# Aligning Global and Local Aspects

## of

# A National Information Programme

## for Health :

### Developing a Critical and Socio-Technical Appreciation

Submitted in partial fulfilment of the requirements for the award of

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at the

## University of Central Lancashire.

**STEPHEN NICHOLAS HARROP MB.ChB. MBA, FRCS, FCEM.**

VOLUME 1 : INTRODUCTION & KEY LITERATURE

# DECLARATION

I declare that :

This thesis is my own work and has not previously been submitted for the award of a higher degree, at either the University of Central Lancashire or elsewhere.

Whilst registered as a candidate for the research degree, I have not been a registered candidate or enrolled student for another award of the University or any other academic or professional institution

No material contained in the thesis has been used in any other submission for an academic award and is solely my own work.

No part of the thesis has been produced in collaboration with any other individual or academic institution.

**Signature of Candidate** _____

**Type of Award** _____

**Department** _____

# A B S T R A C T

**Introduction**

Written by a full-time clinician, this thesis explores an example of 'Big IT' in healthcare, the National Programme for IT in the United Kingdom National Health Service. It is unique in exploring the interaction between people and information technology in the healthcare workplace, from an engaged standpoint within one of the National Programme's implementation sites, in order to provide a critical and a socio-technical appreciation.

The National Programme (a 'global' intervention in the NHS context) will be implemented locally, in every NHS institution and in each part of each institution. Its global aspect is essentially rational, eliminating local considerations. Its local aspects are occasioned and situated in a fluid, essentially social context. The tension between the global and the local is mirrored, every time a healthcare professional interacts with a patient, in the interplay between a standard intervention and a non-standard situation.

**Background and Purpose of the Thesis**

A substantial consensus is developing, that the National Programme has under-estimated the importance of the socio-technical dimension. The purpose of the thesis is to develop an approach that will equip clinicians and managers at implementation sites to understand and comment critically but constructively, on the design, implementation and evaluation of information systems, so they can promote the successful assimilation

of the National Programme for IT at their own place of work from a socio-technically-informed position.

**Methodological Approach and Setting**

The body of the thesis is a set of five case studies which deploy developments of Checkland's Soft Systems Methodology (NIMSAD : Jayaratna, 1994 ; Multiview : Avison & Wood-Harper, 1990) within Pawson & Tilley's (1997) Realistic Evaluation framework. The case studies, conducted in an ordinary NHS Trust hospital, examine the mechanisms and context within which the new information systems proposed by the National Programme might be expected to promote the Trust's five most important strategic goals.

Driven by the practice of information systems implementation, itself intimately bound up with, and inseparable from, the evaluation, the design and the strategic purpose of the information system, the thesis develops an approach that brings to life the complex implementation context through the eyes and the concerns of operational clinicians as well as strategic managers.

**Findings**

These two ideal typical groups face in different directions from the centre of an uncomfortable middle ground that stands between the Department of Health and the patient.

Where managers epitomise a generalised accounting relationship with the Department of Health as the sponsor of healthcare, provided to consumers, clinicians represent a specific professional accountability to each individual patient. These responsibilities depend on different forms of social organisation, requiring different orientations of information systems.

The implementation of the centrally-driven National Programme represents, at the same time, a cost and a problem.

To become a source of strategic benefits and a solution to strategic problems, the Programme needs to be influenced, if not driven, by the people whose responsibility for the direct delivery of care to patients could be facilitated by information systems. The systems required by this orientation towards the operational delivery of health care are different from those suited to the description of 'activity' to an external audience, for strategic accounting purposes.

Using the same data processing infrastructure of networks and computers, two differently orientated forms of 'system' are 'integrated' in a technical sense only. Functionally, they are fundamentally intractable to integration within a single rationale.

The first form of 'system' requires the input of data by one distinct group, operational clinicians, so that another distinct group, managers, can manipulate abstract quantities according to formal rules, to generate and test a theory of strategy and operations. The computer is a central intermediary between these two groups. Data flow is emphasised at the expense of data entry.

The second form of 'system' enables the practice of a collaborative team, whose members interact efficiently and often opportunistically, to effect the direct delivery of care to patients. The computer is an adjunct to collective sense-making in a fluid clinical situation, where the basis for assumptions is perpetually de-stabilised as new events and information merge. Data entry is secondary to the collaborative care of patients.

**Local Messages of General Importance**

The key message from the thesis to an NHS Trust is that two different appreciations of information systems are precariously balanced. The first is the planner's detached appreciation of the Trust as a structured set of discrete functional units, groups and processes, integrated by information technology whose primary function is to process data. The second is the practitioner's appreciation of the Trust as a complex of intersecting workplaces where information technology connects individual clinicians to their personal tasks, and to each other, by supporting a highly-contextualised form of communication.

Local implementation of information technology needs to be oriented towards the fluid and ambiguous definition of information-related tasks and roles, necessitated by the reality of clinical collaboration. It must take account that the need to accumulate and distribute data, to describe the clinical service to the outside world, is accompanied by a need to support clinical communication that underpins the actual delivery of a high quality clinical service, driven by the vocational and professional motivations of front-line clinicians.

**Policy Implications**

The policy implication of the thesis for future 'Big IT' projects in healthcare is that the assumptions of information policy in the National Health Service during the period, 1998-2010 now require reappraisal. In particular, the process of clinical engagement, which in the National Programme has mediated the relationship between government, clinicians and the computer industry, must accommodate a richer appreciation of the clinician : as a participant in a complex task environment rather the operator of an information machine.

The findings of the thesis will be useful in the context of a policy shift, from a model based on central procurement of standard information systems, to one based on local procurement. The National Programme and its associated programme of clinical engagement need to be brought, from stakeholder events and representative meetings, into the heart of the clinical workplace.

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# CHAPTER ONE

# OUTLINE OF THE THESIS

## 1.0 : INTRODUCTION

This thesis is about the NHS and one of its hospitals, its information systems and the people who make them work.

My purpose in undertaking this research has been to understand better how an information system for my workplace needs to be designed, implemented and evaluated. I have wanted to acquire this knowledge in an organised fashion by pursuing a course of academic study, under the supervision of acknowledged experts.

Demonstrations of healthcare information systems necessarily take place outside the immediate work environment. The representative of a producer demonstrates a scenario of his own imagination and the various functional accomplishments of hardware and software are shown to advantage. The focus is on the machine.

Demonstrations of this kind never convey the pressures generated by the tasks and circumstances of real practice. The demonstrator's capacity to direct attention to a scenario in which his machine is central always seems to negate the audience's effort to comprehend the machine in the context of a bad day at work. Potential users need a way to frame their expectations and understanding, of an information system and its implementation, in order to bring clarity to their appreciation and assist their informed contribution to its development.

### 1.0.1 : Why Research into NHS Information Systems ?

Information Technology is important to me : first as a practising clinician, whose satisfaction at work stems from working with colleagues and treating patients, and is hindered by inefficient processes and interfaces between clinical disciplines ; second, as a service manager, faced with the need to develop a department's resources in negotiation with external decision makers.

In 1985, newly appointed as consultant in an Accident & Emergency Department in a large hospital, my ambitions for my department were to create an environment for safe and efficient clinical practice, and to emulate the best practice of teaching hospitals by developing my department's capacity to teach and train young professionals, develop its clinical methods and services and produce useful clinical audit and research projects.

As the department's *de facto* manager at the time, I wanted to develop its resources by demonstrating its successes and the challenges it faced, especially those due to inadequate resources. In order to make the business case for the staff my department needed, I had to manage a budget and demonstrate the optimum use of my existing resources. The immediately available computing resource was my own 32 Kilobyte BBC microcomputer with external data storage on tape cassettes.

I used this computer to build and manipulate databases. When the opportunity arose, I replaced this with an Amstrad 1 megabyte computer that cost me £1,000. The main strength of this computer was its word processing function.

Over time, the need has intensified to compete for scarce resources and to produce information for a variety of audiences. I have seen information as the key to winning arguments, and an information system as fundamental to the acquisition, storage, retrieval and organisation of information.

Early published reports of computers in Accident & Emergency Departments (Yates, 1982 ; Gray *et al.,* 1982) cited the following functions :

- Patient register, demographics, secular pattern of attendance and disposal
- Utilisation of resources
- Categorised account of activity
- Skeleton clinical summary.

The information stored was used for planning, research and communication of rudimentary information between the A&E department and the patient's General Practitioner.

Later developments of computers in Accident & Emergency Departments introduced :
- Patient tracking
- Crude clinical diagnostic coding
- Timing of critical process events to promote dissolution of transfer delays from A&E to wards.

DeDombal (1982) described a computer programme which was later refined to produce Bayesian statements about the likelihood of alternative diagnoses for patients with abdominal pain, with an explicit intention (DeDombal, 1995: personal communication)

to force and rely upon a prescribed model of examination. My own anecdotal experience of this system was that the examination required was not feasible or tolerated by female patients, given the conditions of overcrowding and lack of privacy that prevailed in my department at the time.

My own department's first computer system was introduced in 1992, in the context of the NHS Resource Management Initiative (Brennan, 2005 ; ch.7), amid long queues for service and for hospital admission after service, stressed patients, and harassed staff. Its shortcomings included slow processing, an unfriendly user interface, laborious access to limited clinical information, and the irrelevance to clinical work of the Resource Management information that was to be supplied by clinical staff.

During my career, several technical developments have expanded the potential of computers to assist work in a major clinical department of a large hospital. These include :

- Processing speed & storage capacity

- Graphic User Interface

- Mouse, pointing, touchscreen

- Portability

- Networking / World WideWeb

- Infra-red network

- Website design (database driven)

- Database design (web access)

- Distributed access to documents, images and applications

- Distributed construction of clinical records.

In this way, computers have become "better" along a single, technical axis of evaluation. It will be argued in the body of the thesis that this necessary improvement is not sufficient for computers and information systems to blend in with the realities of work.

Technical developments have been paralleled by several changes in the social environment of clinical practice, resulting in an altered relationship between doctors (and clinical professionals in general), managers and patients.

These include the increasing demands made by users of all forms of public service, to be respected as sovereign consumers, and the more confident expectation, of a knowledgeable and articulate section of the public, to be emancipated from the thrall of the professional. In the meantime, a less articulate section of the public still needs help from professional doctors and nurses, whose orientation is towards engagement with the individual needs of an identified patient, rather than a distanced and anonymous, procedural relationship between corporation and client.

Change in the relationship between professionals and the public has drawn impetus from a series of events that have refocused medical ethics. The Bristol (Kennedy, 1991) and Alder Hey (Redfern M *et al*., 2001) Inquiries marked the expulsion of paternalism and benevolence from the relationship between professional and patient, and demanded a focus on justice and respect for individual autonomy. The rights of the citizen to privacy have led, through the Data Protection Act (United Kingdom. Office of Public Sector Administration, 1998) and the Caldicott Report (Caldicott, 1997) to restrictions on the circulation and storage of data identifiable to an individual. Nevertheless, the Climbie Inquiry (Lord Laming, 2003) has demonstrated the need for professionals to

identify and communicate extensively about the most vulnerable members of the community.

Alongside these contradictions, and fears of a "digital divide" (Kvasny & Keil, 2006), the internet has allowed an explosion of information, appearing to erode the professional's monopoly of arcane knowledge. The development of Evidence Based Medicine and clinical guidelines has been synergistic with a general strengthening of professional accountability as well as the elimination of unjustified, idiosyncratic and unproductive clinical practice. Professionals are having to reappraise their social niche as a consequence of these developments.

Information systems have the potential to mediate these altered relationships. Their introduction is occurring in an environment characterised by constrained resources, high public expectations, political and managerial scrutiny of clinical services and organisational flux.

There seem, to me, to be three challenges at the start of this research : to articulate what is required from information systems in the NHS ; to ensure that suppliers satisfy users' needs rather than promote gratuitous technical refinements ; and to ensure that that users operate information system accurately so that the information that circulates is reliable.

It is also necessary to appreciate that clinicians use computers in a demanding clinical environment.

## 1.0.2 : Wider Organisational Relevance

The introduction of IT to an individual hospital or department is likely to be relevant to the wider context of the National Programme for IT in the NHS. This is a massively ambitious public sector IT programme within an archetypal public sector organisation.

Because the NHS is made up individual sub-units, an inquiry situated in one of these can be relevant to the entire organisation.

By 2009, the NHS IT programme has evolved through three phases :

*Information for Health* (United Kingdom. NHS Executive, 1998) proposed visionary change, centred on the promises that "information systems will be integrated" and "management information will be derived from operational systems. Electronic records were to ensure the secure and reliable transmission of all the information needed for any patient's management during a crisis.

Developed as the National Programme for IT, it focused on technical issues and central procurement, rather than relevance to public health gain or workplace efficiency. *Providing 21st Century Support for the NHS* (United Kingdom. Department of Health, 2002) was characterised by a centrally driven project agenda, "ruthless" technical interoperability standards and central procurement. Its "National Systems Architecture" was built around a national communications network and the development of electronic records, electronic prescribing and electronic booking of appointments.

As Connecting for Health, the IT programme has concentrated on Integrated Care Records : records integrated around patients rather than institutions.

In each of these phases, there has been an underlying risk, expressed in the balance between "technology push" and "clinical pull" approaches to the introduction of new information systems to the NHS (Wyatt, 1996).

On the one hand, technology push represents the imposition of available but potentially unsuitable tools without adequate regard for the carefully elicited needs of the host community. On the other hand, clinical pull represents the tendency to drive expectations in advance of what can be provided, so that perfection becomes the enemy of what is good enough.

In the NHS, the commitment to introduce technology on a mass scale threatens disproportionately to favour technology push over information pull. The challenge will be to get the balance as good as it can be, and to show how it can be made better in future.

This implies a social and a critical, rather than a technical account of the project.

## 1.0.3 : Wider Theoretical Relevance

Information systems are pervasive. The National Programme of IT is a major intervention in a large (public) organisation. It is an example of globalism in practice. A standard idea is to be introduced to a wide array of non-standard environments.

The nature of social structure and the linkages it entails is of considerable interest in social theory as well as the theory of information systems. Social structure is not only a constraint on social organisation and behaviour but can also constitute a resource to enable social action (Giddens, 1984).

Alongside the opposition of technology push and information pull is a second opposition, between constraining and enabling technology. We need to understand, better than we do at present, how computers fit into the clinical workplace. The thesis will develop a socio-technical perspective, contrary to the idea that the implementation of new information systems is a technical accomplishment of managers and trainers. It will be suggested that critical appraisal and learning about their situation by people in the workplace is fundamental to workplace commitment and successful assimilation.

The proposed investment in the National Programme is huge. It deserves careful investigation to ensure that its implementation will succeed according to the broadest range of criteria. Because people are a crucial part of the NHS and of any information system, it will be necessary to place alongside the rigorous application of "hard", scientific reason an equivalent, "soft" approach that takes due account of the non-rational aspects of social enterprise. Alongside the socio-technical discussion, the thesis will develop ideas based on critical theory.

## 1.0.4 : Research Question

My research question is :

***How can I equip myself and colleagues to understand and comment critically but constructively, on the design, implementation and evaluation of information systems, so that we can promote the successful assimilation of the National Programme for IT at our own place of work ?***

## 1.0.5 : Research Aims

The aim of the research is to develop a way of understanding how I and others at my place of work can best construct an understanding of information systems in terms of our contribution to the workplace rather than the "Head Office".

This will help my research to be relevant and influential at my own place of work. However, I expect the findings to be useful in comparable contexts, where the detail of individuals and events may be different but fundamental similarities emerge.

It is hoped that the research can also be relevant and interesting to academic community by contributing insights from the detailed study of the particular and the specific aspects of a local site. These cannot be accessed by a detached observer, with no commitment to a system of values, who is only interested in mass effects and generalities. They can only be accessible to a researcher who is both deeply engaged with the politics of the site yet agnostic between the various streams of commitment that can be discerned.

## 1.0.6 : Practical and Theoretical Implications

The practical implication of the research will be to enable me to act as a resource for colleagues who will not have studied the issues relating to the design, implementation and evaluation of information systems in the same depth. The outcomes will be of practical local value inasmuch as they will stem from local inquiry and investigation.

The theoretical implications will stem from the experience of putting academic theory into practical use within a "problem situation" identified in the "real world" of people, relationships, imperatives and pressures.

## 1.0.7 : End Point

The implementation of the National Programme so far has been an extended process rather than a discrete event. It is likely  that no new information system will be introduced within my own limited sphere of influence during the period of this research.

The end point will be my enhanced understanding of relevant issues, derived from engagement with literature, derivation of a conceptual framework, acquisition of empirical data from the workplace, comparison between empirical data and the framework, and the formulation of credible conclusions and useful recommendations. These will assist local preparedness and practical action when the time to implement the National Programme finally arrives.

### 1.0.8 : Research Objectives

The research objectives will be constructed around the NIMSAD framework of Jayaratna (1994).

I have chosen this framework for its reflective approach towards each successive, deliberate step in the progress from the inception to the conclusion of the research project. This puts it in contrast with the simple and unreflective procedural sequence of a prescribed method.

The NIMSAD framework contains the following phases :

1. Enter and understand the research setting

2. Make a Diagnosis : structure understanding

3. Define a "Prognosis Outline" : identify the desired impact of IT

4. Identify Problems : issues impeding the desired impact

5. Identify Notional systems to help overcome these impediments

6. Formulate a Conceptual-Logical Design : identify what elements need to be created and integrated

7. Formulate a Physical Design : identify how relevant elements should be put together

8. Implement an action plan.

By providing a sequence of numbered steps, NIMSAD creates direction towards conclusion of the project but accommodates the influence of what has been done

already, what is to be done later, and what is happening now, upon what is being done now.

The essential departure from a prescribed method is that, whilst the phases of NIMSAD outlined above can be followed strictly in the sequence given, their primary purpose is to provide orientation, so that the researcher can identify what he is doing at any time and situate this within the wider framework.

I plan to use NIMSAD in two ways.

First, I will use NIMSAD in this present chapter, to develop my own plan to understand and engage with the research task, of understanding the juxtaposition of the NHS and the National Programme for Information Technology, seen as a 'problem situation'.

Second, in Chapter Five of the thesis, I plan to use NIMSAD in a more concrete way to shape the fieldwork phase of the research. I intend to develop a diagnostic and therapeutic approach that is tuned to understand the task of implementing the National Programme in the researcher's own local workplace.

I will then apply, in Chapter Six, the approach derived in Chapter Five, to specific aspects of the local situation in my own hospital.

## 1.1 : USING NIMSAD TO PLAN THE RESEARCH

### 1.1.1 : Understanding the Situation of Concern that confronts the Researcher

The essential aspect of the situation is the following equation :

$$IT + NHS = Better\ NHS$$

I want to understand what counts as improvement, how it is intended that information systems shall be agents of improvement, and how that agency is to be assured.

### 1.1.2 : Performing the Diagnosis

NIMSAD describes a mutually constitutive relationship between three elements : a Problem Solver, a Problem Situation and a Problem Solving Methodology.

The problem solver is my self as a researcher. The problem situation places me in relationship with my need to understand how information systems are designed, implemented and evaluated, so that, when I or my colleagues are confronted with an information system, we will be able to form a reasoned, critical appraisal, relevant to the local situation.

NIMSAD suggests itself as an approach towards a problem solving methodology, through its use of systems concepts and through the reflections it encourages, upon each of the three elements.

The first stage in diagnosis in NIMSAD is the "conceptual / logical model" ("DM 1") of the researcher's problem situation (**Figure 1.1**).

**Figure 1.1 : DM 1, The Researcher's View of Himself, as a Participant in a Problem (Research) Situation**
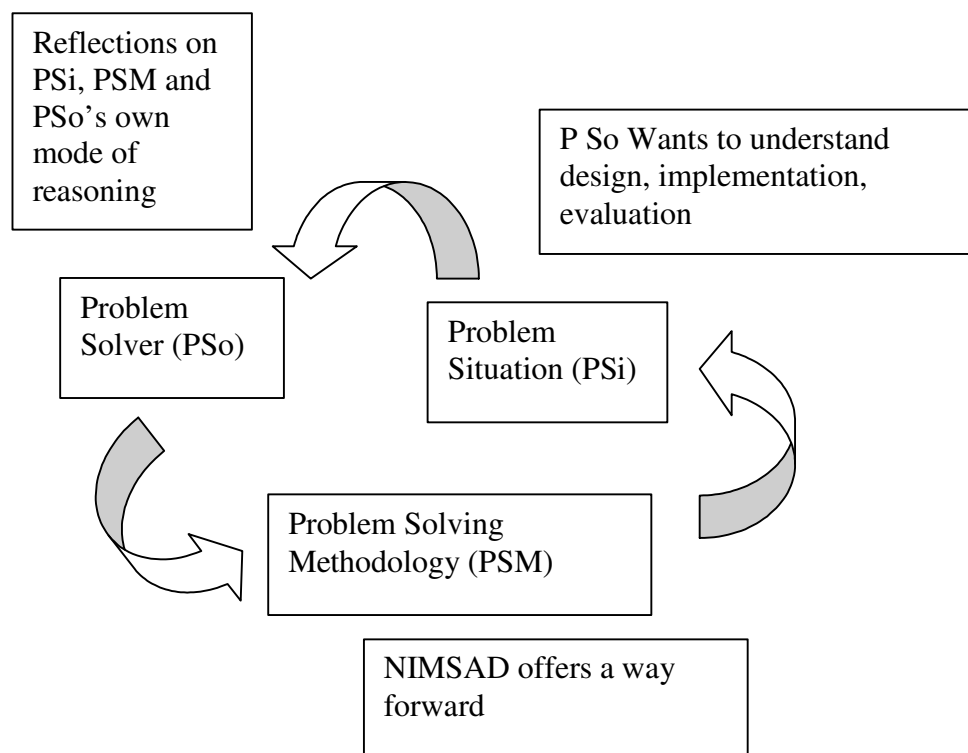


The second stage is the "physical model" ("DM 2") of the researcher's problem situation (**Figure 1.2**).

In the physical model, the researcher can see that technology is being inserted into a set of relationships between people, organisational structures, processes and tasks (See

Jayaratna, 1994 : p.59) . This is happening under the watchful gaze of a variety of audiences : for example, strategic managers in the NHS generally, managers in the National Programme for IT, patients and their representatives, future users of the new technology.

**Figure 1.2 : DM 2, The Researcher's Model of the Problem Situation he is Studying**
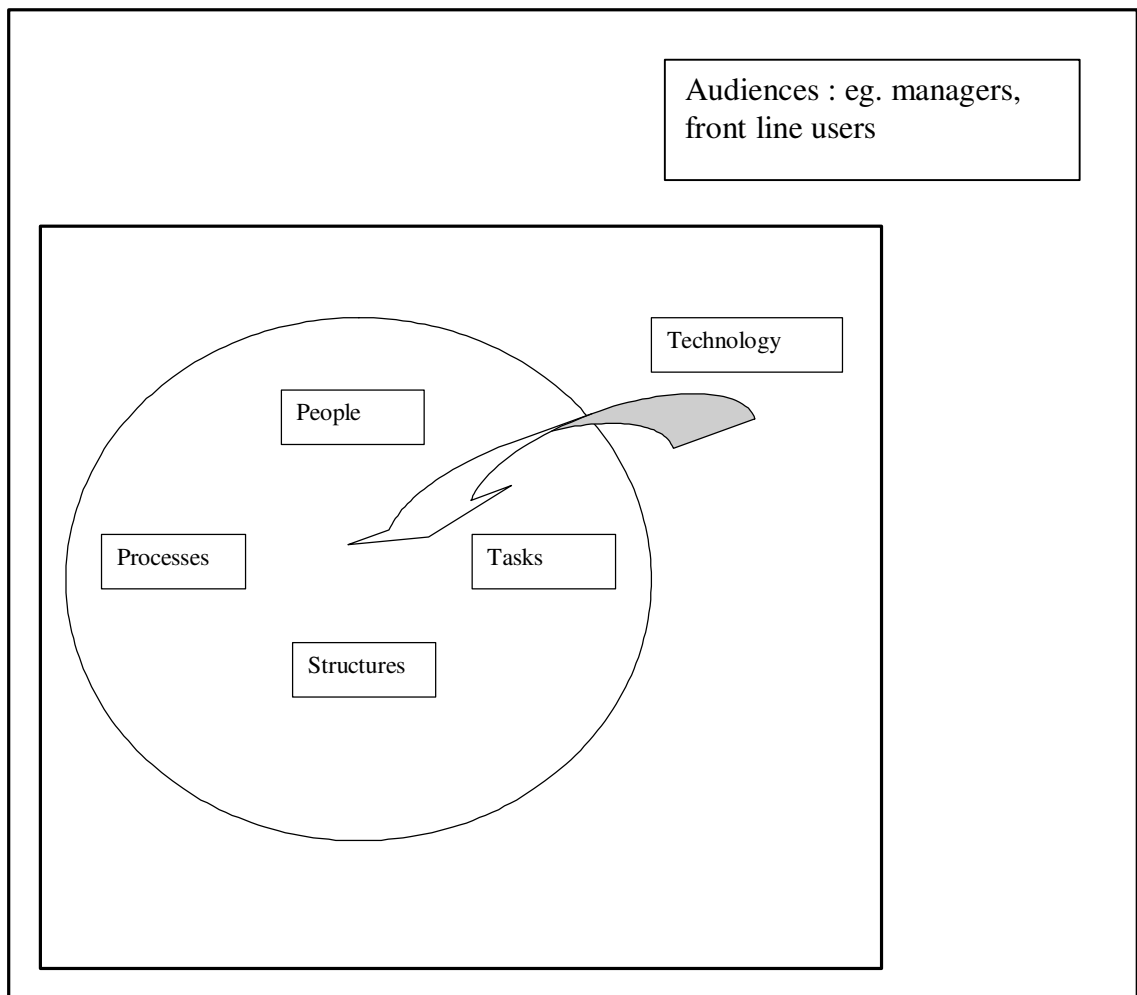
### 1.1.3 :  Prognosis Outline : the "Desired Future State"

My 'desired future state' is to understand how the strategic set of interconnected people, structures, processes and tasks, represented by the National Programme and those charged with its local implementation, needs to influence and be influenced by each of the multiple instances of an operational set of interconnected people, structures, processes, tasks *and technology*, at the workplace (**Figure 1.3**).

**Figure 1.3 : The Desired Future State ; The Researcher Wants To Give Future Users A More Articulate Voice In Their Dialogue With Information Systems Planners.**
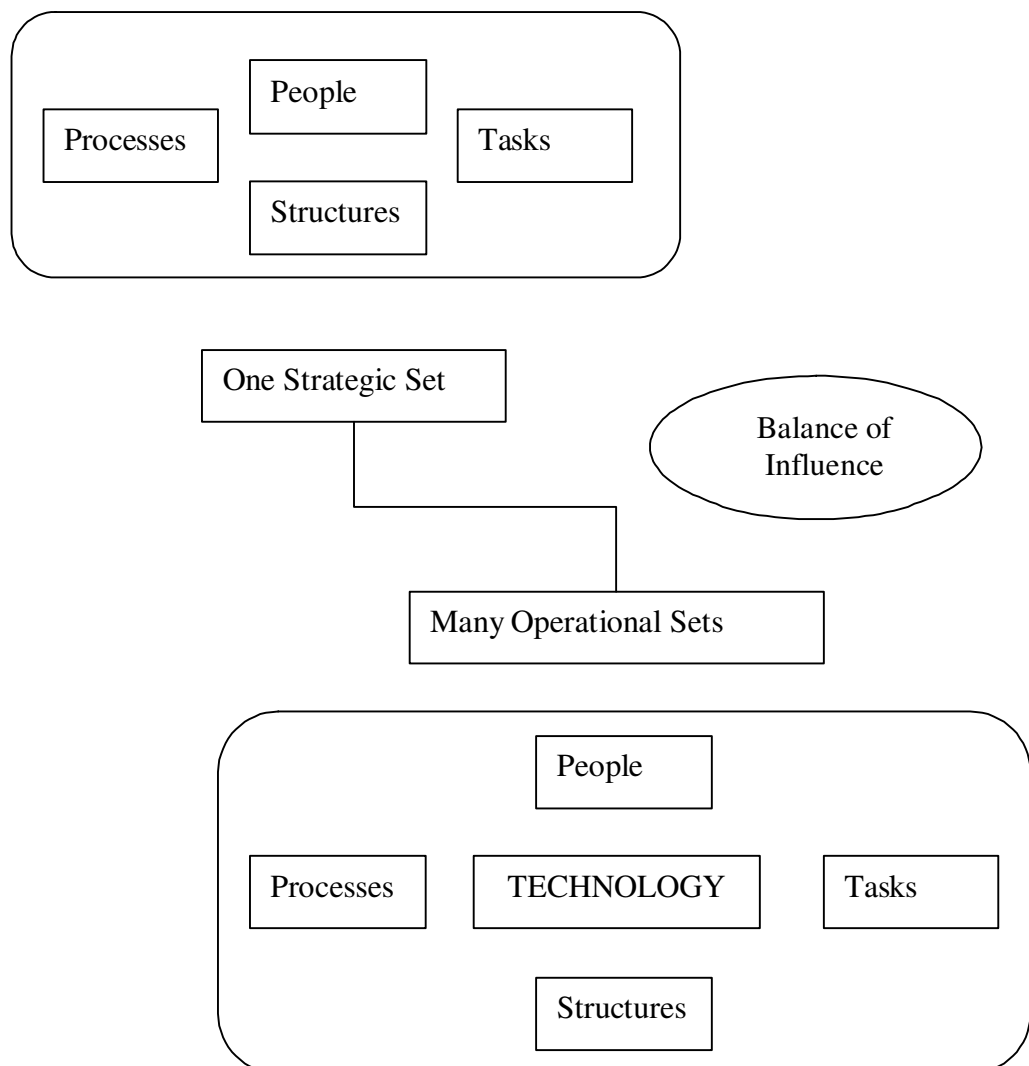
### 1.1.4 :  Problems

The chief problem in the way of progress is that an information system cannot be comprehended in isolation from the continuing stream of events that surround its use.

This is especially the case for the planners who perform strategic tasks (eg. implementation) or inhabit strategic processes and structures. However, information system users at the operational level also need a structure within which to understand and express their own needs.

### 1.1.5 : Notional System

One way to deal with the gap in understanding identified above is to ignore it. The implementation process is considered at a 'hard' mechanical level only. Progress of the implementation system is monitored and controlled by a supervisory system (**Figure 1.4**).

**Figure 1.4 :  A 'Hard Model Of Implementation And Control**
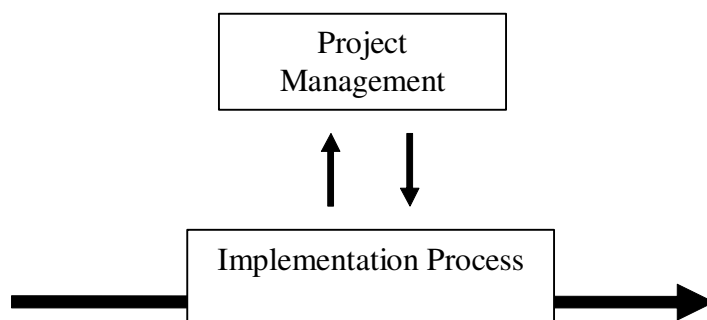
If the gap in understanding remains open, the actions of the project management team are unlikely to reflect accurate diagnosis or to have a rational basis.

An alternative, 'soft' systemic approach is suggested in **Figure 1.5**, below :

**Figure 1.5 : A 'Soft' Model of Implementation**
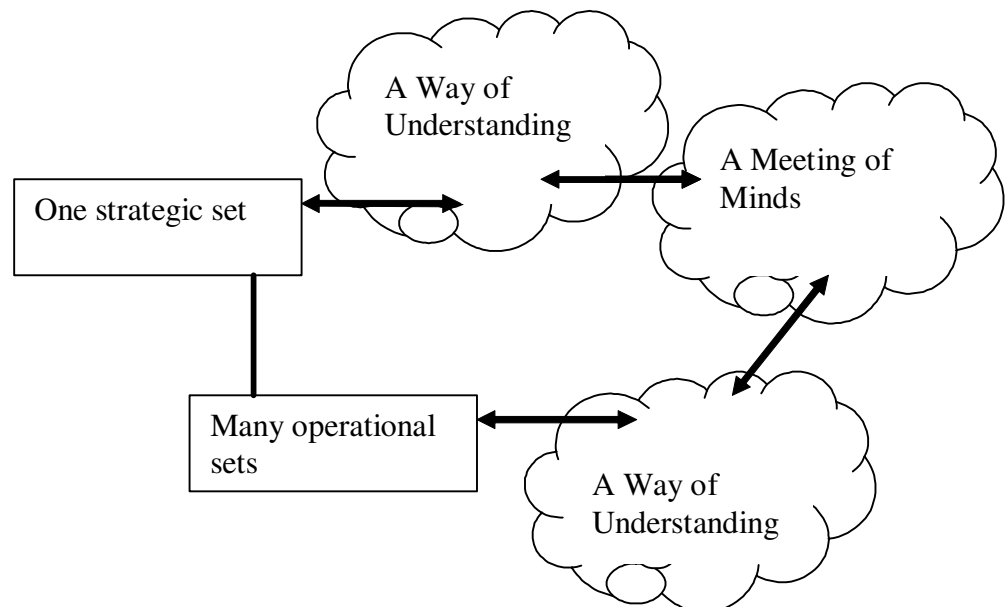


**1.1.6 : Conceptual / Logical Design**

The conceptual / logical design links the success of the National Programme and its implementation to the development of understanding and discourse between parties. A meeting of minds (**Figure 1.6**) can take many forms and need not result immediately in agreement. Conflict may be inevitable and can be fostered as long as it is constructive.

The 'meeting of minds' will be brought about by using models and concepts from the academic literature.

**Figure 1.6 : Conceptual / Logical Design. Applying the Literature to the Researcher's Situation of Concern**
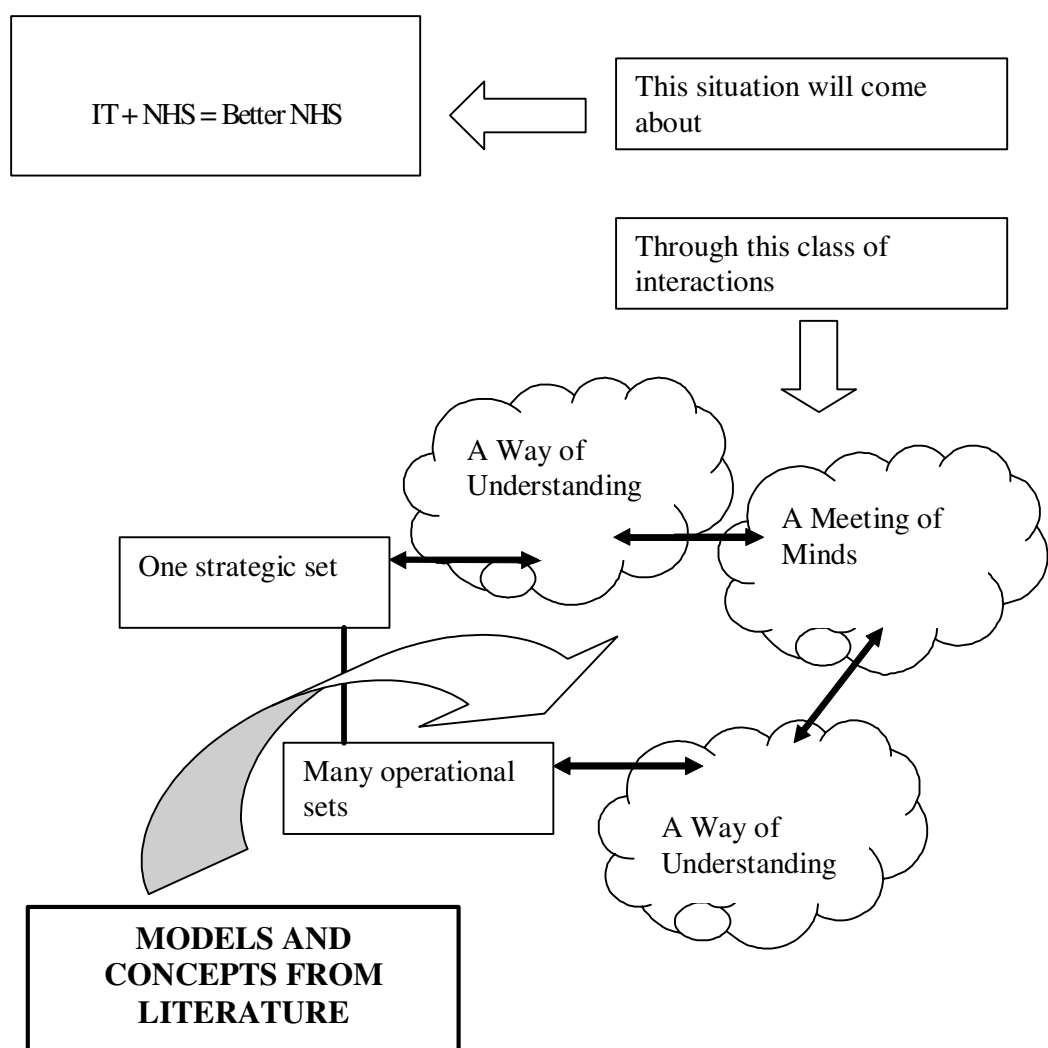
### 1.1.7 : Physical Design

The conceptual / logical design will have identified components from literature to construct a way of understanding the design, implementation and evaluation of information systems so that strategic and operational managers and end users can participate on the most equitable terms.

The physical design will assemble these components coherently to construct, in chapter five, a diagnostic and therapeutic approach that can be applied, in chapter six, to the problem situation that I, as a researcher, wish to help alleviate. This is the problem situation of an NHS Trust where the National Programme is to be implemented.

### 1.1.8 : Implementation

The application of the diagnostic and therapeutic approach to the problem situation experienced by the Trust will constitute the body of the research.

## 1.2 : OVERALL STRUCTURE OF THE THESIS

The structure of the thesis is now presented in broad outline. Chapter three and the subsequent chapters of the thesis are then explained in greater detail.

**Chapter 1** is this introductory chapter.

**Chapter 2** : Policy Background to the NHS and NHS Information Systems. This presents the backdrop to immediate concerns in relation to information systems within the NHS. As such, it provides a preliminary basis, for the design and focus of information systems in the NHS, that can be compared with the outcome of the proposed research.

**Chapter 3** : Literature Review. The information systems literature is explored, distinguishing between informatics as a technical science with roots in engineering and informatics as an essentially social and political discipline.

**Chapter 4** : Research Approach and Objectives : The research will take present case studies and interviews. It will be identified as action research.

**Chapter 5** : Research Findings.

**Chapter 6** : Analysis of Research Findings.

**Chapter 7** : Reflections on the Problem Situation, the Problem Solving Process, the Researcher as Problem Solver, the Research Process and the Strengths and weaknesses of the Research.

**Chapter 8** : The Practical Outcomes of the Research.

**Chapter 9** : Policy Implications.

**Chapter 10** : Conclusion of the Thesis.

### 1.2.1 : Policy Review : Chapter Two

This chapter explains the rationale for the National Programme and sets it in the context of wider political and societal concerns.

### 1.2.2 : Literature Review : Chapter Three

Four sets of oppositions emerge from this review of relevant literature.

The problem situation is first presented as the insertion of technology into a mechanistic organisational structure. The relationship between structure and action is discussed and the problem situation is then presented, not as the insertion of technology but the appropriation of technology by people doing their jobs.

Problem solvers are discussed in terms of opposed positivist, interpretivist and critical paradigms. Critical Realism is then discussed as a potential means of their unification.

The problem solving methodology is initially modelled on the clear conceptual separation of definite entities, proposed by the seventeenth century philosopher, Rene Descartes. He is placed in opposition with a twentieth century philosopher, Maurice Merleau-Ponty, for whom entities define each other and, therefore, cannot be conceptually separate ; only interdependent and contingent.

The problem solving methodology is discussed in practical terms, ordered around aspects of information systems strategy, their design and development, their implementation and their evaluation. A variety of individual methodologies are discussed but the principal theme to emerge is that method as theory is opposed against method as practice. Process is set against improvisation.

Overarching these themes is the opposition between globalism and localism. Globalism represents the hierarchical supremacy of one idea over its rivals. Issues are viewed from the standpoint of the structured whole, considered as a closed system.

Localism tests every idea against the detail of a local context. Global causes (interventions) produce global effects (outcomes) but the expression and intensity of effect are mediated by contextual factors, whose essence and variability are local. The global intervention loses its systemic integrity because its various points of contact with separate local sites constitute "boundary objects", made ambiguous by membership of both the global intervention and the local site.

Rather than cementing the global intervention and each local site as modules of a greater, physically intersecting whole, in fixed, hierarchical relationship, boundary objects mark points of coalescence and dissolution between closed systems that have now become open to each other, by virtue of functional intersections. These render system boundaries fluid and hierarchical relationships uncertain because the intersections are contingent, provisional and bi-directional.

### 1.2.3 : Research Approach : Chapter Four

The research approach will be developed in chapter four of the thesis.

### 1.2.4 : Research Findings : Chapter Five - Developing a Diagnostic and Therapeutic Approach to the Local Problem Situation

Chapter Five of the thesis will apply NIMSAD once more ; this time, to construct a diagnostic and therapeutic approach to the practical situation.

Chapter section 5.1 presents a first background understanding of the "situation of concern", based on an interview with the Trust's IT Manager. There is a perceived need to introduce information systems. The need and relevance of information systems is unclear.

In section 5.2, this understanding is widened by discussion with members of the Trust's Executive Team. Two distinct systems of activity are identified : the IT delivery system

and the business delivery system. The problem situation is seen to contain several constituencies (managers, clinicians, patients ; information systems users and suppliers) and a mix of 'hard', institutional (National Programme for IT, external regulators, the Trust ) and 'soft', social (clinical practice) structures. This chapter reports activity under NIMSAD's phase of "diagnosis".

Section 5.3 explores the Trust's future direction, to which information systems are expected to contribute. This is NIMSAD's "desired future state". The 'IT delivery System' needs to be more closely aligned with the 'business delivery system'. The new Chief Executive has brought about a distinct climate shift, from static organisational reporting in a command and control environment towards dynamic organisational learning in an organisational development environment. The 'business delivery system' is, in effect, being transformed into an 'organisational development system'.

The "desired future state" is to integrate the IT delivery system with organisational development. IT will satisfy organisational development needs in the broadest sense, including changes in clinical processes and methods resulting from organisational development activities. The outcome will be to deliver the Trust-Wide Objectives which encapsulate the Chief Executive's organisational transformation agenda.

Section 5.4 identifies "problems". NIMSAD refers to entities that are either missing or mal-aligned. This chapter identifies the need to establish a conscious link between the Trust's 'IT delivery system' and its 'Business Delivery System'. From a functional perspective, this implies the stronger definition of purpose for these two systems, of which the former switches its focus from technology to information and the latter from the steady state of business delivery to the more dynamic and adaptive state implied by

organisational development. Reflection from other perspectives deepens and broadens this analysis.

Section 5.5 identifies strategies, in the form of "notional systems" which, if they were brought into existence, would address the 'problems' identified in the previous chapter, making it easier to attain the "desired future state", where the Trust's information systems were more closely aligned with the Chief Executive's Trust-Wide Objectives. The relevant systems reflect agenda definition, values alignment, conflict surfacing and agenda critique.

Section 5.6 reflects on the problem solver, the problem situation and the problem solving methodology and brings together conceptual understandings of the design, implementation and evaluation of information systems that reflect the propensity for technology to be "translated" from the designer's conception of use into the user's personal relationship with his own practical situation. This represents the "conceptual / logical design" phase in NIMSAD. The chapter suggests a 'plane of cleavage' between, on the one hand, groups, processes and technology and, on the other, individuals, tasks and technology. The two positions separated by the 'cleavage plane' represent fundamentally opposed philosophical positions with practical significance.

Section 5.7 situates the conceptual / logical model described in section 5.6 within the wider activities of information systems design. The components identified in the last chapter are now presented as a unified whole. The model is then placed amid specific zones of interest, originally identified as relevant to design, but incidentally relevant to strategy, implementation and evaluation.

### 1.2.5 : Research Findings : Chapter Six – Applying the Diagnostic and Therapeutic Approach to the Local Problem Situation

The final phase in NIMSAD is "implementation", putting the physical design to work in the real world. Chapter Six applies the concepts and model developed in the three preceding sections to a set of case studies to illustrate, in their practical context, issues relevant to the design, implementation and evaluation of information systems to be provided under the National Programme.

### 1.2.6 : Reflections and Conclusions : Chapter Seven

Section 7.1 will reflect on the research process.

Section 7.2 will present my critical reflections on the problem situation represented by the introduction of the National Programme.

Section 7.3 will reflect on my own intellectual development as a 'problem solver' during the 'research journey'.

Section 7.4 will review the problem solving methodology.

Section 7.5 will present the contributions and limitations of the research.

Section 7.6 will suggest the direction of future research.

### 1.2.7 : The Practical Outcome of the Research : Chapter Eight

Chapter eight will present a review of the practical outcomes of the research project as an internal consultancy document for the Trust where the research was conducted.

### 1.2.8 : The Policy Implications of the Research : Chapter Nine

Chapter nine will present the implications of the research for future policy relating to large scale information systems in the NHS.

### 1.2.9 : Conclusion of the Thesis

Chapter ten closes the thesis and summarises briefly the intellectual journey it represents.

# CHAPTER TWO

# POLICY OVERVIEW

## 2.0 : INTRODUCTION

The purpose of this chapter is to appreciate the expectations of the information system's institutional sponsors.

The expectations of these corporate strategists and planners represent a global view and vision of the NHS. The public-funded provision of local information systems is expected to be coherent with this vision and with the overall framework provided by NHS policy and NHS information policy.

Section 2.1 outlines NHS information policy and the National Programme for IT.

Section 2.1.0 explains NHS information policy since 1998. Section 2.1.1 briefly summarises information initiatives prior to 1998. Section 2.1.2 summarises the policy context of the National Programme. Section 2.1.3 explains the areas of public concern that have influenced thinking about the programme. Sections 2.1.4 and 2.1.5 explain the programmes implementation and success.

Section 2.2 presents brief conclusions.

# 2.1 : NHS INFORMATION POLICY

# AND THE NATIONAL PROGRAMME FOR IT

## 2.1.0 : NHS Information Policy since 1998

The White Paper, *The New NHS, Modern, Dependable* (United Kingdom. Department of Health, 1997) set out the plans of a newly elected government for healthcare in the United Kingdom. Its associated information strategy, *Information for Health* (United Kingdom. NHS Executive, 1998) provided an overall verdict on the previous (1992) strategy (section 1.33).

> *"While it did deliver some important national infrastructure, the previous strategy………was over-concerned with management information, and failed to address the real needs of the NHS for information to help clinicians and managers to deliver more effective healthcare and improved population health."*

*Information for Health* (section 1.3) committed to a clinical focus in the form of :

- lifelong electronic health records for every person in the country
- round-the-clock on-line access to patient records and information about best clinical practice, for all NHS clinicians
- genuinely seamless care for patients through GPs, hospitals and community services sharing information across the NHS information highway

- fast and convenient public access to information and care through on-line information services and telemedicine

- the effective use of NHS resources by providing health planners and managers with the information they need.

It was based on the following "principles" (section 1.30) :

- information will be person-based

- systems will be integrated

- management information will be derived from operational systems

- information will be secure and confidential

- information will be shared across the NHS.

The principal innovation within *Information for Health* was the patient-based Electronic Record, subdivided as follows :

"2.10 Electronic Patient Record (EPR) describes the record of the periodic care provided mainly by one institution. Typically this will relate to the healthcare provided to a patient by an acute hospital. EPRs may also be held by other healthcare providers, for example, specialist units or mental health NHS Trusts.

2.11 The term Electronic Health Record (EHR) is used to describe the concept of a longitudinal record of patient's health and healthcare – from cradle to grave. It combines both the information about patient contacts with primary healthcare

as well as subsets of information associated with the outcomes of periodic care held in the EPRs……"

Systems integration was to occur at six levels (section 2.64) :

1. Clinical Administrative Data (Patient Administration Systems)

2. Integrated clinical diagnosis and treatment support (Departmental systems integrated with Patient Administration Systems)

3. Clinical activity support (Electronic ordering, results reporting and prescribing, multi-professional care pathways)

4. Clinical knowledge and decision support (knowledge bases, embedded guidelines, rules, electronic alerts, expert systems support)

5. Speciality specific support (specialist clinical modules, document imaging)

6. Advanced multi-media and telematics. (Telemedicine, Picture Archiving and Communications Systems).

*Information for Health* had cast the information strategy for the NHS as a *national* programme for *local* implementation, focused around the delivery of Local Health Improvement Plans, themselves geared towards the delivery of National Service Frameworks[*] addressing key health challenges.

In contrast, *Delivering 21$^{st}$ Century IT support for the NHS* (United Kingdom. Department of Health, 2002) focused on the nationally co-ordinated delivery of

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[*] National Service Frameworks were announced in "*The New NHS, Modern Dependable*" and provide a comprehensive ideal model of management and standards for a variety of medical conditions.

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infrastructure in the form of "ruthless standardisation" (*ibid:* para. 1.2.1) at a technical level, national arrangements for procurement (recapturing the market from its suppliers) and clearly defined channels of centralised responsibility and authority : in other words, a *national* programme for *national* implementation. A local process of implementation became a global one. Local functional sensitivity gave way to national technical uniformity.

The resulting "National Systems Architecture" (*ibid.:* p.2). introduced electronic prescribing, electronic booking of appointments and electronic records, and supported these with the "N3 National Network" that was to form the "spine" for the national electronic distribution of patients' confidential medical data. Respecting the important issue of confidentiality, access constraints, authentication procedures and encryption were given development priority.

Subsequently, the National Programme's delivery arm has been named, "Connecting for Health" ; recognising that tight project-management had lent an undesirably self-centred aspect to the Programme and re-asserting its purpose as an instrument of wider change. A national local ownership programme (NLOP) has been launched, to strengthen the engagement of the broader NHS with the ICT programme.

In this form, the programme has reverted to a *national* programme for *local* implementation, focused on the integration of clinical services and records around the individual patient. However, the decisions about what is to be implemented locally have now been taken in isolation from a clinically led view of health improvement or a locally led view of the way local elements of healthcare ought best to interact .

Chantler, Clarke and Granger (2006) have described the content of the IT programme in terms of its technical infrastructure.

The aim has been to build a national broadband network that can handle vast volumes of data traffic without degradation. Information is modelled around a national data "spine", to which a summary care record for every patient is linked. The summary care record is populated with information fed from more detailed, local records held by individual healthcare providers, or in each patient's personal health webspace ["My HealthSpace"].

The "spine" also manages the exchange of digitally stored X rays and other images, electronic prescriptions and pathology results, and outpatient or other appointments. The ability to integrate "to enable a single, immediately updatable record to be available irrespective of the location in which the patient is treated" is a core goal of the National Programme, as is the ability to integrate electronically all the disparate elements of healthcare provision which constitute the 'patient's journey' through the processes of treatment for a given condition such as a cancer.

Additional to the 'spine', Bacon and Pugh (2006) identify "the replacement of local systems at hospitals and GP practices throughout the NHS with centrally selected software" as the second principal component of the National Programme. They maintain that : *"The fundamental error made when setting up the programme was to assume that centralised procurement of national systems would be more efficient than local decision making guided by national standards. ……….. Central selections mean that all local ownership of such systems is lost …… this makes the systems even more difficult to deploy".*

## 2.1.1 : Background - Information Initiatives Prior to 1998

Since the 1960's, the Patient Administration System (PAS) of each hospital has recorded and administered hospital 'activity' in terms of in-patient and out-patient 'episodes'. It is essentially a clerical function but also contains, for each episode, a 'diagnostic code' that indicates broadly the clinical purpose of the activity undertaken.

As emerged in the Bristol Inquiry (Kennedy, 2001 : Annexe A, paras. 57-67), coding and the maintenance of PAS are 'back room', administrative functions, carried out in isolation from front-line clinical activity, essentially for planning purposes. Having no relevance apparent to clinicians, their execution has tended to be correspondingly poor (Kennedy, 2001 : Ch.6 : paras 26-27). However, extracts from each hospital's PAS are published in NHS Hospital Episode Statistics and are used to compare one hospital's performance with another. In this sense, the figures intended for planning are published 'over the heads' of clinicians, purporting to compare clinical performance. Public debate over health services is founded on fallible representations, whose relation to the truth is not necessary but only coincidental.

The NHS information initiatives which preceded *Information for Health* are described by Brennan (2005 ; ch.7). They include Hospital Information Support Systems (HISS), the Resource Management Initiative (RMI) and Clinical Audit. All of these have or had the potential to refer back to the Patient Administration System (PAS). Brennan paints a picture of a market for NHS information systems that had suffered 'provider capture'.

HISS were intended to 'integrate' the different administrative systems that existed to manage different parts of the hospital (eg. X Ray, pathology, A&E, pharmacy) in the

sense that the output of any of these systems could be processed in a central system such as PAS.

Brennan (2005 : p.54-62) and Perrin (1998) explain how the Resource Management Initiative (RMI) resulted from efforts to assemble information about the costs of capital assets, human resource and clinical procedures with the number of patients treated and their severity of illness. Coding structures were revised and the level of detail available was enriched. This was to allow efficiency comparisons, first between hospitals and subsequently between individual clinical firms.

Brennan explains that HISS was implemented independently and sporadically by individual NHS hospitals, purchasing 'solutions' from a variety of providers whose systems were electronically incompatible with each other. However, departmental systems had often been supplied by different manufacturers and their functional 'integration' required manual transcription of output from one system to another. Despite their promise, both HISS and RMI have suffered from the incompatibility of their component information systems.

## 2.1.2 : The Policy Context of the National Programme

Electronic information systems are central to the e-government strategy, outlined in *Transformational Government* (United Kingdom. HM Government Cabinet Office, 2005 ; p.3-4). Here, the aim is to transform and 'modernise' public services, making them responsive to personal needs as well as improving their economic efficiency and eliminating process steps that confer no added value.

The *Wanless* Report (Wanless, 2002) to the Chancellor of the Exchequer made recommendations which instigated the National Programme for IT and provided a foundation for subsequent health policy.

Wanless' terms of reference asked him "to determine the resources needed for high-quality service". The result was "the Review's vision of such a service in 2022".

To achieve parity over the next 20 years would require "a very substantial increase in resources for health and social care" as well as radical reform. Both would need support from a major programme of "effective investment in IT". Funds intended to purchase IT resources must be ring-fenced against diversion for other purposes. The proliferation of incompatible IT systems would need to halt.

Wanless' interim report (Wanless, 2001) had identified chronic underfunding, inefficient spending, and lack of capacity contributing to health outcomes below the European average.

Productivity improvement would stem from better use of information, reduced bureaucracy, clinical as well as financial effectiveness, successive devolution of responsibility for direct care from one sector of the workforce to another, better integration of social care with health care, and better recognition of inter-relationships between resources in the system.

Public funding of healthcare need not be equated with public-sector provision. To take greater responsibility for their personal health the public needed information on health

matters, and to make informed choices when seeking healthcare, they needed improved information about health outcomes.

In making his recommendations, Wanless pointed to the need for a full information base about health inequalities and the relationship between socio-economic need and health need.

The United Kingdom House of Commons Public Administration Select Committee (2003) identified a prevailing "measurement culture" in the NHS, characterised by centripetal reporting of summary information to assure the confidence of an external public or parliamentary audience. They wished public services to develop a "performance culture" characterised by the capacity of an internal organisational audience, to generate organisational learning from its own informational resources.

In the same vein, the *Gershon* Efficiency Review (Gershon, 2004), advocated the recycling of resource, from unproductive supervision to the facilitation and emancipation of front-line interactions in all sectors of public service. A key aim within efficient reconfiguration at the level of service delivery was to maximise the productive time of public service professionals in the front-line.

## 2.1.3 : Intervening Factors

**The Unstable NHS Environment**

The National Programme and the NHS each emerge from their respective background in policy, for NHS information and for the NHS itself. The evolution of NHS information policy has not been closely aligned with the rather unstable shifts in policy for the NHS itself. The ideal of freely flowing information is opposed by a countervailing concern for individual privacy. Sweeney and Griffiths (2002 : p. 95) summarise four phases in healthcare policy since 1983 (**Table 2.1**).

Over time, these phases have been associated with various policy shifts, from strong, centralised control structures emanating from the *Griffiths* letter (Griffiths, 1983) to the devolution of "earned autonomy" to NHS Foundation Trusts ; from the introduction of an NHS "internal market" in *Working for Patients* (United Kingdom. Department of Health, 1989).to its abolition in *The New NHS* (United Kingdom. Department of Health, 1997) and then reverting to a system of "Payment by Results" and contested service provision in *The NHS Modernisation Plan* (United Kingdom. Department of Health, 2004).

At the same time, the NHS landscape has been transformed by various structural reorganisations and by the emergence of new forms of service provision, such as call centres (NHS Direct), nurse-led Walk-In Centres, GP Out of Hours collaboratives and polyclinics.

**Table 2.1 : Phases in NHS Policy ; policy instruments and associated information strategies**

| Phase | Policy Instrument | Information Strategy |
|---|---|---|
| **"The First Way"** : Managerial command with a focus on control. | Griffiths Letter. | Local integration of information about activity, manpower and finance : increasing precision of accounting. |
| **"The Second Way"** : The purchaser-provider split ; developing market forces. | *Working for Patients.* | *Getting Better with Information.* |
| **"The Third Way"** : Integrating cooperation and competition : attempting to get the best of both worlds. | *The New NHS* and *The NHS Plan.* | *Information for Health* followed by *Delivering 21$^{st}$ Century Support for the NHS.* |
| **"The Fourth Way"** : Understanding the health service as a complex adaptive system ; post-normal healthcare. | *The NHS Improvement Plan.* | National Programme for IT re-branded Connecting for Health : National Local Ownership Programme instigated. |

The regulatory framework has included the emergence of clinical governance, encouraging the adoption of evidence based best practice guidelines, enshrined in the National Service Frameworks and guidelines which emanated from governance

structures (The Commission for Health Improvement[*] and the National Institute for Clinical Excellence - NICE) announced in *The New NHS*.

The White Paper, *The New NHS*, required the local elaboration of Health Improvement Plans, linked to National Service Frameworks (NSF's). In turn local information strategies (LIS) were to be linked to the delivery and monitoring of these frameworks. The same White Paper imposed a statutory duty of quality on the NHS. In The NHS Plan, the announcement of new funding for the NHS was accompanied by renewed emphasis on efficiency and it is only in the *Darzi* review (Lord Darzi, 2008) that all healthcare providers will now be "required by law to produce 'Quality Accounts' just as they publish financial accounts" (*ibid* : p.11). *Darzi* expects that "Every provider of NHS services should systematically measure, analyse and improve quality. They will need to develop their own quality frameworks, combining relevant indicators defined nationally, with those appropriate to local circumstances. This will include quality measures that reflect the visions for improved services that are at the core of this Review" (p.50).

To summarise the policy factors for the NHS itself that have intervened during the evolution of NHS information policy, the financial survival of individual institutions seems set to become a distinct local preoccupation, alongside the need to identify each institution's contribution towards the improvement of the nation's health. Provider differentiation and proliferation can enhance access, but communication between providers is key to promote co-ordination, avoid conflict of information provision and inefficient duplication of resource consumption. Incentive payments based on tariff rather than market costs reinforce the need, not only to measure what is done, but also to

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[*] Now, after various transitions, the Care Quality Commisssion.

do it more efficiently. This often entails more efficient communication, not only within organisational boundaries, but across collaborative interfaces.

Policy for NHS information contains the contradiction that information will be "shared across the NHS" but will also be "secure and confidential". It has been easier to develop technical controls on authorship and access to information than to clarify how information access and use blend with users' individual and collective work.

The *Caldicott* report (1997) was a response to the intensification of NHS accounting procedures and the demand for wider circulation of information about treatments given to individual patients. Alongside the Data Protection Act (United Kingdom. Office of Public Sector Information, 1998) it constitutes the foundation for the restrictive rules of information governance within the NHS.

The Data Protection Act states that data must be:

- fairly and lawfully processed
- processed for limited purposes
- adequate, relevant and not excessive
- accurate
- not kept longer than necessary
- processed in accordance with the data subject's rights
- secure
- not transferred to countries without adequate protection.

Despite these safeguards, the technical programme has encountered professional and public scepticism over the National Programme's ability to maintain the confidentiality of sensitive patient information. Therefore, detailed security arrangements have been made, to limit users' access to any patient's electronic record. This has been accompanied by careful arrangements to allow individual patients to opt out of electronic records or to control the most sensitive aspects of their content.

Mason (1986) refers to "four public policy challenges of the information age" : accuracy, privacy, property [ownership] and access.

These concerns are to be addressed by the NHS Information Commissioner. He has set out his view of NHS electronic care records (United Kingdom. Information Commisioner's Office, undated), in which he notes the concern of some individuals that their information should not be shared widely, even within the NHS. He expects patients to have the right to opt out of sharing, to have access to the shared component of their record, and to have some limited editorial rights over the content or visibility of this component.

The Commissioner expects that access will be controlled according to the "legitimacy" of the reader's relationship with the patient, determined by their role in that patient's health care. Patients, or managers on their behalf, will have rights and responsibilities to audit access to records. Information will not be shared outside the NHS without the explicit consent of the patient, unless "allowed or required by law".

Against this background, the public inquiry into the death of Victoria Climbie (Lord Laming, 2003) highlighted the failure of communication and coordination of services

around a vulnerable individual. Discussion within the inquiry highlighted the ethical tension between the surveillance of groups and individuals, for the protection of their health, and the invasion of their personal privacy (Judd, 2002). Arguments for the free flow of patient related information encounter objections based on personal privacy and the control of unauthorised access.

**Clinical Risk and Safety**

In the 1990's, a series of high profile medical failures in the NHS (Smith, 1998 : Berwick, 2001) began to stimulate the institutionalised control of clinical safety, previously the responsibility of the individual doctor.

*An Organisation with a Memory* (Donaldson, 2000) was intended to spearhead actions and activities which would minimise litigation costs by eliminating adverse events through systematic reporting and recording, and formal inquiry into the most serious events.

Ham (2008) has commented on the (United Kingdom Healthcare Commission, 2008) report, *Learning from Investigations*, concluding that the proactive organisational leadership and learning envisaged in *An Organisation with a Memory* are still lacking.

Doctors, managers and patients share a common concern for the safety of healthcare. Leape (1994) reported that "180,000 people die each year [in the USA] partly as a result of iatrogenic injury, the equivalent of three jumbo jet crashes every 2 days."

In the United States, the Institute of Medicine document, *To Err Is Human : Building A Safer Health System* (Kohn *et al*., 1999) challenged healthcare providers to set and measure performance against their own proactive standards, and to represent themselves through performance measures against which patients can make informed market choices.

Leape and Berwick (2005) report that this challenge has been taken up, not only by healthcare provider institutions but also by external agencies representing government, insurance payors and accrediting bodies. They expect electronic records to help in "setting safety goals" (eg. "a 90% reduction in hospital acquired infections, a 50% reduction in medication errors, a 90% reduction in errors associated with high-harm medications"). The message is "mobilize pressure for change" and then demonstrate change by setting and measuring numerical targets and performance indicators.

Berwick (1996) has stressed two points. The first of these is that any practice of measurement is better than none. Reinertsen (1998) stresses that organised data are pivotal to the manager's ability to marshal commitment towards change. Berwick and Nolan (1998) exhort doctors to see themselves as key leaders in improving healthcare and medical systems.

Nelson et al. (1998) provide examples of industrial methods (statistical process control (SPC) charts) applied to clinical practice. These methods require the continuous retrieval of specific data to monitor previously identified measures of process or outcome. Mohammed et al. (2001) use the Bristol and Shipman scandals to demonstrate how "Shewhart's forgotten lessons" might have been applied prospectively to identify Shipman's performance anomalies and intervene earlier.

Berwick's (1996) second point is that performance indicators only measure the operation of the unreconstructed system. Effective change is not "change in a system", but stems from "change of a system". By inference, effective change is radical change. Clearly, the measurement and monitoring of safety needs to be complemented by an organisational framework that supports organisational learning and reconstruction. By measuring, rationalising around consensus (Clemmer *et al*., 1998) and purposefully redesigning new systems of activity, Berwick (1998) and Nolan (1998) show how it is possible to build an organisational learning dynamic around measures of performance.

For Chang and Powell (1998), the key transition to be made in support of Business Process Re-engineering and Total Quality Management is the cultural transition from a culture of command and control to a culture which empowers leadership, teamwork, entrepreneurship and the capacity to manage the risks of change.

The argument, then, is that variation ought to take a place alongside control as an organisational safeguard. Alongside order, a degree of disorder is also healthy. Strategic pre-planning cannot identify all contingencies and tight control must not preclude emergent responses.

Reason (2000) has argued, "Most managers of traditional systems attribute human unreliability to unwanted variability and strive to eliminate it as far as possible. In high reliability organisations, on the other hand, it is recognised that human variability in the shape of compensations and adaptations to changing events represents one of the system's most important safeguards."

Likewise, the Actor Network Theorist, John Law (2003) presents an analysis of the public inquiry into a fatal train crash, allegedly caused because a train driver passed a signal at danger. Guilt, initially located at a distinct site (the driver) was quickly dissipated within the complex of (generic) man and machine (train, signalling apparatus). The alternative ascription of blame to a discrete 'system' that ought to have been more tightly defined and controlled also failed.

Law uses the evidence of the inquiry to argue that 'systems' and 'control events' are human constructions, assembled from fluid relationships whilst external contextual variables are assumed to be held constant. For Law, this assumption is not feasible and "*adding complexity to the relations that make up a system to strengthen those relations may actually dissolve those relations in practice ......... systems are never failsafe ......... they may ......... dissolve themselves from within as they attempt to increase their reliability.*" It is not possible to construct the world as a comprehensive set of immutable rules.

The inquiry heard how an internally cohesive rule set, governing the standard design of signals, had to be adapted to contingent events : the signal would have been invisible against the background of another structure if it had been constructed strictly according to the standard. Other examples were cited to show that the continuity and safety of railway operations depended on continuous human improvisation, using general rules and the particular context to assemble a conclusion about required action.

It follows from these ideas that clinicians will require information systems to facilitate, rather than control or eliminate, their individual judgements in order to practise in ways

that are not only safe, effective and based on best evidence, but also attuned to the peculiarities of the patient and the clinical situation as Sackett *et al.* (1996) endorse.

**Transparent Clinical Methods**

Consumers' demands for transparency, the need to meet escalating demand by up-skilling of professionals, and the ambitions of non-medical professionals themselves have conspired with complementary concerns over issues of patient safety, clinical effectiveness, control and economic efficiency to drive the standardisation of clinical practice, manifest as clinical protocols, National Service Frameworks and care pathways.

**Understanding Professional Practice in terms of Power and Emancipation**

Following the Bristol inquiry, closed medical audit procedures became multidisciplinary audit meetings, open to managers (Kennedy, 2001 : Final Report ; Recommendations, para.143). The inception of Clinical Governance (Scally & Donaldson, 1998) consolidated a shift in the balance of power between the Department of Health (*via* the Chief Medical Officer), the General Medical Council and the British Medical Association.

Adler *et al*. (2008) suggest that there is a general tendency, epitomised within healthcare, changing the relationship between professionals and their clients (patients) or subservient professions. Procedures are codified and their basis in evidence made

transparent. The professional's role is no longer to possess and apply arcane knowledge but to obtain, compare and explain sources of knowledge to the patient.

The government's appointed 'Patient Czar' and chairman of the NHS Care Record Development Board has made several observations on the relationship between professionals and the public (Cayton, 2005). In the first of these, he sees professionalism as deriving, not from the benevolent intentions of a class or college of practitioners, but from the manifest control of a process which ensures that professionals do good and do no harm.

In his second observation, the 'Patients' Czar' has neatly reflected the conflict between the normalising and constraining tendency of managerialism and the need for an empowered form of craft or professional practice. Speaking about the NHS Care Records Board, he says :

*"Much of the arguments that flow back and forward are between those who have a technical, utilitarian, instrumental understanding of clinical practice and those of us who argue that technology exists to support humanity not to control it. The difference is between those who look to standardise clinical practice and those who look for a personalised and consistent approach to care."*

In his third observation, the 'Czar', sees professionalism not as a state in subject/object relationship between a profession and a client population but as an interaction between individual practitioners and individual patients. This interaction has three characteristics. The first is an empathic involvement between equals. The second is a form of expertise characterised less by the possession of knowledge than by its

thoughtful application. The third is a mutuality within the professional relationship which supersedes professional autonomy and enhances accountability.

The Czar's fourth observation is to remove the professional from the authoritative role of independent expert to that of a link between the patient and a wider corpus of other professionals and their knowledge.

### 2.1.4 : Strategies and Interactions : Implementing the National Programme

Chantler, Clarke and Granger (2006) conclude, "Perhaps the greatest challenge to successful implementation to improve the quality and efficiency of health care is the human processes that need to change to accommodate the IT revolution ......... Above all will be the need to provide sufficient training for staff, especially clinicians, to use the new systems".

It seems that, at some stage, everybody will be uniformly persuaded to accept the National Programme's information products as supplied, and will comply with the requirements of their use. If this is to be the case, people in the NHS will respond to the Programme, rather than the Programme responding to people.

The implementation of the NHS IT programme is directed by NHS Connecting for Health in *The National Programme for IT Implementation Guide* (United Kingdom. NHS : Connecting for Health, 2006). The Guide distinguishes (p. 34) between the practice and the purpose of implementation.

The *National Programme for IT Implementation Guide* (p.31) states, "projects implementing National Programme products would usually be delivered as part of a wider integrated change programme. The Integrated Service Improvement Programme (ISIP) is developing an integrated approach to service improvement and benefits management." Safety, support for service improvement and confidentiality are identified as objectives for a programme which will be "business led", to "maximise value in recent investments in IT". It will address first those areas identified in local planning processes as most in need of the information products to be implemented. The programme will support "patient pathways" and "maximise effective use of clinician time" (*ibid.* page 34).

Implementation of the Programme will be "locally driven and led and centrally supported" (p.34). Internal consistency is to be assured through information standards and the use of PRINCE2 project management methodology (United Kingdom. Office of Government Commerce, 2009). PRINCE2 [PRojects IN Controlled Environment] emphasises definition, documentation and librarianship, planning, communication, coordination, risk management and control, to ensure efficiency, accountability and good governance in the deployment of public resources. The control function restricts shifts in contractual, technical or business assumptions during the project.

A report by the National Audit Office [NAO] (United Kingdom. Comptroller and Auditor General, 2006) stated (p. 6), "The Department of Health and NHS Connecting for Health should provide greater clarity to organizations and staff in the NHS as to when the different elements of the Programme will be delivered. NHS Connecting for Health should ensure that it has a robust engineering-based timetable for delivery,

which it is confident its suppliers are capable of achieving." It identified "significant challenges" for the National Programme.

- Ensuring that the IT suppliers continue to deliver systems that meet the needs of the NHS, and to agreed timescales without further slippage
- Ensuring that NHS organisations can and do fully play their part in implementing the Programme's systems
- Winning the support of NHS staff and the public in making the best use of the systems to improve services.

These ideas express faith in a hierarchy of conditions which, if met, will result in the successful delivery of the National Programme Intervention and its intended Outcomes.

Paragraph 4.1 stated : "A key lesson from many unsuccessful IT projects in the past is that the NHS needs to see the Programme as a business change programme with clear goals and benefits rather than an IT project. Success therefore requires :

- Engagement of NHS managers and clinicians to win their support for the overall vision and purpose of the Programme and the benefits it will deliver
- The NHS to articulate its business change priorities and users to shape their business processes accordingly
- Commitment by the local NHS to install the IT systems and use them to improve services
- Sufficient capability to implement effectively, including training the NHS staff that will use the systems." (NAO Report : p. 35).

Protti (2003) has identified local clinician involvement as a key source of support for clinical information systems projects and criticises the National Programme for its tendency to keep clinicians at arm's length until technical development have been well advanced.

In England, "Wider engagement and mobilisation of the NHS was not started until it was judged that procurement had reached a sufficient stage of maturity to be able to communicate its outcome in a meaningful and efficient way. It was concerned that to have done so earlier might have raised expectations which were either speculative or may not have been met. NHS Connecting for Health also faced severe resource constraints on undertaking such activities." (United Kingdom. Comptroller and Auditor General, 2006 : p. 35). By this stage, an extensive Output Based Specification had been developed "with input from clinicians", which "described in full what the successful suppliers were required to build" (Chantler, Clarke & Grainger 2006).

### 2.1.5 : Outcomes : Progress with the National Programme

Progress with NPfIT was expressed by Chantler, Clarke and Granger (2006) in terms of numbers of registered users, numbers of e-mails sent every day, the numbers of PACS∗ systems installed every week and number of images stored. Electronic booking of appointments ('Choose and Book') had been implemented to "facilitate patient choice as well as the electronic booking of first hospital outpatient appointments by general practitioners". The programme had "failed to meet its target of universal electronic

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∗ Picture Archiving and Communications System : allows electronic storage, retrieval and shared viewing of medical images (x rays, scans etc.).

booking by the end of 2005, but its performance has now improved with 62 percent of general practitioners using the service and 10,000 patients benefiting daily".

These claims about the extent of penetration tell us nothing about the nature of any benefit derived. Neither do they explore the success or otherwise of the relationship between the NHS and its new IT systems.

## 2.2 : C O N C L U S I O N

The policy and evaluation outlined here provide a preliminary grounding for prescriptions about information systems for the NHS.

The National Programme is presented as a global technical project, to be progressed as an exercise in project management, alongside a political process of "clinical engagement", to drive acceptance by a potentially reluctant organisation.

The research-based part of the thesis will explore the non-technical factors associated with the use of information systems in an NHS hospital. The emergent arguments will assist deeper understanding of "clinical engagement", not as an exercise in political manipulation but as an inquiry into the local individual and organisational concerns that, if satisfied, might convert passive and reluctant acceptance into eager and avid assimilation.

The froth of engagement, enthusiasm and anticipation urgently needs to be given substance. The research will shed light on the nature of the socio-technical factors that

are, as will be seen, held important for successful implementation of the National Programme.

An understanding of these factors will help in closing the conceptual gap between the intervention of new information systems in the NHS and the realisation of benefits.

The next chapter of the thesis is a literature review which follows Jayaratna's (1994) separation of a problem situation, problem solvers and a problem solving methodology.

# CHAPTER THREE

# LITERATURE REVIEW

## 3.0 : INTRODUCTION

### 3.0.0 : Approach to the Review

The review has been conducted from an "engaged" (Van der Ven, 2007) rather than a strategic position. I have worked reflexively 'from inside' my own research situation, answering questions as they emerged from literature and from the research, by reference to newer or newly relevant literature.

My aim has been to expand iteratively two complementary and interacting understandings : of the technical information systems field and of the clinical, social and political situation to which information systems are to be introduced.

With a different aim, to synthesise a set of affirmative statements about a clearly defined issue, my approach would have been to convert a clearly stated research question into a search strategy and to apply this to several bibliographic databases. Papers would have been assessed for relevance and methodological quality and the results from the most relevant and methodologically robust papers would have been synthesised to identify areas of relative certainty and uncertainty.

I could not apply this approach to the aim of understanding the field of information systems in a context yet to be researched, or of understanding the reasons why they might succeed in some situations and not in others. I was not in a position to decide, prospectively, what I was looking for or how I would recognise it when I found it. My approach had to be exploratory and selective.

I specifically avoided surveys of nurses' attitudes to computers, accounts of the monitoring of biochemical and physiological signals and investigations into the impact of computers on the dynamics of consultation in general practice.

I explored veins of relevant literature as they became salient to emerging insights. I identified key authors and topics, making these the object of limited, highly focused searches using bibliographic databases and internet search engines, consistent with the spirit of an informatics research project. As I identified key journals, I hand searched their archives for relevant papers.

My starting point was Walsham's (1993) study of information systems in organisations. This was the earliest worked example I could find of a series of non-positivist case studies. It led me immediately into the realms of philosophy and sociology.

Walsham's work was based on Giddens' (1984) structuration theory and both works led to a study of social theory and political philosophy and their application to information systems.

I traced the co-ordinated emergence of information systems as a post-technical discipline to a conference held in Manchester in 1985. The various papers which

constituted the conference proceedings (Mumford E *et al*., 1985) identified a cadre of authors whose work might be traced forward from that point, and a set of philosophical positions and methodological approaches that have informed the subsequent development of the information systems literature.

I was able to find evidence of formal methodological contributions to the introduction of information systems to the NHS ; for example, those described in Checkland & Scholes (1990). However, these tended to deal with social and political issues at the level of formal organisational structure rather than with practical issues at the level of the workplace.

An exception was Mumford's (1995 : part 4) case studies of a participative consultative approach to the deployment of information systems in individual NHS workplaces. These described the process of consultation with front-line clinicians but did not illuminate 'what it's like', to use information systems in a clinical environment.

It has not been possible to summarise the massive and sprawling literature as if it were a compact and coherent whole. My approach has been to present a series of different aspects of the literature and to arrange these in a way consistent with the themes that have emerged and with the structure suggested by the literature itself.

### 3.0.1 : Situation

The National Programme (later, Connecting for Health) has been dubbed, "The biggest computer programme in the world …. Ever !" (Brennan, 2005). Its task has been to introduce to the National Health Service an interoperable Electronic Health Record[*], associated with the development of e-Prescribing and e-Booking of appointments.

The EHR Impact study (European Union, 2009) investigated "The Socio-Economic Impact of Interoperable Electronic Health Record (EHR) and e-Prescribing Systems in Europe and Beyond". A tributary study (European Union, 2008) investigated "The Socio-economic Impact of Scotland's Emergency Care Summary[+]". This report (Extended Executive Summary ; p.39) identifies two "not to miss" opportunities. These are, first, to use interoperability as the prime driver of benefits and, second, to "organise productive dialogue between users and ICT [Information and Communications Technology] experts".

A team of nine authors (Car *et al.*, 2008) was commissioned by the NHS Connecting for Health Evaluation Programme to report on "The Impact of e-Health on the Quality and Safety of Healthcare" in the form of "a systematic overview and synthesis of the literature". In their words (p.24) :

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[*] Interoperability is defined as "the ability to exchange, understand and act on patient and other health information and knowledge among linguistically and culturally disparate clinicians, patients and other actors, within and across jurisdictions, in a collaborative manner. EHRI distinguishes between three levels of interoperability, which are potential interoperability, limited connectivity and extended actual connectivity". (European Union, 2009)

[+] The Emergency Care Summary is a frequently-refreshed "read only" summary of a patient's currently prescribed medications and life-long health care events. Although capable of future extension, its initial ambitions have been limited but participation has been more or less universal amongst General Practices throughout Scotland. It is perceived to be useful to A&E Departments, GP Out of Hours Services and NHS 24, the Scottish equivalent of NHS Direct, through which callers can receive telephone advice to guide their actions during health emergencies.

*"Most technological innovations fail to realise their potential and this unfortunately has also been true with respect to the history of e-Health applications.*

*Major factors contributing to these failures – which may in some cases be spectacular – include the lack of appreciation and attention paid to the human factors issues during product development and socio-technical factors that subsequently enable innovations to diffuse and embed themselves into healthcare organisations………"*

A team of five authors (Greenhalgh *et al.,* 2009) received funding from the Medical Research Council, the National Institute for Health Research and the UK Department of Health Connecting for Health Evaluation Programme, and has produced a systematic literature review of the literature pertaining to electronic patient records.

They begin their review by stating the claims for the potential of electronic patient records to form "the cornerstone of a modernised health service" and immediately balance these with reference to the frequency with which electronic patient records systems fail. They attach importance to "appreciating situated micropractices in different clinical settings" and "the hidden work of those close to the patient" and they point to the reported success of 'home grown' clinical information systems relative to systems designed remote from the workplace.

### 3.0.2 : Background

The supporting infrastructure for the National Programme has centred on the construction of the N3 National Network and the data 'spine' It has been shaped by the

incapacity of any single supplier, to handle the volume of traffic implied by such a structure.

England has been divided in to 'clusters' of Strategic Health Authorities, to whom consortia of businesses have tendered to supply 'off the shelf' products. In the case of secondary care, these have contained 'best of breed' electronic record systems, usually designed for non-NHS markets.

Implementation has been focused on national procurement arrangements, the development of interoperability standards and a process of 'clinical engagement', in which the general population of the NHS is to be recruited by national and local early-adopter product champions.

In 2007, a group of "computer scientists, engineers and informaticians" wrote an open letter (Anderson, undated) to the Health Select Committee, to "question the wisdom of continuing NPfIT without an independent assessment of its technical viability".

The letter challenged the Programme's technical architecture, project plan and detailed design, questioning its present and future fitness for purpose, its capacity for the volume of traffic envisaged, and its conformity with confidentiality guidance.

It also cited the absence of precedent for a project on this scale, the exit of suppliers from the market, and the delicate nature of support from healthcare staff.

When the internal market, proposed for the NHS in the 1990's, required improved accounting procedures to manage contracts, service plans, budgets, costing and pricing

mechanisms and internal trading, Bunch (1992) questioned "a pervasive assumption that the advent of cheap and sophisticated information systems will allow anyone to find out anything about anyone anywhere". Instead of a massive, omniscient machine, "What is required in the NHS is for each part of the organisation to be really clear about what it needs to know and to obtain this information in the simplest way possible".

Bunch proposed that a successful information strategy must have clear objectives and support organisational change. He distinguished a bureaucratic, administered organisation with divided accountability from a pro-active, managed organisation, characterised by teamwork and shared accountability. He also proposed that the accuracy and validity of the data collected would be suspect unless "when possible, those requiring the information should be responsible for collecting the data".

Driven by the information requirements of external agencies, there was a tendency for the information needs of managers to overshadow those of clinicians. Managerial accounting was supported by retrospective data analysis. Concurrent clinical control required information "in real time".

Bunch set five strategic information objectives : information requirements definition, technical standards, data standards, information governance standards and training. To obtain a realistic managerial understanding, Bunch asserted that hospital information systems must focus on "the clinical coalface".

For Bunch, as a clinical manager, the motivation for front line clinical staff stemmed from mutual accountability within the workplace and a shared appreciation of managers' data needs.

Mumford (1991) recognised specifically "the need for relevance in clinical information systems". The subsystems used by each group must, therefore, be able to provide the information that each group regards as essential in furthering its work mission and major work interests. If this does not happen, these systems will probably fall into disuse.

Mumford identified the following sources of relevance : pay and promotion, esteem of colleagues, job satisfaction, relevance to personal goals, and direct design input by future users. To moderate the discourse between managers and staff, it is essential to understand how staff, collectively, view work priorities before starting to design a system to produce management information.

### 3.0.3 : Analysis

The letter to the Health Select Committee was followed by a themed edition of the Journal of Information Technology, published in September, 2007. This edition contained the following contributions : Randell (2007), Brennan (2007), Clegg & Shepherd (2007), Currie & Guah (2007), Mark (2007) and Cordella (2007).

Randell (2007) presents "a computer scientist's reactions to NPfIT" and identifies centralisation and mass procurement as major sources of risk. He argues that the concentration of data at the level of a national data "spine" can be a threat to reliability and security because the consequences of any individual technical failure are vastly amplified.

Brennan (2007) comments that individual examples of successful, hospital-wide integration projects have not been replicated widely across the NHS. One cause is the distance between IT companies and potential users in the NHS, separated by their agency relationship with NPfIT as a proxy customer. He identifies three major themes that are not addressed adequately :

1. Clarity of NPfIT's purpose
2. The potential of IT to reduce risk, enhance patients' safety and re-engineer clinical service delivery
3. The use of "intelligent IT" to support the "patient's journey" along the "care pathway".

Brennan relates these themes to "an overriding technical element in the value system of the National Programme" and the "misconception", that the National Programme is just about electronic records. The architecture of the National Programme favours central rather than local aggregation of data. The emphasis has been to develop the "spine" in advance of integration focused sensitively on local patterns of information exchange, necessary for the "safer, more joined up care" that the Programme ought to support.

The local exchange of patients' demographic identifiers, health services utilisation records and personal clinical records, aggregated centrally, depends on participants' access to a local integration hub (the community Patient Administration System), with which all subsidiary systems have to be compatible. NHS institutions have been reluctant to "write off" costs sunk in their existing 'legacy' systems, or to incur the further costs of new systems without clarity as to the direct institutional benefits.

In addition, the concept of using "intelligent IT" to support the "patient's journey" along the "care pathway" runs up hard against the complexity of healthcare transactions, around a single patient with potentially multiple comorbidities, in relation with multiple NHS providers, all at different stages of IT implementation and integration.

Clegg and Shepherd (2007) argue the need to change the mindset which has presented the National Programme as a "technology project". They frame "six main lessons" around the following themes :

1. Performance : major IT projects risk major failure.

2. Need : it is hard to establish the business case for technology-led projects.

3. A systems view : the context of introduction places diverse individuals in differentiated roles. No one person or discipline can assemble a complete picture of need or future operation.

4. Ownership : technology led programmes and conceptually led Business Processs Re-engineering projects encounter failure more often than those led by users' own perceptions of need.

5. Project Management : needs to be focused on delivery of service, not on implementation of technology.

6. Senior Management : enlightened junior managers are powerless if senior managers perpetuate a techno-centric culture.

In their view, the National Programme is especially vulnerable to failure because of :

- High political profile and risk-averse culture

- Mismatch of competence and experience with location and need

- No salient measures of implementation outcomes

- Complexity in terms of professional groups, organisational boundaries and dispersal of organisational components.

For Clegg and Shepherd, a "techno-centric" project has the merit, that it can efficiently deliver the technical IT agenda. Its major fault is that it cannot adequately define what outcomes the IT agenda is to support. The National Programme needs to be seen as supporting specific service outcomes rather than its own implementation. Its success needs to be measured in terms of service outcomes. The Senior Management of the National Programme needs to include senior end-users who can direct service-centred organisational learning.

Currie and Guah (2007) point to "conflicting institutional logics" which "both fuel and inhibit changes in the governance systems and working practices of healthcare practitioners". They identify that the National Programme is seeking to engage clinicians and other stakeholders by presenting the National Programme in a fashion divorced from a clear understanding of the healthcare system in terms of the pressures to which it must constantly adapt.

These pressures include :

- The "organisational field" : complexity manifest by evolving organisational structures and policies

- "Institutional logics" : formal and informal interpretations of societal, organisational and local imperatives

- Governance systems : authority systems exerted by or on behalf of managers, professionals and patients.

The organisational response is mediated by sets of ideas and beliefs, for example, the primacy of patients' interests or the need to balance individual against societal interests ; as well as material resources, including constrained finance and scarce human resource.

Mark (2007) asks, "whose needs is government serving" in its implementation of the National Programme. The topic of "modernisation", she says, has given way to that of "transformation" in the rhetoric of government statements on public services.

Where the former emphasises "fitness for purpose", the latter stresses "responsiveness", to the needs of clinical users and their patients. Yet the pace of technical implementation has been forced ahead of stakeholder engagement and appears as a control-oriented response to political pressures to demonstrate 'value for money' and the accomplishment of delivery against deadlines. This is not, primarily, a purposeful response to the needs of patients.

Where 'modernisation' carries a general sense, 'transformation' has a sense of "individualised consideration". Delivering equipment to support the National Network, Choose and Book, electronic prescribing or electronic records against deadlines does not give sufficiently clear a sense of the 'transformed' process in which clinical users and patients will interact and be satisfied. Yet, if the purpose is to satisfy the information needs expressed within organisational structures, the National Programme has to cope with the constant flux of their reorganisation. Mark identifies "the unstable political environment" and "the changing location, role and status of the medical record" as key inhibitors of transformational change.

Mark sees the National Programme as a mix of "rule based" work which "depends on some actor to enforce compliance" and "normative" work which "relies on cultural and moral force". Expressed elsewhere as "objectified disembodiment" and "embodied subjectivity", this distinction may not have been recognised or balanced within the National Programme, sufficient to balance the needs of government, managers, professionals and patients, and command the confidence of patients and the wider NHS.

Mark suggests that Government can easily explain delays in the delivery of the National Programme in terms of the systemic incapacity of suppliers. This tendency belies the complex dependency within the National Programme. For example, doctors and patients' representatives have been slow to agree on the content of the summary electronic record held on the "spine", or the manner of storage patients and the public will allow for their personal data. Given this complexity, it has been difficult to arrive at clear statements of functional need within the Programme.

Cordella (2007) relates the National Programme to the wider context of e-Government and "New Public Management" (NPM). NPM is a reaction to the failings of traditional, bureaucratic public administration to achieve goals of efficiency and accountability and pursues these ends through decentralisation and "marketisation".

He suggests that "democratic values of equality and impartiality" are being neglected. Competition can provide a lever for redesign and reform, in the relationship between government, public services and people, to enhance efficiency and effectiveness without loss of equity. However, Cordella argues, competition favours the strong and disadvantages the weaker citizen.

The bureaucratic form of government has a particular strength in its capacity for rule-based impartiality, equality and social justice, gained through the elimination of non-rational considerations. Rather than eliminate bureaucracy, e-Government ought to be directed towards facilitating the swifter, accurate conduct of its machination.

In contrast, NPM focuses on a set of narrowly defined results rather than the embodiment of values. Transparency and efficiency run ahead of effectiveness. Service identity, values and character are sacrificed to minimise cost. This leads to a bias in service provision which favours those best equipped by wealth and power of expression to manipulate "market" conditions to their own advantage. The effective discrimination is heightened when IT is used to mediate NPM because of the "digital divide" which privileges those who can access and use IT resources and disadvantages those who cannot.

Where market organisation expands the scope of choice, it may also expand the volume and cost of transactions before a choice is made. Bureaucracy is inherently a strategy to simplify decision making through rules, so that the internal efficiency of the machine is maximised. However, Cordella acknowledges the difficulty of aligning the internal rule sets of discrete government organisations when it is sought to integrate common aspects of their disparate functions.

The analysis provided here reflects concerns about the logical and technical structure of the National Programme and its viability, as well as its relationship with broader political and societal goals. It does not address the factors that influence the willingness and capacity of clinicians in the front line of healthcare, to contribute data input.

In contrast with the contributions related to the organisation and delivery of the technical programme, and its political and policy aspects, Randell (2007) and Eason (2007) address socio-technical issues.

Randell (2007) stresses the socio-technical aspect of information systems as important for reliability and security. He equates the engagement of users, by "training and convincing them" to use unfriendly systems, with "bullying".

Eason (2007) describes the National Programme as "a massive example of ….. [an] attempt to implement pre-defined technical systems into existing organisations". "Standard technical systems" are seen by the Programme as a way to communicate between disparate teams representing individual "socio-technical systems".

