiting to carry out a task or performing the necessary administration in preparation for an activity is time wasted. On this basis, under what circumstances does interaction with healthcare information systems improve productivity and by how much? It is also reasonable to ask whether implementation of such systems changes the organization's politics in favor of allowing people to fulfill their potential and whether there are unanticipated side effects consequent on their use.

The reflective nature of the critical theoretic approach should form a part of the research roadmap. One possible weakness of the present research outline is that it is fairly uncritical with regard to its own assumptions. It takes existing healthcare structures for granted and considers ways of improving them, using ideas from critical theory. This is justified to some degree by the generally accepted value of health and healthcare as a necessary precondition for living a good life. This positive view toward healthcare can, nevertheless, cloud the fact that such systems are embedded in and can serve to stabilize problematic social systems: for example, the way in which individual health and access to healthcare is often related to social class and income. The research roadmap needs to underline that exploring the influence on social class and income of the QA approach to the design of health information systems is highly desirable. Can information systems based on such an approach lead to a more equitable and just distribution of healthcare in society? To what degree are healthcare systems, including their information, based on ideological assumptions? These and related issues should be explored once the appropriateness of critical ideas for QA in health information has been empirically demonstrated.

6. Conclusion

This paper presents a conceptualization of healthcare that argues it is a group activity involving communication between members. Feedback is not only central to a patient's care but also to improving the care delivered by the group. Quality assurance is not only of technical importance but can have desirable social implications that the perspective of critical theory highlights.

Analysis using a theory central to the critical tradition: Habermas' Theory of Communicative Action implies that feedback, as used in QA, is central to healthcare delivery because standardized conversations about care processes may develop that involve all stakeholders. When used to support such discourses, information systems, designed to support quality assurance, change from having a passive role to being actively involved in healthcare delivery. Health information systems satisfying the conditions, identified by critical analysis, necessary for their use in healthcare, may gain the potential to provide a return on investment as well as to enable individual and collective emancipation.

This perspective could have significant consequences for health informatics and health information systems. Arguably, these ideas offer new directions for research and development. The next step will be to implement a QA-based health information system that will allow observation of its technical as well as emancipatory properties.

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