If "local socio-technical systems design work" is neglected, "It is likely that the emergent behaviour of healthcare staff will serve to minimise the impact of the systems".

Eason asks, "Is it possible to have a centralised information technology programme and local socio-technical design ?"

To begin to answer this question, Eason reports "emergent socio-technical system responses to three applications" : PACS, Choose and Book and Electronic Healthcare Records Systems. Five patterns of response were evident :

1. Successful adoption in the case of PACS.
2. Partial use of Choose and Book and electronic records, with continued reliance on existing, tried and tested paper-based routines.
3. Workarounds : especially in relation to intrusive access security controls ; password sharing.
4. Stress, failure and delay : when a Choose and Book system was implemented and found to be incompatible with the Patient Administration System.
5. New forms of organisation : forced or enabled by the new technology.

From these findings, Eason concludes that users restrict their use of IT systems to minimise the disruption of existing routines, unless they can see that prescribed use carries clear benefits and no major interference with organisation or working practices.

In the absence of "a shared and informed approach by the local user community that might enable them to get a collective benefit from the new technical facilities in the interests of patient care", Eason concludes that "there will be a range of *ad hoc* responses ….. that will probably marginalise the effects of the new system". He continues, "Some of these responses may be useful to individual users but they may equally be dysfunctional for the system as a whole".

Eason proposes an approach with five elements :

1. A standing socio-technical systems committee, representative of all local stakeholders.
2. Focus on the potential of new technology to assist healthcare delivery.
3. Use modelling in simulated scenarios.
4. Phased implementation with technical configuration customised to local needs.
5. Post implementation review aimed to develop new understanding.

The overall conclusion Eason draws is that the principal factor inhibiting local socio-technical systems design is the strategic decisions made over the "over-arching coordination of the technical programme and the form of the implementation programme". He identifies three *loci* of decision making.

The first is the National Programme. The second is the Trust : "the NHS has policies it wants to see implemented at Trust level and, at Trust level, decisions are being taken about IT policies that make sense in the Trust". The third, "*de facto* locus of decision

making" is identified "at the individual or health team level, when users decide what to use or not to use of the electronic facilities that are offered".

### 3.0.4 : The Further Structure of the Literature Review

Greenhalgh *et al.* (2009 : p.731) identify the essence of the electronic record as a property that is not intrinsic but one which is 'situated' in the relationship between the record and other factors.

*"Our starting point was that however defined, the EPR is socially and organisationally embedded. That is, it is used by people in particular social contexts, for particular social acts."*

Following Jayaratna (1994), the message of the present literature review, and of the thesis as a whole, will be that these 'other factors' are to be understood in terms of the 'problem situation' in which the electronic record and other aspects of the information system make their contribution, the 'problem solvers' who contend with the 'problem situation' as it confronts them, and the 'problem solving methodology' constituted by problem solvers' behaviour in relation to the electronic record.

These three elements, identified separately and distinctly, elude singular definition for two reasons. First, they appear differently from differently situated vantage points. Second, at any time and in any place, they are each mutually-constitutive and inseparable abstractions from the same integrated whole.

Despite this, for the sake of clarity the remainder of the literature review will be presented as three distinct topic reviews, followed by a concluding section.

Section 3.1 will deal with the Problem Situation. It will discuss electronic patient records, integrated systems, standardised clinical methods, and the concept of Management Information from Operational Systems. It will then place information systems in the context of the clinical workplace and will discuss the process of information systems change and the concept of clinical engagement.

Section 3.2 will discuss the Problem Solver in terms of four approaches to thinking (positivist, interpretivist, critical and recursive) and their philosophical origins. This section will end by presenting critical realism as a suitable framework for the discussion of information systems.

Section 3.3 will consider different forms and examples of the Problem Solving Methodology. It will begin with a critique of models and methodologies. Then it will begin to develop a taxonomy of models and methodologies, based on the dominant paradigm espoused and the area of information systems competency (strategy, design & development, implementation, evaluation) to which the methodology is applied. As it develops, the taxonomy will take account that the object of modelling can be the problem situation, the problem solver or the problem solving methodology.

This section will continue by distinguishing between 'hard' and 'soft' approaches to the problem solving methodology, as it applies to each of the four competency areas. The section will end with a brief discussion of three evaluation approaches, of which the last is based on critical realism.

Section 3.4 will present conclusions as to the choice of methods and approaches to be carried forward into the research.

## 3.1 : T H E   P R O B L E M   S I T U A T I O N

## 3.1.0 : Introduction

A simple, preliminary statement of the problem situation is that information systems are, for various reasons, to be introduced into the United Kingdom Healthcare system.

Haux (2005) has provided a 20 year retrospective account of development in health information systems. First, he points to the continued co-existence of paper-based and computer-based systems of data recording, storage and retrieval.

Second, he identifies the tendency to standardise clinical processes and develop interoperable patient-centric records.

Third, against a background of departmental, institutional and global information systems, trans-institutional and trans-national health care, and multi-lingual and multinational healthcare delivery, it has become possible to use data from Hospital Information Systems for planning as well as clinical administrative purposes, enhancing quality management and control, healthcare planning and research. An emerging interest in strategic information management and change management has begun to overshadow technical aspects of information systems design and development.

Continuing technical developments remain relevant : for example, radio frequency identification and "ubiquitous computing environments" and, especially, the ability to store and retrieve images alongside text.

Fourth, he points to the increasing use of health data by patients and their agents, assisted by the development of medical bibliographic databases and search engines and the internet.

Three themes emerge :

First, the primary objectives of the National Programme are : to introduce electronic records to overcome the deficiencies of paper-based systems; to integrate systems so that data can flow freely and so that organisational discontinuities do not impinge on the experience of patients ; and to produce management information from operational systems.

Second, healthcare and its organisation are complex, fraught with risk and suffer criticisms of inefficiency, inaccessibility and unresponsiveness. Information systems carry hopes of increased organisational and procedural clarity, improved control of clinical practice and resource utilisation.

Third, to understand the problem situation beyond the strategic purpose of information systems in healthcare, however, we need to understand that the introduction of information systems to the clinical workplace is a process of change. We need to understand information systems in relation to the clinical workplace and the people who work there.

**Six Assumptions**

Greenhalgh *et al.* (2009) identify six assumptions about (electronic) medical records that have not been upheld by the empirical literature. Thus :

a)  A medical record is more than a container for data, it is an organiser, providing data with context and meaning.

b)  The integration of electronic records into clinical work is not seamless and unproblematic. Bridging the gap between the conceptual model and the reality of practice requires human intellectual effort.

c)  Electronic records will not necessarily increase the effectiveness and efficiency of clinical work. Secondary data users benefit from better accessible data but clinical work is often made less efficient.

d)  Electronic records will not, themselves, drive changes in interactions between staff and between staff and patients. They will support change but this will need people to take the lead.

e)  Electronic systems will not necessarily eliminate paper. Paper "offers a unique level of ecological flexibility".

f)  The benefits of an electronic record system do not continue to grow as more and more elements are absorbed into a single structure. Smaller, local EPR systems may often (though perhaps not always) be more efficient and effective than large, global ones.

**Structured Medical Records**

The Royal College of Physicians of London (Mann & Williams, 2003) has engaged in a project to standardise the format and content of the medical record, as a pre-condition for the successful development of electronic patient records.

The plan recognises primary and secondary functions of the medical record. Primary functions provide an *aide-memoire* and a means of communication between parties to the patient's shared management. Secondary functions provide information for a variety of accounting, audit, research and planning purposes and serve as a defence against litigation or hostile criticism.

**Accumulation and Co-ordination**

Berg (1999a) ascribes two major, active roles to the medical record : accumulation and co-ordination.

As accumulation, the record stores and orders a symbolic account of actions and events. Complex activities, consisting of the multiple, independent contributions of a dispersed

group of people are collapsed into an "over-simplified and unrealistically problem-free" conceptualisation of reading, writing and the record.

As coordination, the record itself mediates the way professional colleagues interact, organises aspects of the way they work, and influences clinical decisions through the content it conveys. Crucially, it can transform a remark or request into a "legally-formulated instruction" and can "determine 'what counts' as the basis for action". "Precomputed" ideas about task dependencies are "inscribed" as a subtext in the design of the structured record and intended to influence the way activities are undertaken. The record's ability to mediate these actions is enhanced or diminished by its form and the way its appearance changes as successive entries are made.

Berg says that co-ordination requires a form of active work that cannot be pre-computed. The record has to be kept up to date and completed properly. Any standardising intention makes demands on practice, risking that compliance will fail because the benefits of compliance are absent (enjoyed elsewhere) or not appreciated (potentially enjoyed locally but undervalued).

Finally, the structure and form of the record tend to shape and filter what can be communicated. The communications the record affords or forbids reflect the balance of influence between designers, managers and users.

**Record Keeping as the Construction of Meaning**

Berg (1996) contends that writing the medical record involves contemplation, making sense and planning. It is an attempt by an accountable writer to structure the response of a critical reader. Reading involves appreciating a situation, obtaining information from the patient and, sometimes, other sources, and comparing this with the record. The informational meaning of the clinical record or computer screen extends beyond the written symbols and is situated somewhere between record and reader. Every fresh "reading of the record" is occasioned by the reader's need to make active sense of an immediate situation and is developed in conjunction with the patient or some other source of further information, corroboration or clarification.

As people write in records and other people read them, they, themselves, are constructing events actively. Action is more than a reflex response to the symbols that represent the text.

**'Bad' Reasons for 'Good' Records**

Electronic records have the potential to impose unsuitable structure onto clinical data capture in order to serve planning purposes. It will be vital to balance the disciplined and the improvisational content of the record.

Heath & Luff (1996) show that reading, writing, and editing the medical record are processes that extend beyond a simple dialogue between an individual and a document. The record and its related practices are not individual but social and tacitly

conventional. The writer makes significant assumptions, about the contribution of the reader's clinical knowledge and experience to the emergence of meaning from the text, and about his future behaviour, anticipating that any future reader will clarify recent content by reference to past record entries.

Heath & Luff believe that the development of electronic records must take account, that writing and reading the medical record take place in an "unstable" context. Activities, circumstances and alternative demands for attention fluctuate from moment to moment or from place to place. Record keeping and its desirable disciplines are subject to compromise against these competing elements. It is undesirable for an electronic structure to restrict statements to a limited range that cannot accurately express what the clinician wishes to convey to the record. This can be a consequence when the balance is struck imperfectly between the primary and the secondary functions of the record.

They argue that secondary purposes are "'bad' organisational reasons for 'good' clinical records". Developers of medical record systems must take fully into account the wider context in which the dialogue between the immediate user and the record occurs.

**Electronic Records as the Driver of Change**

The authors of the EHR IMPACT study (European Union, 2009) outline the "future goals and potential of interoperable electronic patient records" : to increase the number of users, to extend functionalities, to expand interoperability and to utilise more current system functions. They state that "The EHR IMPACT cases show that interoperability is a prime driver of benefits from EHR and e-Prescribing systems. Benefits rely on

access to information regardless of place and time". Interoperability will be crucial to some time-critical clinical situations and, more frequently, to the automation and abolition of data transcription tasks.

Car *et al.* (2008) avoid a techno-centric view that treats electronic records as a commercial end in itself and they relate the potential benefits to a concern for the quality and the safety of clinical services.

Anticipated quality benefits include more effective treatments and new forms of service delivery that are relevant, acceptable, efficient and equitable. Anticipated safety benefits include the reduction of clinical error, using electronic information systems to intervene in vulnerable, high risk processes and to render the healthcare setting more amenable to good clinical practice.

However, they draw attention to "the vast gap between theoretical [face valid] and empirically demonstrated benefits ……… A contributing factor to this gap between theoretical and empirical factors is that many of the applications developed are not fit for purpose".

In particular, they cite, first, "clinically irrelevant prompts" from clinical decision support systems and "advice and support not appropriate to the knowledge and experience of the user or to the clinical situation and the constraints on alternative practice". Second, they cite "the cross-cutting issue of the socio-techno-cultural dimensions of developing and implementing e-Health applications", under which category, they include human factors, ergonomics, the user interface and people's readiness for change.

**The Perversity of People and the Persistence of Paper**

Laerum, Ellingsen and Faxvaag (2001) found that only a small proportion of the total functionality of an information system, widely deployed across Norwegian hospitals, was used. Their findings suggest that the continuing coexistence of alternative paper systems and the convenience of electronic system use were potent factors distinguishing the designers' ideal from users' actual use of the system.

People do not automatically conform with rules. Structure is used flexibly, in conformity with the immediate circumstances and the purpose in hand.

Harper *et al*. (1997) "illustrate how the practical use of documents by medical practitioners can sometimes be fundamentally at odds with organisational aims and purposes". Anaesthetists were to use a structured proforma, to record information about patients' preoperative condition, for retrospective audit and clinical risk stratification.

Those who bothered to use the form tended to complete only the parts that were relevant in "*this* particular case of *this* operation for *this* patient" and to use the form "in such a way as to transform a form designed for *general* purposes into one that is useful for *specific* purposes". A paper record afforded *ad hoc* modification of its formal structure, allowing annotations foreign to the categories expected by its design. (I don't need to record *that*, but I need somewhere to write *this* !).

**Limits to the Benefits of Integrated Records**

Berg (1999b) is critical of grand ambitions as a basis for information systems. Formalising medical practice or eliminating paper are insufficient aims in themselves. Instead, we need to focus on the "accumulating" and "coordinating" actions of medical records and information systems that we tend to overlook.

Berg recognises that clinical work is essentially "pragmatic and fluid". It is subject to a "constant emergence of contingencies". He bridles at the idea of formalising complex sets of interactions into a set of rules, whether as a care pathway or a process model. It is not necessary for the designer to expropriate decision making from the individual clinician. The role structures and turn-taking formalised in models of this type of "work as imagined" are not sufficiently replicated in "work as performed".

The "affordances" an electronic record allows or makes happen stem from, shape and are shaped by the interaction between the record and human actors. Computer screens and paper documents actively constitute many of the tasks performed in the clinical environment. We need to understand more than how to replicate a paper form in the structure of an electronic document. Rather, we need to understand how information resources contribute to what Berg calls "articulation work". "Articulation work" is the "invisible" and "under-valued" effort, invested in documents and forms, that binds one network of demands, resources and actions to another.

### 3.1.2 : Integrated Systems

The National Programme for IT has focused on the "integration" of self-contained information systems by virtue of technical standards that support data transfer across electronic interfaces and 'hubs'.

This is not the same as supporting the behavioural contribution of organisational sub-units towards the systemic coherence of a larger, collective whole.

In this sense, integration implies the alignment of local priorities with those of the collective. Although the subordination of the local to the general interest can appear to facilitate progress in the institutionally preferred direction, it can also carry the cost that an important organ of the systemic organism is forced to function sub-optimally. This is a potential source of organisational pathology rather than organisational health. The terms of integration, potentially brutal, need to be sensitive to this risk.

Pinelle & Gutwin (2006) draw attention to the internal fragmentation and complex variety hidden within a healthcare organisation. The image of a tightly integrated organisation is less useful than one in which "authority structures" and quasi-autonomous, "operational units" are in a loosely-coupled relationship, adapted to the nature and needs of an organisation whose end product is the transformation of people rather than the production of commodities.

Interdependence and integration are low. Functional differentiation is high. Collaboration tends to be discretionary, the natural state of relationships is fluid and the rate of change is rapid. Hierarchy is undermined by contingency and the resulting need

for individual staff members to act autonomously. Within the envelope of organisational cohesion, participants have different goals, values and frames of reference.

These factors limit the capacity of electronic records and clinical pathways to automate co-ordination and the requisite aim is to facilitate collaboration.

Ellingsen & Monteiro (2003) present a study of an integrated electronic patient record system in Norwegian hospitals. They note the prevalent concept of health information systems organised around and subordinated efficiently to a single, dominant rationale.

Arguments for integration of information systems tend to deprecate redundancy and fragmentation of information. Ellingsen and Monteiro suggest, these attributes may have positive value in the collaborative workplace. As examples of "poorly integrated" systems, they cite Patient Administration Systems, X Ray and Pathology systems, electrocardiogram images and electronic document scanners.

Ellingsen & Monteiro (2006) discuss integration in terms of horizontal integration between participants in the management of an individual patient and in broadly synonymous terms of "integrated care", "shared care" and "continuity of care". Then they quickly move to discuss the introduction of a standard IT system to integrate activity and information flows across multiple sites within a pathology department.

Alongside the technical issues (such as interfacing, data standards, legacy systems), the problem of integration lies deeper than the failure of an integrating process. The generic product collides with individual local adaptations, such that "a local setting is no longer

local, but dependent on design decisions in other settings ……… the lack of success with (seamless or tight) integration in hospitals is neither accidental nor transient".

The generic "laboratory" system did not fit individual laboratory units. The problem could not be solved by generalising individual adaptations to suit all parties, since congruity with the biochemistry laboratory set the stage for incongruity in the microbiology lab. Integration had been "promoted at the expense of usefulness" as judged in the wards and clinics where pathology results were needed to guide patients' treatment. The authors conclude that the problem's intransigence is "immanent" and that integration is not an event but a "granular" set of discrete, carefully considered interventions.

From the analysis these authors provide, it appears necessary to accept dissensus rather than consensus, as a necessary concept for information systems design.

Martin *et al*. (2006) demonstrate that the dependability of an information system is not an absolute quantity. It is "situated" in local organisational and workplace practices. Integration, therefore, implies more than the simple elision of electronic systems, achieved through technical and data standards. It requires the working practices of each of the organisational zones brought together by the integrated system to be understood and respected fully during the related process of people integration. People's thinking and practices at work are not centred solely and unified around the information system, but around the other considerations that come into play during daily work in diverse settings.

### 3.1.3 : Organisational and Procedural Clarity : Standard Approaches to Differentiated Situations

Organisational and procedural clarity entail the perception and abstraction of salient data from the general mass, and their encoding in a process of description. (Checkland & Holwell, 1998: p.86-92 refer to these selected data as "capta"). The 'manufacture of meaning' is an active, inherently biased, human process and not a pure revelation of inherent meaning. Coding and decoding break the continuity between the world and our view of the world (Tsoukas, 1997). Well-codified processes and procedures have clarity but codification is made transparent by explaining, in clear terms, the distinction between the peculiarity of the observed instance and the supposed features of an ideal case. A critical view reduces an absolute distinction between order and disorder to a preference for one form of order over another, less suited to a particular contingency.

Crocker, Johnson and King (2009) see care pathways as a means to manage processes, resources and performance towards time-limited access targets. They see the primary need as, therefore, to agree rules of syntax and semantics so that information systems can communicate. However, the paper also recognises the spread of audiences (clinicians, information systems developers, commissioners, patients) for whom care pathways are being developed and the variation in rigidity (clarity of task sequencing) between one pathway and another. The paper does not stress the intelligent human judgements that ought to operate throughout the pathway's application to particular contingencies. These judgements are needed to confirm the continuing suitability of generic "best practice" for a real patient whose semantic 'fit' with the pathway may only be approximate.

The tendency to seek organisational transparency and control through formalised clinical methods has stimulated Berg (1997) to elaborate on the "problems of the protocol".

Protocols represent the effort of one individual or group to determine the practice of others. They exert a political, constraining effect under the guise of explicit rationality. This may be necessary for safety in some circumstances and beneficial to the training of novices but the fundamental premise may be at odds with the actual working of the experienced clinical mind.

Berg is sceptical of "the tendency to perceive and describe the management of patients' trajectories as constituted by a sequence of individual, formally rational decisions". The clinician is expected to compare the patient with a prior store of clinical knowledge. The act of comparison is assumed neutral but is, in fact, a human construction. In other words, it is a social rather than a scientific accomplishment because data are framed within a human judgement about their veracity or validity. This is necessary to avoid harm to patients from blind adherence in the face of contrary factors.

First, protocols suffer from dissonance between the clinical situation "as imagined" and the contingencies that surround the situation "as performed" (Nemeth, Cook & Wears, 2007). Formalised regimes are insensitive to the individual case, and cater poorly for emergent issues, not anticipated at the time of prescription.

Second, protocols perpetuate "the illusion of the single answer". They unrealistically imagine a 'standard' patient in a 'standard' context. Third, they deliberately filter out the characteristics of the clinical situation that are hardest to describe in order to

construct standard dimensions. Their resulting clarity and transparency is, therefore, a construction rather than the purported distillation of a 'scientific' truth. Their use is aligned more closely with accountability than with sensitivity to clinical nuance.

Berg concedes that protocols provide a useful substrate for reflection and organisational learning if they are held to represent what could be, rather than what 'is' or 'ought' to be the case. Their formulation ought to recognise more than the perspective of a single profession or stakeholder cadre. He acknowledges their value as a coordinating device when seen as a resource rather than a rigid constraint.

The thrust of Berg's argument is to recognise the undeniable presence of protocols in the environment of accountable clinical practice. Naïvely hard-wired into the texture of information systems, they will constrain and diminish effective clinical practice. Incorporated with a fully informed understanding of the workplace, and used intelligently as resources, they offer useful "affordances" in the form of enhanced delegation and professional, as opposed to managerial, control.

Berg & Timmermans (2000) argue that standard practice has no intrinsic authority that makes it universal. It becomes universal when its effectiveness in minimising uncertainty encourages people to conform. Minimising uncertainty means making a selected, desirable state more certain, at the cost that some other potentially desirable state is made less certain. Simple, model order is actively assembled from complexity through the sacrifice of alternative regimes of order.

The ability to conform is the ability actively to rationalise the interpretation of the rule with the interpretation of the situation at hand. Berg & Timmermans call this active

process "articulation work" and argue that rules and structuring processes are most successful when their writ is circumscribed. "Lesser rules can lead to more stable performance".

Ellingson, Monteiro & Munkvold (2007) contrast the conception of standardisation as uniformity imposed from a divorced position against an alternative conception, constructed around sensitivity to contingencies and the needs of service recipients.

The former conception sees work practice as defective and dismisses the roots of current practice which influence the feasibility and desirability of change.

In the latter conception, it is an adaptation of one set of norms to another. "Rather than following clear plans, care delivery frequently takes the form of stepwise explorations with high degrees of uncertainty".

Electronic systems offer efficiency through the application of a single set of pre-ordinate rules to multiple situations : for example, to link a clinical message, a clinical decision support tool and a resource allocation code. The problem then arises, that even the highest common factor of description sacrifices precise relevance to any specific situation for generality of application, in a way incompatible with deliberate, careful, "stepwise exploration".

### 3.1.4 : Management Information from Operational Systems :

### The Provisional Nature of Information

Proudlove and Boaden (2005) have suggested that the information systems to be provided by the National Programme ought to integrate data from multiple sources in order to provide the information required for the operational control and management of hospital beds and patients' length of stay. In assuming that information is immutable, they have ignored the social process by which information is constituted according to the context of the specific occasion where it is needed.

There is an inherent assumption, that what is controlled and accounted in these procedures has a tangible reality. For example, Clarke *et al.* (2006) have demonstrated the practical difficulties in accounting the supply of acute hospital beds against emergency demand. They show how the evidence of bed availability from the direct observation that beds are currently occupied is "defeasible" by comparison with information not contained in the bed statement.

The perception of supply resulted from a social process of balancing contingent factors. A bed could become 'vacant' if its occupant became a focus of attention and if a consensus was reached, that arguments promoting his continued care in hospital could no longer withstand the conflicting need to provide beds for newcomers. The assignment of patients to categories is shown to be flexible, ambiguous and determined by contingent rather than intrinsic factors.

Hartswood *et al.* (2003) also describe how the matching of patients with clinical and administrative categories is sensitive to the balance of prevailing pressures. The

category used to describe a patient is carefully selected in order to negotiate and expedite a clinical decision. It is chosen to reinforce and retro-fit an accommodation with an overall clinical situation, rather than for absolute correspondence between the patient and the model contained in the category.

These findings demonstrate the risk, inherent in the mechanical transmission of coded data from one context of meaning to another, that the meaning implied in the first intended context is incomplete or misleading in the next.

Hospital Discharge Summaries are written at the end of a hospital attendance for the dual purpose of onward clinical communication and clinical coding. Winthereik & Vikkelso (2005) have illustrated the conflict between the administrative accounting function of the document, potentially strengthened by standardisation and electronic presentation, and the clinical coordinating function, needing expressive power and detail.

The issue lies in the balance of structured fields and codes needed for accounting, and the free text needed to support nuanced communication. The coded description of the episode submitted for accounting is a clear instruction, to be believed and processed mechanistically. The clinical communication is an invitation to a professional colleague to apply his own skills to areas of uncertainty, assisted by other knowledge not conveyed or even known by the author.

Tightly structured as a form, the discharge letter is intended itself to express certainty and to structure the reader's administrative response. Loosely structured as a letter, it "affords" the opportunity to construct a coherent narrative thread and allows the

expression of any doubt or uncertainty surrounding a given statement, projecting and protecting the writer's own clinical competence against criticism or litigation.

Winthereik & Vikkelso state, "a piece of information in one material setting is not identical with a piece of information in another ……… Sender and receiver are embedded within organisations that are not uniform, rational frames of action, but complicated, conflict-ridden and ambiguous".

### 3.1.5 : Information Systems in the Clinical Workplace

The language of Management Information from Operational Systems suggests a distinction between information systems that serve control, planning and accounting functions, and linked systems which support the work of the clinical 'shop floor'.

To understand the introduction of information systems to the clinical workplace, we must understand the social organisation and the nature of the clinical workplace as a complex environment where multiple rationales and punctuated routines collide in a way that is chaotic but never random.

**Understanding the Clinical Workplace**

The emergency department of a hospital is an area where the continuity of tasks is constantly punctuated by gaps between the initiation and completion of sub-tasks. Several accounts (Coiera and Tombs, 1998 ; Spencer *et al.* , 2004 ; Woloschynowych *et*

*al*., 2007) highlight the opportunistic "interruptive" and "inefficient" nature of communication in hospital emergency departments.

Intensity of work, multiplicity of concurrent tasks and the frequency of interruption challenge human concentration and interfere with meticulous attention to detail. There is a strong tendency in this environment to communicate immediately and to prefer modalities which support synchronous rather than asynchronous communication and acknowledgement (Coiera and Tombs, 1998).

Often, one individual functions as a 'communications hub' (Fairbanks, Bisantz & Sunm, 2007 ; Wolshynowych *et al*., 2007) but the intensity of communication and interruption remains generally high. Some roles initiate more communications than they receive, or *vice versa*.

Too much communication may threaten clinical efficiency and safety as much as too little. Parker and Coiera (2000) argue that intensive communication exhausts the memory of human processors of information. Memory saturation endangers accurate performance of critical tasks, yet drives clinicians' anxiety to off-load by communicating more intensively. Asynchronous means of communication, for example, written notes, require the author to trust the recipient. Synchronous communication generates immediate acknowledgement. It dissipates the anxiety of the communicator, albeit at the expense of the recipient.

Yan Xiao *et al*. (2007) discuss the use of communal whiteboards in the clinical environment as a repository for individuals to 'dump' symbols for people, conditions and events until others are ready for them to be communicated. The individual can read

the display at his own convenience and conversation can focus on clarification rather than primary description.

The whiteboard's designed features were supplemented by vernacular symbols and icons that were meaningless out of context but succinctly enriched the information available for exchange when interpreted against a shared understanding of that specific workplace. The shared display provided an external representation to assist the individuals' internal processing of the situation and set out the "common ground" (Coiera, 2000) of understanding between individuals.

Coiera (2000) distinguishes between "computational" and "conversational" paradigms. The "conversational" paradigm cannot be collapsed into the "computational" paradigm and automated. There is a continuum that allows some tasks better to be aligned with one paradigm ore the other

The distinction between the two paradigms allows debate as to whether the interruptive and informal channels of communication in the clinical workplace represent a fundamental technical inefficiency that needs to be rectified by technology, or whether they are a fact of life that must be fully acknowledged in a deconstructed conception that fits more accurately with the chaotic and *ad hoc* organisation of "work as performed".

Reddy and Dourish (2002) in an intensive care unit, demonstrate that the conduct of clinical work and the assembly of information, to describe, document and coordinate it, are not continuous, synchronised or parallel streams of activity. Their rhythms interact

chaotically. New information may be known before earlier information has been communicated.

In this environment, information has to be interpreted in context, as a social act. Rather than a commodity, owned by one person and transferable to another, it is 'relational', centred in Coiera's (2000) "common ground" between individuals in dialogue.

There seem to be two general objectives for communication in the clinical workplace : to eliminate unnecessary communication and interruption and to understand fully the nature of the communication that is necessary. Communicated information is not 'contained' by either the human interlocutor or the computer, but is 'situated' in a communicative space between the two.

Reddy, Dourish and Pratt (2006) examine the concept of time in relation to work in the clinical setting. When work is modelled as a 'system', the model implies the classical concept from physics, of continuous, absolute, fluid time. In contrast, observed work is oriented and made relative towards specific events and occasions that punctuate the day's routine. The smooth "temporal trajectory" of "clock time" is pitted against the lumpy and interfering "temporal rhythms" of "work time". Finally, the collective orientation towards "work time" is contrasted with each individual's orientation towards his own personal deadlines.

Deadlines and salient events during the working day constitute "temporal horizons", in relation to which tasks become increasingly urgent and pared down as the deadline approaches. A "temporal horizon" may be a consultant's ward round, the end of a shift, a planning meeting or an impending deterioration in the condition of an individual

patient. Data, acquired, reported and stored are absolutely valid with regard to the point in absolute clock time when they were sampled but are invalidated by the flux of events. That is to say, the validity of data is only relative to temporal rhythms and horizons which are not absolute but constructed socially.

**Making Information Technology 'At Home' in the Clinical Workplace**

Berg (2001) argues that technical design failures exist alongside failure of adequate socio-technical appreciation. 'Success' or 'failure' of IT implementation is judged by many competing and conflicting criteria from many perspectives. Design, implementation and evaluation are inseparable when considered from a socio-technical standpoint. Organisations, work practices and technology dynamically shape each other, long after the technology has been designed and installed. The social and the political are as important as the technical aspects of design, implementation and evaluation and criteria may vary over time, even at a single site.

'Success' or 'failure' cannot be treated as static attributes and assessed or predicted by pre-determined criteria. They are emergent states such that an information system can be seen to be succeeding or failing in some of its attributes, under given circumstances at a particular time or place.

Berg dismisses three "myths". First, an information system is not simply 'rolled out' as a technical intervention. Implementation needs to be part of a mutual and carefully managed adaptation between the host organisation's work procedures and the new technology.

Second, implementation needs to be managed as a process of organisational development, in which procedures and motivations are carefully and respectfully reconsidered. Crucially, Berg argues, attempts to extinguish variation in practice by formalising routines can impede less 'visible' but equally essential interactions between people, procedures and documents. "Tasks that seem to be executed in a highly variable way are actually fine-tuned to match a context that is highly variable". These ideas threaten the concepts of 'process maps' and care pathways.

More than token 'user participation' is needed if deep understanding of the workplace is to be imported into design, implementation and evaluation. However, user participation needs sensitive coordination.

Berg's third 'myth' is that implementation and organisational redesign can be planned. The process is an emergent one. Especially in a clinical context, the complexity of influences and contingencies requires a culture of organisational learning rather than command and control.

Heath, Luff and Svensson (2003) present a 25-year review, of papers published in a single Journal (*Sociology Of Health And Illness*), whose central theme is that the shaping of practice by technology is reciprocated by the "social shaping of technology".

They contrast "institutionalisation", represented by the penetration and diffusion of technology into the places, structures and processes of a healthcare organisation, with technology "made at home" within the social practices of the workplace, where individuals interact with tasks and each other.

Institutionalisation pursues goals of accounting and accountability, the facilitation of diagnosis and organisational diagnostic categories, clinical communication and the organisation, co-ordination and amplification of clinical resources. The organisational benefits are thus expressed as outcomes.

To be "at home" technology has to gain coherence and consistency with the prevailing culture and values of the workplace but this is not a sufficient condition. Technology "gains significance and relevance through every day activities and ordinary experience". The other benefits of the technology are expressed in terms of people's relationships with their individual tasks and their collaborators.

### 3.1.6 : The Process of Information Systems Change

**Lessons from Failure**

Scott et al. (2005) comment of the implementation of electronic patient records in the Kaiser Permanente Healthcare system in the United States. Several factors were inimical to the success of the new system.

The new system was a 'done deal'. Clinicians were sidelined at the strategy formulation phase. The compliant culture of the workforce led to the system's acceptance at face value during the planning phase but the system, once implemented, generated conflict between managerial data requirements and clinicians' professional ethics. Assumptions were unrealistic : for example, that the clinical consultation commences with a known diagnosis or that non-standard patients will fit standard templates. Accounting functions

interfered with clinical. The system was difficult to navigate and made simple clinical tasks difficult. In contrast to these organisational and human factors, the technical performance of the system was not reported as an issue.

Fitzgerald and Russo (2005) have compared the initial, unsuccessful implementation of the London Ambulance Service's Computer Aided Despatch System (LASCAD) with its later, successful implementation. **Table 3.1.1** summarises their analysis.

**Table 3.1.1 : Analysis of factors affecting the London Ambulance Service Computer-Aided Despatch System implementation (adapted from Fitzgerald and Russo (2005).**

|  | Initial, failed implementation | Later, successful implementation |
|---|---|---|
| **Project Organisation** | Lack of project competence or adherence to explicit methodology.<br><br>"Over ambitious" project timetable.<br><br>Awareness of failure. | Competence and conscious use of (PRINCE) methodology.<br><br>"Relaxed" project timetable.<br><br>Learning from failure. |
| **Information System** | Complex. | Simple, incremental. |
| **Supporters** | Determined Chief Executive.<br><br>Demoralised staff. | Charismatic Chief Executive actively engaged and motivated staff on their own terms. |
| **Environment** | Political drive for widespread NHS reform.<br><br>Adverse industrial relations climate. | Public Inquiry findings gave new Chief Executive ammunition to withstand political pressures for rapid progress.<br><br>Improved industrial relations. |

Although Fitzgerald and Russo (2005) point to the ability of an inspirational, charismatic, powerful and politically adroit figure, these attributes will not turn bad systems design and implementation into good.

Beynon-Davies (1999) has also analysed the initial failure of LASCAD and notes that the subsequent public inquiry had found, "the computer system did not fail in a technical sense".

He uses the term, "error", to denote "divergence from a set of principles of best practice". "Development errors" hinge around the selection and adherence to a design and development methodology. "Errors of use" stem from mismatch between strictures on human behaviour, embedded within computer and software design, and human factors which interfere with prescribed interactions between man and machine.

His account describes the roles, processes, events and rules around which LASCAD was initially constructed. He then examines the escalation of factors which culminated in the system's collapse.

These factors included the prevalence of user-errors, the uncritical application of decision rules by the computer, the invalidity of key assumptions embedded in the system design (eg that users will log events on the computer as they happen) and the recruitment of system 'noise'.

System 'noise' escalated when the system generated automatic error alerts because anticipated actions and events had not occurred. These required the attention of human

operators who had not been able to cope with the volume of primary signals from the computer.

Failure of human response allowed the computer to recycle each primary request for an ambulance between operators. More than one ambulance was then deployed to a given incident, whilst other calls were unsupplied. Staff lost confidence in the computer's instructions and began to disengage from the computer and from the human roles constructed around the assumptions of the software designer.

As sources of failure, Beynon-Davies identifies the absence of a "demonstrable and unitary power structure within the NHS" at a "macro" level, and the industrial relations atmosphere between managers and the managed at the "micro" level.

But do information systems in healthcare only fail if industrial relations are poor ? Certainly, there are political and ethical challenges alongside the technical, that might be harder to negotiate if relations are poor to start with. This is not where matters end.

A report by the Wellcome Trust and the Nuffield Trust (Singleton, Pagliari, & Detmer, 2009) acknowledges the ethical difficulties raised by electronic health records alongside the more prosaic conflict between the multiple definitions of the electronic record as a personal record, an institutional record, a longitudinal record or a population database.

The report identifies seven key requirements for Electronic Health Records : clear vision and purpose for their application, semantic interoperability, the ability to accumulate knowledge, the ability to disseminate knowledge through decision support, the provision of workforce education and training, a programme to ensure innovation

and continuous improvement of healthcare quality, and a parallel programme to disseminate experiential learning about the impact of electronic health records on quality, efficiency, safety and patient experience.

Last, the report points (p.11) to the disconnect between technical, regulatory and sociotechnical debates and "a danger of delivering a fixed IT solution to a changing business problem." (p.42). *"The group recommended that EHR's* [Electronic Health Records] *are embedded within complex sociotechnical and organisational systems". Their implementation requires "strategies and tactics ……… appropriate for complex adaptive systems"*.

Greenhalgh et al. (2008) take up this last point, stating : *"shared electronic records are not plug in technologies. They are complex innovations that must be accepted by individual patients and staff and embedded in organisational and system level routines."*

**Deployment *versus* Introduction of Information Systems**

Maguire and Ojiako (2007) point out "the fundamental difference between information systems introduction and deployment". *Deployment* is a centralised, technical task, aiming to ensure the straightforward integration of new with existing information systems. In contrast, *introduction* is a distributed activity, aiming to ensure minimum disruption in any individual workplace. Introduction has several dimensions.

The first of these is the management of change. They say that staff impacted by change should be encouraged to understand the implications of that change. The people operating an information system need to be fully aware of its rationale and its rationale has to be congruent with the local rationale of situated work practice.

The second dimension is the management and training of the "human resource". Showing staff how to use the system does not guarantee that they fully understand what the system is for or why they should use it.

Third, Maguire and Ojiako point to the need for NHS organisations to have an IT strategy that aligns the IT programme with the strategic direction of the parent organisation. It developments must be seen to support broader objectives than merely the diffusion of IT.

Fourth, the organisational environment is a dimension where the patient focused culture of the clinical workplace must be fully appreciated, as well as the local human resources profile and the skills of prospective users. This appreciation must exist in the context of a clear understanding of the relevant systems of human activity and their boundaries.

The fifth dimension recognises the need to incorporate user perspectives into the design rationale.

The sixth dimension is the concept of systems introduction, contrasted with deployment as above. This is essentially the practice of working out what an information system needs to do at that particular workplace, to preserve and project the values and norms that ought to exist there. Maguire and Ojiako suggest that "the traditional systems

development lifecycle approach is likely to be inappropriate to the needs of a large and complex organisation working in a turbulent environment where agility and change are endemic. ……… Large and complex organisation such as the NHS need to appreciate that smaller projects with the potential to deliver benefits in a shorter timescale should be given more prominence".

Their final dimension of importance is Return on Investment, reflecting the idea that all parties need to know what the information system is for, and why it is relevant.

Maguire and Ojiako draw several important conclusions, related to the extension of organisational-informational relationships beyond organisational boundaries, the need to use as well as capture information from information systems, and to the rapid pace of change that can threaten a massive capital investment with redundancy. It is these factors that require information systems projects to be small, multiple and agile instead of monolithic.

**User Resistance**

One goal of "clinical engagement" is to minimise resistance by information system users. Resistance should not be equated uncritically with deviance from organisational goals.

Diegeling and Carr (2004) detect a shift of focus away from critical managerial success factors, attributes and traits as universally effective characteristics and towards

"management of meaning" in which managers have sought to "colonise" or rectify local culture, viewed as a faulty component of organisation.

Both of these approaches implicitly locate power, influence and authority in the upper levels of hierarchy. Ideas from ethnomethodology and symbolic interactionism, challenge this belief, arguing that power and its concomitants are 'situated' within the flux of discourse between organisational actors.

In their view, the appropriate discourse, in terms of leadership in health reform, needs to focus on the issue of "authorisation". "Authorisation" stems from the elements of local social structure or culture as well as from organisational hierarchy.

Agents of change need to place themselves in a sensitive and recursive relationship with the multiple undercurrents of local culture, constituted by the separate ideologies and power relations between one professional group and another.

These authors argue that discourse about health care process reform and teamwork ought to be given a concrete foundation by "disaggregating" work. Issues are crystallised when a specific clinical condition is discussed, as in the design, operation and evaluation of specific clinical pathways.

Vardi and Wiener (1996) distinguish between organisational misbehaviours intended to benefit self, to injure others or the organisation, or to benefit the organisation. Misbehaviour intended to benefit the organisation is associated with strong identification with the values of the organisation and high cohesion between the individual and his immediate peers. The question is : why, when strategic managers

have decided that information systems will be valuable, might front line users decide otherwise ?

The anticipated or actual use by managers of an information system can be a potent factor inhibiting "clinical engagement". For example, Doolin (2004) describes the introduction of a case mix management system to a hospital in New Zealand where it was intended to compare the performance of individual clinicians.

Knowledge that their performance was under scrutiny was expected to be a powerful disciplinary influence upon the clinicians (Foucault, 1977) to eliminate variance in performance between peers. Within a devolved management structure of clinical directorates, it was attempted "to construct the interests of doctors as congruent with those of management. This involved translating the notion of patient care in terms of effectiveness and efficiency".

Doolin found that some doctors, faced with incongruity between the information produced and their own perceptions, began to interrogate the system to discover systemic explanations for variance and support claims for enhanced resources. Others disengaged completely, citing this incongruity and suggesting plausible alternatives to explain the reported variances and nullify the need to alter practice. With no clear incentives to participate, and no forum for organisational learning, the casemix system fell into disuse.

Timmons (2003) has examined nurses' resistance to the introduction of IT in hospitals. Some of the studies he cites point to a poor 'fit' between people, tasks and technology whilst others point to the use of opportunities to push back against a perceived inequity

of power relations, between nurses and doctors or between nurses and the managers who were able to define the information requirements.

Timmons finds that resistance tends not to be generalised or orchestrated, but is located within individual instances of interaction between a person and a machine. Neither is it translated into positive action.

Nurses' rejection of a system for care planning tended to arise from incompatibility between assumptions built into the computer model and necessary patterns of local, multidisciplinary practice.

Attempts to minimise use derived from users' preference for and reversion to their pre-existing paper system ; the absence of evidence that information input was used ; and a tendency to batch input according to convenience.

Criticism tended to be based on technical performance and ergonomic shortcomings and on the cost of use, in terms of time and work increased rather than abated.

A more fundamental set of criticisms also emerged. The idealised clinical method embedded in the care planning system interfered with users' reflexive choice of their own method. The care planning system generalised a standard image of the patient's needs, remote from any actual patient, and limited description to categorisation. Established to measure the quantity of clinical practice, the machine imposed its own degradation of practice quality. These findings are incorporated and augmented by Urquhart and Currell (2005).

Timmons (2003) concludes that resistance is not an irrational deviation from acceptable norms. It is not sited with the deviant user, but "found at the interface between system design ….. and nursing culture and practice".

In this vein, Ojiako, Maguire et al. (2010) observe that "the implementation of the Choose and Book [e-booking of appointments] system has failed due to the inability of project sponsors to appreciate the complex and far-reaching softer implications of the implementation ………". In England, electronic booking of appointments has been driven by alternative policies and rhetorics : to utilise spare capacity across the NHS, to stimulate competition between providers, to empower patients and to enhance accessibility. In addition to clear-cut technical failures that have damaged confidence in the system's reliability, implementation to further these conflicting policy aims has been divorced from insight into the ways doctors and patients in the NHS want or need to work, in relation with each other and with the wider NHS.

Majeed (2003) believes that electronic booking has been introduced in a form that has been irrelevant to clinical practice and patients' expressed preferences for improved services. He believes it is less important to provide information for performance management by managers than to facilitate clinical practice. In his view, clinicians' priorities are to improve the flow of clinical information between health professionals, to develop integrated electronic health records, and to make information (about patients, clinical activity and health services) accessible, all supported by improvement in the performance of the electronic infrastructure.

### 3.1.7 : Clinical Engagement

Within the National Programme, there is a clear consensus that "clinical engagement" is vital to its success. The objectives of clinical engagement are not clear. The minimum requirement appears to be to persuade clinical end-users to accept the technology programme to be implemented.

The authors of the EHR IMPACT study (European Union, 2009) state (p.36), "Engagement is working with users and stakeholders so they can participate in the design, development, requirements and constraints of e-Health ……… Dealing with positions, propositions, concerns and requirements distinguishes engagement from consultation ……… Effective engagement also enables users to adapt to changes at their own pace, with the ICT [Information and Communications Technology] following suit."

Newell *et al*. (2000) show how the spread of an organisational innovation is encouraged by manipulating the influential and the impressionable.

Innovation diffusion is conventionally assumed to fail at the stages of implementation and usage. Newell *et al*. focus on the preceding stages, where the agenda of problems, ideas and expectations is formulated, and candidate technologies identified. Both suppliers and eager user-adopters create peer pressure to adopt an innovation without fully understanding why it is necessary or how it will result in benefits.

Sold as a "bundled" set of 'solutions' or as a "black box" full of "commodified" ideas, the information system is not inherently relevant or congruous with the host

organisation. It has to be made so through an active process of unbundling and reintegration. Many organisations lack and fail to appreciate the multidisciplinary resources needed to perform these tasks.

One way to manipulate the influential and the impressionable is to employ incentives. Benson (2002a) sees implementation of information systems in secondary care as a transaction that can be 'sweetened' in this way. The same author (2002b) emphasises technical challenges -systems architecture and scalability - as primary obstacles to the transfer of information technology from primary to secondary care.

The need to persuade acceptance suggests a mismatch between the products on offer and what clinicians intuitively recognise as something they need and can use.

Martin *et al*. (2006) illustrate the gulf in mutual understanding that divides the *dramatis personae* during the planning and implementation of an information system in a UK hospital. The supplier and the corporate analyst have a clear conception of the way the system will be used, that is ill-aligned with the ways its future users understand their own work.

In effect, the new information system is to be compared with work. In this context, Nemeth, Cook & Wears (2007) make a distinction between "work as imagined" and "work as performed".

The message is that the implementation of an information system is not principally a matter of engineering acceptance by manipulating people, ideas and values. Clinical engagement ought to be an 'exploration' of work practice and the potential for practice

to be revised, aimed at organisational learning and deep understanding rather than superficial description. This entails "appreciating situated micropractices in different clinical settings" (Greenhalgh et al., 2009) and comparing these with the strategic goals of the information system's institutional sponsors.

## 3.2 : PROBLEM SOLVERS

### 3.2.0 : Introduction

The immediate problem solvers are characterised by the things they know from their experience and by the ways they think and know. Jayaratna (1994) uses the term, "personal mental construct". Mitroff and Linstone (1993) refer to the technical, organisational and personal perspectives of organisational stakeholders. Checkland (1999) talks about their "world view" (*Weltanschauung*).

Hirschheim (1985) charted five phases in the evolution of scientific and social theory relevant to information systems. Positivism, its refinement as logical positivism and its decline into post positivism had been interrupted by the more or less sequential developments of anti-positivism and contemporary criticism. The five phases are best envisaged in two parallel streams (**Table 3.2.1**).

Subsequently, the most conspicuous advance has been an emergent understanding of social structure in relation to information technology, of the social construction of technology and of computer supported co-operative work. These epistemologies have carried with them an understanding that attributes and qualities are not inherent in objects but situated in systemic relationships between objects.

Systems thinking, the understanding of objects in systemic, co-constructive relationship, has roots in hermeneutics, phenomenology, symbolic interactionism and ethnomethodology. The analysis of structural relations in the social *milieu* has been conducted at an increasingly granular level. The concept of structure as a stable state

has given way to the concept of structuring as a fluid, dynamic and iterative process, such that alternative accounts of relationships between entities and events can be equivalent.

**Table 3.2.1 : Evolution of Scientific and Social Theory (Hirschheim, 1985)**

| Positivism | Anti-Positivism |
|---|---|
| Unity of scientific method. Search for constant conjunction between cause and effect (laws). Phenomenalism : knowledge depends on observation. Asocial, value-free process. Based on logic and mathematics. | Perceptual apparatus filters understanding and knowledge. Perceptual apparatus is socially and historically conditioned. Individuals and events are inseparable from surrounding context. Individuals exercise choice and freedom of action. Action is based on perception rather than direct stimulus. |
| **Logical Positivism (Logical Empiricism)**<br><br>Search for networks of verifiable statements. Physicalism : knowledge depends on hypothesis, derived from reproducible observation or deduction from first principles. Communities agree on what has, or has not, been observed. | **Contemporary Criticism**<br><br>Process of knowledge acquisition filters what is known. Tacit values underpin statements of purported 'fact'. A political dimension hides behind the rational. Methods are inseparable from goals. |
| **Post-Positivism**<br><br>Methods of physical science fail in relation to social activity. Social phenomena better explained in terms of social conventions than absolute laws. Method of investigation determined by goals of investigation. The absence of a uniquely appropriate mode of investigation allows employment of plural modalities. | |

## 3.2.1 : Ways of Knowing and Understanding

Becker and Niehaves (2007) address five "fundamental" epistemological questions (questions about knowledge and ways of knowing). The questions are summarised, with slight modification of language, in **Table 3.2.2**.

**Table 3.2.2 : Fundamental Epistemological Questions (Becker and Niehaves, 2007)**

| Question | Optional Answers for This Question | | |
|---|---|---|---|
| Ontology<br><br>(the kinds of things we can know about) | Real things :<br><br>(exist independent from human cognition) | Concepts :<br><br>(products of the human mind) | Conceptual<br><br>(appearances of real things) |
| Impact of<br><br>knowing | No impact on the<br><br>thing known | | Knowing modifies<br><br>the thing known |
| Basis of truth | Correspondence | Consensus | Semantic<br><br>(ability of language to convey ideas beyond its logical content) |
| Derivation of<br><br>knowledge | Direct experience<br><br>(Empiricism) | Thought, divorced<br><br>from experience<br><br>(Rationalism) | Intellectual<br><br>processing of<br><br>experience |
| Methodology :<br><br>means of access to<br><br>knowledge | Induction, from<br><br>individual to general<br><br>statements | Deduction, from<br><br>general to<br><br>individual<br><br>statement | Hermeneutic<br><br>understanding |

### 3.2.2 : Linear Thinking - Positivism, Interpretivism and Criticism

**The Four Paradigms of Burrell and Morgan**

The Information Systems literature has tended to organise discussion around four "mutually exclusive" (positivist, interpretivist, radical structuralist and radical humanist) paradigms (**Figure 3.2.1**) defined by Burrell and Morgan (1979). Chua (1986), referred to "the dubious distinction between the radical structuralist and humanist paradigms", and Orlikowski and Baroudi (1991) followed her example in collapsing these into a single, "critical" paradigm.

Burrell & Morgan demarcated the four paradigms by the intersection of an "objective / subjective" axis, describing the nature of science, and a "regulation / radical change" axis, to describe the nature of society.

**Figure 3.2.1 : Four Paradigms (Burrell & Morgan, 1979)**
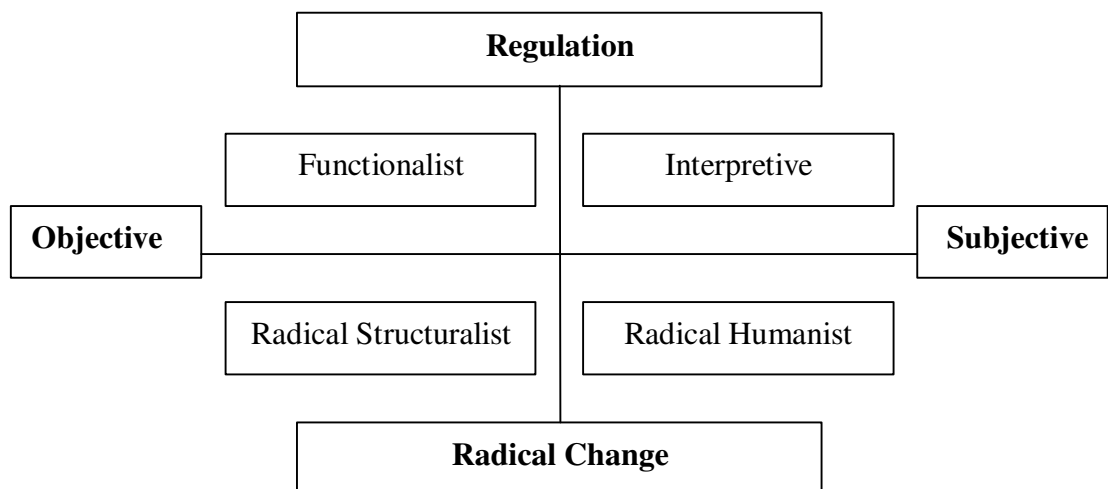
**Empirical Evidence for the Paradigms**

From field studies of information systems design and development in the printing and aviation industries, Hirschheim and Klein (1989) have developed three empirical perspectives from the Burrell and Morgan framework. Unable to find evidence of the fourth, radical humanist paradigm in practice, they have suggested how it might be elaborated through Habermas' critical social theory (see Lyytinen & Klein, 1985).

**Paradigm Wars, Pragmatism and Paradigm Pluralism**

Rather than interpret the four paradigms as distinct categories with distinctive rules of assignment, Goles & Hirschheim (2000) regard the paradigm boundaries as fuzzy and "permeable". This provides complementary insights from alternative positions, affords richer discourse and allows them to "select the approach and methodology most suited to a particular research question".

**The Positivist, Interpretive and Critical Paradigms in Detail**

Orlikowski and Baroudi (1991) characterise each of the paradigms in turn, in terms of the way each treats the nature of knowing, the nature of being and the relationship between theory and practice. For each paradigm, they supply their "assessment".

**Characterising The Positivist Paradigm**

Orlikowski and Baroudi (1991) characterise positivism as follows :

**Knowing :**    Knowing is a state. It does not alter the thing known. Immutable facts and universal laws can be discovered and this general knowledge can be applied to explain, predict and control a specific situation.

**Being :** Entities are independent from human cognition. The observer and the observed have separate, independent existence. The observed entity can be dissected into identifiable components. These can be understood separately and individually. The relationships between them can be explained, predicted and controlled.

**Theory and Practice :** Theory focuses on each immutable, individual identity. The practical impact is to isolate individual identity and negate its local context.

**Assessment of the Positivist Paradigm :** The positivist approach emphasises validity, rigour and replicability. Contextual influences are ignored and the *status quo* is privileged. The ritualistic methodology of positivist science limits the scope of valid findings. It does not afford understanding of non-deterministic or reciprocal relationships.

**Characterising The Interpretive Paradigm**

Orlikowski and Baroudi characterise the interpretive paradigm as follows :

**Knowing :** Knowing is an active human process. Knowing and the thing known shape each other. Knowing is heavily modulated by contextual factors. The process of modulation can be understood, in terms of concurrent but not necessarily causal influences.

**Being :** Entities impinge on human consciousness. Their impact cannot occur without the agency of a conscious human observer. The entity and its relationship with the human observer are both irreducible. The relationship is conditioned by social participation.

**Theory and Practice :** The theoretical focus is on the social and cultural terms of engagement between observer and observed. The practical impact is to emphasise contextual influences over individual identity.

**Assessment of the Interpretive Paradigm :** The interpretive approach illuminates "the social rules and meanings that make social practices possible". It ignores external factors which underpin social rules and meanings. It also ignores side-effects ("unintended consequences") of social action which affect social relationships. This approach emphasises social cohesion over social conflict. It does not attempt to explain how social order came about, or how it is likely to change over time.

**Characterising The Critical Paradigm**

Orlikowski and Baroudi characterise the critical paradigm as follows :

**Knowing :** The contextual modulators of knowing have specific historical and geographical origins. The relevant influences are material rather than moral. Mutual shaping of the knowing and the known could have a different outcome if material conditions were altered.

**Being :** The form of being is restricted by material constraints. Being cannot be isolated from material conditions of existence. Material conditions of existence can be altered by human action. Social participation occurs within a framework of unequal / asymmetric power relationships.

**Theory and Practice :** Theory is focused on inequality of influence ("domination") and what is left out ("alienated") as a consequence. The practical impact is to challenge the basis for action and to promotes change in material conditions.

**Assessment of the Critical Paradigm :** The critical approach illuminates the relationship between the whole and its parts. It affords central importance to external (historical, social, economic, political) factors influencing local effects and emphasises effects of social and behavioural differentiation rather than social uniformity.

### 3.2.4 : Recasting Burrell and Morgan in a Critical Light

Deetz (1996) has criticised Burrell and Morgan for equating "objective" with the methodology of natural science and pejoratively associating "subjective" with lack of rigour. "The boring and misleading subjective-objective problem" is, for Deetz "the most problematic legacy of Burrell and Morgan's analysis".

In Deetz' view, the Burrell and Morgan matrix is less useful as a taxonomy than as a means to "focus attention" and stimulate "the right questions". Its dimensions "foster less interesting and productive conflicts and developments than are possible". The centre of understanding should not be the "faulty" psychological distinction between an interior (subjective) and an exterior (objective) world of consciousness, but language.

Loaded with personal and collective cultural experience, language reflects a world view that is not neutral but situated. The ideas contained in this world view have "elite" or "*a priori*" status. Many of these fail to withstand challenge during discourse and are superseded by "emergent" ideas. For Deetz, this is a more useful and intellectually robust distinction than between subjective and objective. Equally the distinction, between a "reproductive" ("consensus") orientation towards the existing hierarchy of ideas and social structure and a "productive" ("dissensus") orientation towards the disruption of this hierarchy, is more useful than distinctions between structure and radical change or order and conflict (**Figure 3.2.2**).

**Figure 3.2.2 : Deetz' Revision of Burrell and Morgan**

| Consensus | | | |
|---|---|---|---|
| | Normative | Interpretive | |
| *A priori* | | | **Emergent** |
| | Critical | Dialogic | |
| Dissensus | | | |

### 3.2.5 : The Decline of Positivist Science and the Emergence

### of Interpretive and Critical Epistemologies

The history of the information systems discipline is described in terms of its origins in a technical and technocratic literature and the political struggle for the emancipation of an interpretive and critical literature, focused on the relationship between information technology and people. The purpose of this section is to explain the loss of confidence in science as a paragon of knowledge acquisition and to establish the validity of a social and humanistic approach.

**Rationalism, Functionalism, Empiricism**

According to Monod (2004 ; p.111) positivism contains "at least three" traditions: rationalism, functionalism and empiricism.

Monod associates rationalism with Leibniz' belief, that concepts can be independent from experience. This is the "pure reason" on which Kant focused his *Critique of Pure Reason*. He then explains that functionalism is a development in sociology from rationalism, in which society is seen as an organism, whose individual members' actions are directed by the welfare of the whole. Neither rationalism nor functionalism makes a direct appeal to sense experience.

In contrast, empiricism represents the trend in philosophy that rejected dogma in the face of tangible experience and visible evidence[*].

**Logical Positivism (Logical Empiricism)**

Logical positivists (logical empiricists) are associated with their correspondence theory of truth. Their quest was for a stable foundation (verification principle) to verify statements by correspondence with previously observed "facts" (Hughes and Sharrock, 1990 ; p.44). By rejecting any statement which was neither true from first principles nor verifiable through direct observation they intended to ensure that distinctions between

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[*] Hume's 'fork' famously stated, "If we take in our hand any volume ; of divinity or school metaphysics, for instance; let us ask, Does it contain any abstract reasoning concerning quantity or number ? No. Does it contain any experimental reasoning concerning matter of fact and existence ? No. Commit it then to the flames : for it can contain nothing but sophistry and illusion". (Hughes and Sharrock p.28).

categories were uncontaminated by human judgements and preferences. This left them unable to deal with moral and ethical issues (Crotty, 1998 ; p.23-26).

Mingers (2004a) explains the three elements of their stance :

- Observation and perception provide a direct, unproblematic mirror on nature
- Constant conjunction of events does not constitute proof of a cause and effect mechanism
- A set of particular observations can support the formulation of universal laws that can then allow confident deductive predictions.

**The Crisis in Physics**

Monod (2004) explains that the classical science of Galileo and Newton had relied on the twin doctrines of objectivity (the observer-independence of 'true' statements, which depended on Descartes' sharp separation of self [subject] from surroundings [object]) ; and causality (the inference of deterministic 'laws' from the predictable repeatability of a consequence from an event).

In the early 20th century, science encountered a crisis when both of these fundamentals became untenable. Discoveries in quantum physics now established that definite knowledge could only be approximated.

Heisenberg's uncertainty principle implied that quantum physicists could only define states of matter and energy in relation to each other, and in terms of probabilities rather than certainties.

The quantum physicists were forced to abandon the idea that science was objective : their results depended on the apparatus used and were, therefore, observer-dependent. This meant that "real" things could not be defined independently of the observer and his perceptual apparatus. Bohr's complementarity principle meant that 'truth' could no longer be defined by correspondence between observation and theory. Alternative descriptions of physical reality could be equally valid.

**Post Positivism**

Hirschheim (1985) tells us that post-positivism "is not a particular school of thought with any agreed set of propositions". Arguing the case for research in non-functionalist paradigms, Hirschheim's fundamental thought is "to do away with the physical science model as the only accepted vehicle for knowledge acquisition". Some of post-positivism's roots are traced in the following, for which sources are Crotty (1998 ; p.31-37), Hughes & Sharrock (1990 ; p.76-82, 91-92, 171-180), Robinson & Groves (2004, p.113), Mingers (2004a) and Klein & Herskovitz (2007).

- **Popper**

Popper's ideas are outlined by Collinson & Plant (2006 : p. 236-240). Popper has overturned the logical empiricists' twin doctrines, substituting hypothetico-deductive "bold conjecture" for induction and falsification for verification.

- **Pragmatism : Pierce and Dewey**

Mingers (2004a ; p.90) identifies and outlines two positions in reaction to the theory-laden nature of empirical observation. The first of these, pragmatism, considers science to be essentially a practical activity, aimed at producing useful knowledge that helps in a practical way, rather than understanding the true nature of the world. The relevant principle is consensus rather than correspondence.

- **Kuhn**

Mingers' second position corresponds with Kuhn's challenge to Popper's suggestion that science proceeds in an "evolutionary" manner through the consequences of falsification. From this position, "truth is that which is accepted by a scientific community rather than correspondence to some external reality" (Mingers, 2004a ; p.90).

The newcomer to science "learns how to accept, work and think within the idioms already established in their particular scientific discipline". He is drawn into a specific

set of norms, values and beliefs, a particular world view and a ritualised set of methods which, together, constitute the "paradigm" within which knowledge is recognised and construed. Scientists follow social convention rather than rationality, adhering closely to the current paradigm whilst hostile evidence accumulates. A new paradigm is established when hostile evidence has accumulated to the point of crisis.

- **Lakatos, Feyerabend**

Lakatos argues that any given research programme contains a nucleus of established theory, surrounded by newer hypotheses, each of whose contribution to the stability of the overall programme is negligible. In contrast, Feyerabend suggests the observed practice of science owes more to showmanship than to rational integrity.

Kuhn, Lakatos and Feyerabend have attacked scientific practice on grounds of human behaviour rather than philosophical principle. The philosophical principle at stake is whether the goal of certain knowledge is attainable.

- **Quine**

On Popper's view, the mental model of empirical experience remains fixed and mutability is concentrated in the mental model of anticipated experience that constitutes the theory under test. On Quine's view, mutability is more evenly divided. Quine proposes twin theses (Klein and Herskovitz, 2007 ; p.116-120).

The "holism thesis" situates any theory of interest against a substantial background in other theory, with which it is "bundled". This leaves the theorist "free to choose what statements to revise and what ones to hold fast".

The "under-determination thesis" allows that "any set of data can be fit by many different [mutually inconsistent] theories ….. we are never in a position to know that any of these theories is the truth".

Quine's twin theses allow us to choose between competing modifications to theory, according to our chosen interpretation of empirical experience. Quine allows the belief that science and its findings represent a process of social construction rather than natural discovery.

**Antipositivism**

Anti-positivism, as explained by Burrell and Morgan (1979 : p.5), rejects the stance that the observer can achieve mental separation from the observed. Klein and Lyytinen (1985) have argued that a "scientistic, engineering" approach is insufficient foundation for an information systems discipline focused on computing as fundamentally a social activity.

Pettigrew (1985) stresses "the requirement to understand the emergent, situational and holistic features of an organism or process in its context, rather than to divide the world into limited sets of dependent and independent variables, isolated from their context".

Respect for this principle distinguishes a "craft process" from "merely the application of a formal set of techniques and rules".

- **Phenomenology and Hermeneutics**

Boland (1985) makes a neat distinction between "how things work", identified by positivist science, and "what things are", identified by phenomenology. Boland argues that phenomenology is the "preferred" foundation for the study of information systems.

Phenomenology takes the stance that significance is not intrinsic to the things we experience. Instead, we assemble significance in a process which involves our own intellectual apparatus.

Boland then explains the relationship of phenomenology with hermeneutics ("the problem of the study and interpretation of texts") and makes the "central claim", "that the use, design and study of information systems is best understood as a hermeneutic process". The texts to which Boland refers were originally religious texts, written in an ancient language, centuries previously. That is, to interpret symbols and signs.

As (Butler, 2002) puts it, this was to "explain the intentions of the Gods". To do this requires a structure and an understanding of norms, values and beliefs and tradition, crucially imparted through language.

The text is meaningless without a reader. Its interpretation relies on the reader to construct its significance. Geographical, historical and linguistic separation preclude

any corroboration of the reader's interpretation by the original author. Therefore, there can be no absolute or definitive interpretation. Interpretation cannot be determined by rules, only by convention, agreed or disputed between members of the interested community.

Textual interpretation, knowledge acquisition and social change are mediated by language. Boland (1985) states, "Information systems are data becoming information in consciousness; organizations are socially constructed through language; and our reasoning about both these processes takes place in dialogue".

- **Symbolic Interactionism**

Symbolic Interactionists investigate the ways in which human responses to verbal, non-verbal and situational cues arise from behaviour which is knowledgeable, and situationally aware, rather than from reflex responses to symbols with fixed, inherent meaning. They understand the content of human communication as a negotiated phenomenon :

- People act towards things on the basis of the meanings they attribute to them.
- Meaning is derived from and arises from social interaction with others.
- Meaning is received and modified through an interpretive process by the recipient (Crotty, p.72).

- **Ethnomethodology**

Giddens (2001 : p.689) describes ethnomethodology as "the study of how people make sense of what others say or do in the course of day-to-day social interaction". It is "concerned with the 'ethnomethods' by means of which human beings sustain meaningful interchanges with one another".

Ethnomethodology is thus a natural descendent of symbolic interactionism.

**"Contemporary" Criticism**

Richardson & Robinson (2007) refer to "the mysterious case of the missing [ie critical] paradigm". Brooke (2002d) highlights the following variants of critical information systems theory :

- Critical Systems Theory, using systems thinking and Soft Systems Methodology to identify and eliminate power asymmetry
- Critical Realism, examining the impact of power relationships and resistance as contextually determined mechanisms on workplace relations and the outcomes of an IT intervention
- Critical Post Modernism, challenging the modernist concept of continual progress towards a remote ideal by challenging the ideal itself.

The separation between the interpretive and the critical paradigms is conceptual rather than real, and not all interpretive authors (eg. Walsham, 1993, Doolin, 1998) have been able to avoid critical 'contamination' of their interpretive perspective.

The uniting concept is constructionism, defined by Crotty (1998 ; p.42) as "the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context".

Contemporary criticism, according to Hirschheim (1985), focuses on three principal weaknesses of logical positivism :

- Dependence on theory : theory-laden language distorts social exchange
- Dependence on deduction : limits the basis from which ideas can be developed
- Actual practice of science subverts espoused values : focus on scientific ritual rather than the quality of knowledge produced.

Lyytinen and Klein (1985) regard information systems and their design as opportunities for a powerful elite to exploit both computers and people for instrumental purposes. The intrusion of power is the point of departure of a critical from an interpretive reading of information systems.

Stahl (2005) identifies "an agonist view of society and a critical intention to change the *status quo*" as defining characteristics of critical research.

In the critical paradigm (Brooke, 2002a, 2002b, 2002c), the individual is 'emancipated' from the collective. The balance of importance afforded to salient issues differs according to contingency. Generalities are 'deconstructed' into sets of events whose relationship is a matter of coalescence rather than consequence. Critique challenges ideas which are salient to individuals but are presented as if they ought to be the dominant concern of all parties under all circumstances. Hierarchies of ideas are identified, the language of their expression is questioned and underlying assumptions are exposed and challenged by alternative perspectives.

Brooke (2002a) outlines three "major tasks" for critical research :

- To investigate the nature of phenomena at local levels
- To critique taken for granted assumptions
- To develop relevant knowledge and practical understanding that enables change.

Brooke (2002c) summarises the critical project in terms of power, resistance and emancipation. The discovery and elimination of 'distorted communication' is a prelude to emancipation. Various authors (for example : Mumford, 1995 ; Varey, Wood-Harper & Wood, 2002 ; Stahl, 2006) have been concerned to inject an ethical dimension into information systems design and to develop a critical information systems ethics.

**Ethical Information Systems**

It is a moral challenge for those engaged in the implementation of information systems to identify the ethical basis for the actions they take. As Walsham (1996) argues, an ethical basis for action goes beyond issues of duty to the client and to professional colleagues (Oz 1992) or to the data subject (Mason, 1986).

Walsham identifies four "problematic ethical issues" for Information Systems :

- Conflicts between duties and good means / ends
- 'Good' Information Systems practice
- What sort of person should I be ?
- Rights of groups.

Each of these issues derives ultimately from the idea that each issue in the relevant argument has an absolute rationale, independent from personal situation or perspective. The political and irrational aspect stems from the ways these different issues are experienced, balanced and disputed by individuals. Wood-Harper *et al.* (1998) demonstrate how these perspectives are knitted together in an "ethical conflict web" by mapping the stakeholders in the Problem Situation against the issues most salient to them, the dominant ethical perspective from which they view these issues, and the alternative perspectives which might apply.

Wood-Harper, Corder & Byrne (1999) provide a practical example of this mapping and propose four principles of "ethically situated information systems development". These are paraphrased as follows :

- Priority of ethical over technical reasoning

- Priority of discretion over direction

- Even distribution of ethical benefits and risks

- Ethical stance explicit at all stages.

Moral arguments, based on asymmetry of power and influence between individuals and communities of people, have counterparts in the relations between ideas. These operate at an abstract level but become highly practical when translated into expensive clusters of machinery to affect the conduct of work. This is even more the case when the work in question is healthcare.

### 3.2.6 : Positivist, Interpretive and Critical Social Theory

**Positivist Social Theory : Comte and Durkheim**

Comte and Durkheim are credited with the positivist project, to discover an intellectually rigorous science of society based on naturalistic "laws" (Hughes and Sharrock p. 93).

Durkheim's project was to demonstrate the "coercive force" of "social facts" by making and correlating statistical observations. For example, Durkheim made correlations between categories of people in social groups and rates of suicide. Then he deduced categories of suicide and used his observations to deduce conclusions. His conclusions became more robust as corroborative evidence was accumulated.

Durkheim's urge to "treat social facts as things" reflects a concern for explanations which focus on social structure as an extrinsic constraint on human agency.

**Interpretive Social Theory : Weber**

Crotty (1998 ; p.67-71) explains that Weber, like Durkheim sought rigorous explanations for regularities in social behaviour.

Where Durkheim had aimed to identify social laws with "coercive effect", external to the individual, Weber was concerned to identify how these effects were exerted through human agency in the form of human behaviour and motivation at the level of the individual. Weber developed the formulation of "ideal types" : a method to caricature "the outcome of persons acting under a common motivation and choosing suitable means to the ends they have in view" (Crotty, 1998 : p.70).

Weber distinguished social behaviour directed towards traditional social hierarchy, emotional affiliation or common values from conduct directed towards rational goals. Whilst interested in social structure, he was also interested in the social norms, values and beliefs that hold social structure together.

Walsham (1993 p.5) states, "Interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors". He continues by associating context, processes of change and the intellectual processes of human actors in the "social construction" of meaning.

The interpretive paradigm contains major strands focused on hermeneutics, phenomenology and symbolic interactionism (Walsham, 1995).

**Critical Social Theory : Marx, Habermas, Foucault**

Burrell and Morgan (1979 ; p. 284) describe the purpose of criticism : "to reveal society for what it is, to unmask its essence and mode of operation and to lay the foundations for human emancipation through deep-seated social change. It is an overtly political philosophy, in that it stresses the need to follow the logic of one's philosophical and social analysis with practical action of a radical kind".

▪ **Marx**

"Practical action of a radical kind" is redolent of Marx. "The philosophers have only interpreted the world in different way. The point is to change it." (see Crotty, 1998 ; p.117 : Warburton, 1998 ; p.186). For Marx, human social action was not determined by the existence of universal social laws with Durkheim's "coercive force", but by the historically rooted "material conditions of production" (Warburton, 1998 ; Ch. 19). Materialism replaced idealism : "In direct contrast to German philosophy, which

descends from heaven to earth, here we ascend from earth to heaven ….. we begin with real, active men ….. Life is not determined by consciousness, but consciousness by life" (see Crotty, 1998 ; p.117).

The legacy of Marx has been to question what it is commonly stated *ought* to be the case, to begin from what empirically and patently *is* the case, and then to work towards a radically reappraised conception of what *ought* to be the case.

- **Habermas**

Lyytinen and Klein (1985) and Hirschheim and Klein (1989) have based their critical perspective on the theory developed by Jurgen Habermas.

Following Habermas' "Theory of Communicative Action", Lyytinen and Klein (1985) distinguish first between "purposive-rational action, oriented to success", and "communicative action, oriented to agreement".

Second, they distinguish between "social interaction" and asocial, "instrumental action". Instrumental action is solely "oriented to success" or purpose.

When social interaction is purposeful or success oriented, using "decision rules" and "empirical technical knowledge", it is termed, "strategic". Strategic action can be "overt" or "covert".

If social interaction is "oriented to agreement", it is termed, "communicative".

Communicative action may be "oriented towards understanding", ie. to determine the premises on which a particular proposition is based. If these premises are challenged and debated, communicative action assumes the form of "discourse".

Lyytinen and Klein say that Habermas "rejects scientistic attempts to define the universe as a set of facts, which are independent of the observer and his or her action". They then describe how Habermas distinguishes between three "knowledge interests" (**Table 3.2.3**) :

**Table 3.2.3 : Habermas' Knowledge Interests**

| Technical | purposive, rational, control oriented ; cause and effect ; scientific method. |
|---|---|
| Practical | communicative : understanding of values and norms ; hermeneutic, 'socially constructed' understanding. |
| Emancipatory | discursive ; power and unwarranted constraints  reflection, criticism of assumptions. egalitarian distribution of effort and reward between stakeholders. |

- **Foucault**

Brooke (2002b) suggests that the critical perspective has become unduly identified with a single individual (Habermas) and that the perspective can usefully be "enriched", especially in relation to the twin themes of emancipation and power, by reference to an alternative *oeuvre*, that of Michel Foucault.

As explained by Giddens (2001 ; p.675-676), Foucault's central theme is the role of discourse in power and control within society. Communication is conducted in forms of expression biased towards the interests of one or other elite. Discourses become "a powerful tool to restrict alternative ways of thinking or speaking. Knowledge becomes "a force of control".

- **Comparing Habermas and Foucault**

For Brooke (2002b), the first point of comparison is between Habermas' normative concept of an "ideal speech situation" and Foucault's position, "situated" in the context of "the economic relations of production" and "networks of linguistic signification".

Habermas envisages progress towards the elimination of instrumental and strategic communication and the establishment of a purely rational basis for communication and complete mutual understanding. In contrast, Foucault sees that power pervades all social relations and all communication is "distorted", because it disguises the concerns of an elite as norms and matters of neutral fact.

For example, Saravanamuthu (2002a) considers Business Process Re-engineering ("the management fad of the 1990's ….. for maximizing efficiency and returns") to represent a sinister and cynical form of coercive practice in which management's dominant economic rationality, threatening the balance of employment and unemployment, and the quality of work and its content, is disguised by the rhetoric of the "sovereign consumer" (or, in the case of the NHS, patients' "choice").

Brooke's second point of comparison arises from the greater detail in Foucault's analysis of power. That is sensitive to "juridical" (repressive rules and mechanisms of power) and "microphysical" (methods of domination and the exercise of power) forms of power.

Doolin (1998) amplifies Foucault's concept of "disciplinary" power. "According to Foucault", Doolin states, "power is exercised from within the social body. His disciplinary power operates by enhancing the calculability of individuals. It is constantly exercised by surveillance, observation and comparative measures that reference the norm". Disciplinary power relies on the individual constantly to compare his personal actions against what can be made visible against the background of societal or organisational norms.

Information Technology is one way this visibility can be established and awareness of this potential can colour the way IT is integrated with other norms and values in the social context of its use. Doolin illustrates this point with an example of a hospital casemix system and its impact on the behaviour of clinicians.

Stahl (2004) uses a "market" metaphor for the situation where, as Foucault would see things, the outcome of discourse is determined by the distribution of "social, technical and other capital". In contrast, for Habermas, the ethical and egalitarian conduct of discourse should ensure that the best argument will win in all circumstances where internal inhibitions or external constraints on expression can be eliminated and contentious "validity claims" openly tested for authenticity.

### 3.2.7 : Recursive Thinking - The Systems Approach

The three positivist, interpretive and critical approaches suggest a linear and uni-directional engagement between the understander and the understood. The fourth approach, now considered, alters completely the terms and direction of this engagement.

In a 'systemic' understanding, neither element can be conceptualised separately from the other. Each element reflects aspects of the other and is defined reciprocally or "recursively" (Greenhalgh, 2009) by the other.

**Characterising The Systems Approach**

Applying the approach of Orlikowski and Baroudi (1991) to Checkland (1993), Checkland & Scholes, 1990), Checkland & Holwell, 1998) we can characterise the systemic approach as follows :

**Knowing :** Positive, interpretive and critical modes of knowing are in recursive relationship with each other. There is no absolute and authoritative knowledge. Instead, 'knowing' consists of the construction of alternative insights, equally defensible, equally contestable and equally useful (Checkland, 1993 : p.283).

**Being :** Being 'is' always 'in relation to ……… 'some other entity or concept (Checkland & Holwell, 1998: p.110).

**Theory and Practice :** Theory is focused on parallel strands of rational, cultural and political modes of thinking. The practical impact is to present alternative constructions of any given situation for comparison, contrast and iterative re-modelling (Checkland & Scholes, 1990 : p.27-53).

**Assessment of Systemic Thinking :** 'Systems Thinking' considers entities as constituents of a larger whole. It is concerned with the mutual influence (communication), potential inequalities in influence (hierarchy and control) and in the behaviours of the collective whole that cannot be anticipated from knowledge of its constituent parts (emergence) (Checkland, 1993 : p.75).

**Philosophical Background to Systems Thinking**

Checkland (1993 : p.74) describes the failure of reductive, scientific methods to the solution of complex, ill structured problems :

> *"the inability of reductionist science to cope with various forms of complexity. Systems thinking is an attempt, within the broad sweep of science, to retain much of that tradition but to supplement it by tackling the problem of irreducible complexity via a form of thinking based on wholes and their properties which complements scientific reductionism."*

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- **Analytic Reduction : Descartes**

This section begins paradoxically with Descartes' conceptual separation of his mind (which certainly exists because he is thinking) from his body (which his radical scepticism continues to doubt) and all other physical realities. Descartes subsequently extended this separation "to divide each of the difficulties that I was examining into as many parts as might be possible and necessary in order best to solve it." (*Discourse on Method* : see Checkland, 1999 ; p.45-47).

- **Inquiring Systems : Leibniz, Locke, Kant, Hegel, Singer, Churchman**

Churchman (1971) identifies five kinds of "inquiring system" relevant to the question, whether human processes of thinking could be replicated in an intelligent machine. The five types of inquiring system are explained by Checkland (1981 ; p.258-261), Mason & Mitroff (1973), Mitroff (1973), Ulrich (2004) and Malmsjo (2006), as well as by Churchman himself. The individual philosophers to whom they are ascribed are also explained by Collinson & Plant (1987), Richardson & Courtney (2004), Robinson & Groves (2004). Each kind of "inquiring system" describes a different mode of thinking for the problem solver.

A Leibnizian inquiring system is an internally consistent set of rules, arguments and procedures, founded on a proposition which is neither open to debate nor susceptible to proof or falsification.

A Lockean inquiring system is one whose propositions are founded on consensus, between those experiencing a phenomenon, about the interpretation to be assigned.

A Kantian inquiring system reflects the realisation that human cognitive processes are interposed between "the thing itself" and the individual's appreciation. A different cognitive lens will produce a different appreciation[*].

A Hegelian inquiring system makes progress towards complete rational understanding by iteration through three stages. A proposition (thesis) was to be followed by a counter proposition (antithesis). The two competing propositions were then to be reconciled (synthesis). Hegel's theme is, in fact, an ever expanding wholeness.

Hegel believed that the state was an expression of complete rationality. Its members fell into four ideal types.

The *Citizen* was governed passively by the laws of the state and had no concept of liberty.

The *Person* was, in contrast, fully conscious of liberty.

The *Victim* was completely self-absorbed, isolated from and irrelevant to the tide of historical events.

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[*] Monod and Boland (2007) provide a brief summary of Kant's adjudication in the *Critique of Pure Reason*, that "The Critique is not in error when it teaches us to take the object in two different senses : as appearances, and as the "thing in itself". Kant used the Greek "*noumenon*" to denote the "thing in itself", independent of observation and "unknowable". He used the term, "*phenomenon*" to denote the "appearance" constructed in the human mind from empirical sense experience. Access to the *noumenon* was achieved only through the *phenomenon.*

The *Hero* was fully aware, able to exert influence and change things for the better and able to participate fully in the historical moment, uninhibited and unconstrained.

A Singerian inquiring system follows Hegel's tradition by arguing that each alternative philosophical tradition can be "swept into" a progressively comprehensive whole, whose boundaries and horizons expand infinitely to accommodate each new element. The mood of the project is "heroic" : not directed but carried forward by ideas as they emerge. Its corollary is that what "ought" to be the case can, through well-informed human endeavour, be brought within the realm of what "is" the case.

- **Extension to Inquiring Systems : Heidegger and Merleau-Ponty**

Bennetts and Wood-Harper, (2003) have proposed an "extension" to Churchman's inquiring systems in order to incorporate hermeneutics and phenomenology, choosing Maurice Merleau-Ponty (see Collinson and Plant 1987 ; p.245-249 : Macann, 1993 ; ch.4) as the relevant epitome. "It is for his attack on Cartesian dualism however that Merleau-Ponty is best known." (Macann, 1993 ; p.195).

Others (eg Winograd & Flores, (1986): Ciborra (1998, 1999, 2006), Ciborra & Hanseth (1998), Butler (1998), Butler & Murphy (2007), O'Donnell and Henricksen (2002)) have depended on Heidegger to provide the conceptual basis of their own ideas.

Macann (1993) sets out the respective phenomenological projects of Husserl, Heidegger and Merleau-Ponty. An introductory reading of Heidegger is also presented by Wrathall (2005).

Husserl's project was to understand the intellectual processes through which experience is constructed from reality. By "bracketing" the factors contributed to current experience by past experience, he could appreciate the "essential structure of the phenomenon".

In this, Husserl was influenced by Dilthey, who believed that human understanding reflects a world view "grounded not in the intellect but in life". The events in life are "ephemeral". The world view is provisional and contingent on the tide of past events. History, for Dilthey, is "an immense field of ruins" (Crotty, 1998 ; p.94).

Husserl's effort to strip away perception from reality still owes a debt to Descartes and the first point of departure from this tradition is made by Heidegger, in association with Gadamer.

For Gadamer, interpretation of experience is conditioned by language, itself conditioned by the "preservation amid the ruins of time" of its traditions by a community that has built the language around its own common experiences, traditions and prejudices (Crotty, 1998 ; p.94). Gadamer's concept of understanding as a "fusion of horizons" suggests partially intersecting islands of "historically effected consciousness", each separately conditioned by its unique prior exposure to experience, tradition and language.

Heidegger's departure from Husserl stems from his own belief that we are "thrown" into a world that is already present and which is bounded by time. Experience is inseparable from contingent effects. When we use a tool, we are using it "in order to…" a specific purpose. Place and time bear heavily on existence in a way that defies the

concept of "clear and distinct ideas". In Macann's words (1993 ; p.87) "there can be no free-floating apprehension or comprehension of the world or of entities located in the world".

In Heidegger's view, technology, such as a hammer or an information system, is just an object of contemplation ("present at hand") until it comes into being by virtue of being used ("ready to hand"). Present at hand, it represents the necessary aspect of its own being. Ready to hand, it now represents an actual aspect of its being but this state has come about through the user's projection, on to the tool, of the future possibility of being, represented by the 'fusion of horizons', shared by the user and the technology.

In practical terms, this must mean that a designer cannot construe an information system to be 'for' a purpose conceived in isolation from the context of the user and the possibilities for his own self-fulfilment.

Merleau-Ponty takes things further. It is impossible to take a God's eye view of the world because our capacity for experience is centred in a body, itself situated in a restricted zone of time and space. Merleau-Ponty's investigations in physiology and clinical psychology confirm that movements and actions are organised at a pre-verbal level before they are expressed in language.

The emphasis now falls upon embodied action rather than disembodied purpose, and upon the succession of the present moment rather than, as for Heidegger, the future possibility of existence. The practical significance of Merleau-Ponty's thought is to shift the problem solver's attention : away from the purpose of technology, defined in a way that expands or restricts human potential, and on to the interaction of the technology

user with the technology and his concurrent activities, in a fluid context constituted by an endless succession of present moments.

### 3.2.8 : Antipositivist Social Theory (Structuration and Actor Network Theories)

**Structuration Theory**

Giddens (1984) rejects "structuralist" assumptions that people's conduct is governed by mechanical laws, motivations and constraints ; and with "functionalist" explanations that suggest that people are passive in a teleological or homeostatic way, to maintain the internal stability of a society (or an organisation) and maintain its viability against extraneous threats. He argues (p.1), it is a weakness of these conceptions of society, that they emphasise "the social whole over its individual parts (i.e., its constituent actors, human subjects)".

What he thinks matters is "neither the experience of the individual actor, nor the existence of any form of societal totality [i.e. social structure], but social practices ordered across space and time" (p.2).

Giddens' thinking is influenced by the ideas contained in phenomenology, symbolic interactionism and ethnomethodology. The central theme is "social reflexivity". People "do" social action consciously (discursive consciousness), sub-consciously (practical consciousness) or unconsciously, but, in each case, knowledgeably, interacting with a specific situation (1984 ; p. 4-7, 22-23).

For Giddens, people in social groups and societies are never completely powerless against stronger agents. "Power within social systems ….. presumes regularized relationships of autonomy and dependence between actors ….. But all forms of dependence offer some resources whereby those who are subordinate can influence the activities of their superiors. This is what I call the *dialectic of control* in social systems." (1984 ; p.16).

Contrary to Durkheim, "Structure is not 'external' to individuals : as memory traces, and as instantiated in social practices, it is in a certain sense more 'internal' than exterior to their activities …….. " (1984, p.25).

As conscious social actors, individuals in a social situation deploy their own "resources" to adjust the balance of power. The "resources" they use include the "interpretive schemes" they use to link communication with meaning ("signification") ; the "authoritative" and "allocative" resources which permit and facilitate the exercise of power and rights within unequal relationships (of "domination") ; and the social norms and values which mediate between constraints or the "sanction" of action and ideas of what is permissible ("legitimation").

**Actor Network Theory**

Where structuration theory treats different social and organisational groups as homogeneous, Latour (2005) makes the point that sociologists interested in conflict have tended to "underestimate the number of actors".

Actor Network Theory (see essays by Law, Latour, Mol, and Callon in Law and Hassard, 1999) affords equal explanatory power to inanimate ("*actants*") as to human actors. Actors may be members simultaneously of multiple networks of commitment and may shift affiliation between these.

Law (Law & Hassard, 1999 : p.3-9) emphasises "relational materiality" (entities come into being through their relationships with other entities) and "performativity" (coming into being is a process rather than an event). The consequent "fractionality" implies that 'coming into being' is 'coming into being-in-the-world' and can have multiple forms according to the variety of contingent effects.

Callon (1986) explains how networks are stabilised through four "moments of translation" :

1.  *"Problematisation"* : A convinces B that B's action requires A's resources.

2.  *"Interessement"*: A prevents B from considering any alternative resources.

3.  *"Enrolment"* : A sets the conditions under which B will receive resources.

4.  *"Mobilisation"* : A's relationship with B is replicated in other instances of B.

"Translation is a process before it is a result". The result is not necessarily permanent. As a result of successful "translation", A has succeeded in recruiting multiple instances of B to his prescribed routine. The network remains stable until the final moment, *"Traduction"*, when instances of B begin to respond to other networks of commitment whose stability will be equally transient.

Latour (2005) explains that, as technology diffuses, it encounters the intersection of actor networks, each with its own social culture. In this way, when the insertion of technology is replicated from one local site to another, each local actor is differentiated by the unique constellation of actor networks to which he also belongs.

Inanimate objects contain the "*inscribed*" assumptions of one actor or group within the network, about the characteristics or future behaviour of other actors or groups, to whom they are linked by the inanimate object in question in the process of "*enrolment*".

As "actants", technology (for example, computers and software) becomes a vehicle for powerful stakeholders to project their own assumptions onto the behaviour of multiple communities of less influential users, across the lifetime of the capital investment. Technology becomes a device for the powerful to stabilise the network around their own preferences.

However, the theory also explains how distance, time, human interpretation and local priorities modulate the assumptions, inscribed by the system's author, about the system's ideal operation, when it is transplanted from the context of design into successive and differentiated host communities.

Latour (2005) "reassembles the social" by addressing five "sources of uncertainty". First, a given position (such as a person about to perform an action) can be reached from an infinite variety of antecedent positions. Second, there is no "point motivation" : action is the resultant of multiple forces. Third, the relationship between actor and role (or information system and context) is not considered as a cause and effect hierarchy, but as an equitable exchange. Fourth, the field of interest is not the frozen relationship

but the surrounding processes of association and dissociation. Finally, these processes are not inevitable chains of consequence, but result from human behaviour, contingent on local circumstances.

Latour then performs three "moves". To begin, he "localises the general". The general, abstract idea is brought down to the level of a specific location and context. Second, he "redistributes the local". Idea, location and context are made inseparable. Finally, he "connects sites". At different times and places, analogous patterns of association can have different outcomes. Latour asks himself how similarities and difference between outcomes can be explained.

Finally, Latour makes three observations and questions how they come about. First, agency is transported across distance and time by "connectors". He wants to know what they are and how they work. Second, there are different kinds of agency. Some forms are inert "intermediaries" and others are active "mediators". He wants to know how they act. Finally, different "connectors" are not continuous with each other. He wants to know how they come together and what happens when they come together.


### 3.2.9 : Critical Realism : A Unifying Paradigm
### for the Information Systems Discipline ?

Denzin and Lincoln (2000, page 165) propose a post-positive paradigm, in whose critical realist ontology, "apprehension of 'reality' can only be imperfect and probabilistic".

Mingers (2004a) has suggested that critical realism can provide "a consistent and coherent underpinning philosophy for Information Systems" as a significant step towards resolving the multiple strands of Information Systems theory.

For different reasons related to their different perspectives, Monod (2004), a physicist, and Klein (2004), a social theorist take issue with this claim.

Critical realism accepts the reality of entities whose existence cannot be observed directly, but which can offer plausible insights into the relationship between an event such as an information system and the successful or unsuccessful outcome of its application.

As Mingers explains (2004a ; p.92), critical realism locates the conditions of knowledge in the structure of reality rather than in the intellectual apparatus of the observer. It asks the ("transcendental") question, "Given a particular empirical observation, what can the world be like to allow this to occur ?". The method of critical realism is neither induction nor deduction but "retroduction". Instead of believing in a structure of physical 'laws', critical realists look for generative mechanisms and the positive or negative interference of extraneous factors p.(94-95).

Possible answers to the "transcendental" question operate at two distinct levels.

At the level of '*ontological realism*' things are held to exist whether or not we know about them. They are not altered by our knowledge of them.

Where 'naïve realism' stops short at this point, critical realism proceeds to take full account that knowing is an individual act of intellectual processing. At the level of *'epistemological relativism',* this means that we have separate reality from representation.

Critical realists expand the idea of causation, giving it complex content and rendering its components susceptible to analysis. The relationships between the components of causation are not necessary but contingent. The components are "*real*". They can be augmented, vitiated or unaffected by each other, and by changes in the "*actual*" external conditions in which the "*empirical*" observation occurs.

**Mingers' Thesis**

Empiricists cannot observe without introducing the effects of their observational apparatus (p.90). Conventionalists (with beliefs based on social convention rather than verification or falsification) only know what can be expressed within the current orthodoxy. Neither approach deals adequately with the central position of politics in social research, manifest in the 'theory-laden' aspect of language in social discourse.

Critical realism takes account, first, that many attributes are only intelligible within the context of a social institution or practice. Second, many activities and social institutions (for example, language) exist, and have their own system of implicit values, before we deploy them for our own purposes.

Nevertheless, critical realism also has to take into account that social structures do not exist in isolation from the activities they govern, nor from social actors' conceptions of what they are doing. Unlike 'laws' of natural science, social structures, are not universal but are 'situated' in space and time[*]. Where natural science deals with closed systems, social systems are interactive and open, and cannot be artificially closed for the purpose of experiment.

Critical realism allows investigation to go beyond description and to invite speculation on explanations at a granular and correspondingly rigorous level. Second, it admits social as well as physical explanations of observed phenomena. Third, it recognises that observations are fallible and requires a detailed account of the assumptions and limitations of the intellectual framework that underpins observation and interpretation.

**Monod's Critique**

Monod's (2004) chief objection to Mingers is that contemporary physics has progressed beyond the notions of objectivity and causality, enshrined in "the outdated physics of Galileo and Newton" that critical realism purports to overcome. The twin fundamentals of classical science (objectivity and the correspondence theory of truth) have been deposed by two new principles.

First, the deterministic concept of cause and effect has been superseded by a broader conception, that the relationship between events can take more than one form ("conditions of possibilities").

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[*] In other words, they refer to a particular place and occasion.

Second, the idea that scientific 'truth' was accessible through the progressive refinement of a single, definitive method has given way to the appreciation that different scientific methods provide different scientific 'truths'.

**Klein's critique**

Klein (2004) argues that critical realism does not sufficiently acknowledge the developments in contemporary criticism. He needs critical realism to take account of "four philosophical intellectual turns" that have influenced contemporary philosophy and the science of Information Systems.

The first two of these are Kant's "Copernican Revolution" : the understanding that what we perceive and what exists are separated by the limitations of our own cognitive apparatus ; and Kuhn's understanding that the politics of science can be as influential as its methods in shaping beliefs.

The third is the "linguistic turn" that has followed Wittgenstein's exposure of the complex link between language and meaning that impregnates neutral communication with prior theory.

The last is the "double hermeneutic" in social science : through their own theoretical lens, social scientists observe and interpret the behaviour of knowledgeable social actors who are, themselves, observing and interpreting the world around them. Once again, social scientists' observations of social actors are inevitably conditioned and loaded with prior theory which must be made explicit before conclusions can be drawn.

Klein argues (p.130-132) that critical realism specifies the kinds of things that can exist in the world less efficiently and less comprehensively than interpretivism. Critical realism's post- positive roots limit its scope to statements that are susceptible to falsification. Therefore, it cannot address social values, norms or ethical questions.

Then, Klein suggests that critical realism is not based on realism at all. Answers to the "transcendental" question (what must the world be like for this a given empirical observation to have been brought about ?") are "based on theoretical constructs".

Where the vocabulary of critical realism is restricted to 'mechanisms', interpretivism has a richer vocabulary of "human intention or *a priori* theory constructs such as structuration theory, instrumental reason, communicative distortion, forms of social control, etc." (p.134).

For Klein, three issues restrict the usefulness of critical realism. First, critical realism is 'critical' only in opposition to the verification principle of logical positivism. Second, critical realism requires awareness of the "double hermeneutic" when it is applied to the social sphere. Third, critical realism is "uncritical" of the ethical issues addressed in critical theory.

Despite these shortcomings, Klein acknowledges that critical realism has the capacity to be enriched by incorporating the four philosophical "turns" Klein has identified, and their most recent developments.

**Mingers' defence**

Mingers (2004b) accuses Monod of translating questions about what exists into questions about the limitations of our knowledge of what exists. He insists that we can believe in real things, yet appreciate that what we know about them is conditioned by our own personal cognitive apparatus.

To Monod's concern is that there can be no knowledge without a knower, whose perceptions influence what is known. Mingers retaliates that "knowledge must be knowledge *of* something".

To Monod's contention that cause and effect are outdated concepts, Mingers responds that critical realism recognises the complex nature of causality and can recruit other traditions outwith positivism to reinforce its exploratory and explanatory power. These other traditions illuminate both aspects of the "double hermeneutic" : the researcher's own cognitive filter, which modulates his perception of empirical observation ; and the understanding of the relationship, between social actors and the social, cultural and power structures of the world they inhabit, that go beyond "the conscious self-understanding of individual subjects".

In response to Klein, Mingers insists that critical realism has indeed engaged with the four 'turns' Klein indicates. It can derive knowledge of generative mechanisms from non-positivist perspectives. In consequence of its access to the critical as well as the interpretive paradigm, critical realism can, after all, satisfy Klein's concerns about its ability to deal with non-rational (norms, values and ethical beliefs) as well as rational factors.

### 3.3 : THE PROBLEM SOLVING METHODOLOGY

### 3.3.0 : Introducing Methodologies and Models

Iivari, Hirschheim & Klein (2001a) distinguish between a methodology and the techniques it contains. The methodologies evident in the Information Systems literature map to a smaller number of approaches. In turn, these map to the four paradigms identified theoretically by Burrell and Morgan (1979) and empirically by Hirschheim and Klein (1989).

Jayaratna (1994 ch.2) appreciates the 'context' purpose of methodology, to place a construction on the problem situation, and its 'content' purpose, to help solve the problem itself. He recognises that the purpose of each design step, intended to produce a change of state in the problem situation, is more important than the step itself. Jayaratna identifies several important aspects of methodology :

- An emphasis on structuring rather than structure

- The rationale behind the structuring process

- The nature of the embedded model

- Philosophical assumptions underpinning the methodology

- The characteristics of the methodology creator *versus* the characteristics of the methodology user.

Jayaratna (p.43) distinguishes between a methodology and a framework. Methodology authors have tended to present their successes and understate their failures. Their claims

need to be tested against a "methodology-independent framework" that can help us to understand the area of problem solving, understand the structure, steps, form and nature of the methodology, and frame our conclusions.

He defines methodology as "an explicit way of structuring one's thinking and actions. Methodologies contain models and reflect particular perspectives of 'reality' based on their embedded philosophical paradigms. A methodology must show 'what' steps to take, 'how' those steps are to be performed and, most importantly, the reasons 'why' the methodology user must follow those steps and in the suggested order."

On the other hand, a conceptual framework is "a meta- level model through which a range of concepts, models, techniques, methodologies can either be clarified, compared, categorised, evaluated and/or integrated. A methodology differs from a conceptual framework in that a methodology always implies a time-dependent order of thinking and/or action stages."

Taylor, Moynihan and Wood-Harper (1998) discuss the advantage of using a methodology to embed quality assurance and to enforce discipline and clarity of expression in writing, coding and documentation. Substitution of evolutionary formal design processes by trial and error and 'rapid development' methods risks a lack of co-ordination, standards and documentation that create problems for the subsequent support of the new system.

The disadvantages of methodology use include time, effort and overhead costs. A methodology can be inflexible and impose steps, sometimes, without convincing evidence of need. The methodology overhead has to be balanced against the local and

the organisational benefit. There is a danger that methodology is used to satisfy the requirements of external regulators, auditors and inspection authorities instead of responding carefully to the ways n which information technology will be used (Horton & Wood-Harper, 2006).

The standard design methodology for government information systems in the United Kingdom is SSADM (Structured Systems Analysis and Design Methodology). It embodies a series of mandatory steps that must be recorded in detail for the purpose of project control.

Wastell (1996) describes the results. The methodology becomes a "fetish" : a self-sufficient surrogate that represents psychologically and substitutes a real experience. SSADM generates "mountains of paperwork for review". Developers become so absorbed in technique that end users are sidelined. Wastell identifies "a tendency to over-rely on the structure, to let the method think for them……people get bogged down….they lacked the confidence to say 'look we're getting into too much detail here,' ". For many users, the methodology is rather a means of "social defence" (Fitzgerald, 1998 refers to the "comfort-factor"), in an environment of accountability, risk and stress, than a positive tool for successful design.

Fitzgerald (1997) distinguishes between methodology in theory and methodology in use. Experienced designers tended not to use methodologies rigorously. This was not because they were ignorant of their existence but because they used the methodologies "in a conscious and deliberate fashion", adapting their approach to the situation in hand.

On this view, methodology is either a barrier or a bridge between a designer/theorist and a practical design problem. The specialised activities within a formal methodology can become institutionalised as a core competence of the IT developer and contribute to what Flynn and Jazi (1998) call "the user-developer gap".

Kautz *et al.* (2007) identify "diversity", "knowledge" and "structure", operating at successive organisational levels, as "persistent problems" that confront information systems developers and require specific responses. They say that the diversity of challenges needs to be reduced through the division of labour and by formalisation and specialisation of roles. This requires knowledge, local and special, to be acquired and disseminated through "constant communication and negotiation". Structured approaches to organisational and technical problem solving need to be applied pragmatically alongside a well-developed situational awareness.

**Models**

A difference has been suggested above, between prescribed methodologies and the things that happen in practice. The methodology is a model for behaviour.

Jayaratna (1994 ; p.242) defines a model as "a complete and coherent set of concepts which can underpin our understanding and actions".

Where a mimetic model reduces physical structure, a conceptual model, simplifies conceptual structure. In either case, a model is only a selective representation and never completely 'is' the thing it purports to represent.

A model may be a physical object in its own right. As such, it may represent a physical reality or an idea. The physical model is distinct from the individual responses it elicits, in people with different prior experiences and personal conceptual apparatus.

These responses are neither inherent in the model nor pre-programmed into the human *psyche*. They are evoked by a mental model, of a thing or a situation, shaped by a blend of individual personal interpretation and social convention.

A textual or visual representation of the mental model may be more or less successful in expressing the mental model itself, simply because linguistic theory interposes a pre-verbal phase of cognition between sensory experience and expression.

**A Critique of Models and Methodologies**

Ciborra (1998) argues that we have been solving problems longer than we have been making models and constructing methodologies. Flexible infrastructures are more useful and more realistic than master plans. Formalistic methods have the severe limitation, that they are constructed from post-rationalisation of past experience, and deployed before the problem is defined.

In Ciborra's view, the reductive method of science distances the model builder from reality. Abstraction is mistaken for reality. We come to 'believe' the model and ignore the interface between the model and the messier aspects of reality it ignores.

In other words, a model is an "idealised" form of a poorly structured world. We must beware of imputing formal properties to an ideal proposition. We need to treat the model sceptically and retain the ability to 'see things as they are'. Rather than idealise and behave as if the situation 'is' the model, we ought to focus on the things that do not fall together in a neat plan. A model ought not to be a substitute for careful improvisation.

We can conclude, from Ciborra's argument here, that a good model or methodology is not like a 'magic wand' but is an aid to careful and conscious navigation through the problem situation.

Planned action is idealised action. Elsewhere, and Ciborra (1999 ; Ciborra & Hanseth, 1998) argues that planned action, without regard for current context, is neither a usual nor a successful strategy. Successful navigation through the problem situation is what he terms, "improvisation". Technology is both understood and misunderstood as a "tool".

Misconstrued, a tool has a distinct purpose and can be well adapted for that particular purpose. This works well when the stereotyped task is simple and well defined.

Properly understood, a tool is a resource, able to be deployed for the unpredicted needs of the moment and whose improvised use is not limited by preconceptions about its purpose. Such preconceptions occur when we see technology as "a distinct source of representation" (Ciborra, 2006), limiting its potential application to what has been anticipated in advance of experience.

Hughes and Wood-Harper (2000) present four propositions about information systems development methodologies, each from the situated perspectives of system developers, then from those of their industrial clients.

First, methodology users vary in their experience ("from novice to expert" : Benner, 1984). This affects whether they use the methodology as a resource 'ready to hand' or 'present at hand' : whether it is incorporated into action fluidly, expertly and intuitively, appropriate to the task or whether adherence to the methodology is seen as an end in itself, relegating the primary task to the background.

Second, methodology users apply a process of sense making (Jayaratna's "mental construct" and the interplay of problem situation, problem solver and problem solving methodology) that mediates the conversion of a 'methodology in theory' to a 'methodology in action'.

Third, "methodologies are tailored to the contingencies of a situation". Action is tuned primarily to the pace of the problem situation rather than to the stringencies of an externally-stipulated plan.

Finally, the 'comfort factor' aspect of methodology use can prioritise defensive practice and transparency over relevance to the task in hand.

These four propositions are not only highly relevant to the use of methodologies and models in the Information Systems field. They are also highly relevant to the use of decision support tools (clinical pathways, prescribing support) in clinical medicine and

to their agency in the 'enrolment' of clinicians in the actor networks of managers, policy makers, pressure groups and politicians.

### 3.3.1 : Towards a Taxonomy of Information Systems Models and Methodologies

Lyytinen (1987) recognises three issues in the development and use of information systems :

- Balance of economic-rational and human factors

- Approach to design and development and choice of paradigm

- Definition, attainment and ethical validity of IS goals.

**Three Categories**

Mingers (2003) states that all methods (methodologies) "have in common the basic mechanism of modelling, but ……… differ in terms of *what* they model (ontology), *how* they model (epistemology), and *why* they model (axiology)".

He classifies methods, therefore, as follows :

- *What the method purports to do* : eg. Soft Systems Methodology is a method to "explore different world views relevant to a real world situation and contrast them in a process of debate"

- What it assumes to exist (ontology)

- How it is represented (epistemology)

- Four dimensions of axiology : What kinds of information should be provided ; Where should information come from ; Who is the information for (analyst, facilitator, participant in the problem situation) ; What is the information for (eg. "to learn about and improve a problematic situation by gaining agreement on feasible and desirable changes") ?

Having classified a given methodology as above, Mingers can then map its approach to appreciation, analysis, assessment and action onto the matrix shown in **Table 3.3.1.**

**Table : 3.3.1 : Analysis of Methodology (Mingers, 2003)**

|  | Appreciation of | Analysis of | Assessment of | Action to |
|---|---|---|---|---|
| **Material (positivist)** | physical circumstances | underlying causal structure | alternative physical and structural arrangements | select and test best alternatives |
| **Personal (interpretive)** | individuals' beliefs, meanings, emotions | differing perceptions, personal rationality | alternative conceptualisations and construction | generate accommodation and consensus |
| **Social (critical)** | social practices, power relations | distortions, conflicts, interests | ways of altering existing structures | generate empowerment and enlightenment |

Mingers' own categories (material, personal, social) correspond broadly with the positivist / functionalist, interpretive and critical paradigms, discussed earlier.

**Four Areas of Application : Competency Areas in Information Systems**

Iivari, Hirschheim and Klein (2001b) identify four competency areas whose understanding assists the process of "aligning" IT with the organisation and its people, in contrast with the more instrumental and manipulative concept of "fitting".

The first of these is the organisational alignment of IT (focusing on 'fit' between IT and the social and organisational context rather than organisational objectives. Second, they identify the construction of user requirements. The third area is the implementation of IT within an organisation. Finally, they identify the evaluation and assessment of IT artefacts.

### 3.3.2 : Modelling the Problem Situation

**Positivist Models, Suggesting Material Structure and Function**

One approach to the problem situation is to reduce it to the intervention of information technology into the organisational structure of the NHS.

Mintzberg (1993) presents an organisational model which emphasises internal functional differentiation. Its spine contains the "strategic apex", the "middle line" and

the "operating core", flanked by the "techno-structure" and the "support services". Where the strategic apex is concerned with the detection of trends in the external environment, the formulation of policy and the strategic redeployment of material, human and financial resources, the role of the middle line is to create and maintain structures of communication which assure the realisation of apical policy through the productions of the operating core. The middle line is responsible to promote efficient liaison between elements of production, supervise their problem-free interaction, to detect when things are going wrong and to restore stability.

The techno-structure, in an NHS organisation, is constituted by the professional systems of knowledge, skills and values that underpin the physical delivery of healthcare that occurs after the patient has been assimilated by the administrative and clerical functions of the operating core. Support services ensure the integrity of plant and the continuity and resilience of business and clinical processes.

Where Mintzberg's model appears closed against external influences, Beer's (1972) cybernetic, "viable systems model" explicitly incorporates organismic sensitivity to the external environment.

This model contains a vertical hierarchy of repeating horizontal structures. Operations and management sectors are demarcated at each successive level, sensitive to each other, to the external environment (eg labour market, commodity supply and demand). and to external regulation. Horizontal units are linked vertically, exclusively through management sectors.

A third model, due to Leavitt (See Jayaratna, 1994 : p.59) portrays an organisation as an encounter between people and structures, tasks and technology. The intervention and implementation of new technology can be understood and evaluated at any organisational level through its impact on these elements.

**Interpretive Models, emphasising the Process of Structuring : Structuration Theory**

Walsham (1993) discards organisational metaphors built around the structural and functional conceptions of organisation as machine or as organism in favour of those which present the organisation as a culture or a political system (see Morgan, 1997 ; ch.6,7).

In his analysis, the content of change is secondary to the context and process of change. He aligns (p.60) context with theories based on social structure and function, and process with social theories based on individuals and interactions. Then he uses Giddens' (1984) "structuration" theory as an analytic bridge to establish "context-process linkage".

Structuration theory (**Figure 3.3.1**) links Walsham's "context" of action (social structure) and "process" (content of social (inter)action) through "modalities". Communication, use of power and permissive sanction (aspects of process/interaction) are linked respectively to "structures of signification, domination and legitimation" (aspects of context/structure) by their respective "modalities" (interpretive schemes,

allocative and authoritative resources, and cultural norms) (Giddens, 1984 ; p.29 :

Walsham, 1993 ; p.61).

**Figure 3.3.1 : Structuration Theory : the Duality of Structure and (inter)Action through Modalities.**

| Structure | Structures of Signification | Structures of Domination | Structures of Legitimation |
|---|---|---|---|
| **Modalities** | Interpretive Scheme | Facility | Norm |
| **(Inter) Action** | Communication | Power | Sanction |

**Critical Models, Stressing the Ambiguity of Identities, Relationships and Hierarchies : Actor Network Theory**

The National Programme has represented the intention to introduce a standard information technology to multiple non-standard sites. Walsham (2001) applies Actor Network Theory to studies of global technology transfer, at individual, group and organisational levels, across geographical and cultural boundaries.

Doolin and Lowe (2002) argue that Actor Network Theory is a valuable adjunct to critique because of its power to demonstrate the ambiguity of identities, relationships and hierarchies.

Hanseth et al (2004) argue that structuration theory provides powerful insights into interpersonal or intersectoral relationships but is less powerful than Actor Network

Theory to address the fluid relationship, between information technology as designed and information technology in the situated and occasioned context of use.

**Critical Models Exploring the Inter-Sectoral Distribution of Power : Power Circuit Theory**

The expansion of governing influence across geographical and administrative boundaries is a global aim that is only partially relinquished when power is devolved from the centre within a tight framework of accountability. Regulation, to suppress contingency and expunge "unacceptable variation" in practice, is used by centralised authority to extinguish local social organisation and behaviour and assert a model which is basically colonial.

However, Silva (2007) recognises that events and interpretations of events are 'situated' in the context of surrounding conditions (place, time, history of surrounding events) and 'occasioned' as special rather than general occurrences. Even power is "relational" : not possessed by any individual but present in the direct and the indirect or symbol-mediated relationships between individuals.

Silva distinguishes between rules (social structure) which determine individual behaviour, the interpretation of rules which enables individual action (choice of behaviour), and power. Power, the non-rational basis of rules, operates overtly to lay down rules but also operates covertly to modify or implicitly discipline individual choice. Choice is intrinsic, where power to modify choice is an extrinsic influence on

the individual. For Silva, information systems "are key instruments of control" and "they can radically change work tasks which will impact workers' identity".

To explore the relationship between information systems and power, Silva assesses the relative merits of four approaches :

- Phenomenology and Hermeneutics

- Critical Theory

- Structuration Theory

- Power Circuit Theory.

Phenomenology and Hermeneutics highlights power derived from the ability to influence other people's interpretation of things and events but it "does not lead to a concrete theory of power that can help researchers in gathering concrete data capable of depicting a rich picture of the power phenomenon".

Critical Theory holds, according to Silva "that technological artefacts are the result of political struggles, so they are the carriers of specific interests". This is a move beyond establishing the source of power in its ability to modify action, and towards the exploration the effects of power. Silva points out that Lyytinen and Klein (1985) specifically identify user resistance, alienation and lack of use as negative effects of power.

Structuration Theory is criticised by Silva for two principal shortcomings. First, it operates at a rarefied, meta-theoretical level, unencumbered by local data. Second, its focus on the mutual constitution, dissolution and reconstitution of social structure and

social action tends to overshadow enduring background relationships, dominated by powerful influence. This is especially the case when IT artefacts are present as "carriers of specific interests" to perpetuate the prior outcomes of "political struggles".

Having criticised these first three approaches, Silva now seeks, in "Power Circuit Theory", a theoretical framework to provide "analytical concepts on power that are linked to data". Power is not possessed by an individual but comes into being each time a relationship between individuals is instantiated. There are three 'circuits' : episodic, social and systemic.

- Episodic circuit, actor A has power over the actions of actor B. Power is "translated" in four "moments".
  5. *"Problematisation"* : A convinces B that B's action requires A's resources.
  6. *"Interessment"*: A prevents B from considering any alternative resources.
  7. *"Enrolment"* : A sets the conditions under which B will receive resources.
  8. *Mobilisation"* : A's relationship with B is replicated in other instances of B.
- Social circuit : A has capacity to exercise power and discretion not to use power. B's choices are limited by the possibility that A might exercise power.
- Systemic circuit : A determines the societal goals that will direct B's efforts.

Silva concludes that power circuit analysis excels over the other approaches cited because it provides specific and detailed insight into the operation of power and political action within the social processes of information systems implementation.

**Critical Models Relating to the Control and Facilitation of Work : Operative and Supportive Information Systems**

Cecez-Cecmanovic *et al.* (2002) make a distinction between information systems that support the subordination of one interest by another, and systems that support the fullest expression of each individual's personal professional motivation (**Table 3.3.2**).

**Table 3.3.2 : Critical Comparison of Information Systems Rationale (Cecez-Cecmanovic *et al.*, 2002)**

| Perspectives | Ontological Assumptions | |
|---|---|---|
| | **Work is where the individual is subordinated to the collective goal, idealised as a 'system'.** | **Work is where each individual's personal goals and motivations are realised.** |
| **Individual Perspective** | Power is openly distributed. A dominant individual or *elite* expresses "Instrumental" and "Strategic" rationalities. | Individuals express personal, "Substantive" Rationality. |
| **Collective Perspective** | There are hidden asymmetries of rhetoric, information and power. The language and content of discourse are value laden. Communication is "distorted" and rationality is only "*Quasi-*Communicative". | There are no hidden agendas. The collective allows uninhibited expression to all parties and there is "Communicative Rationality". |

Malmsjo (2006) distinguishes "operative" from "supportive" information systems.

Operative information systems support 'hard', formal processes of positivist reasoning which treats information as a transmissible commodity with physical properties independent from individual experience. On this view, information can be assembled, stored, processed, delivered and retrieved.

Supportive information systems support 'soft' processes of anti-positivist reasoning, whereby individuals continuously construct and refine a mental model. On this view, information is an individualistic process, based on comparison of new information from the external environment with prior learning.

According to Malmsjo, operative and supportive types of information system differ according to the characteristics, shown in **Table 3.3.3**.

**Table 3.3.3 : Operative and Supportive Types of Information System**

|  | **Operative Systems** | **Supportive Systems** |
|---|---|---|
| necessity | information is necessary for the process to continue | the process can continue without the information supplied by the supportive system |
| users | information roles are tightly coupled with occupational roles | similar information roles may be performed by a variety of occupational roles |
| purpose | system purpose is evident and formalised | system purpose is not precisely defined |
| information availability | the information contained in the system is available nowhere else | the information contained in the system can also be found from other sources |

### 3.3.3 : Modelling the Problem Solver

**'Hard' and 'Soft' Models of the Problem Solver**

Checkland and Holwell (1998 ; p.41-49) identify Herbert Simon and Sir Geoffrey Vickers as contrasting epitomes of the problem solver. Simon's "hard, functionalist" approach is characterised by analysis and decisive choice between binary alternatives in definite and permanent relationship. Vickers' "soft, appreciative" approach represents a perpetual accommodation between competing and conflicting pressures in which the relationship between one idea and another is fluid and open to modification by other ideas.

In Checkland's terminology, 'hard' problems are concrete and well defined. They are amenable to rational analysis through a pre-ordinate methodology. The paradigm is decision making. In contrast, 'soft' problems are ill-defined and have substantial social and political undercurrents. The paradigm is navigation between competing scenarios : more an exploratory approach than an explicit plan, and the associated methodology tends to be an emergent one.

**Systems and Systems Thinking**

Checkland (1981 ; p.72-86) explains that systems thinking deals with sets of interacting elements and considers these sets as irreducible, self-contained wholes. In this way of thinking, entities are not considered to exist independently and are defined only in relation to each other. In particular, "Systems thinking is founded upon two pairs of

ideas, those of the *emergence and hierarchy*, and *communication and control*." (Checkland, 1999 ; p.75).

Hierarchy refers to the ability of one subsystem to achieve primacy over another. Emergence refers to the ability of the assembly to achieve effects that cannot be predicted from the individual properties of its members.

Systems are considered to have an internal dynamic. Stability is maintained through communication between interacting elements. Some actions and interactions are self-reinforcing, accelerating departure from an original state (positive feedback). Control negates this tendency, through hierarchy (the capacity of one element to override another) and the damping effect of one interaction upon another (negative feedback).

The natural state of a system is one of more or less damped oscillation rather than complete stability. The intervention of delay (inertia), between the initiation of the conditions for interaction and the interaction itself, can affect the amount and the rate of change, and the direction of departure or return towards the original state.

When the system's environment is neglected, the system is treated as a 'closed' system, impervious to the effects of external events. In contrast, an 'open' system is highly sensitive to the effects of external events, modulated by passage across the system boundary.

'Chaos' refers to the tendency of some systems to experience dramatic shifts of state. However, this term does not imply randomness, the complete absence of order. Any state of a chaotic system is ambiguous : it can be reached from more than one set of

antecedent conditions (path dependency) and its transition from this state to the next is contingent on the alternative behaviours of its sub-systems. This uncertain tendency interferes with an observer's ability to predict events within the system.

Systems with large numbers of elements and interactions are 'complex', in distinction from 'simple' systems. Complex systems are often chaotic and the chaotic tendency is increased by openness to environmental effects. Openness to the environment and the flexible nature of the distinction, between what is to be incorporated within and what is to be excluded by the system boundary, create problems for a universally valid definition of any given instance of a system.

When complexity contains observable regularities it is 'chaotic'. The infinitely numerous potential states cluster around a smaller range of stable zones or 'attractors'. Variables can be relatively few, but each contains a statistical range of values. McBride (2005) explains chaos theory as follows :

- "Chaotic behaviour does not indicate a lack of order. Rather, the order is difficult or impossible to describe in simple terms ………"

- "Chaotic systems react significantly to ….. " (changes in their external environment) " ….. and shift between a number of semistable states. It is the - study of this fluid behaviour that gives rise to significant insights."

- "Variables associated with the system do not repeat values although they remain within a fixed, definable space."

- "The complex interactions between actors and technology that occur in the development of IS[*] strategies and the development of organizational changes in response to information systems may be open to interpretation within a chaos theory framework."

The observation that variables cluster "within a fixed, definable space" is summarised in the concept of a 'strange attractor'. Over time, values of the variable can move abruptly from one strange attractor to another. This effect is conditioned by what has happened already, either within the 'system' or within the context in which the system is set. Because of this, a given state of the system, social or physical, can be reached from a variety of starting conditions, yet the same starting conditions can result in a variety of final states. Tiny influences can have profound effects. Sequence and correlation between events do not necessarily imply causation.

**Problem Solver as Systems Thinker**

Senge (1990) appreciates systems thinking (the "fifth discipline") as the integrating factor that establishes coherence between four other disciplines. This approach to systems thinking aims to identify the point of "leverage" where a small scale intervention can have a significant and worthwhile systemic effect on the efficiency of an organisation.

Senge's own expression of the five disciplines is amplified by Bell and Wood-Harper (2003).

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[*] IS : Information Systems.

"Personal Mastery" establishes control over events and constraints by virtue of clear vision and commitment to results. "Mental Models" allow participants to be aware of their own personal perceptual apparatus and the perspectives of others so that they can become aware of alternative mental models. The "rich pictures" and "CATWOE" components of SSM fall within this category. "Shared Vision" expresses destiny and aspiration. The vision is developed by ensuring that all relevant voices and ideas are taken equitably into consideration. "Team Thinking" entails thinking beyond personal boundaries and interests to consider issues in wider context. The result is the growth of mutual confidence, honest disclosure and organisational capacity to act differently.

Seen as the keystone for these four disciplines, "Systems Thinking" enables each individual whole, defined by its own boundary, to be seen as part of a larger whole. There is a continual, critical awareness of boundaries and a willingness to reset these inwards or outwards without losing sight of the 'bigger' picture or neglecting local detail. Seeing local issues in their systemic context is key to the anticipation of systemic consequences from local action.

Checkland notes that Churchman had discussed inquiring systems in an *ontological* sense as if they existed in concrete form. Senge's treatment of systems appears similar. Checkland carefully points out that, in his own conception, systems thinking, the characteristic activity of the systems thinker, is conducted in an *epistemological* sense, as a way of conceptualising a situation metaphorically, using the language of systems, without implying the existence of any system in concrete or tangible form.

As an entity, a system is itself defined in relation to the other entities that constitute its environment. The distinction between the system and its environment is not 'real'

(independent from human cognition). Instead, it is an artificial, human construct and depends on human perceptual apparatus. Cordoba (2009) provides a critical account, showing the political and ethical importance of the system boundary. The setting or definition of a system's boundary is, therefore, open to challenge.

**Problem Solver as Social Critic and Emancipator**

Heinz Klein has been a leader in the application of emancipatory critical theory to information systems. The European Journal of Information Systems (anonymous, 2009) has invited papers describing "Kleinian Information Systems". **Table 3.3.4** shows conventional theses about information systems and the Klein's own antitheses.

**Table 3.3.4 : 'Kleinian' Information Systems**

| Dimension | Thesis | Klein's Antithesis |
|---|---|---|
| post functionalist | focus on implementing a system | focus on changing organisational relationships |
| axiological | technical-economic considerations are paramount | ethical considerations are paramount |
| emergent | the information system has a self-contained rationale | the system emerges as an adaptation to the social and political constraints of an organisation |
| semantical | the information system merely processes data | the information system communicates meaning which reflects a world view |
| Hellenic | an information system serves the interests of an *elite* | an information system can deliver democracy through enlightenment |

### 3.3.4 : Modelling the Problem Solving Methodology in Positivist Terms

### (i) 'Hard' Approaches to Organisational Alignment of IT (Strategy)

A traditional, positivist or functionalist conception of management information systems is provided by Gorry and Scott-Morton (1989), shown in **Figure 3.3.2**. This framework deals with different levels of control (strategic, operational, management) and different intensities of data structure.

**Figure 3.3.2 : Gorry & Scott-Morton Framework for Management Information Systems**

| Figure 1 | Information Systems: A Framework | | |
|---|---|---|---|
| | **Operational Control** | **Management Control** | **Strategic Planning** |
| **Structured** | Accounts Receivable | Budget Analysis— Engineered Costs | Tanker Fleet Mix |
| | Order Entry | Short-Term Forecasting | Warehouse and Factory Location |
| | Inventory Control | | |
| **Semi-Structured** | Production Scheduling | Variance Analysis— Overall Budget | Mergers and Acquisitions |
| | Cash Management | Budget Preparation | New Product Planning |
| **Unstructured** | PERT/COST Systems | Sales and Production | R&D Planning |

In this framework, various activities are labelled as varieties of formalistic business transaction with no negotiated or political content. The framework presupposes that the information system will be integrated within the host organisation without encountering problems related to the human component of information systems, yet such problems can lead to expensive systems being rejected by users and gradually extruded from operational use. Relevant examples from the NHS are provided by Maguire and Ojiako (2007), cited earlier.

Rahimi Vimarlund and Timpka (2009) advise that "merely implementing a hospital information system will not automatically increase organisational efficiency". Benefits are realised when workflows and processes are re-engineered around the new information system. Users need time to assimilate the change. Legacy hardware must be compatible with the new software and staff have to be "educated" to encourage them to use the system.

Despite their 'hard' orientation, these authors also acknowledge important socio-technical issues that 'hard' methodologies usually ignore. They say that end users can help developers to understand their every day work practices and feed back early implementation lessons. They can develop their own appreciation of the new system as "a useful tool in their every day working life".

- **Project and Programme Approaches**

Differences between project and programme approaches are set out in "*Managing Successful Programmes*" (United Kingdom Office of Government Commerce, 1999).

Thus (*ibid* : p.12-13), "A project has a definite start and finish point, with the aim of the delivery of an output that may be a product, service or specific outcome. A programme has a vision of the 'end-state', but no clearly defined path to get there ……… There are inherent tensions between the pressures on projects to complete to time and on budget and the need to achieve the wider goals of the programme". The contrast is developed further in **Table 3.3.4** (*ibid* : p.13).

Meanwhile, the document continues (p.37), "The fundamental purpose of a programme is to transform the organisation in some way, to do things differently, or to do different things. The programme's Vision Statement describes the desired outcome of this transformation".

**Table 3.3.4 : Contrasting Projects and Programmes**

| Project Management | Programme Management |
|---|---|
| Intense, focused : outputs driven. | Concerned with broadly defined change objectives. |
| Closely-bounded, relatively certain objectives. | Multiple, complex activities with fluid and uncertain relationships. |
| Manages delivery of specific product, service or outcome. | Synergistic. Net benefit exceeds sum of individual project benefits. |
| Benefits represent an abrupt change in state for the host organisation at end of project. | Co-ordinates impact, benefits and deliverables from multiple component projects. Changes continue to evolve after individual projects conclude. Programme conclusion marked by achievement of organisational transformation rather than project. termination |

- **Functionalist Models : SASS and SSADM**

The functionalist conception of requirements construction is provided by DeMarco (1979) in Structured Analysis and Systems Specification (SASS). In this methodology, business processes and data flows are analysed at progressively more granular levels (functional decomposition : **Figure 3.3.3**) and then rationalised.

The outcome of the methodology is dictated by the plain logic of business transactions. Social and political elements, that might intrude from a new system - implications for jobs, redundancy or redeployment - or from the impact of new information systems on the nature and quality of work, are deleted from the design discourse.

**Figure 3.3.3 : Functional Decomposition in SASS (DeMarco, 1979).**
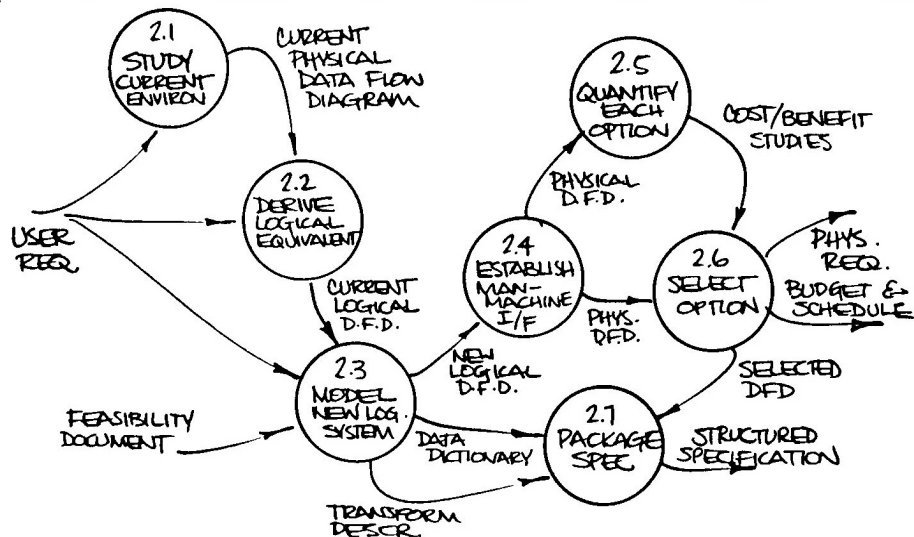
Universal Modelling Language [UML] (Booch, Rumbaugh & Jacobson, 1999) associates a de-contextualised, ideal typical actor, and his associated role, with a specific function of the information system in a "use case". The language provides a convenient notation to describe entities, their attributes, relationships and state-changes, as well as complex sequences of events, activities and combinations of activities.

The archetype of information systems design methodology in the United Kingdom public sector is Structured Systems Analysis and Design Methodology (SSADM). Not surprisingly, it and the related PRINCE (Projects in Controlled Environment) project methodology are intended to safeguard probity and control in the use of public funds.

In PRINCE (United Kingdom : Office of Government Commerce, 2009), a technically complex project is broken into stages with controls and milestones so that risk in any stage is carefully controlled before moving to the next stage. For each stage, a technical, a business and a user co-ordinator are appointed. The stage is not concluded and progress to the next stage cannot occur, until all three co-ordinators have signed off. However, the complex negotiations that can confront the user co-ordinator are not guided by the methodology.

SSADM itself contains a similar cascade of modelling steps, each completed before the next begins (**Table 3.3.5**).

The opening feasibility study is conducted along rational-economic lines. The social and political analysis of change is eliminated from consideration and relegated to a relatively late stage of the implementation process. As Checkland and Holwell (1998 ; p. 121-124) point out, the strategic business need for the system and its affordability by

the organisation are settled before there is a clear understanding of the operational problems that interfere with business efficiency, and the reconfigurations of people and processes that a new system might support.

**Table 3.3.5 : SSADM Modules, Stages and Activities**

| Feasibility Study | **Stage 0** Overview. Data Flow Diagrams and high level Logical Data Structures, describing the present business. |
|---|---|
| **Requirements Analysis** | **Stage 1** Data Flow Diagrams and Logical Data Structures used to produce detailed logical models of current system. **Stage 2** Identification of future business system options, supported by development of relevant Data Flow Diagrams and high level Logical Data Structures. The preferred option is chosen. |
| **Requirements Specification** | **Stage 3** More detailed development of Data Flow Diagrams and Logical Data Structures for the preferred option. Development of Entity Life Histories (eg, new patient, diagnosed patient, treated patient, discharged patient). |
| **Logical System Specification** | **Stage 4** selection of best option to classify, store and circulate data. **Stage 5** detailed analysis of transactions to be undertaken by people operating the new system. |
| **Physical Design** | **Stage 6** configuration of hardware and programmes. |

### (iii) 'Hard' Models of Implementation

Lyytinen and Robey (1999) argue that, to succeed in implementing their information systems, organisations have to convert barriers to learning into "gateways" to learning and organisational problem solving and abandon three "myths". The barriers include interdepartmental rivalries and isolation as well as unwillingness to declare and learn from error. The myths are :

- Technical 'fix' : technique and technology are sufficient to create organisational improvement
- Silver bullet : intervention can be successful without prior diagnosis
- Organisational restructuring : changing structures without changing interactions, dialogues and discourses is sufficient.

Bygstad *et al.* (2010) define "big bang", "stakeholder", "technical" and "socio-technical" ideal-typical patterns to describe the integration of new information systems with the existing technical, organisational and human context. Each has specific strengths, weaknesses and risks that undermine any universal preference.

The distinction is useful to identify alternatives to an unreflective, "big bang" implementation and to direct attention to potentially neglected aspects of implementation.

- **Information Systems Success**

The DeLone and McLean success model (2003) is shown in **Figure 3.3.4**. The model contains links between seven dimensions of success which, together, are held by its authors to define the information system's fitness for purpose.

**Figure 3.3.4 : DeLone and McLean Success Model**
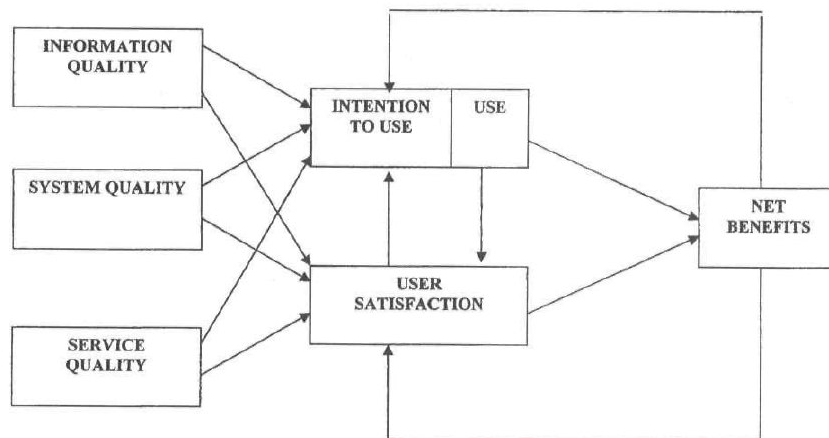


This model is useful because it places the quality of a 'good' information system alongside the twin needs, to provide intelligence for performance management (information quality) and the need to assist performance itself (service quality). For the front line user, it represents usefulness (intention to use and actual use) and usability (user satisfaction).

However, information systems exist amid an organisational and political culture that can be modelled and shaped (Oliver and Memmott, 2006). The collaborative workplace may be local or dispersed across a wide geographical area. The model ignores these aspects.

Despite its plausibility, Van der Meijden *et al.* (2003) could not encompass within the DeLone and McLean model all the dimensions of success or failure they could identify from an extensive literature review of clinical information systems.

The model neglected four arguments. The organisational structure to deliver the information strategy was ineffective unless linked clearly with the overall structure of the organisation. The workforce needed to be adequately informed and engaged. Successful systems reflected designers' adequate understanding of work practices. 'Task-structure fit' was an important factor in the success of electronic clinical activity recording and coding and for computerised entry of physicians' orders.

Expanding the concept of 'task-structure fit', Joshi & Rai (2000) link the quality of an information system to users' job satisfaction through three pathways. The primary, direct pathway provides information that is accessible and fit for the user's purpose. It is supported by two subsidiary pathways. The "role conflict" pathway reflects the alignment of computer-related tasks. The "role ambiguity" pathway reflects the accessibility of information that assists task clarity.

▪ **Critical Success Factors**

Bowns, Rotherham & Paisley (1999) were commissioned by the United Kingdom Office of Public Management to undertake a literature review of factors critical to the success of NHS information systems projects. **Table 3.3.6** shows the factors they identify.

**Table 3.3.6 : factors critical to the success of NHS information systems projects (Bowns, Rotherham & Paisley, 1999)**

| Organisation | |
|---|---|
| Culture | Enabling, adaptive culture. Decentralised decision making. Sensitive influence by managers rather than attempted control of professionals. |
| Strategy | Alignment of business, human resource and information strategies. Aware of gap between government policy and organisational practices. |
| **Project** | |
| Management roles | Decisive role to initiate the project. Continuing supervision during implementation. Encouragement of user involvement and users' readiness to change work practices. |
| Organisational change | Association of new information systems with new work practice. Phased familiarisation with information technology eg through use of e-mail. Realistic timescale for implementation, maturity and evaluation. Flexibility of information system to meet users' evolving needs. Adequate financial resource. |
| Human resources | Overcome clinicians' scepticism of information systems projects. Overcome job insecurity. Identify practical, clinical as opposed to financial incentives. Adequate training. |
| Stages | Adoption , implementation, post-implementation stages. |
| **Environment** | |
| Political | Avoid excessive central guidance. |
| Technical | Scepticism in the face of suppliers' performance claims. |
| Commercial | Distribution of risk between purchaser and supplier. Realistic approach to quality control of in-house development. |

Legris et al. (2003) examine a factor model of information technology acceptance, finding that, although many factors could be isolated, categorised and correlated with technology acceptance, the predictive and explanatory power of the model was severely restricted. Here, technology acceptance is isolated from individual experiences and occasions of use, and is reduced to the status of a quantity, rather than understood as a succession of superficially similar events, encountered by people acting under subtly different sets of demands, constraints and choices.

Berg (1999a) believes it is impossible to consider analysis, design, implementation or evaluation in isolation from each other. IT and work practices generate each other. Rather than present 'prescriptions for success' in the form of 'critical success factors', Berg thinks it is better to provide useful perspectives which assist understanding but fall short of rules.

- **Information Systems Failure**

Several authors (Sauer, 1993; Beynon-Davies, 1999; Fitzgerald and Russo, 2005) cite the classification of information systems failure due to Lyytinen and Hirschheim (1987).

- Correspondence failure        failure to fulfil predefined design objectives

- Process failure        failure to produce a system within the prescribed time scale and budget

- Interaction failure        failure to gain implementation or satisfy the user

- Expectation failure        failure to address salient problems, important to a specific stakeholder group.

Sauer (1993 ; p.24-26) criticises the concept of "expectation failure" because it fails to indicate clearly the causes of failure, or to prioritise the focus of remedial action. He regards the four categories of failure as potentially salvageable "flaws", whose uncontrolled accumulation leads to "terminal" loss of political support at various organisational levels. He restricts the term, "failure" to the loss of support sufficient to bring about the project's termination. (p.27).

Sauer (1993, p.100) arranges the project organisation, the information system and its supporters into a "triangle of dependences" between the system, its supporters and the project organisation. Later Sauer argues that information systems failure is not simply a failure of systematic problem-solving, but also stems from uncontrollable environmental or contextual factors, to which the three elements of the triangle have been unable to adapt. "If the contextual problems continue to impose themselves, then the situation may become less and less satisfactory, leading the supporters ultimately to a negative evaluation and a determination to terminate all support" (Sauer, 1993 ; p. 318-320). Project supporters encounter constraints which limit their tolerance of setbacks or their ability to meet the costs of all expectations.

Heeks, Mundy and Salazar (1999) have examined the topic of failure in Healthcare Information Systems. Their 'ITPOSMO' analysis of success or failure hinges on the degree of correspondence between design assumptions and local realities at the point of deployment. The seven dimensions of analysis are : Information, Technology, Processes, Objectives and values, Staffing and skills, Management and structures and Other resources.

These authors pose "questions for future research" which focus on : the pressures which force managers into one rational choice compared with another ; barriers to adoption of 'best practice' ; and techniques to close the gap between design conception and local reality.

- **Deployment Challenges**

Pinelle and Gutwin (2006) identify four "deployment challenges" for information systems in loosely-coupled organisations.

- Central authority is limited. Persisting practices are difficult to eradicate in favour of the new system.
- Role-related perspectives come into conflict. It is difficult to disseminate a unitary concept of the new system's value that is relevant in plural sites. A new system may challenge existing power relationships and dependencies between authority structures or operational units, in ways that will be perceived differently according to the advantage likely to be gained or lost.
- Critical mass is difficult to achieve because of high autonomy and low interdependence between the detailed internal processes of operational units. Variations in uptake between sites limits the overall effectiveness of the system as an integrating device.
- The distribution of effort and benefit within the global information system is unequal. This is especially acute in a fast-paced clinical environment if the new approach to a high-volume procedure (such as electronic note-making) consumes disproportionate time.

These challenges accentuate the costs of information systems deployment in healthcare.

Pinelle and Gutwin make the following recommendations :

- Use focus groups to confront differences and build consensus

- Direct development from the operational unit upwards

- Identify local product champions

- Align roles and responsibilities to eliminate role-conflict

- Identify and address inequities early.

- **Managed Implementation : Maturity Models**

Maturity models, discussed by Gillies (1998a) and by Wainwright and Waring (2000) facilitate the staged implementation of a business intervention that would, otherwise, be too great a change to be accommodated.

Gillies' (1998b) GP Information Maturity Model (GPIMM) assesses the depth of penetration of IT into a given general practice. It assigns a maturity level according to explicit criteria and then advises managerial intervention required for transition to next level (**Table 3.3.7**).

In the form proposed by Gillies and Howard (2003), a maturity model approach assesses the level of penetration by technology within the host community, considered as a discrete entity. It simplifies the web of interactions within the socio-technical system by matching organisational core competences, role based contributions and developmental

stages in a single matrix. The emphasis is shifted from strategies to 'fit' a pre-determined information system into a stable environment, onto the process of 'aligning' an information system with organisational change.

**Table 3.3.7 : Information Maturity Model (Gillies, 1998b)**

| Level | Designation | Summary Description |
|---|---|---|
| 0 | Paper based | no computer system |
| 1 | Computerised | computers used by clerical / administrative staff |
| 2 | Computerised Primary Health Care Team | computers used by healthcare professionals |
| 3 | Coded | limited use of codes |
| 4 | Bespoke | locally agreed coding policies and protocols |
| 5 | Paperless | paper records to all intents and purposes abandoned |

- **Technology Use Mediation**

Davidson & Chiasson (2005) describe factors that mediated the use of information technology in a clinical context (**Table 3.3.8**). These factors operated during each of four distinct implementation phases.

**Table 3.3.8 : Technology Use Mediation (Davidson & Chiasson, 2005)**

| Implementation Phase | Context | IT | Mediation |
|---|---|---|---|
| **Establishment**<br><br>Staff are introduced to the technology and shown how it is to be used. | Concerns over cost and quality of clinical decision making, especially in relation to lab use and prescribing. | Functions presented at a conceptual level. Pre-defined order sets and pathways. Automated alerts challenged some clinical decisions. | Appeared convenient to use. |
| **Reinforcement**<br><br>Assistance in use, encouragement, troubleshooting. | Nurses willing to enter data on behalf of doctors.<br><br>Strong medical hierarchy. Significant accommodation of doctors' preferences and convenience. | Generic screens populated with local data and prepared for differentiated use. Some functions disabled on grounds of workflow hindrance. | Peer to peer coaching. |
| **Adjustment**<br><br>Refinement of technology, or operating procedures or clinical processes. | Legacy systems in pathology were regarded as 'state of the art'.<br><br>Nurses & technicians able to consolidate lab requests to avoid duplication but not willing to countermand physicians' electronic orders. | Construction of interfaces.<br><br>Lab requests held in abeyance to allow time for duplicate requests to emerge and be eliminated. | Clinical referees monitored operations and suggested revised procedures.<br><br>Nurses & therapists empowered to introduce local variation to standard pathways. |
| **Episodic Change**<br><br>eg. New system release, abandonment, replacement. | Emergence of cross-disciplinary disease management groups. | Expansion of clinical data repository. | Support from managers interested in clinical effectiveness. |

## (iv) 'Hard' Models of Evaluation

▪ **Dimensions of Quality**

Garvin (1984) contrasts various tangible dimensions of industrial quality, all of which take the usefulness and correctness of design specification as given. However, he was

unable to account for all aspects of quality without invoking a hermeneutic ("transcendent, innate") dimension, intractable to deeper description or rational analysis.

Thus, information systems and clinical service quality may be defined along the axes shown in **Table 3.3.9**.

**Table 3.3.9 : Garvin's Quality Dimensions related to Clinical Information Systems**

| Axis | Content |
|---|---|
| Product axis | Enables predictable outcome of care |
| User axis | Accessible and relevant, satisfies users' preferences |
| Manufacturing axis | Clinical processes are efficient |
| Values axis | Responds to concerns for safety and confidentiality of patients, and rationality of evidence-based clinical methods |
| Transcendent Quality | The totality of the patient's experience |

▪ **Metrics**

Aggelidis and Chatzoglou (2008) identify user satisfaction, usage and economic evaluation as principal approaches to evaluation. They argue that "the efficiency, productivity and effectiveness of the personnel depend to a large extent on the quality of information systems used by organisations" and that "measurement of users' satisfaction with information systems may be the most effective" of these three evaluation methods.

- **Health Technology Assessment**

The primary tool of Health Technology Assessment is the meta-analysis of randomised controlled trials. The related methodology of evidence based medicine (Greenhalgh, 1997 : p.8-11) posits a standard patient or setting, a technology and one or more comparators, and one of more functional or economic outcomes. The paradigm is reductive and has little power to explain variation in outcomes from similar interventions or how to turn an unsuccessful outcome into a successful one.

Health Technology Assessment (United Kingdom : National Institute for Health Research, undated) assesses whether the technology works, for whom, at what cost, and how it compares with the alternatives. Walley (2007) explains the goals of Health Technology Assessment : to identify relevant technology, define research questions, investigate in ways that are useful to policymakers, clinicians and patients, compare costs, effectiveness and wider impact in the real world (ie cost- and clinical-effectiveness) of new technology against established best practice or current NHS practice, and to disseminate findings.

The preferred methodological approach is "usually randomised controlled, but very pragmatic, trials" but Walley recognises "the inevitable trade-off between the need for rigour and generalisability on the one hand and context-specificity and immediacy on the other".

- **Benefits Realisation**

The benefits realisation approach places the implementation and evaluation processes in systemic relationship. Thus *Managing Successful Programmes* (United Kingdom Office of Government Commerce, 1999) states: "To ensure that benefits are eventually realised, they must be positively managed from the start. The successful realisation of benefits requires active monitoring of programme and project deliveries" (*ibid* : p.37-38).

*Managing Successful Programmes* (p.39-41) identifies the potential scope of programme benefits and subjects these to "four critical tests" of benefit. There must be a precise, comprehensible description of the benefit, a noticeable change in the pattern of business delivery, a location of benefit within the organisation and a plan to measure benefit and its achievement.

In addition (p.44), the benefits management strategy compares predicted improvement with the need for improvement as perceived by those stakeholders to whom the strategic group attaches importance. A rational planning approach is adopted to identify programme performance indicators, assign responsibilities, and to identify key interventions and their organisational consequences and the feasibility of given actions.

- **Randomised Controlled Trials**

Wyatt and Wyatt (2003) suggest the approach to evaluation depends on the prioritised list of questions the evaluation is to answer. They suggest three options.

A "Before & After" design measures or describes the *status quo ante* and compares the situation after implementation. This type of evaluation is open to bias because there is a tendency to afford greater scepticism to the results of negative than to positive outcomes.

A controlled Before & After design compares the development over time of at least two completely comparable environments, of which at least one is excluded from the intervention.

The gold standard is a Randomised Controlled Trial. This is carefully designed to eliminate the effects of chance, bias and confounding. For some information system applications, for example, computer-aided prescribing, it may be feasible to allocate some patients at random, to be treated with or without the agency of the information system.

In each of these instances, the purpose of the study is to test the validity of the prediction, that detectable effects will be brought about by the intervention concerned.

Multiple factors defeated the attempt of Littlejohns, Wyatt & Garvican (2003), to, evaluate "the biggest medical informatics project in Africa" in a randomised controlled trial, whose end points were to be improvements in patient care and the management efficiency of hospitals.

Variables that could not be controlled between hospitals ranged from the stability of the local electricity supply, concurrent local service developments (new pharmacy and

laboratory systems), the rate of progress in staff training and external pressures on the best prepared hospitals to implement their systems in advance of the trial as a whole.

The trial had to be downgraded to a before and after design. "No significant difference" was found, in the quantitative outcome values identified, between index hospitals and controls but this form of evaluation was incapable of distinguishing the attributes of the system from confounding organisational and contingent factors.

The authors state that the analysis of randomised controlled trials becomes more complex as the number of variables examined increases and the boundary of the system under trial is expanded to incorporate them, yet the various models available suggest that the net must be cast widely to incorporate all factors relevant to success or failure.

In respect of information systems, randomised controlled trials face changes in technology, the clinical environment, the nature of the information that is relevant, and the lifetime of the concerns that information systems are required to address.

When Hunt, Haynes, Hanna *et al.* (1998) attempted a systematic review of computer-based clinical decision support systems, "no common measure of effect was considered to be justified for meta-analysis of the trial results". There was too much variety in the systems and trials reported. Meta analysis depends on adequate volume of well-designed trials, testing highly similar interventions, in similar settings, tested against similar, well-specified outcomes. Conclusions on the measured utility of an information system in an idealised, controlled setting are difficult to transpose to the real setting, where users' perceptions of its usefulness and usability influence their 'intention to use' the equipment and, therefore, its efficacy.

Findings such as these have led Greenhalgh *et al.* (2008) towards the stance that :

*"because of the complexity of the innovation, the dynamic and contingent nature of the implementation process, and the shifting environmental context, (political, economic, technological), complex service level innovations are inherently unpredictable and that the search for reproducible "effect sizes", "mediators", and "moderators" is likely to prove fruitless ……… The best we can do is to explain what is happening as we observe it and reflect on it in a theory driven way. Our goal (which contrasts with that of many programme evaluators) was thus interpretation rather than prediction ……… "An evaluation approach that aims for interpretation and understanding rather than prediction and "effect sizes" can generate important insights about the mechanisms of success or failure in complex change programmes*." (Greenhalgh, 2008)

### 3.3.5 : Modelling the Problem Solving Methodology in 'Soft' (Interpretive and Critical) Terms

Iivari and Lyytinen (1998) refer to a "Scandinavian tradition", defined by "anti-positivism, user participation and action-orientation". Hirschheim, Iivari and Klein (1997) and Iivari, Hirschheim and Klein (2000) focus on five "non-functionalist" approaches. The "Trade Union" approach, focused on distributive bargaining between management and trades unions, and the "Professional Work Practice" approach, which distinguishes between the theory and the practice of information systems professionals, need not be developed here. The remaining three approaches are more relevant.

They are :

- The Interactionist Approach

- Speech Act Theory

- Soft Systems Methodology.

- **The Interactionist Approach**

Kling (1980) distinguished six "perspectives on computing in organisations". The rational and structural perspectives focused respectively on the formal ends and tasks to be facilitated through computing (Mingers' "material" category). The human relations perspective dealt with the reciprocal impact of computer use and management-employee relations (Mingers' "personal" category). Two further perspectives represented the political and class-political aspects of organisations (Mingers' "social" categories). The interactionist perspective focused on the interaction between people and computers.

Kling and Scacchi (1982) distinguished between "discrete-entity" and "web" models of computing activity. Wood-Harper and Wood (2005) associate discrete-entity analysis with a positivist perspective and consider the interpretive and critical perspectives as variants of web analysis.

Discrete-entity analysis sets out to establish sources of compatibility and to rectify sources of incompatibility without understanding what these sources are or how they operate. Kling and Scacchi (1982) identified two major manifestations of this approach : the substitution of computer processes for human activity and an "aggregation"

approach to development which progressively added new functional capabilities around a core technology.

Web analysis examines "the interaction between people and technology as part of a larger social and technical mosaic in which the development and use of the focal technology is embedded". This approach favours relevance over functionality and took a view of relevance which emphasised the individual organisation member over the organisation itself. Each individual organisation member was visualised within a "production lattice" of relationships with other individuals and with technologies. Even organisations are seen as involved in "a larger matrix of social and economic relations".

Horton, Davenport and Wood-Harper (2005) identify five "Big Ideas" from Kling's legacy which, if ignored would constitute "obstacles to progress".

First, the existence of "multiple points of view" forces an interpretive stance and serves "to challenge the social neutrality of computer technology".

Second, the introduction of computers forces "social choices" and brings their analysis into the real domain of time, place and demonstrable social relations so that the operation of power and its consequences can be demonstrated.

Third, the concept of a "production lattice" shifts the emphasis from the user as the source of implementation failure onto the analyst who fails to appreciate the user's perspective.

Fourth, Socio-Technical Interaction Networks ("of social, economic and political interactions") offer a potential basis for advance modelling of the implementation situation by "deconstructing" organisations to reveal what is going on under the surface.

Kling's fifth "Big Idea" is to identify "institutional regimes of truth". These are "statements about the social world that function as true". They include balance sheets and lists of comparative performance indicators and any other descriptor of well-being that is used as a building block for discourse within an organisation.

Institutional truth regimes present only a subset of reality. They can form a basis for apparently rational argument but can leave other important facets of reality neglected. When, as Zuboff (1998) discovered, employees use computers to "informate" rather than automate their work, they are adducing information that they can use to challenge institutional truth regimes.

- **The Speech Act Theory Approach**

This approach, with its arcane vocabulary, is explained by Esa and Lyytinen (1996) and by Iivari and Lyytinen (1998). An information system is said to enable acts of communication or "speech acts", intended to change people's beliefs, material conditions or actions.

Where other models have focused on the 'speaker', the Esa and Lyytinen model (**3.3.5**) gives equal prominence to the 'hearer', who must first understand the "speech act" and

its illocutionary content (the speaker's expectations of the hearer's actions) then accept

its validity before engaging in "mutual commitment" with the speaker.

**Figure 3.3.5 : Speech Act Theory : (from Esa and Lyytinen, 1996)**

| Context | | Mutual Commitment | | | Effects |
|---|---|---|---|---|---|
| | | | | | **Speaker** performs instrumental or speech action expressed in speech act |
| **Speaker** Performs a speech act → | **Hearer** Understands the speech act → | **Hearer** Accepts the speech act → | **If action is needed** → | { { { { | ↕ |
| **Negotiation about illocutionary meaning** | | | | | **Hearer** performs instrumental or speech action expressed in speech act |
| | **Negotiation about validity claims** | | | | |

The hearer's understanding and acceptance are determined by current and prior aspects

of context and influenced by factors derived from the hearer's own personal experience.

Speech Act Theory can help us to understand the implementation and presence of

information systems as a discourse between organisational actors, where the design of

information systems reflects expectations and exchanges between one group of actors

and another, as well as exchanges between the world appreciated by the user and the

world represented within the computer. Its framework has the potential to allow

exploration of the non-rational as well as the rational aspects of organisational

communication, both at the stages of information systems planning and operational computer use.

- **Soft Systems Methodology**

The development of Soft Systems Methodology (**Figure 3.3.6**) is described in detail by Checkland (1981) and Checkland and Scholes (1990). As a key feature of the methodology, "Root Definitions of Relevant Systems" are defined through the acronym, 'CATWOE' :

- Customers : those who benefit or suffer in the Problem Situation.

- Actors : those who perform the actions which constitute the Problem Situation, or will perform in the reconstructed situation.

- Transformation : the changes that will transform the Problem Situation into a better one.

- '*Weltanschauung*' : the 'world view' of participants in the Problem Solving Process. It is determined by the way each separate participant 'fuses' his developing interpretation of the Problem Situation with his prior knowledge and experience and it has cultural and technical dimensions.

- Ownership : those whose actions will make or break the transformation project.

- Environment : influences (for example, the economic climate, legislation, technical constraints) outside the span of control of participants that will limit participants' freedom of action or discretion.

**Figure 3.3.6 : Soft Systems Methodology (Original 7 Stage Model due to**

**Checkland and Scholes 1990 ; p.27**
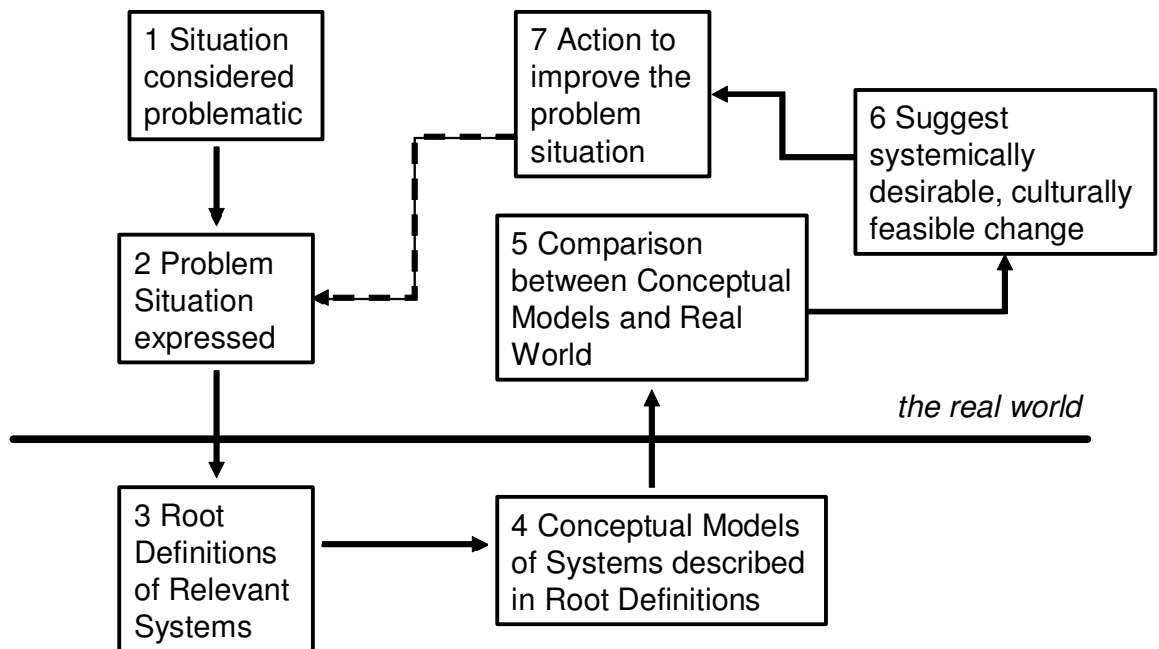


Soft Systems Methodology lays special stress upon the T and the W of CATWOE. The aim is to name and then to model a "notional system" that will transform the problem situation. The nature of the transformation to be effected is as much a politically as a rationally-defined entity and it is necessary to diagnose and construct the world view responsible for this prescription. Part of the modelling process depends on the identification on the remaining components of CATWOE, described above.

Soft Systems Methodology has evolved from the formal set of seven programmatic steps shown in **Figure 3.3.6**, to the looser, recursive plan of **Figure 3.3.7**, based on parallel streams of "logic-based" (hard, unproblematic) and "cultural" (soft, negotiable, politically complex) analysis.

**Figure 3.3.7 : Soft Systems Methodology ; Social and Rational Streams of Analysis (Checkland and Scholes 1990 ; p.29**
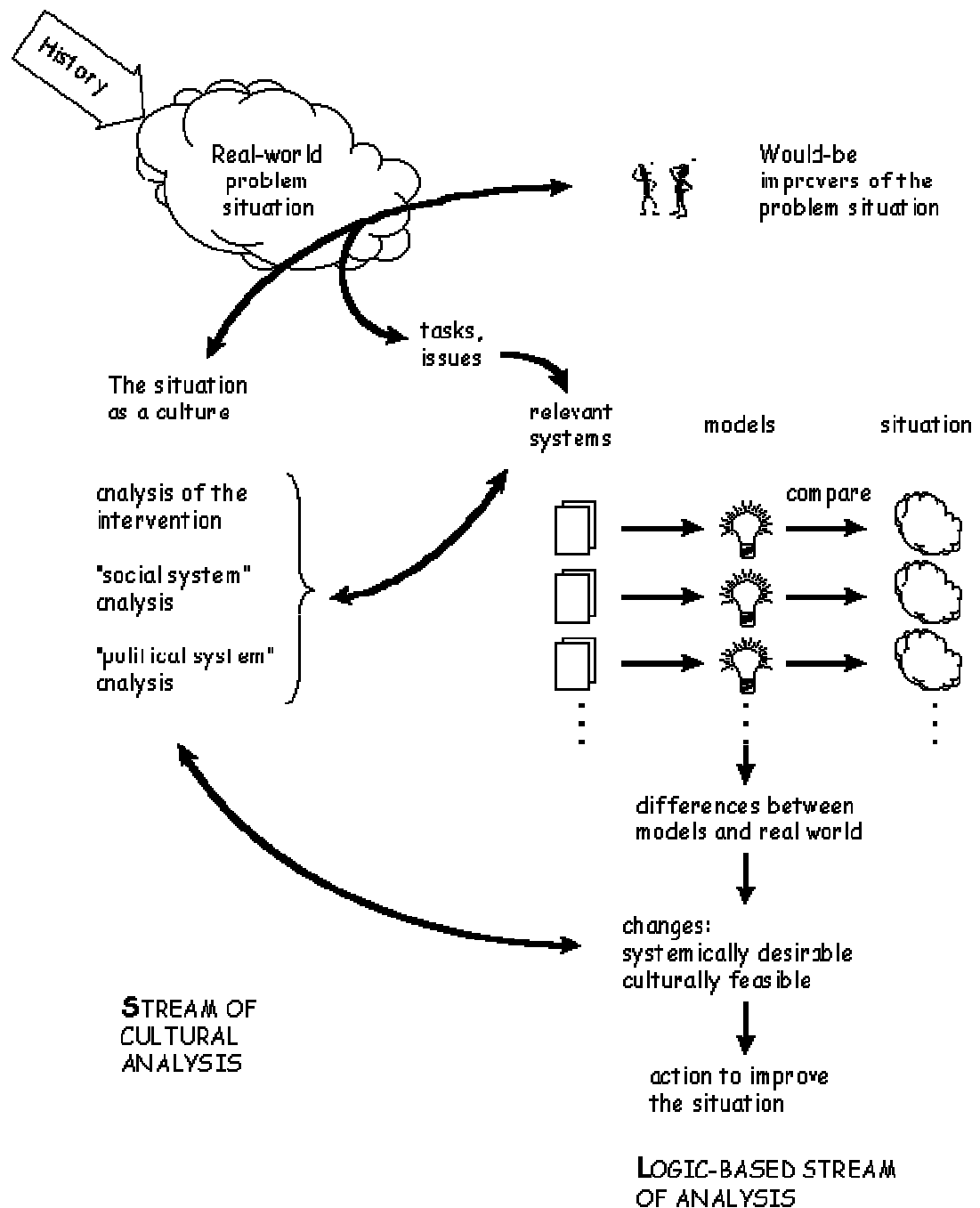
Checkland and Holwell (1998 ; p.10) emphasise that information systems are, essentially, systems of purposeful human activity, assisted by information technology. The need for information and information technology cannot be understood in isolation from the activity system it is to support.

The "stream of cultural analysis" is explored through "analyses one, two and three" (Checkland and Scholes, 1990 ; p.29 , p.44-53).

"Analysis One" identifies the *dramatis personae* of the problem situation : the 'client' who wants the situation to change, the problem solver who will bring change about, and the people who will be affected by change. Their responses will make or break the change programme and the problem solver will need to recruit them as 'problem owners' who will commit themselves to the discovery of a successful solution to the problem situation.

"Analysis Two" examines the roles, values and norms which explain the behaviour and actions of clinicians, managers and patients in the problem situation. These factors will influence the deployment of the National Programme and the use of its products.

"Analysis Three" is concerned with the way power is expressed within the problem situation.

Soft Systems Methodology uses "rich pictures" (Checkland & Scholes, 1990 ; p.45-47) to express the structure, process and climate of the problem situation and to catalyse discussion and debate within the problem solving team. Where a decision making algorithm shows the logical ('syntactical') connections between isolated components, a

rich picture invites a negotiable understanding of each component in terms of its ('paradigmatic') relationship with the other components of the systemic whole.

### (i) 'Soft' Approaches to Organisational Alignment of IT (Strategy)

Greenhalgh *et al.* (2008) contrast the "technology push" model ("centrally driven, rationalistic, oriented to pre-defined, relatively inflexible goals"), which had constituted "the predominant change model" applied to the introduction of shared care records in NHS primary care, with "a socio-technical change model [that] would transform the [shared care records] programme substantially".

They say, "*Emphasis would need to shift from project management (that is, running a circumscribed initiative with a predefined, measurable goal by working systematically and solving problems along the way) to programme management (that is, bringing together multiple elements in iterative and adaptive ways against an ever changing background context, towards a more abstract goal ……… This goal needs to be continually redefined and negotiated throughout the innovation journey but is better able to transcend system shocks (such as shifts in technology specification or prevailing information technology policy).*"

Effectively, this is a proposal for an emergent approach towards fitting the IT programme carefully into relationship with the contemporary, formal programmes of change that form its context. It is also a shift in emphasis from the structural aspect to the (social and political) process aspect of programme theory, which contains informal, local as well as formal management agendas.

As an example of an emergent approach to strategy, Levary (1997) argues that the IT programme needs to be geared to align with organisational development, business process reconfiguration and the physical re-design of the clinical workspace, but he also places the design of the emergency department, to maximise patient satisfaction and the enablement of staff performance, in systemic relationship with the design of its IT system.

The bases upon which issues are negotiated and decided are not rational but social and political in their nature. Greenhalgh *et al.* (2008) continue : *"The skills of project management relate to planning, organising, monitoring, adjusting, documenting and reporting. Those of programme management include negotiation, sense-making, synthesis and, above all, situational judgement."*

- **Communicative and Emancipatory Aspects of Information Systems**

The skills in question are open to the critique, based on Habermas' Theory of Communicative Action (Lyytinen & Klein. 1985), suggested by Hirschheim, Klein and Lyytinen (1996). The context of change is presented in terms of positivist, interpretivist and critical "orientations", The process of change. is described in terms of three "domains" (technology, language and organisation) (**Figure 3.3.8**).

The "control" orientation corresponds with a positivistic view of the world, oriented towards control, predictability and planned decision making. A "control" orientation results in the use of language and organising capabilities to direct technology towards given ends. A "strategic" approach manipulates people in exactly the same way, as if

they were "things". The "communicative" and "discursive" orientations correspond with interpretive and critical approaches.

**Figure 3.3.8 : Hirschheim, Klein and Lyytinen (1996) framework.**

| DOMAINS | ORIENTATIONS | | | |
|---|---|---|---|---|
| | Control | | Sense-Making | Argumentation |
| | Instrumental | Strategic | Communicative | Discursive |
| Technology | | | | |
| Language | | | | |
| Organisation | | | | |

The resulting matrix provides a critical mirror to reflect the posture of a given organisation by defining nine ideal types of strategic setting for 'context-process interaction'.

### (ii) 'Soft' Approaches to Design and Development

▪ **Multiview Methodology**

The authors of this methodology take the stance (Wood Harper, 1985 ; p.175) that "a methodology cannot be separated from the problem situation and the analyst's intention and beliefs". The three elements stand in systemic relationship with each other. Multiview is, *par excellence*, a recursive methodological approach.

Multiview is described variously by Wood-Harper (1985), Antill and Avison (1985), Avison & Wood-Harper (1990), Bell & Wood-Harper (1998, 2003). It explicitly incorporates Soft Systems Methodology (Checkland, 1981,1999) and the ETHICS approach to human-centred job design (Mumford, 1995). The methodology requires the analyst / researcher to compare his own stance towards those in the problem situation against four 'ideal-types', modelled on the framework developed by Hirschheim and Klein (1989).

From an original project to bridge the gap between social and technical informatics (Wood-Harper, Antill and Avison, 1985), the methodology has also developed as a bridge between functionalist, interpretive and critical paradigms and between Habermas' technical, communicative and emancipatory knowledge interests.

A revised form [Multiview2] is developed by Avison, Wood-Harper *et al.* (1998), Vidgen, (2002), Vidgen *et al.*. (2002), Avison & Wood-Harper (2003). In this more explicitly hermeneutic form, the problem solving approach is not pre-defined but "emerges", from problem solvers' comparison of the problem situation against their "interpretive scheme". This lends sense and orientation to engagement. The methodology is thus "contingent" as well as "emergent".

The original form of Multiview is shown in **Figure 3.3.9**.

As Multiview has been revised and developed, its presentation as a set of sequential steps (Bell and Wood-Harper, 1998; 2003), has given way to their treatment as "aspects" (Basden, 2002, Basden & Wood-Harper, 2006) of a holistic project (Avison. Wood-Harper *et al*., 1998).

**Figure 3.3.9 : The Original Form of Multiview**
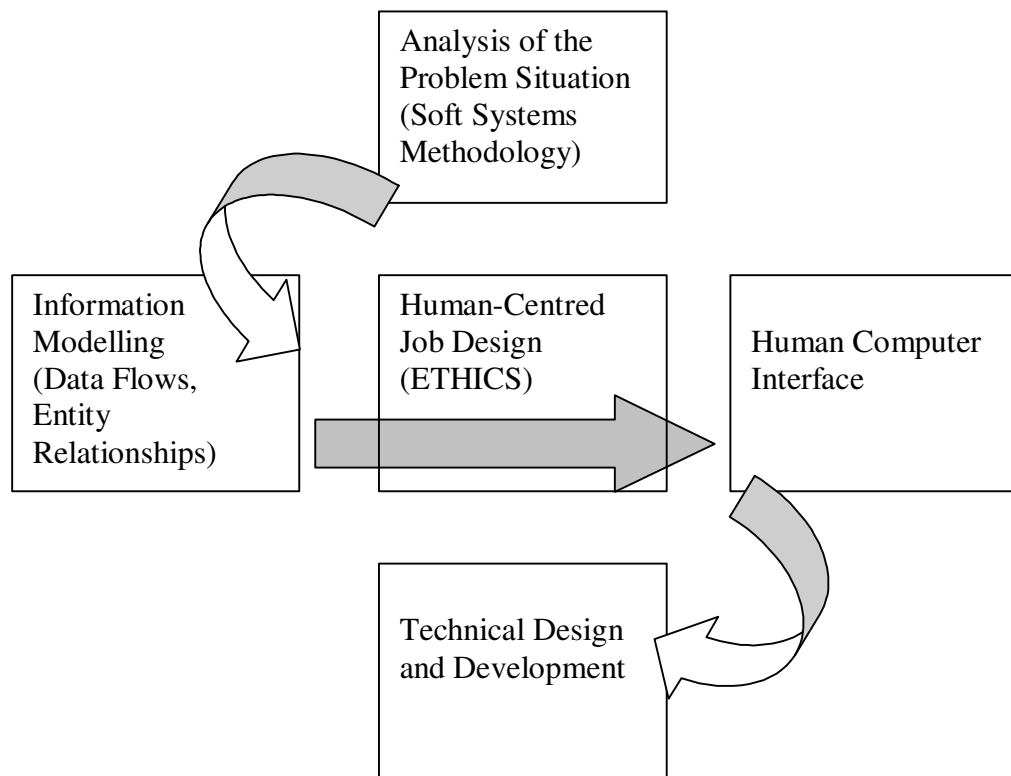


The closed system, suggested by the triad of problem situation, problem solver and problems solving methodology, has been made into a more complex, open system by the revised methodology's adoption of "unbounded systems thinking" (Mitroff and Linstone 1993) : the problem situation is recognised to contain a variety of stakeholders, each of whose idiosyncratic Technical, Organisational and Personal perspectives has roots in antecedent historical episodes, salient for that person. These perspectives can align in a consensual, Lockean way but are equally likely to conflict in Kantian or Hegelian (dialectic) fashion.

**Figure 3.3.10** Avison, Wood-Harper *et al.* (1998) shows the revised form of Multiview [Multiview2], where the original form constitutes an "interpretive scheme", through which the problem solvers can organise their 'world view' in order to 'navigate' rather than 'problem solve' their way through the problem situation.

**Figure 3.3.10 : Multiview Methodology : Revised Form (Avison, Wood-Harper *et al.* 1998)**
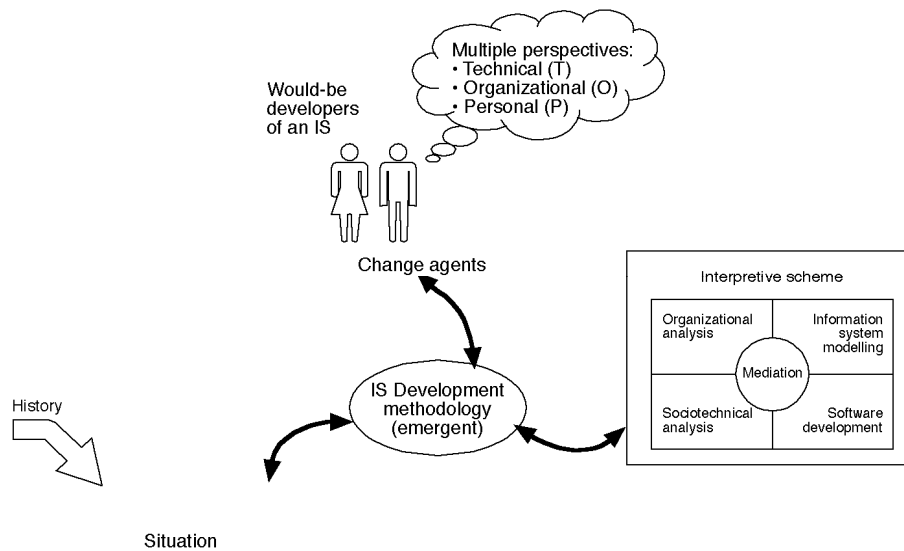


**Figure 3.3.11** shows how the revised form of Multiview relates to Checkland's twin streams of analysis (compare Figure 3.3.7).

**Figure 3.3.11 : How Multiview reflects Checkland's Twin Streams of Analysis (Avison & Wood-Harper, 1993)**
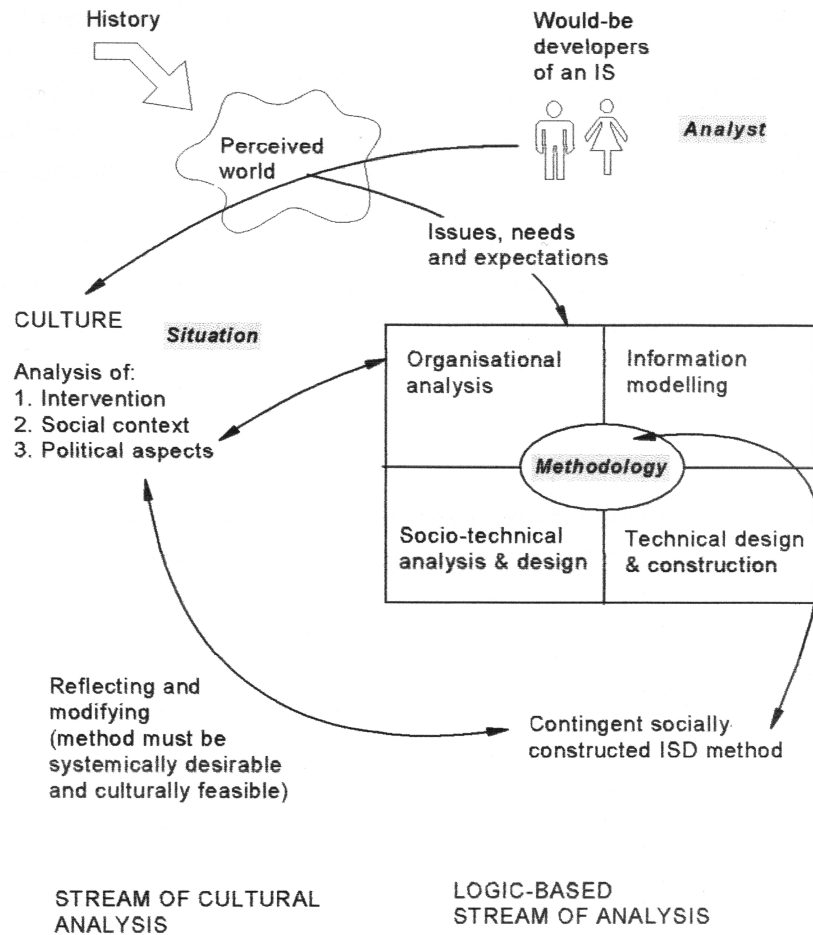


Figure 3.3.12 shows how the authors place their interpretive scheme in the context of structuration theory.

**Figure 3.3.12 : Multiview Reconciled with Structuration Theory (Avison, Wood-Harper *et al.*, 1998)**
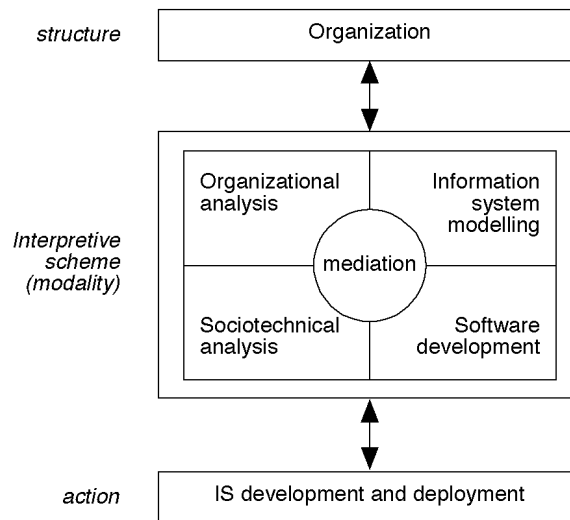


**▪ Socio-Technical Design : ETHICS**

The ETHICS methodology (Mumford 1995) represents a commitment to the ethical stance that sees people at work as ends in themselves and not as means to managerial ends. It counters the economic rational goals of management by asserting a humanistic commitment to people's control over their own lives at work. It takes the socio-technical stance, that technology can only succeed when it is mutually congruent with the social structures and routines of the workplace.

Thus, alongside the need for economic efficiency, pursued through automated data transmission, and the wish to provide the best information for accurate management, it is a key ethical imperative to allow the future users of an information system to

participate in the design of the information systems that will profoundly influence the quality of their working lives.

ETHICS identifies the following components of job satisfaction :

- problem solving of a challenging kind

- freedom to plan own work

- ability to work independently of others

- ability to see a job through from start to finish

- understanding how a job fits into the work of the department as a whole

- being able to check own work and correct mistakes.

When staff are treated as means to information ends, the quality of data management is likely to be poor because the data are not seen as relevant by the group that inputs or accesses them. The subsystems used by each group must, therefore, be able to provide the information that each group regards as essential in furthering its work mission and major work interests. If this does not happen, these systems are likely to fall into disuse.

Mumford (1991) identifies the following sources of relevance : pay and promotion, esteem of colleagues, job satisfaction, relevance to personal goals, and direct design input by future users. It is essential to understand how staff view work priorities before starting to design an information system.

Participation includes users' involvement in comprehensive analysis and work redesign. ETHICS requires end-users of information systems to accomplish four tasks :

- identify the problem they would like their information system to tackle

- specify their information needs

- set objectives for their system

- redesign jobs and departments so that the total system can work more efficiently and achieve the organisational mission.

Unless a high degree of organisational democracy is feasible, the purpose of the information system is likely to have been fixed before ETHICS is deployed (Mumford 1997, **also** Kawalek & Wood-Harper, 2002). Hirschheim (1994) and Saravanamuthu (2002b) have criticised ETHICS for too ready an acceptance of managers' perception that resource constraints will prevent the complete realisation of information systems users' needs.

- **Understanding Information Systems Change as a "Punctuated Equilibrium"**

Leavitt's model (See Jayaratna, 1994 : p.59) portrays an organisation as an encounter between people and structures, tasks and technology(**Figure 3.3.13**).

**Figure 3.3.13 : Leavitt Model**
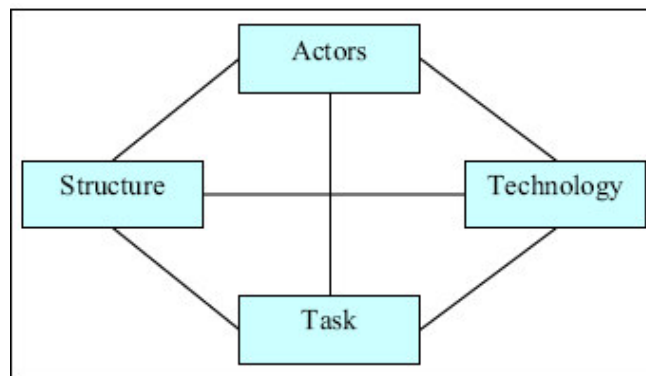


Lyytinen and Newman (2008) provide a "punctuated socio-technical change" model of information systems change. **Figure 3.3. 14** is derived from their model. The model is conceptually rich but centres around the Leavitt model, expressive of fundamental, "deep structure" at the level of management or the workplace. Continuity is "punctuated" when "critical incidents" cause "upheaval". "Gaps" then appear as (any of the) components of the Leavitt model become misaligned and are only closed when relationships are reconfigured.

**Figure 3.3.14 : Punctuated Socio-Technical Change Model (after Lyytinen and Newman, 2008)**

```
                    ┌─────────────────┐
                    │   Structures    │
                    │  (and Groups)   │
                    └────────┬────────┘
    ┌──────────────┐  ┌─────────────┐  ┌──────────┐
    │  Processes   │──│  Technology │──│  Tasks   │
    └──────────────┘  └──────┬──────┘  └──────────┘
                      ┌─────────────┐
                      │ Individuals │
                      └─────────────┘

              ┌──────────────────────┐
              │   Critical Incident  │  ⟵═══
              └──────────────────────┘

                    ┌─────────────────┐
                    │   Structures    │
                    │  (and Groups)   │
                    └────────┬────────┘
    ┌──────────────┐  ┌─────────────┐  ┌──────────┐
    │  Processes   │──│  Technology │  │  Tasks   │
    └──────────────┘  └─────────────┘  └──────────┘
                      ┌─────────────┐      ╳╳╳
                      │ Individuals │      GAP
                      └─────────────┘      ╳╳╳
```
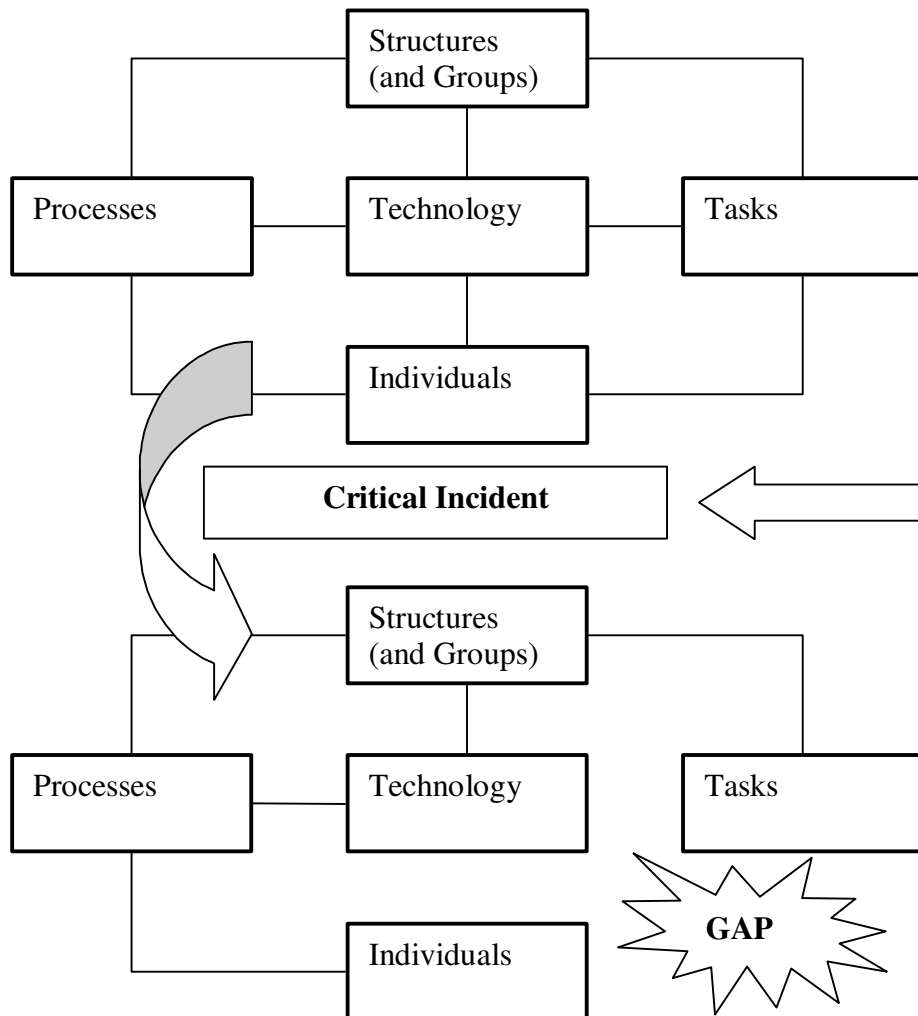
- **Implementation as Technology Transfer**

In the case of organisations involving people, a purely mechanical conception of systems is inadequate. The concern is with people and their capacity for judgement, intuition, interpretation, collaboration and conflict. Concepts from the physical world are only metaphors for the social.

Morgan (1997 ch.8) represents organisations as "flux and transformation". Plsek and Greenhalgh (2001) use the term "complex adaptive systems" to describe this metaphor, stating, "To cope with escalating complexity in health care we must abandon linear models, accept unpredictability, respect (and utilise) autonomy and creativity, and respond flexibly to emerging patterns and opportunities."

The organisational image of flux and transformation is reflected in Checkland's (1999) model of an "appreciative system". Checkland sees the Problem Situation as "the flux of events and ideas unfolding through time". As ideas and events unfold, human actors within the appreciative system take actions which, themselves, affect the flux of ideas and events.

Their appreciation of the unfolding situation is conditioned by social values and norms ("standards") which evolve according to past and current appreciation of the situation (**Figure 3.3.15**).

**Figure 3.3.15 : An Appreciative System (Checkland, 1999)**
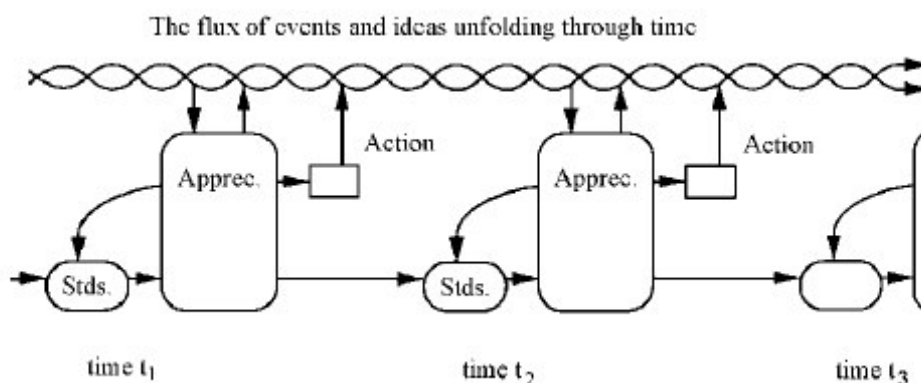
Actor Network Theory contains the belief that technologies and artefacts enshrine the ideas and intentions "inscribed" by their authors. When ideas and intentions traverse space and time they encounter and are "translated" by people whose receptivity is conditioned and modulated by their individual experiences and perspectives, as well as by the culture in which they coexist with other people. Artefacts are not neutral but are active ("actants") in the mediation between authors and recipients, whose alignment of ("enrolment") with inscribed ideas is not necessarily complete.

**Figure 3.3.16** reconciles Actor Network Theory with the theory of appreciative systems and shows how artefacts and ideas traverse the "spaces" between one environment and another against the background of elapsing time. In the appreciative units which constitute each given environment, imported ideas and artefacts encounter and interact with individual people, aligned differently with others according to their roles and responsibilities, who have their own prior personal experience and current concerns.

**Figure 3.3.16 : Extending the Idea of Appreciative Systems : The Translation of Ideas and Artefacts Between Appreciative Systems**
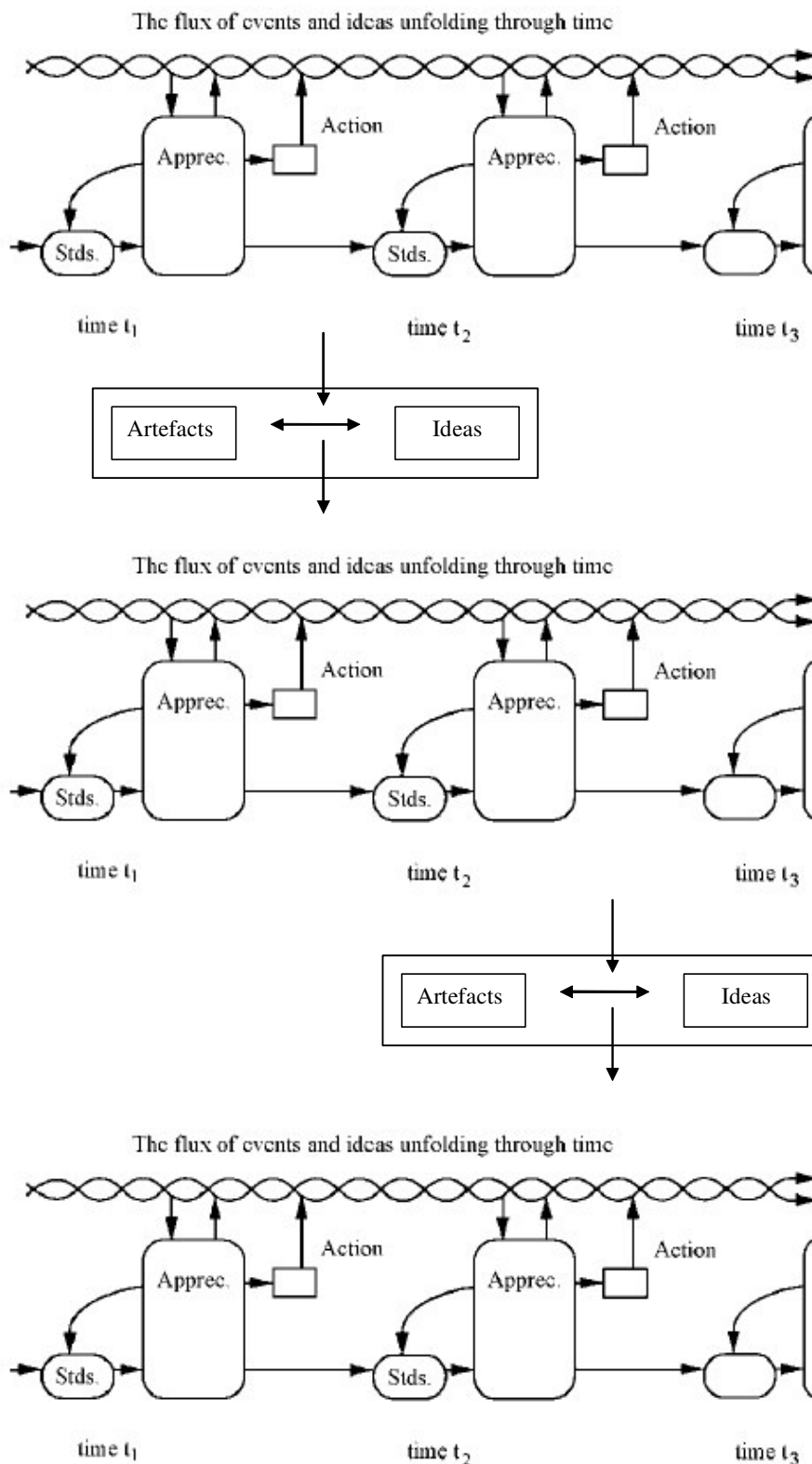
- **Implementation as Technology Adoption**

Andreu and Ciborra (1996) explain the nature of organisational learning required for organisations to develop the "core capabilities" that confer strategic advantage. The issues are illustrated in **Figure 3.3.17**. Core capabilities are valuable, rare, difficult to imitate and have no strategically equivalent substitute.

**Figure 3.3.17 : Technology Adoption Model due to Andreu and Ciborra (1996)**
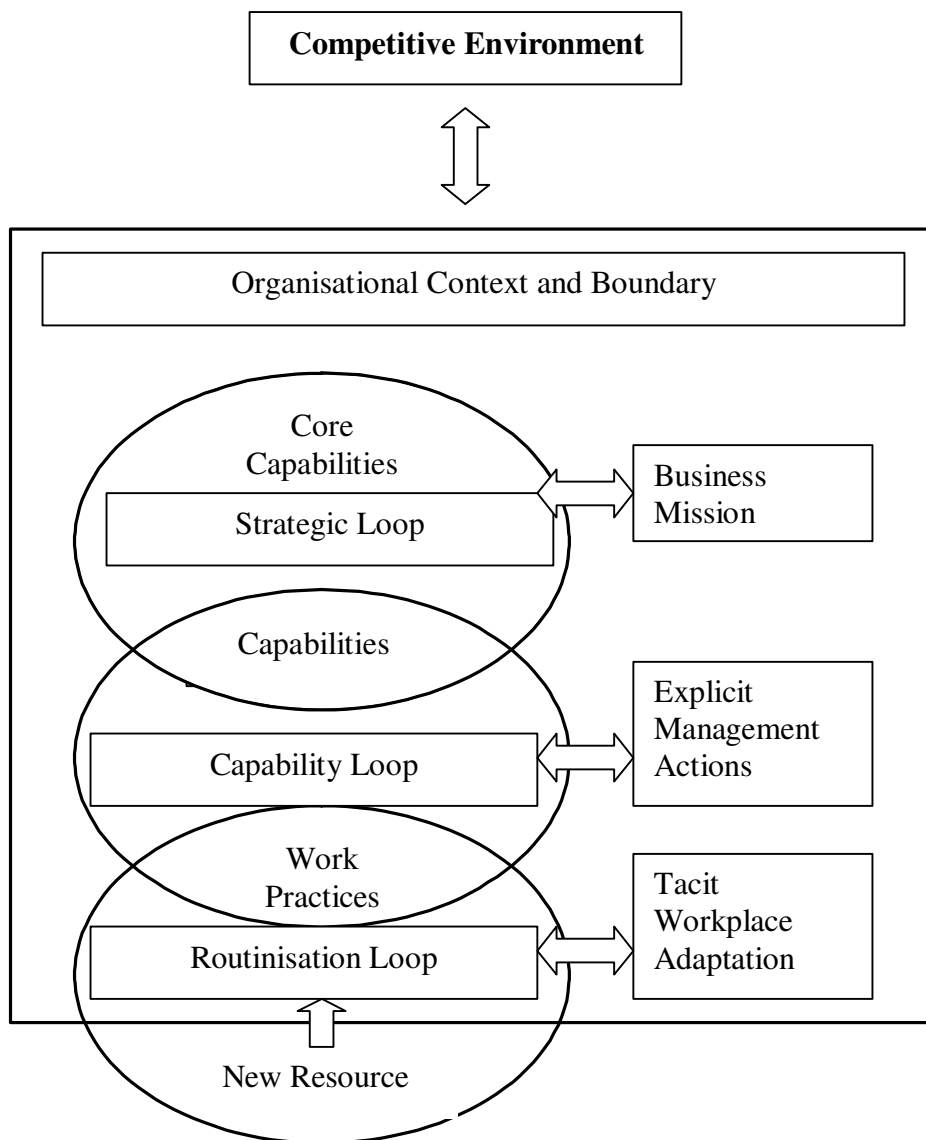
These authors loosely tie the development of "core capabilities" to lower level, generic "capabilities" through path dependent, idiosyncratic transformation processes in which newly-adopted resources are used and combined in workplace "routines".

Developing these capabilities involves organisational learning on two fronts. On the strategic front, there is learning about the way resources are supposed to be combined and used efficiently, to meet the challenges of the external business environment. The neglected second front aims to relate the acquisition of new resources to the establishment of new capability. This requires exploration of the substantial tacit aspects of the organisational routines and work practices in which new resources are incorporated.

The distinction between the two fronts is summarised in the distinction between "work as imagined" and "work as performed" (Nemeth, Cook & Wears, 2007). Overall, it is not possible to codify all the steps that contribute to the development of a core capability, because of this tacit dimension.

Specific clinical examples include the efforts described by Dourish (2003), to design flexibility into "placeless documents" (i.e. electronic patient records), and the case described by Jensen (2006), in which the scenario envisaged by the designer of a nurse-call system was completely at odds with the system's actual use during the routines of work on a real ward, because the role identified by the designer to a designated nurse was diffused in practice between the nurse and her colleagues according to the contingencies of the surrounding situation.

Greenhalgh *et al.* (2004, 2008) describe the use of a "Diffusion of Innovation Model" to assess the introduction of shared electronic records in primary care (**Table 3.3.10**). The model contains a mix of 'hard' and 'soft' elements. Thus, 'critical success factors' (organisational antecedents for innovation, communication/influence, wider environment) and evaluation criteria (material properties of the technology, attributes as innovation) are combined with elements of the change process (implementation and routinisation process) and indicators of organisational maturity (concerns of potential adopters, organisational readiness for innovation, communications between implementation sites).

**Table 3.3.10 : Technology Adoption Model (after Greenhalgh, 2008)**

| Elements of the Model | Expansion |
|---|---|
| Material Properties of the Technology | Includes key functionality and works smoothly & efficiently under real conditions of use. |
| Attributes as Innovation | Observable (benefit is immediately apparent). Better than existing. Simple to operate. Fits in (with cultural values and ways of working). Trialable (can be withdrawn from use). Customisable (can be modified and reintroduced). |
| Concerns of Potential Adopters | Before adoption (costs & benefits of use). During early use (how to operate, when to use). During established use (scope to customise). |

**Table 3.3.10 (continued).**

| Communication and Influence | Peer pressure, product championship, propaganda. |
|---|---|
| Organisational Antecedents for Innovation | Local capacity for leadership, organisational learning and tolerance of risk. Slack resource. Ability to measure effect of change. |
| Linkage | Early and ongoing dialogue between change agents, developers and end-users. Sharing of learning within and between institutions. |
| Wider Environment | External environment supports or mandates change. |

### (iv) 'Soft' Approaches to Evaluation

An important dimension of the 'soft' approach is the emergence of the methodology from a process of learning about the problem situation.

Thus, the model shown in **Figure 3.3.18** (Smithson and Hirschheim, 1998) balances efficiency and effectiveness "zones" against an "understanding zone", where the focus of evaluation is related to psychological and social relationships between individuals, social groups and technology.

**Figure 3.3.18 : Smithson and Hirschheim Evaluation Model for Information Systems**



**Underlying Assumptions**
Objective/Rational

**Efficiency Zone**

| | |
|---|---|
| Hardware/software monitor | Quality assurance |
| Simulation | (manufacturing) |
| Code inspection | Total quality management |
| Software metrics, cleanroom | |

**Effectiveness Zone**

| | |
|---|---|
| System usage | Resource utilisation |
| Cost benefit analysis | Economics |
| Critical success factors | Management |
| User satisfaction | Organizational behaviour |
| Gap analysis | Marketing |
| Risk analysis | Management |

Area of use                                          Origin
IS                                                      non-IS

**Understanding Zone**

| | |
|---|---|
| Personal construct | Cognitive psychology |
| Context, content, process | Organizational behaviour |
| Social action | Sociology |
| Formative evaluation | Evaluation research |

Subjective/Political

Similarly, Lundell and Lings (2003) argue that the means of evaluation must reflect the capacity of the evaluated object to evolve. The context of evaluation affects the approach to evaluation. The terms used in evaluation may be interpreted differently according to context.

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Insight develops with experience in the field. Application and understanding are linked iteratively through learning.

Their doubly-grounded (2G) framework's essential feature is that evaluation concepts and their relationships are not defined *a priori* but emerge during the process of analysis. The primary (strategic) grounding is in data derived from the internal environment of the wider organisation and its external strategic and regulatory context. The secondary (pragmatic) grounding is in the dynamics of IT in the workplace.

Evaluation is inherently a social process, whose politically loaded motivations require a critical approach. Serafeimidis and Smithson (2000) explain that a positivist approach to evaluation, exemplified by cost-benefit analysis, addresses technological and accounting aspects at the expense of organisational and social aspects. Accordingly, it fails to address the elements of uncertainty, risk and context dependencies, based on human and social factors, that can threaten the realisation of business benefits. They identify several purposes, served by evaluation :

- Assessment of organisational worth

- Ranking alternatives

- Diagnosis to guide planning and control

- Input to strategy formulation

- Value to organisational learning

- Political support and legitimation of the investment

- Understand the social, cultural and political relationship between an information system project and the people in the organisation.

The variety of evaluation purposes invites a mode of evaluation that is relevant to the purpose in hand. Positivist forms of evaluation are "limited" in their organisational relevance. When the focus of evaluation is the success of the information systems project as an organisational transformation, the interpretive approach is better suited to illuminate the dynamics of the process of change, within the context of change.

In contrast with the positivist tone of conventional Health Technology Assessment approaches, Kazanjian and Green (2002) propose a "comprehensive health technology assessment framework" that incorporates a critical theory perspective, focused on inclusivity and equity. Their framework asks : who should be involved in decisions on health technology adoption and who is affected by these decisions : what contribution does the technology make and what gap does it fill, whose well-being will be affected and by how much, and what will be the impact of the technology in different contexts of well-being ? The major dimensions of the framework are : the population at risk, the population impact, economic concerns, the social, ethical, legal and political context, and the role, quality, sources and convergence of the scientific evidence.

Although Serafeimidis and Smithson (2003) argue the need for business driven forms of evaluation, they go on to argue that this must be sensitive to the informal evaluations of stakeholders, and the integration of evaluation with the wider organisation and its goals. They focus on four evaluation orientations : control, sense-making, learning and exploration (**Figure 3.3.19**).

Figure **3.3.19 : Four Evaluation Orientations (Serafeimidis and Smithson, 2003)**

| | | Organisational Impact of Information Systems | |
|---|---|---|---|
| | | **tactical** | **strategic** |
| **Perception of Objectives** | **consensus/clarity : attainable objectives** | control | social learning |
| | **dissensus/ambiguity : problematic objectives** | sense making | exploratory |

Ammenwerth *et al*. (2003) identify three main problem areas for evaluation : the complexity of the evaluation object, the complexity of the evaluation project and the motivation for evaluation.

They propose a framework for evaluation studies of healthcare information systems.

- Identification & motivation of relevant stakeholders

- Consensus on evaluation aims and precise specification of the evaluand

- Methodological steps (planning, execution and analysis of the study)

- Elaboration of suitable evaluation questions and criteria

- Selection of appropriate evaluation methods and tools

- Specification of study protocol and report format

- Approach to the problem of the "moving target" : evolving changes in the evaluation object, the evaluation context and the motivation for evaluation, drifting during the lifetime of the evaluation.

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Ammenwerth *et al*. (2004) suggest that evaluation has been undervalued as an activity necessary for reflective academic and organisational practice, challenge and reflective learning. They advocate the development of theoretical grounding and expertise in evaluation and the development of good practice guidelines. At the same time, they recognise that evaluation must be free from external pressures and conflict of interest and allow the choice of the most appropriate methodology for the specific evaluation question, context and motivation.

Where Ammenwerth *et al* (2003) outline a sequence of functional steps, Klecun & Cornford (2005) base their evaluation framework on human perspectives and organisational context as well as system functions. Each dimension is addressed at the levels of structure, process and outcome. Their critical framework acknowledges the mixture of rational, social and political aspects of organisations and organisational change.

Developing this framework, they enunciate five "principles", summarised as follows :

- Critical-emancipatory intent : allows rich organisational diagnosis and harnesses enrichment of working and social lives to the long-term sustainability of organisational goals

- Evaluation reflects social, material and historical conditions : allows challenge of current practices and power structures and ties data generation to organisational learning

- Critically-informed methods : allows the purposes and choice of evaluation method to be reviewed, revised and refined, ensures important issues are not suppressed and generates evaluation findings relevant to organisational well-being

- Evaluation must capture enactment : encourages iterative and reflexive treatment of evaluation data. Implications for change are driven by the way people and technology interact and by the illumination of unexpected outcomes

- Evaluation is fundamentally reflexive : questioning assumptions, beliefs and findings. The resultant organisational learning stimulates engagement and augments the dynamic for change and improvement.

### 3.3.6 : Three Specific Evaluation Methodologies

**Constructivist Evaluation : Fourth Generation Evaluation**

Guba and Lincoln (1989) have sought to expand the scope of evaluation in education from successively refined normative (therefore, ideal) positions into a "fourth generation" plan of "constructivist evaluation".

They have identified three antecedent "generations". "First Generation" evaluation took the form of simple performance measurements. "Second Generation" evaluation took the form of description, in terms of relevance to prescribed need and congruence between achievements and objectives. "Third Generation" evaluation focused on the

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judgement of emergent need, with three variants : decision-oriented evaluation relied on the timely production of advice ; goal-free evaluation provided information about effects of use ; 'Connoisseur' evaluation assessed conformance with relevant and current, expert-defined values.

Connoisseur evaluation of information systems abstracts features frequently incorporated in reportedly successful information systems. Insight is gained through the limited lens of what has been considered important in the design of each individual system represented in the evaluation.

Fourth Generation Evaluation is sceptical of pre-ordinate criteria, prescribed by experts, and proposes a plan of "responsive, constructivist evaluation". This relies on the "hermeneutic-dialectical circle", in which claims (of benefit), concerns (about harm) and issues (unresolved controversy), are analysed, interpreted and negotiated iteratively with and between the stakeholders whose views are sought.

**Critical Systems Heuristics**

The principal themes of Critical Systems Heuristics (Ulrich, 2005) are the sources motivation, power, expertise and legitimation that "are" and "ought to be" evident in the processes of (information systems) design, implementation and evaluation.

Critical Systems Heuristics has the potential to focus a contructivist plan of evaluation. At the same time, it can contribute to realist evaluation because of the constructivist component contained in that methodology.

**Critical Realism : Realistic Evaluation**

Pawson & Tilley (1997 : p.xii-xiii) propose "Realistic Evaluation", describing what is "real" as what is situated in place and time, firmly rooted in the here and now. Its properties are "not self-evident" but need qualification, clarification, and reconciliation with their context. They emerge from "the interplay of Individual, Institution, Structure and Agency".

These authors define "Realism" as an outlook which stresses the mechanics of explanation, recognises the impact of the evolving context and espouses explicit theory, linking Context and Mechanism with Outcomes of Intervention. They state that their approach is "Realistic" because it is purposeful and informs practice as well as theory, capable of translation into policy and decision making, and locally relevant, able to inform local practice.

As they argue (ch.2), the rigour of positivist evaluation is defeated by the practical limitations on experimental design, imposed by contextual flux and complexity, and by the inconsistency of the empirical results obtained. Context-free findings from social inquiry can never be locally relevant.

Pragmatic evaluation is focused on the production of useful results : usefulness implies a constituency and pragmatic evaluation is, therefore, a political rather than a rational exercise.

Constructivist evaluation, the construction and arbitration of consensual understanding (Guba & Lincoln, 1989 : ch.7), depends also, unrealistically, upon the construction of a

restricted parliament who will agree explicit, power-free rules of engagement in order to develop an opinion that is inevitably parochial and qualified by participants' limited and conditioned perspectives.

A pluralist approach to evaluation, combining methodological rigour, political *nous* and empathy with multiple, situated perspectives, founders on the restricted nature of the resources available to address an unrestricted scope of inquiry.

Realistic evaluation is claimed as an advance on all of these approaches because it goes beyond statements about *whether* social interventions work, to explore *how* they work.

Pawson and Tilley reject *sequential* explanations that link cause and effect directly. Instead, they require *generative* explanations that provide deeper insight into 'what the world might be like' for an intervention to produce a given outcome. Generative explanations involve the specification of mechanisms, susceptible to contextual modification (accentuation, negation). They are concerned to know "what works for whom, in what circumstances" (*op cit*. p. 144).

The aim of the methodology is thus to posit conjectured configurations of intervention, context, mechanism of effect and outcome and then to test these discursively with informants from the problem situation. This involves iterative "teaching and learning", in which the researcher explains his reasoning to the informant and then modifies his reasoning in the light of the information received. At the same time, the authors remain open to empirical evidence from other sources (p.116).

Evidence accumulates in the form of 'middle range' theories which transcend the immediately parochial but make no claim to universality (p.116). Similarities in the findings from disparate intervention sites allow abstraction of theory towards a higher level of generality. Differences in the findings from similar sites invite the refinement of theory specification. The accumulated evidence can assist the policy cycle when policy makers are drawn into the "teaching and learning cycle" as "a source of testable theory, which takes the form of an explicit or reconstructible context-mechanism-outcome pattern configuration" (p.201-202).

The insight provided is expressed in terms of emergent arguments, rooted in context and complexity, rather than simplifications, abstractions or *a priori* theorems.

Realistic Evaluation is emerging as an approach to health information systems Examples are provided by Redfern, Christian & Norman (2003), Byng, Norman & Redfern (2005) and Oroviogoicoechea and Watson (2009).

## 3.4 : C O N C L U S I O N

One task of this review has been to develop a taxonomy to organise the many strands of a diverse literature. The taxonomy's principal distinction has been between 'hard' approaches based on positivist and 'soft', non-positivist (interpretive and critical) paradigms. A recursive paradigm has also been recognised. This places elements in systemic and mutually constitutive relationship and contrasts with the linear logic of argument, from one position to the next, evident in those examples from the other paradigms when the aim has been to describe and affirm one position, to explain the

reasons for that position or to assert an alternative rationale to justify a different position.

These paradigms have been applied to the problem situation, the problem solver and the problem solving methodology.

The review has not succeeded in demonstrating a clear distinction between the recursive and the other non-positivist paradigms. There are significant zones of overlap between the recursive and the interpretive and critical paradigms. These 'soft' approaches reflect a joint orientation towards understanding rather than affirmation of the *status quo*. They reflect the critical insight, that understanding is always situated.

The review's approach to the *Problem Situation* has been to obtain evidence describing actual information systems projects in the field of healthcare but to pay special attention to papers which reflect on what people are doing and thinking when they are using information systems.

The problem situation has been described in terms of the intervention of information systems in a large organisation. Problematic aspects of the problem situation can be understood as the interaction between the intervention and its accommodation within a social and organisational culture. Both the description of the intervention and the understanding of its host context relate to a *status quo* that can be appraised critically in terms of alternative possibilities. Description, understanding and critique all occur from a detached standpoint. In contrast, an emergent appreciation is one that develops during situated experience in the problem situation as it is instantiated and occasioned.

Rather than attempt an approach to the *Problem Solver* based, as suggested by Burrell & Morgan (1979), on the invidious comparison from a positivist position, between objective and subjective accounts of the nature of science, the researcher has preferred to follow Deetz (1996), whose point of departure is a critical world view. This leads him to begin with the distinction between *a priori* and emergent arguments, the latter also being consistent with an orientation towards understanding.

What is at stake for the present researcher is not an order/conflict or a stability/radical change perspective, but the question whether the discourse about information systems in a healthcare setting ought to be oriented towards unitary consensus, focused on the need for Management Information from Operational Systems, or whether it ought to give equal validity to divergent perspectives. Are we to integrate data processing systems around a single, dominant rationale or are we to develop a looser parliament of more sophisticated strands of communication ?

'Hard' 'descriptive', problem solvers assemble ostensibly neutral statements about the problem situation and present these as being free from human interpretation or ideology. 'Soft' problem solvers can use structuration theory to provide an interpretive understanding of the problem situation in terms of different internal cultures and the interplay of social agency and social structure but tends to subordinate a local to a global 'big picture'.

This denial of local detail is avoided when the 'big picture' is understood as a fluid, non-hierarchical mosaic of interlocking local problem situations. Actor Network Theory allows the 'critical' problem solver to interpret the problem situation as a collection of local sites with specific peculiarities of history, context, culture and future possibilities.

The 'emergent' problem solver is equipped by Soft Systems Methodology (Checkland, 1981, 1999) and its off-shoots, NIMSAD (Jayaratna, 1994) and Multiview (Avison & Wood-Harper, 1990), to experience from within, the systemic relationship between the problem solver, the problem situation, his own personal intellectual apparatus and the problem solving methodology which flows from the interplay between these elements.

In regard to the *Problem Solving Methodology*, the taxonomy has applied, first positivist then non-positivist approaches to each in turn of the competency areas of information systems strategy, design & development, implementation and evaluation.

The strategy, design and development, implementation and evaluation of information systems have significant social and political ramifications alongside the rational simplicity of primary arguments based on the strategic context of an organisation. However, the content of work and its immediate operational context in the social workplace also present influences which affect the practical use of information technology, in ways that can differ substantially from the designer's intentions.

By focusing on the technology and the analysis of clinical or business processes, 'hard' problem solvers risk ignoring the people who will make or break the new system, by failing to use it in the manner intended. The task of the problem solver is to engage future users in a consensus that supports the new system by using a 'soft' approach, aimed at comprehending and challenging the *status quo*.

To achieve this fruitfully, problem solvers will need to break down the corporate 'big picture' into a detailed understanding of the multiple, varied sites and occasions where the relationship, between people and their information systems, is instantiated and re-

defined. A stronger consensus will emerge if multiple and potentially conflicting 'local pictures' are not subordinated prematurely to the corporate view but are given full expression, as a set of equally valid, parallel understandings. It will be necessary to explore dissensus before conflicting issues can be settled safely through the exercise of organisational power and discipline.

The researcher's overall orientation has been to explore and understand what might work, why and under what circumstances, rather than attempt explanation, prediction and control from a general set of absolute propositions.

This is a critical realist orientation but it has been argued in the debate between Mingers (2004 a,b) and Klein (2004), that interpretive and critical, hermeneutic modes of understanding are well suited to provide insights into the question, "what must the world be like for an information system to succeed ?". The literature reviewed here suggests that there is a critical issue of congruence between work as designed and work as it is understood and performed on repeated occasions which are dissimilar as well as similar.

A user's choice, when and how to make use of the information system, represents an informal evaluation. The review gave specific mention to three formal evaluation approaches : "Fourth Generation Evaluation" (Guba & Lincoln, 1997), evaluation based on Critical Systems Heuristics (Ulrich, 2005), and Realistic Evaluation (Pawson & Tilley, 1997).

The first of these evaluation approaches, despite its "hermeneutic-dialectic" methodology, is oriented towards general conclusions and summary consensus. The

second is moral in tone, aimed to make progress from what *is* the case towards what *ought* to be the case.

The third approach, Realistic Evaluation, has been chosen as a foundation for the present research because of its pragmatic orientation towards the empirical reality that information systems succeed in some settings but fail in others : for reasons that may not be intrinsic to the particular artefact but relational, between the artefact and the user in a specific context.

In Heidegger's terms, information systems are provided by corporate strategists as 'ready to hand'. They are used as 'present at hand' by front line staff who understand them in hermeneutic and recursive relationship with the task in hand. That relationship is carried in a mind which is, in turn, carried by a body whose experience and history are peculiarly situated. This insight places Merleau-Ponty in opposition to Descartes, the champion of disembodied, objective thought.

Equally, it places the strategic deployment of information systems in opposition to their "improvised" use in the workplace, as Ciborra (1998, 1999) argues. The model described by Andreu and Ciborra (1996) is particularly effective in expressing this opposition.

Jayaratna (1994) has provided a precedent for using Leavitt's model in a modified form. As an heuristic, it is open to further modification to take account of the opposition between objective and hermeneutic thinking. Such a modification would distinguish between the role of information technology in mediating the objective relationship between organisational processes and management structures, compared with the

mediation of the hermeneutic relationship between an individual and the tasks he has to perform in the context of a fluid and complex working environment.

There are various candidate methodologies to elucidate the mechanisms, operating in context, that intervene between the intervention of an information system and its strategic outcomes. They include structuration and Actor Network theories. The authors of Multiview acknowledge (Avison, Wood-Harper *et al.*, 1988) the debt of their own methodology to these theories and Multiview, like NIMSAD, has the advantage that it emphasises the relationship between the information system user as a problem solver, the context of use as a problem situation, and the user's accommodation, between the information technology and his situated and occasioned tasks, as a problem solving methodology.

These selected methodologies and approaches will be exploited in chapter five.

The next chapter will develop my approach to the field research.

# Aligning Global and Local Aspects

# of

# A National Information Programme

# for Health :

## Developing a Critical and Socio-Technical Appreciation

Submitted in partial fulfilment of the requirements for the award of

## Doctor of Philosophy

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**STEPHEN NICHOLAS HARROP MB.ChB. MBA, FRCS, FCEM.**

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**VOLUME 2 : RESEARCH**

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# CHAPTER FOUR

# RESEARCH METHODOLOGY

## 4.0 : INTRODUCTION

This chapter explains the choices I made during the design of the research. It explains how the research was performed.

Section 4.0 introduces the debate over rigour versus relevance in research about information systems.

Section 4.1 explains my choice of *genre*. This is Action Research, chosen for its capacity to combine academic rigour with practical relevance.

Section 4.2 explains how rigour is assured in the qualitative methods used in Action Research, so that the findings produced can be accurate, and also credible because they are valid and reliable.

Section 4.3 explains the options from which I made my choice to select case study as the research vehicle that best supports an action research approach.

Section 4.4 explains the design and conduct of the research in detail.

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Fitzgerald & Howcroft (1998) discuss the researcher's stance *vis a vis* the available research approaches :

The *Isolationist* approach eschews all other than the preferred approaches.

The *Supremacist* approach assumes there is an inherently 'best' approach, regardless of the research problem.

The *Integrationist* approach forces methodologies with different paradigmatic bases into an inappropriate synthesis.

The *Pluralist* approach deconstructs the research problem and applies thoughtfully, the most appropriate paradigm and methodology to each emergent aspect of the whole.

The latter approach entails thinking at four levels :

- Ontological
- Epistemological
- Axiological
- Methodological.

At each of these levels, it is possible to identify a 'hard', positivist and a contrasting, 'soft' pole of a dichotomy. Rather than adopt, at each level, a position polarised at one

or the other extreme, the researcher should position himself at the point on the intervening continuum best suited to the problem and constraints that, together, constitute the research situation.

Fitzgerald & Howcroft equate 'hard' with positivist and 'soft' with interpretive or critical paradigms. However, Weick *et al.* (2005), like Checkland and Holwell (1998 : p.41-49) distinguish between problem solving and sense-making paradigms. Interpretive theories can then be said to describe the elements around which sense is made and critical theories challenge their hidden content of power, inequality and coercion.

Weick *et al.* (2005) emphasise that sense making "organises flux". It is a continuous, not a static process. The sense-maker selects elements for attention from the amorphous mass of proto-information that constitutes his environment. The researcher's 'double hermeneutic' task is to make sense of how the people he is studying are making sense of their own fluid situation. Sense-making is a "distributed" process. Each person and event in the problem situation is a source of data from which others, exposed to their own, fluid data environment, will share the collective, sense-making task. The goal of sense-making is explanation that is plausible in its context, rather than the discovery of eternal 'truth'. The outcome of plausible sense making is contingent and provisional.

The methods chosen will be oriented towards  the paradigm (sense-making) that is appropriate to that goal, as shown in **Table 4.0.1**.

The goal of the present research is not to make confident predictions of the outcome of an information systems intervention, with factors of success or failure identified and controlled in isolation from events. Instead, it is to identify plausible accounts of

observed reality that provide useful knowledge and insights that illuminate the context and the mechanisms that link the intervention to its outcomes.

**Table 4.0.1 : Contrasting Research Polarities**

| Paradigm | Decision Making | Sense-Making |
|---|---|---|
| **Goal** | Confident predictive theory | Plausible explanation |
| **Ontology** | Idealism | Realism |
| **Epistemology** | Modernist : hierarchy of clear and distinct ideas ; progress towards accurate discovery of 'truth'. Positivism | Post-Modernism : contingency, equivalence of alternative explanations. Hermeneutics and Phenomenology, Critical Realism |
| **Axiology (espoused values)** | Absolute Truth. Rigorous identification and calculation of 'facts' | Consistency with observed reality. Pragmatic identification of a satisfactory way forward |
| **Methodology** | Deduction, Verification, Correspondence theory of truth | Induction, Falsification, Retroduction, scepticism, Holism, Under-determination |

## 4.1 : R I G O U R *versus* R E L E V A N C E
## I N  I N F O R M A T I O N  S Y S T E M S  R E S E A R C H

This section contrasts rigour with relevance in information systems research. The information systems literature has evolved against a contest between proponents of rigorous scientific method and those of other approaches likely to provide more relevant results.

Research is relevant if it resonates with issues (that ought to be) important to the reader and if the original research setting is sufficiently similar to the reader's own situation for the study findings to be generalised (translated or extrapolated) there. Research is all the more relevant if it results in worthwhile change.

Benbasat & Zmud (1999) argue that "most IS academic research today [i.e.1999] lacks relevance to practice". They give five explanations for the lack of relevance in Information Systems research, all of which hinge around the academic obsession with rigorous method at the cost of practical application to real world problems.

To be relevant, they argue, research must focus on the practical implementation of ideas and allow "for contextual differences that are important to individual readers". Research must :

- address the practical concerns of practitioners in the field of application
- produce knowledge and prescriptions they can use
- refer to technologies and business issues before they have become obsolete
- be readable and enjoyable by a wide audience.

To be "applicable", they said that research must :

- be capable of influencing practice

- present theory in context and enable the researcher to "make prescriptions and be proactive"

- "develop frames of reference to organize phenomena and provide contingency approaches to managerial action"

- be "*both* rigorous and relevant".

Benbasat & Zmud summarise their requirements : to "make prescriptions and be proactive" and to "develop frames of reference to organize phenomena and provide contingency approaches to managerial action".

Lee (1999) argues that natural science is the wrong paradigm for Information Systems research. Where natural science "pursues the goal of truth in formal propositions" and "produces knowledge about what the world is", inquiry in professions, for example, medicine, "pursues the goal of effectiveness in actions" and "produces knowledge about how to intervene in the world and change it in order to satisfy real-world needs".

Davenport and Markus (1999) suggest that rigour and relevance can be balanced along an economist's indifference curve ("impact frontier"). Research needs to be modelled on the needs of 'clinical' Information Systems practice rather than the methodological preferences of journals, academic faculties or funding institutions. Lyytinen (1999) goes one stage further than this, arguing that Information Systems research ought not to

assume practice but is needed to identify practice and the "elements ….. relevant in understanding and changing that practice".

Relevance, therefore, is not simply a matter of correspondence between a study setting and the reader's own situation. Relevance has a clinical dimension, requiring a study also to have implications for action. It must combine knowledge of the model case with specific local insight, careful diagnosis and prescription for local action. The prescription is not relevant if not taken by the patient.

## 4.2 : A C T I O N   R E S E A R C H

### 4.2.0 : Introduction - General Characteristics of Action Research

This section focuses on Action Research as the preferred approach to inquiry in the Information Systems field.

According to Bryman (1989 ; p.170), Action Research allows a variety of paradigms and qualitative methods that can, but need not, be complemented by quantitative methods.

Baskerville (1999) explains that action research focuses holistically on complex social structures and processes, and on their response to intervention. Action research takes an interventionalist and an interpretivist stance, such that the researcher seeks, through his own perceptual apparatus and through that of those involved in the problem situation, to

understand rather than to predict the events it contains. "Researchers both observe and participate in the phenomena under study".

The focus is on specific local ("idiographic") detail, not on generalisation. Action research accommodates qualitative data and has foundations in phenomenology and hermeneutics and post-positivism.

Action research has quality criteria of its own but ultimately depends also on the properties of the underpinning qualitative methods employed.

Baskerville and Wood-Harper (1998) state, "Action research methods are highly clinical in nature, and place IS researchers in a 'helping role' within the organizations which are being studied". Baskerville (1999), identifies the following characteristics of Action Research :

- Orientation towards action and change
- Problem focus
- Organic process
- Collaboration among participants as well as between participants and the researcher.

Baskerville describes four major characteristic of information systems research (paraphrased) :

- Dual commitment to practical problem solving and expansion of scientific knowledge
- Help understand the complex and multivariate nature of the social setting
- Collaboration between the researcher and others in the problem setting
- Primary focus on understanding change processes in social systems.

Baskerville's "ideal social setting" for Action Research is one where :

1. "The researcher is *actively involved*, with expected benefit for both researcher and organization"
2. *"the knowledge obtained* can be *immediately applied*, there is not the sense of the detached observer, but that of an active participant wishing to utilize any new knowledge based on an explicit, clear conceptual framework"
3. "the research is a (typically cyclical) process *linking theory and practice"*.

For Mumford (2001), the distinguishing features of Action Research are a combination of practical problem solving with theoretical relevance. Understanding of the Problem Situation engenders suggestions for improvement. Lessons from practical actions to implement these ideas inform contributions to the theory of change management.

## 4.2.1 : Is Action Research Just Consultancy ?

Gill and Johnson (1997, p.62-63) contrast between action research and consultancy. The key elements of contrast are the relationship between the client and the analyst, the analyst's role in diagnosis and the origin of a prescription for action.

In consultancy, the consultant and the client are in vertical relationship. Diagnosis is not explored in depth and the consultant's role in diagnosis is minimal. The consultant's methodology is an off the shelf 'package', originating outside the problem situation. The consultant is not involved in the implementation of his proposals.

Action research places the client and the researcher in a horizontal partnership. The action researcher introduces explicit academic concepts, structure and challenge to explore the detail of diagnosis and refine its accuracy. The action researcher's methodology is determined by his interaction with the client and the emerging data and he is closely involved in the implementation of his ideas.

For Baskerville (1999), action research and consulting differ in terms the five dimensions shown in **Table 4.2.1.**

McKay and Marshal (2001) refer to the "dual imperative" which distinguishes action research from consultancy. Action research is distinguished from consultancy by its contribution to a research agenda, focused on new learning about the theoretical framework, over and above its contribution to problem solving action.

**Table 4.2.1 : The Difference Between Action Research and Consulting (after Baskerville, 1999)**

|  | Action research | Consulting |
|---|---|---|
| **Motivation** | scientific prospects, perhaps epitomized in scientific publications. | commercial benefits, including profits and additional stocks of proprietary knowledge about solutions to organisational problems. |
| **Commitment** | to the client, and to the research community for the production of scientific knowledge. | to the client alone. |
| **Approach** | Collaboration is essential in action research because of its idiographic assumptions. | typically values its "outsider's," unbiased viewpoint, providing an objective perspective on the organizational problems. |
| **Foundation for recommendations** | theoretical framework. | suggests solutions that, in the consultant's experience, proved successful in similar situations. |
| **Essence of the organisational understanding.** | founded on practical success from iterative experimental changes in the organization. | independent critical analysis of the problem situation. |

Baskerville and Wood-Harper (1998) identify different sub-forms of action research in **Table 4.2.2.**

**Table 4.2.2 : Characteristics Analysis of Action Research Forms (from Baskerville & Wood-Harper, 1998)**

| | Process Model | Structure | Typical Researcher Involvement | Primary Goals |
|---|---|---|---|---|
| **Canonical Action Research** | iterative | rigorous | collaborative | Organisational Development / Scientific Knowledge |
| **IS Prototyping** | iterative | rigorous | collaborative / facilitative | System Development |
| **Soft Systems Methodology** | iterative | fluid | facilitative | Organisational Development / System Development |
| **Action Science** | reflective | fluid | facilitative | Organisational Development / Scientific Knowledge |
| **Participant Observation** | reflective | fluid | expert | Scientific Knowledge |
| **Action Learning** | reflective | fluid | expert | Training |
| **Multiview** | linear | rigorous | any | System Development |
| **ETHICS** | linear | rigorous | facilitative | Organisational Development / System Development |
| **Clinical Fieldwork** | linear | fluid | facilitative | Organisational Development / Scientific Knowledge |
| **Process Consultation** | linear | rigorous | expert | Organisational Development |

These authors point out that ethnography, case study and Action Research each refer to a genre rather than a homogeneous approach. Each genre contains different sub-forms with different models, structures and goal sets. They argue that rigour in action research does not stem from the goals but from the processes pursued. This leads them to contrast the extant account, of the six major characteristics of Action Research, with their own, revised account (**Table 4.2.3**).

**Table 4.2.3 : Extant and Revised accounts of Action Research Characteristics (after Baskerville & Wood-Harper, 1998)**

| Extant Focus : Goal Characteristics | Revised Focus: Process Characteristics |
|---|---|
| Aim to increase understanding of an immediate social situation | Acknowledge and explore complex, multivariate nature of social setting |
| Assist practical problem solving and expand scientific knowledge | Make "highly interpretive assumptions" about observations. Intervene in the problem setting |
| Performed collaboratively and enhances the competencies of the respective actors | Participatory Observation : the social setting is observed and experienced from within |
| Understand change processes in social settings | Understand change processes in social settings |
| Use data feedback in cyclical processes | Allow linear, single-pass process. Allow participative form of observation to provide main source of accuracy |
| Perform within "mutually acceptable ethical framework" | Ethical imperative applies to all research and is not a defining feature exclusive to Action Research |

To conclude this section, it is noted that a researcher's dogged allegiance to a given 'brand' of Action Research, with goals specified in advance of diagnosis, is less

important than the actual steps taken in relation to diagnosis and action within the problem situation.

### 4.2.3 : Sources of Rigour in Action Research

To assess the quality of Action Research studies in Information System, Lau (1999) has synthesised a framework with four dimensions :

- Conceptual foundations : aims, theoretical basis, philosophical paradigm and variety of action research undertaken

- Study design : technical stages of the action research project

- Research process : problem diagnosis, action interventions, reflective learning, iterative nature of the study, general lessons learnt

- Role expectations : relative roles of the researcher and the participants, development of participants' competencies, ethical issues to be addressed.

For Baskerville and Pries-Heje (1999) validity can be enhanced by "a rigorous, reliable approach to theory formulation", for which they adopt the Discovery of Grounded Theory (Glaser & Strauss, 1967) as a model.

Baskerville and Pries-Heje establish only partial resonance between Action research and Grounded Theory. They set a balance between inquiry and action which allows some 'givens' to be deduced from the Problem Situation taken at face value and they concede, "Action research and grounded theory cannot be completely integrated. The field of

study is too limited and goal-directed to permit full use of a comparative method like grounded theory."

Baskerville (1999) makes several suggestions to enhance rigour. First, the approach must be "appropriate for the research question of interest to an audience that accepts post-positivist learning". Second, there should be a "client-system infrastructure" – a formal research agreement that establishes the consent of participants to disclosure of research findings and sets what Bell and Wood-Harper (2003) call the "terms of reference" that delineate the researcher's authority and freedom of action. Third, the researcher must establish the explicit theoretical foundations that form the basis of his diagnosis. Fourth, although Baskerville cites a variety of data collection methods, any chosen method should be carefully planned (and executed).

Baskerville then states that the researcher must rely on the people in the problem setting for key knowledge and avoid assuming "the authoritative role of the external consultant". The researcher and his collaborators within the problem situation must then continue action, reflection and learning until the immediate problem situation is relieved. Finally, the temptation to generalise findings must be "tempered" with "an interpretation of the extent of similar settings to which the theory can be expected to apply".

Avison, Baskerville and Myers (2001) state, "the rigour of many (Action Research) studies in IS can be improved….. the findings have frequently been emphasised at the expense of the process".

These authors consider that rigour can stem from attention to "three aspects of control" : initiation (the study is driven by a practical problem rather than a research agenda) ; authority (the researcher's freedom of action within the Problem Situation and his power to instigate change are made clear) ; and the degree of formalisation which pins down terms of reference, lines of authority, reporting relationships etc.

Davison, Martisons & Kock (2004) have laid down five "principles of canonical action research". The first is that the researcher and client should agree that the action research format is appropriate and that the findings of the action research will be implemented. Second, the process is cyclical, iterating between examination of theory and observations in the field. Third, the theoretical framework of the research is explicit. Fourth, change is brought about. Finally, reflection produces learning about the problem situation and the theoretical framework.

### 4.2.4 : Doing Action Research

Baskerville (1999) recognises a "diagnostic" and a "therapeutic" phase of action research. The latter phase is then expanded so that a cyclic model with five phases results :

1. Diagnosis

2. Action planning

3. Action taking

4. Evaluating

5. Specifying learning.

The learning specified will have three forms. First, new knowledge will emerge about the deviation of the actual from the anticipated outcome of intervention : what will need to be done differently on a future occasion. Second, critical self appraisal will alert the action team to its own organisational norms and the way these will need to change. Third, theoretical knowledge will result from the confirmation or modification of the theoretical framework, prompted by the outcomes of action.

Shah, Eardley and Wood-Harper (2007) express the five phases of the cycle as analyse, plan, execute, evaluate and capture learning or move on to next project. The cycle is applied in turn to four stages of entry by the researcher or academic research team into the host organisation, iterating as necessary. The four stages of entry are, negotiation with the executive board (preparation), networking and formation of the project team, the creation of a climate for change (institutionalisation of the project) and the inception of the pilot project.

At the strategic level, the action learning cycle is applied to the establishment of collaboration between the academic and the business institution, the initiation of the action research and the implementation of organisational learning resulting from the research.

At the tactical level of the host organisation, the cycle is applied to the planning and to the co-ordination of the research, and to the "harvesting" of the action learning. It is also applied to the building of the action research teams, the supervision of the action research, its monitoring and to the process of reflecting on the action research.

At the operational level, it is applied to the research process itself : the conduct of interviews, the collection of action research data, its analysis and the feedback of action research results to the operational team.

### 4.2.5 : Conclusions on Action Research

The last example shows the extent to which action research can be scaled up in a large organisation, given ample resources. However, the appeal of action research to this researcher stems from its diagnostic and therapeutic or "helping" orientation on a less ambitious scale.

The appeal stems also from the orientation towards thoughtful diagnosis in advance of expert prescription.

This chapter has established that action research is unique in its capacity for organisational relevance but extends beyond consultancy because of its contribution to academic theory and to the researcher's participation in worthwhile change, as opposed to pontification about a future desired state.

The rigour of action research can be enhanced by attention to each next deliberate step, both in the planning and execution of the research itself and in the conduct of the specific research methods used.

Thus, where some aspects of rigour relate to the nature and conduct of Action Research described above, other aspects relate to the individual qualitative methods used within the Action Research process. These are now discussed.

## 4.3 : R E S E A R C H   M E T H O D S

### 4.3.0 : Introduction

Research in a clinical setting tends to equate rigour with a scientific paradigm and *quantitative* methods. The research goal is then to produce, as its outcome, an accurate set of findings from which reliable and relevant conclusions can be drawn as a basis for future action.

When we distinguish between the procedures and the outcome of research, it is clear that the quality of 'good' research must derive from the researcher's clear idea of what he wants to find out, reflected in the adoption of research methods and procedures capable of answering the research question posed. Methods suitable to evaluate a rational and quantifiable hypothesis are not directly transferable, to the problem situation of a researcher who wants to explore 'what the world must be like for an information system to succeed'.

In the latter case, it is necessary to take account of individualistic perspectives, reflecting partial and divergent rather than general and convergent viewpoints. The setting is social and political rather than natural and rational. Where the focus is to

explore and understand, rather than to measure, the appropriate methods are those of *qualitative* inquiry.

The quality of research conducted using these methods is judged on the basis of : a clearly specified research question ; the selection of a research approach capable of providing relevant and useful information ; careful and deliberate attention to sampling of respondents ; data collection and documentation ; data corroboration ; data analysis ; data presentation ; and inferences and conclusions that are well-argued in terms of the data.

### 4.3.1 : Assessing the Quality of Qualitative Research

The quality of research conducted using these methods is judged on the basis of : a clearly specified research question ; the selection of a research approach capable of providing relevant and useful information ; careful and deliberate attention to sampling of respondents ; data collection and documentation ; data corroboration ; data analysis ; data presentation ; and inferences and conclusions that are well-argued in terms of the data.

Silverman (2005; p.228-229), specifies four quality criteria for qualitative research :

- The research helps to build a useful social theory
- The researcher anticipates the reader's scepticism
- The research methods and approach are carefully argued
- The research makes a contribution to practice and policy by providing practitioners, clients and/or policymakers with new insight.

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**What Distinguishes Good Quality Qualitative Research from Anecdote ?**

(Pope Ziebland & Mays, 2000) comment on this issue. Qualitative research is distinguished from anecdote by its self-conscious, reflective and reflexive approach to systematic data collection and analysis in relation to an explicit line of inquiry. They say, "Good qualitative analysis is able to document its claim to reflect some of the truth of a phenomenon by reference to systematically gathered data ……… poor quantitative analysis is anecdotal, unreflective, descriptive without being focused on coherent line of inquiry ……… good qualitative analysis relies on the skill, vision and integrity of the researcher doing that analysis ………"

**The Contribution of Explicit Theory**

Rigorous procedure is complemented by the use of explicit theory.  Hence, coherence between the phenomenon of interest and its local and historical background are achieved (Walsham, 1993) through "tight reasoning, based on explicit theory, to establish the relationship between the empirically observed context, its interpretation by key situational actors and the processes of change in the Problem Situation".

**Relativist and Realist Quality Criteria**

Mays & Pope (2000) differentiate relativist and ("subtle"-) realist quality criteria.

- **Relativist (anti-realist) criteria for quality (Mays & Pope, 2000)**

  - New theory

  - Novel claims

  - Credible account

  - Description sufficient for competent performance in the culture studied

  - Findings transferable to other settings

  - Reflexivity.

Reflexivity describes the researcher's self-conscious awareness of several factors : the limitations of his own intellectual apparatus ; their filtering effect on his appreciation of the problem situation and the people in it ; his own impact on the social setting, its dynamics and the disclosures it will afford ; and the implications of all these considerations for a careful and self-conscious approach to each next, deliberate research step. Reflexivity extends into data collection, interpretation and reporting.

- **Realist criteria (Mays & Pope, 2000)**

  - triangulation

  - validation by respondents

  - clear description of data collection and analytic methods

  - reflexivity

  - negative cases

  - unbiased presentation of multiple perspectives.

## 4.3.2 : Credibility

Mays & Pope (1995) discuss rigour in qualitative research in terms of purposive, non-random sampling ; reliability based on systematic, meticulous data analysis ; and validity.

For Silverman (2006, Ch.8) the overarching criterion of qualitative research is credibility.

Findings are credible as far as they are supported by the data. There are clear links between the data, their interpretation and the researcher's conclusions. The researcher provides sufficient information for the reader to judge whether the research findings can be generalised to his own situation.

Credibility has two components, reliability and validity. Silverman uses the image of a thermometer (2006 ; p.282) A reliable instrument that measures consistently but inaccurately. One that is valid produces, on repeated measurement of the same signal, a range of values that cluster around a "true" value.

## 4.3.3 : Reliability

**Tests of Reliability in the Different Paradigms**

In the positivist paradigm, the observed effects will be reproduced whenever the experimental context is replicated.

In the scientific realist paradigm, the observed effects will be promoted, inhibited or radically different if the context differs sufficiently or if the people studied exercise different choices according to their personal perceptions and previous experiences.

The constructivist (interpretetivist) and critical theory paradigms offer explanation or critique but do not extend to prediction of future events. Reliability is determined by the quality of the analytic theoretical framework and by the strength of circumspect argument that associates the analytic framework with the various concordant and discordant sources of data acquired.

Silverman (2006, ch.8) distinguishes between the data and the researcher's inferences from those data. The research is reliable to the extent that the link between inference and data is better than tenuous (i.e. inference is "minimal"). The reader needs to be able to distinguish between the analysis that emerges from the data (the 'emic' analysis) and the researcher's own theoretical framework (the 'etic' analysis).

One way to promote reliability is for more than one researcher to analyse the data (inter-rater reliability), and then to compare the analysis, inviting a further analyst to adjudicate any difference of interpretation. To minimise the gap between statement and inference ("minimal inference"), the researcher should present any given phrase or sentence in sufficient context to allow accurate interpretation (Silverman, 2006 ; p.287). Silverman also advocates careful attention to inflection, hesitation and other nuances of speech during interview transcription and interpretation.

For Silverman (2005 ; p.228), the research design must be carefully argued and data transcripts must be available for inspection and assessment of reliability. Theoretical

assumptions have to be clear and the theoretical models employed, discussed. The research processes must be adequately documented. The strengths and weaknesses of data and methods must be discussed. Changes made to the research design must be documented.

### 4.3.4 : Validity

Silverman (2005 ; p.210) equates validity with "truth". This requires critical investigation of all the researcher's data instead of simply selecting anecdotal quotes that match the researcher's preconceptions.

Anecdote is avoided by providing exemplary instances of behaviour and by explaining in advance why some instances are to be included and others not. Tables of abstracted data lose contact with the original research interview or transcript Silverman (Silverman, 2005 ; p.211). The researcher needs to show how any given quote is representative.

**Assuring the Accuracy of Findings : Triangulation and Respondent Validation**

Triangulation refers to the corroboration of one data item by another. Keen & Packwood (1995) state, "Case studies often use triangulation to ensure the validity of findings. In triangulation all data items are corroborated from at least one other source and normally by another method of data collection".

Mays & Pope (1995) discus validity in terms of triangulation, contradictory ("deviant") cases and the researcher's ability to provide information sufficient for the reader to understand the research setting and come to his own conclusions, about the relevance of local findings to his own situation. To this, they add coherence with established theory and frameworks of understanding.

Denzin and Lincoln (2000, p.119) add : " ……… triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question. Objective reality can never be captured. Triangulation is not a tool or a strategy of validation, but an alternative to validation".

Respondent validation occurs when the researcher presents his findings to his informants for ratification or refutation.

Silverman (2005, p.212) dismisses triangulation and respondent validation as "flawed" methods. He takes issue with the idea that the "truth" of interpretation depends on correspondence between findings from different methodologies, and challenges the view that the opinions and statements of respondents constitute a yardstick of "truth".

Silverman (2006 ; p.292) says, "the major problem with triangulation as a test of validity is that, by counterposing different contexts, it ignores the context-bound and the skilful character of social interaction …….. ". Here he is adopting the logical empiricist position, that the findings from one reliable method need not be refuted by apparently contradictory findings from another. Neither are they necessarily verified when the results of two or more methods converge.

Instead, Silverman (2005, p.212) relies on five strategies :

- The refutability principle

- The constant comparative method

- Comprehensive data treatment

- Deviant-case analysis

- Using appropriate tabulations

The refutability principle holds that relationships are provisional : they can never be proved, only not yet refuted. The constant comparative method involves the assembly of conclusions from a small data set and then revising these conclusions in the light of further data in successive iterations. Comprehensive data treatment means making sure that every single item of data has been taken into consideration so that there can be no question that data have only been considered selectively. Deviant-case analysis means deliberately looking for the data that contradict the current hypothesis.

Appropriate tabulation (for examples, Miles & Huberman, 1994) only promotes validity if it has an explicit rationale. Under certain circumstances, tabulation can assist validity. Silverman does not appear to suggest that validity depends on tabulation.

### 4.3.5 : Conclusions on Qualitative Research Methods

Quality in qualitative research derives from the researcher's clear idea of what he wants to find out, followed by careful and deliberate attention to sampling, data collection and

corroboration, data documentation, data analysis, data presentation, inference from the data and conclusions that are well-argued in terms of the data.

In contrast with experimental, scientific research, the research design may undergo modification in response to information and knowledge acquired during the research. The outcome of the research may be a theory that is robust against attempts at refutation. Alternatively, it may be a credible set of statements, the test of whose relevance is their correspondence with the experience, intuition, understanding and openness to persuasion of the audience.

'Scientific' research aims carefully to recognise and eliminate or minimise, contextual influences that will confound scientific findings. This is impossible in settings where the intervention of interest occurs in a setting whose history and characteristics are beyond manipulation. Contextual influences must be taken fully into account and cannot be marginalised.

On the other hand, bias can be managed. The researcher needs to be fully aware of his own prior conditioning, values and beliefs that he will bring to the research context and its interpretation. He has the choice, to try and set these to one side or to bring these fully into focus and contrast his own world-view with that emerging from the research. Triangulation and respondent validation are established strategies to assure the accuracy of research findings through correspondence with an assumed unique, discoverable 'truth'. This is a positivist assumption and these strategies are not compatible with a paradigm that suggests that 'truth' is not a remote, discoverable entity but 'situated', as a 'good enough' basis for social action, in the values, beliefs and historical experience of a social group.

Qualitative research need not emulate science strictly in its exact criteria of credibility. Instead it has rigorous criteria of its own that reflect its parent realistic and interpretive paradigms.

**Table 4.3.1** summarises the factors of validity and reliability in a credible study.

**Table 4.3.1 : Factors of Validity and Reliability in a Credible Study**

|  | **Validity** | **Reliability** |
|---|---|---|
| **Research design** | Carefully argued, adapted to emergent understanding. Modelled around an explicit theoretical framework. Data collection methods are sufficiently sensitive to provide answers to the questions posed. | The research steps are clearly described so that another researcher could approach the problem in the same way with a reasonable expectation of reproducing the same results. However, the interpretive paradigm departs from the scientific because it rejects the idea that a unique "truth" can be approached and discovered through a meticulous process of inquiry. |
| **Sampling** | Purposive sampling of data sources, chosen to corroborate or challenge each other. | The researcher can justify his choice of data sources. |

**Table 4.3.1 (continued)**

|  | Validity | Reliability |
|---|---|---|
| **Data collection and corroboration** | The influence of the researcher on the research setting is minimised. The research reflects the values of the host community, not his own. Statements reflect the sincere beliefs of those questioned and are not a reflection of what people think the researcher wants to hear. | Researcher's sensitivity to nuance and capacity to explore uncertainty of interpretation by eliciting further information and clarification.<br><br>Constant comparison between emergent data and the researcher's own developing understanding of the research setting.<br><br>Cross-checking of apparently secure conclusions by search for deviant cases / conflicting opinion. |
| **Data documentation** | Careful transcription of recorded material. | Tape recording of interviews. Preservation of transcripts. |

**Table 4.3.1 (continued)**

|  | Validity | Reliability |
|---|---|---|
| **Data analysis** | The grounds for summarising a statement in a short phrase or "category" are well thought out, not arbitrary. | Careful transcription by the researcher himself. Awareness that computer assisted transcription has limitations that interfere with the researcher's reflection on the data during transcription. |
| **Data presentation** | Allows reader to distinguish between data, analytic framework and author's interpretation. | Statements of interest are adequately contextualised when reproduced in the report. |
| **Inferences from data** |  | "minimal inference". |
| **Conclusions** | Research conclusions are surrounded by sufficient contextual detail to focus the reader's understanding and appreciation. The reader can then safely judge whether the results and conclusions are relevant to other contexts. | Linked to data and inferences through clear, defensible argument. |

## 4.4.0 : Introduction

This section sets out the choices available to a researcher when deciding the form his study ought to take. It explains the choice of case study as the preferred vehicle and identifies characteristics of a model case study.

## 4.4.1 : Five Traditions of Qualitative Inquiry

Cresswell (1998) identifies "five traditions" of qualitative inquiry, aimed at understanding rather than measurement. Each has a different focus, plan of data analysis and narrative form. These are described in **Table 4.4.1**, adapted from Cresswell (1998) : p.65) :

**Table 4.4.1 "Five Traditions" of Qualitative Inquiry**

|  | **Biography** | **Phenomen-ology** | **Grounded Theory** | **Ethnography** | **Case Study** |
|---|---|---|---|---|---|
| **Focus** | Life of an Individual | Invariate structure of experience | Theory development | Cultural Description and Interpretation | In-depth Analysis |
| **Data Analysis** | Stories, epiphanies, historical content | Statements, meanings, themes, general description | Highly specific plan of data organisation | Description, analysis, interpretation | Description, themes, assertions |
| **Narrative Form** | Detailed picture of the individual's life | Description of the 'essence' of the experience | Theory or theoretical model | Description of cultural behaviour | In-depth study of the 'case' or 'cases' |

**Biography**

Biography focuses on the interaction between a single individual and surrounding people and events, over (a limited period of) his lifetime. The individual and his context, of people and events, are shown to influence each other. The biographer explores the significance of these events and relationships for people in his own, contemporary context.

**Grounded Theory**

Strauss and Corbin (1990 ; p.23) explain : "Grounded theories are inductively discovered by careful collection and analysis of qualitative empirical data. That is, this method does not begin with a theory, and then seek proof. Instead it begins with an area of study and allows the relevant theory to emerge from that area."

In the phase of "open coding", discrete events, happenings and phenomena are identified and labelled in "categories". Rules are developed so that category assignment is always consistent. As this phase proceeds, the rules of category assignment become more explicit through the development of criteria known as the "properties" of each category. "Dimensions" are also developed to describe the volume, frequency and intensity of each property.

Care is taken to allow the concepts to emerge from the data, through the researcher's critical reflections and through "constant comparison" between one idea or information source and another. Especially, the researcher uses respondents' own jargon ("*in vivo*

codes") as category labels and explores its meaning by seeking respondents' own explanations. The researcher's own preconceptions are excluded.

Each conclusion from this process is treated as a fallible hypothesis, tested by seeking statements that challenge the conclusions drawn so far in relation to each category. There is an active search for "deviant cases" that will challenge rather than corroborate emerging inferences. Eventually, further inquiry ceases to add new insight. The category has now become "saturated" and that line of inquiry can be closed.

In the phase of "axial coding", ideas are arranged in clusters under broad headings. The first cluster is the "central phenomenon". It is surrounded by other clusters, representing "causal conditions", "intervening conditions" and "context". The reactions of people and social groups to these sets of influences are grouped in the cluster labelled "actions and interactions". These have implications or "consequences" for the community in question or for others.

The final phase of "selective coding" completes the detail of residual uncertainties and the grounded theory is then presented as a "story".

**Phenomenology**

Phenomenology recognises that the observer's own mental apparatus presents a barrier between the outside world and the observer's internal perception.

Cresswell (1998, p.33, 55, 147-150) explains a phenomenological study as follows.

A typical study begins by suggesting why the researcher is interested in a particular phenomenon and suggests that it may possess an "essential structure". The philosophical perspective of a phenomenological study is outlined (as in the literature review of the present thesis).

Interview transcripts are broken down into individual statements ("horizontalisation"), then translated into "clusters of meaning", "expressed as psychological or phenomenological concepts". These are constructed into textural, then structural descriptions : respectively, a synthesised account of what was experienced, then how it was experienced. The researcher finally reflects on what he has learned about the philosophical basis of the study.

Phenomenology attaches equal worth to the multiple perspectives that can emerge during such a study. Although this places a counterpoise against the researcher's own perspective, the act of questioning and drawing inferences from responses is an extension of the researcher's own intellectual bias and limitations. He must be constantly aware of this potential constraint on the content that emerges from the enquiry, and sensitive to the new knowledge that might be revealed.

**Ethnography**

Ethnography focuses on the language, practices and tools employed by a distinct community, and on the values, norms and beliefs that constitute its culture. These are explored from within the society in question.

The researcher becomes a participant in the daily lives of those he studies, aiming. to understand a culture through the experience of living under the conditions experienced by the community. The verbal testimony of individuals is constantly compared with other sources and with the researcher's own carefully documented observations.

In classical ethnography, participation is prolonged (deep immersion). Baskerville and Wood-Harper (1998) use the term, participatory observation when presence within the problem situation is less intensive.

Mays & Pope (1995) distinguish four classes of observer and observation technique (**Table 4.4.2**):

**Table 4 4.2 : Classes of Observer and Technique (Mays & Pope, 1995)**

| Complete participant | covert observation |
|---|---|
| Participant as observer | overt observation, those observed are aware of the observer |
| Observer as participant | mainly questions and little sustained observation |
| Complete observer | experimental design, no participation |

Silverman (1998) criticises the tendency for ethnographic research to rely on interviews to elicit "how people 'see' things" and prefers "to focus instead on how people 'do things'". As an ethnographer, he is interested to focus on practice *in situ*, looking at how organisations are routinely *enacted*".

**Case Study**

Yin (1989 p.13-14), defines a case study as : "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident."

Yin goes on to say that, where the phenomenon and its context are inextricable, case study inquiry

- "copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
- benefits from the prior development of theoretical propositions to guide data collection and analysis."

Bryman (1989 : ch.6) establishes close correspondence between action research and case study, on the basis of the contextual familiarity and description necessary for both forms. In particular, the "case" tends to be situated in a location or community of human activity. Key events, activities and personalities tend to be important, but incidental to the identity of the case.

A case study can embody multiple qualitative and quantitative methods. Case studies usually comprise a number of emphases and there is a strong emphasis on context. Case studies do not aim to infer findings from a sample to a population or to generate laws,

but they provide an understanding of organisational functioning and provide a degree of theoretical insight. They can also serve to illustrate an instance where theory or parts of theory are confirmed. Finally, "many action research projects are in fact special kinds of single case study."  (pages 178-9).

Case study can draw on any of the qualitative traditions identified by Cresswell (1998), as well as on quantitative data. In particular, participative observation is often supported by examination of documents (which may extend from simple reading and citation to detailed statistical analysis of content) and by qualitative interviews.

Britten (1995) describes three interview genres :

In a structured interview, standard, closed questions are asked in standard fashion so that the instrument of inquiry does not vary from respondent to respondent. Answers may be constrained in the form of multiple choices to fit pre-determined categories. Nuance is not explored. The interview questions are completely led by the researcher.

In a semi-structured interview, open-ended questions define the area of interest and invite the respondent to answer freely. Several issues may be addressed in this way during the interview. The scope of the interview is broad and depth of exploration is correspondingly less.

In an in-depth interview, the scope of the interview is relatively confined compared with a semi-structured interview but probing and confirmatory questions explore the detail of responses in greater depth. The later questions in each sequence are determined by what the interviewee says.

Keen & Packwood (1995) believe,

> *"Case studies using qualitative methods are most valuable when the question being posed requires an investigation of a real-life intervention in detail, where the focus is on how and why the intervention succeeds or fails, where the general context will influence the outcome and where the researchers asking the questions will have no control over events. As a result, the number of relevant variables will be far greater than can be controlled for, so that experimental approaches are simply not appropriate ……… The case study is an alternative approach - in effect, a different way of thinking about complex situations which takes the conditions into account, but is nevertheless rigorous and facilitates informed judgements about success or failure".*

They explain that a case study does not describe a discrete event so much as a rich texture of ideas, events and processes in which multiple perspectives are given explicit expression.

> *"Often an intervention is ill-defined, at least at the outset, and so cannot easily be distinguished from the general environment.  Even where it is well-defined, an intervention may not be discrete but consist of a complex mix of changes that occur over different timescales ……… Any intervention will typically depend for its success on the involvement of several different interested groups.  Each group may have a legitimate but different interpretation of events; capturing these different views is often best achieved by using interviews or other qualitative methods within a case study design."*

The intervention at the heart of the case study can be difficult to separate from its own ramifications. Even when a case study is planned over a prolonged timescale, "it is not clear at the outset whether an intervention will be fully implemented by the end of a study period – accounts of major computer system failures show this. Yet study of these failures may provide invaluable clues to future success."

Stake (2000) distinguishes between "instrumental" case studies, contributing to the refinement of a generalisation, and "intrinsic" case studies with a hermeneutic, "intention, to understand "what's going on".

Van der Ven (2007 ; p.ix) uses the term, "engaged scholarship", to describe an exploratory approach to case study that proceeds from the perspective of one informant to the next.

### 4.4.2 : Quality Criteria for Interpretive Case Studies in Information Systems

Markus and Lee (1999) point out the need to develop evaluation criteria which respect the nature, the differences between and the sources of rigour within, the qualitative, interpretive and case study traditions.

Accordingly, Klein and Myers (1999) present seven interdependent "principles for conducting and evaluating interpretive field studies in information systems". In this category, they include ethnography and those aspects of case study which depend on data from participative observation.

Overarching the other six principles is the hermeneutic foundation of interpretive research and the attempt "to understand phenomena through the meanings people assign to them". The "fundamental" principle is the hermeneutic circle in which, citing Gadamer, they say, " ….. the movement of understanding is constantly from the whole to the part and back to the whole ….. The harmony of all details with the whole is the criterion of correct understanding".

The remaining six principles are outlined below :

1. Contextualisation : "subject matter (must) be set in its social and historical context so that the intended audience can see how the current situation under investigation emerged".

2. Interaction : understanding results from the exchange of interpretations between the researcher and other participants in the Problem Situation.

3. Abstraction / Generalisation : "the attempt to relate particulars ….. to very abstract categories ; unique instances can be related to ideas and concepts that apply to multiple situations."

4. Dialogical Reasoning : the researcher must identify explicitly the fundamental philosophical roots of the research, both to his readers and to himself ; must "identify what type of interpretivism (he) prefers, identify its philosophical roots, and relate the particular strengths and weaknesses of the preferred philosophical direction to the purpose of the work."

5. Multiple Interpretations : where dialogical reasoning requires the researcher to "confront" the implications of his own pre-conditioned values and judgements, as "the necessary starting point of our understanding", multiple interpretations recognises the scope for dissensus as well as consensus between the interpretations of different participants.

6. Suspicion : of the grounds for belief, assent, trust and attention, demonstrated in a given social setting.

Two important issues arise from the hermeneutic origin of these seven principles. First, the authors identify that hermeneutic interpretation can never be detached from contamination by historically-conditioned, socially constructed systems of value. The principles of dialogical reasoning and multiple interpretations deliberately acknowledge this and require the researcher to be aware constantly of the "prejudices" which are shaping his and their current understanding.

Second, where validity in positivist experimental research stems from statistical similarity between the study setting and the situations to which the study findings are extrapolated, they reiterate Walsham's (1993, p.15) argument that validity in interpretive studies stems from "the plausibility and the cogency of the logical reasoning used in describing the results from the cases and in drawing conclusions from them".

By making use of Deetz' (1996) schema, we can take this argument one stage further by ensuring that Walsham's plan of "cogent and logical" reasoning derives validity from each of Deetz' four quadrants : from correspondence between formal arguments in the

"functionalist" quadrant ; from cultural understanding in the "interpretive" quadrant ; from ethical exploration in the "critical" quadrant ; and from the free expression of uncensored argument in the "dialogical" quadrant.

Klein & Myers' (1999) principle of suspicion tacitly establishes a link with the critical tradition, where there is a constant awareness of the sources and effects of 'distorted communication' stemming from power asymmetry and resistance towards what they call "the restrictive and alienating conditions of the *status quo*".

### 4.4.3 : Quality Criteria for Realistic Case Studies : Healy and Perry (2000)

Healy and Perry (2000) detect a gap in the literature that fails to supply criteria for validity and reliability within the paradigm of scientific realism.

**Table 4.4.1** is adapted from their account and serves to summarise a plan of critical appraisal for qualitative studies.

They begin by contrasting their validity criteria for realistic case studies against those normally produced for positivist research. They also comment on validity criteria for two other paradigms, constructivism and critical theory.

**Table 4.4.1 : Validity Criteria for Critical Appraisal of Studies in Different Paradigms (adapted from Healy & Perry, 2000)**

| | Positivism | Constructivism | Critical Theory | Realism |
|---|---|---|---|---|
| **Suitability of Paradigm** | Things that are not defined by human perception. | People who reflect and make choices. | | |
| **Consistency with Paradigm** | Internal consistency of context-independent ideas. | Explicit interpretive framework and assumptions. | Explicit critical framework and assumptions. | Argument demonstrated with reference to context. |
| **Perspective** | Single, neutral, perspective ignores individual human perspectives. | Takes account of multiple perspectives with the intention of understanding. | Takes account of multiple perspectives with the intention of emancipation. | Takes account of multiple perspectives to demonstrate contingency. |
| **Rigour of Method** | Carefully constructed apparatus and procedures limit error, eliminate chance effects and ensure accuracy of measurement. | Research conclusions can be traced back through quotations, transcripts, documented observations, original documents etc.  Continuous search for corroborating statements / data sources (triangulation). Alternatively, continuous sceptical search for contradictory (deviant) sources.  Adherence to canonical features of specific methods. | | |
| **Focus** | Hypothesis Testing and Deduction from Theory. | Explores the terms of social practice and moral arguments. | Explores the ethical basis of social practice and moral arguments. | Induction, Hypothesis Development and Theory Building. |
| **Construct Validity** | The quantity measured accurately reflects the quality it represents. | Concepts are labelled from individual or collective, but non-universal human perspectives. There is no yardstick of validity in these paradigms. | | Rigorous link between concept and label. Explicit rules determine category membership. Category label describes all aspects of category. |

## 4.4.4 : A Model Case Study

Healy and Perry (2000) describe the conduct of a realistic case study. After preliminary literature review and interviews, the researcher they describe drew up an initial theoretical model which he then used as the basis for further in-depth interviews with a carefully selected, non-random sample of respondents. He triangulated the emerging picture with evidence from documents and further interviews. Finally, he compared his interview transcripts and presented a theory in the form of a narrative.

That researcher explicitly outlined the criteria that could be used to judge the quality of his own research. First, he defended his choice of realism as the appropriate paradigm in which to conduct his research. Second, he carefully described the local and historical context in which the events described in the research happened.

Contrary to Constructivism, this Realistic researcher did not confirm 'real' status on his own perceptions but used these as a comparator for the multiple perspectives of other informants.

He gave transparency to his conclusions by establishing an audit trail backwards through quotations, interview transcripts and a database of interviews, respondents, key quotes and category codes. Also, he described key procedures for case selection and data analysis and he described how he established rapport in his interviews without introducing bias. The validity of constructs was established through their comparison with existing literature and the text of transcripts.

## 4.5 : DESIGN AND CONDUCT OF THE STUDY

### 4.5.0 : Introduction

Having discussed theoretical aspects of qualitative research, it is now time to explain, step by step, how the research was designed and conducted. I defined my terms of reference, considered my status within the organisation of interest, developed my plan of study and sought ethical approval. I then sought and gained the consent of those I wished to contribute information.

I constructed the research around qualitative interviews. These required me to make efficient use of respondents' limited time and elicit their information without imposing my own. I spent many hours, faithfully transcribing the tape recording of each interview. Finally, I had to develop a treatment of the transcripts that would accurately reflect the information received in a set of balanced arguments, grounded in those data.

Aware at all stages that I might encounter multiple perspectives and rhetorics, I took care to set aside any pre-conceived ideas of my own, about the detail of their content.

### 4.5.1 : Terms of Reference

At the outset of the study, I defined my own terms of reference. These were, to prepare for the introduction a new information system within my own department by understanding the potential impact of a new information system from an understanding

of interactions between front line users in the Emergency Department and their existing information systems.

After presentation of preliminary plans to an academic audience, I was advised to extend my terms of reference to include a focus on the evaluation of information systems within the National Programme.

At a later stage, I sought approval from the Chief Executive of the hospital, to interview board-level executive officers about their information requirements and their expectations from new information systems. The Chief Executive requested me to make my research as relevant as possible to the Trust's evolving IT programme and its implementation.

It was only at the end of the study period that the Trust began to develop the detail of a plan to upgrade its existing information systems. At this stage, I was able to contribute some of my findings to the planning team.

### 4.5.2 : The Research Setting

The research was conducted in a 'standard' NHS Trust Hospital with approximately 600 beds. It provides a 24 hour emergency service and it balances this provision with the fulfilment of contracts for prescribed volumes of elective in-patient work. There is a tension between these two streams of clinical activity.

The district served by the Trust contains pockets of significant urban deprivation and many emergency patients present with a diagnostic label that describes only inadequately the complex medical and social problems they face.

Distant from any metropolitan setting, the Trust depends on a relatively stable workforce of nurses but, at the same time, experiences difficulty recruiting to all of its nursing posts. Various initiatives have been pursued to recruit abroad but there is a significant gap between actual and 'target' establishments.

There is a similar gap between the Trust's actual and 'target' medical establishment. It is normal in the NHS for the medical workforce to be more mobile than its nurses, except for consultants who tend to remain in post for the rest of their career.

Although the Trust has an excellent industrial relations history, the recruitment gap places strains on individual staff and wards.

The research was centred in the Trust's Accident & Emergency (A&E) Department. This department accepts undifferentiated patients with a wide variety of clinical and social problems, which vary in their acuity, urgency and complexity. It organises urgent management and streams patients into the hospital's differentiated, speciality wards. Where hospital clinics and GP surgeries operate appointments systems, access to A&E is open. Efforts to create order are constantly undermined by new disorder.

An A&E department is a microcosm of the Trust and the NHS, because of the multiplicity of its interfaces and the variety of its patients. All the operational problems and deficiencies of the Trust and the Primary Care network concentrate their effect on

this department, whether through a chronic shortage of beds or through patients' perceived difficulties in obtaining access to primary care services.

This has meant, on protracted occasions, that the A&E Department has maintained its own proper function whilst also accommodating substantial numbers of demanding patients for long periods after the completion of their emergency care.

Problems with the flow of patients in the hospital at large are thus reflected in, and compound, the problem of flow through the limited accommodation in A&E. For the department's doctors and nurses, there is a perpetual tension between the management of flow and the careful management of each individual patient.

The principal constraints and challenges faced by the Trust include its financial limit, the need to respond to government imposed performance targets, the need to maintain public confidence in its services, the need to manage its limited beds and the need to recruit, retain and develop its workforce.

The ethos of work in the Trust is a blend of professional focus on the individual patient, respect for organisational hierarchy and the cohesion of small workgroups who aim to maintain professional standards under conditions which are often non-standard. Causes of sub-optimal conditions include parsimonious establishments and staff absences that can place unwelcome strain on those present.

The principal element of the Trust's clinical governance is its clinical management structure, of divisions and directorates. This is supplemented by clinical audit and

research and development functions but the intensity of these functions is less than would be encountered in the academic environment of a metropolitan teaching hospital.

The emphasis is constantly on the management of performance against the financial and measured targets of each individual administrative unit. The link between clinical audit projects and service improvement initiatives is relatively weak. Little development activity has tended to take place across the interfaces between individual directorates or divisions. As the research reached its conclusion, this situation began to show signs of changing.

### 4.5.3 : The Status of the Researcher

Throughout the study, I have been employed as a full time clinical consultant in Emergency Medicine, working evening and weekend shifts as well as daytime work. I have also frequently attended the department at night to respond to individual medical emergencies or to a diffuse an overall situation when queues have developed beyond the ability of rostered staff to cope.

My role as a senior clinician has also required me to attend a variety of planning and clinical governance meetings as well as, specifically, meetings to plan the development of new information systems.

I have thus been, in all senses, a full participant in the clinical service and in the planning of support for its delivery and governance. The nature of my clinical workplace is to require significant collaboration and mutual sensitivity between doctors,

nurses and managers. Immersed deeply in the overall culture of the hospital, I have also been aware of its heterogeneity and the need to understand the multiple perspectives it contains. These derive from each member's employment group (managerial, clerical, clinical) and level of seniority or span of responsibility within that group.

### 4.5.4 : Form of Study

I framed the study around several choices : of paradigm (science, interpretation, critique), of tradition (biography, grounded theory, phenomenology, ethnography, case study), of methodology (watching and observing people, talking to people, reading about them and their activities), and of technique (form of observation/participation, interview structure, mode of documentary analysis).

I had to plan to contain my study within my available time and resources, and to propose a form of study that would not present ethical difficulty to a senior medical practitioner who might be drawn into complex decision making as a result of his presence and expected availability to staff in the clinical environment.

The need for patients to consent was avoided by limiting the study to NHS staff.

The form of study proposed was an interpretive and critical case study, based on qualitative interviews which would not be highly structured.

### 4.5.5 : Ethical Approval

The study received approval from the Ethics Committee of the Faculty of Health in the University of Central Lancashire. The research proposal was also submitted via the COREC process and the Blackpool, Fylde and Wyre Local NHS Research Ethics Committee advised, "…this project is not one which is required to be ethically reviewed under the terms of the Governance Arrangements for Research Ethics Committees in the UK".

### 4.5.6 : Consent to Participate

All those interviewed gave written consent to be interviewed, and for their transcripts to be quoted in an academic publication. I informed participants in planning meetings of my interest and intention to publish and they gave their collective, verbal consent.

### 4.5.7 : The Impact of Research Ethics on the Research

Alongside the formal research ethics procedures, it is necessary to consider how ethical issues affect the conduct of the research.

Research in the NHS is governed by ethical arrangements which place the safety, autonomy, privacy and confidentiality of patients above the search for knowledge. Given that the implementation of information systems in the Trust had not proceeded as

far as electronic patient records, it was not necessary to intrude into individual doctor-patient consultations.

Nevertheless, the governance structure of research ethics in the NHS discourages non-consensual participation in research both by patients and by NHS staff. Explicit statements in the ethics approval form identify the potential harms to both groups and the proposed measures to avoid these. When disclosures are likely to be sensitive, it is necessary to be explicit about formal consent by staff to participate and about the security of tapes and transcripts.

I was aware that the findings of the research might have consequences for the reputations of the managers and other participants in the research project, for the Trust and its reputation, and for the success or otherwise of its information programme which represented a huge capital investment.

This translated into a professional responsibility for the confidentiality of his informants and to avoid causing harm through inappropriate attribution or disclosure of findings.

My resources and experience did not allow me to adopt a high organisational profile as a researcher and I was wary of intruding in managerial affairs, beyond the authority of my slowly emerging findings.

A sense of duty to communicate findings to the managers and clinicians involved, soon after interviews had been completed, conflicted with an equally felt duty : to process the research data in a careful, reflexive and reflective way and to construct a robustly

coherent, credible and rigorously defensible set of narratives before releasing findings that might otherwise mislead.

Although doctor-patient consultations were excluded from the research, and interviews took place outside the clinical setting, I found myself in a quandary over the dual role I held as a consultant in the department where much of the research took place.

First, my status as a senior clinician had the potential to impact on the veracity of my interview subjects. In part this was mitigated by my having built, over time a mature, friendly and mutually respectful relationship with the hospital's staff in general.

Aware that some interviewees might inhibited by my status as a senior organisational figure, I avoided selecting individuals myself. Instead, I requested head nurses, in the manner suggested by Mumford (1995), to brief groups of staff from different grades and to invite the election, by peers, of individuals who would relate personal experience but also reflect the consensus of their colleagues.

Whilst these procedures helped to dispel any sense of coercion to participate, the general formality of NHS ethics approval and governance structures favoured a plan of explicit, written consent and an opportunity for 'cooling off' between the invitation to participate and the actual interview. The formal nature of these additional procedures tended to distance me from, rather than helping me to 'join in', the research situation with its inhabitants.

Second, it was not feasible for me to abandon my medical consultant role to act purely in a research capacity when present 'on the shop floor'. My starting point was already

that of the ethnographer who has 'gone native'. It was necessary for me to consider how to set boundaries around my own stock of experience in order not to commit the cardinal 'sin' of the full participant, loss of objectivity.

For a researcher seeking positivist credentials, 'doing research to' a community, this would have been a significant problem. For a researcher in the hermeneutic-phenomenological tradition, 'doing research with' that community, the issue is not objectivity (comparison of observation with ideal 'truth) but reflexivity (the recursive exchange of influence between the social context of the research and the researcher's comprehension of the emerging reality of the research situation). Reflexivity allowed me to regard myself as one of my own informants, able sceptically to test my own 'inside knowledge' and preconceptions against the conclusions emerging from other data, and *vice versa*.

This sceptical treatment elevated the status of my 'inside knowledge' and personal experience, allowing me to regard as valid testimony, observations and insights that would otherwise have been regarded as anecdote.

### 4.5.8 : Study Participants

Interviews were conducted in four batches over a period of 15 months, between Spring, 2006 and Summer, 2007.

Batch 1 interviews explored the ways nurses in the Emergency Department (the ED) used that department's information system. One use of the information system was to manage the flow of patients through the department.

Batch 2 interviews assessed the information and organisational requirements to manage the flow of patients through the hospital.

Batch 3 interviews assessed the organisational preoccupations and information requirements of board level executives and their associated managers.

Batch 4 interviews were conducted to complement the managerial and nursing perspectives already gained, by eliciting those of consultant level medical staff who were associated with specific clinical and organisational initiatives.

**Tables 4.5.1 (a-d)** outline the characteristics of those interviewed and the rationale for their selection.

I have been concerned to avoid the identification of individual informants through their unique job titles. Because of this, the indicative attributions of interview extracts cited in the research report (chapters five and six) do not always concord precisely with the identities shown in the left hand column of the tables.

**Table 4.5.1 (a) : Characteristics of those interviewed in Batch 1**

| Interviewee | Responsible to | Special Interest |
|---|---|---|
| Healthcare Assistant #1 | Staff Nurse #1 | Performance of simple tasks within a loosely-controlled team structure |
| Healthcare Assistant #2 | Staff Nurse #1 | Performance of simple tasks within a loosely-controlled team structure |
| Staff Nurse #1 | Sister #3 | Management of clinical activity within a sub-unit of the ED |
| Staff Nurse #2 | Sister #3 | Management of clinical activity within a sub-unit of the ED |
| Sister #1 | Sister #3 | Supervision of junior nurses and supporting staff throughout the ED as a whole |
| Sister #2 | Sister #3 | Supervision of junior nurses and supporting staff throughout the ED as a whole |
| Sister #3 | ED Nurse Manager | Supervision of junior nurses and supporting staff throughout the ED as a whole |
| ED Nurse Manager | | Nursing professional discipline and standards of practice within the ED and associated Medical Admissions Ward |
| ED Clinical Director | | Medical professional discipline and standards of practice within the ED and associated Medical Admissions Ward |

**Table 4.5.1 (b) : Characteristics of those interviewed in Batch 2**

| Interviewee | Responsible to | Special Interest |
|---|---|---|
| ED Business Manager | Director of Operations | Operational performance against 4 hour target for transit through ED |
| Bed Manager | ED Business Manager | Timely matching of waiting patients with vacant beds |
| Discharge Co-ordinator | ED Business Manager | Timely discharge of patients from occupied beds ; diversion of ED patients away from ward-based care and into community-based care |
| Directorate Assistant | ED Business Manager | Investigation of service complaints and 4 hour target breaches |
| Ward Sister | Divisional Nursing Officer | Clinical procedures and processes of ward-based patient care |
| Director of Operations | Chief Executive | Operational performance against 4 hour target for transit through ED |
| Director of Planning and Performance | Chief Executive | Operational performance against 4 hour target for transit through ED |

**Table 4.5.1 (c) : Characteristics of those interviewed in Batch 3**

| Interviewee | Responsible to | Special Interest |
|---|---|---|
| IT Manager | Director of Finance | Responsible to implement key deliverables within the National Programme |
| Information Officer | IT Manager | Information storage, retrieval and representation |
| Director of Finance | Chief Executive | Board level responsibility for Information, and for the Trust's financial balance |
| Deputy Chief Executive | Chief Executive | Board level responsibility for Business Planning and Operations |
| Director of Planning & Performance | Deputy Chief Executive | Compliance with external direction and assembly and interpretation of business information |
| Deputy Medical Director #1 | Medical Director | Patient Safety and Risk Management |
| Deputy Medical Director #2 | Medical Director | Medicines management : safe prescribing and dispensing |
| Divisional Director (Consultant) | Medical Director / Deputy Chief Executive | Development of services, service quality and business plans across a range of directorates, including Emergency Medicine |

**Table 4.5.1 (d) : Characteristics of those interviewed in Batch 4**

| Interviewee | Responsible to | Special Interest |
|---|---|---|
| Deputy Medical Director #2 | Medical Director | Medicines management : safe prescribing and dispensing |
| Consultant #1 | Medical Director | Innovative development of clinical services for Stroke patients |
| Consultant #2 | Medical Director | Cardiothoracic Surgeon, proactive in publishing of clinical outcomes by named surgeons |
| Consultant # 3 | Medical Director | Emergency Physician at start of consultant career, facing significant structural change in service provision |
| Consultant #4 | Medical Director / Chief Executive | Orthopaedic Surgeon with interest in a new field of surgery and its outcomes : nominated by Chief Executive and Medical Director to lead local engagement of consultants with the National Programme |

## 4.5.9 : Conduct of Interviews

An interview is a direct interaction with the respondent and there is potential for the social dynamic of the interview to generate selective disclosure or an account that the interviewee thinks the researcher wants to hear. At other times, the speaker may genuinely believe what he is saying and may be unaware of his own tacit assumptions and bias.

Each interview was structured sufficiently to focus on the basic topics the researcher wished to explore, and to manage efficiently the limited time the interviewee could spare. Interviews lasted between 30 and 60 minutes. This allowed time for disclosure and in-depth probing, and for the interviewee to develop his own themes without the interviewer imposing his own ideas.

I aimed to adopt an empathic rather than an inquisitorial style of questioning, to encourage honest rather than censored disclosure.

Each episode in the interview began with open ended questions to invite explanation, rather than confirmation or denial of a proposition. Later questions in each phase invited elaboration and continued disclosure or amplification. Reflective comments were sometimes made at this stage in order to maintain rapport, to project empathy, close psychological distance, challenge answers without alienating the interviewee, and maintain the flow of information.

Towards the close of each phase, if necessary for understanding, direct questions were used to confirm a tentative conclusion. Alternatively a summary, of the conclusion reached from listening, was offered for confirmation.

As each topic became exhausted, I resumed control and directed the interviewee into a fresh topic.

### 4.5.10 : Data Capture

Each interview was tape recorded. I carefully transcribed each recording, statement by statement, frequently rewinding to verify what I had heard and ensuring that every word was reproduced accurately. Tapes were destroyed after transcription, but each informant was invited to read the transcript of their own interview in order to rectify any possible misrepresentation.

### 4.5.11 : Ancillary and Corroborative Data Sources

Documentary data sources included policy and guidance documents freely available within the NHS, the reports and other documents submitted by the IT Manager to the Trust Board, team briefing and other materials issued by the Chief Executive and other Executive Directors. My participative observation of practice in various settings took place either as a participant-as-observer in a senior clinical and clinical-managerial role in my own work setting or, in other settings, as an observer-as-participant with a declared interest in information systems research.

## 4.5.12: Data Treatment and Interpretation

**Deciding what to do with the data**

Procedures to construct a grounded theory or a phenomenology ("the irreducible structure of the phenomenon") were identified in section three of this chapter. These procedures share the goal of establishing the best possible approximation to absolute, discoverable 'truth'. The outcome is a robust theory without, necessarily, a prescription for action.

The diagnostic and therapeutic intent of action research need not prescribe action from an 'expert' position. Its more modest aim is to help those in the problem situation (itself a mosaic of intersecting problem situations, seen from different perspectives) to determine their own way forward, on the basis of perspectives opened up by the researcher. To be helpful, these perspectives also need to be critical.

To achieve this purpose, the aim of data treatment is to identify themes that originate in the data, are coherent with the situated context from which the data have been derived, and are as consistent with a conflict perspective as they are with consensus.

**Deciding how to do it**

Pope, Ziebland & Mays (2000) describe "framework analysis" as an alternative to grounded theory. Where grounded theory insists on the emergence of theory from the data alone, framework analysis allows the incorporation of *a priori* concepts, derived

from experience of the research environment, gained by the researcher or others, outside the immediate context of the research activity. Framework analysis contains the following stages :

1.  Familiarisation : reading and re-reading the data.

2.  Thematic analysis : continuous comparison of each transcript with *a priori* and emergent themes.

3.  Indexing : themes are identified by shorthand codes and each transcript is annotated according to the themes it represents.

4.  Charting : Each emerging theme is represented on a chart, showing the location of representative excerpts from each interview transcript. Each interviewee or sub-set of interviewees from the overall sample is represented on a similar chart, displaying the themes identified to that individual or cluster.

5.  Mapping and Interpretation : This process is guided by the initial research objectives and by the themes which have merged during (2) and the subsequent stages. The charts are used to assemble concepts, to show how each concept varies between individuals or situations, and to show how concepts are related.

Having set out with the intent, to isolate individual words, phrases of paragraphs of text to confidently identified, quasi-algebraic categories from which I would be able to

deduce and construct logical arguments, I identified, as principal *a priori* themes, five well-publicised strategic issues for the Trust.

My definition of emergent themes underwent frequent and iterative revision as I examined more and more data, such that the sequence of completed analytic steps gave way to a more direct process of written argumentation, represented by successive drafting and repeated re-drafting of the material which will be presented in chapter six. In practice, I could only understand emerging data items in relation to an emerging, overall interpretation of the data.

I could only appreciate the statements that constituted the data in relation to their surrounding context, within and between transcripts. The fundamental aspect of my approach was to engage intensively in continuous comparison between text fragments and passages, themes emerging from these data, new learning about the field acquired as the research progressed and, finally, my own personal knowledge of the field. I considered the latter to be essential if I were to have realistic confidence in the credibility of my own emerging conclusions.

I recognised that hypotheses suggested by any given interview need not be refuted by contradictory statements from another. I expected that plural perspectives were just as likely to diverge as to converge. I deliberately sought evidence of multiple, independent perspectives that need not be reconciled, as well as seeking 'deviant cases' that might modify any emerging consensus between convergent statements. I was sensitive to different managerial and clinical rhetorics, so that I could make distinctions and recognise the 'multiple realities' of stakeholders in specific situations.

# CHAPTER FIVE

# DEVELOPING

# A DIAGNOSTIC AND THERAPEUTIC

# APPROACH

# TO THE PROBLEM SITUATION

## 5.0 : INTRODUCTION

This chapter uses the stages suggested in NIMSAD (Jayaratna, 1994) to build a diagnostic and therapeutic approach to the advent of the National Programme, seen initially as a solution without a clearly-defined parent problem, in an NHS hospital, interpreted as a multi-layered organisation with multiple goals.

Somehow, the 'Information Technology delivery system' and the 'business delivery system' need to be aligned. This is as much a social as a rational or technical problem. It highlights the need for equitable organisational discourse, yet the well-articulated intentions of information systems suppliers and the upper levels of management are not matched by an explicit comprehension, by users, of their own requirements from their future information systems.

The purpose of the diagnostic and therapeutic framework to be developed in this chapter is to help identify and better align, the needs of the information system's future users with those of its corporate sponsors.

The framework developed in this chapter will then be demonstrated by application in Chapter Six.


## 5.1 : NIMSAD Stage 1 :

## UNDERSTANDING THE "SITUATION OF CONCERN"

## Meeting the IT Manager


### 5.1.0 : Section Summary and Introduction


The introduction of information systems is mandated centrally through NHS policy for information. The National Programme is perceived at the point of implementation as a source of costs. The business and clinical value of meeting these costs needs to be identified.


This section introduces the IT Manager so that we can understand, through his eyes, the problem of implementing the National Programme locally. The "Situation of Concern" is that the National Programme for IT is to be implemented in a large hospital within the NHS.


The section will review the IT Manager's current Implementation Plan in the form of tasks and milestones. The Implementation Plan is a rational model of the Intervention which the implementation of the National Programme represents. It forms a template for a sequence of problem-solving decisions.

The IT Manager is expected to present an IT strategy and to plan an ordered sequence of steps. These have to be assimilated by the managers who will approve and execute his plans, and on the clinicians who will use the systems successfully.

Because of this, the section will provide an alternative view of the IT Manager's situation, using an approach derived from Soft Systems Methodology. This view will take the form of a 'Rich Picture'.

The 'Rich Picture' is not a definitive map, capable of only one interpretation. It depicts elements in association but it is expected that the nature of the association between elements will depend on the interpretations of disparate individuals with different technical, organisational and personal or professional perspectives.

As such, the 'Rich Picture' represents the potential for social dissonance as well as social cohesion. It sets out not a problem for solution but a complex Problem Situation in which it will be necessary, sometimes in succession and sometimes simultaneously, to make a set of pragmatic accommodations.

### 5.1.1 : Entering the Situation of Concern

The first key feature of the Situation is the cost of the information programme against the background of the Trust's commitment to recover from a £22M financial shortfall.

Against this background, the IT manager's proposals are likely to be tested through the comparison of infrastructure costs with costed benefits which might result if key activities can be made "better".

**Table 5.1.1** shows the projected cost of the IT Manager's proposed programme

**Table 5.1.1 : Projected Local Costs of the IT Programme**

| *Financial Year* | *Revenue* | *Capital* | *Current Quantified Benefits (recurrent)* |
|---|---|---|---|
| *2006/07* | *Identified* | *Identified* | |
| *2007/08* | *£190k* | *£1,648k* | |
| *2008/09* | *£35k*<br>*Cumulative - £225k* | *£1,000k* | *£450k* |
| *2009/10* | *£100k*<br>*Cumulative - £325k* | *£1,000k* | |

The second key feature, therefore, is the interface between the National Programme and the Trust's own goals, strategic direction and business plan.

The third key feature follows in the form of the risk, that benefits cannot be identified to justify capital expenditure, or that anticipated benefits might not be realised.

At present, progress is measured against project implementation milestones, of the kind shown in **Table 5.1.2**, and against the original six 'levels of integration' contained in 'Information for Health'.

**Table 5.1.2 Project Schedule for the Local IT Implementation Programme**

| Time Line | System/functionality | Project |
|---|---|---|
| 2007 Q1 | Electronic Records Management | Feasibility study |
| | Technical Infrastructure | Review capability |
| | Pathology | Review current system |
| | Radiology | Implement new system |
| | Infection Control | Implement new system |
| | Cancer e-Prescribing | Implement new system |
| 2007 Q2 | Digital Dictation | Feasibility study |
| | e-Prescribing | Option Appraisal |
| | Pharmacy Automation | Feasibility study |
| | Scheduling – 18 weeks | Feasibility study |
| | ChooseandBook v2 | Implement National Solution |
| | BVH Wireless Network | Implement |
| | Sterile Services – Track and Trace | Implement National Solution |
| 2007 Q3 | PACS Central Store | Implement National Solution |
| | H@N Communications | Implement new system |
| | Urgent Care Centre | Implement new system |
| 2007 Q4 | Clinical Modules – LE2.2 on current PAS – includes Order Communications and Results Reporting | Implement |
| | Implement Scheduling for 18 weeks. | Implement |
| 2008 Q1 | Total Bed Management Solution | Feasibility study |
| 2008 Q3 | Clinical Modules – LE3.5 – with reference PAS, includes Maternity functionality. | Feasibility study  and Implement |
| 2009 Q2 | Clinical Modules – LE3.5 – extended functionality | Feasibility study  and Implement |
| 2009 Q4 | Clinical Modules – LE4.0 – with clinical documentation, Theatres, Pharmacy and e-Prescribing | Feasibility study  and Implement |

Although the IT manager is the only person for whom IT is a sole responsibility, he is directly accountable to the Director of Finance, for whom complete recovery of revenues is a major concern, and he is also supported, and accountable to the Trust Board, via the governance structure indicated in **Table 5.1.3**.

**Table 5.1.3 : Governance of the Local IT Programme**

| | |
|---|---|
| **TRUST**<br>**BOARD** | Organisation Strategy. Ensuring the Trust makes best use of IM&T to drive the overall organisation strategy. |
| **INFORMATION GOVERNANCE COMMITTEE**<br>**Senior Responsible Officer** | Making strategic investment decisions. Defining the strategic direction of the Trust with regard to IM&T. Defining and monitoring the Operation Plan for the Trust. Establishing frameworks to achieve the programme. Lead in the governance of IM&T and establishing values and behaviour required. Ensuring benefits are stated and ultimately delivered. |
| **IG Programme Board** | Leading, Managing and Monitoring the Programme through to the delivery of the new capabilities and the realisation of benefits.. |
| **Programme Manager** / **Business Change Managers** / **Programme/ Project Office** | Coordinating the work of the programme.<br>Handling risks and issues |
| **Projects**<br>**Local** / **Health Economy** / **National** | Led through recognised Project Management Methodologies (Prince II). Relevant Project Executives and Project Managers responsible for the delivery of the Projects and Benefits. Handles Project Issues and Risks. |

The link between the purchase and introduction of IT resources, and the realisation of benefits by the Trust is not clear. What is happening when benefits are being realised, how is IT helping, what are the priorities, and how are IT systems to be made unobtrusive when they are introduced ?

However, he is also influenced externally by the central structure of Connecting for Health, through the Strategic health Authority and its Chief Information Officer.

Therefore, the IT manager's responsibilities include a mix of local and national, internally and externally-driven initiatives which need to be made coherent with each other, and with the overall development of the Trust.

A variety of local IT projects are intended to contribute to these aims :

- Full N3 local compliance
- PC Replacement Scheme
- Radiology Information System (RIS) – integrated to PACS
- PACS central store integration
- Wireless Networking to support Hospital at Night.
- Maternity functionality
- Infection Control systems
- Emergency and Unscheduled Care

- Track and Trace (Blood Products and Sterile Services)
- e-Prescribing
- Whole Systems Bed Management
- Additional Choose and Book compliance
- Scheduling (incl. Diagnostics)
- Electronic Records Management (incl. Document Management)
- Digital Dictation

**Table 5.1.4** shows the main areas of development within the IT manager's plan, their costs and their contingencies.

## Table 5.1.4 : Local IT Development Areas and Costs

| System | Interfaced | | Current Est. Cost | | Financial Year | Notes |
|---|---|---|---|---|---|---|
| | Yes | No | Capital £,000 | Revenue £,000 | | |
| Radiology | X | | Project Started | | 2006/07 | Identified within Radiology Budgets |
| Electronic Records Management – Document Management | X | | 23 | 0 | 2007/08 | Feasibility Study |
| Pathology | X | | 150 | 20 | | £150,000 |
| Infection Control | | X | Project funded elsewhere | | | Part of the Pathology Modernisation and £300k capital bid |
| Cancer e -Prescribing | | X | Project funded elsewhere | | | Funded through the Cancer Network |
| Digital Dictation | X | | 0 | 0 | | Feasibility Study |
| e-Prescribing | | | 0 | 0 | | Feasibility Study. Will form part of LE4.0 |
| 18 weeks – scheduling | X | | 450 | 45 | | High Priority |
| ChooseandBook v2.0 compliance | X | | Bid for funding to Executive Directors | | | Part of Operational Services |
| Technical Infrastructure review | | | 25 | 0 | | |
| Wireless Infrastructure | | | 200 | 20 | | Essential enabling infrastructure |
| Sterile Services – Track and Trace | X | | Project funded elsewhere | | | Estimated to cost £300k in hardware – funded via Estates Capital |
| PACS Central Store | X | | Central funding allocated | | | £100k of central funding allocated |
| Hospital at Night Communications | X | | 250 | 45 | | Hospital at night communications study to be performed first. |
| Urgent Care Centre | X | | Project funded elsewhere | | | Part of UCC Project |
| PC Replacement Scheme | X | | 250 | 0 | | |
| Clinical modules LE2.2 | X | | 300 | 60 | | PID required. This includes Ordering and Results |
| Whole systems Bed Management | X | | 150 | 35 | 2008/09 | Review in 2007/08 for implementation in 2008/09 |
| Clinical modules LE3.5 – reference solution, PAS and Maternity included | X | | 600 | (450) | | Note: £450k (revenue benefit) |
| PC Replacement Scheme | X | | 250 | 0 | | |
| Clinical modules LE3.5 – extended functionality | X | | 250 | 0 | 2009/10 | Will form extended part of LE3.5 Project |
| PC Replacement Scheme | X | | 250 | 0 | | |
| Clinical modules LE4.0 – advanced functionality | X | | 500 | 100 | | Requires PID for firm cost estimates |

### 5.1.2 : Understanding the Situation of Concern from the IT Manager's perspective

In the previous section, we looked at what had to be done. The task had a self-contained aspect which provided little insight into its relevance, the relationships to be established or the reasons why others might want to associate or dissociate themselves.

**Phenomenon of Interest : IT and Business Strategies Disconnected**

The phenomenon of interest is the implementation of the National Programme at the level of an NHS Trust. The Trust's IT strategy is reactive and disconnected from its business strategy.

This makes it difficult for the IT manager to align his development plan with specific aspects of the Trust's plans :

> *"I'm trying to take the Trust's IM&T strategy and fit it with the goals of the organisation and look at what systems we need to develop to support these goals." (IT Manager)*

> *"……….how we get from multiple agendas at different timescales, based on when there's an opportunity, to this integrated timeline that is taking us to an integrated system." (IT Manager)*

> *"This is my plan, but what's **the** plan?" (IT Manager)*

**Causal Conditions : IT Not Seen as Instrumental to Broader Goals**

Isolated from the mainstream of the business agenda, the IT agenda commands insufficient support from the executive and the general workforce.

> *"We seem to go, 'here is a wonderful system. The IT manager and his team will get it working'. Nobody will dispute that they get the systems working, but whether people are actually signed up to what it really means etc is difficult."*
> *(Executive Director #2)*

**Context : Uncertain Needs and Unstable Planning Assumptions**

Aside from these factors, progress is hindered by other, external as well as internal factors.

The external factors include delays within the National Programme, such that promised products are not forthcoming, and uncertainty over the finance available for implementation.

Financial constraint also operates internally :

> *"I am identifying possibly £1.6 million worth of capital. Now, that, at the moment, is nowhere near agreed."* (IT Manager)

In contrast,

> *"Every target is important and it's very easy for people to say, well yes we must do all of these, but they all conflict against each other at that monetary level".*
> *(IT Manager)*

The end result for the IT Manager is that many sub-projects are vulnerable to financial and other forms of insecurity. Dependence on uncertain factors renders delivery of the programme lumpy and "*it just keeps bunching up*".

Constant refocusing of attention is required as planned action gives way to opportunism, and related events proceed asynchronously and chaotically :

> *"I think one of the problems that we've got is that it's like a supertanker and flotillas………Everyone, cancer networks, they're all trying to dart around. They react quicker, they get pots of money, it's the usual thing that we get, you know, there's are pot of money at the year end………I'm not so sure that we look at the benefits realisation in as much detail as we should………We're working to multiple agendas." (IT Manager)*

**Intervening Conditions : National Programme Offerings Seem More Expensive Than Relevant**

As well as facing problems of definition in relation to the business plan, the local IT strategy is hampered by the absence of suitable products from the National Programme's repertoire.

> *"A lot of the things scheduled for this year should have been completed before. There are two issues for that. The national programme is not delivering. The finance is not available." (IT Manager)*

> *"……… the systems we've been offered so far, and have not implemented……… have not met the basic functional requirement needs of our front-end users and have not met the basic functional requirement needs of our reporting users. What has been offered gives us less functionality than we currently have……… one reason, from my point of view, it could not produce a contract dataset and, therefore, we could not have submitted a contract dataset to the centre." (Information Officer)*

**Strategies and Interactions : Forge Ahead With Infrastructure**

In the absence of a clinical and business lead, the IT strategy is focused on specific technical interventions rather than on IT solutions to specific clinical or business problems faced by the Trust. Lack of a clearly stated need interferes with users' commitment to systems which, at a technical level, are introduced competently :

*"I have a driven agenda that* [tells me to implement e-prescribing]………. *but what I can facilitate in e-prescribing is to make sure there's an infrastructure in place. So a big part of what we're doing next year, there's a wireless network to provide wireless connectivity. I can keep improving the technology at will, based on the amount of money that is made available and that's my contribution to e-prescribing. Somebody else needs to contribute the other side of e-prescribing, which is related to business change." (IT Manager)*

**Consequences : An IT Programme Without a Purpose**

The IT department's technical perspective is isolated from the mainstream clinical and business agendas. The IT department can provide infrastructure "at will", given a programme budget, but there is a clear risk that the infrastructure provided will have no useful application if specific requirements are not specified by end users. As a result, it is difficult to focus the resource provided, and the outcome is an attempt to second-guess the plans of others, and to "cover all bases".

In a similar vein, it is difficult to attach business or clinical meaning to the concepts entailed in 'covering all bases'. These include :

*"things like 18 weeks scheduling, and clinical modules including order communications s and results reporting." (IT Manager)*

In turn, it is also difficult to respond to external drivers, such as the mandated implementation of e-prescribing, other than to supply infrastructure in advance of a business or clinical need, clearly stated at the level of the user.

### 5.1.3 : Initial Conclusions on the "Situation of Concern"

In contrast with the extracts from the IT Manager's plan, shown above, **Figure 5.1.1** presents the IT Manager's Rich Picture.

**Figure 5.1.1 : The IT Manager's Rich Picture**



The IT Manager at the centre of the picture is under scrutiny by the Chief Executive of the Trust and by the Regional Information Manager responsible for the implementation of the National Programme (Information for Health) at regional level.

The IT Manager wants to be proactive within a clear, coherent framework of organisational and clinical goals. Without this clarity, he has been forced to react to various incoherent developments.

The supply of finance to the IT project is indirect and precarious. The IT Manager can channel infrastructure and "functionality" from the technical resources at his disposal but cannot convert these into productive clinical application.

To do this, he has to engage with clinical colleagues. They, themselves, need to understand their own potential contribution to the assimilation of IT resources which may not appear immediately or necessarily relevant to the work they do.

**5.2 : NIMSAD Stage 2  :  "D I A G N O S I S"**

**Widening Understanding : Meeting the Chief Executive and Members of the Executive Team**

**5.2.0 : Section Summary and Introduction**

This short section introduces the Chief Executive and his team, then places the National Programme into perspective amongst their chief concerns.

Two distinct systems can be identified in the NIMSAD DM 1 level of diagnosis (**Figure 5.2.1**) : the IT delivery system and the business delivery system.

Examined at the NIMSAD DM 2 level of diagnosis, the problem situation contains several constituencies (managers, clinicians, patients ; information systems users and suppliers) and a mix of 'hard', institutional (National Programme for IT, external regulators, the Trust) and 'soft', social (clinical practice) structures (**Table 5.2.1**).

**Figure 5.2.1 : NIMSAD DM 1 : Conceptual / Logical Diagnosis**
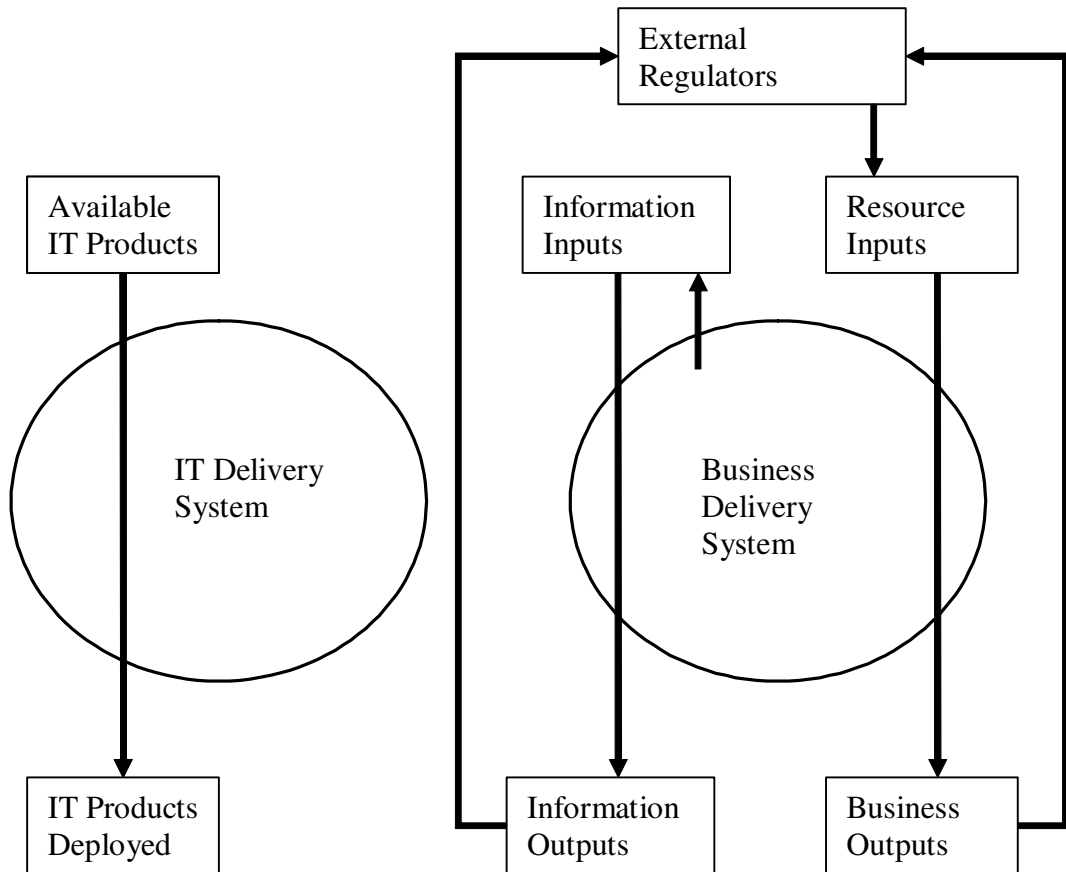
**Table 5.2.1 : DM 2 : Physical Diagnosis**

| Element | Content |
|---|---|
| Information Technology Programme | Machine procurement / selection procedure Delivery Maintenance Training |
| Trust Executive & Managers | Financial management Performance management Economic efficiency Customer (patient) satisfaction Employee satisfaction |
| Clinical practice | Clinical Effectiveness, Patient Safety |
| Information | for external consumption for organisational learning for routine clinical communication |
| Clinical Machine Users | Use consistent / not consistent with design assumptions Use integrated / not integrated with clinical processes |
| Patients | Data security, access to care, continuity of care |

## 5.2.1 : The Chief Executive and Executive Team

During the two year period, 2005-2007, the Trust experienced several major changes. The arrival of a new Chief Executive was associated with changes in occupancy of senior executive roles which included :

- Medical Director

- Director of Finance

- Director of Human Resource

- Director of Planning and Performance.

The defining characteristics of the new Chief Executive's reign have been to tackle aggressively a £22M financial deficit and to commit to the achievement of a challenging access target (the 18 Week Target, or "18 Weeks") a year in advance of requirements. These objectives have been seen as fundamentally necessary to the Trust's bid to earn quasi-autonomous, 'foundation' status. Amongst the Trust's measurable achievements have been :

- Opening of a new sub-regional centre for cardiology and cardiac surgery

- Closure of a satellite hospital and concentration of surgical services

- Closure of some medical beds to trim capacity

- Ring-fencing of surgical beds to maintain throughput

- Abolition of overspill, by medical patients into surgical beds

- Reduction in length of stay

- Reduction of cancelled operations.

*"This year has been incredibly tough in terms of getting some of those deliverables in terms of pulling out money but there are some wins out there : for example surgical beds. The number of cancelled operations that we've had this year compared with last is significantly less. We are talking about major differences in terms of where we were performance wise………We don't have, as a result of the way that we're using our surgical beds, the amount of medical outliers we had, we did have the worst preoperative length of stay in the country……….in the last 18 months our average length of stay has come down from around six days to four days. Any indicator you wanted to take seemed to show an excess of medical beds compared with anywhere else in the country………that was a hurdle we had to get over. From a clinical best practice perspective it has improved dramatically and then there has been a saving on the other side."* (Executive Director #2)

### 5.2.2 : Putting the National Programme into Perspective

**Figure 5.2.2** provides one of many possible 'Rich Pictures' of the National Programme. It offers one understanding for discursive purposes, from a perspective within the Problem Situation, rather than a definitive verdict from a universal perspective.

The central panel of the picture shows the additive relationship between the National Programme for IT (depicted by the Connecting for Health icon) and the NHS. Electronic Records, eBooking and e-Prescribing are being metaphorically parachuted into the NHS without a clear understanding of the way they are to be assimilated. At this stage, the various components of the picture are presented as uncomplicated 'discrete entities'.

**Figure 5.2.2 : A 'Rich Picture' of the National Programme**
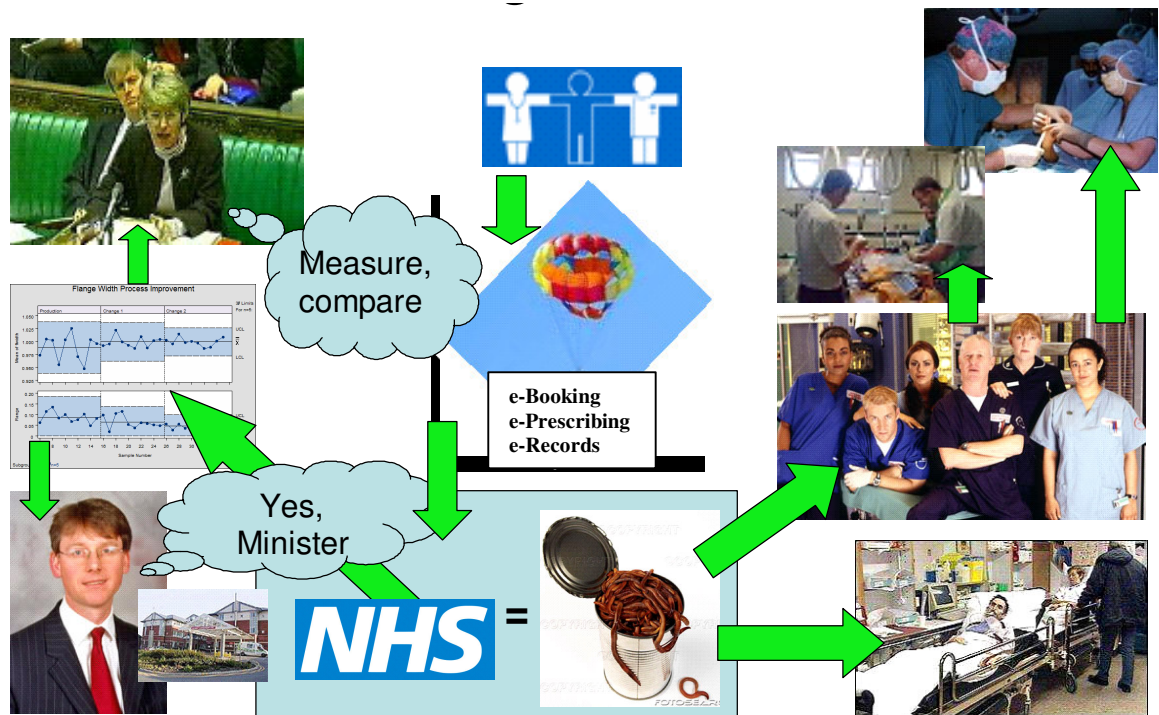


Reported by the Chief Executive (bottom left) and manipulated externally by the Department of Health and the Secretary of State (top left), the NHS is seen as an homogeneous whole whose behaviour can be abstracted and reduced to measures of performance. This provides a symbolic level of understanding and allows formalistic comparisons of quantities to be contested between adversarial positions.

The Chief Executive occupies an uncomfortable middle ground, between his generalised accounting relationship with the Department of Health as the sponsor of healthcare and a specific accountability to each individual patient as the consumer.

The alternative understanding, represented on the right, suggests a 'web' of complex interactions between people with varied roles and activities, replicated in every NHS institution. At the focus of each interaction is an individual patient. The purpose, nature

and precedence of these activities, involving managers, clinical professionals and patients, is at the core of the relationship between the National Programme and the NHS.

### 5.2.3 : Conclusions on "Diagnosis"

In summary, the implementation of the National Programme has been only one item within the overall agenda set by the Chief Executive. The question remains, how is IT to be made relevant to the Trust ?

On the one hand, IT can be used to consolidate the acquisition of information that can be reported externally. On the other hand, it can be used to maximise the Trust's productive capacity.

## 5.3 : NIMSAD Stage 3   :   "P R O G N O S I S   O U T L I N E"

### Future Direction : Trust Wide Objectives

### 5.3.0 : Section Summary and Introduction

This section indicates the general direction of developments in the Trust, to which IT will contribute.

The 'IT delivery System', identified in the last section, needs to be more closely aligned with the 'business delivery system' (**Figure 5.3.1**). Appointed in Autumn, 2005, a new Chief Executive has brought about a distinct climate shift, from static organisational reporting in a command and control environment towards dynamic organisational learning in an organisational development environment. An 'organisational development system' is growing up alongside and subsuming the 'business delivery system'.

The "desired future state" is to integrate the IT delivery system with both business delivery and  organisational development. IT will satisfy organisational development needs in the broadest sense, including changes in clinical processes, roles and methods resulting from organisational development activities and organisational learning. The outcome will be to deliver the Trust-Wide Objectives which encapsulate the Chief Executive's organisational transformation agenda.

**Figure 5.3.1 : Prognosis Outline**
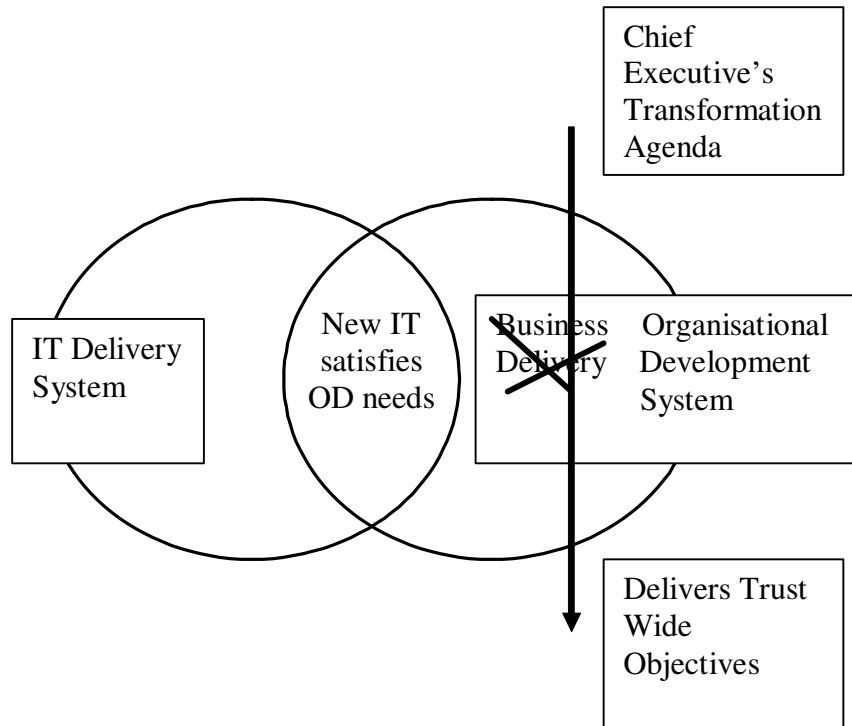
**5.3.1 : The Transformation Agenda**

**Central Phenomenon : Organisational Development**

The focus of interest in this section is the Trust's Organisational Development strategy.

The Chief Executive has sought to redefine the corporate ethos through engagement with the workforce. The resulting Organisational Development initiative has been termed, "The Blackpool Way".

> *".......about using and empowering our workforce to further improve the quality of services to patients." (Executive Director #3)*

Within this programme, and under the Chief Executive's leadership, the following corporate goals have been developed by the Trust's staff :

- To perform in the top ten percent of trusts on all performance measures
- To offer Best Value for Money to the Taxpayer
- To be the Hospital of First Choice for the Community
- To be a Great Place to Work.

**Figure 5.3.2** summarises these aspirations in a second Rich Picture that establishes a conceptual link, between high level service planning goals and the day to day detail of clinical service delivery.

**Figure 5.3.2 : Trust Wide Objectives**



**Causal Conditions : Need to become Financially Stable**

Decentralisation of the NHS power structure has required NHS Trusts to qualify for "Foundation Status". To "earn autonomy" and become "fit for foundation", the Chief Executive and his team have had to pass rigorous tests of the Trust's financial stability and ability to meet quality and efficiency criteria.

> *"The immediate imperative is to get the Trust onto a sound financial footing."*
> *(Executive Director #3)*

**Intervening Conditions : Mandated Delivery of an IT Programme**

*"There are four main pillars in the national strategy." (IT Manager)*

As part of the wider NHS, the Trust is expected to implement four specified National Programme 'deliverables' (N3 Network infrastructure, Choose and Book, e-Prescribing, Electronic Records).

**Context : Payment by Results and Contested Service Provision**

- Constrained NHS funds : concern for financial efficiency

- Service revenues related by tariff payments to commodified outputs (Payment by Results) : concern for financial stability and recovery of revenues.

- Proliferation of service provision forms and contested service provision : concern for service quality and outcomes

- Shift of emphasis from externally-imposed targets to locally- relevant "Standards for Better Health"

- Concept of quality which encompasses operational efficiency, clinical effectiveness, patient safety and the regulation of medical professionals.

By achieving service costs below the national tariff level of reimbursement, it will now be possible for the Trust to make an operating surplus. This will require the Trust to recoup revenues accurately and for clinical services to avoid unnecessary expenditure.

However, the Trust will also need to take proactive steps to ensure that patients prefer it to other providers of the same or similar services.

*"If the Trust is to do anything else it has to be on that sound financial footing. Following on from that, we've got to start to appreciate the world we're operating in now." (Executive Director #3)*

*"We are in an environment which is more and more competitive. The reality is, we're heading to a point where the NHS, really, will be a commissioning organisation which will commission services from whichever provider can offer it at the best value for money and to the highest standard. ……… And we've got to realise that the future of the Trust as an organisation depends on our being able to thrive in that competitive environment. And that brings a whole host of different information needs which we've not really previously addressed." (Executive Director #3)*

*"I think all of the targets, even 18 weeks, are almost irrelevant ……… You might squeak in under 18 weeks, you might have a waiting time of $17^1/_2$ weeks and hit the national target, but if the next hospital down the road is dealing with people in 3 weeks, ……… they will go to the other hospital anyway." (Executive Director #3)*

**Strategies and Interactions : Creating Responsive Clinical Management Structures**

Key to the realisation of the Trust's objectives is the capacity of managers and senior clinicians to translate them into a coherent programme of concrete organisational change.

An organisational development culture, in which information is interpreted and considered by the Trust's internal "information audience", is developing alongside the traditional reporting culture which has focused on the delivery of information for external consumption.

The development of the Trust's business strategy has been facilitated by the creation of an infrastructure of directorates and divisions for joint planning between managers and clinicians belonging to related business groups. Information acquired and assembled is presented to a maturing information audience in increasingly coherent detail :

> *"There's a lot of stuff at the moment that Monitor* [the Foundation Trust regulator] *is pushing : what they call service line reporting." (Executive Director #2)*

The aim is to integrate information about activity, finance and use of human and other resources at subdivisional rather than global organisational level.

By sharing a proportion of the Trust's operating surplus with each contributing clinical business unit, the Trust's Executive Directors hope to incentivise continuous improvement.

*"If we become a Foundation Trust, one of the things we can do in terms of retention of surpluses is to say to people, ……… you come up with savings early and you get to use them." (Executive Director #2)*

**Outcomes : A Plan to Improve Capacity to Achieve Organisational Goals**

The desired outcomes are encapsulated in the achievement of financial stability and the realisation of the Chief Executive's Trust-Wide Objectives, reiterated here :

- Top Ten Performer against all Key Performance Indicators
- Value for Money for the Taxpayer
- Great Place to Work
- Hospital of Choice for the Local Community.

In terms of Soft Systems Methodology, the 'roots' of the problem situation which help define the desired future state are as follows :

- **Customers** : Monitor, other external regulators of the Trust's business.

- **Actors** : Trust Executives

- **Transformation** : Become solvent and transform constrained budgets into operating surpluses that can be shared with clinical units. Meet and exceed externally imposed targets. Adopt standards and compete with other providers. Generate ethos of continuous improvement.

- **World View** : Organisational Development culture ; development of the Trust as a learning organisation. Trust wide Objectives

- **Ownership** : Clinicians

- **Environment** : Flux and instability.
  - Finite appointments to key posts.
  - Volatile 'trading' environment, new competitors, Patient 'Choice'.
  - Financial regime (Payment by Results).

## 5.3.2 : Conclusions on "Prognosis Outline"

The essence of successful local implementation of the National Programme will be to establish its synergy with the most salient aspects of the Trust's agenda. These include its 18 Week Target ; the creation and maintenance of workforce stability so that 'production' is not disrupted by morale issues (strikes, staff turnover, staff absence) ; the establishment of a preference by patients to be treated at this and not at some other hospital ; and the establishment of control by the newly-designated Foundation Trust over its own destiny.

The intended outcome is that the IT programme should be accurately aligned with the organisational changes required by the Chief Executive's Trust-Wide Objectives and by the need for the Trust to recover its revenues under Payment by Results, make a year on year operating surplus and survive in an evolving context of shifting and competitive business relationships.

As these requirements evolve, so must the information systems, so that the information they provide can remain relevant to corresponding changes in information needs.

**Figure 5.3.3** summarises the central issue : the need to establish relevance and synergy between new information systems, external expectations and the Trust's direction of travel, and to ensure their 'goodness of fit' with the people who will use them.

**Figure 5.3.3 : Fitting the IT Programme into the Bigger Picture**



Value for Money

The Blackpool Way

Great place to work

First Choice for Patients

Top Ten Performer

18 Weeks

How are we going to fit these in ?
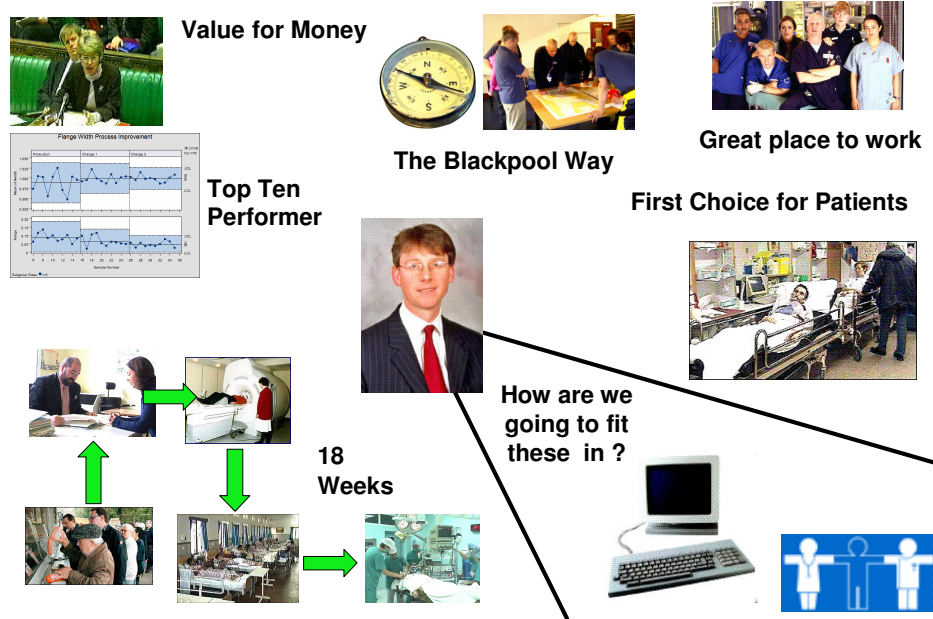
5.4 : NIMSAD Stage 4  :  "P R O B L E M S"

**Absence of Elements, Alignment of Elements**

**5.4.0 : Section Summary and Introduction**

This section begins by identifying the need to establish a conscious link between the Trust's 'IT delivery system' and its 'Business Delivery System'.

From a functional perspective, this implies the stronger definition of purpose for these two systems, of which the former switches its focus from technology to information and the latter from the steady state of business delivery to the more dynamic and adaptive state implied by organisational development.

Reflection from other perspectives deepens and broadens this analysis.

The "desired future state" identified in the last section was one where new information systems were reconciled with the Chief Executive's Trust-Wide Objectives. These epitomised a twin challenge : to represent the Trust statistically to a critical audience of external regulators and to create a happy workforce in an efficient, hospital, popular with patients.

In the first case, the Trust's clinicians are required to supply data input to computers which will then generate information outputs required by the Trust's regulators. The doctrine of "Management Information from Operational Systems" is an attempt to camouflage information supply to managers by clinicians, in the guise of information systems, ostensibly useful to clinicians but with a twist. The twist is that, to provide the information managers need, the information systems must be used rigorously by clinicians with other things on their minds.

In the second case, a key organisational development ideal is to generate within the workforce an exemplary local culture (Oliver & Memmott, 2006 : ch.14). "The Blackpool Way" will be characterised by individual autonomy, empowerment, mutual respect and accountability.

The expression of this ideal takes our thinking about the problem situation beyond rational problem solving, where the marshalled 'facts' lead to unequivocally 'right' deductions, and into the social and political realm of life in an organisation.

A key component of the NIMSAD approach is to reflect on the problem situation, the problem solving methodology and, crucially, the problem solver's own intellectual stance towards all three of these components.

This activity comes naturally at the point where the gap is contemplated, between the problem situation as understood at the "diagnosis" stage and the "desired future state".

The four "ideal types" of analytic stance (**Figure 5.4.1**) identified by Avison and Wood-Harper (1990 ; p.270) provide a useful framework within which to conduct this reflection and the question of absent and mis-aligned elements which underpins the "problems" stage of NIMSAD can usefully be discussed from each of these standpoints in turn.

**Figure 5.4.1 : Alternative Analytic Stances (Avison & Wood Harper, 1990)**
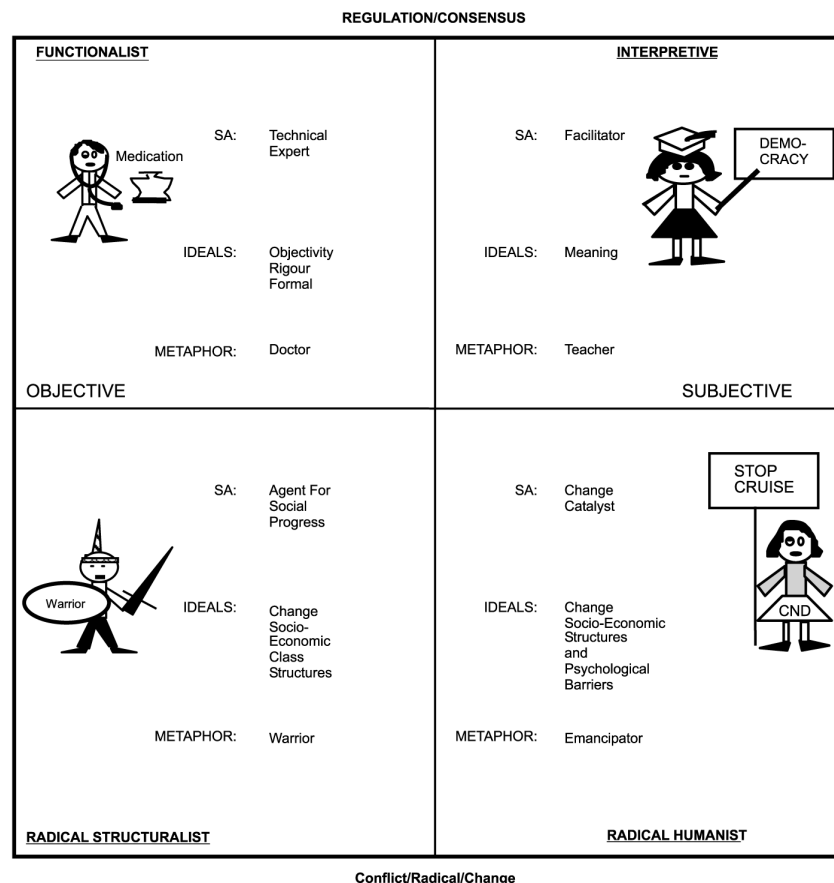
The problem of specific interest from this perspective is the absence of conscious integration between IT development and organisational development (**Figure 5.4.2**).

The impetus for the National Programme is centrally driven. IT needs assessment has not been developed in the manner envisaged in *Information for Health*, where IT developments were expected to be tied into local Health Improvement Plans.

**Figure 5.4.2 : NIMSAD Stage 4 Problems in 2006**
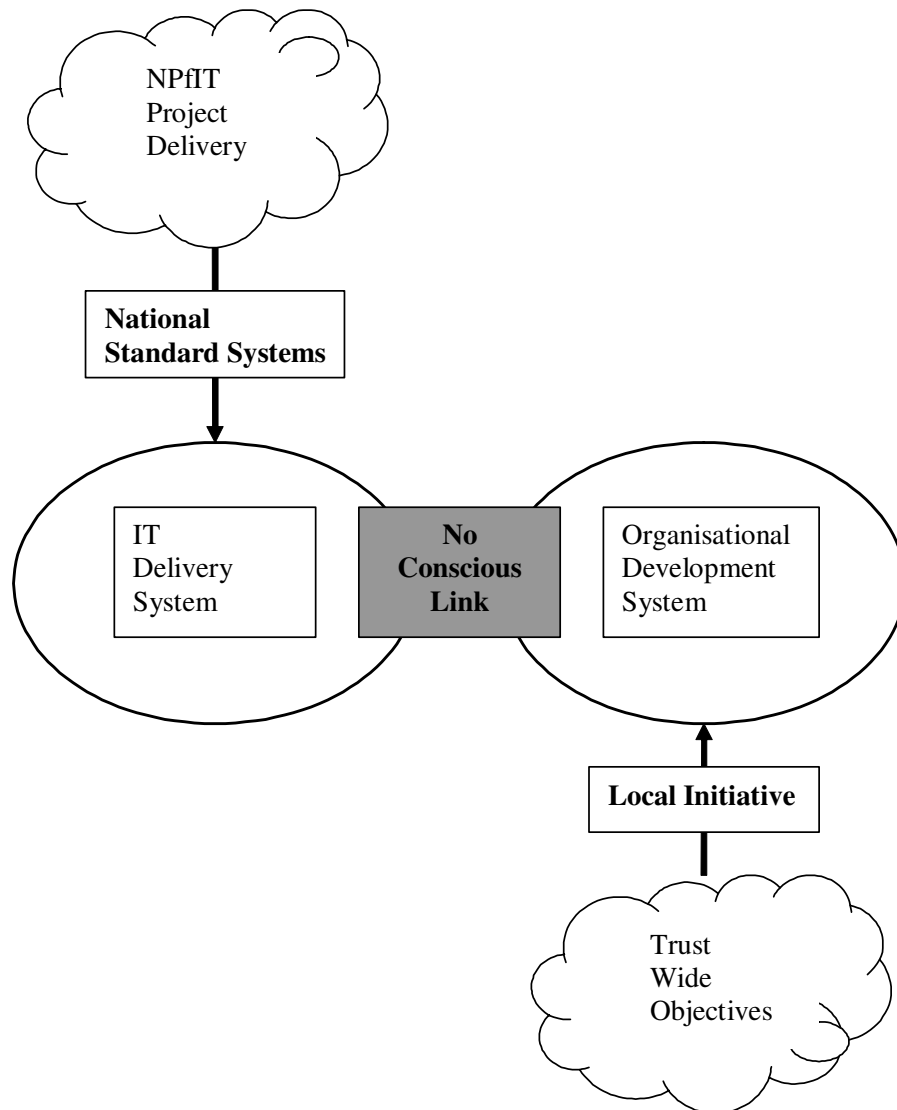
The dominant driver is for the Trust to recover reimbursement for clinical activity within an externally driven accounting framework. Increasingly, this is related to the need to achieve targets and standards within a framework of performance management and to demonstrate the quality of the Trust's services (**Figure 5.4.3**).

**Figure 5.4.3 : NIMSAD Stage 4 Problems in Transition, 2006-2008**
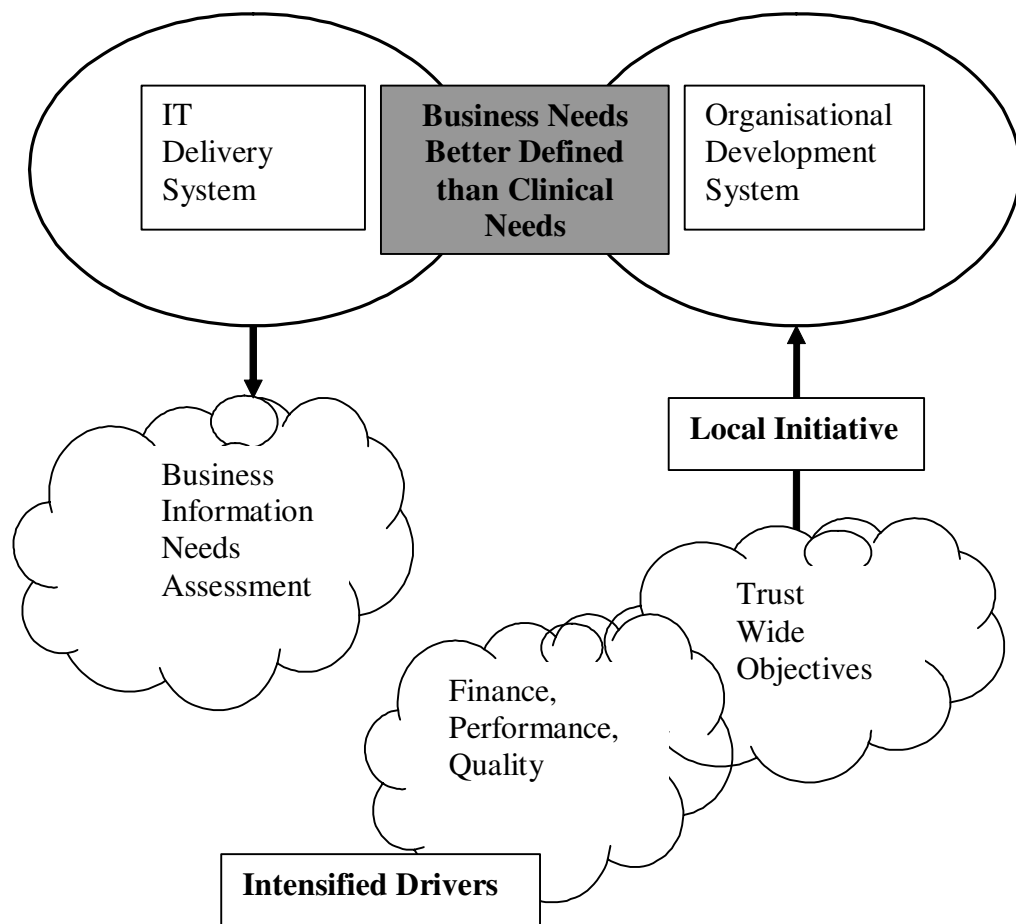


Through a series of 'lean' initiatives, the Trust has begun to dig beneath the surface of structures and processes to focus on people and tasks. The contribution of IT systems to the facilitation of clinical work is not yet clear and is being led by the systems that are available rather than by an independent assessment of IT needs. "Earned autonomy" has allowed the (Foundation) Trust to disengage from the National Programme for the time

being and to engage with non-standard providers, better able to supply what the Trust believes it needs. This has released the Trust from central prescription of its information systems but nevertheless leaves it exposed to a supplier-led market (**Figure 5.4.4**).

**Figure 5.4.4 : NIMSAD Stage 4 Problems in 2008**
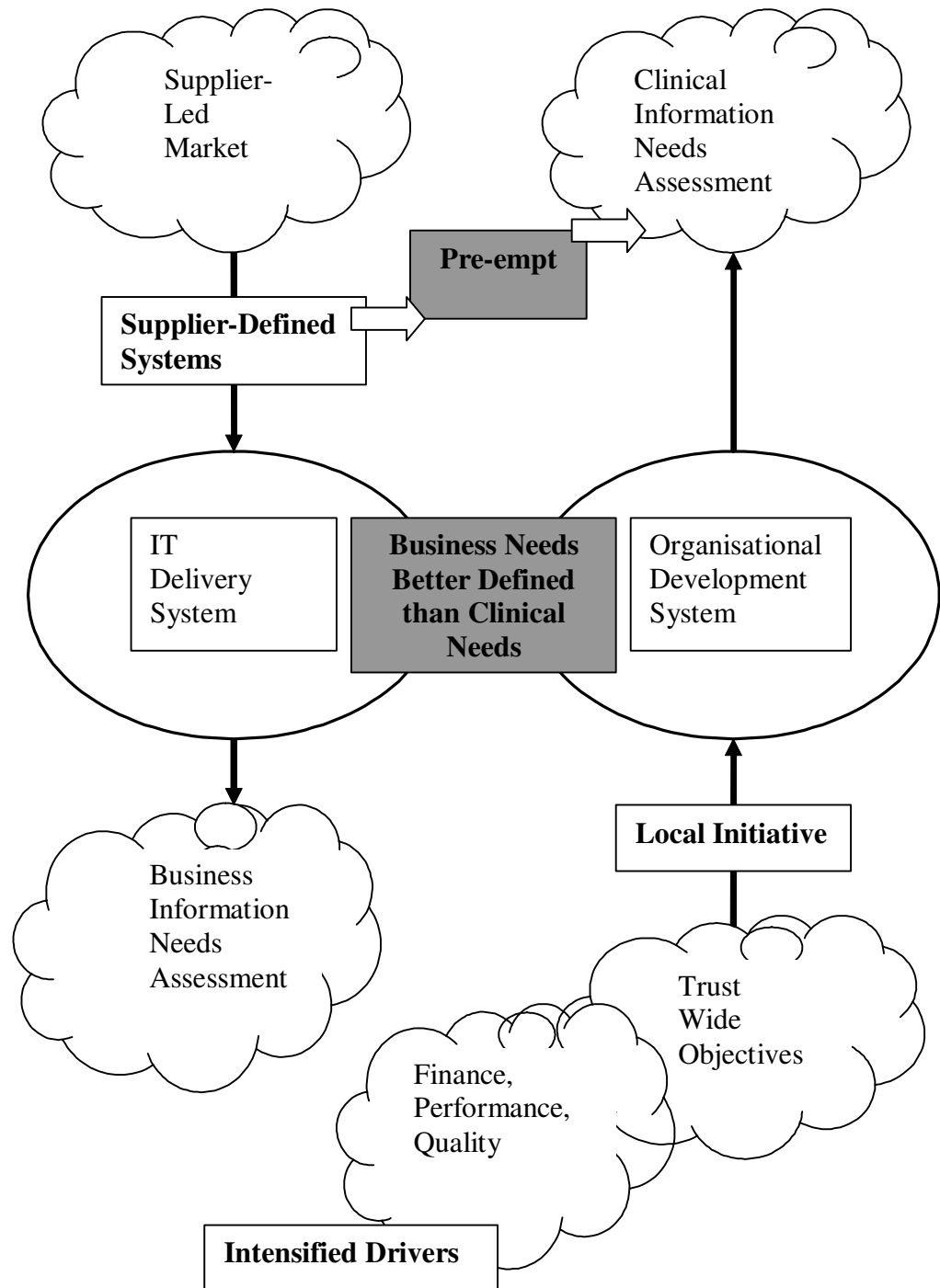
In either case, the system supplier is apt to pre-empt a user-led needs assessment because he has developed a product in isolation from the specific user environment where it will be deployed.

## 5.4.2 : Interpretive Perspective

In this perspective, the introduction of the information system is taken as a given. The relevant persona in Avison & Wood-Harper's typology is the "facilitator", whose role is to align the perspective of the managers responsible to drive the project's implementation with the perspectives of those who will be affected by its introduction.

This consideration introduces, at minimum, a distinction between managers and end-users, i.e. clinicians. The facilitator will deploy "change-management strategies" to assure the implementation's 'smooth landing' in the host environment. 'Clinical Engagement' is an essential component of this strategy. The 'terms of engagement' tend to be tacit rather than explicit, within an ethos of corporate unity.

The interpretive perspective recognises that the intrinsic merits of the new information system are insufficient for its problem-free adoption. Acceptance is 'situated' in a 'fusion of horizons' : between the perceptual framework through which those in the host environment consider their own fluid situation, and the framework through which they interpret the intrinsic attributes of the information system itself, as they first appear.

The role of the "facilitator" is to promote mutual accommodation between the information technology and its human users. The desired position is one that allows the

technology to be flexible and has the least negative impact on the ease with which the most important tasks of the user's job role are undertaken (**Figure 5.4.5**). A distinction is drawn, between 'user-friendly' technology that is irrelevant to the user's most salient tasks and technology that is instrumental in assisting those tasks.

**Figure 5.4.5 : Mutual Adaptation between New Information Systems and Future Information Systems Users.**
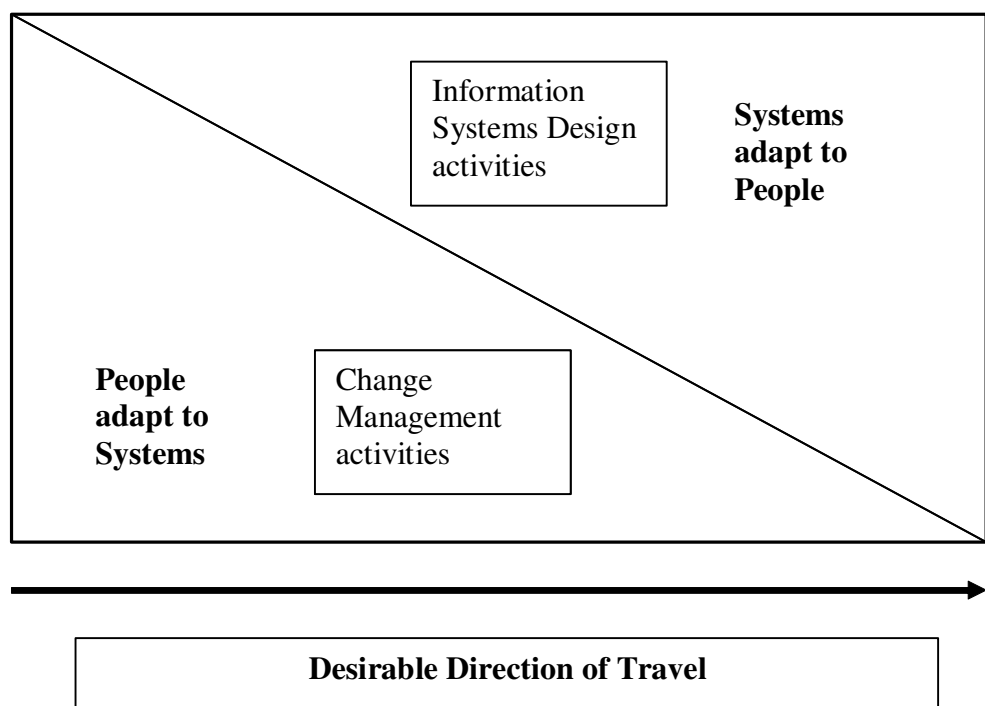


Figure 5.4.5 suggests the need to soften change management activities so that they take adequate account of future users' needs, especially when the operation of information systems is not the primary focus of users' professional activity.

Users' perceptions of their own needs is likely to reflect systems of norms, values and beliefs. Change management activities must respect these elements of local organisational culture in order to be successful.

The emancipatory perspective highlights alternatives to any current argument, deliberately undermining every confidently held position so that it can be refined in the light of richer argument.

**Figure 5.4.6** provides a sketch map of organisational discourse related to information systems in the NHS.

**Figure 5.4.6 : A Sketch Map of the NHS Information Systems Discourse.**

Patients

Managers          Clinicians

Quality                              Patients

Finance          Performance          Providers          Pathology
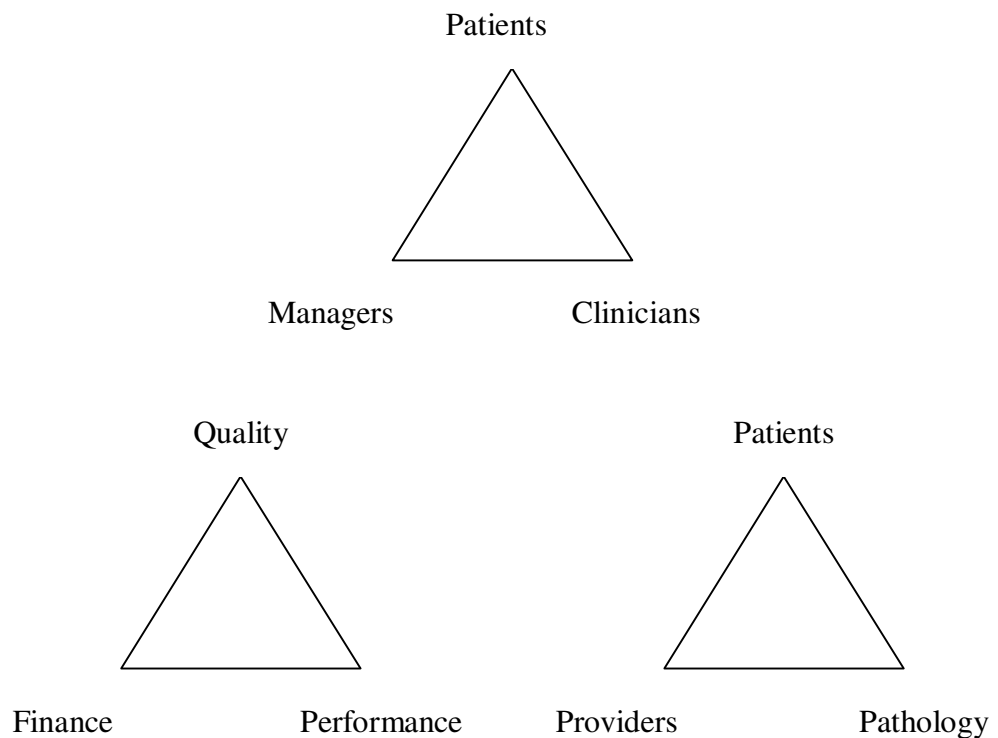
By focusing anywhere on this diagram, the reader is immediately aware that attention has been diverted from some other important centre.

At the top of the diagram, three sets of beneficiaries are identified. At bottom left, the focus is on three measures of organisational fitness. At bottom right, a focus on the pathology recalls information systems such as cancer registries, geared to compare provider performance or patient outcomes in relation to a given pathology. A focus on the provider neglects the patient but provides information necessary for organisational integrity and continuity. The third, complementary focus is on the patient, placed at the centre of concern.

### 5.4.4 : Radical Structuralist Perspective

In this fourth perspective, attention turns to the relative positions of three sets of actors : patients, doctors (standing for clinicians in general) and managers (**Table 5.4.1**).

**Table 5.4.1 : Permutations on Power Relationships between Patients, Doctors and Managers**

|                | Patient | Doctor | Manager |
|----------------|---------|--------|---------|
| **Pre-Griffiths** | Grateful client | Expert Professional | Acolyte Administrator |
| **Post-Thatcher** | Sovereign consumer | Accountable Professional | Policy pawn |
| **Post-Bristol** | Fully-engaged participant | Information conduit | Impresario |

For patients, the advent of new information systems in the NHS has the potential to widen lay access to arcane medical knowledge, transforming the patient's position of

dependence on the professional, and helping to realise Wanless' ideal of a "fully-engaged" public.

By assisting access and retrieval of 'best evidence' by clinicians, new information systems ought to shorten the lead time before evidence-based best practice becomes generally adopted. The enhanced visibility of best evidence is a challenge to the professional. He is no longer, from the patient's or the manager's perspective, the 'fount of all wisdom'. His role is now to be good at 'finding out' and conveying specific information, tailored to the patient's individual requirements.

For managers, the 'earned autonomy' of Foundation Trust status represents a release from subservience, to the professional *elite* or to tightly-managed, central performance targets, and the opportunity to lead the locally sensitive development of each individual organisation.

### 5.4.5 : Conclusions on "Problems"

From a functionalist perspective, there needs to be closer alignment between information needs assessment and organisational development. This is less easy than it might be if the information system is specified nationally whist the organisational development plan is allowed to evolve locally.

The Trust's temporary withdrawal from the National Programme only means that the development of IT systems can, in principle, remain more or less remote from the Trust, in the hands of suppliers, pre-empting users' own assessment of their needs from an

information system. It is possible that an individual supplier might want to "work with" the Trust to tailor its offering towards specific local needs but, as a trader in the market place, it will need to restrict special development costs in favour of general applicability to unspecified future customers. From this perspective, customisation is just an instrument of market penetration.

From an interpretive perspective, a better understanding of the user perspective is needed in order to further the implementation of the information system as an organisational 'given'. Where user-responsiveness is a political necessity from a functionalist standpoint, the interpretive perspective can provide insight into organisational norms, values and beliefs. To be adopted successfully, the new information system will have to be congruent with the social and political culture of the workplace

These considerations go beyond the stance of managers towards clinicians, most likely to produce effective collaboration between these two sectors. The impact of computer use upon the primary focal activities of care-giving is likely to be an equally important determinant of success, even when the primary driver of the new information systems operates at the strategic level. At this level, the discourse of finance, performance and quality is naturally dominant.

The emancipatory perspective surfaces other strands of discourse which might otherwise be overshadowed. The perspective of the patient is placed alongside those of the manager and the information system user. The overall efficacy of resource utilisation is placed alongside the agendas represented by efficient patient journeys and clinically effective pathways of care.

Finally, the radical structuralist perspective can refer specifically to the broader societal balance of power and accountability, to assess the potential impact of new information systems on relationships between managers, professionals and patients.

## 5.5 : NIMSAD Stage 5  :  "N O T I O N A L  S Y S T E M S"

### A Way to Frame Organisational Discourse

### 5.5.0 : Section Summary and Introduction

This section sets out to identify strategies, in the form of "notional systems" which, if they were brought into existence, would address the 'problems' identified in the previous section, making it easier to attain the "desired future state", where the Trust's information systems were more closely aligned with the Chief Executive's Trust-Wide Objectives.

The argument so far has been that the new information systems to be provided within the National Programme for IT need to be made relevant to the business goals of the Trust, encapsulated in the Chief Executive's Trust-Wide Objectives and the wider organisational development and quality agendas.

In the last section, it was noted that business information needs are more clearly expressed than front-line users' clinical objectives for their information systems (**Figure 5.5.1**).

It was also noted that different perspectives are available to complement a purely functional appreciation of an information system. 'Bridging the gap' between the problem situation presently experienced and the "desired future state" requires a way to appreciate needs from all of these perspectives.

**Figure 5.5.1 : Supplier-Defined Systems Can Overpower Users' Needs Unless The Latter Are Clearly Defined**
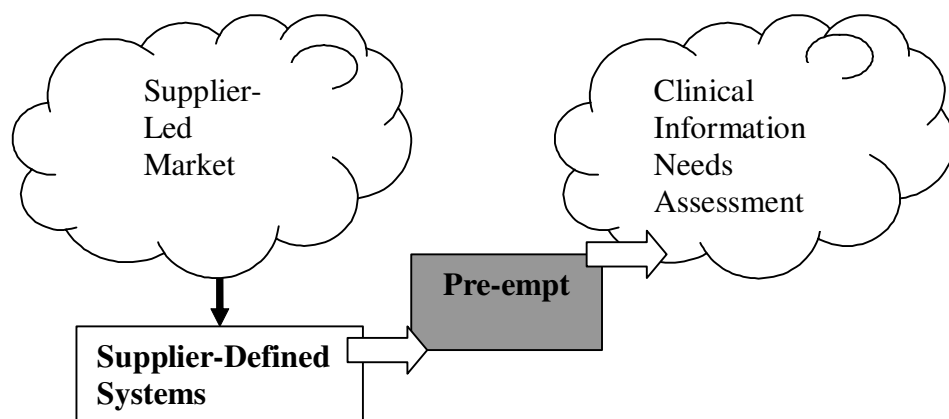


The purpose of this section is to suggest "notional systems" : sets of aligned elements that achieve together what no element could achieve on its own, to assist the appreciation of information systems in terms of their contribution to desired or desirable organisational outcomes.

### 5.5.1 : Functionalist ("Expert") Perspective : Agenda Alignment

The Trust's intended progress towards an "interim EPR (Electronic Patient Record) solution" is mapped in **Figure 5.5.2**.

The first 'notional system' to emerge is, therefore, a formal implementation project whose lower level activities, labelled "people", "process" and "technology", form the focus of interest.

**Figure 5.5.2 : EPR Roadmap**
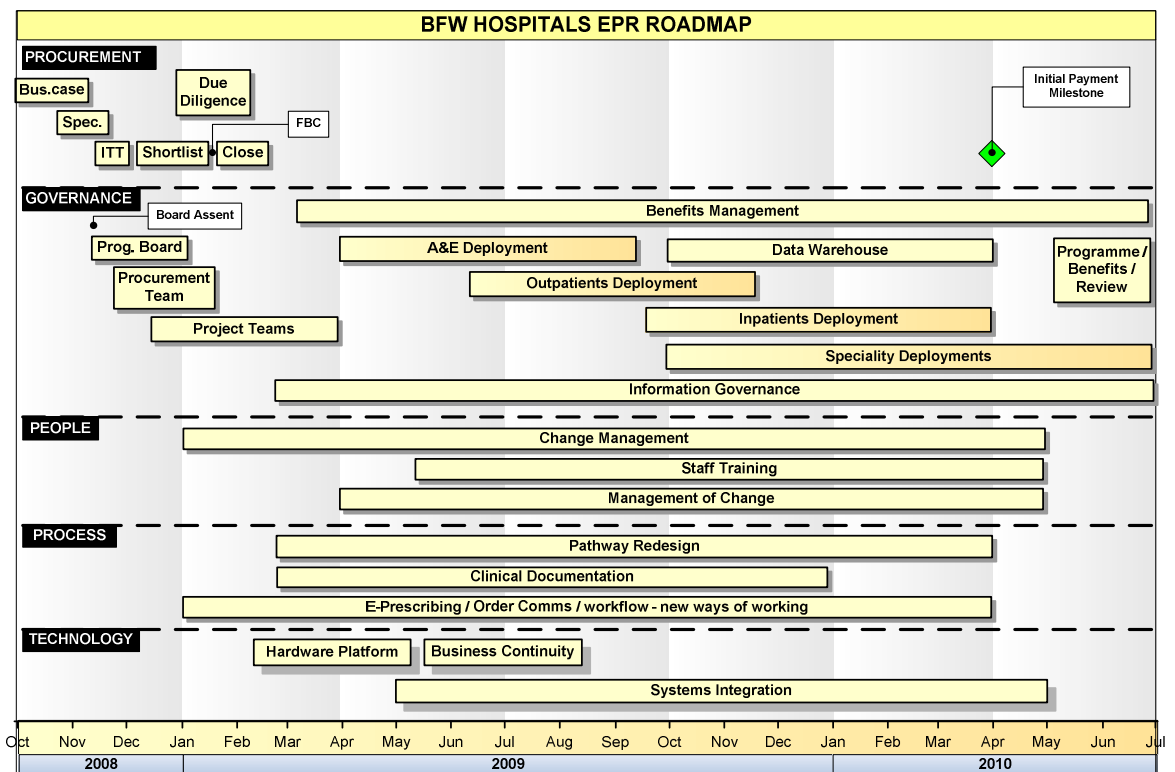


Where the "technology" work stream will allow one electronic data repository to communicate with another, detailed ideas about the purpose of interoperability will be identified in the associated "people" and "process" work streams.

It follows that a contrasting 'notional system' could be desirable if it brought together people, processes and technology.

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The relevant 'notional system' (**Figure 5.5.3**) contains people who are using the Leavitt model to understand more deeply why they need information systems and how information systems will help them. It is an 'agenda definition system.

**Figure 5.5.3 : Agenda Definition. Aligning Technology with People and Tasks as well as with Structures and Processes,**
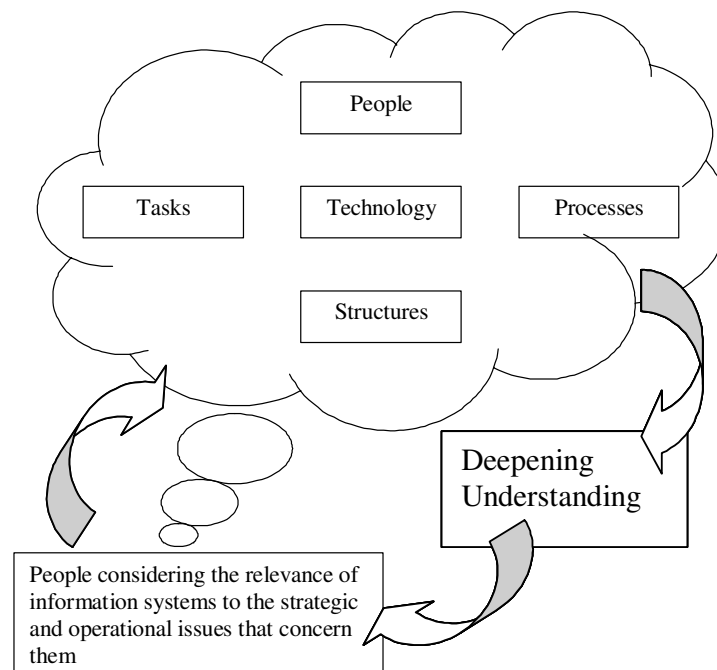


The Leavitt model considers groups of people as structures within an organisation and relates them to organisational processes through technology. However, it goes beyond this and also considers people as individuals, intimately concerned with the individual tasks that constitute their own job role. The model thus identifies a second set of relationships, between (individual) people, tasks and technology.

The model, the people using it and their deepening understanding, of the way the model's components interact in their working lives of others as well as their own,

constitute a system to allow a fuller appreciation of the way the proposed information systems will contribute to the alleviation of fundamental operational as well as strategic concerns.

Where the "people" activities in Figure 5.5.2 hinge around preparing people to accept pre-ordained change ("technology push"), the focus in Figure 5.5.3 is on the identification of changes that people assessing the relevance of their new information systems need to be enacted ("information pull").

A major source of relevance is in the capacity of information systems to enable fundamental changes in business processes. It is to be remembered that business processes take place in the context of a physical, built environment that is not easy to change.

Further, although human resource management aims to create flexibility within the workforce, many demarcations which might be overcome locally are reinforced by professional structures established beyond local control, for example in Deanery training programmes and the moderating influence, beneficial to patients, of the Royal Colleges on the expansion by individuals of their scope of professional practice.

### 5.5.2 : Interpretive ("Facilitator") Perspective : Values Alignment

The "facilitator" perspective balances the (change management) activities that implement pre-ordained change with activities intended to satisfy the need for change felt by individual and groups of organisational actors (information systems design

activities). For the sake of simplicity, the two major protagonist groups are clinicians and managers.

The relevant "notional system" is a 'values alignment system' (**Figure 5.5.4**) that can identify the bases of clinicians' locally felt needs and compare them with managers' strategic intentions. Consensus is built on points of convergence between these agendas. The terms of discourse influence the way common ground is structured and understood and influence the way each protagonist group moderates its expectations.

**Figure 5.5.4 : A Values-Alignment System**
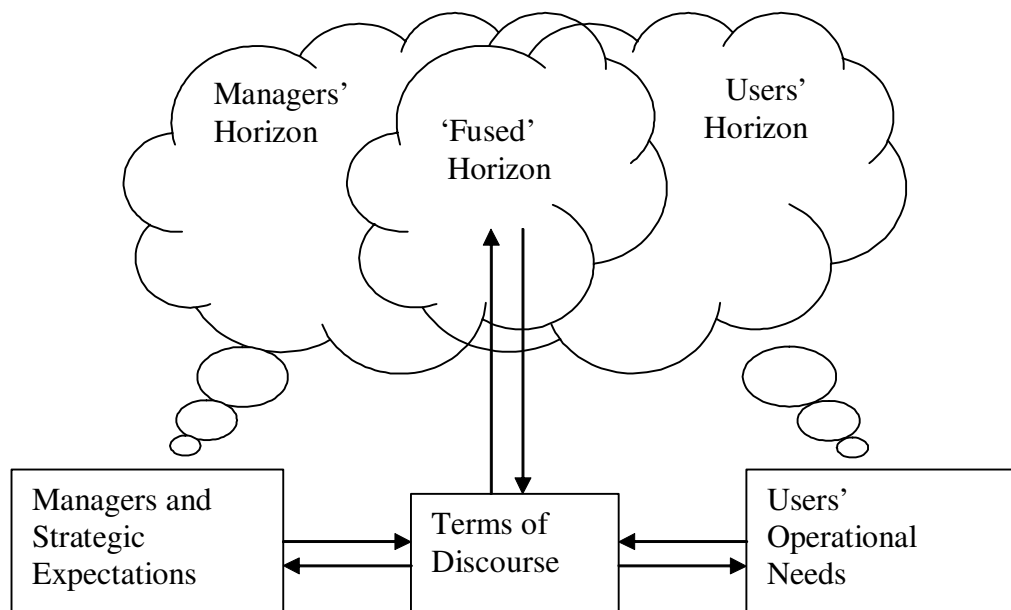


Influence over the terms of discourse is not necessarily shared equally by these two groups and the language in which discourse is conducted can be biased towards the ideology of either party. An additional "emancipator" perspective is needed, to counter this tendency.

### 5.5.3 : Emancipatory Perspective : Conflict Surfacing

Where the "facilitator" perspective furnishes a notional system to identify points of convergence between managerial and clinical agendas, the "emancipator" perspective offers a rich set of controversial topic areas from which to challenge assertions and argue an alternative appreciation of the information system's relevance (**Figure 5.5.5**). Guba and Lincoln (1997 ; p.72-74) refer to "claims, concerns and issues".

**Figure 5.5.5 : A Conflict-Surfacing System.**
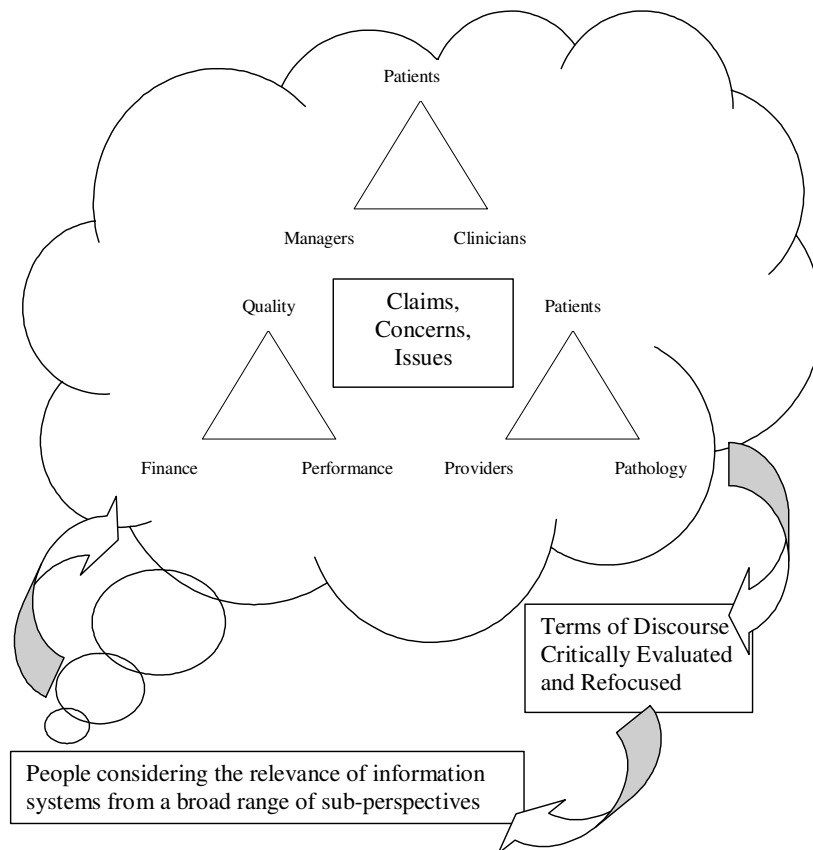
### 5.5.4 : Radical Structuralist ("Warrior") Perspective : Agenda Critique

Finally, the "warrior" perspective (**Figure 5.5.6**) can specifically and critically address the ethical perspective of what an information system ought to contribute towards an intensification or levelling of power relationships between managers, professionals (clinicians) and patients.

**Figure 5.5.6 : A System to Assess Power Relations Between Patients, Clinicians and Managers**
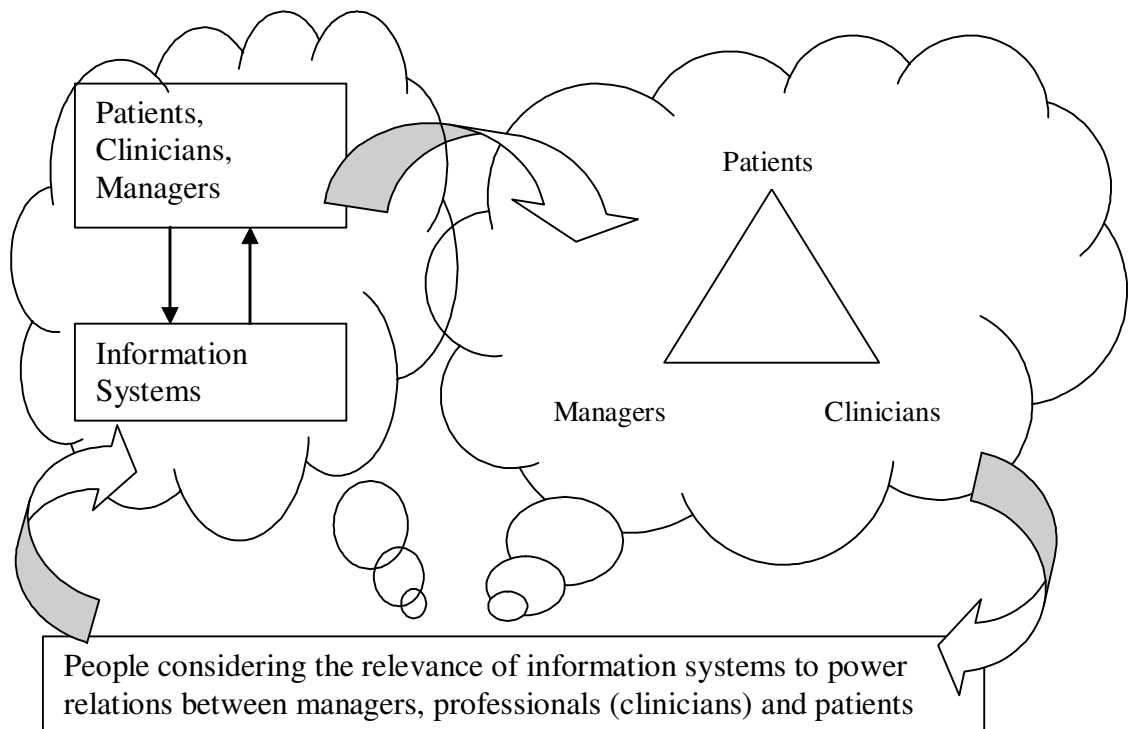


People participating in this system are critically evaluating the impact of information systems on themselves as well as on the other parties in this triangular relationship.

### 5.5.5 : Using Deetz' Framework to Organise the Four Perspectives of
### Avison and Wood-Harper

Deetz' framework (**Table 5.5.1**) helps to organise the four perspectives.

**Table 5.5.1 : Organising Avison and Wood-Harper's Four Perspectives around Deetz' Framework**

|  | Consensus | | |
| --- | --- | --- | --- |
| *a priori* Agendas | Agenda Definition | Values Alignment | **Emergent Agendas** |
|  | Agenda Critique | Conflict Surfacing | |
|  | Dissensus | | |

Agenda definition, usually by an organisational elite, sets an agenda from a privileged perspective. Successful implementation requires agreement by the workforce to the minimum extent represented by compliance. This in turn requires sufficient alignment between managerial and workforce values to moderate the emergent "yes, but" arguments of the workforce in favour of some higher system of values, for example "patient safety".

Conflict surfacing allows full expression of polar opposite, emergent "yes buts" so that no voices are privileged or suppressed. Full expression of dissensus ought to result in a synthesis of ideas from which progress can be made. Impasse is a less defeatist term to describe the alternative than deadlock, opening the door to lateral thinking.

One form of dissensus is to argue that the wrong set of ideas is being privileged and that another set should be given *a priori* status. This has happened within the National Programme, where the emphasis has shifted from integrated Hospital Information Support Systems (HISS) to patient-oriented electronic records.

### 5.5.6 : Conclusions on "Notional Systems"

Future users of information systems in the NHS are confronted by the carefully argued statements of managers, about the contribution of information systems to managers' strategic intentions, and by managers' belief that the systems they install will function as anticipated, to produce the outcomes managers desire.

They also face sellers' insistence, that their product accurately meets needs that users lack a critical capacity of their own to express. If these needs are not met, there is a clear risk that information systems will not meet managers' needs because they have not met users' needs.

To make a broad assessment of a new information system's potential contribution requires identification of the various agendas it must serve. Some of these are explicitly stated from the outset but others may not be. An 'agenda definition system' is a response to this problem.

The purchase and introduction of an information system together constitute an act with social and political as well as technical aspects. A 'values alignment' system maps the territory shared between the horizons of managers and those of future users. Information

from the activity of this system could helpful in allowing users to articulate their own agenda.

A 'conflict surfacing system' serves to prevent premature consensus between managers and users by positing alternatives to the first intuitions of both parties.

Finally, a system for 'agenda critique' specifically addresses the effect of new information systems on power relations between managers, professionals and patients.

The systems proposed here complement each other. They are similar inasmuch as they bring together people from different parts of the Trust who might not otherwise meet as equals in a problem-structuring and problem-solving forum. The principal point of difference between the four models is the conceptual model around which participants structure the relevant discussion in each of the four instances.

## 5.6 : NIMSAD Stage 6 : "C O N C E P T U A L / L O G I C A L D E S I G N"

### Selecting Useful Concepts from the Academic Literature

#### 5.6.0 : Section Summary and Introduction

This section reflects on the problem solver, the problem situation and the problem solving methodology and brings together conceptual understandings of the design, implementation and evaluation of information systems that reflect the propensity for technology to be "translated" from the designer's conception of use into the user's personal relationship with his own practical situation.

The section focuses on the user rather than the sponsor of the information system.

Preliminary reflection about the problem situation, in which the Trust's managers wish to implement successful information systems, reminds us that this is a social and a political rather than a technical enterprise. Normative implementation methodologies suffer from the shortcoming that they provide no insight into why or how their prescriptions work.

When we reflect on the problem solver, it is apparent that we can either treat individuals or groups within the Trust, or any of its functional departments, or any of its services, as disembodied entities that will be linked together by information systems or we can treat them as things "in the world", inseparably bound to their own train of historical events and local features.

Reflecting on the problem solving process, we are aware that a tool's use "as imagined" or designed tends to be different from its use when it 'comes alive' in the hands of the practical user and is "translated" or absorbed into the practical situation.

This section brings together conceptual understandings of information systems design, implementation and evaluation that explicitly or implicitly acknowledge this tendency. Their own use sets the stage for an approach to implementation that will focus on a close understanding of the user rather than the sponsor of the information system.

In particular, the user is considered as somebody whose primary role is more than merely to operate a computer when key events occur. The user's principal role is to initiate or participate in those events.

## 5.6.1 : Using Realistic Evaluation to Position Other Concepts

The assembly of concepts relevant to the introduction of new information systems to an NHS hospital will furnish insights into the contextually-influenced "mechanisms" which, as Realistic Evaluation postulates (**Figure 5.6.1**) , provide the 'meat' in the sandwich between the intervention of information systems and their intended outcomes.

**Figure 5.6.1 : What might be going on when an information system succeeds or fails ?**
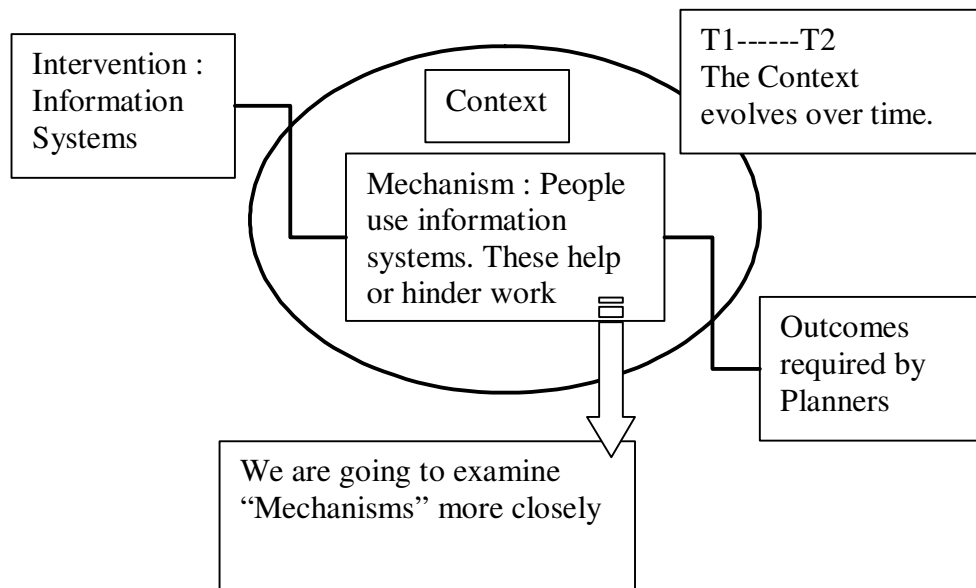


Consistent with the doctrine of "Management Information from Operational Systems", the most important "mechanism" is that information systems are used by clinical users in the immediate clinical environment to produce local clinical outcomes. Operational users (clinicians) perceive information systems directly as helping or hindering their work.

Clinicians' "problem situation" places them in intimate contact with clinical work and the clinical workplace. This is a collaborative environment where they seek to generate individual and collective outcomes. The latter contribute to, but are not necessarily identical with planners' (managers') desired outcomes.

## 5.6.2 : Using Multiview to Understand "Mechanisms" in Realistic Evaluation

Although developed as an approach to information systems design, Multiview is well suited to the exploration of the mechanisms we are interested to explore. As Figure 3.3.9 shows, Multiview considers problem solvers, the problem situation, the way they collectively or individually perceive the problem situation (their "interpretive scheme") and an "emergent" approach to the problem situation (the problem solving methodology).

Multiview has been chosen as an epitome for information systems design because it recognises the different interests of various stakeholders in the information system's application, to a problem situation experienced differently from the specific perspectives of each. The problem situation is defined differently for each stakeholder and has developed out of antecedent historical episodes that are salient for that person.

Stakeholders are not considered as if contemplating the problem situation from a position of isolation. Instead, they are intimately involved in it, to the point that the problem situation is part of the personal experience of the world that distinguishes each stakeholder from other individuals. In turn, this individuality distinguishes each person's relationship with the information system from the generic.

The design (problem solving) approach is not pre-defined but "emerges" from the engagement of problem solvers with the problem situation and with the "interpretive scheme" that lends sense and orientation to engagement.

### 5.6.3 : Problem Solvers

**Figure 5.6.2** illustrates the operations and financial managers who are working out how to align new information systems with the performance management of the Trust's clinical operations, along with the clinical managers who are there to provide a clinical perspective on the management task.

**Figure 5.6.2 : Problem Solvers and their individual technical, organisational and personal (professional) perspectives**
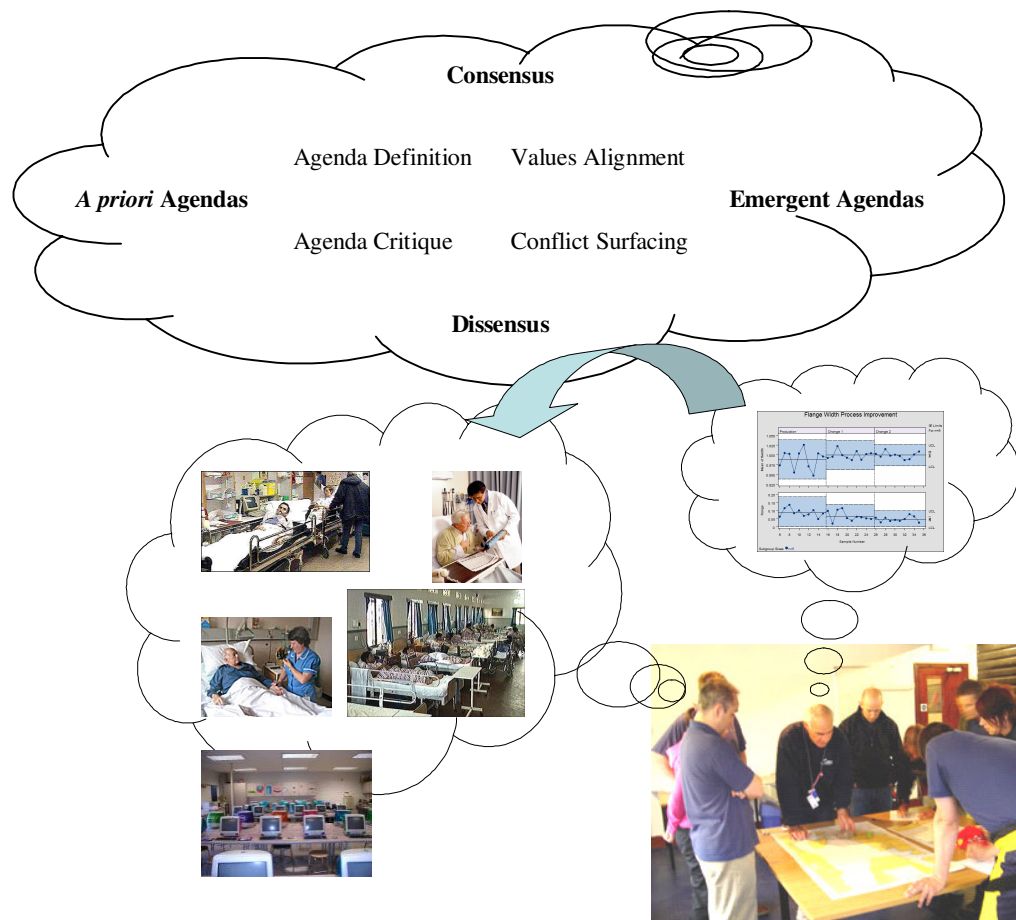
Dependent on the maturity of the planning group is its ability to combine the activities of values alignment, conflict surfacing and agenda critique alongside the initially defined agenda.


**5.6.4 : The Problem Situation : Information Systems Change Seen as Technology Adoption**


The "mechanism", interposed by Realistic Evaluation between the "intervention" and its "outcomes", is now restated as the technology's active assimilation by its users. Technology has been assimilated when its use has become 'second nature' rather than a deliberate effort of attention. Assimilation entails the "translation" of ideas contained ("inscribed") in the designer's conception of the technology, into the conceptual scheme of the user at work.


The technology adoption model (Andreu and Ciborra, 1996) contains the concept of assimilation in the idea of "routinisation" (**Figure 5.6.3**). This crucial concept complements and moderates the conventional notion, that implementation is a successful strategic accomplishment of managers who intervene by manipulating the responses of a passive community.


In the wider context, the planners shown above focus on the instrumental relationship of the information system with the Trust's business mission, as it might be expressed in the "core capabilities" represented by Chief Executive's Trust-Wide Objectives.

To achieve the business mission, the information system must support the more basic "capabilities" that support the "core capabilities". Specific managerial interventions will promote the closer interactions of groups, and the streamlining of processes to enhance their efficiency and satisfy performance targets.

The processes concerned contain the specific tasks, performed by individuals, time after time but under circumstances which are always fresh and different from previous occasions, when other things were going on or treatment was being given to a prior patients with a different antecedent history.

**Figure 5.6.3 : Technology Adoption Model**
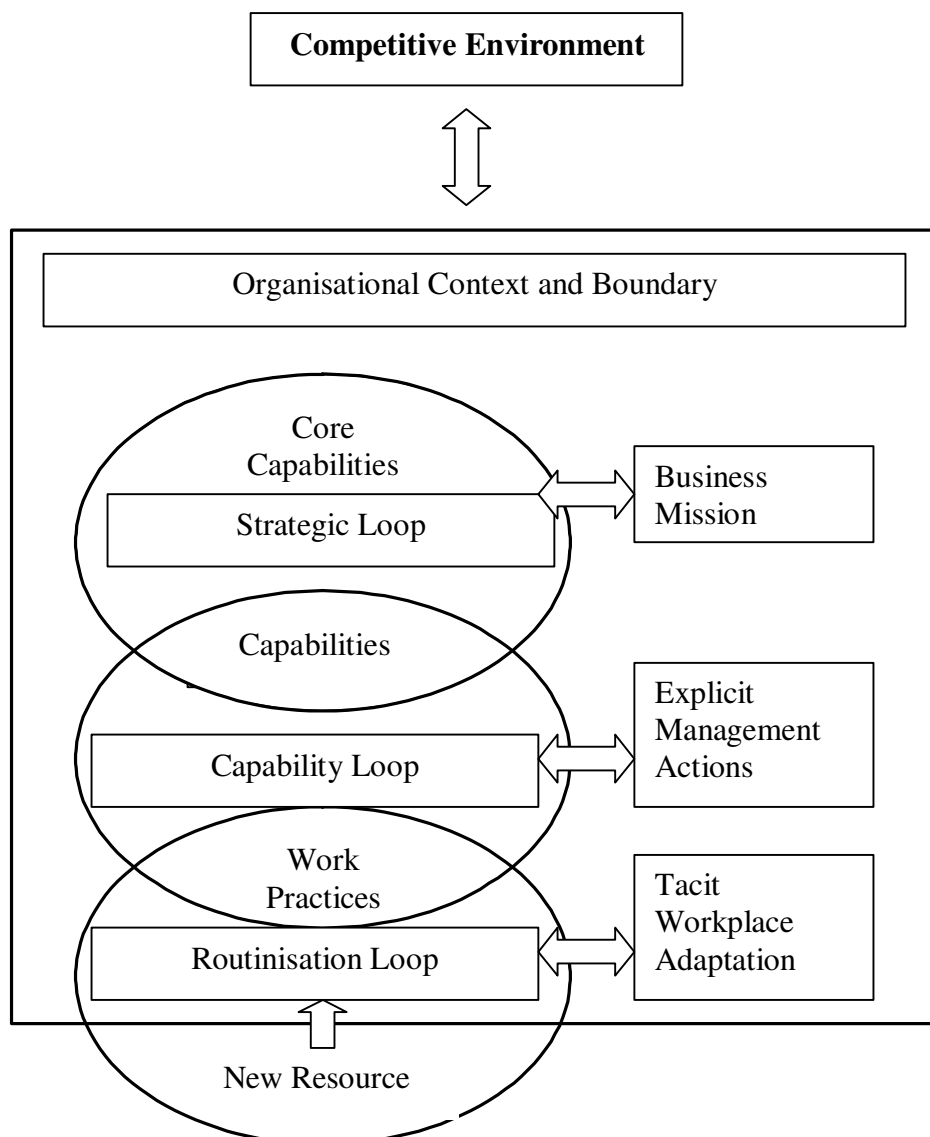
The point of interest in this model is where the new technology is incorporated into the "tacit" routines of work practice. These are behaviours and activities that are extruded from descriptions of process but undeniably occur, as pragmatic responses by individuals to the unfolding situation that surrounds them.

### 5.6.5 : Interpretive Scheme : Understanding Tasks and Computer Use as Embodied Activities

The interpretive scheme is modelled in the 'plane of cleavage' between the halves of the modified Leavitt model (**Figure 5.6.4**).

**Figure 5.6.4 : The Plane of Cleavage**
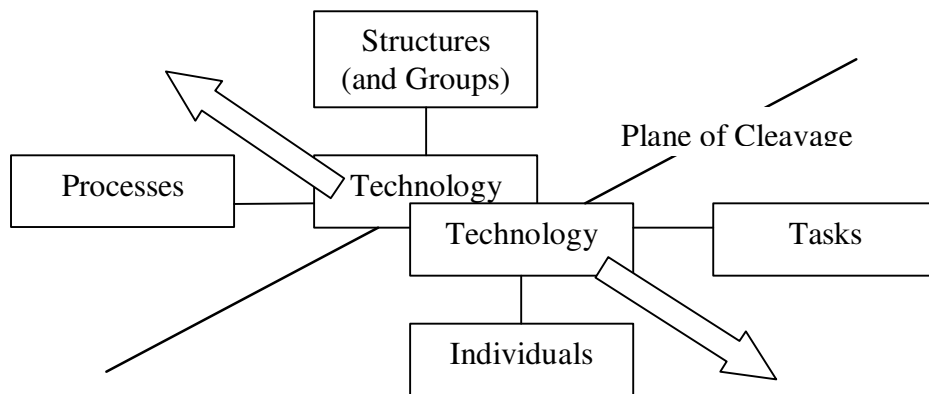


The cleavage plane separates the strategic relationship between processes, groups and technology from the operational relationship between technology, individuals and tasks.

For the Trust to be a "Top Ten Performer" and provide "Great Value for Money to the Taxpayer", managers need to think in terms of groups, processes and the form of technology that Malmsjo (2006) has termed "operative".

In contrast, for the Trust to be "The Provider of Choice for the Local Community" and to be "A Great Place to Work", they need to think about individual interactions between patients, care-givers and the form of technology that Malmsjo calls "supportive". The question of Management Information from Operational Systems hinges on the compatibility of these two forms of information system, not in technical sense of interoperability but in the sense of the division of attention between computer and care-giving at key moments.

The figures of Rene Descartes and Maurice Merleau-Ponty in **Figure 5.6.5** represent the opposed conceptions of identity that characterise the two sides of the cleavage plane.

On the one side, entities are so clearly distinguished that they have no individuality. The generic group is placed in apposition with the generic process and the generic technology. Individuals are absorbed into the structure of groups and processes, treated as immutable wholes that can be measured, monitored and manipulated.

On the other side of the cleft, entities and related entities constitute each other and cannot be teased apart. The task, the individual performing the task and the technology supporting the task are held to contribute defining features to each other from one moment to another as the problem situation is transformed during "the constant flux of events and ideas" (Checkland, 1999 ; pp.A50-A55). The individual and the task are to be considered as specific instances, identified by location and time.

The practical significance of these ideas is framed within the intersection of patients' trajectories through healthcare.

**Figure 5.6.5 : Cartesian and Hermeneutic Phenomenological Paradigms**
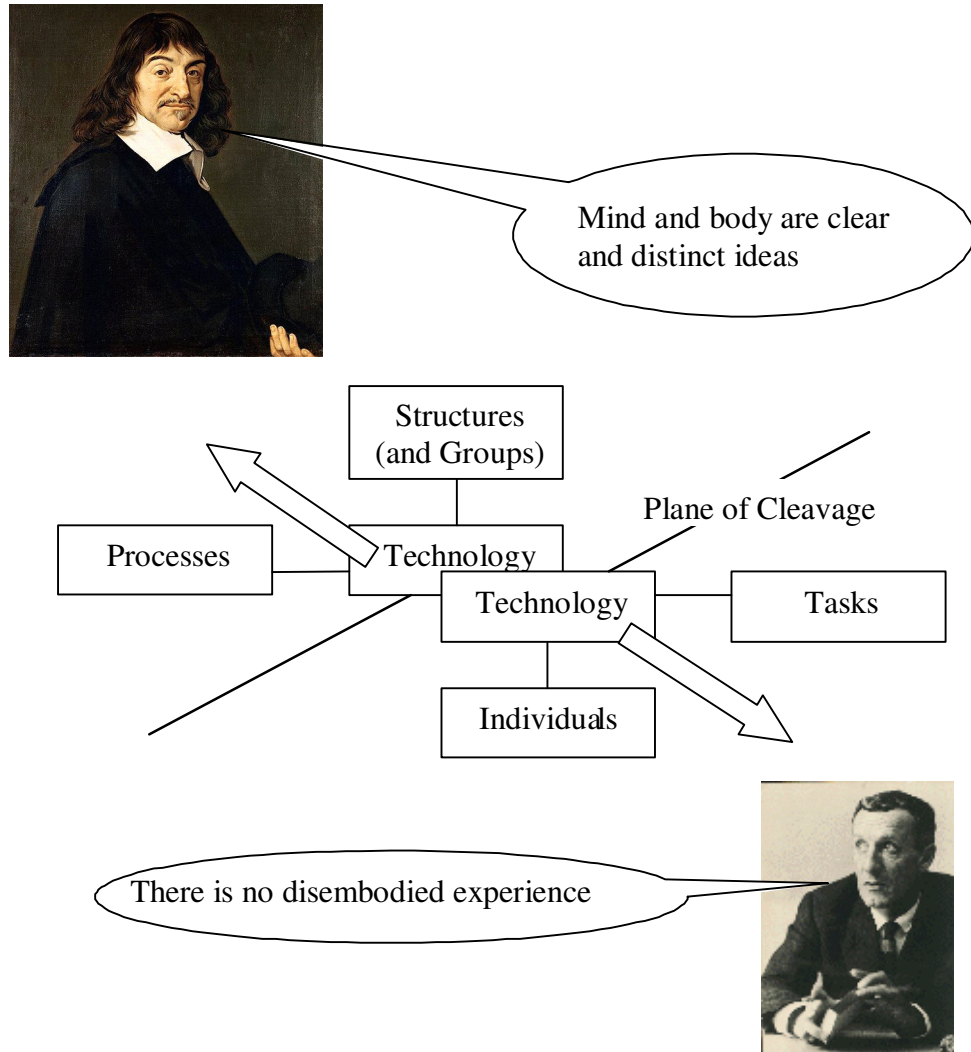
The problem solving methodology that stems from this point of interest is to consider critical moments when the technology comes into contact with individuals and the tasks of clinical care-giving (**Figure 5.6.6**).

**Figure 5.6.6 : Management Information from Operational Systems, derived when Individual Clinicians encounter Critical Moments in Day to Day Work**
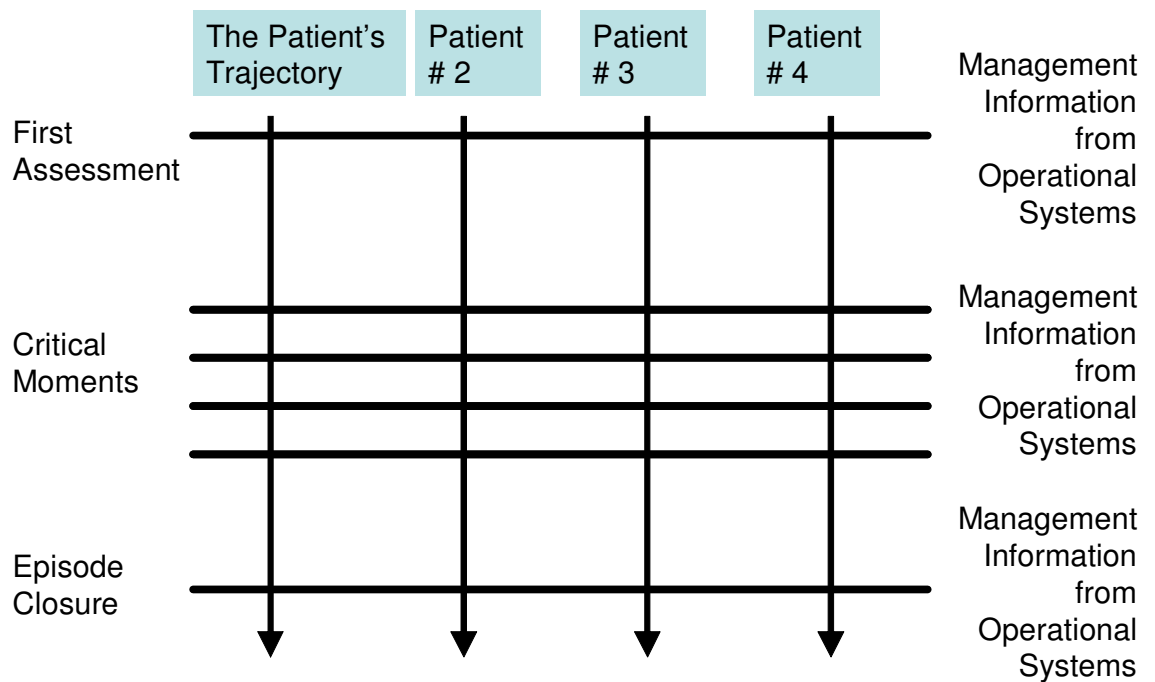


Critical moments represent, simultaneously, opportunities to provide "Management Information from Operational Systems" and individual instances of coalition between an individual clinician, a task or sequence of tasks, and the information technology that contributes to the environment of clinical practice.

Critical Moments are not just key steps in a process. They are occasions when more than one patient is being looked after or when one task impinges on another.

### 5.6.7 : Conclusions on "Conceptual / Logical design"

This section has shifted the emphasis from the strategic purpose of information systems to the users who will operate these systems in the clinical environment. In turn, it also serves to focus attention onto prevailing conditions in the user environment that favour an information system's spontaneous assimilation rather than the success-oriented work of manipulating a system into place.

Understanding information systems change as embodied activity draws attention to the constant occurrence of critical moments when the information technology suddenly becomes obtrusive and the relationship between the individual user, the task and the technology is thrown into relief.

## 5.7 : NIMSAD Stage 7 : "P H Y S I C A L  D E S I G N"

## Using the MULTIVIEW Methodology to Assemble the Selected Concepts

### 5.7.0 : Section Summary and Introduction

This section situates the conceptual / logical model described in section 5.6 within the wider activities of information systems design. The components identified in the last section are now presented as a unified whole. The model is then placed amid specific zones of interest, originally identified as relevant to design, but incidentally relevant to implementation and evaluation.

### 5.7.1 : Assembling the Model

**Figure 5.7.1** shows the components of the logical / conceptual model, now identified as mutually constitutive elements of a Multiview model, specific to the situation of present interest.

**Figure 5.7.1 : The Assembled Multiview Model**
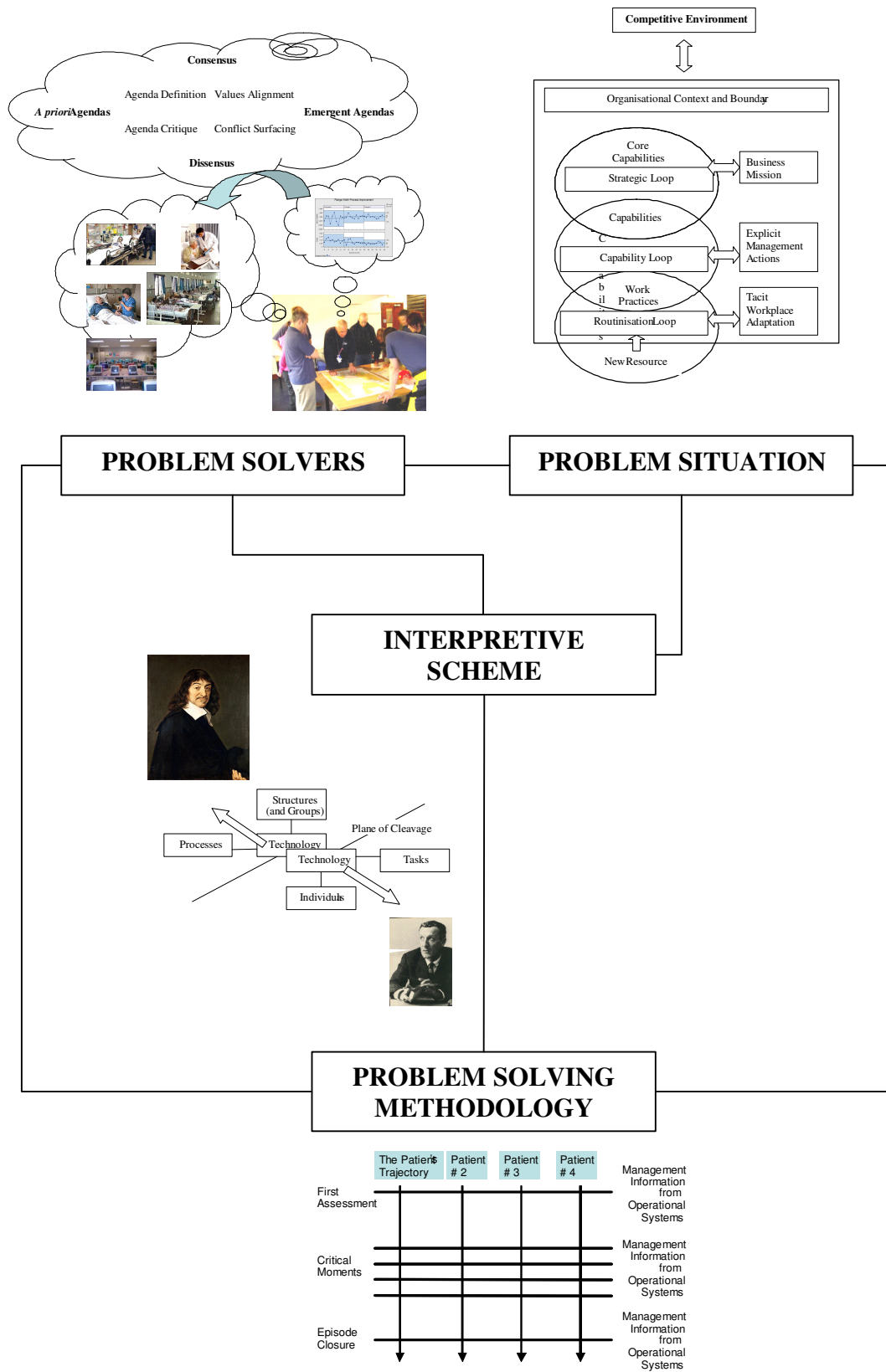
## 5.7.2 : Putting the Model Into Context

**Figure 5.7.2** displays the different 'views' contained in the originators' first version of

Multiview. The two fields of greatest relevance to this study are highlighted.

**Figure 5.7.2 : Major Components of Multiview as Originally Formulated**
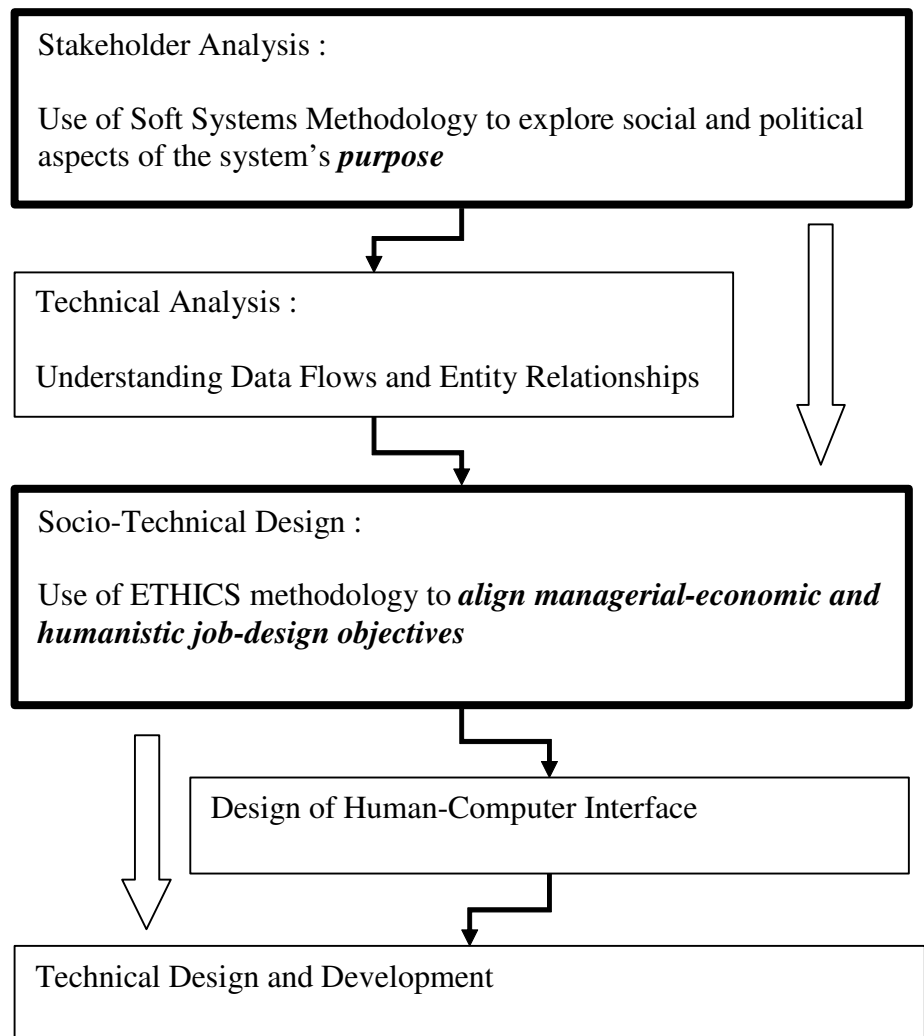
In the Stakeholder Analysis, stakeholders are able to participate on more or less equal terms in debate over the information system's purpose or *fitness of purpose*. In the Socio-Technical Design, attention falls onto the system's *fitness for use*. Future operational users are invited to contribute to the alignment of managerial-economic and humanistic job-design objectives, again on more or less emancipated terms, using ETHICS methodology.

### 5.7.3 : Using the ETHICS Component of Multiview to Pinpoint the Focus of Attention

The ETHICS methodology is summarised in the following 15 steps :

1  Why Change ?
2  Boundaries : Limits of Remit
3  Current Systems and Practices
4  Improved Systems and Practices
5  Which Departments ?
6  What do they do ?
7  What should they be doing ?

   8  Job satisfaction needs (questionnaire)
     knowledge fit
     psychological fit
     efficiency fit

> **task structure fit**

     ethics fit

9  Future analysis
10 Efficiency vs Job Satisfaction objectives
11 New Working Practices
12 Technical Options
13 Detailed Work Design
14 Implementation
15 Evaluation

Within step 8, the 'fit' between the technology and the structure of tasks performed by people pinpoints the point of entry for the investigation to be undertaken.

### 5.7.4 : Conclusions on "Physical Design"

The assembled conceptual model is now ready to be deployed within the concrete, real world epitomised by the Trust.

## 5.8 : NIMSAD Stage 8  :  I M P L E M E N T A T I O N
### Applying the Assembled Concepts in the Problem Situation

The final phase in NIMSAD is "implementation", putting the physical design to work in the real world. Chapter Six, which now follows, does this by presenting five explorations which relate information systems and the people who use them, to the Trust's salient strategic objectives.

# CHAPTER SIX

# APPLYING

# THE DIAGNOSTIC AND THERAPEUTIC

# APPROACH

# WITHIN THE PROBLEM SITUATION

## 6:0 : INTRODUCTION

Each section of this chapter applies the diagnostic and therapeutic approach to an important preoccupation within the Trust. The first section represents the overarching preoccupation for the Trust : to remain viable by maintaining financial stability. The second to fifth sections each address one of the Chief Executive's Trust Wide Objectives.

## 6.1 : ACHIEVING FINANCIAL STABILITY

### 6.1.0 : Introduction

The Trust's Business Mission is to provide healthcare under the terms of an agreement with the commissioning bodies. At the heart of the arrangement is the translation of human activities and utilisation of resources into a restricted set of commodities which

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can be traded for money. The Trust's financial stability depends on its core capability, to retrieve reimbursement by :

> *"………being able to describe what it is that we do in a way that our Commissioners would recognise and be willing to pay for."* *(Executive Director #1)*

The Trust's problem situation in this respect contains the need for explicit managerial actions that will close the gap between work practices and the capacity to furnish this description.

In effect, the gap to be closed is between the tasks performed by individuals and the groups and processes involved in reimbursement. The effective conduct of tasks, focused on data generation to support reimbursement but conducted at the clinical level, needs to be robust against the tacit workplace adaptation that occurs when a new resource is incorporated within the routines of productive social activity.

### 6.1.1 : Reporting and Processing Data to Achieve Reimbursement

Three extended interview extracts are now presented in order to describe the structure through which the Trust reports its activity to its internal and external information audiences in order to receive reimbursement and stimulate improved production. The open and *in vivo* codes derived are then assembled into the axes suggested by Strauss and Corbin (1990) in order to provide an organised analysis.

**Extract A : Interview 02 : Information Officer**

*"**Spells** is predominantly used around **SLA** [**service level agreement**] **monitoring**. We've gone through a series of **currencies** if you like for our **service level agreements with our Commissioners** over time.*

*Spells are around **in patient data**. So patients are **admitted** into the hospital and **discharged** from the hospital.*

*The **base data** that is stored in are what are called **finished consultant episodes**, so a patient will be admitted to hospital under a **consultant or the consultant's team**. They may then **transfer** to another consultant for **a different period of their care**.*

*Each one of those is **generating a finished consultant episode** and that's how **things are stored**, historically, within the **patient administration system**.*

*Eventually, the patient will be discharged. Now, in 80 to 90 % of all admissions, we only have one finished consultant episode.*

*What happens if the patient goes through **a series of finished consultant episodes** is you have a period from admission to final discharge and that is what we call the **district spell** or **hospital provider spell** which can contain any **number of finished consultant episodes between a single admission and a single discharge.***

*The reason they've moved **contract monitoring** if you like and the base currency for all of that into spells is that some organisations could be seen to **falsely inflate their number of finished consultant episodes** and therefore **generate more income by transferring patients unnecessarily between consultants.***

*But Data is still stored within the system as finished consultant episodes. There are national pieces of software that we are given which will group those into spells.*

*So it will go through all our finished consultant episodes in the period and give us our **spell-based data**.*

*Within our system we actually hold a **spell number**, which we can use to create our own **spell-based data** as well.*

*each **patient** has a **unique key**. They will then have any number of **in patient episodes** linked to that. They will have any number of **outpatient attendances** or **non attendances** linked to that. They will each have a series of events linked to that. They will each have **A&E attendances** linked to that." (02/127-186)*

**Extract B : Interview 01 (Executive Director # 2)**

*"Now what we are actually **paid** on is not based on the **single episode**, we are paid for what is known as the **spell**. The spell can have **multiple episodes** within*

*it and it goes into a piece of software called the **spell converter** and that **churns out** the **price** of what should have been paid on the other side.*

*Now, **the problem with that** is that that data, we try and **match back** to, for argument's sake, a particular specialty, say trauma orthopaedics and you might find that someone who was admitted, arguably through A&E with **fractured neck of femur**, and has a whole **raft of other problems** as well, we are actually only being paid for that fractured neck of femur.*

*Now, at the moment, you might have a situation where that patient was effectively booked onto the system under one consultant, and was **never moved** from **being under that consultant's care**, but had **another procedure done to them**, and that's what are paid for.*

*When we **turn that data round** and say to everyone, this is **what you did last month**, let's try and **understand** that better and see if we can **make the whole system work**, everyone says, "oh, **Dr X. isn't a surgeon !**". That doesn't work!*

*We're stuck with **having to churn stuff through the spell converter**, otherwise we won't **get paid** ……… That's going to take an awful lot of hard work and feedback loops and all sorts of things to make that even close to everyone saying, yes okay ………we know it **comes out as a something else through the spell converter**, but we do believe that we are **getting paid for all the procedures that we've undertaken**.*

*So **the way the system has been developed actually has already become disconnected from the front line and from a clinical understanding.***

*………so there's **an awful lot of man hours that go into that**, just that process of **trying to make it** so that - the management product if you like - at the end is **understandable from a clinical perspective** in terms of, **why do I only earn X**.. Well, it's all entirely understandable when you can take people through it, but, we don't help ourselves, quite frankly." (01/116-167)*

*"Now, I know that we've been **sending the GP a letter** to say that this is what we've done, but it has **not gone onto PAS** and we **haven't been able to bill for it**." (01/526-528)*

**Extract C : Interview 102 (Executive Director #1)**

*"Now **coding** is the **lifeblood** if you like of our information. **Clinical coders** put **what has happened to the patient** onto the system. We have a relatively small number of coders for the number of patients we see, which produces the issue of a **high workload**. Also, in terms of **the quality of clinical information they have to go on** to make their clinical coding decision, there can be problems in terms of **incomplete or delayed discharge summaries**. It can be hard to get the diagnosis, or to **get** the primary and secondary diagnoses in the right order, or the tertiary diagnosis and **the right detail**, so they have to do **a lot of digging** in their limited time." (102/188-196)*

**Analysis of Interview Extracts**

**Central Theme : Accounting and Being Paid**

The central theme of interest is "*getting paid for all the procedures that we've undertaken*" by reporting clinical activity into a mechanism of activity analysis and tariff reimbursement. "*The way the system has been developed actually has already become disconnected from the front line and from a clinical understanding*".

**Causal Conditions : Dancing to the Commissioner's Tune**

The Trust is in an arm's length, provider relationship with a commissioning Primary Care Trust. The Provider Trust is forced to adopt the accounting framework imposed by the commissioners in order to recover revenues.

The bargain with the commissioner is known as a "*service level agreement*". The tale of sickness, injury and care is reduced and reified as "*activity*", provided at an agreed price.

**Context : The Arcane Jargon of Episodes and Spells**

Accounting is conducted in a language of 'episodes' and 'spells'. 'Spells constitute the *"base currency"* for the bargain between the commissioner and the provider.

'Spells' are focused on a consultant and relate to his period of contact with a patient during admission. During a single admission (spell), a patient's care may be transferred from one consultant to another, correctly generating more than one episode.

The Trust is reimbursed for 'spells' rather than 'episodes'. 'Episodes' are focused on the patient and his period of contact with the Trust between admission and discharge from the hospital. Information on episodes is stored in the Trust's Patient Administration System.

The Patient Administration System organises data around a Patient Unique Key in terms of outpatient attendances, in-patient episodes and finished consultant episodes. One patient episode can represent several finished consultant episodes.

Spells are calculated by software (the 'spell-converter') owned by the commissioners. "Base data" are transferred electronically from the Trust's Patient Administration System and *"the spell converter churns out the price"*.

**Intervening Conditions : Coding and Decoding Accounts of Clinical Practice**

Information on episodes is supplied to the Patient Administration System by clinical coders. These are clerical staff who extract, from clinical documents, data about the patient's diagnosis and the revenue-earning procedures that have been provided.

Coding is the "*life blood of our data*". If there is more than one diagnosis, coders have to "*get the diagnosis or get the primary and secondary diagnoses in the right order, or the tertiary diagnosis in the right detail*".

Coders rely principally on discharge flimsies filled out by junior doctors at the time the patient leaves hospital.

The primary purpose of the discharge flimsy is to notify the patient's GP that the admission has taken place and has terminated. Prepared for this primary, clinical purpose, it is then used for an unrelated, accounting process. Expressed in clinical vernacular, rather than the formal language of clinical coding, the information contained is potentially misleading for the secondary purpose and clarification has to be sought elsewhere.

The quality and organisation of clinical information in clinical case notes can be poor. The discharge summaries (flimsies) that provide the coders' principal substrate are often incomplete or delayed. The nature of hospital notes and

record keeping is such that coders have to do "*a lot of digging*". Coders process a high workload in limited time.

It is important for the Trust and its coding staff to capture clues about complex cases, such as the "*fractured neck of femur (with) a whole raft of other problems (who has) another procedure done to them*". Because a single 'spell' can contain more than one 'finished consultant episode', coders have to identify such complex spells completely.

To do this properly, they depend on the completeness of data documented clearly in the case notes, or reported to the Patient Administration System. When a patient is 'moved' from the care of one consultant to another, there needs to be an audit trail for the coder to follow. If the patient is "*never moved from being under that consultant's care*", there is no audit trail for the coder to follow.

**Strategies & Interactions : Checking and Maintining Probity**

The language of spells is intended to inhibit the inefficient and exploitative shuffling of patients between consultants by Trusts in order to inflate their account of income-generating spells.

Legitimate consultant transfers may result from inaccurate screening and direction by GP's (for whom the Trust is not responsible) or from pathologies or co-morbidities (which the Trust cannot prevent) that emerge during an accurately-directed admission.

However, commissioners monitor the account of "*activity*" to make sure that Trusts do not *"falsely inflate their number of finished consultant episodes or generate more income by transferring patients unnecessarily between consultants".*

The Trust is driven by twin needs : to avoid impropriety and to review its remuneration against its reported activity, to adopt its own internal audit process.

It is possible for the Trust's information department to reconstruct a sample of spells from constituent episodes using the "*spell identifier*" and the "*patient unique key"* to cross-match a table of information. This is a checking strategy, adopted for lack of confidence in the ostensible information, provided by the primary accounting process. Anomalies are sometimes glaring "*Dr. X isn't a surgeon !*"

**Outcome : Running at a Loss**

Inaccurate data have a triple cost.

First, "*an awful lot of man hours that go into that"* i.e., the need to monitor a defective information process.

Second, the opportunity to recoup revenues is lost. The Trust cannot account accurately for all of the episodes and expenditures within every spell and is in doubt over whether it is retrieving all its entitled earnings. The accountant's

'bottom line' is that if the data have "*not gone onto PAS ......... we haven't been able to bill for it*".

Third, the coding process produces information anomalies that only become visible when the information is presented to senior clinicians, whose clinical behaviour and performance managers are seeking to influence. Clinicians' confidence, in managers and management information, is dented when a surgical operation is credited to a physician.

### 6.1.2 : Management Information from Operational Systems

The reporting of clinical activity into the accounting structure represents one example where the clinician required to contribute information into the accounting system is also required to fulfil the clinical requirements arising at that moment.

From a managerial perspective, the choice of expressions used to describe clinical activity is fundamentally important :

> "*Coding will be more important still with Payment by Results. We've got to ensure that, when we're coding, we're making the most sensitive codings for the income. Aside from the clinical aspects of coding, if a patient has, in effect, three or four different things done which have different codes, we have to make sure that we're extracting the one which gives us the best income. You only receive the income based on one code, so we've got to make sure that the primary code that is pulled out is the one that gets the best income.*" (Executive Director #2)

The structural process of reporting is shown in **Figure 6.1.1**, where the dotted line represents the interface between the clinical process, where coding is at the margin, and the managerial process, where it is central.

**Figure 6.1.1 : Reporting Clinical Activity into an Accounting Control Structure**

```
  ────────────►   ┌─────────────┐   ─────────────────►
                  │ One or more │
  ┌───────────┐   │ serial or   │   ┌───────────┐
  │ Admission │   │ parallel    │   │ Discharge │
  └───────────┘   │ patient     │   └───────────┘
                  │ episodes    │         │
                  └─────────────┘         ▼
                                    ┌───────────┐      ┌──────┐
  ┌────────────────────────────┐    │ Discharge │ ───► │  GP  │
  │ Operational (Clinical) System │  │ Flimsy    │      └──────┘
  └────────────────────────────┘    └───────────┘
  ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─│─ ─ ─ ─ ─ ─ ─
  ┌────────────────────────┐              ▼
  │ Management Information  │         ┌──────────┐
  └────────────────────────┘         │ Coding   │
                                     └──────────┘
                                          │
                                          ▼
                            ┌─────────────────────────────┐
                            │ Patient Administration System │
                            └─────────────────────────────┘
                                          │
                                          ▼
                                 ┌─────────────────┐
                                 │ Spell Converter │
                                 └─────────────────┘
```
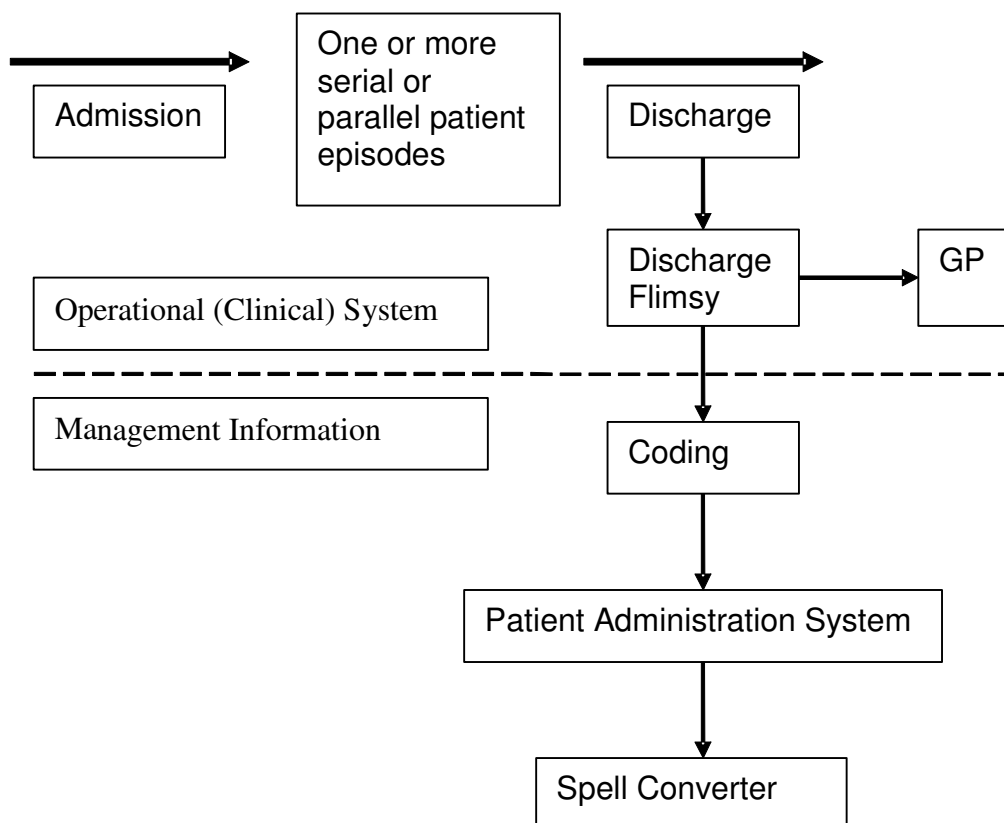
From the clinical perspective, it is equally important for the groups of clinicians and coders to align their activities better :

> *"Our operations are not coded properly.  They are not even paid correctly in terms of their complexity. I visited the coding department the other day. The OPCS coding for the operations performed ……… is very poor.  It doesn't reflect reality at all. We are trying to improve our coding because, with Payment*

*by Results, we will be funded by what we do. At present, our coding is poor and we are not receiving what we are due." (Orthopaedic Consultant)*

*".........having been through trying to get our payments through Payment by Results right, we have some enormous issues occurring ......... A classic one is* [a particular kind of high cost operation]. *If you call it* [operation X] *it goes through one code and if you call it* [operation Y] *it codes through another code and which one you call it is desperately important because for one you get paid for the operation, but if the code is taken down the other route you only get a default payment. You have to call it* [operation X]*, because if you call it* [operation Y] *you don't get paid for it." (Consultant Surgeon)*

For this reason, it appears easy to achieve the alignment of values at a representative, group level between the clinical culture of patient-oriented processes and the clerical culture of reporting and accounting. Whilst seeking to establish compatibility between these cultures it will also be necessary to recognise incompatibilities that limit complete reconciliation and to understand why and how they do so. Thus :

*"In* [one surgical speciality] *for example they are trialling coding their own procedures. They felt that the coding and the* [data fed back by the Trust] *was inaccurate and affecting their payment by results." (Performance Manager)*

*"The only way of being accurate is to code it as you write the operation notes. I have some colleagues who would disagree, but I think we should be coding strictly at the time of the operation." (Orthopaedic Consultant)*

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### 6.1.3 : Applying the Diagnostic and Therapeutic Model

**Problem Situation**

Within the Trust's problem situation, it is a core capability for managers to report activity accurately and gain reimbursement. Underpinning this is the capability to capture activity from the working practices of clinicians. The 'technology' deployed to achieve this capture is crude. It is merely the completion of a discharge flimsy on self-copying paper. One copy goes to the GP, a second copy goes to the coding department and the third remains in the patient's notes.

Explicit managerial action has tended to be limited to asserting periodically the need for doctors to fill this flimsy conscientiously and exhorting better compliance.

Completion of the flimsy is located within the process shown in Figure 6.1.1 but there is clearly a difference between the procedure as imagined, compared with the procedure as performed in the overall task context.

**Problem Solvers**

*Agenda Definition*

The fact that the Trust's revenues depend on the accurate coding of clinical activity provide a clear agenda for the Chief Executive.

### Values Alignment

Clinicians realise this and some are willing to promote the coding of their clinical activity as it is performed. Managers are beginning to succeed in persuading senior clinicians to align their values around a business imperative presented by the NHS '*Payment by Results*' financial regime. Even so, some senior clinicians appear less willing to engage and "*code it as you write it in the operation notes*", for reasons which could be attitudinal or practical.

### Conflict Surfacing

Clinical staff write their communications in relative ignorance of clinical coding structures, so that coders "*have to do a lot of digging in their limited time*". Equally, coders are relatively ignorant of clinical issues, so that "*it can be hard to ......... get the primary and secondary diagnoses in the right order*".

Whist clinicians criticise the quality of coders' work, for example, "*The OPCS coding for the operations performed ......... is very poor.  It doesn't reflect reality at all ......... we are not receiving what we are due*", coders criticise clinicians for "*the quality of clinical information they have to go on*".

*Agenda Critique*

The model serves to remind us that finding "*the most sensitive codings for the income*" is a deliberate act, for which the mental effort required might be a distraction from other aspects of the clinician's primary role. It suggests that the alternative to solving the problems presented by coding as a secondary process might be approached by bringing the relevant people and procedures together more closely in time and place rather than relying on information technology as the sole mediator.

## Interpretive Scheme

The discharge flimsy represents the 'technology' at the heart of the adapted Leavitt model. The model helps us to situate the flimsy between two groups (managers and clinicians) and two processes (clinical and administrative).

The interpretive scheme suggests that we should consider a systemic improvement in work design (Senge's (1990) concept of "leverage"), by investigating, with staff, how the discharge flimsy mediates or interferes between an individual clinician and his concurrent clinical tasks and paperwork, and between collaborating clinicians and their shared commitment to a single patient.

**Problem Solving Methodology**

The problem solving methodology has been to focus on a system to convert information about the clinical management of a patient into organisational currency. There has not been a balancing focus on the overall preoccupations of the individual clinician when completing the flimsy.

## 6.1.4 : Achieving Financial Balance : Lessons from the Model

This part of this chapter has described the building of consensus between managers and representative senior clinicians around the need to describe clinical activity to an external regulator, in order to achieve complete reimbursement.

In terms of agenda setting, the overarching imperative, to present an account of activity to obtain reimbursement and revenues, is inescapable. In terms of agenda alignment, the design of a new information system must ensure that needs of clerical data retrieval converge with those of clinical note keeping.

We also need to understand better the practical as well as the attitudinal conflicts that, despite the imperative of better clerical and accounting information, prevent compliance in the production of the discharge flimsy and other parts of the clinical record on which coding depends. Their elimination, will be assisted through the improved construction of the primary clinical record and by understanding its completion in relation to simultaneous clinical activities and responsibilities.

Agenda critique would present alternatives to the *a priori* assumption that the presentation of clinical data for the benefit of a remote group of secondary clerical users (coders) ought to be a primary concern for clinicians, for which a technical solution would be the re-design of the clinical record, to facilitate and partially automate the coding process.

Aspects of the *status quo* to be considered for change include a continuing review of the culture that subordinates clerical to clinical effort, a review of the spatial and temporal separation of coding from clinical procedures and an exploration of the strengths and weaknesses of coded compared with more expressive forms of record.

# 6.2 : AIMING TO PERFORM IN THE TOP TEN PERCENT

### 6.2.0 : Introduction

Performance improvement depends on an organisation's capacity to learn how to change, on the basis of sound evidence. The twin requirements are for reliable data and the right kind of group to interpret the data.

Where the quality of data available is at issue, the specification of data required to provide rich and informative texture needs to be complemented : by attention to the conditions interposed between the intention to collect data, and the action of data collection itself.

### 6.2.1 : Problem Situation

Despite its acquisition of 'foundation' status, with 'earned autonomy', the Trust will need in future to compete in a climate of 'contested' service provision. It is a core capability for the Trust (and a mark of institutional prowess) to excel in the published performance ratings, on measures of quality as well as cost.

For this reason, it is a core capability for the Trust to respond quickly to output and performance signals. It must develop its capacity for organisational learning and continuing performance improvement. It must also develop the capacity to generate accurate signals that truly reflect the performance they purport to describe.

An explicit managerial action has been to develop the structure of divisions and directorates so that performance information can be translated into the modified organisation of clinical practice :

*"………a proper performance management process whereby we are sharing information with each directorate on a regular basis about their performance. Now, that might be about the range of outpatients and inpatient waiting times : The information that is available ……… I don't think we have shared that enough with directorates………" (Executive Director #3)*

The intention has been to broaden the plane along which the 'meeting of minds' can occur, between the managerial and the clinical perspective, deepening the level of inquiry and debate over the organisation of clinical services and devolving accountability and authority into a clinically-led management structure :

*We have the clinical directors' meeting once a month. What I want to see, and what we are developing, is a performance management process which will give as a lot more time to discuss the management issues within each individual directorate………What I would like to see is the development of a divisional structure within the Trust which will enable the executive directors to deal with four or five divisions, that is much easier to manage and then have performance meetings with them on a regular basis, allowing divisions to manage their own patch -their own directorates- themselves on a similar sort of basis, regularly meeting to discuss performance in detail." (Executive Director #3)*

Clinicians' engagement and the associated organisational learning are to be supported by the development of "Better Information Groups" :

> *"………Better Information Groups at directorate level, where the clinicians and the managers and the senior nursing staff come together and will look at what the information is telling them, partly from the financial point of view about whether we are coding things correctly, but also from the point of view of clinical quality. As I mentioned, we want to improve things like mortality rates, readmission rates and those sorts of things." (Executive Director #3)*

### 6.2.2 : Problem Solvers

**Agenda Definition**

Presented as a core capability and enshrined within the Chief Executive's Trust Wide Objectives, the ambition to be a Top Ten Performer represents a clearly identified agenda. The supporting aim is to capture data to measure key aspects of performance and clinical quality.

**Values Alignment**

Potential conflict of interest between the clinical and the accounting rationale is resolved by aligning values around a broader appeal to "*the benefit of patients*" and the concept of "*quality*" :

> *"We exist as an **organisation** for the **benefit of patients** and if we lose sight of that, whether or not we're **balancing the books** or **hitting the four-hour target**, it does not matter." (Executive Director #2)*

> *"I've talked about being in the top 10% of providers. There is a very clear goal for us over the next annual healthcare ratings, to try and achieve a rating of "excellent" for quality of services." (Executive Director #3)*

**Conflict Surfacing**

Despite the formation of Better Information Groups, the Trust's development of its information audience of managers and clinicians has been hindered by conflict over anomalies in the information produced :

> *"We spent a long time arguing about whether the data were robust or not instead of identifying where the issues were." (Performance Manager)*

It seems that the Trust needs to complement its advance, in developing its capacity to understand and learn from data, by developing its understanding of the process of data acquisition and the barriers to accurate data entry. It is questionable whether Better Information Groups are capable of resolving issues directly because the relatively senior clinicians involved are not those to whom the task of data capture is routinely assigned.

**Agenda Critique**

Efforts to stimulate clinical performance improvement through measurement and the deployment of incentives could be complemented by information system interventions that help to facilitate and redirect the clinical effort. This can be achieved at an operational or at a more dramatic, strategic level :

> *"A lot of it is efficiency, trying to make sure that the patient gets the right management in a timely fashion and not interventions that aren't required ……… At what point in that process are people adding value?" (Divisional Clinical Director).*

> *"Certainly, having an unscheduled care centre next to an A&E immediately increases your options because, within the unscheduled care centre, you've got two or three or more options that that patient can be attended to without being an A&E attendance." (Divisional Clinical Director).*

### 6.2.3 : Interpretive Scheme

The interpretive scheme separates an accounting culture, focused on technology used to measure the performance of groups and processes, from a clinical culture where technology might assist chains of interactions that link clinicians and their individual tasks around individual patients.

In the former instance, one executive interviewed suggested initially that inferences could be drawn by examining measured performance data in successively finer detail, but went on to recognise that the measured data only provided part of a bigger picture :

*"In terms of drilling into the information, a lot of that is an additional exercise. The information system itself produces the detail of how many patients have breached* [the performance target]*, then getting into the cause is another exercise added on." (Executive Director #3)*

*"*[The routine reports are] *useful in pointing to areas that we should focus attention on.………we need to dig deeper into the data and understand what's going on because the data will only give you part of the picture." (Performance Manager)*

An early contribution from 'Better Information Groups' has been to provide a forum in which groups of managers and clinicians can explore and begin to rectify discrepancies between the situation reported and clinicians' own experience :

*"The Better Information Groups came out of frustration I guess, whereby we as a planning department, or my colleague in the information department, might be producing information, say for a performance management meeting within a division, and we would put it on the table and they would say, 'What? We don't agree with this !' ……… the view was that we needed to establish these local information groups or Better Information Groups to identify what the divisions needed and what did they want and whether they had confidence in that*

*information. Because we can still produce what they wanted but if they didn't have confidence in it that would undermine everything were trying to do."*
*(Performance Manager)*

The challenge has been to find a technology (that is to say, a means) by which clinical staff will contribute to the accurate recording of their own activity

### 6.2.4 : Problem Solving Process

One factor promoting the entry of data to measure performance is the equitable distribution of benefits, such that those providing management information from their operational systems also derive information they can use themselves :

*"If you're going to put an IT system in, say we've got the ORMIS\* system in theatres, then people have to have some buy into that so that everybody's got to be getting something out of it. Now, there is a lot of benefit in that in terms of being able to see theatre lists coming up in advance, knowing who's going to be doing them, anaesthetising them, you can plan them better because you've got average operating time, for individual surgeons. You can generate log books for everybody. You can monitor theatre utilisation. So everybody's getting something out of it and that is synergy." (Divisional Clinical Director)*

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\* Operating Room (operating theatre) Management Information System.

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The personal incentive emphasised here is, nevertheless, related to measurement and planning, rather than the execution of individual healthcare tasks or individual engagement with identified colleagues.

When the researcher visited an operating theatre to see the ORMIS system in action, he was made aware that the incentive of collaboration between colleagues can override a commitment to a distant recipient of data. The responsibility to call for the next patient on the operating list, and log that this had been done, was inconsistently shared between staff of different disciplines, rather than reserving a rigid division of labour.

Staff members often left their personal log-in active so that others could perform this and other computer functions swiftly, in passing from one non-computer task to another. This unplanned use of the computer as a vehicle for collaboration had anomalous consequences for the information system as a whole :

*"……… in management terms, you need to be sure you information is accurate and that requires the right people to enter the right information on the right place, and to understand what they're entering And sometimes it's not entirely clear what it's being collected for ………" (A&E Consultant).*

*"At this stage, it's almost a hindrance to me in some ways because we have password-based systems. Fortunately, as a consultant, it's not too often that I have to write down blood results myself, which means, whenever I do, my password has expired, so I'm there looking for someone who's got a valid password that can get me on the system." (Consultant Anaesthetist).*

*"One of the anaesthetists recently got blamed for cancelling loads of patients but what happened was that his ORMIS login was being used by lots of different people to enter data for any number of different reasons". (Consultant Surgeon)*

### 6.2.5 : Performing in the Top Ten Percent ; Lessons from the Model

The question of Top Ten performance has been addressed at the level of "explicit managerial action" in three ways. By redistributing part of the Trust's operating surplus to the areas generating the best performance, the incentive is provided to improve the acquisition of management data. Clinical Directorates have been reorganised, to generate organisational learning from the data produced. Better Information Groups have been convened, to inquire how the information produced for planning and decision making can better reflect clinical actuality.

Better Information Groups need to investigate the ways information systems can combine the means to measure clinical activity with the means to help the people engaged in production to recognise and manage their own situation as fluently as possible.

The interpretive scheme of the model hints at a 'glass ceiling', separating the groups of planners from the individuals on whom they depend for the input of performance data at the margin of their clinical tasks. The planners are analytic information users who "drill deeper" into the organisational data about the past performance of processes but recognise that "the data will only give you part of the picture". The front-line staff who

supply data to the analytic machine are also documenting and exchanging information for some more immediate purpose.

At the planning level, it is accepted that the stringencies of information governance require many data inputs to be identified to an individual and accountable password holder. At the operational level, the technology-related procedures required by clinical governance are shown to be vulnerable to routines of practice based on collaboration between colleagues in direct contact with each other.

Password procedures, designed to limit access and allow attribution of data input, "hinder" clinicians' fluent collaborative work. Illicit password sharing illustrates a pragmatic adaptation of the intended procedures to support the way clinicians work together fluently. As a result, the information available to planners who are not 'in the know' is flawed because the assumed link between the data and its author is lost, in the conflict between the logic designed into the system and the tacit logic of people working together and sharing some aspects of their jobs with others.

At this point, the emphasis of the problem solving methodology shifts from concentration of the management information that is to be acquired from operational systems, on to the primary clinical activities that surround the acquisition of data. Instead of suggesting in data quality, the *outcome* of data acquisition, we ought now to be interested in opportunities to align better the *process* of data capture with primary clinical processes. These come together at the critical point epitomised by a clinician, engaged in the *task* of clinical documentation during and within the context of immediate and wider clinical responsibilities.

## 6.3 : AIMING TO PROVIDE VALUE FOR MONEY TO THE TAXPAYER

### 6.3.0 : Introduction

The provision of Best Value for Money to the Taxpayer hinges around maximising valued outputs and minimising monetary inputs. There has been huge interest in the development of integrated care pathways to organise resources efficiently around the patient.

Care pathways are intended to establish an agenda of control, continuity and coherence between otherwise isolated events in a patient's management ; breaking down the insularity of individual institutions, departments or people, aligning effort around combined economic and clinical values, and promoting collaborative efficiency through collective awareness of an organising principle.

They are also intended to help managers to monitor the efficiency of care delivery ; help nurses and other non-medical staff to anticipate medical decision making ; eliminate unproductive and potentially inaccurate decision making by delegates ; and help medical staff to co-ordinate their activities with those of colleagues. To patients, care pathways offer insight into the principal stages and procedures of their management and, perhaps, the opportunity to plan their affairs around their management.

The widespread adoption of the care pathway approach is expected to shift attention from waiting lists for individual services towards the overall continuity of management for any given patient across disparate functional units.

*"We should be using the information system to schedule that patient's pathway right from the beginning, so, if we get a referral from a patient for, you know, a hernia or something, we should be able to say, quite simply, at each stage in the pathway, what is going to happen, right upfront to the patient, so they know when they're going to have the procedure done and where it's going to be done." (Executive Director #3)*

### 6.3.1 : Problem Situation

Amongst the Trust's core capabilities, one is to meet the requirement to provide timely access to its resources. A specific target is to provide a first definitive treatment within 18 weeks of first presentation. It is, therefore, a necessary supporting capability to monitor, the actual trajectory of a patient for each of the Trust's 'product lines' (cancer, stroke etc.) against an ideal standard.

*"It's absolutely critical we have some kind of system which logs what's happening to people right along the pathway, what interventions have been given and I just think that the moment , that sort of stuff is not there." (Executive Director #3)*

An explicit managerial action is thus to design, for each of the Trust's 'product lines' (cancer, stroke etc.), a clinical pathway that will minimise decision making and eradicate redundant steps and duplicated effort. A second such action is to develop the capacity to monitor the operation of those parts of the pathway where information is presently lacking :

*"When we were told that the patient pathway for Cancer had to be completed within 62 days, from referral to treatment, we put a lot of work into pathways, actually mapping out what the current patient pathways were, identifying where there was duplication and taking that out of the system to streamline the whole process." (Executive Director #3)*

*"………we're in a situation at the moment where, for instance, we have relatively good information on inpatient and outpatient waiting times, who is on the list etc, but when you look at diagnostics, that's very patchy………So on the whole area of diagnostics, just to enable us to manage the waiting list, we need some IT development." (Executive Director #3)*

Monitoring depends on capture of sentinel pathway events through routine workplace practices :

*"The whole 18 week thing is based on patient pathways and again we are not very good at producing information which shows what is happening along the patient pathway ……… one of the things we've got to do for the 18 weeks, for instance, is identify when the patients receive their first definitive treatment. Well, in our systems at the moment, we don't flag that up." (Executive Director #3)*

It will be necessary to devise data collection procedures that can withstand 'tacit workplace adaptation' i.e. the improvised application of a specified monitoring structure.

## 6.3.2 : Problem Solvers

**Agenda Definition**

Care pathways represent a clearly identified agenda for the Chief Executive in the context of a performance-managed institution :

> *"If you take the biggest single operational challenge I mentioned, the 18 week referral to treatment target………" (Executive Director #3)*

**Values Alignment**

It has not been difficult to align managerial-economic and clinical values around the clearer specification of processes, relaxation of clinical roles, delegation and the elimination of unnecessary consultations and investigations :

> *"We have done some work in our department with a system called musculo-skeletal pathways. We have developed several pathways, in collaboration with primary care, ……… that's a good way of organising an outpatient clinic and a good way of triaging* [streaming and prioritising] *patients. The pathways are managed by a group of GPs and extended scope practitioners and physiotherapists. ………they decide………where the patient will fit best for each pathology and we have designed several pathways for each joint and I think that has the potential to be developed." (Orthopaedic Consultant)*

*"………trying to ensure speedy flow through the system, trying to make it more efficient ……… decreasing the number of times patients are reviewed without added value………see patients sooner, get early referrals ……… manage them before they become a real crisis ……… adopt treatment modalities that may improve outcomes. A lot of it is efficiency, trying to make sure that the patient gets the right management in a timely fashion and no interventions that aren't required." (Divisional Clinical Director)*

One consultant has initiated three interventions to integrate the management and prevention of stroke, which lend themselves to the pathway approach. These are centred around : the coordination of immediate investigation to discover patients who can benefit from delivery of 'thrombolytic' treatment in the emergency phase ; rapid access to carotid artery surgery for patients who have suffered a minor stroke ('TIA'), heralding the risk of major stroke ; and rehabilitation for patients who have survived stroke with major disability. Economic efficiency is thus aligned with clinical benefit :

*"If they are thrombolysed* [ie. definitive treatment with a clot-dissolving drug] *within an hour the outcome is much, much better. And our challenge then is to deliver that service to those patients as they come through the door." (Stroke Consultant)*

*"We hope to start a rapid access TIA clinic in the next few months and the plan there will be to see all patients who have a TIA within seven days of their event, aiming for the ones who require it to have their carotid endarterectomy* [surgical operation] *within two weeks of their event. From Department of Health data,*

*providing that service would prevent around about 11 strokes per year in this district." (Stroke Consultant)*

*"They would come up to the TIA clinic, they would be assessed electively and we'd say, 'Yes we think clinically this is a TIA. Go upstairs and have a Doppler ultrasound scan' and then if that was positive, they would be seen by the vascular surgeons, probably later that day and be booked in for their endarterectomy, subject to the CT scan that they might have that day or later on." (Stroke Consultant)*

*"………you've got a 30% absolute reduction in stroke risk from a TIA operated within two weeks, compared to the advantage disappearing to zero after three months." (Stroke Consultant)*

*"You're trying to maximise the number of people who can get home to an independent life." (Stroke Consultant)*

The alignment of values around the care pathway for stroke carries forward from the dialogue between managers and clinicians into the dialogue between one clinical discipline and another :

*"I work closely with the vascular surgeons and we've developed the TIA clinic together. From their point of view, if they can feel that they are getting the patients and can operate on them within the time window where they will have maximum benefit." (Stroke Consultant)*

**Conflict Surfacing**

Nevertheless, areas of potential conflict between problem solvers can also be defined, centred on incompatibility between different strands of institutional logic.

First, the norms of control, predictability and maximally efficient resource utilisation encounter the need for flexibility, responsiveness and tolerance of risk :

> *"You're not working with a set number of patients ………but with the influx of patients as they come through as emergencies. Some weeks you may have many more than other weeks ………" (Stroke Consultant)*

> *"The challenge for the vascular surgeons is to have space on their operating lists for an unpredictable workload. ……* [One week] *there are no patients and they have reserved the slot ……… or two slots. That might be three hours operating time that they suddenly have to fill." (Stroke Consultant)*

Second, efficient working practice may need to 'leapfrog' the institutionally-preferred 'Choose and Book' mechanism that has been a major pillar of the National Programme's "National Systems Architecture".

> *"The TIA clinic will be very dependent on IT. What we hope to do is to have a rapid referral system, direct from the GP surgery, where they would e-mail the referral.  This can't go through Choose and Book because it's a very time dependent, emergency referral." (Stroke Consultant)*

**Agenda Critique**

In terms of agenda critique, care pathways represent an outright rejection of one *a priori* rationale and the substitution of another.

The care pathway approach departs from the conventional, institutionally oriented mapping of several competing patients to one single resource and, instead, maps multiple resources contributing to the care of a single patient.

Despite the attraction of the patient-focused paradigm, pragmatic limitation of access to scarce resources thus lends continuing validity to the original, resource-based paradigm.

**Problem Solvers : Summary**

**Table 6.3.1** applies structuration theory to show the kind of relationships, between the content of clinical activity, the context of clinical activity and the processes to be supported by an information system contributing to "Value for Money to the Taxpayer".

Although the table appears to align elements within a unitary framework, suggesting the cohesive organisational culture that ought to characterise an efficient institution, it also contains elements where cohesion is likely to break down in conflict. Not all cases of the same condition are equally time-critical, so that the adjudication of priority between a stroke and cancer case requiring the same diagnostic resource may depend on a professionally informed appreciation of the specific patients concerned.
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**Table 6.3.1 : Structuration Theory Applied to the Stroke Pathway**

| Structures of Signification | Structures of Domination | Structures of Legitimation |
|---|---|---|
| 18 Week Target.<br><br>Clinical Pathways, Patient Journeys. | External Regulators, Performance Measurement and Management. | Time critical nature of benefit from some treatments. |
| | | |
| **Interpretive scheme** | **Resources : allocative** | **Values, norms, beliefs** |
| Indicators of organisational well-being, variance of performance from standards, time-limited targets.<br><br>Mortality and morbidity from stroke. | Capacity of diagnostic services.<br><br>**Resources : authoritative**<br><br>Authority to deploy diagnostic and theatre resources.<br><br>Authority to adjudicate competing and disparate needs. | Efficiency, Clinical Effectiveness, Evidence Based Practice, for stroke patients.<br><br>Equity of access to scarce diagnostic resources for non-stroke (eg cancer) patients. |
| | | |
| **Communication** | **Use of Power** | **Sanction** |
| Summary measures and statistics add urgency to the pace of each individual's management.<br><br>Clinical colleagues consult and intervene when the urgency of a given case appears greater than is being afforded by the natural availability of scheduled resources. | Managers use mix of anxious inquiry and congratulation.<br><br>Professionals adjudicate distribution of scarce resources between competing pathways. | Patients' anxiety is reduced, treatment effect is maximised, resources are accurately directed and planning is enhanced when well-designed care pathways are efficiently administered. |

**Groups and Structures, Processes and Technology**

**Figure 6.3.1** illustrates the care pathway concept in principle. With care pathways as embedded structure, Information Technology will enable the manager with the stop watch to monitor and control the process that takes each patient in turn from the queue and passes him through a sequence of resources.

**Figure 6.3.1 : Care Pathway as Structure, Group and Process Linked by Technology**
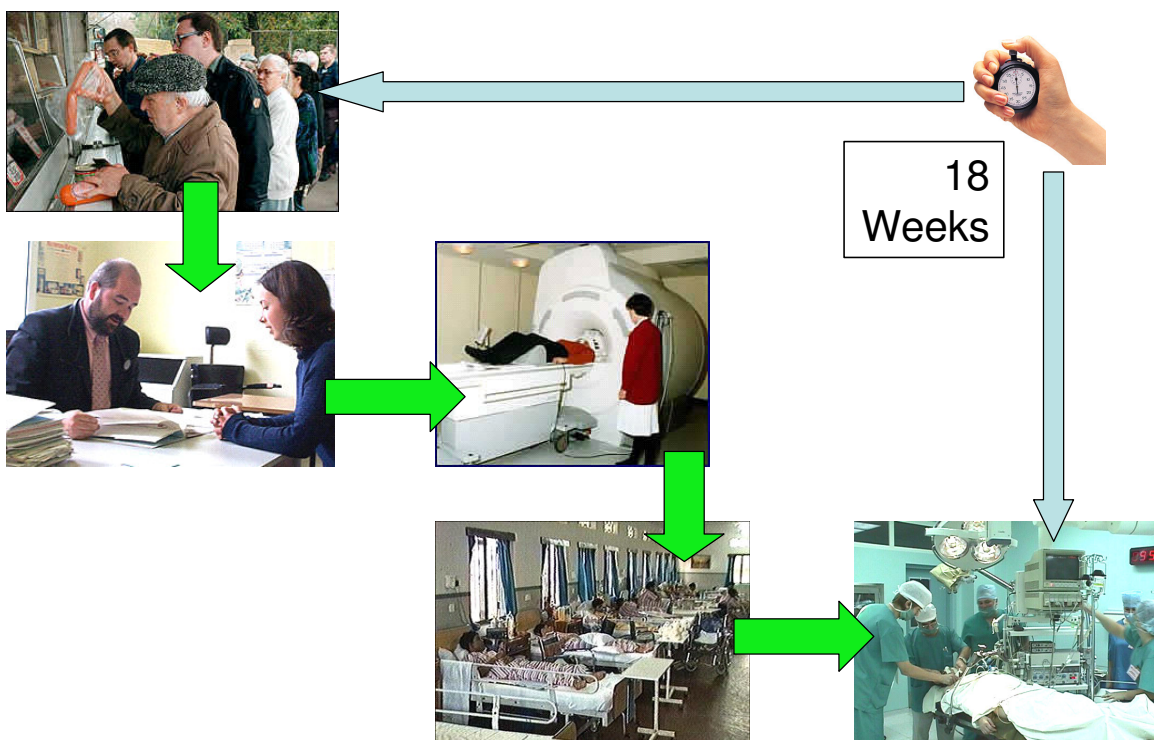
**Tasks, Individuals and Technology**

In contrast (**figure 6.3.2**), each resource in the pathway is also part of one or more other, cross-cutting networks of demand, each with its own queue. Each individual practitioner's commitment to the care pathway is a compromise with his commitment to tasks generated within other pathways and each task is related, not to a species of queue but to an individual patient with particular characteristics that require the adjudication of need. The pathway's 'gatekeeper' is surrounded by the existing technology of referral : paper-based forms and the telephone, augmented occasionally by face to face contact.

**Figure 6.3.2 : Care Pathway as Individuals and Tasks, Linked by Technology**
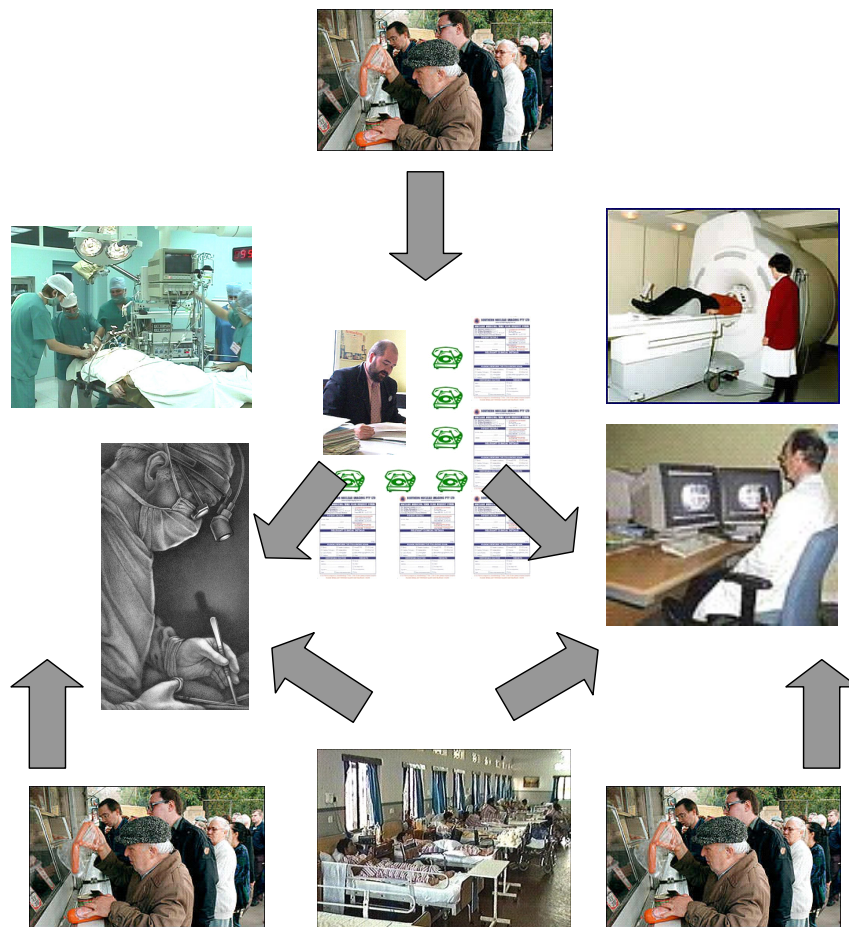
## 6.3.4 : Problem Solving Methodology

The model of a care pathway imagines a single patient who accesses each separate resource in sequence. Management Information is acquired at each milestone in the patient's progress. As **figure 6.3.3** shows, the problem solving methodology must take account that, in some clinical environments, an individual clinician's attention may be spread between several patients, each at different stages on one or another pathway.

**Figure 6.3.3 : Care Pathways and the Patient's Journey**
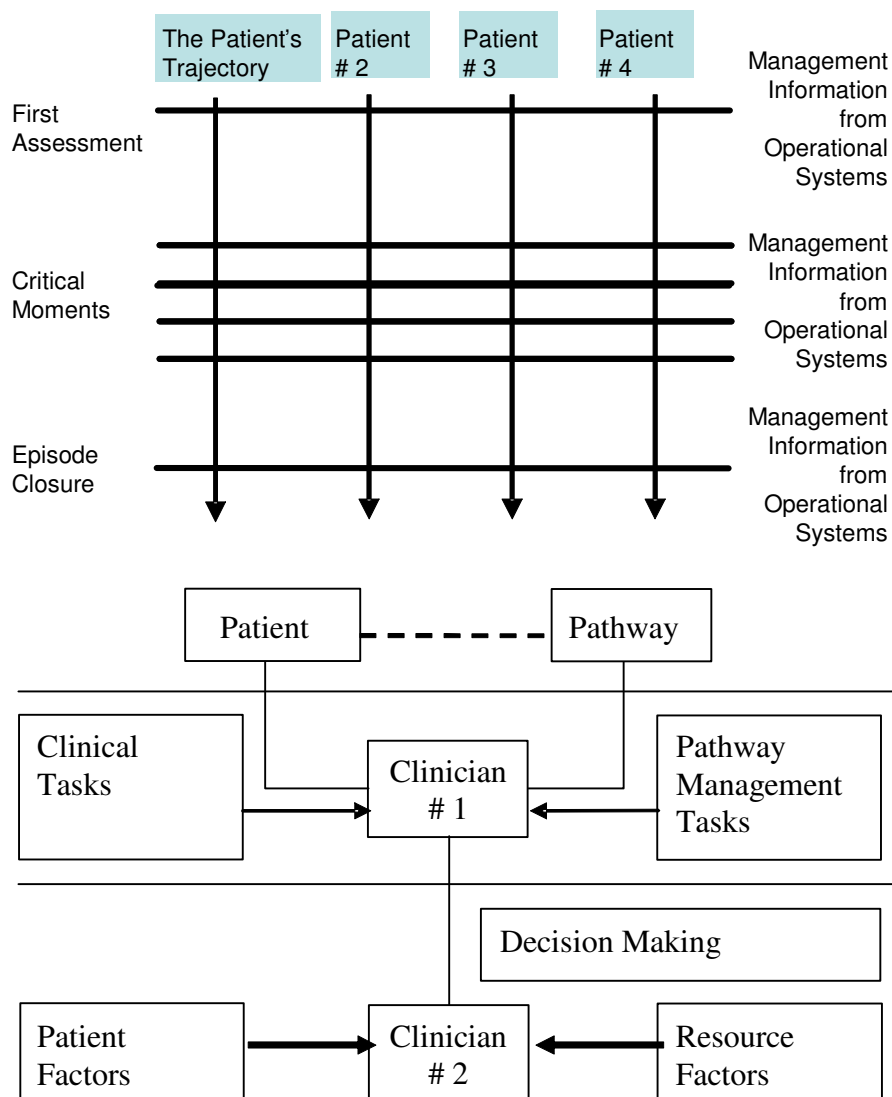
In the lower half of figure 6.3.3, it is shown that the link between the patient and the pathway is the individual clinician (clinician #1). This clinician's attention is divided between tasks related to pathway management and tasks that are oriented towards clinical work in a team of practitioners. The team may be concentrated or dispersed.

Care pathways offer the prospect that efficiency can be introduced through the elimination of a referral or decision-making step, in which clinician #2 is consulted. There is an opportunity to bypass time-consuming and error-prone human judgement, using best evidence criteria as the basis for automated decision making. This point holds, even when clinicians #1 and 2 are one and the same person.

However, figure 6.3.3 also shows that the determination made by clinician #2 is contingent on patient factors (differences between the ideal type of patient envisaged by the pathway and the patient with non-standard characteristics) and resource factors (factors such as competition from other sources of demand) which moderate the patient's own priority to receive the scarce resource.

Because of these considerations, the problem solving methodology to manage care pathways using information technology represents the need for accurate choice between valid opportunities to predict and automate the outcome of clinical decision making, and equally valid occasions when it is preferable to allow human agency to recognise and adjudicate contingencies. As an abstraction for the sake of measurement and description, care pathways tend to model a closed system. In contrast :

> *"They're trying to impose clinical pathways on what is a highly complex, open system." (Consultant Surgeon : contribution during planning meeting).*

## 6.3.5 : Value for Money ; Lessons from the Model

Monitoring the 18 week target will be simplified if we can specify each patient's management in advance in a care pathway, capture every relevant event and compare the intervals between events with challenging standards.

The scope for "tacit workplace adaptation", or improvised use of this specified plan arises when patients present with ambiguous symptoms. One problem will be to establish the conventions that will give selected individuals the authority to "put" the patient on the pathway, given the consequences for observed performance, wasted resources and possible adverse patient outcomes if the patient is categorised incorrectly.

As was shown in Table 6.3.1, conflict can exist within a cohesive structure and human, professional adjudication is necessary to resolve incommensurable issues that cannot be codified in a decision mechanism.

The control function of the pathway, allowing one organisational group to monitor the processes of another, is thus set against the need to provide individual clinicians with the means to assemble rapidly the information they require to make an adjudication, often in concert with another professional colleague who might be remote.

The favoured information model is to represent resources clustered around the individual patient in order to redress the balance of power between the individual patient and the institution providing care. This is insufficient because an institution that delivers Value for Money also has to manage its resources tightly. This also means representing patients from different pathways clustered around a single, scarce resource.

Care pathways may be better seen as an organising principle or a rationale, rather than a fixed structure. Contemporary social theory (structuration theory, Actor Network Theory) reminds us that the association between pathway elements is fluid and happens because sufficient conditions come about time after time, rather than because they necessarily must. When the ability of human actors to recognise and adjudicate contingencies is adequately recognised, collective awareness of the care pathway can become a validating factor that generates the opportunity to use a given resource, instead of a constraint that demands its use when contingent factors suggest otherwise.

The practical relevance of this argument is that guidelines and pathways might be most effectively presented as opportunities to link one action with another (Giddens' (1984) "interpretive schemes" and "structures of legitimation"), rather than as fixed constraints, forcing the user's next action (Giddens' (1984) "structures of domination").

# 6.4 : THE PROVIDER OF CHOICE FOR THE LOCAL COMMUNITY

## 6.4.0 : Introduction

In the climate of contested service provision, a viable hospital must command the confidence of the patients and the community it serves. When patients complain about their hospital experience, many complain about their length of stay in the Emergency Department before being admitted onto a ward. An efficient process of emergency admission is central to the patient's own goals.

An obvious response to long waits within the Emergency Department is to intensify activity there. However, the biggest challenge to efficient work in the Emergency Department world-wide has been the phenomenon of 'exit block', caused by the inability of the hospital's wards to assimilate patients, long after the conclusion of their immediately urgent need for assessment, investigation and intervention. The consequence of 'exit block' is the diversion of Emergency Department staff and workspace, away from the immediate needs of emergency arrivals and towards the continuing needs of patients not yet accommodated on wards.

For the Trust to be the provider of choice for the local community in an emergency, the hospital's managers must eliminate 'exit block' from the Emergency Department by carefully managing its economy of beds. Its front–line professional staff must be attentive to the needs of their patients.

## 6.4.1 : Problem Situation

Responding to public concern over the distress of patients, waiting on trolleys in corridors to be admitted to a ward, the Department of Health has offset a previously dominant concern with waiting lists for elective patients by instituting a 'four hour target' for the transit of patients through the Emergency Departments of all of its hospitals.

The new target has been made a measure of performance, not only for the Emergency Department but also for the Chief Executives of the Trust and its commissioning Primary Care Trusts.

Already fundamental to the Trust's "business mission", the need to generate flow through the hospital's beds has become even more salient. A better response to the needs of emergency patients is aligned with maximising the productive value of limited resources and reducing the costs of in-patient stay.

Explicit managerial actions, projecting bed management as a "core capability" have been to develop the supporting capabilities, to manage beds and to develop the capacity of clinical directorates and divisions for organisational learning towards the adjustment of hospital routines and redistribution of beds.

There remains the need, to control length of hospital stay and match differentiated beds with differentiated need.

The systematic gathering and maintenance of intelligence about 'bed-state' - the match or mis-match between demand and supply of beds - has been seen as key to the control of flow through the hospital. This need is reflected throughout the health economy :

*"There is a bed management issue, but a lot of that relates to the discharge of patients farther down the line, not only in this hospital but within the community hospitals as well. That's not just from a health perspective, that's from a social services perspective as well." (Associate Director of Operations).*

Viewed analytically and reductively, the essential capabilities have been to provide :

- a continuous data representation of the admissions queue and its different streams

- a continuous data representation of occupied and vacant beds across the hospital

- a continuous comparison between the these representations

- an operational bed management team to acquire the necessary data and manage the hour to hour matching of patients from competing admission streams with the limited and continuously evolving availability of beds

- a tactical group to meet at set intervals during the day, to anticipate and respond to mismatch

- a strategic group to manage the redistribution of resources between organisational stakeholders.

**Figure 6.4.1** shows the intended outcomes of bed management.

**Figure 6.4.1 : Intended Outcomes of Bed Management**

| | |
|---|---|
| Beds | Strategic Relationship with Social Services |
| 'Outliers' (ie. Medical Patients in Surgical Beds) | Strategic Reconfiguration / Redistribution of Hospital Beds between Specialities |
| Breach Analysis | Modified Organisational Behaviour by Clinicians and Support Staff |
| Continous Comparison of Admissions Queue with Available Beds | Hour to Hour Matching of Supply with Demand for Beds |

The analytic and reductive view is elegant because of its apparent simplicity. However, it is an abstraction that excludes an understanding of the workplace and its practices, that form the setting where new technology is to be adopted and made routine.

The Admissions, Transfers, Discharges (ADT) module of the hospital information system appeared to promise a vehicle to collect and display data about the bed state of each individual ward. It was, therefore, made available to all wards and staff were exhorted to use it :

*"………a notice round the wards to say how important it was to keep that updated. And he'd listed all the reasons, very <u>valid</u> reasons to do it." (Bed Manager).*

Electronic recording and a shared display of data did not provide the anticipated benefits :

*"That system is there. The reason it doesn't work is because people don't use it and therefore if you were to look at the intranet now and look at the bed state report, you will find that a ward that may have 24 beds has currently got 27 patients on it and the reason for that is, some of the patients that have been admitted have been put on the system, but the discharges haven't, and that then as a tool is meaningless. Whereas, if those patients were being admitted and discharged on the system appropriately, at the flick of a button, we would also see exactly how many beds there were in the hospital, where they were, and therefore the bed management effort, instead of having to ascertain the information in the first place, would be about actually getting the people into the beds. So I don't think we use that as well as we could." (ExecutiveDirector #3).*

*"I mean it's so out of date where it's frustrating, I also have to look at the repatriation of patients to other hospitals. So, say I'm chasing for a patient to go to - let's say, Hull - and they are still on my paperwork and I check on the ward and they didn't go yesterday type of thing, so I phone the hospital and say, "can you take patient A ?" and they say, "Yes. We have done !" and yet they're still – 'on that ward' ! So, it's well out of date really, and they went something like 4*

*o'clock the previous day, and that's just one example out of many." (Bed*
*Manager).*

The resulting situation is that bed management meetings are more a matter of assembling a collective mental picture of "the current state of play" from vague and conflicting cues, rather than calculating an accurate forecast of events from definitive, synchronised data :

*"We do three bed meetings per day and each meeting is chaired by an Associate*
*Director of Operations and we take it in turns to be responsible for a day. At*
*that meeting we get information about the current state of play and the number*
*of beds that are expected (to become vacant) at that moment and how many are*
*likely to come up later." (Associate Director of Operations).*

*"You know, going to a meeting and kind of half guessing and nobody being*
*really sure………We talk about : elective admissions ; how many we think there*
*are that day – and I use the term loosely, 'think' ………" (Associate Director of*
*Operations).*

The management information required is supposed, within the ethos of the National Programme, to be derived from operational systems. Ultimately, these depend on the capacity of front-line clinical professionals to supply clerical data during their daily round of clinical tasks and "work practices".

*"The wards seem completely incapable of doing that – completely incapable."*

*(Associate Director of Operations).*

Ostensibly, there is a major potential for an electronic information system to acquire and disseminate bed state information. If clinicians can supply the information, managers can process and interpret it to achieve the smooth flow of patients through the hospital.

*"………it would be great, though, if we didn't have to phone for bed states, because it's time consuming." (Bed Manager).*

A bed manager described the intensity of communication entailed by her work in the following interview extracts :

**Extract 1**

*"We're looking at patients' **admissions** to the hospital from different areas, looking at the **elective** patients coming in for planned surgery and the **emergency** patients coming in through **A&E**. Also **from home, through GP's**, **clinics**, and from **other hospitals**, **repatriation patients** - and making sure that there's a **safe** flow, and **prioritising** the patients - making sure that there's a steady flow  - and prioritising the right patients, making sure that they're all safely admitted."*

*"Most of the time we're on the phone- really- because **the phone's stuck to your ear** because you're trying to **find information out constantly throughout your shift**. You **phone around** the wards to **find out** what **discharges** are **coming up.** You're phoning the wards to make sure they're getting the surgicals, getting the electives in. All areas are constantly bleeping you throughout the day. You can easily have **forty bleeps in a morning**. So you're constantly on the phone , **answering these bleeps - requests for beds from different areas** - you know, as well as the electives, there's theatres might suddenly need a bed to go to, so your're constantly **trying to get information** and **giving information**.*

*We get people bleeping to request a bed. We're talking all clinics - medical , surgical, orthopaedics. A&E will bleep us to say there's  patients in A&E that need to be moved. MAU will bleep us for beds - or have you got any yet, or- **that bed that's come up on that ward - can you make it a side room** ? We get bleeped erm it might be infection control asking, can we move this patient to another area because they may be needing a side room that type of thing..........They'll bleep us if the patient's on a ward, they need to go to another ward : they're on a medical ward and they need to go to surgical and vice versa. They bleep us to see if they can **move a patient that's an outlier** - a medical on a surgical ward, to see if they can get them onto a medical ward."*

**Extract 2**

*"You're **taking them away from their work**. Sometimes you phone up and they say, 'You've got to talk to the nurse in charge'.........because if you get*

*inaccurate information*, they'll say, '*you should have talked to the person in charge*'... *So you're **dragging them away** and then they'll say, 'well **you can't talk to me now, I'm just doing the medicines**, so you'll have to talk to me again'.*"

**Extract 3**

"*Sometimes **by the time we collect that information**, it can **change very quickly** like this morning, when I said "on MAU there's one GP referral", XXXX said, 'well that's two now.' That happened within two minutes, you know what I mean. So as far as I'm concerned, that's what I aim for , **absolutely accurate information**. But it's **only as good as the information we're given**.*"

**Table 6.4.1** provides a summary of the three extracts.

**Table 6.4.1 : Conceptual Analysis of Interview Extracts 1,2 & 3**

| Central Interest | Brokering requests for beds and information about beds. Absolutely accurate information. Admissions discharges, transfers. |
| --- | --- |
| Cause | Elective, emergency. Streams : A&E. home, GP's, clinics, other hospitals, repatriation. Move a patient that's an outlier. |
| Context | Collective prioritising. Individually safe. That bed that's come up on that ward - can you make it a side room ? |
| Intervening | Taking them away from their work. You can't talk to me now I'm just doing the medicines. Inaccurate information. |
| Strategies & Interactions | Phone around. Find out. Find information out constantly throughout your shift. Trying to get information. Giving information. Discharges are coming up. Chasing for a patient to go. |
| Consequences | Constantly on the phone. The phone's stuck to your ear by the time we collect that information. Forty bleeps in a morning. Out of date - change very quickly. Only as good as the information we're given. |

**Central Focus : Brokering Requests for Beds**

The focus falls on the brokering of requests for beds and information about beds, in order to co-ordinate admissions discharges and transfers of patients into, between and away from wards. The bed manager is trying to obtain and provide "*absolutely accurate information*".

**Causal Factors : Multiple Streams of Demand**

The need arises because of different, competing classes of patient (elective, emergency) and different admission streams, ("*through A&E. Also from home, through GP's, clinics, and from other hospitals, repatriation patients*"). Wards and patients' needs are also differentiated and it is often necessary to move a convalescent patient to the wrong kind of ward, to accommodate a new patient on the right kind of ward. This generates a later need to "*move a patient that's an outlier*", to restore host beds to the parent speciality and allow correct care to resume.

**Context : Fluid Situation and Provisional Data**

The bed manager's goal of "*absolutely accurate information*" is compromised by the provisional nature of the information that is available. Beds are not vacant but "*discharges are coming up*". The job is one of actively searching, "*phoning around*", not simply getting but "*trying to get*" information and "*finding information out constantly throughout your shift*". The need to deal with provisional information means

checking to see whether it has become definite. This can amount to "*chasing for a patient to go*" when the process appears to need driving.

**Intervening Factors : Asymmetrical Priorities and Dependency**

The principal intervening factor is that the bed manager depends on clinical ward staff for the information essential to her role. Her requests for information, about patients and their readiness for discharge, from ward staff is seen as an intrusion : "*you're taking them away from their work*". Direct care for patients is given priority, so "*you can't talk to me now, I'm just doing the medicines*". A second factor is that information from the ward is imparted in the context of other knowledge. If the bed manager asks the wrong person, she gets "*inaccurate information – you should have asked me*".

**Strategies & Interactions : Prioritising Requests**

These activities take place in the context of a collective ethos where the needs of one patient have to be prioritised against those of the next. Nevertheless, each individual patient must be managed safely, "*making sure that there's a safe flow, and prioritising the patients - making sure that there's a steady flow - and prioritising the right patients, making sure that they're all safely admitted*". Finally, some patients require seclusion, resulting in requests such as "*that bed that's come up on that ward - can you make it a side room ?*".

**Consequences**

The consequence is a labour intensive jumble of information requests and exchanges. The bed manager is "*constantly on the phone - the phone's stuck to your ear*". As well as interrupting the duties of ward staff who can be correspondingly reluctant to co-operate, the bed manager herself can be interrupted by "*forty bleeps in a morning*".

The task of comparing information about demand and the supply of beds cannot be construed as a simple one of analysis and deduction. Effort is consumed in the construction of impressions about a situation in constant flux. Events have already marched on "*by the time we collect that information*". In consequence, the bed manager feels that she and her team are "*only as good as the information we're given*".

### 6.4.2 : Problem Solvers

**Agenda Definition**

The bed management agenda is clearly stated in terms of the smooth management of the patient's trajectory as a smoothly-flowing process, set against a model of capacity management (**Figure 6.4.2**) :

**Figure 6.4.2 : Process Model of the Patient's Journey**
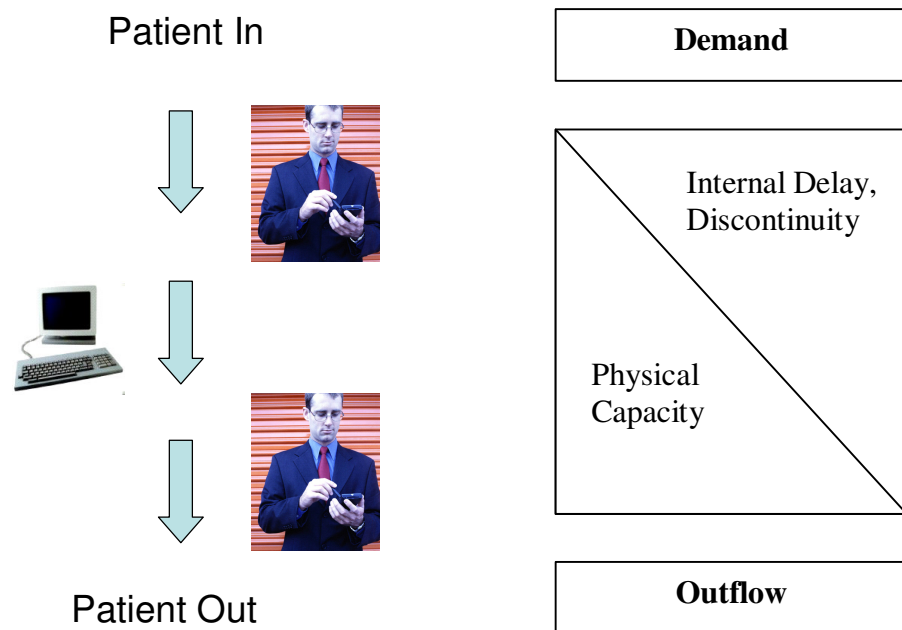


**Values alignment**

The fulfilment of this agenda requires clinical professionals to support the managerial goal of smooth process flow. Motivating factors include an appeal both to pragmatic as well as idealistic values. Idealistically, the aim has been to :

> "………*give the patient an experience where they feel that they've been dealt with quickly and efficiently.*" *(Executive Director #3)*

Pragmatically, it has been possible to identify anomalous conditions that run counter to professional as well as managerial expectations :

*"………the situation where surgically trained nurses are having to provide care to medical patients." (Executive Director #3)*

*"………we may actually still have 10 patients down there who have already had a decision to admit and, therefore, A&E itself has, in effect, become an inpatient ward." (Executive Director #3)*

*"You end up where they're all in the wrong places : like orthopaedic could end up taking a couple of surgicals - we try not to do it but we have to sometimes. We have orthopaedics on a surgical ward. So a surgical ward might have surgical outliers but this is because of so many medical outliers.*

*...but this happens because the medical outliers are on the surgical wards.*

*So you could have a surgical ward, say 34, they could have ten medical outliers, they could have three orthopaedic outliers, they could have an ENT outlier, so then we struggle getting the electives in." (Bed Manager)*

**Conflict Surfacing**

The question emerges, whether the apparent "complete incapability" of ward staff, to supply the information required by bed managers, might result from the perversity of front-line staff or from reasons which ought to be respected and given prominence in a more comprehensive appreciation of the differentiated needs of differentiated stakeholders :

*"They've got to be given a benefit of doing that. I can see why they don't do it because, as soon as they declare a bed, they get another patient. If they don't fill that bed state in, in a timely manner, they get one or two hours' breathing space. So, they're human !" (Associate Director of Operations)*

*"They don't declare the beds do they ? I know, as a student, I've noticed that. They don't declare the beds because they want a bit of a break."  (A&E Staff Nurse)*

For a senior nurse in charge of a ward, requests for bed state information are only part of a continuing stream of clinical and non-clinical information requests. Her participation in the cast of actors providing bed state information depends on competing responsibilities and distractions that are difficult to control :

*"I've shut myself in the bathroom to write my case notes before now because I just get constantly interrupted.........it's endless, the interruptions." (Ward Sister)*

For the nurse on the ward, the request for bed state information represents yet another task to be accommodated in an over-busy routine. An information system that allows key tasks to be consolidated has greater appeal than one that adds to the proliferation of tasks.

*"They've been trialling some kind of system to identify delayed discharges and the problem with that is, you have to enter the information every single time you*

*do it and there's no way of saving that information. So you're typing in the same*

*patient's details every time you have to do it ……… on the next day". (Ward*

*Sister)*

**Agenda Critique**

The critical aspect relates to the focus of data collection and exchange, to control the movement of patients as objects in a managed process. Information supplied by the ward team would enable the bed management team to identify each existing patient accurately to each occupied bed, and each waiting patient immediately to each vacated bed :

> *"………we could be more organised at* [the] *four o'clock* [bed meeting] *because we'd know who was coming in and where………you don't know who's here, you don't know who's arrived, you don't know whether they're in the PCAU, you don't know whether they are in A&E. They might not have hit the hospital. They would know because they've taken them at one central point, for every speciality." (Assistant Director of Operations)*

The critical alternative is to focus information management on communication between members of a clinical team. There are two aspects to be considered.

First, the team needs to take periodic stock of its shared situation. It needs to construct its own work around a particular group of patients and any special features that identify

446

a given patient for special attention. Such features are identified in the ward's communications book.

Second, having identified any patient for special attention, at least one member of the team then needs to enter or analyse specific detail within the medical record.

> *"I'm interested in looking at a more thorough documentation process. We tend to repeat a lot of what we write in care plans and case notes, and we have a lot of different points of information. The communication book is part of it , it all amalgamates together ……… There are things in the communication book that won't be written in the case notes, for instance, and there's things that will be written in communication but will not be written in care plans. I need to look at some kind of system where we can make this all a little bit easier really." (Ward Sister)*

### 6.4.3 : Interpretive Scheme

**Groups & Structures and Processes**

The doctrine of Management Information from Operational Systems implies the provision of information by one group (clinicians) so that it can be used by another group (managers) within administrative processes. The distribution of information effort and benefits is asymmetrical.

Management Information from Operational Systems represents an accounting paradigm, where individual, discrete events are assembled into a logical structure, to allow confident, unproblematic action. Aspirations for a new information system for bed management reflect this paradigm :

*"When we go to the bed meeting it will be extremely useful, because we will know exactly how many patients are on the way, we'll know at any one time how many beds we're going to create………we'd know how many are coming in and then we can work out how many are likely to come up for overnight." (Associate Director of Operations)*

*"If the IT was absolutely accurate, and our bed state was linked into it………and it automatically updated our bed state, that would be great. So if it automatically - we didn't have to do anything - it would just do that." (Bed Manager)*

*"When you look at the bed state information that we have on the intranet, we have a good system in the sense that if everybody kept it up to date we would know that we had a live bed state at any point during the day. As a patient was admitted or discharged from a ward, we wouldn't need bed managers checking up whether the bed was there, the system would automatically tell us. (Executive Director #3)*

The conceptual model of the bed management process is shown in **Figure 6.4.3.**

**Figure 6.4.3 : Conceptual Model of Bed Management**

Control :

Oversight by Operations Manager

A&E
System

Bed
Management

ADT
Module

Patient in
Accident &
Emergency
becomes
Referred
Patient

Patient
matched
with Vacant
Bed

Bed
Vacated on
Ward

Vacant Bed
becomes
Occupied
Bed

Time taken to effect transfer

delay

Patient
transferred
to Vacant
Bed
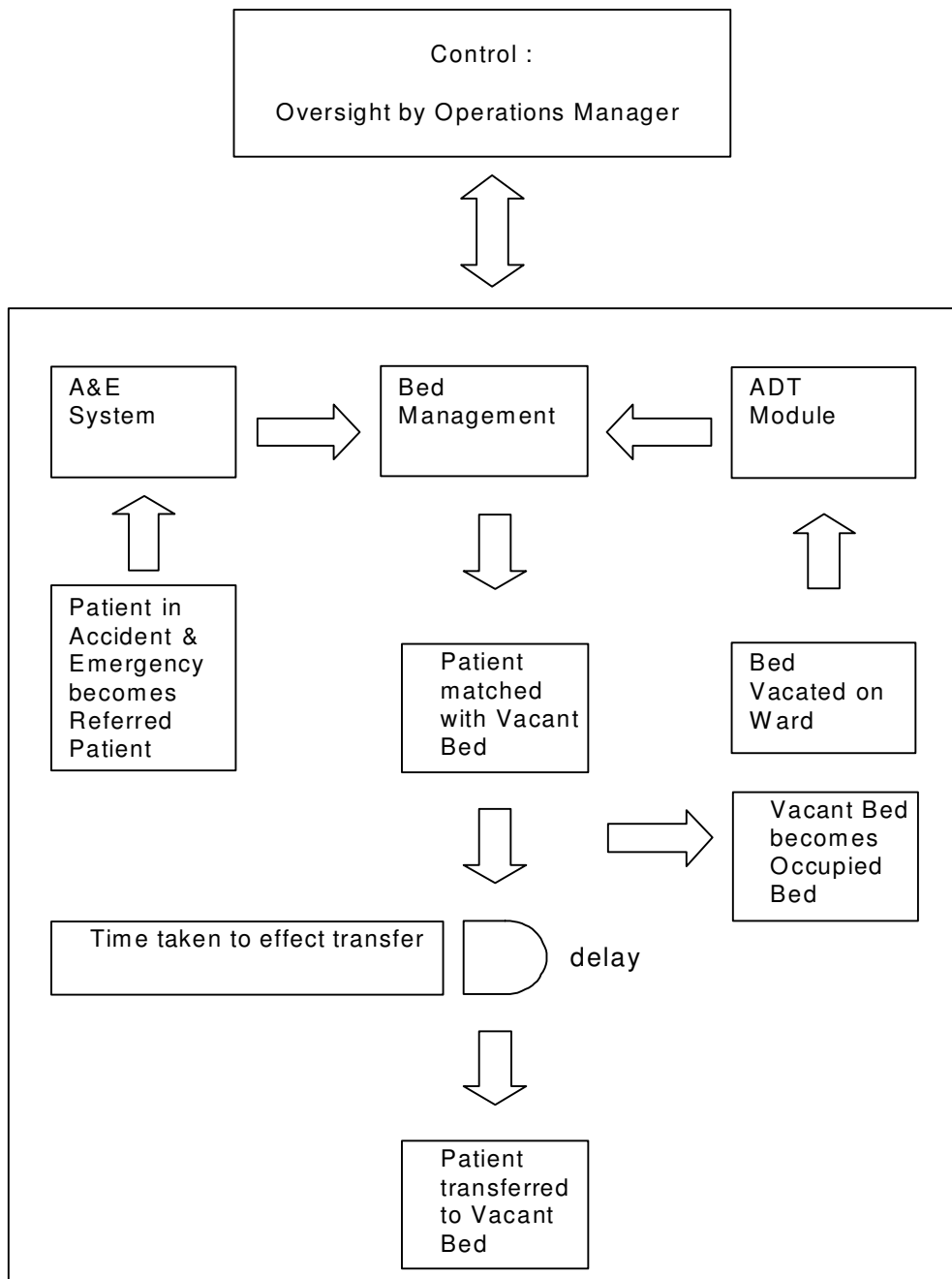
**Technology**

Technology intervenes between structures and groups (the bed management structure, bed managers, ward staff) and processes (ward processes, the bed management process).

It also intervenes between individuals and their respective tasks.

In the former instance, the technology is the Admissions Discharges Transfers Module. Staff enter the data required when they get round to it, or when their competing tasks allow.

In the latter case, staff also divide their attention between the patients and the recording of information, either in the communications book or in patients' case notes. Here, the technology is pen and paper.

It is not the form of technology that helps constitute a 'plane of cleavage', but the way it is applied. On the one side, technology is used by members of one group to collect values of data variables so that members of another group can act on the logical message conveyed. On the other, it is used to record statements that individuals will interpret and compare with information from patients, colleagues and other sources, as they determine their own basis for action.

**Tasks and Individuals**

Individuals use the technology represented by the communications book and casenotes to determine the tasks that need to be allocated and performed. Some tasks are clearly delineated :

> *"Whether they need bloods to be taken, whether they need particular types of preparation ………"  (Ward Sister)*

Others need clarification and the communications book prompts staff to discuss issues with patients and determine the actions to be taken.

> *"We need to understand what are their home circumstances, whether they've got care coming in, that kind of thing." (Ward Sister)*

> *"……… how they've been or,  you know, have they been in any pain, are they settled, what hygiene needs have been attended to." (Ward Sister)*

### 6.4.4 : Problem Solving Methodology

The process of producing Management Information from Operational Systems envisages specific data flows, triggered by specific actions. When these actions are identified to a specific formal role, they constitute a task identifiable to an individual, in priority relation with all of the other tasks associated with that role.

The Admissions Discharges Transfers (ADT) module is used most reliably where a clerical officer is constantly on duty with a specific role, to operate the electronic register :

> *"on medical admissions, they tend to be much more aware of the need to electronically transfer these patients. They have somebody manning the desk 24 hours a day... specifically directed to update the admissions and discharge process." (Discharge Co-ordinator)*

When clerical support is incomplete, the responsibility to supply information to the ADT module is diffused amongst staff who have other priorities :

> *"We do very well during the hours that the ward clerk's there, because she does that and that's probably one of her priorities. And there are certain members of staff who do it very well and there are a couple of the auxiliaries who make sure it's kept up to date, particularly after hours and during the night.........At other times, I think there's a sense that people don't see it as a priority." (Ward Sister)*

The conceptual model of bed management was shown in Figure 6.4.3. However, the opportunities to undertake the associated computer interactions do not arise from the representation of work in the scheme shown, but from the overall content of work itself. The opportunities are affected by institutional pressures to complete all treatments within a specified 'window' of time, the priorities presented by a sick patient, the presence of other patients and the constraints imposed by limited resources.

Resource constraints in particular alter the coupling between data provision tasks and the individuals identified to perform them :

*"The first thing that I do when I come on duty, apart from handover, is to look at staffing………I've got two people on maternity leave and four people on long term sick out of a staff of 25. Quite a high proportion………If there's me and another nurse, we tend to split our duties into two teams, each with half of a ward. So, if there are only two of us, I will start giving out the medications at this point and making sure the insulins have been given prior to breakfast. If there are three of us, then I tend to do more of the administrative roles, but focusing mainly on the discharges." (Ward Sister)*

Information supply competes with other accountable priorities. Often multiple sets of actions have to be set in train more or less simultaneously at 'critical moments' throughout the working day, each focused around the same patient and each with its own information requirement. The documentation of tasks performed is often separated physically as well as conceptually from their execution :

*"You can't not give medications out." (Ward Sister)*

*"There is a clear policy … around dispensing of pharmaceuticals, etc. …have we arranged transportation, do the relatives know, make sure we're not discharging them with a cannula in situ." (Discharge Co-ordinator)*

*"If they are discharging late in the day : that is when the staffing tends to be the lowest, that's when the pressure's on … they're just concentrating on what they feel is the most important...the final piece in the jigsaw... the electronic discharge, is an afterthought - I'll do that later, when I've got five minutes."* *(Discharge Co-ordinator)*


*"There's a tendency for nurses to want to get all their patient care done, and then come out of that environment and document their case notes and do all the clerical side." (Ward Sister)*


**Table 6.4.2** is condensed from an interview extract to identify the activities that form the main professional activities of the ward nurses and amplifies the concept of 'critical moments'.

The message from Table 6.4.2 is that the simple concept of a patient's journey (or trajectory) is complicated when multiple tasks coincide for the same patient or when multiple patients are present, each at similar or different stages of their own journeys. Journeys intersect when, for example, drug rounds or doctors' ward rounds occur. They are intermingled when a task for one patient's journey has been started but cannot be completed yet, and the time has to be filled by attention to uncompleted tasks for other patients.

**Table 6.4.2 : Main Professional Activities of Ward Nurses**

| Clinical Management of Patients | Ongoing treatment : sterile procedures, technical procedures and cleaning up mess and soiling |
| --- | --- |
| | Bed Making. |
| | Meals and Feeding. |
| | Assistance with dressing. |
| | Assistance with personal hygiene. |
| | |
| | Any particular investigations they're having that day. |
| | Managing diets. |
| | Care planning : assessing patients' functional capacity, dependence and need for nursing support with activities of daily living. |
| | Prescriptions : making sure that patients' emerging needs are adequately reflected in doctors' prescriptions. |
| | Liaison with relatives and investigating patients' home circumstances. |
| | Drug Rounds. |
| | Ward rounds. |
| | |
| Activities associated with Patients' Discharge | Organise ambulance transport. |
| | Organise various clinic and therapy appointments. |
| | Get the doctors to write a prescription sheet, and a discharge letter form. |
| | Get hold of relatives : Inform relatives. |
| | Speak to residential care if they're in residential care. |
| | And liaise with the bed management as well. |
| | |
| Management Duties of Senior Nurse | Off duty. |
| | Organising training. |
| | Sickness absence interviews. |
| | Appraisals. |
| | Checking out e-mails. |
| | Actioning safety notices. |

**Figure 6.4.4** should be compared with **Figure 6.4.5**. Where Figure 6.4.4 epitomises the idea of resources clustered around the patient's journey, seen from the perspective of a manager or the patient himself, Figure 6.4.5 illustrates the reality of the problem situation for staff on the ward. The latter case is characterised by extremely fluid associations : between the index patient in the centre of the picture, the other patients on the ward, their respective physical journeys through the ward; their parallel,

metaphorical journey through the process and tasks of care, and the doctors and nurses who are constantly shifting between patients, tasks and the data gathering devices.

**Figure 6.4.4 : Process Model :  a Patient's Journey**

Sick Patient



Well Patient
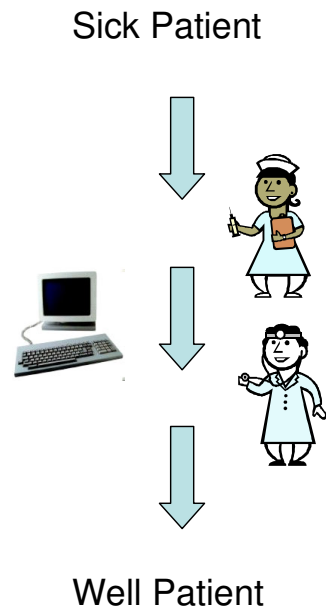
**Figure 6.4.5 : Problem Situation Model : Multiple Patients at Different Stages on Multiple Journeys.**
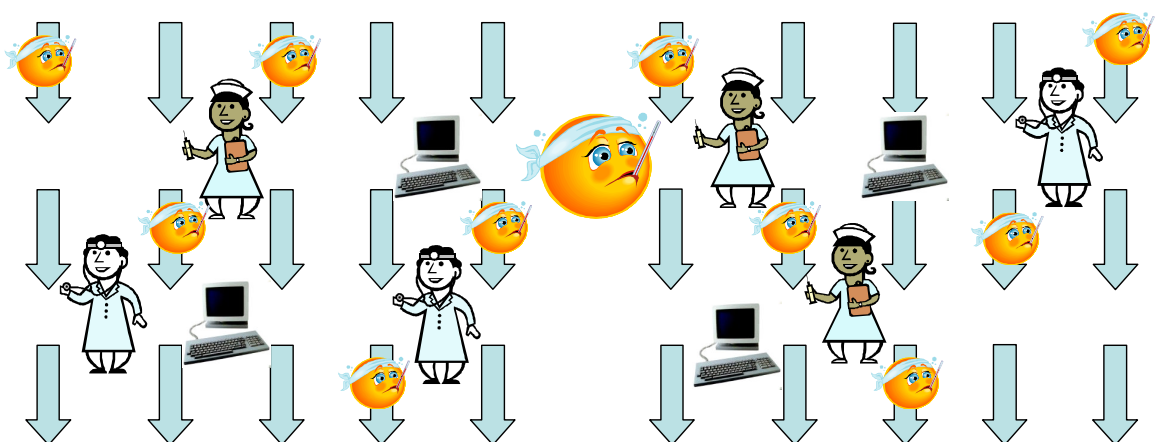
In the situation shown by Figure 6.4.5, the chief need is not for a means to report progress to an external efficiency monitor but a means to enhance internal communication and cohesion within the clinical team :

> *"I need accurate and clear management plans from the doctors . That would be very helpful because we can then work towards - I seem to be focusing on discharges, but that is a large part of what we do - but with a <u>clear</u> accurate management plan you can work towards an identified discharge date. Particularly in medicine, that is quite often difficult to do, because you could have a patient come in with MI for instance, with expected length of stay 5 days. But, during that time, they might suddenly develop some other problem which will then need investigating. So the discharge date gets reviewed on a regular basis." (Ward Sister)*

### 6.4.5 : Provider of Choice : Lessons from the Model

To contribute to the Trust's "business mission", the information system must withstand "tacit adaptation", of which an extreme example is the failure by one group of staff to supply information required by another.

The root causes of this challenge to the information system's success cannot be attributed wholly to the perversity of unreliable staff. They are not located by individual blame or by faults in systematic design of roles and transactions.

Instead, they emerge as consequences of neglecting what Law (2000) has termed the "fluidity and dislocation" of relationships which change from moment to moment.

The relationships are fluid and dislocated because they are conceptual rather than concrete. Individual components participate in multiple sets of relationships, simultaneously or in rapid alternation. Once again, structuration and Actor Network theories suggest that any set of relationships looks permanent because components fall into alignment, time after time. Connections between components are not necessary consequences of physical factors, but contingent. They last only as long as the right contextual factors operate and they are reconstituted whenever similar situations occur.

This case study began with the concept of a community, focused on a single, comprehensive rationale, eliminating or minimising human participation in the assembly and transmission of data during the process of bed management.

The supply of Management Information from Operational Systems is likely to depend on the ability of less ambitious, smaller scale systems to support individuals, juggling multiple tasks in an overcrowded routine. Such systems will, in the words of Law (2000) be "partially connected, multiply ordered, ambiguous and not very coherent". The ideal should not always be to eliminate human agency but, often, to support it.

## 6.5 : A GREAT PLACE TO WORK

### 6.5.0 : Introduction

"A Great Place to Work" is underpinned by the Chief Executive's vision of "the Blackpool Way". Developed with staff, this vision aims to engender an atmosphere of mutuality and collaboration between individuals, groups and the various subunits of the institution. Their efforts are aligned towards common ends, oriented towards the needs of patients and the stability of a challenging workplace.

Clear, simple rules and routines, amenable to control allow people to share a clear understanding of what is going on around them and anticipate further action. However, as rules, they represent constraints or "structures of domination" (Giddens (1984).

In "A Great Place to Work", the simplicity of constraining rules is balanced by their enabling stimulating opportunities to solve more or less challenging problems, from an understanding of basic principles and an appreciation of contingent factors (Giddens' "interpretive schemes", "norms" and "structures of legitimation").

The ability to use their own intellectual faculties provides satisfaction both for the managers and the clinicians who work in the service. It assists the delivery of the service, to standards of quality and outcomes that can attract appreciation from service consumers and from external regulators.

"A Great Place to Work" thus accommodates a diversity of perspectives within a whole whose harmony can tolerate dissonant themes without disintegrating. Whenever

possible, the issues represented by different perspectives are aligned. If they cannot be aligned, they are heeded, balanced and traded-off rather than negated, one by another.

This part of the chapter visits a particular workplace, the Accident & Emergency department of the Trust, to develop these ideas through an understanding of the interplay between clinical staff and their information system.

### 6.5.1 : The Problem Situation

The "business mission" of the Accident & Emergency Department is to satisfy high public expectations and a pattern of demand that is prone to random surges, within tight financial constraints. It caters for patients at all ages and with every kind and intensity of immediately urgent illness or injury.

As there is no control over patients' pattern of attendance, the department is in a state of constant tension, between the efforts of staff to create order and stability and the unpredicted arrival of the next patient, who might present with any of a variety of challenging clinical conditions. *Par excellence*, Accident & Emergency is where model order and contingency meet head on.

It is a "core capability" of the department to manage each patient safely within the government-imposed four hour target interval. A range of other "capabilities" support this, including the ability to know, at any time, how long any particular patient has been present.

Capabilities which support local control include knowing which patients are in the department, where in the department they are and what stage in their trajectory they have reached. These capabilities support the safety of each patient and the timeliness of his management but they also support the deployment of resources from busy to even busier parts of the department. Senior clinicians need to manage the flow of patients within the department and across its interfaces with admitting wards.

Capabilities which support response to the patient include the ability to record clinical information about history and clinical findings, to request diagnostic investigations and receive the results and to refer to evidence-based decision support tools which facilitate rather than expropriate the clinician's role.

Capabilities which support external control include the ability to trace, retrospectively, a patient's entire journey through the department, supporting clinical audit, quality control and clinicians' personal professional development activities, as well as the management of litigation and complaints.

An "explicit managerial action" has been to respond locally to global NHS initiatives in the form of "World Class Commissioning" and "Advancing Quality". Both of these initiatives are intended to promote and measure compliance with evidence-based clinical methods.

In Spring, 2009, the Trust announced its decision to purchase an "Interim Clinical Solution" because the information products offered by the National Programme are thought not to be developed sufficiently to support its burgeoning information requirements.

In April, 2009, the Emergency Department's senior clinicians and managers were invited by the IT Department to comment upon a Draft Output Based Specification, assembled by a team of external information systems consultants from "the best of the best" Emergency Department information system specifications.

The Trust's intention is to go to the international market place to identify a supplier who has already developed a product capable of meeting the Output Based Specification. This product will have been developed elsewhere and will represent a new resource that will be absorbed into the working practices of the Emergency Department.

In the timescale allowed it was not possible to explore, during the specification stage, the human, organisational or social factors that might influence the practical feasibility of the system's future operation, by users in our own department, in the fashion intended by its designers.

To any extent that work practice might fall at odds with the preconceived purpose and operation of the information system, its assimilation into the workplace will represent "tacit workplace adaptation".

For this reason, the present research, undertaken in anticipation of such an event, has gained particular relevance and it is hoped that the findings will assist the evaluation of the new system, during and after its successful introduction.

**Agenda Identification**

The Output Based Specification has been collated by an external expert team who have studied similar specifications for an extensive range of hospital information systems, from the UK and elsewhere. The specification, whose main components are summarised in **Table 6.5.1,** is a hybrid of these various contributions and identifies outcomes that will be produced if the information system is operated properly in a technical sense.

**Table 6.5.1 :Interim Clinical Solution ; Principal Components**

| Strategic Functions | Clinical Functions | Administration |
|---|---|---|
| • Information Reporting, Analysis & Audit.<br>• Bed management, capacity monitoring and planning.<br>• Integrated Care Pathways / Planning.<br>• Scheduling. | • Accident, Emergency & Urgent Care.<br>• Orders Processing.<br>• Results Reporting.<br>• ePrescribing / Drug Administration.<br>• Clinical Documentation (Assessment, History, Observations and Correspondence).<br>• Decision Support. | • Ambulatory care management.<br>• Rostering. |

**Values Alignment**

The values of managers and clinicians are in a state of balance around the department's patients. There is an explicit acceptance that the hospital is a managed environment, where clinical goals must fall into line with the economic rational goals of managers.

However, in a busy department where the pace of activity is fast and human resource and physical workspace are constrained, it is necessary to ensure that every member of the team can recognise the opportunity to contribute the knowledge and skills the situation demands. **Table 6.5.2** uses structuration theory to summarise the social and cultural context which surrounds the Output Based Specification .

**Table 6.5.2 : Structuration Theory used to organise the aligned values of Clinicians and Managers.**

| Structures of Signification | Structures of Domination | Structures of Legitimation |
|---|---|---|
| Four Hour Target, breaches, clinical exceptions.<br><br>Clinical Pathways, Patient Journeys. | External Regulators, NHS Complaints Procedure, Performance Measurement and Management. | Patients' needs for safety, comfort and reassurance. |
| | | |
| **Interpretive scheme** | **Resources : allocative** | **Values, norms, beliefs** |
| Indicators of organisational well-being, variance of performance from standards : time-limited targets.<br><br>Measurement of Workload and Case Mix, Recovery of Revenue. | Funded Establishment.<br><br>Deployment of staff from quiet to busy areas. | Efficiency, Clinical Effectiveness, Evidence Based Practice.<br><br>Interventions are necessary rather than exhaustive. Needs are prioritised, within and between patients.<br><br>Balance of autonomy and control. |
| | **Resources : authoritative** | |
| | Authority to deploy human and material resources.<br><br>Authority to assign own tasks. | |
| | | |
| **Communication** | **Use of Power** | **Sanction** |
| Summary measures and statistics. | Managers use mix of anxious inquiry and congratulation.<br><br>Professionals use balance of attention, between the low volume, high intensity category of patients and high volume, low intensity category. | Workspace congestion is eased when patients pass swiftly and smoothly through the department.<br><br>Patients are happier, less demanding. |

**Conflict Surfacing**

Four areas of conflict are identified. First, the needs and priorities presented by patients and appreciated by clinicians do not always allow immediate compliance with the expectations of managers. There is a conflict between between computing and care-giving :

> *"It's very difficult to get away from that computer and I'm not blaming the computer, if we didn't have it I don't think it would work, and that can sometimes get frustrating when – I like going and admitting the patient – you sort of lose your patient care." (A&E Staff Nurse #1).*

The second conflict, illustrated in **Figure 6.5.1** is between clinical practice traded as an economic commodity, and clinical practice as thoughtful and careful communication.

**Figure 6.5.1 : Is clinical Practice Just An Economic Commodity ?**
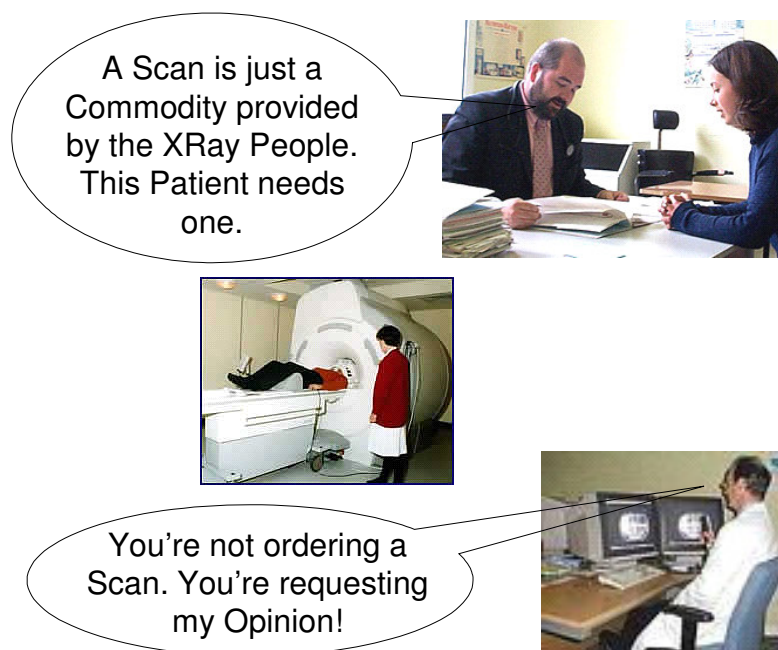
A third conflict arises between a rational portrayal of clinical activity as a linear sequence of discrete steps based on a single, imaginary patient (**Figure 6.5.2**), and an experiential understanding of interlinked situational appreciation and action that defies sequential analysis and recognises multiple simultaneous commitments (**Figure 6.5.3**).

**Figure 6.5.2 : Tracking the Patient Across Interfaces in a Linear Sequence of Events**

```
┌──────────────┐                          
│ Open         │                          
│ Hospital     │                          
│ Presence     │                          
└──────┬───────┘                          
       │                                  
┌──────┴───────┐              ┌──────────────┐
│ Open Local   │─────────────▶│ Open Local   │
│ Presence #1  │              │ Presence  #2 │
└──────┬───────┘              └──────┬───────┘
       │                             │       
┌──────┴───────┐              ┌──────┴───────┐
│ Clinical     │              │ Clinical     │
│ Activity :   │              │ Activity :   │
│ Area 1       │              │ Area 2       │
└──────┬───────┘              └──────┬───────┘
       │                             │       
┌──────┴───────┐              ┌──────┴───────┐
│ Close        │              │ Close Local  │
│ Presence #1  │              │ Presence #2  │
└──────┬───────┘              └──────┬───────┘
       │                             │       
┌──────▼───────┐              ┌──────▼───────┐
│ Exit         │──────────────│ Exit         │
└──────────────┘              └──────┬───────┘
                                     │       
                              ┌──────▼───────┐
                              │ Close        │
                              │ Hospital     │
                              │ Presence     │
                              └──────────────┘
```
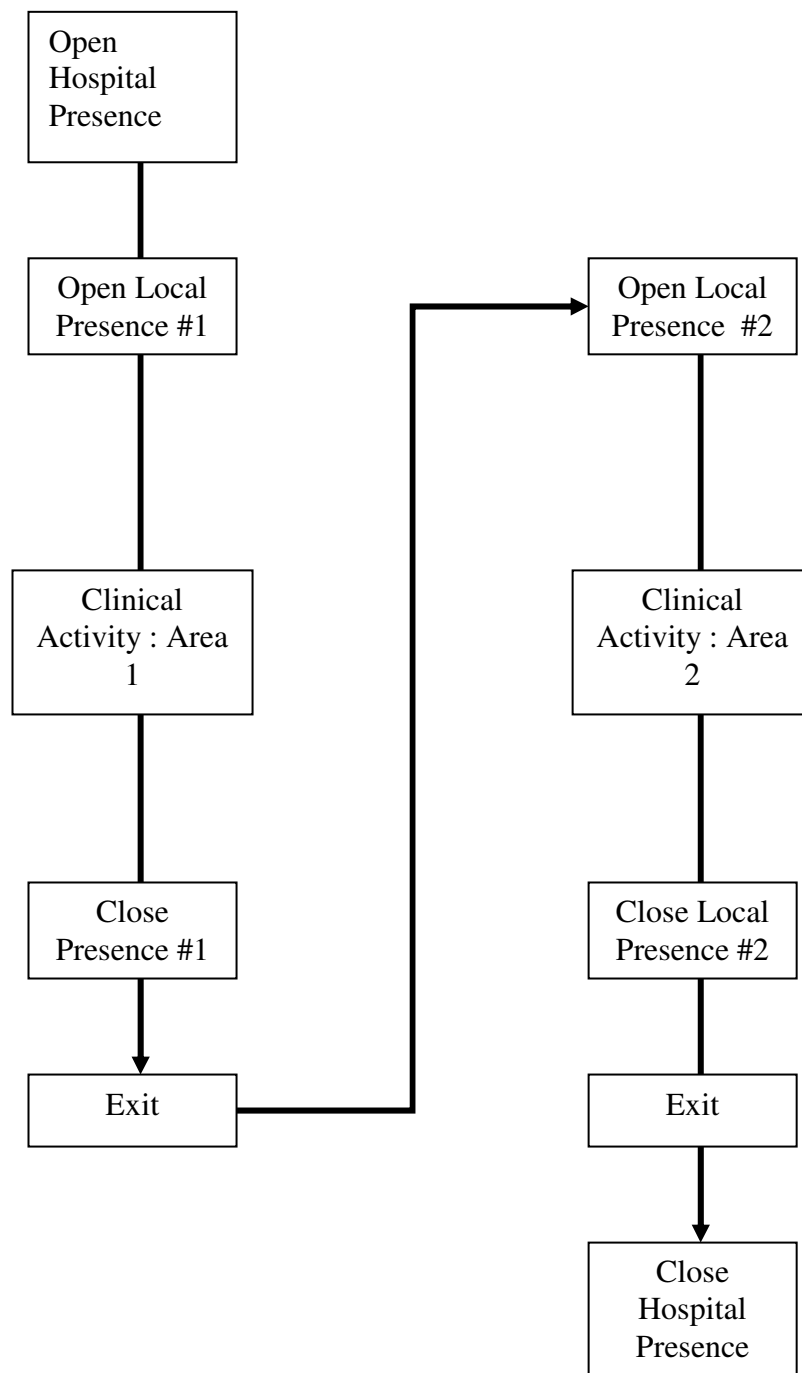
**Figure 6.5.3 : Elements of Clinical Activity**
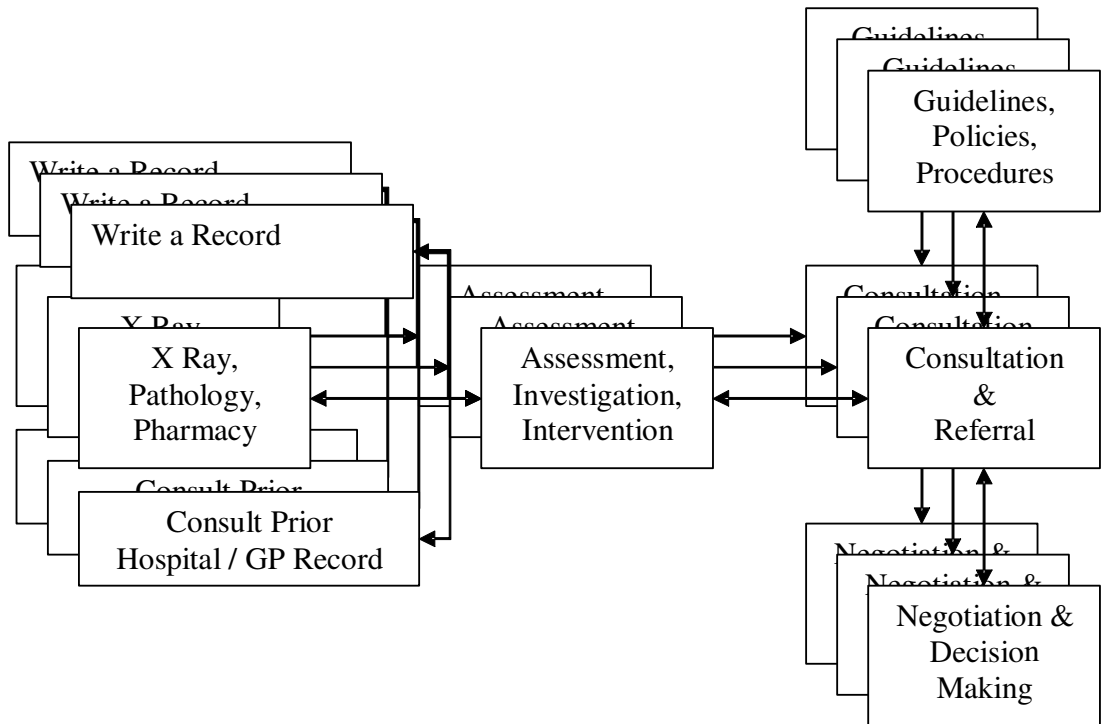


The fourth area of conflict identified relates to the different purposes for which information is recorded in a clinical record (**Figure 6.5.4**).

In the first instance shown in Figure 6.5.4, the accountant benefits from the accumulating and organising functions of the medical record. He accepts the record as an explicit statement of 'facts' that can be entered and calculated in a formal system of mathematical logic. Data structures and record formats are rigidly defined. Codes and categories are considered to be unambiguous.

In the second instance, the matching of an entity to a chosen category is recognised to be a human intellectual effort rather than a straightforward, axiomatic representation of the signified by a signifier. Clinical diagnosis and decision making are shown as consensual social activities in distinction from mathematical operations. The

implementation of clinical decisions is assisted by the co-ordinating function of the medical record.

**Figure 6.5.4 : Describing Clinical Activity for Different Purposes**



Describe, explain, justify

Let's work out what's going on

Investigate ?
Intervene ?
Refer ?

Let me measure your performance

Tell me about our patient

In the third instance illustrated by Figure 6.5.4, any practitioner may be called to give an account of his actions or omissions, to a patient, his family or his legal representatives. The record is carefully written with this possibility in mind and conscious effort is made to construct a defensible narrative that will maintain the impression of competence. Generations of doctors have been taught, "If you haven't written it, you haven't done it !" (Mann & Williams, 2003). The practitioner's need to defend himself against alternative representations drives the expansion rather than the condensation of ideas in the medical record and promotes multiple individual entries by the various contributors to clinical care, rather than a single, brief composite account.

**Agenda Critique**

The favoured information model for the National Programme is a patient-centric Electronic Patient Record. This represents an ideology that suggests the interests of the patient ought to be paramount under all circumstances. Although it is hard to argue otherwise, at least two alternative ideological stances can be identified alongside the patient-centric argument.

*Patient Centric Data Model*

In this model, a single patient is treated for no, one or many diseases at no, one or many institutions. The paradigm is patient-focused care.

*Disease Centric Data Model*

This model supports the need to accumulate knowledge about the effective management of individual diseases. The paradigm is evidence based medicine.

In a disease-centric information model, such as might support a cancer or a trauma network, a single disease affects many patients and is treated at one or many institutions.

*Institution Centric Data Model*

Patients depend for their treatment upon financially viable institutions. The proposed introduction of internal trading between directorates favours a third, institution-centric form of data model. The paradigm is institutional efficiency. In this model, many patients are treated by one (sub)institution for many different diseases.

**Processes, Groups and Structures and Technology**

**Figure 6.5.5** highlights the conflict between the metaphor of an evenly flowing production process and the reality of the clinical situation.

**Figure 6.5.5 : Processes, Groups and Structures and Technology**



The image of a production process suggests a pre-conceived plan, insulated from contingencies, conducted by one group and monitored through its own accounting process by another, controlling group. The behaviour of the production team is expected

to be efficiently invariant. Figure 6.5.5 suggests that interruptions and contingencies are pervasive in clinical practice. Order and disorder are evenly balanced.

Shortly after the introduction of the four hour target, the department's clinical staff was supplemented by "navigators" with a specific, restricted role and a limited interest in the overall needs of any given patient. This was to micro-manage performance by ensuring that all events were recorded as they occurred and to maintain the pace of each individual patient's management. The outcome did not contribute to "A Great Place to Work" but generated conflict. Navigators were focused on accelerating the management of the patient nearest 'breaching' the four hour target. Clinical staff were aware of clinical, as well as performance, priorities :

> *"They* [navigators] *would keep an eye on times. They would keep an eye for blood results to come back, that a patient was ready for review. Then they'd go and speak to the doctor. But because they didn't know what was going on in the rest of the department, sometimes the nurse in charge might feel that, although it's time for that patient to be reviewed, there's another poorly patient that we can't get an intravenous cannula in and we need that doing as a priority : that will only take a few minutes and* <u>*then*</u> *you can go and see the patient again. And that was where the doctors would feel they were under pressure ......... they were getting very agitated. And then that became a whole issue that they felt that patient care was being compromised." (A&E Staff Nurse #1)*

**Individuals, Tasks and Technology**

The computer information system is intended to help make the Trust "A Great Place to Work" by providing a vehicle for communication between members of the collaborating team (**Figure 6.5.6**). The shared contribution and display of information is intended to help individuals gain a clear and immediate picture of their shared situation, and plan their own contributions without excessive prompting or intrusive supervision. By providing access to external reference sources, the computer provides a partial antidote to the inexperience of junior staff members and facilitates their supervision by senior staff.

**Figure 6.5.6 : Individuals, Tasks and Technology**



Where's My Next Patient ?

What's the Usual Procedure for this ?

Has Mrs. X been treated yet ?
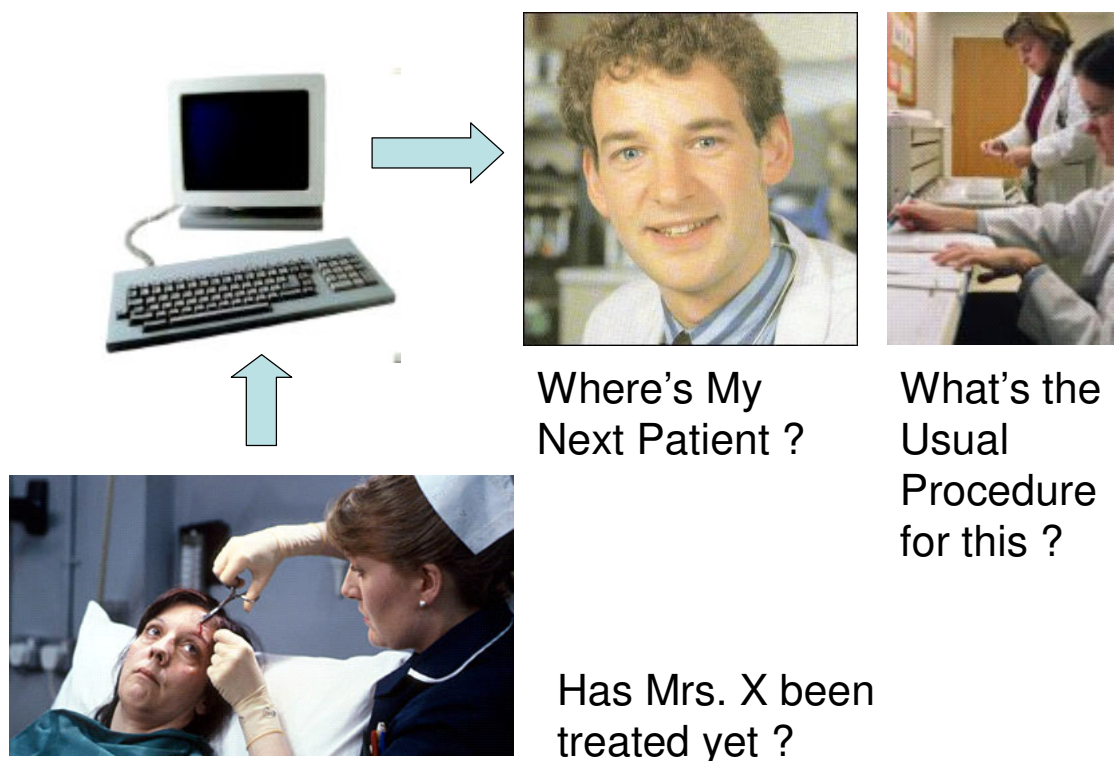
Because the shared display is distributed across terminals on a network, it provides a 'window' onto the problem situation, for individuals outwith the team, whose own problem situation overlaps and, crucially, for anyone trying to gain a rapid overview of the entire problem situation from any of its geographically separate sectors.

*"The information system can make my job easier ……… I can get a picture of what the Accident and Emergency department is like if I am on the Clinical Decisions Unit for any length of time. I've a feeling for the demand that's there because it can impact on how quickly we need to move people around from Clinical Decisions. So it is particularly useful from an activity point of view. It provides me with the trigger for the four hour target which I can quickly glance at to know what the 'status' of patients' management is, which again is useful because if it's blank it tells me that we've got a problem because the patients are not being seen and they're not anywhere near to being 'processed', as I would say, through the emergency system.  If they're 'waiting for review' it indicates that they're reasonably well on with the management of that case and I can do that away from the department just as well as I can do it from within the department." (Nurse Manager)*

*"I'm always thinking one step ahead. As soon as you see a patient whose a surgical patient, I'm thinking, are there any beds, what will they need ?" (A&E Staff Nurse #1)*

*"It's like a window into A&E for us. What will happen then is that we will liaise with the staff nurse on obs ward, or minor injuries* [these are subsections of the Accident & Emergency Department], *depending where these patients are, are*

*we going to be needed to see these patients, does M or C need to come and do*

*an assessment, or is there no point because they're in the fracture clinic at the*

*moment. So it's really the logistics around the day to day work ……… From that*

*perspective, it's very useful to us, and works well." (Discharge Co-ordinator)*

*"You couldn't physically be in all areas at once. I could quickly scan on the*

*computer and notice that, for example, there is a child with a head injury in*

*minor injuries at three o'clock in the morning. That would make me want to*

*know, why is a five-year-old child in the department at three o'clock in the*

*morning with a head injury. I'd pick up things from the computer system that*

*otherwise I might have missed, and I could activate social services and things*

*like that. It was (emphasis) a very useful tool." (Senior A&E Sister)*

A key implication of this interpretive scheme for the problem solving methodology is to realise that data are supplied to the information system by clinicians who are collaborating primarily with colleagues in their own local, fluid problem situation, and only secondarily in the problem situation that managers face. Managers depend upon clinicians for data but the clinicians have their own reasons to supply data to the computer and they have other means to supply data to each other.

In situations of low risk, the data presented by the computer are regarded as a definitive basis for independent action within the parameters of a given occupational role :

*"If they're busy doing something else, then I can see………it will say, on the*

*screen, 'requires nursing Kardex* [card index of patients] *and ECG', so if she's*

*busy, I know that I will need to go and do observations on that patient, do an*

*ECG and then I can say, 'I've done that lady in number five. You need to go and*

*ask her the questions to write in the Kardex', so I can be getting on with work*

*whilst she's busy with someone else." (Health Care Assistant)*

Where risks are higher, the computer is only safely used as one source of information amongst others. The user's 'reading of the situation' is more careful and takes account of other information from the context. Direct communication with other people allows specific information to be selected and reinforced, over and above the expressive capacity of the screen display or printout :

*"You need to take a handover from an ambulance crew – for that information*
*we can't just stop verbally communicating about each patient. You need to*
*gather information yourself I think. I don't think it could help with the*
*ambulance handover." (A&E Staff Nurse #2)*

*"That's the problem, because that conversation that you have with that nurse*
*then highlights - you know - what they need on discharge, when they need to see*
*their GP, what medications they need to go home on.  It's very important.  That's*
*part of the discharge process I don't know whether the computer - I wouldn't like*
*to see that interaction go between the doctor and the nurse." (Senior A&E*
*Sister)*

*"If you do handovers, you should really walk around the beds, so you can*
*actually physically see the patients, because then you will notice a physical*

*deterioration in their condition. But people tend to do it standing at the computer. If you're looking at a computer, you are not looking at a patient."*
*(A&E Sister #2)*

In other circumstances, individual staff obtain and exchange information without using the shared computer display of the electronic information system at all :

*"You can just know by looking in your cubicles. You can keep a track of where your patients are, where they're going, and it doesn't mean that you have to be fixed to that screen to know that. You can go back and have done five different things with different patients and have discharged two and know about that and take them off , and know that someone's in xray without having to keep changing something all the time." (A&E Staff Nurse #2)*

Even though these examples show how the electronic information system enhances to collaborative work within the clinical team, they also show that individuals within the clinical team display a significant level of independence from the electronic information system in formulating their individual and collective interpretation of the situation.

The partial independence of individuals from the computer display creates problems for the nurse maintaining operational control of a busy clinical area, whilst other nurses and doctors go about the tasks of caring and curing. The computer display helps an individual to store data until attention can or need be given, and complements face to face communication.

*"The nurse in charge of that area would be near a computer all the time. Or could only do trivial tasks – not get tied up with a major bed change. Apart from the computer there does need to be somebody around that area taking charge, for example when an ambulance comes in, so when you say that it looks as if we're stuck behind the computer, sometimes we are updating the notes as well, co-ordinating what's going on in the area………" (A&E Staff Nurse #1)*

*"If you're in charge of majors and you've got 20-25 patients, you get it into your head that, if you leave that computer, everything will just go all to pot around you, so you literally need one person to stay there and coordinate that area, and they will make sure that everything's clicked on , but as soon as that nurse goes away, because somebody else doesn't know what's going on, they can't just automatically take over." (A&E Sister #2)*

*"Often when it is busy and when I'm in charge of the assessment area I sometimes write myself a list of jobs because sometimes there's that many – you don't want to forget anything – sometimes you just scribble on a piece of paper." (A&E Staff Nurse #1)*

*"For the doctor to say, "Right I'm going to see this patient, and the nurse in charge of the area should be able to tell them a little bit about the patient as well – just a brief background because they've admitted the patient as well, or they have liaised with the nurse that's admitted them, and then when the doctor comes out of there, he should say immediately to the nurse in charge, I want whatever, and then the nurse can be doing that whilst they're writing up their notes." (A&E Staff Nurse #1)*

**6.5.4 : Problem Solving Methodology**

The fourfold essence of the problem solving methodology is, first, to understand that participants in the problem situation supply data to map a representation of clinical events onto the trajectory of patients passing through a physical place and a metaphorical process. Second, it is to understand that the clinical problem situation is different from the managerial. Third, it is to explore how the act of data supply fits in with the other actions the participant is undertaking at the time. This is Mumford's (1995) "task structure fit". Finally, the form of a given message dictates its value to an individual recipient.

The problem solving methodology,  summarised in **Figure 6.3.4**, was developed  in **section 6.4** by imagining the clinical workplace in terms of a collaborating team of doctors and nurses (and other healthcare professionals), dividing their attention between multiple patients at various stages of their individual trajectories or "patient journeys".

**Figure 6.5.7** represents exactly the same the same set of ideas as Figure 6.3.4  but at a lower level of abstraction. This figure is simply the mapping of real clinical activities (Figure 6.5.3) onto their rationalisation or metaphorical interpretation as an aggregated process (Figure 6.5.2). However, the mapping is extremely flexible because any clinical activity can take place at any stage in the imagined process :

> *"When the department gets busy, the 'process' goes" (IT Manager in conversation  during clinical secondment)*

**Figure 6.5.7 : Clinical Activity in the Context of the Patient's Managed Presence**
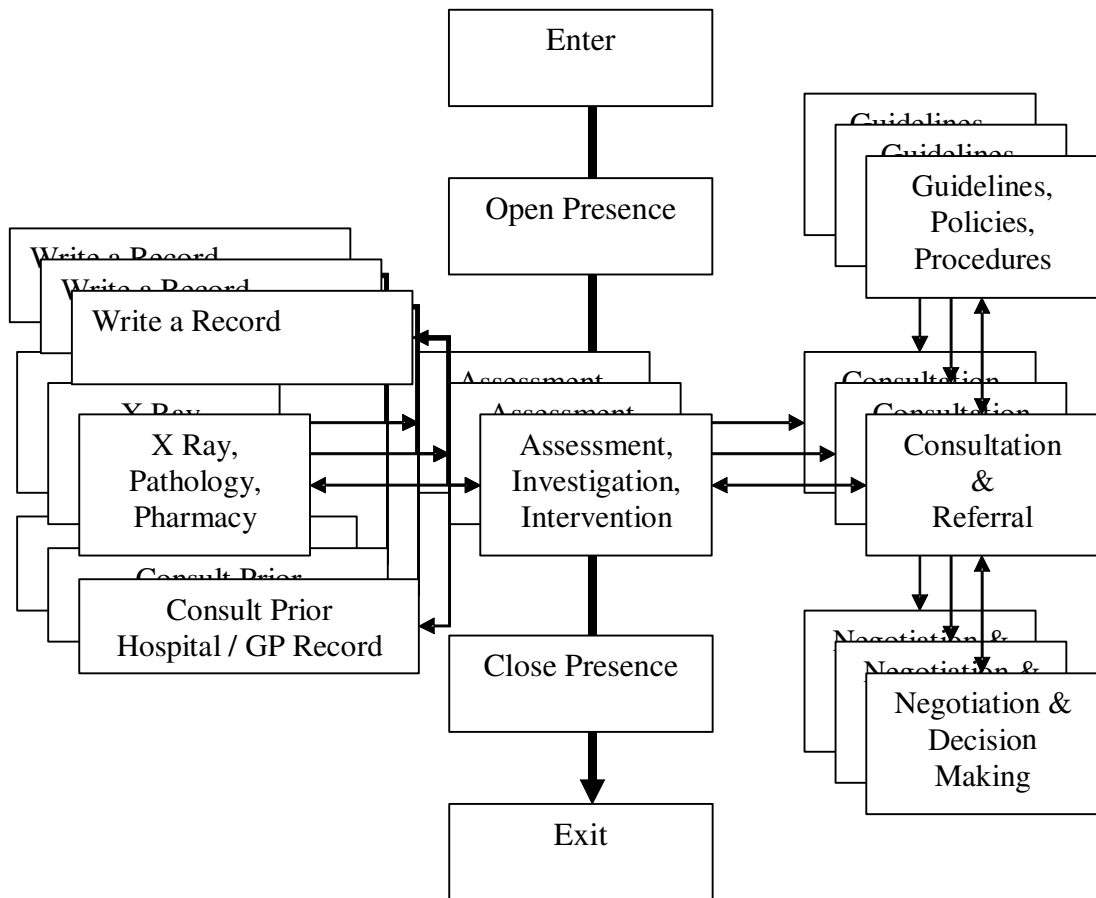


Figure 6.5.7 is intended to illustrate how, during the flow of time between the registration of a given patient's presence and its closure, any clinician may be engaged in any of a cluster of related activities, for that or for many other patients. The focus falls upon an opportunity to provide data when a task is undertaken, rather than at a fixed point in a constructed 'process'.

Flexibility in the relationship between data provision and the model 'process' is mirrored in the relationship between clinical staff and their operational information system, from which they are supposed to supply management information.

The two major dimensions of Management Information from Operational Systems are process efficiency and resource effectiveness. Each clinical activity is an opportunity to contribute data towards one of these streams.

**Process Efficiency**

Management of process efficiency, considered in **Figure 6.5.8**, depends on the registration of key process events and the measurement of elapsed intervals.

Three instances are shown in Figure 6.5.8. In the first instance, the index event happens before it is registered. Whenever there is a delay, between the transfer of a patient and the registration of the transfer, the Emergency Department's reported performance against the four hour target is downgraded and its externally perceived efficiency is compromised.

The department's actual efficiency is compromised whenever a delay in communication prolongs the chain of events between a patient's admission and his transfer or discharge.

In the second, model instance shown in Figure 6.5.8, registration is simultaneous with the index event. The information system provides a display, replicated on each terminal, of patients in the queue, their presenting problem and the length of time elapsed since registration. A doctor selects the next patient from the displayed queue and adds his own name next to that of the patient by selecting an option from a pick list.

**Figure 6.5.8 : The Registration of Management Information from Operational Systems**
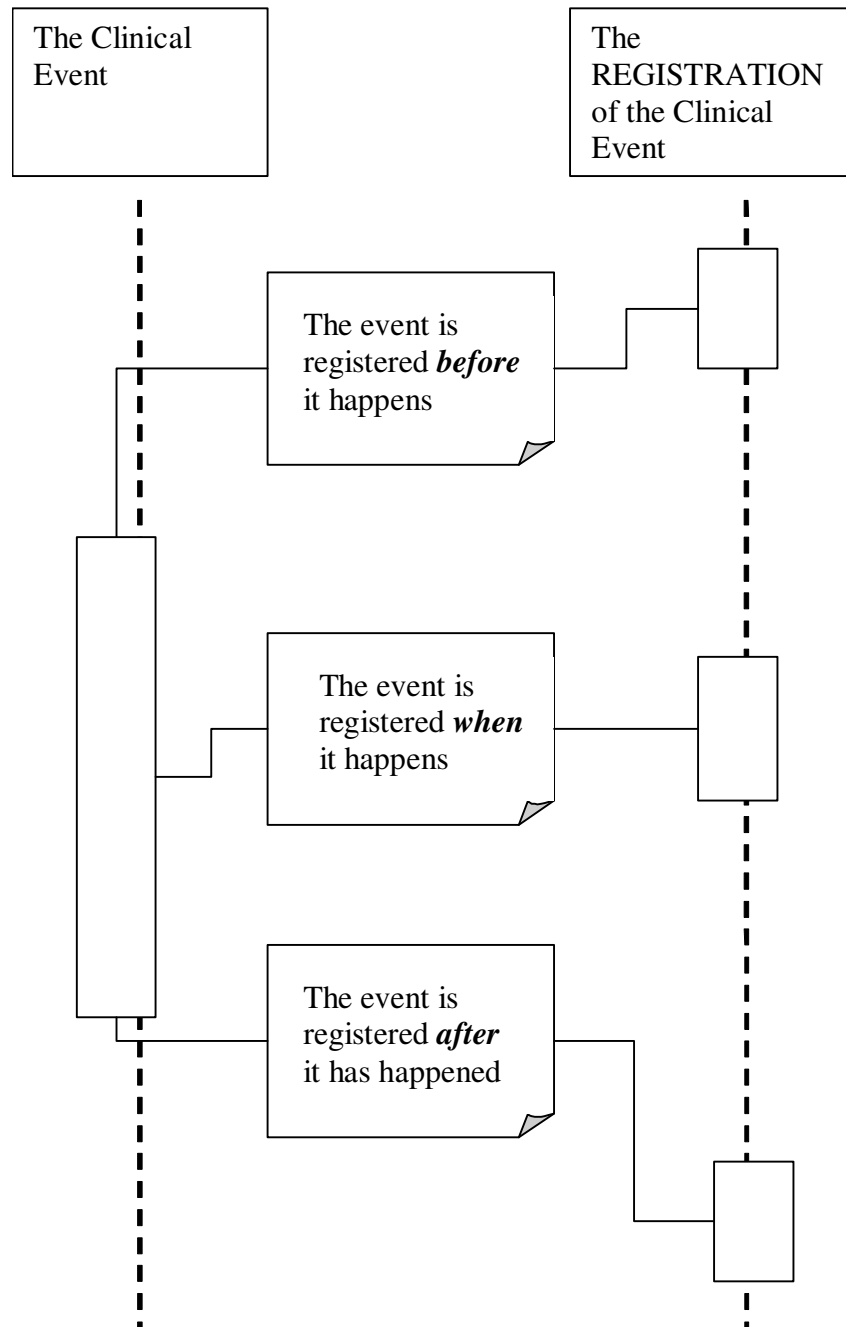


This action can be, and in observed practice often is, performed on the doctor's behalf by a third party. In contrast with a case note entry, this is not a medico-legally accountable statement and the informal ethos of a collaborative environment lends itself

to this practice. Whoever registers the event, it is automatically date- and time-stamped by the computer.

The third instance is a deliberate departure from the model instance and occurs when the team of doctors, each at his own pace picking the next patient in sequence from a common pool, has fallen behind the influx of patients. The queue is escalating, treatment spaces are exhausted and flow through the department has stagnated. The full screen of patients' names with no doctors' names appended is an overwhelming challenge for each individual doctor who considers the situation in isolation from his colleagues. Under these conditions, the shift leader needs to intervene.

The shift leader's response is to assign to each doctor his personal list of patients to work through, and use the shared computer display to append doctors' names to patients in advance of their being seen. Control and responsibility are distributed equitably between individuals. Work is distributed according to each participant's competence and ability and everyone can see who will take responsibility for each patient.

This departure is a switch from an operative to a supportive (Malmsjo, 2006) mode of the computer's role. The computer is used to re-establish *internal* control by creating, for care-givers *within* the problem situation, a shared and better detailed awareness of what now needs to happen. This benefit outweighs the consequence of incorrect conclusions suggested to a mechanism of *external* control, about the time a patient contact occurred or about any important time relationships, between this and other relevant events.

**Resource Effectiveness**

Management of resource effectiveness involves finding out what presences were opened and closed for each patient, how they were related to each other, and what key investigations and interventions were provided, for each overall trajectory. Collection of the required management data is a secondary result of data recording for their own salient purposes by clinicians ; either collaborating in their own collective problem situation or actively constructing a personal narrative, for secondary purposes related to individual clinical accountability.

**Task Structure 'Fit'**

**Table 6.5.3** shows how the act of data supply fits in with the other actions the participant is undertaking at the time.

**Table 6.5.3 : Supplying Management Information from Operational Systems**

| Critical moment | Opportunity | Management information from operational systems |
|---|---|---|
| Registration (clerk). | Signify to the clinical team that another patient has joined the queue to be assessed and treated. | Catalogue of all attendances, each linked to an identified patient. Obtain a mandatory dataset: crude activity analysis. |
| Make a clinical assessment (clinician). | Display a message that can be read by any authorised staff member. | Coded explanation of attendance can be matched against final coded diagnosis and outcomes. |

**Table 6.5.3 (continued)**

| | | |
|---|---|---|
| Request an investigation (clinician). | Broadcast an indication that investigation requested / completed/ result available.<br><br>Provide a detailed sub-message that can be read by any authorised staff member. | Coded catalogue of all investigation requests, each identified to an individual patient and attributable to an identified author or clinical team. |
| Order / perform an intervention (clinician). | Broadcast indication that investigation requested / completed/ result available.<br><br>Provide a detailed message that can be read by any authorised staff member. | Coded catalogue of all interventions, each identified to an individual patient. |
| Consult a reference source (clinician). | Download a document. Complete on-line a structured, condition-specific record with an embedded guideline. | This may be a clinical pathway document. Control assumes record synchronous with activity. |
| Read or write a clinical record or letter (identifiable, accountable clinician). | Individuals ensure free text is sufficiently explicit for clinical coding as well as continuity of care. Alternatively, intelligent text contains embedded codes at the required level of detail. | Coded summary of case notes. Important to capture "the most sensitive code for the work done". |
| Move a patient to another treatment space or ward (clinician or clerk). | Update a shared display of beds and patients. | A more or less accurate time-space map of the patient's physical journey. Control assumes record synchronous with movement. |
| Find 'my' next patient (clinician). | Read off that patient's physical location from the displayed list : check inconsistencies with immediate colleagues. | Timed log of every movement between treatment locations for every patient. |

**Table 6.5.3 (continued)**

| | | |
|---|---|---|
| Take /assign responsibility for a given patient or list of patients (identifiable, accountable clinician). | Broadcast an indication that a named doctor has assumed responsibility for an identified patient. Signify that other doctors can focus on other patients. | Compare demand against satisfaction by measuring patient's time in system before responsibility assigned as proxy for time in system before responsibility effectively undertaken. |
| Find out the 'state of play' for any individual patient or for the department as a whole. | Read off that patient's progress against model from the displayed list. Check inconsistencies with immediate colleagues. | Enhance concurrent, as opposed to retrospective, control. |
| Make the business case for enhanced resource. | Capture every attendance at Registration. Obtain information about case mix and resource consumption each time a case note entry is made. | Capture resource intensity as well as volume of clinical care. Add evidence of health benefit by including details of diagnosis or change in physiological status during treatment. |
| Answer a complaint under the NHS Complaints Procedure. | Read off a time line of significant events from an event record.<br><br>Reconstruct the clinical reasoning of each individual involved, from case notes. Review Xrays and results of blood tests.<br><br>Find out what else was going on in the Department at the same time, that might have interfered with optimal management. | Reconstruct a defensible narrative of events, judgements and actions.<br><br>Place in context of contemporary events. |

**The Nature of the Transmitted Message**

The construction of individual personal narratives by participants in the same clinical problem situation creates two difficulties for Management Information from Operational Systems. The first is that the coder has to extract information from (a summary of) multiple record entries made by plural participants. Clinicians and coders use different forms of expressive language and do not usually meet.

The second difficulty is that transmitted data represent only part of the message understood by the transmitter and interpreted by the receiver. Transmitted data represent a mix of certain events and uncertain contingencies. The statement, "Dr.X amputated a leg" carries an implication to the receiver that the leg ought (or ought not) to have been amputated.

Additional data will be irrelevant to an accounting process but could be profoundly important in another context. The author will always want to be succinct but, depending on the purpose of the message, will also want to add other data to ensure the correct inference at the receiving end.

**Figure 6.5.9** expands Figure 6.5.3 to show how the basic elements of clinical activity result in the contribution, by various participants, of multiple, more or less carefully constructed but potentially accountable, indelible case note entries, each attributable to a single, identifiable author. The data to be recorded represent a complex clinical situation to three kinds of audience.

**Figure 6.5.9 : Constructing an Accountable Clinical Record**
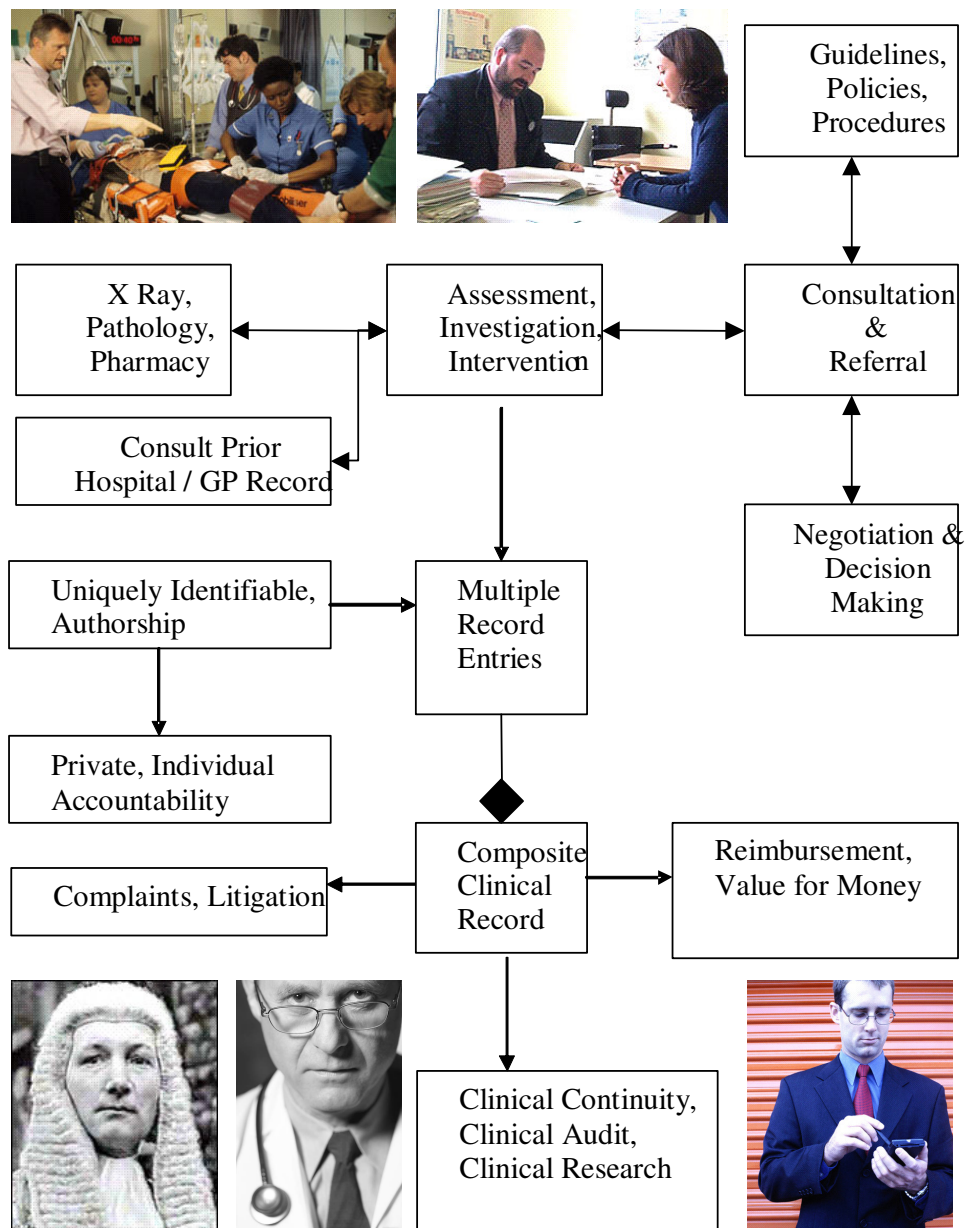


The first audience is the accountant who will equate clinical outputs with financial inputs and draw inferences about Value for Money. The second is the community of professional colleagues who will collaborate in the patient's continuing care. The third audience is the legal representative of a potentially dissatisfied patient.

## 6.5.5 : A Great Place to Work : Lessons from the Model

The Emergency Department is a battleground between two paradigms. Model order and control are pitted against contingency and autonomy of action. The two paradigms are represented, respectively by Malmsjo's (2006) "operative" and "supportive" forms of information system. The first is oriented towards ideal behaviour and is potentially defeated by the 'careful improvisation' of users. The second is designed to promote this kind of conscious engagement in the problem situation.

The Output Based Specification of the information system prescribes desirable functionalities from an uncritical standpoint. The basis for this standpoint is revealed when it is analysed through the lens of a formal social theory. Structuration theory is one such theory and is useful to compare the content of the information system intervention (action), the cultural and political context it represents, and the link between the context and the process of action.

The distinction between patient-centric, disease centric and institution-centric alignments of the data model is not unimportant but the principal areas for "discursive argumentation" during the design and evaluation of an information system for the Emergency Department include the following.

First, the conflict between computing and care-giving is reflected in the distinction between the "operative" and the "supportive" orientation of the information system. Where the operative form allows the clinical problem situation to be monitored by an external audience, the supportive form assists internal participants in experiencing and responding to their problem situation, enhancing performance rather than control.

Second, the clinical problem situation is different from the managerial problem situation. Since information systems are sponsored by strategic managers, it is natural to expect them to favour the operative function. However, managerial ends are brought about by participants in the clinical problem situation and greater "leverage" (Senge, 1990) is likely if the supportive orientation is favoured.

Third, the task for Management Information from Operational Systems is less to conceal data supply to secondary users within primary tasks than to consider how the disparate tasks undertaken by an individual are best linked by an information system that best replicates the way individuals organise the critical episodes that punctuate their working day.

Finally, the form and the value of a message are mediated by the purpose of the message. Three types of message each reflect a different balance between code and nuance. An accounting message is definitive and is expressed in a simple code. A clinical communication is more nuanced but can be made succinct and efficient through the partial replacement of text by code. Finally, a defensive message is essentially argumentative and must be fully expressive.

It is unlikely that all three forms of message can be accommodated in a single, comprehensive information structure. It is more likely that a successful information system will incorporate a substantial element of human agency to provide integration, rather than rely extensively on automated data flows.

# Aligning Global and Local Aspects

## of

# A National Information Programme

## for Health :

### Developing a Critical and Socio-Technical Appreciation

Submitted in partial fulfilment of the requirements for the award of

## Doctor of Philosophy

#### at the

## University of Central Lancashire.

**STEPHEN NICHOLAS HARROP MB.ChB. MBA, FRCS, FCEM.**

VOLUME 3 : REFLECTIONS AND CONCLUSIONS

# C H A P T E R   S E V E N

# R E F L E C T I O N S

## 7.0  :  I N T R O D U C T I O N

The present research began with my intention to develop an information system that would equip me to promote change in the resources and operational environment of a clinical department in an ordinary NHS hospital. This has required me to understand the design, implementation and evaluation of information systems generally.

The Emergency Department is an interesting environment because it represents the NHS in microcosm, by virtue of its position at the cross roads between primary and secondary care, the variety of its case mix and the number of its interfaces with other disciplines. In this sense, a relatively parochial study has potential relevance to the NHS as a whole, itself an epitome of a complex service-oriented organisation.

In the event, my own local scope became absorbed within the wider, fluid environment provided by the Trust as a parent organisation and by the Trust's own anticipated involvement as recipient of the National Programme for IT.

My eventual research question was : ***How can I equip myself and colleagues to understand and comment critically but constructively, on the design, implementation and evaluation of information systems, so that we can promote the successful assimilation of the National Programme for IT at our own place of work ?***

At the start of the research, I identified three challenges, To promote successful implementation, we needed to understand, in greater depth, how computers fit into the clinical workplace, in order better to articulate, what is required from information systems in the NHS and more successfully ensure that information systems meet users' needs.

The third challenge was to ensure that users operate information systems accurately, so that the information that circulates can be reliable.

**At the end of the research, I have concluded that a reliable description of clinical and business activity, however important to support business and consumer decisions, is a necessary but insufficient rationale to provide information systems in the NHS. It is equally important for information systems to contribute to effective clinical practice. These two distinct contributions operate in fundamentally different ways.**

Section 6.1 described the supply of financial information by the Trust to an external regulator, on terms dictated by the regulator. The Trust is portrayed as a homogeneous entity in relation to the wider business environment of the NHS.

Section 6.2 focused on the measurement of performance against mandated targets and on securing the compliance of staff with efforts to obtain 'Better Information'.

Section 6.3 presented alternative views of care pathways : first as a control for organisational performance, efficiency and resource utilisation. ; second as a source of conflict when two internally consistent streams of logic, converging on a single

contested resource, such as a theatre or a scanner, require flexibility, responsiveness and tolerance of risk. Reference to structuration theory allowed the care pathway to be construed either as an "interpretive scheme" supporting "structures of signification or domination", or as a set of "norms" supporting a "structure of legitimation".

Section 6.4 revolved around three groups of people whose activities profoundly affect the ability of the Emergency Department to deliver its service. This section repeated the theme of competition from several streams converging on the hospital's limited complement of beds.

The central character was the bed manager, conducting information about beds from the ward to the hospital management team in their periodic bed meetings. The aspiration was for automated information transfer to provide a continuous, mechanically recalculated summary of the bed state from certain evidence. The reality was the need for those attending the bed meeting to assemble, from uncertain evidence, a collective impression of the bed situation and to decide individual tasks and their urgency.

The needs of the bed management team were set against those of the team of nurses, also 'making sense' of their collective situation and adjusting tasks, roles and priorities to its contingencies. Once again, one stream of logic, the requirement to supply information to the machine, competed with another, the need to prioritise attention to patients.

Section 6.5 completed the transition from a focus on technology *intervening between* groups and processes, to an understanding of technology *in systemic relationship with* individuals and the personal tasks that contribute to the collective effort. This was a

transition from a strategic to an emancipatory orientation (Hirschheim, Klein & Lyytinen, 1996) of the information system (and, by association, the parent organisation) towards the people it contains.

For the healthcare assistant, technology empowered and enabled her to identify her next task without prompting. For the supervisory nurse, it facilitated oversight of a poorly-staffed environment and stimulated lateral thinking based on past knowledge and experience : she could draw inferences from the information provided by the computer and confirm these by visiting a specific site to inspect and inquire directly from patients and colleagues. For the middle grade nurse, communication took place between individuals as well as through the computer. The 'reality' of the situation was never a single statement but an assembly of ideas.

At the conclusion of the research, it is appropriate to reflect on a number of topics.

In section 7.1, I reflect on the research process : what I have done, how I went about the research, what succeeded, what might have succeeded better, what I have learnt and what are the implications for future research practice.

In section 7.2, I reflect on alternative constructions of the problem situation faced by the NHS and its National Programme for IT.

In section 7.3, I reflect on the 'mental apparatus' I have brought to bear on my research topic. This is Jayaratna's "mental construct" and I use Jayaratna's headings to structure my own discussion.

Section 7.4 employs the same structure to reflect on the approach to the National Programme's implementation as a problem solving process. In particular, it reflects on the process of implementation as a rational, goal-driven project, compared with the alternative construction as a process of exploration and understanding.

Section 7.5 presents the academic contributions and limitations of the research under the headings, "theory", "methodology" and "practice".

Section 7.6 suggests the direction of future research.

## 7.1 : REFLECTIONS ON THE RESEARCH PROCESS

### What I have done

I have investigated the introduction of new information systems to the NHS, as reflected in my own place of work, with the intention to inform my own appreciation and that of colleagues, of the new information systems that would eventually arrive.

Expecting to provide a single, definitive and coherent picture for the reader to contemplate, I have actually provided a mosaic of perspectives, from which the reader will assemble his own conclusions, based on his own knowledge, and experience and on the other components of Jayaratna's "mental construct".

# How I went about the research

I began with a clear mental model of the research process as a structured activity, consisting of distinct steps.

I chose an interesting and worthwhile research topic and formulated a research question, to be set within the context of established knowledge as disclosed by a literature review.

I intended to investigate this question by the rigorous application of a formal research methodology that could be repeated by any other researcher who might wish to replicate the results of the study to validate its findings.

Data would be gathered, analysed and interpreted and then presented in a way that made their meaning clear and unambiguous. Data analysis was to be carried out as a formal procedure using coding systems and tables to isolate textual fragments from interview transcripts, group these under coded headings according to explicit rules and then to separate these further under a smaller number of headings in order to present a coherent story. The presentation of data would be accompanied by a clear account of the research setting and the conditions under which the research had been conducted.

The research findings would then be compared with the prior literature to distinguish between what was known already and what new knowledge had been added.

Qualified by an appraisal of the strengths and limitations of the research, its findings would then be translated into recommendations for new research and for altered practice.

Each step in the argument would follow logically from the preceding, so that my conclusions would be well-grounded in the data. Having examined the object of the research with a reliable tool, meticulously applied, I would be confident that I had abstracted as reliable a description of the truth as could be discovered. Accurate description would allow confident, expert prediction.

**What succeeded ?**

To accomplish this investigation, my first task was to examine the policy literature of the NHS to understand the preliminary arguments for the provision of new information systems and for the National Programme. This was undertaken in chapter two.

In chapter three, I explored extensively the literature describing the content and the context of the proposed change. I explored the alternative problem solving approaches suggested by the information systems literature and investigated their origins in the philosophy and literature of social science. Finally, I investigated models of change related to information systems, emphasising models of change as a social and political process.

My next task was divided into four stages. The first of these was to identify and comprehend the various traditions and techniques of social research, described in chapter four.

The second stage was to deploy and analyse the mental model of the research process that presented those traditions and techniques as an instrument through which to display

and describe what was to be discovered. This was begun in chapter five. Section 5.1 provided a clear understanding of the problem situation as experienced by one person, the IT manager. I asked questions, analysed the responses and assembled the multiple issues and concerns the IT manager expressed as a rich picture of his problem situation. The salient theme was that the IT project was not clearly related to the business needs of the Trust.

The third stage of this task was for me to synthesise my analytic understanding with an understanding of the context in which the research was to take place and to conduct further interviews to explore the issues surrounding information technology, relevant to those interviewed. This stage of the task is represented by sections 5.2 and 5.3 of the research.

The practical outcome was a rational and unitary description of the Trust's business needs, derived from interviews with members of the Trust Executive. The learning outcome in research terms was that the technique of eliciting and recording responses remained much the same, whilst the questions posed and the choice of subsequent interviewees were determined by responses elicited from previous questions and by an active scepticism, that any individual's responses could represent the only construction of the topic.

The fourth stage was to evaluate my chosen approach against an external comparator. Section 5.4 resulted from the appreciation that the account of a coherent, rational and unitary situation, obtained in section 5.3, needed to be set against a model that represented the research setting as a messy social and political environment,

characterised by discontinuity rather than continuity of ideas and by a conflict between the business needs of managers and the practical needs of front-line clinicians.

## What might have been more successful ?

This approach placed my self and my research in conceptually separate positions, separated by the research approach and isolated from the context in which the research was conducted. This separation was carried through into the initial plan of data analysis.

The initial plan was to effect a progressive regionalisation of the data. Each isolated data fragment was assumed, on a positivist basis, to contain its own intrinsic meaning. Coded quanta of meaning could be tabulated and assembled into larger, discrete clusters from which a logical structure would emerge.

In the event, I could only understand each data fragment in context. The meaning of each data fragment was not intrinsic at all but relational : its meaning was derived from three sources acting in systemic relationship.

The first of these was the surrounding text of the parent interview transcript. The second was my progressive understanding of that transcript and its emerging themes, developing over time through repeated reading. The third was my emerging understanding of the overall problem situation and its different aspects, derived from the understanding of each transcript in relation to the others.

On the basis of this realisation, my task could be re-cast in terms of desirable outcomes rather than process steps. The means to perform this was provided by Jayaratna's NIMSAD.

Section 5.1 thus represents my entry to and preliminary understanding of the research topic as a set of claims, concerns and issues situated in a historical and a geographical context. I find myself, therefore, interested in a *problem situation* rather than a problem in isolation.

Section 5.2 represents my constructive interaction with the problem situation (Jayaratna's "diagnosis"), to which I am in danger of importing my own prejudices unless these are carefully eliminated or acknowledged and actively compared with alternative perspectives. Section 5.3 represents the identification of "problems".

Up to this point, my plan of research was descriptive and rational. Section 5.4 recognised the social and political aspects of the research context and the consequent need for an approach that would accommodate critique alongside description. In section 5.5, I recognised that the salient task for the Trust was to develop organisational discourse so that implementation of supplier-defined business systems would not pre-empt adequate expression of clinical users' needs. Sections 5.6 and 5.7 then identified concepts and models from the available literature and applied these to construct a diagnostic and therapeutic model through which to develop the discourse.

# What have I learned ?

My initial approach had been to place myself, metaphorically, eyeball to eyeball with my field of interest and to observe this through the intervening medium of  a methodology.  My eventual approach corresponded with Stake's (2000 ; p.445) advice, to "put your best intellect into the thick of what is going on", experiencing the research situation from within.

Although I have used NIMSAD in a deliberately methodical way, for clarity of explanation, Jayaratna's approach in NIMSAD is to place the research situation, the researcher and the research approach in systemic relationship with each other, so that the attributes of each emerge from the researcher's appreciation of the others.

Jayaratna allows the eight stages recognised in NIMSAD to be followed as a time-ordered sequence of methodological steps but does not regard this as necessary or even desirable (Jayaratna, 1994 : p.232). Ciborra's (1998) paper, cited in section 3.3.0, provided a crucial insight by showing that method is a derived concept and that improvisation is the primary mode of 'real' being in the world.

The approach taken in Multiview (Avison, Wood-Harper *et al*., 1998) is to place an "interpretive scheme" at the heart of the triangular relationship between the problem situation, the problem solver and the emergent problem solving approach.

Although the interpretive scheme is specifically oriented towards information systems design, it is only a small leap of imagination to substitute an alternative. Jayaratna's eight stages provide an immediate candidate.

**Implications for future research practice**

Applying the new understanding to the research process afforded by these emergent approaches allowed the research to escape from ritual and domination by technique and to focus on the careful construction of a series of situated descriptions. These were prepared from the testimony of those who inhabited the situations identified.

This approach allowed the quality of the research to be judged less by the researcher's rigorous adherence to a strict set of methodological steps and rather by the improvisatory skill (Ciborra 1998) with which appropriate techniques had been applied within an emerging relationship between the research situation, the researcher and the emergent research approach.

## 7.2 : REFLECTIONS ON THE PROBLEM SITUATION

By 2010, the National Programme for IT has become vulnerable to a stringent economic climate, the impending possibility of a change of government and its failure to deliver the anticipated systems and benefits on time.

In contrast, the pressures for NHS institutions to adapt to the fluid policy environment have intensified. The drive to shift resources from secondary to primary care is forcing NHS Trust hospitals to reappraise their service profiles. The payment by results system makes it imperative for Trusts to code and capture their revenues accurately and the impact of the Darzi review has been to intensify a focus on the accuracy, relevance and timeliness of service delivery.

The NHS Trust where the present research has been conducted exemplifies the continuing belief that, despite loss of confidence in the ability of the National Programme, to deliver the information systems the NHS needs, the urgency has become pressing, to invest in new information systems to support the most important strategic organisational aims and objectives.

During the course of the research, the accounting of planning and performance has been superseded by efforts towards active organisational learning in the form of 'lean' initiatives and the reconfiguration of internal organisational structures.

The substance of the National Programme for IT has been its focus on interoperability standards and central procurement. The Programme has drawn a balance between globalism and localism, manifest in debates about the aggregation of electronic patient records at a local, an intermediate or a national level. The issue has been settled substantially by the pragmatic consideration, that no single supplier could manage the volume of traffic implied by integration at the national level. The National Programme for IT has been fragmented and dispersed between a small number of "clusters" and consortia of "local service providers" (Brennan, 2005 : Ch.10).

The prime strength of the National Programme has been its co-ordinating power. Its major weaknesses have included the inertia of a giant, bureaucratic structure, coupled with its capacity to inhibit local initiative and its inherent insensitivity to local circumstances.

A global intervention imposes formal structure on multiple, differentiated local realities. In so doing, it demonstrates authority's biased preference, for aspects of local reality

that are congruent with the intervention, and its tendency to dismiss aspects that are potentially incongruous and problematic.

A further weakness of the National Programme has been its susceptibility to capture by extraneous political events. e-Booking (Choose and Book) has been harnessed to the policy of contested service provision instead of being geared to facilitate the effortless transaction between a patient, a referring doctor and an appointments clerk (Maguire & Ojiako, 2010).

In contrast, Picture Archiving and Communications (PACS) (in *Information for Health* but not in the National Programme's National Systems Architecture) has been effortlessly assimilated into clinical practice (Eason, 2007) because it solved practical workplace problems, facilitating the availability of XRay films and reports and allowing remote consultation through shared access.

To the extent that the National Programme, with its philosophy of Management Information from Operational Systems, has privileged the needs of secondary data users (IT linking organisational groups and structures around processes), it has neglected the needs of individual care-givers (IT linking individuals and their tasks), recording their personal account of patients and interactions. These needs are additional to those of clinicians communicating face to face within the direct clinical team and to those of clinicians communicating in an extended team, where face to face contact is not feasible.

The relevant example from the present research was the case of bed management, described in section 6.4. Here, information supply required by a central (global)

function, maintenance of an on-line bed state, conflicted with the local priorities of care-giving. Inputs were batched instead of being synchronised with the events they were to describe. Decisions made on the basis of information from the machine had anomalous consequences. The ideal of  "absolutely accurate information", available  "at the push of a button" could not be realised in practice.

The Wanless report reflected a certainty that information systems were necessary for the NHS to provide maximally efficient healthcare. As Pawson and Tilley (1997 : p.31-34) argue, the *successionist* logic of a simple cause and effect relationship is insufficient to explain the connection between an intervention (in this case, new information systems) and its outcomes. To explain *how* the connection is to be made requires a deeper account of *generative* causation, more sensitive to the problematic aspects this case illustrates.

The problem that confronts any information system which uses one group strategically (Hirschheim, Klein & Lyytinen, 1996) to meet the data requirements of another is the problem of data quality : 'rubbish in, rubbish out'! It is as if the information system's weakest component is the staff who enter the data during their day to day work.

The thesis has cast a critical light on this suggestion and generated an appreciation that the measured outcomes of work depend on the coherence of IT with the social organisation and tasks of the workplace, as they are adapted to the fluid situation.

The oft-repeated prescription, to connect information systems with strategic outcomes, has been "clinical engagement". However, clinical engagement during product development has been held at arm's length (Protti, 2003). Clinicians have eventually

been invited to become 'product champions' for pre-structured, 'off the shelf' products. In that role, they are 'opinion leaders' in favour of the planned change rather than leaders in understanding the organisational realities that hinder consensus. Attention is focused on the machine and the creation of political support.

If clinicians have not been engaged with the National Programme (and some of them *have*), they are certainly engaged with the practicalities of day to day clinical practice and its accomplishment. The National Programme could have been led by this engagement.

Suppose, instead of a strategic, instrumental orientation, focused to administer the prescription of e-booking, e-prescribing and electronic patient records, as an imagined cure for organisational symptoms, the National Programme had taken one of the alternative orientations identified by Hirschheim, Klein and Lyytinen (1996).

An "interpretive, sense-making" orientation would have unearthed and explored the social and cultural foundations for diagnosis and consensus between managers and clinicians in relation to IT systems instead of relying on economic rational foundations. Enthusiasm for standardised clinical methods and clinical pathways reflects deeper values such as the autonomy of the practitioner who, knowing the overall plan, can intervene in ways that are orthodox and safe and that remain within the practitioner's competence, without waiting for a formal instruction. Had the expansion of human resource been a primary aim, attention could have been directed to identify all the other ways in which information systems in the clinical workplace could contribute to this goal. Standard, structured clinical methods would then have been a resource as well as a constraint for action.

A "discursive, argumentative" orientation might have taken a Foucauldian turn, accepting asymmetry of power between managers and clinicians as inevitable, then seeking to identify and mitigate sources of asymmetry based on Giddens' (1984) "facultative" (material resources controlled by managers) or "authoritative" (knowledge) resources, controlled by clinicians.

The alternative would have been to follow the direction set by Habermas and developed by Klein, exposing potential sources of conflict and to exploring these fully and equitably before taking conclusive action. Here, the researcher wishes to emphasise conflict in terms of poorly-aligned ideas rather than polarised conflict between personalities or power groups.

Had a systemic approach been adopted, the primary focus would not have been on persuading the patient to accept the prescribed system. Instead it would have concentrated on careful diagnosis before the specification of a remedy.

For example, alongside the need for effective bed management, to alleviate pressures in the Emergency Department, the 'rich picture' would also have revealed individual clinicians on the ward balancing the competing priorities of multiple patients in a complex task environment, as in Figure 6.4.5. The world view (Checkland's "Weltanschauung") would have been that it is better to consolidate tasks than to allow them to proliferate and the desired transformation would have been to convert a complex task environment into one less complex, where more could be achieved for less effort, using the information system as a lever.

The feasible and desirable systemic response would not have been to add yet another task (bed reporting) to an already pressured environment but to facilitate and condense the various tasks associated with admitting and discharging a patient from the ward, in a way that incorporated the new task invisibly.

Within the National Programme and its implementation sites, understanding of the problem situation has tended to focus on the outcomes required by the upper echelons of policy making and management. The 'explicit managerial action' has been to promote the political aspects of clinical engagement without equivalent attention to practical aspects that might better have reflected the reality and requirements of the clinical workplace.

## 7.3 : REFLECTIONS ON THE PROBLEM SOLVER

### Perceptual Process

The Wanless report prescribed investment in information technology as a remedy for organisational ills. Trained in medicine, I have learned to equate expertise with technique, based on rigorous, 'scientific' thinking and method. Safe, defensible practice is based on accurate measurement and description and on prediction, deduced from established 'facts'.

It has been disconcerting to learn, in section 3.2.4, that the scientific model has feet of clay, even though the dominant mode of clinical scientific discovery is through Popper's attempted refutation of 'bold conjectures' in randomised controlled trials.

'Facts' are only provisional. They survive as 'facts' only because they have not yet been disproved.

My training in medicine has also taught me that medicine is an art as well as a science. Its claim to be an art stems from the capacity to explore, with patients, their bases for belief and behaviour and to adapt technique to circumstances.

Currently, good medical practice is characterised as 'reflective' practice, comparing what is done with what could or ought to be done. One learning outcome from the research has been to remind me that reflection focused on the refinement of technique ought also to be complemented by interpretive and critical modes of reflection. Bases of belief and behaviour can be explored and identified in the interpretive tradition, and exposed to ethical challenge in the critical tradition.

The science of information systems is heavily indebted to social science, where understanding is often understanding of the understanding of others (the 'double hermeneutic'). Critical realism recognises the importance of this understanding because the ideas and beliefs of others affect the material conditions of our own existence.

As recipients of new information systems, people in the NHS are being asked, in a process of clinical engagement, *how* the information systems are to be introduced. To answer this question properly, they need to understand their own understanding of *why* they need such systems and how the context of their use is likely to impact on the production of benefits.

**Values and Ethics**

Section 3.3.5 introduced the topic of an organisation's orientation towards its people (Hirschheim, Klein & Lyytinen, 1996). An organisation represents as much a collective of ideas as of people. Its internal conflicts are better understood as conflicts between ideas rather than, necessarily, between personalities.

A "strategic / instrumental" orientation is to treat people and ideas as objects, whose meaning is restricted to their relationship with a dominant ideology such as economic efficiency, clinical effectiveness or defensibility of practice.

An 'expert' practitioner must beware of this restriction and remember that an "interpretive sense-making" orientation can still be biased towards the terms of understanding dominated by *elite* decision makers.

Consciousness of an emancipatory orientation towards "discursive argumentation" allows people and ideas to be treated as ends in themselves, with unlimited potential for release of meaning in adaptive relationship with circumstances.

**Motivations and Prejudices**

Motivations and prejudices represent visions of change and defence against change. There is a tension between control and resilience.

The implication of an emancipatory orientation for information systems, organisation structures or clinical decision tools such as clinical pathways is that their integration can tend to be oriented towards control.

If such systems are to remain relevant, their internal consistency has to be moderated by sensitivity to contingent events. Their resilience will then depend on permissive zones of inconsistency or "articulation" (Berg 1999a,b ; Berg & Timmermans, 2000). Articulation allows individual elements to adapt to the impact of external events without disrupting the internal cohesion of the fluid whole. It is a form of "paradoxically invisible" (Berg & Timmermans, 2000) work that is performed, essentially, by human agents, interposed between the designed system of work and the contingencies that could not be anticipated in the design process.

## Reasoning Ability

Section 3.2.6 gave a brief account of Churchman's (1976) "inquiring systems". A Leibnizian system was an internally consistent set of rules. A Lockean system was based on convention, social learning and operation within social norms. A Kantian system took account that different conclusions might be drawn from the same evidence according to the ethical or cognitive filter brought to bear. A Hegelian system pitted one set of Kantian conclusions against another in a cycle of thesis, antithesis and synthesis. Finally, a Singerian system was progressively inclusive, "sweeping in" ideas about possibilities and potential, to contrast what is with what could or ought to be.

**Experiences**

These ways of contemplating the world from a detached position were then complemented by the insistence of Heidegger and Merleau-Ponty, that our appreciation is always an experiential one. The world is there before we are and we appreciate it only through beliefs and language that are impregnated by the ideas and experiences of our predecessors.

**Knowledge and Skills**

The researcher has acquired knowledge of a variety of models and techniques related to information systems strategy, design and development, implementation and evaluation.

The associated skill is to apply this knowledge in a way that is contextually sensitive, ethical and aware of the undercurrents of conflict between general and unitary (global) pronouncements and the peculiarities of a particular (local) situation or occasion. In a world that is always there before we arrive, these sets of knowledge and skills are always 'in relation to ……… ' some situation or context.

**Structuring Processes and Methodologies**

Section 3.3.10 made the point that structured methodologies represent processes of abstraction and improvisation.

Abstraction provides the selective emphasis and punctuation that constitute the methodology and distinguish the theory from the actuality of practice.

Improvisation represents the methodology user's fluent accommodation between his perception of the fluid problem situation, within which the methodology is applied, and the pattern offered by the methodology considered as a whole.

## Roles

Avison and Wood-Harper (1990 : p.270) suggest the four roles of the expert, the facilitator, the emancipator and the class warrior as alternative archetypes of the information systems analyst. Each of these has a different ethical stance in relation to people in the problem situation, as contemplated externally. The expert and the class warrior represent competing definitions of duty. The facilitator is a utilitarian. The emancipator is a promoter of individual autonomy.

To complement these portrayals of the analyst, I wish to suggest two metaphors to describe the information system user.

The "tame lion" describes the user whose energy, actions and potential are captured, controlled and restricted by a dominant agent – the lion tamer. The lion is just a part of the lion tamer's strategic problem situation.

In contrast, the "juggler" is an autonomous performer (a problem solver). This metaphor alludes to Heidegger's "hermeneutic circle" (see Crotty 1998 : p.98).

The juggler and the props he will juggle with - balls, Indian clubs or flaming torches - (the elements of the problem situation) initially represent two clear and distinct ideas. Suddenly, the scene is "thrown" into action as the performer "leaps" into the hermeneutic circle and the elements assume a systemic relationship.

Now, the man and the tools of his trade are inseparable from each other and from the fluid action of juggling (the problem solving methodology), a continuous, iterative accommodation between appreciation of the dynamic situation and formulation of the next in a sequence of fluent actions, each of which transforms the situation anew.

## Models and Frameworks

Section 3.2.9 set out the case for critical realism as a unifying paradigm for information systems. As a framework for thinking, critical realism pursues a model of cause and effect which is "generative" (Pawson & Tilley, 1997 : pp.33-34) because it adds content in the form of context-sensitive mechanisms, to otherwise vacuous, "sequential" cause and effect relationships, eschewed by logical positivists. The associated methodology is neither induction nor deduction but "retroduction" (Mingers, 2004a), posing the question, "what might the world be like for this set of events to have occurred ?"

We can turn this question around and ask, "could this set of events have occurred *in a world like mine* ?" Readers of clinical papers are encouraged to ask themselves whether the population and setting described in a clinical study are sufficiently similar to their own situation for the results to be generalised. Clinical researchers are encouraged to

ask, "is intervention A better than intervention B, in producing outcome X, *in a patient like mine* ?"

Even though a 'silo mentality' tends to be disparaged in favour of a unitary, corporate appreciation of organisational needs, it remains highly relevant for any future user of an information system to ask : "what must an information system be like, to succeed *in the world as I appreciate it* ?" ; and "should I appreciate the world in more than one way ?".

# 7.4 : REFLECTIONS ON
# THE PROBLEM SOLVING PROCESS

The problem solving process within the Trust, as within the National Programme, has been to institute a process of clinical engagement. Institutionally prominent individuals have been recruited as the implementation team's ambassadors to the wider organisational public. Their role is to generate enthusiasm for the project and to explain the process of implementation and the organisational benefits that will accrue. Their activities are reported with appropriate journalistic comment in the organisational media, with the effect that the authentic views of the figurehead can become difficult to distinguish from organisational propaganda.

## Perceptual Process

The natural assumption behind the process of clinical engagement is that the introduction of the new information system will be an organisational good because its intended strategic effects will be benign and dramatic.

However reasonable this assumption, it glosses over any 'understanding of the understanding' of the global or their local problem situation by the new information system's future recipients and users.

The researcher has been motivated by the theme that future users need to have this understanding in order to comment and contribute usefully to the process of organisational dialogue clinical engagement ought to represent. Sections 6.4 and 6.5 of the research contribute by shifting attention from organisational administration onto the preoccupations and concerns of the clinical workplace.

## Values and Ethics

The Trust's organisational development strategy, "The Blackpool Way", outlined in section 5.4.0, represented the willingness of its executive management to reappraise their relationship with the workforce. The Trust needs to encourage a clear understanding by future users, of their own local problem situation alongside the corporate perspective if it is to avoid regressing towards an orientation that is "instrumental and strategic" (Hirschheim, Klein & Lyytinen, 1996).

Sections 6.3.2 and 6.5.2 of the research employed the framework from structuration theory to illuminate the social context of a congruent implementation and afford an "interpretive and sense-making" orientation.

The implementation of the local information programme provides one opportunity to develop a similar understanding of the social context in pursuit of a "discursive, argumentative" orientation towards the emancipatory release of its human potential.

Sections 4 (Provider of Choice) and 5 (Great Place to Work) of chapter six placed the values of efficient production in the context of humanistic values such as the ability to organise one's own work in the context of a team effort within a managed environment.

### Motivations and Prejudices

The information programme represents a highly visible disbursement of public funds, for which named officials will be held to account. There is a clear tension between the need for financial probity and control, to ensure that correct steps are taken and that project milestones are accomplished within the budgets and timescales, and the need to ensure that the capital investment produces effects that are demonstrable, relevant and worthwhile.

If only for this reason, it is imperative to pave the way, during implementation, for a positive evaluation at the conclusion of the implementation process.

The message from the critical realist approach to evaluation is that a general evaluation of the new information system will result from the sum of immediate, experiential evaluations, based on individual occasions and situations, made by users as they interact with their information systems. These evaluations constitute users' understanding of their information systems. Part of the implementation task is to understand this understanding.

## Reasoning Ability

Because the implementation is as much a social as a technical accomplishment, the information project needs to be conducted in a fashion that combines technique and rationality (Leibnizian reasoning) with sensitivity to local social and cultural conventions (Lockean reasoning).

Each appreciation of the information system takes place in the context of a situated point of view and opens the way for new appreciations to be developed (Kantian reasoning). For example, section 6.3.3 presented alternative appreciations of the care pathway concept, from the different ethical standpoints of the operations manager (efficiency) and the resource 'gatekeeper' (equity).

By synthesising alternatives and showing how even the resulting resolution is only partial (Hegelian reasoning) horizons are widened further. Section 6.3.3 also shows how a synthesis between the values of the operations manager and the resource gatekeeper for imaging might be confounded by a new conflict with the resource gatekeeper for theatres.

The desire to make progress towards the ideal of absolute knowledge may be impracticable. Although progress is made by critique, critical realism reminds us that local effects of place and time always have the potential to intrude on general propositions.

## Experiences

The new information systems are to be relevant and instrumental to major strategic objectives and to local operational improvements, both seen as remote but attainable ideals. However, sections 6.4.4 and 6.5.3 stress that they are also to be relevant to the experience of conducting clinical work, where the care-giver's primary focus is not on the information machine but on the patients to be treated and the tasks that surround this activity.

Clinical engagement thus needs support as much from an experiential as a contemplative appreciation. In an experiential appreciation, attributes of the information system such as 'user satisfaction' cannot be seen as pertaining to the information system alone but to each new instance of the interplay between three factors.

The first of these is the problem situation. This is always a specific instance of a particular situation and occasion, when model order and contingency collide as in section 6.4.4.

The second is the user as a participant in a problem situation, of which the information system itself is only one component. The second half of section 6.5.3 describes the

clinician receiving auditory and visual cues from colleagues and from the work environment as well as from the information system.

The third is the user's problem-solving approach to the problem situation. As in section 6.5.4, "*when the department gets busy, the process goes*". The users of the information system are aware of processes, pathways and information flows as routines but are not bound by these. Instead, they deploy them fluently in an improvised fashion, in order to adapt to the contingent needs of the problem situation.

## Knowledge and Skills

Where the knowledge and skills required for contemplative appreciation involve abstraction, generalisation and prediction, those required for an experiential appreciation diverge in the opposite direction, seeking specific detail, difference from the norm and retrospection.

These two forms of appreciation are complementary and represent different approaches to structuring and methodology formation.

## Structuring Processes and Methodologies

Abstraction is the selection of special detail from the general. It follows that a residue of detail remains and that selection can be conditioned by criteria. Models of implementation and clinical engagement in practice can, therefore, have no absolute

validity. Their validity is qualified by the criteria on which abstraction is based and can only derive from their repeated usefulness in practice. The authors of Multiview (Avison, Wood-Harper *et al*., 1998) argue that each problem situation is historically determined and its participants have specific technical, organisational and personal characteristics that cannot be ignored as a generic methodological approach would.

Ciborra (1998a) points out that methodology is an abstraction from the performance of problem solving and that improvisation, applying what is "ready to hand" to the realisation of future possibilities for the present problem situation, ought to occupy our attention because it is the "fundamental" and the empirically observable model of actual practice (Ciborra, 1999).

## Roles

Awareness of the various political and ethical ("expert", "facilitator", "emancipator", "class warrior") stances towards the information system's future users, that have been suggested for the information systems analyst, can help the product champion to subject his own role in clinical engagement to critical appraisal.

An emancipator's "argumentative, discursive" orientation towards information system users has inherent ethical strength but its practical value may be enhanced if it is allied to an empathic appreciation of the participant in the clinical problem situation.

## Models and Frameworks

The theme of this section has been to promote the process of diagnosis over the administration of a remedy for organisational ills.

At the same time, the researcher's orientation is towards realism rather than idealism. If the idealist branch of critique points to alternative possibilities of emancipation, the realist question is always, *what might the world be like for these positions to be attained* ? (Mingers 2004a).

Pawson and Tilley (1997 : pp.31-34) argue that simple (successionist) models of cause and effect provide limited explanatory detail to inform this question. Generative accounts ("conditions of possibility" : Monod, 2004) of causation, based on the interplay between mechanisms and context of operation, provide greater insight.

Highly structured models and frameworks based on the delivery of material outputs or broadly-defined organisational transformations adopt an orientation towards information systems users which is instrumental and strategic (Hirschheim, Klein & Lyytinen, 1996).

A diagnostic approach requires a different, empathic orientation. This is also a therapeutic approach. Its components include "interpretive sense-making" and "discursive argumentation".

The inclusion of Multiview within a Realistic Evaluation framework thus provides the process of clinical engagement with a diagnostic dimension that a programmatic approach overlooks.

The approach described here is highly flexible. A substantial part of the research process was to find appropriate ways to model the *problem situation*, the *problem solver* and the *problem solving methodology*. Modelling of form allowed exploration of content.

After Checkland (Checkland & Scholes, 1990), the *problem situation* and the people it contained were modelled in terms of its social and political as well as its descriptive and rational content.

The *problem solver* was modelled in four guises, representing two alternative *a priori* positions (the "expert" and "warrior" perspectives of Avison & Wood-Harper, 1990), one emergent perspective based on a unitary synthesis of emergent arguments (the "facilitator") and a contrasting emergent perspective based on the incompatibility between arguments and the exploration of difference.

The use of these alternative perspectives contributed an *interpretive scheme* and enabled prescription of action (*the problem solving methodology*) to be supported by the diagnosis and critique of organisational relationships.

# 7.5 : ACADEMIC CONTRIBUTIONS AND LIMITATIONS OF THE RESEARCH

## 7.5.1 : Theory

**Ontology**

The research has been influenced by the critical realist belief that the world contains discoverable things that produce observable effects when they interact with other things under the influence of surrounding factors.

The research has also recognised the social constructivist belief that people understand their situation, location and history in terms of ideas.

Ideas are 'socially constructed' when they reflect prior personal and (shared) cultural experience. An idealist ontology becomes a critical idealist ontology when it is realised that ideas and explanations of ideas rely on fallible understanding : defensible but also relative and never absolute.

Nevertheless, this understanding influences the way people adapt and react to their situation. Their behaviour and its effects are directly observable and are not, themselves, affected by the observer's understanding, means of investigation or powers of description, even if the deficiencies of these three elements limit the observer's capacity to express and understand fully that which has been observed.

In this way, the research has also recognised that the limited apparatus we bring to bear reduces these observable things to ideas. Given different apparatus we might develop different but equally defensible ideas. Yet, these alternative ideal constructions are equally capable of producing real effects

Critical realism thus recognises the compatibility of alternative scientific, interpretive and critical views of the world and, therefore, as argued by Mingers (2004a,b : see also Monod, 2004 and Klein, 2004), can "provide an underpinning philosophy" for information systems generally and clinical information systems in particular.

In conformity with critical realism, the research has also been influenced by the belief that sequence is a necessary but insufficient to link the intervention of an information system with its outcome. Causation is better explained by generative than sequential mechanisms, generative mechanisms being susceptible to modulation by identifiable contextual factors. The 'critical' component of critical realism presents contextual modifiers as local, situated and occasioned rather than universals.

This means that the general outcome of a global intervention, such as a National Programme for Information Technology, has to be understood as the summation of local effects, generated in myriad, differentiated sites on multiple occasions, spread over time.

Local effects call into question the relationship between man and machine. The research has distinguished between the view of man and machine, abstracted from the real world into separate zones of Cartesian space, and the view derived from Heidegger and Merleau-Ponty, that Being is nothing unless it is "Being in the World", where the world

is an endless succession of 'now's', each deeply situated in past and surrounding events that not only limit but also enable, the spectrum of 'future possibilities' : that is to say, the next thing the information system might be used for, by an individual, immersed in one problem situation which will rapidly merge into another.

**Epistemology**

The strategy, design, implementation and evaluation of information systems have conventionally reflected a hierarchy of clear and distinct, 'hard' ideas.

The research has demonstrated the coexistence of 'hard' and 'soft' strands of thinking as intimately related aspects of an irreducible whole. It has recognised that information systems represent a 'hard', rationalistic and reductive intervention in an organisational context with 'soft', cultural aspects that value both the quality and the quantity of clinical care and that value computing alongside care-giving. The different balance of values that exists in different parts of the organisation confers a political aspect alongside the cultural.

The positivist epistemology of clear and distinct ideas, that allows the concept of structure, rigidity and the determination of social behaviour in a system of rules and regulations, has been accommodated alongside an epistemology that negates any kind of determination.

This is the antipositivist epistemology of hermeneutics and phenomenology, ethnomethodology and symbolic interactionism that has led Giddens (1984) to develop

the concept of structuration : the regular association and dissociation of social structural elements that enable, as well as constrain, the actions of knowledgeable social actors as they navigate their fluid and dynamic situation.

The concept of Actor Networks is a further development of these epistemologies, emphasising the flattening of hierarchy, the equal influence of inanimate objects alongside people, the simultaneous membership by individual elements of multiple sets of associations, and the 'inscription' of rules and regulations by the system's originating actors, to regulate the behaviour of the system's diverse groups of recipients.

The research has illustrated the uneasy relationship between computing and care-giving, understood from the positivist perspective as a conflict between clear and distinct ideas. Actor Network Theory affords an opportunity to complement and deepen this understanding from an interpretive and critical perspective.

Previously, Walsham (1993) has deployed structuration theory (Giddens, 1984) to expose critically, social relationships at the level of processes and groups. The focus has fallen on some aspect of the IT system (strategy, design and development, implementation or evaluation), epitomising social action in an organisational context, linked by an appreciation of the fluid and dynamic nature of social structure.

In the present research, the focus has fallen on the individual, spanning more than one network of relationships as he navigates constantly from one overlapping moment of demands, constraints and contingencies to another. We have understood how staff in the clinical workplace switch affiliation fluently between the formal, context-free rules

'inscribed' in the information system and their informal, cultural commitment to the emergent priorities dictated by ongoing events in the workplace.

Walsham (1993) was concerned with the use of communication, power and sanction to mediate the power-laden relationship between organisational groups during relatively slow process cycles. Here, we have been more interested in the emergent balance of ideas as they have affected individuals, conducting tasks during relatively rapid, minute to minute changes of context.

The research has illustrated the difference between a conceptual-logical diagnosis based on a user, confronted with a device to enter and display clinical data, and one based on a doctor or a nurse, confronted by multiple patients at different stages on multiple patient journeys and by a collaborative working environment.

In the first case, the user has been presented in a closed relationship with the data device, through which, in terms of Actor Network Theory, the user was 'enrolled' by the management cadre to provide Management Information from Operational Systems. The primary concept has been the machine.

In the second case, the user has been presented in an open-systemic relationship with the patient-oriented context of clinical work and has derived information from visual and auditory cues and word of mouth exchanges, as well as through the agency of the machine. The machine's prescribed use is 'translated' into the overall context of the preoccupied user. The primary concept has been the user.

**Axiology**

The situated individual understanding described above is open to modification when alternative aspects of context are thrown into focus. This allows ideas that were not initially privileged to gain expression (Deetz 1996). The present research represents a liberal and emancipatory (Kleinian : see Table 3.3.3) stance that can challenge and resist the existing balance of ideas in order to explore fresh possibilities.

The research has drawn attention to alternative constructions of clinical engagement. From a managerial perspective, clinicians will be 'engaged' in committing themselves emotionally, intellectually and practically to the successful implementation of the information systems project, intended to provide Management Information from Operational Systems. From a clinical perspective, computing will fit snugly with care-giving.

On the one hand, engagement can be seen as the strategic and manipulative winning of clinicians' hearts and minds towards the successful emplacement of the equipment in general terms. On the opposite hand, the prognosis outline ought to be that the new equipment will inherently appeal to the practical values that appeal to each individual clinician, on each specific occasion when he or she turns towards and away from the machine.

## 7.5.2 : Methodology

The critical realist approach focuses on contextually modulated, generative mechanisms that link an intervention with its outcomes. In the form of the Realistic Evaluation framework (Pawson & Tilley, 1997), this approach requires the researcher to construct an account of the generative mechanisms he suspects might be at work and then to test these ideas in consultation with the stakeholders he will interview.

Pawson & Tilley suggest an explicit way to construct their emerging account in terms of Context, Mechanism, Outcome configurations.

The present research has demonstrated how the Multiview approach, essentially a social constructivist approach, can structure the exploration and addition of detail to the configuration of Context and Mechanism, within a critical realist framework.

Multiview expresses the Context as a complex of nested and intersecting problem situations, in which problem solvers with different orientations pursue individual and collective agendas. In the research, this context was represented by a specific, simplified model of technology assimilation in a large organisation (Andreu & Ciborra 1996).

Within any region or level of the Context as described above, Multiview has allowed the researcher to construct Mechanisms in terms of four elements : a local problem situation, the actors within the local problem situation (represented as ideal argumentative types), a way of presenting aspects of the problem situation (the "interpretive scheme") and the way problem solvers are observed to interact

constructively and productively within the local problem situation to produce effective outcomes (the "emergent" problem solving methodology or process).

The authors of Multiview derived their ideal typical models of the analyst-problem solver from empirical work by Hirschheim and Klein (1989). Their "warrior" perspective derived from the industrial relations climate at a particular point in history. Although the point has not been developed fully here, the research has also shown that the four archetypes can also be constructed from a different foundation, in Deetz' (1996) criticism of Burrell & Morgan (1979).

Multiview allows problem solvers to construct the world view through which they experience their problem situation. This is afforded by a specific "interpretive scheme", which provides five aspects, sometimes expressed in terms of social analysis, social design, technical analysis, human-computer interaction and technical design (Vidgen *et al*., 2002 : p.32).

The research has shown how Multiview, initially intended as a design methodology, can be adapted for another purpose by replacing the supplier's lens and substituting one more suited to the specific situation.

In this case, the interpretive 'lens' has switched between only two aspects, contrasting a world view consisting of clear and distinct ideas and an alternative world view in which elements fall into systemic relationship as parts of an irreducible whole.

Deployment of the Andreu and Ciborra (1996) model has focused attention on the way that the strategic decision to implement an information system depends for its success

on the ability of operational, front line clinical users to reconcile the demands of computer use with those of their surrounding work.

Through its use of the Andreu and Ciborra model in association with the interpretive 'lens' afforded by the researcher's own modification of Jayaratna's (1994 : p.59) modification of the Leavitt model, the research has illustrated the opposition between a view of the new information system from the top of the organisation and an alternative view from the operational, grass roots level.

At the top of the organisation, it is seen as a specifically aligned tool, instrumental to process change and the delivery of strategic information from one administrative structure or group to another. At the operational, grass roots level, it is seen as a resource, absorbed and used flexibly, in relation to other resources and people, by individuals, to accomplish the tasks of care-giving within a local, clinical problem situation.

The research has identified the need to reconcile two world-views, represented respectively by an "operative" system that supplies management information from operational systems and a "supportive" system (Malmsjo, 2006) that assists individual action as well as cooperative interactions, within the direct or the extended healthcare team in relation to any given patient.

It has identified that the transformation to be accomplished by such a system is the mediation between one world view that constructs the user as a conduit for data that links an operational work environment to a control environment, and another that constructs him as a team member who is constantly sampling the task environment from

a mix of data sources and using the computer as only one of several communication channels.

### 7.5.3 : Practice

The scope and scale of the research were limited by the resources I could bring to bear as a single-handed, self-funded novice researcher. Contact with respondents has been limited by the informal status of the research and by my need to attend to the demands of a full-time clinical post, with a demanding on-call commitment.

To provide detail from a wider range of implementation sites within the Trust would have been, in effect, to initiate the information project before it had become a reality for anyone other than the myself.

The research has been based on interviews in which various people in the Trust have explained how information systems contributed to their life at work or might do so. More detail might have emerged from a combination of interview-based research with triangulation against a detailed and deliberate participant observation.

Silverman (1998) pays greater attention to what people can be observed to do in practice than to "how people 'see things'". Direct participant-observation was not feasible for a senior clinician, whose presence in the study field was sufficient at any time to bring him out of the research role and into the direct clinical management of a patient.

Silverman (2006 : p.230, 260-265) demonstrates the richness of information available from the analysis of intonation, gesture and concurrent activity as adjuncts to its literal interpretation of naturally occurring talk. His first cited example refers to a person being asked awkward questions on television. The second refers to a small team of controllers managing operations of the London Underground from static workstations.

Video recording of interactions between staff, patients and computers would, in the particular research environment studied, have encountered sensitivities about confidentiality and consent for patients as well as for staff. Static video recording would have failed to display many of the actions of highly mobile staff. The presence of a camera operator following individual staff members would have been intrusive and would not have been tolerated by all staff or all patients. Whilst these techniques have the potential to add significant depth of detail to the findings of interview-based research, they are just not feasible in every context.

In the event, I consider that the interviews I have undertaken supply sufficient information to demonstrate the modification and improvised application of Multiview to "relate particulars …… to very abstract categories" so that "unique instances can be related to ideas and concepts that can apply to multiple situations" (Klein & Myers, 1999) that typify the need for computing in the clinical workplace, the alignment of local values with computing, the scope for an alternative *a priori* rationale for computing and the surfacing of conflict between computing and care-giving.

The research has also respected the process characteristics set out by Baskerville & Wood-Harper (1998). It has acknowledged and explored "the complex, multivariate nature of the social setting" and made "highly interpretive assumptions" about

observations, modelled around a rigorously defensible framework of ideas. The research represents an explicit intention to intervene in the problem setting by providing a framework around which future users of the information system can develop their appreciation. This framework has allowed the change process to be understood in its social setting.

Although participant observation has not been employed as a formal research technique in the present research, Baskerville and Wood-Harper require only that the social setting be observed and experienced from within. My status as a full time clinical professional has allowed me to exercise the lesser role of "participative" observer, as well as allowing me to function, from my own circumscribed professional position, as a full participant.

As a novice, it was not reasonable for me to expect the Trust Executive to promise that the findings of my research would be acted upon. In that sense, the research has not fulfilled the first of the five "principles of canonical action research" laid down by Davison, Martinsons & Kock (2004). The fourth principle has not been fulfilled because the organisation is only just preparing its programme to bring change about.

However, the research process has fulfilled the other criteria by iterating between examination of theory and observations in the field. Its theoretical framework has been explicit. This reflective chapter addresses the last requirement, that learning about the problem situation and the theoretical framework should occur.

The research has respected the other quality criteria identified by Klein & Myers (1999) for interpretive case studies. The social and historical context is explained.

Interpretations have been exchanged between the researcher and participants in the problem situation. The philosophical basis of the work has been discussed thoroughly in the literature review, such that the researcher's initial functionalist inclination has been modified during the course of the research. There has been a deliberate appreciation of multiple interpretations of the 'problem situation' and the researcher has remained suspicious of his own interpretations, seeking refutation as well as confirmation through his choice of respondents and a deliberate search, following Deetz (1996), for dissensus as well as consensus between the content of one interview and another.

Although I have been able to bring together a set of relevant concepts, relevant to a putative information systems project and to demonstrate how they can be applied to five real-life concerns within the Trust, it is a limitation of the research that it was conducted before the Trust had announced its information programme to its clinical staff.

The research approach developed here will not produce its most useful findings until it has been thrown into a relationship with groups of individuals, who realise fully that they are faced with the imminent prospect of an actual information system that will be funded and then either designed or purchased off the shelf.

That is to say, the research approach needs to be evaluated in a real problem situation, with problem solvers who are clinicians and managers with limited informatics skills.

Without the critical capacity and conceptual framework to express their own situation, these internal problem solvers or problem owners will be ill-equipped to express the relationship between the information system and their work that will best help them to provide high quality healthcare to patients.

The primary purpose of the research has been to provide the means to enable situated learning to take place, about the relationship between a new information system project and the context in which it is to be enacted. Confidence, in the ability of the research approach developed here to deliver this learning, stems from the action research orientation of one of the major components of the approach (Multiview) and its demonstrated success in other settings.

## 7.6 : DIRECTIONS FOR FUTURE RESEARCH

In their study of "the impact of e-Health on the quality and safety of healthcare", Car *et al*. (2008 ; p.23) state : *"There is need for further research encompassing design, implementation and adoption considerations in relation to e-Health innovations"* and *"There is very little rigorous evidence demonstrating that these technologies actually improve either the quality or the safety of healthcare."*

The reasons they identify include :

1. Weakness of experimental design

2. Unrealistic research timescales

3. "Naïve assumptions that these technologies will be effective in all contexts"

4. Failure to involve end-users

5. Failure to pay adequate attention to socio-technical factors.

These authors recognise an important objective, to *"allow a detailed appreciation of relevant contextual factors that might help better understand the reasons for the success or failure of the intervention to emerge and also, where found to be successful, to allow an assessment of the likely generalisability of the intervention to be made"*.

Amongst their recommendations, Car *et al*. include (p.32) *"the development of a methodological toolkit to facilitate evaluation of e-Health applications throughout all aspects of the development and deployment life cycle of these technologies"*.

Greenhalgh *et al*. (2009) identify "three areas where no more research will be useful" :

1. Simplified experimental studies based on functionalist and determinist assumptions that imply cause and effect relationships between interventions and outcomes

2. Poorly-contextualised attitudinal surveys

3. Under-theorised studies of "failed" or "successful" EPR projects.

The present research has opened up the way to respond to each of these criticisms. It has shown how Multiview can be applied and adapted, within a constructive plan of research, based on critical realism and Realistic Evaluation.

The approach developed in the research can supplement experimental research on healthcare information systems, aimed to test hypotheses about their effectiveness in unrealistically controlled situations, because it can provide useful local learning, about *"what works for whom in what circumstances"* (Pawson & Tilley, 1997 : p.144, 213).

The approach focuses on context before it makes recommendations for change and it provides a theoretical basis to understand, in depth, the contextually conditioned, operation of generative mechanisms that can underpin accounts of 'success' or 'failure'.

Whichever methodology might be chosen from the toolkit suggested by Car *et al.,* it must never be allowed to become 'a hammer that makes everything else look like a nail'. Instead, the future research need is for an approach that develops the researcher's critical understanding of the problem situation, so that the research methodology can become a device that opens up, rather than restricting, deep and critical insight into the problem situation.

How should such research be focused ? Greenhalgh *et al.* (2009) identify seven "key research areas" which include :

1. *"Appreciating situated micro-practices" : "the 'hidden work' of those close to the patient"*

2. *"A systematic review is needed on how information systems in health care and comparable settings might be co-designed in the workplace (i.e. on the proactive application of interpretivist and recursive approaches to maximise the socio-technical fit of such systems" ......... "we found very few published studies in which a sense-making or soft-systems approach was used prospectively in action research or comparable participatory designs."*

3. *The dramatic differences in success between "off the shelf" (commercially developed) and "home-grown" EPR systems ……… "whether, and in what circumstances, "small is beautiful".*

4. *Unsanitised accounts that disclose the realpolitik of EPR projects*

5. *The mismatch between what is known about EPR in organisations and what many policymakers assume is known".*

The first of these areas, in effect, addresses Berg's "articulation work". Articulation work is the "situated micro-practice" required from users to overcome the disconnect, between information system use in designer's theory and information system use in work practice, situated where doctors and nurses interact with each other to treat patients. The present research has distinguished between information technology applied to the relationships between groups and processes, and its relationship with the tasks of individuals in a collaborative work situation.

The second area depends on the further development of studies which, like the present research, incorporate methodological approaches, such as Multiview and NIMSAD, with a debt to Soft Systems Methodology and a primarily sense-making motivation.

In the third area, the suggestion that "small is beautiful" will yield more informative answers is better addressed by the question, "*why ?*" rather than "*whether*". The present research has been influenced by the idea, from Actor Network Theory, that each individual within the problem situation is simultaneously a member of other networks,

from at least some of which the other actors in the problem situation are excluded. Put simply, the conflict between computing and care-giving needs to be explored in research oriented towards conflict-surfacing before the foundation can be laid for a genuine consensus and an effective accommodation between these two polarities.

This leads us in to the fourth area, of "unsanitised accounts that disclose the *realpolitik* of EPR projects", where the ideas from Soft Systems Methodology, reproduced in NIMSAD and Multiview can provide a framework for a rich account of the social, political and socio-technical issues that accompany the logical and rational aspects of project and programme management.

Finally, all of these areas contribute to the fifth, which is "the mismatch between what is known about electronic patient records in organisations and what many policymakers assume is known". The combination of Realistic Evaluation and Multiview developed in the present research provides a potentially powerful vehicle to pursue this aim.

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# **C H A P T E R   E I G H T**

# **K E Y   M E S S A G E S   F O R   T H E   T R U S T**

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## **8.0  :  I N T R O D U C T I O N**

This document presents research, conducted in the Trust, to address the question, ***How can I equip myself and colleagues to understand and comment critically but constructively, on the design, implementation and evaluation of information systems, so that we can promote the successful assimilation of the National Programme for IT at our own place of work ?***

My intention throughout has been to generate insights that can usefully influence the development of information systems at my own place of work. Initially, this took a departmental perspective but, as the research has progressed, it has assumed a broader, more comprehensive scope. This concluding chapter of the thesis summarises the key messages I wish to convey to readers in the Trust where the research took place.

This summary can be regarded by the Trust as an internal consultancy document. In fact, it is more than this because it brings to bear an explicit methodological framework that has been developed in the environment where it will be applied, to assist the production of practical answers to important business questions. The combination of clinical, managerial and theoretical perspectives it offers entitles the document to be regarded as an example of practically oriented Action Research.

It is probably the first clinically initiated example of action research directed at the implementation of the National Programme in a hospital. As action research, it is focused on understanding from a position embedded in the implementation environment instead of simple observation from the sidelines. Where the purpose of much research is to attempt to predict or specify conditions for success or failure, the purpose of this work is to assist those involved in practical problem solving to navigate their way towards successful implementation.

In the Spring of 2010, the Trust is now on the brink of translating its "Vision"* project into concrete reality. Of the four information systems competency areas (strategy, design and delivery, implementation and evaluation), implementation and evaluation are now the principal challenges.

The Trust will be expected to evaluate its information project in order to justify its capital cost and demonstrate probity in the use of public funds.

However, the project will be a visible example for the wider National Health Service : first because of its aim to create the first truly paperless hospital in the United Kingdom and, second, because it represents the first procurement of an information system from a supplier outside the limited list of those contracted to the various "clusters" of the National Programme for Information Technology. It is, therefore, critical to the reputation and well-being of the Trust that the outcome of the evaluation process should be considered successful.

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* "The Vision Project" is the *soubriquet* of the Trust's "interim clinical solution" to the National Programme's inability to deliver products that will meet the information requirements of NHS policies that have raced ahead of the National Programme.

## 8.1 : E X E C U T I V E   S U M M A R Y

I have developed a framework (*SuperVision*) that will contribute to the continuous formative evaluation of the Vision project, from within as opposed to external, summative evaluation. The framework derives from efforts to link both the theory of information systems and the Chief Executive's Trust Wide Objectives with practical aspects of organisational management and clinical activity.

The Vision project is a visible capital and organisational development project as well as an IT project. Its cost, internal complexity, external dependencies and visibility to the wider NHS render it vulnerable.

The project has been managed by an external consultancy and an internal implementation team. It is seen as a potential enabler of strategic benefits which are necessary for the Trust's future resilience and competitiveness in an environment which is expected, in the short to medium term, to be stringent. Clinical Engagement has been seen as crucial to the project's success.

Initially, the project has been managed as an exercise in duly diligent, regulated procurement. Engaged clinicians have assisted as judges of the best-compliant system, judged against an Output Based Specification, supplied by a limited number of competitors from a world-wide market place.

A major theme has been the control of processes and procedures in response to regulatory targets and the drive towards evidence based medicine and the transparency of both the clinical and administrative dimensions of health care. Accordingly, the

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implementation process has centred around the elaboration and rationalisation of process maps which model the trajectory of a single, idealised patient along a unitary view of an idealised process. The clinical and the administrative aspects of control are not always clearly separated.

The risk from this approach is that behaviour at work is forced into conformity with a model of 'practice in theory' instead of allowing a realistic accommodation between 'theory and practice', that takes account of the contingencies the model does not anticipate.

A key element of the *SuperVision* model is to look critically at the way issues are seen by those involved.

At its simplest, the distinction is between two views of the world. The first sees processes and procedures executed by one group and monitored by an external group through the agency of information technology. The second sees individuals working within a team, communicating, experiencing and understanding their personal and mutual situation through other modalities as well as IT, so that they can adjust their tasks to a dynamic understanding of a situation in flux.

Clinical work will be enhanced if the workforce and its supervisors take a comprehensive view of quality that respects equally, each of its various dimensions. Clinical communication needs to be interpreted in terms of information received, interpreted, communicated and understood, rather than in simple data processing terms. The information system ought to be a springboard for individual initiative in support of the collective effort rather than an impersonal device to support 'controls assurance'.

These insights support a revised view of the project as an effort to appreciate the dynamic relationship between clinicians and clinical work. To understand the potential, for staff not to comply with the disciplines imposed by a new information system based on a theoretical refinement of collective practice, is to understand the conflict between computing and care-giving. The corollary is to ensure that the design and implementation of the information system minimises this.

In turn, this entails understanding how clinical staff deploy a variety of rules and social / professional conventions to determine, from instant to instant, how to draw the balance between attention to patients, to each other and to the computer as a device to support information sharing as well as data capture.

The way forward is to distinguish between "operative" information systems (that enable strategic control) and "supportive" information systems (that facilitate individual, personal contribution) and to explore the implications of the distinction fully before attempting a compromise between the two.

To support the emerging consensus, that 'socio-technical factors' are crucial to the acceptance of new information systems, we need to understand better, what these factors are. The modelling of process needs to be complemented by a focus on the modelling of an individual and at least two aspects of his work.

The first of these is the way tasks coincide during the routines of a typical working day. The second is the way individuals have to balance their commitments between computing and care-giving according to the evolving needs of a dynamic clinical situation.

These points are summarised in **Table 8.1.1**.

**Table 8.1.1 : Summary :** *SuperVision* **in Practice**

| Management Framework : | *Situation* | *Background* | *Analysis* | *Recommendation* |
|---|---|---|---|---|
| **Research Framework :** | | | | |
| *Problem Situation* | Visible and Vulnerable Project | A Regulated Procurement | Strategic Benefits depend on Individuals, Tasks and Technology | Appreciate the dynamic relationship between clinicians and clinical work |
| *Problem Solvers* | External Implementation Consultancy and Internal Implementation Team | Judges of the Best Compliant System | Four Kinds of Relationship between Managers and Clinicians | Explore Conflicts between Computing and Care-giving |
| *Way of Looking at Things* | Enabler of Strategic Benefits | Controlling Functional Processes and Procedures | Process Views *versus* Context View | Rationalise and Automate *vs* Support Knowledgeable Action |
| *Way Forward* | Clinical Engagement Programme | Process Mapping | Understanding and Facilitating Quality, Clinical Communication and Personal Initiative | Distinguish between "Supportive" and "Operative" Functions of Information Systems |

The structure of this report is outlined in the next section.

Practical Recommendations are summarised in Section 8.9.

## 8.2 : O U T L I N E

### The Structure of this Report

This report is structured as follows :

Section 8.3 explains the *SuperVision* framework.

Sections 8.4 – 8.7 consecutively present a discussion in the Trust's preferred form, outlining the Situation, the Background, my Analysis and my Recommendations.

Section 8.8 sketches out the way forward for the future.

Section 8.9 summarises practical recommendations.

## 8.3 : T H E *S u p e r V i s i o n* F R A M E W O R K

### 8.3.1 : Two Problems facing Evaluation

First, a variety of factor models purport to account for the success or failure of information systems in simple cause and effect terms, but do not explain how or why these factors operated. Factor theories identify conditions – executive commitment, supportive infrastructure, ownership, performance management – that are associated with information systems success or failure, but may not predict either outcome strongly.

Second, an attempt to explain successful or unsuccessful implementation on a cause and effect basis is likely to be confounded by characteristics of the Trust that are not shared by other institutions or susceptible to control or elimination.

## 8.3.2 : A Realistic Approach to Evaluating the Vision Project

Such 'factors' may be regarded as the contextual conditions that influence the other mechanisms that operate in a successful or failed information systems programme and that the realistic approach to evaluation sets out to identify.

Realistic Evaluation is a form of evaluation that avoids 'sequential' cause and effect assumptions and asks instead, "what mechanisms were at work in the Trust, to generate the outcomes observed from the implementation of a new information system, and what were the contextual factors that influenced (augmented, mitigated) their effect ?"

## 8.3.3 : Structuring Answers to Business Questions

We need a careful way forward, to provide a credible basis to answer this and other important business questions related to the Vision Project. Such a way forward is provided by the Multiview methodology.

This methodology recognises that the problem of implementing and evaluating the Vision Project is situated in a particular environment. It is a *problem situation*, whose clear structure is clouded by the contest between values (for example, clinical and

economic values). Local contextual issues tend to dictate, rather than adapt to, a solution that is appropriate locally rather than unique, general and universal.

Multiview is designed to provide a defensible way forward, through a complex problem situation where multiple interested parties each tend to make sense of the situation in their own way.

Participants in the Vision Project are would-be developers of the information system. They are, collectively, *problem solvers*.

Multiview allows Problem Solvers to be characterised in terms of two kinds of ideas and two kinds of argument.

Primary ideas are formed before the problem situation is entered. They may be reliable or fallible. In contrast, 'emergent' ideas are more reliable because they are formed from the evidence acquired during exposure to the problem situation.

Arguments are collections of valid ideas. They may converge with other arguments in a consensual process. Alternatively, they may diverge without immediately negating each other.

We can recognise four stances towards the problem situation.
- Agreement before debate
- Disagreement precluding debate
- Debate steered towards agreement
- Debate exploring differences.

Problem solvers cannot 'solve' the problem situation in any unique sense because the problem situation is complex and has no unique definition. We can only hope to provide a comprehensive way of describing its many aspects.

These aspects are both rational and social or political. That is to say, some sets of ideas converge in a rational sense. Other sets of ideas diverge and compete. The competition of ideas constitutes the political aspect and this aspect should not be reduced to a clash of personalities, interest groups or power centres.

Prescription for the problem situation is not sensible without an accurate plan of investigation and diagnosis. To provide a comprehensive way of describing its many aspects, we need, as problem solvers, to develop *a way of looking at things*.

The way we look at things and, therefore, the way we understand or interpret what we are doing, underpin a knowledgeable and careful engagement with the specifics of the problem situation that constitutes our *problem solving process*. This kind of understanding approach cannot be provided by a formal, pre-ordinate type of methodology because such methodologies deal in generalities rather than specifics.

### 8.3.4 : Son of Multiview : "*SuperVision*"

The hybridisation of Multiview with Realistic Evaluation promotes the critical, realistic and cumulative developmental intentions of both these approaches.

It especially fulfils the formative intention of Multiview, which places implementation and evaluation in systemic rather than sequential relationship.

This is fundamentally important for a large capital project, spread across the many sectors of a complex organisation, each of whose implementation phases must inform the next.

Given that the Trust's information systems project has been named "Vision", it seems appropriate to Christen the approach to evaluation and careful nurturing of the project suggested here, "*SuperVision*". However, there should be no doubt that *SuperVision* fully acknowledges its parentage.

## 8.4 : S I T U A T I O N

### 8.4.1 : The Problem Situation : A Project to Deliver Benefits

The driving force behind the Vision Project's implementation will no longer be the National Programme for Information Technology. It will be the Trust's need, as an institution, to survive the harsh economic stringencies that are expected to prevail in the next three year planning cycle, whilst conforming to constraints dictated externally. Prime amongst these is the Darzi Review and the associated QuIPP (Quality, Innovation, Productivity and Prevention) initiative (United Kingdom, Department of Health, 2010a).

The problem situation contains a relationship between Top Management, the middle management Implementation Team and the Front Line Staff of clinicians who are responsible not only to supply data to the information system but also to provide direct clinical care to patients (**Figure 8.4.1**).

**Figure 8.4.1 : The Problem Situation**
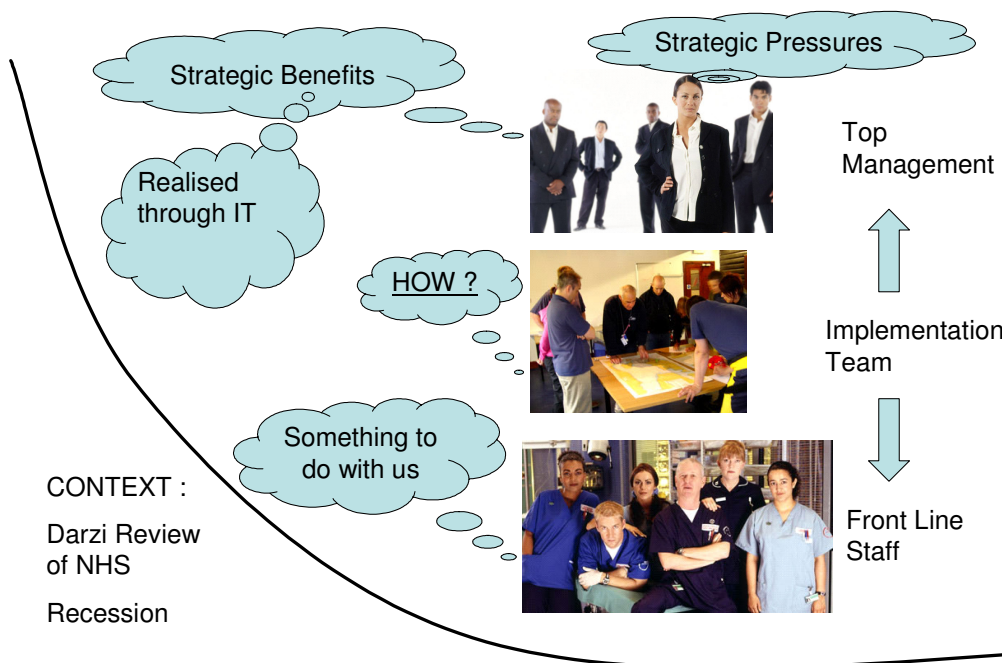


It is the responsibility of Top Management to navigate the Trust through its external environment. This is the context of the problem situation and its chief features in 2010 are the looming economic recession and the Darzi Review of the NHS.

The strategic benefits to be derived from new information technology are ultimately geared to assist this navigation.

The Vision Project cannot be considered in isolation from the environment in which it is to be implemented. Indeed, the QuIPP process is seen in the Trust as an overall envelope for synergy between Vision and other 'corporate enablers'.

These include imminent capital schemes (of which the building of a new Urgent Care Centre is one), the Trust's "Blackpool Way" organisational development strategy and its business change programme : of continuous improvement, focused on realisation of identified benefits and led by empowered managers and clinicians who will be encouraged to work across functional and disciplinary boundaries.

The Vision Project is thus destined to be just one component of a controlled organisational upheaval and its implementation is to be instrumental to the successful navigation of a wider problematic situation. The nature of the 'controlled upheaval' will be manifest in changes in the internal organisation of individual services, at the interfaces between services and in the corresponding governance structures.

### 8.4.2 : The Problem Solvers : An External Implementation Consultancy and an Internal Implementation Team

Responsibility to deliver the successful Vision Project has been delegated by the Trust Board to an Implementation Team, assisted by an expert team of external analysts.

The Implementation Team intervenes between the Trust Executive Team and the future front-line users of the new information system.

### 8.4.3 : Interpreting the Vision Project in Terms of Strategic Benefits Realisation

A defensible strategy for implementation will be provided by the Office of Government Commerce document, *"Managing Successful Programmes"*. This document builds on the structured and controlled management of projects provided by the PRINCE methodology. It is intended to overcome parochial thinking within an individual component project and to promote understanding of the broader enterprise.

*Managing Successful Programmes* (p.37-38) states :

*"Benefits management provides the programme with a target and a means of monitoring achievement against that target on a regular basis. The information provided by programme management indicates whether the programme is a success. ………To ensure that benefits are eventually realised, they must be positively managed from the start. The successful realisation of benefits requires active monitoring of programme and project deliveries".*

### 8.4.4 : The Problem Solving Process : A Clinical Engagement Programme

Benefits realisation will be monitored and controlled by the project team. The project documentation indicates that factor theory will be invoked, to identify conditions - such as the commitment of senior managers, provision of supportive infrastructure, establishment and dissemination of ownership or the imposition of "stretch targets" – that have been associated with success in well-managed programmes elsewhere.

A key factor for the successful implementation of the NHS–wide information programme is believed to be 'clinical engagement'. The Implementation Board contains one principal and several supporting 'clinical champions' for the project.

## 8.5 : B A C K G R O U N D

### 8.5.1 : The Problem Situation : The Vision Project as a Regulated Procurement

In Spring, 2009, unable to provide information required by a variety of stakeholders, and with no proven 'solution' yet available from the National Programme, the Trust Executive authorised the initiation of a tendering process to procure an "interim clinical solution" (information system) from a non-National Programme supplier.

An external consultancy was employed to oversee the procurement process according to the regulations of the European Union, manage procurement risk and ensure 'due diligence' as a defence against reprisals from any disappointed participant in the procurement competition.

### 8.5.2 : Problem Solvers : Judges of the Best-Compliant System

In Summer, 2009, as part of the procurement process, the consultancy prepared an Output Based Specification and representative groups of clinicians and managers were assembled to consider and approve the various sections of this document in short

meetings, conducted on the margins of their primary clinical or managerial duties. Amendments were reported back to the consultancy.

This process was completed promptly within a narrow timescale of a few weeks. Two providers remained in the competition and site visits were conducted in the late Summer of 2009, so that a small group of clinicians and managers could see the systems *in situ* and speak to clinicians in the host sites.

The rules of the procurement process required the implementation team and its clinical advisors to award the contract to the supplier who emerged with the highest marks in a formally-scored test of their ability to supply the Output Based Specification.

In the Autumn of 2009, the group and the procurement consultants met on two pairs of consecutive days : on the first occasion, to conduct final interviews with the two supplier-teams and, on the second, to score the match between the systems as they had been witnessed and the Output Based Specification document.

Those making the adjudication included middle managers from key clinical departments and two clinical consultants, selected for their interest in the project rather than for their access to the opinions of clinical colleagues.

### 8.5.3 : Interpreting the Information System as a set of Functional Processes and Procedures

The clinically relevant chapter headings of the Output Based Specification were as follows :

- Orders Processing

- Results Reporting

- Electronic Prescribing

- Emergency Access and Unscheduled Care

- Scheduling

- Clinical Documentation - Clinical Noting and Clinical Correspondence

- Decision support

- Integrated Care Pathways and Care Planning.

### 8.5.4 : The Problem Solving Process

At the close of 2009, the Trust's Change Management Facilitator and a senior member of the Planning and Performance staff began to meet groups of junior and intermediate grade doctors and nurses, with an analyst employed by the successful contractor, to introduce the implementation project and gain a preliminary understanding of current processes and data flows.

### 8.5.5 : The Problem Solving Methodology-Process Mapping

The implementation methodology adopted so far has been for the supplier of the new information system to engage clinicians in process mapping. Agreed maps of current clinical processes will be used by participating groups of clinicians to agree rationalised maps of future process configurations.

This activity has taken place against the background of an unrelated programme of "lean" initiatives, also intended to engage clinicians in process reconfiguration. Local instigators have changed their posts and the impetus has not been carried forward. The "lean" initiatives, also facilitated by external consultants, have been difficult to co-ordinate with the activities of the implementation analysts, owing to the analysts' location in another country, their limited availability to the Trust and the unrelated, scheduled commitments of these two sets of external advisors.

## 8.6 : A N A L Y S I S

### 8.6.1 : Diagnosing the Problem Situation

A key component of the Multiview methodology, described earlier, is to identify a repertoire of 'lenses' through which parties can agree to 'look at things' together. Two such 'lenses' are provided here.

'The first lens, provided by 'modern' organisational thinking is an impersonal lens that rationalises and organises the division of labour into organisational processes, groups and structures, mediated by technology : in the present case, information technology.

The second lens, provided by 'post-modern, 'critical' thinking recognises that organisations and processes are ideal rather than physical structures, and that any 'real' substance they possess is constituted by the individuals and their personal tasks that can be observed empirically. It is a person-oriented lens.

Looking at the problem situation through the person-oriented lens (**Figure 8.6.1**) focuses our attention onto the realisation of strategic benefits through the triangular relationship between front line staff, their information technology and the tasks involved in their clinical work.

**Figure 8.6.1 : Diagnosing the Problem Situation**
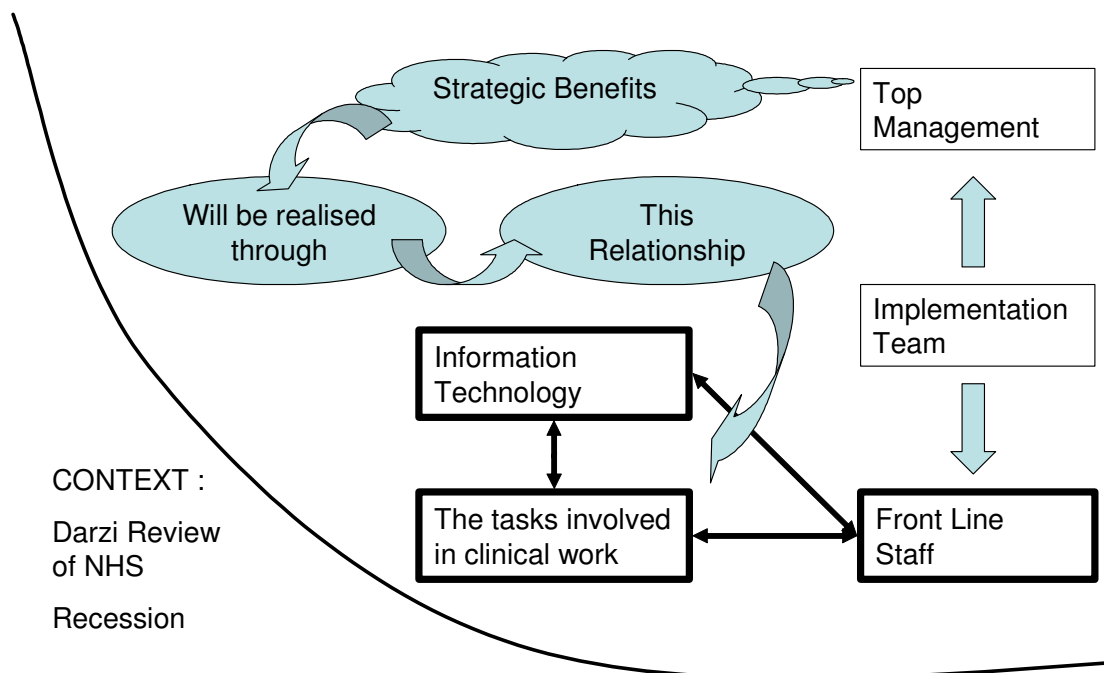
Front line staff perform tasks, of which some are clinical and others are informational. They organise their tasks to promote their own individual and collective efficiency as a team. Finally, they sometimes organise their tasks around an individual patient, for example, writing a discharge note, prescribing take home medications and planning after-care ; and at other times they provide similar tasks for a cohort of patients, as on a ward round.

## 8.6.2 : Problem Solvers

*SuperVision* identifies four stances :

### a) Agreement Before Debate (Agenda Definition)

The agenda for change is initially defined by the organisational sponsors of the project. The benefits to be realised are expressed in their terms, as strategic, economic-rational benefits, summarised as Quality, Finance and Performance.

The recession will impact on the Trust's ability to afford its present operating costs, mandating the rationalisation of processes and information flows. The costs associated with paper-based transactions are a clear candidate for elimination. The Trust has aspirations to be the UK's first paperless hospital.

The Darzi Review will require hospitals to publish "quality accounts" to complement their financial accounts. In the short term, quality accounts will centre around

performance metrics for a few key conditions : for example, readmission within 30 days of discharge after treatment for femoral neck fracture.

The Trust will be required to assemble various metrics to describe performance and its improvement. One set of potential evaluation criteria relates to the ability of the information system to capture these metrics.

**b) Disagreement Precluding Debate (Critique)**

For staff on the wards, data capture to supply financial and quality accounting is not the primary activity. Staff want to practise their clinical speciality and do their best for their patients. There is a tension between computing and care-giving. The quality that is measured through accounting techniques provides only an image of what is actually done that patients or professionals themselves value.

Greenhalgh *et al.* (2008) warn :

*"Much debate about the SCR [summary care record] is currently couched in the discourse of "benefits realisation"……… [institutions are] expected to develop and apply formal metrics to measure the number of lives saved, adverse reactions averted, duplicate tests avoided, or patients empowered per pound invested in the programme). This approach assumes not only that developing and applying meaningful metrics in this area is possible but also that such metrics can be established in advance and used to performance manage the public bodies charged with implementing the programme. Both assumptions are highly questionable."*

The message here is to promote a concept of quality that goes beyond detached observation, measurement and recording of the patient as a "clear and distinct idea" separate from the clinician. It is to promote the contribution of information technology to the clinician's closer, more careful and more successful engagement that 'situates' the clinician, the patient, the clinical problem as it is interpreted by both parties, and the clinician's intentions, in a systemic relationship.

**c) Debate Steered Towards Agreement (Aligning Values)**

The values of the executive and the workforce are aligned around the Trust Wide Objectives :

- Financial Stability
- Top Ten Performer
- Value for Money
- Provider of Choice
- Great Place to Work.

These were developed by staff in support of the Chief Executive's drive to rebuild the Trust's corporate ethos.

The financial security of the employing institution, faced with a £20m deficit, and the "Improving Working Lives" initiative were motivators for staff to collaborate with managers. The need to avoid loss of patients to other providers was a motivator for the executive team to project the aspiration of staff to deliver a high quality clinical service.

Financial stability requires accurate financial and activity accounting.

Better Information Groups are regarded as pivotal to the collection of activity and performance data that are fit for purpose, to support the Trust's aspiration to be a Top Ten Performer, but these groups have to influence the clinicians who are expected to input the data that coders can process.

This means that the organisational learning from Better Information Groups has to be translated into efforts on the wards, not only to manage attitudes and behaviours but also to ensure that the new information systems make it as easy as possible for staff to capture high quality data as they go about their clinical duties.

In that sense, the information system is only as good as the organisational sub-structures in which it is implanted.

**d) Debate Exploring Differences (Surfacing Conflict)**

The Trust is a happy place to work and politicised conflict between organisational groups is neither overt nor actively suppressed.

The issue lies in the conflicts and contradictions inherent in a complex workplace. This is a conflict between equally legitimate ideas and values, when judged in isolation from contingency.

The effectiveness of control and resource scheduling breaks down when demand is varied and variable, diverse and lumpy. Stress can become acute when the resource the clinician has to control and deploy between competing streams of demand is himself.

Things are 'fitted in', to accommodate some new and pressing need as it arises and care has to be taken to avoid the opportunity cost, perhaps paid by another patient in a different queue. Individual rules, processes and procedures are 'bent' to accommodate the new need, often related to some other set of rules, processes and procedures but sometimes related to a form of collaborative 'common-sense' that is not codified.

In the collaborative workplace, task-related roles and identities may change hands rapidly. Values are adjusted according to the situation and the occasion. Data have no absolute value but are interpreted in the light of other data. This makes it difficult to comprehend any patient or clinical situation fully on the basis of a brief or coded description.

All of these issues need to be understood in detail before procedural rules can be safely 'inscribed' in the costly, and therefore permanent, intervention in the workplace the information system represents. Semantic rules are required to allow integrated systems to exchange data across electronic interfaces but the distinction between transmitted data and interpreted understanding necessitates a level of 'play' in the system that is afforded only by human judgement.

The aim of implementation ought to be to ensure that the information system receives a better than lukewarm reception by staff who are neutrally tolerant (**Figure 8.6.2**). A positive evaluation depends for permanence on its re-enactment every time a member of

staff interacts with the machine. We need to understand, by reference to specific examples rather than generalisations, how an individual care-giver, on an individual occasion, appreciates the machine as instrumental in the convenient accomplishment or administration of care-giving.

**Figure 8.6.2 : Conflict Surfacing – Exploring Differences**
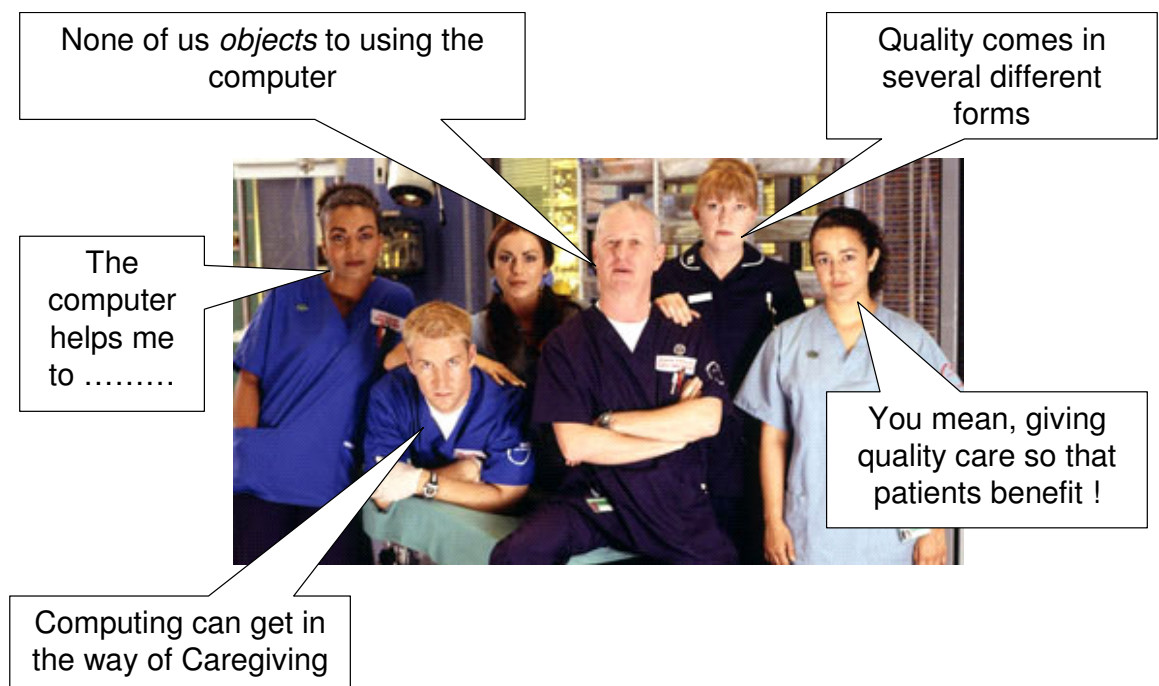


Personal convenience is one aspect of "Improved Working Lives" but another is the scope to project personal values that contribute to the quality of the clinical service. 'Quality' is a diffuse concept, better described in terms of aspects rather than ingredients and their weighted importance. One potential source of conflict derives from the various guises and manifestations of clinical quality that might be preferred by one group or another.

### 8.6.3 : Interpreting Clinical Activity

Process views of clinical activity generalise the individual, focused solely on a uniform production process, designed around a single, passive, ideal typical unit of product. They present a limited model, from which a limited range of alternative responses can be deduced in the form of procedural rules (**Figure 8.6.3**). The process model deliberately eliminates the contingencies to which an individual in the clinical situation may have to adapt. Not least amongst these contingencies are those produced by the patient himself.

**Figure 8.6.3 : Modelling Context Alongside Process**
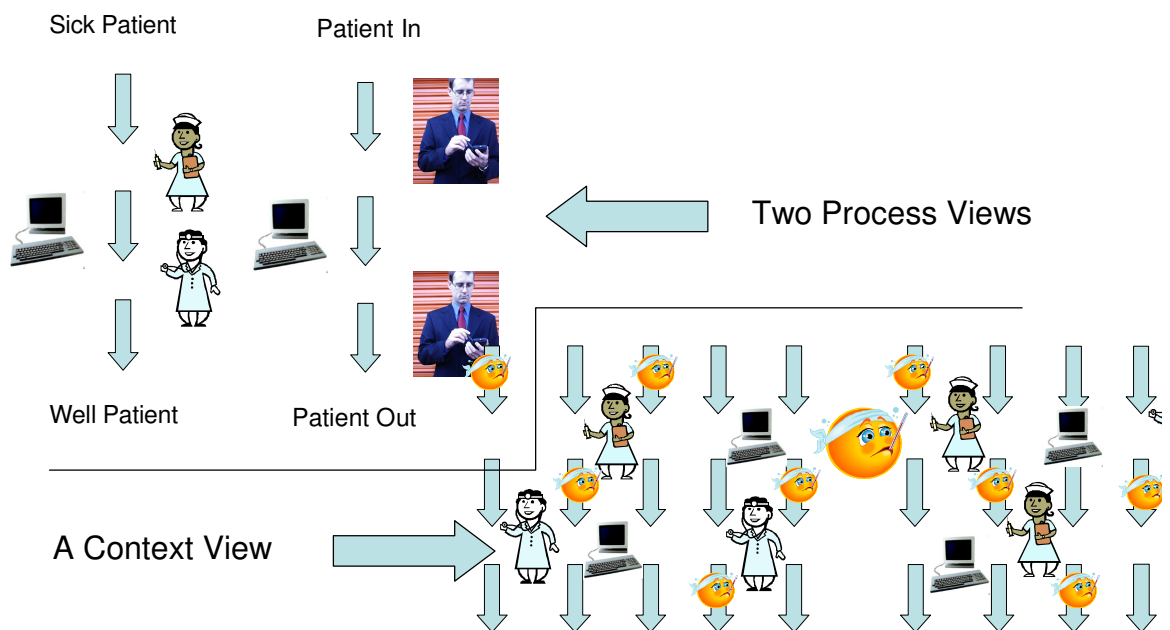


A context view recognises that the clinical situation contains multiple patients at different stages on multiple differentiated clinical pathways, and they ignore that the clinician responsible for a given patient in a ward, an Emergency Department or any other fluid and dynamic situation in which varied services are provided to a

differentiated clientele, has simultaneous responsibilities and preoccupations towards other patients and other processes.

Processes and groups are useful concepts around which to organise an ideal theory of practice and activity but their reality is rooted in the frequently repeated, task related actions of individuals. The model they represent is a model of regularities observed over time, rather than a real and absolute structure. The model is more useful and valid as a *comparator* than a *representation* of actual practice. It is probably most valid in certain controlled laboratory environments and least valid in the Emergency Department, where disruption of routine is the norm.

From an operational view of the world, polarised towards the needs of front-line users, practice is realistic, occasioned and contingent. Actions are shaped equally by the process events and roles contained in the ideal model and by intercurrent events, not identified in the model. Any notional, process-related role may be shared between individuals and a single individual may possess more than one role. Progress is made by facilitating individual effort and removing barriers to collaboration.

The focus is on individuals, working in concert with other individuals, to manage multiple patients at different stages on multiple pathways. The required transformation is for the activities of individuals to be made as fluent as possible, through the elimination of interruptions, delays and duplication in the sequence of personal tasks. Technology is only one of the sources of data from which members of the clinical team assemble the information to guide their work.

From a critical standpoint, the balance between these two views of the world cannot be set prospectively. It must vary according to the external factors or the surges in clinical activity that affect different clinical environments, at different times, in different ways.

## 8.6.4 : The Problem Solving Process - Strengths and Weaknesses of the Process Mapping Approach

Process maps like the one shown in **Figure 8.6.4** deploy the impersonal lens to demarcate roles and responsibilities within the process and show the process steps and dependencies in a logical sequence.

**Figure 8.6.4 : A Process Map**
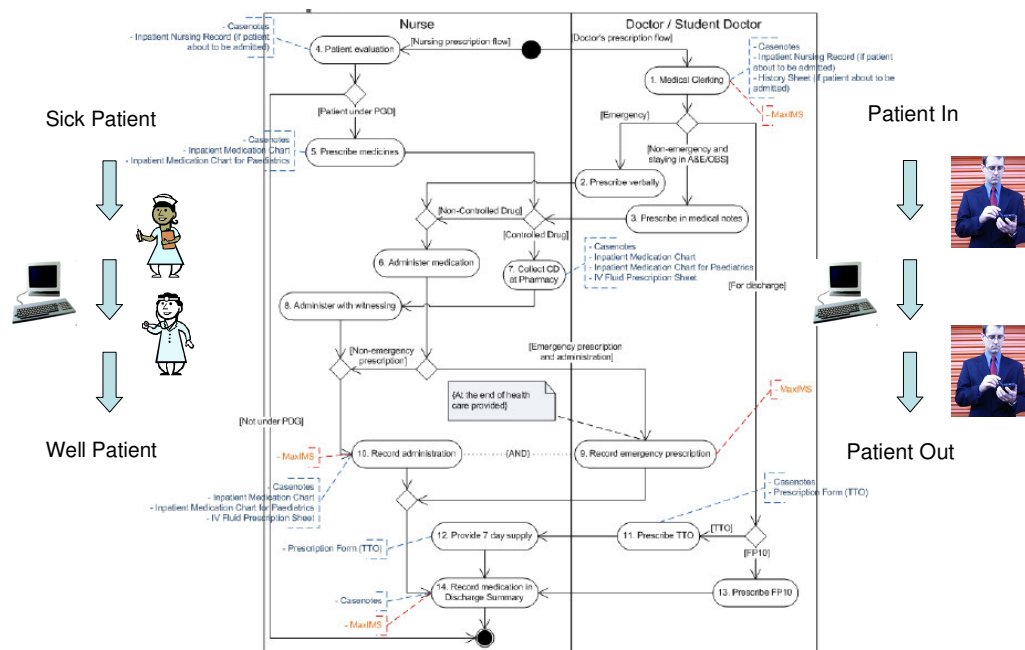
Process maps show individual roles in relation to a single patient, considered as a "unit of product". Their strength is that they provide a model to rationalise and control aspects of productive activity but their weakness is that they present only a limited description of the total situation in which any process step is carried out.

Taking the alternative view, through the person-oriented lens, suggests that the analysis of tasks into an orderly, abstract structure of sequential steps that might be taught to a novice provides only a limited description of the interaction between an individual, a situational context and fluent, expert action.

There is a danger that an information system, if constructed around the de-contextualised analysis of processes and role demarcations, may downgrade expert performance, limit individual resilience and restrict compliant behaviour, instead of allowing creative adaptation to the reality of any emerging situation. We need information systems that facilitate excellence and avoid restricting behaviour to the lowest common denominator.

### 8.6.5 : Quality

Excellence is the ultimate expression of quality. The various aspects of clinical service quality (**Table 8.6.1**) facilitated by a new information system might underpin different evaluations by different groups, leaving aside ergonomic and technical aspects of the electronic machinery. A successful implementation will not merely mean having the information system installed and in (partial) use (possibly tolerated rather than fully assimilated) in as many different areas and locations of practice as possible.

This table presents one model of quality, derived from the literature on information systems, which is capable of development with any of the information system's disparate user groups, to explore statements of the form, "this information system helped (or hindered) me, to ………[deliver some aspect of a quality service]".

**Table 8.6.1 : Aspects of Clinical Quality (derived from Garvin, 1984)**

| | |
|---|---|
| **Product based**<br>Providing clinical care that is fit for purpose | • Making an accurate diagnosis.<br>• Providing evidence based treatment.<br>• Finding and following an approved practice guideline.<br>• Prescribing correctly.<br>• Documenting and Communicating well-co-ordinated clinical management. |
| **User based**<br>Responding to Patients as service users | • Access : helping patients to access the next stage in their management.<br>• Acceptability : accommodating patients' needs alongside service needs.<br>• Relevance : providing the service response that best suits the patient's need. |
| **Manufacturing based**<br>Making it easy to practise efficiently and safely | • Responding to complaints and litigation.<br>• Recognising clinical error and recalling the patient.<br>• Supervising safe and effective clinical management and discharge.<br>• Finding my next task / where I am most needed.<br>• Planning care which is orthodox, safe and effective. |
| **Values based**<br>Outcomes that reflect the Trust Wide Objectives | • Financial Stability.<br>• Top Ten Performer.<br>• Value for Money.<br>• Provider of Choice.<br>• Great Place to Work. |
| **Transcendent**<br>Providing "Customer Delight" | • Doing something for a patient that left them visibly and favourably impressed. |

### 8.6.6 : Clinical Communication

One fundamental task within the quality matrix is clinical communication and documentation. It is expected that information technology will enhance clinical communication and information sharing.

However, these activities are fundamentally different from data processing and data storage. This is because data have inherent meaning, albeit restricted.

In contrast, information has contextual meaning. The data supplied become information when they are interpreted by a recipient in the context of other data available from the recipient's memory existing knowledge, or present surroundings.

We need to distinguish between the ease of *data* entry and transmission, and the mental task of assembling and decoding *information* to provide a defensible account at the level of detail required for a specific clinical purpose.

## 8.7 : R E C O M M E N D A T I O N

There is a general consensus in the information systems literature and among the key players in the Vision Project, that user consultation is crucial to successful implementation. There is an equal consensus that socio-technical factors are important. However, it is not obvious how these ought to be identified and converted from potentially destructive problems into useful clues towards successful implementation.

What remains missing is an insight into the events and circumstances that surround the operational use of information systems, on successive occasions by individuals. Without this insight, designers' and planners' expectations (information system use in theory) will lack a requisite foundation in regularities of users' behaviour that can be observed in the workplace (information system use in practice).

This is less likely to arise from an idealised model of process than from an appreciation of the way an individual clinician's tasks coincide repeatedly during the course of 'a bad day at work'.

### 8.7.1 : Recasting the Problem Situation

**Figure 8.7.1** shows how the problem situation can be re-cast in terms of front-line staff. The strategic benefits that enable Top Management to navigate the strategic problem situation are won when the Front-Line Staff derive operational benefits that enable them to navigate their own clinical problem situation.

Within the context of demands, constraints and choices set by the expectations of politicians, policy makers, planners, patients and the public, clinicians apply the scripted routines of clinical practice in a way that is far from mechanical : it is knowledgeable and more or less carefully adapted to the play of surrounding events.

The way users deviate from model use of the information system, for example by batching their interactions, is a response to the problem situation as it pertains at the time and, as such, represents a problem solving methodology. The quality of the

information system affects the operational capacity of its users and this, in turn, alleviates or exacerbates the problematic situation.

**Figure 8.7.1 : The Problem Situation Recast**
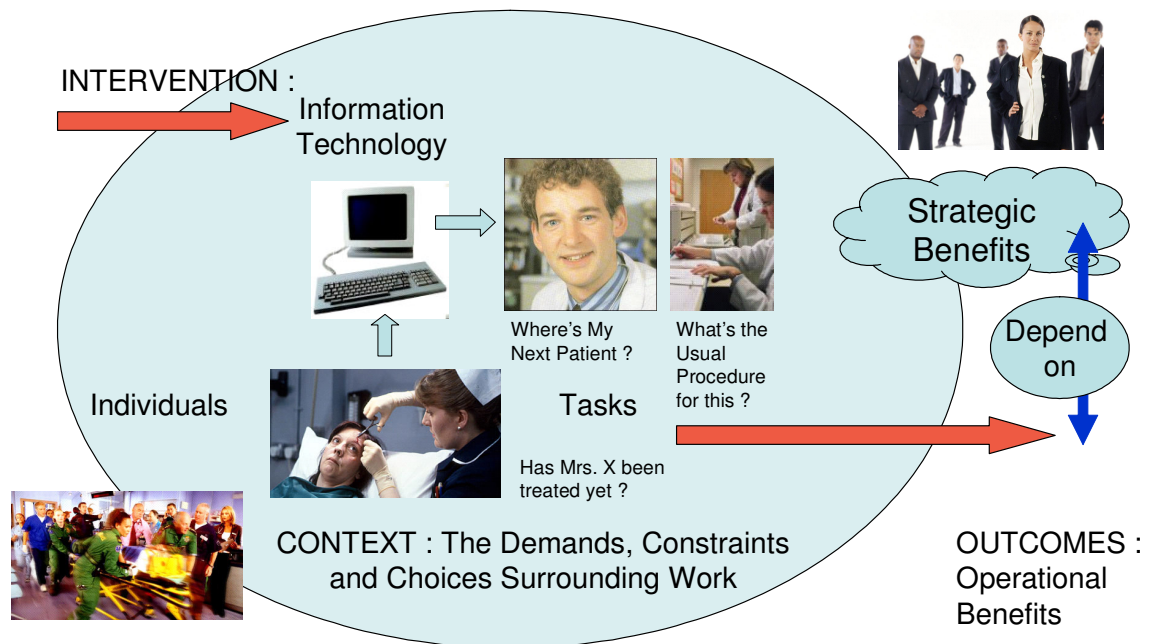


**8.7.2 : Accommodating Different Forms of The Problem Solver**

Because a complex organisation contains multiple strands of interest, commitment and logic, it cannot be reflected accurately in a single strand of thought. Both design and evaluation ought to take account of the emergent ideas developed as the specifics of the situation are encountered, as well as the primary ideas that exist before organisational debate is entered and. Both sets of ideas lead to arguments that can diverge away from consensus as well as converging towards it.

Of the four problem solving stances that have been presented, the first three are essentially descriptive and affirmative. Only the last, emergent and critical perspective adequately questions the *status quo* and illuminates the alternative possibilities for an organisation facing financial stringency and the need for a radical review of organisational structures and practices, assisted by information systems.


### 8.7.3 : Analytic and Systemic Interpretations of the Organisation

Should we interpret the Trust and its information needs in analytic or systemic terms ?

The analytic approach eliminates individuality and groups cases according to their common characteristics. It is a convenient way to order and reduce a confused situation. It results in rules and generalisations, constructed around an ideal case. Because it is impersonal and context-free, this approach favours automation and uncritical data processing. On this view, systems integration is simply a matter of constructing the right rules (syntax).

The systemic approach takes a realistic stance towards organisational and situational complexity. It recognises the real case as a balance between general and contingent factors. Striking the balance defies absolute regulation and favours solutions that are defensible rather than uniquely and exclusively rational.

Instead of eliminating human agency it mandates its preservation, as an essential factor in the active construction of information from an assembly of transmitted and contextual

data. On this view, systems integration is a matter of understanding critically, the various conventions and their interplay that surround this activity.

We should remain aware of these two polarities as primary ideas and regard each as having its place in the design and evaluation of an information system, that must help demonstrate the Trust's capability to the outside world but contribute directly and organically to the capabilities of the people who work within its confines.

**8.7.4 : The Problem Solving Process : Recognising "Supportive" as well as "Operative" Functions of Information Systems**

For this reason, it is useful to distinguish in an evaluation between the "operative" functions of the information system, that assert, monitor and measure the process view, providing Management Information from Operational Systems or asserting pre-configured plans of patients' clinical management, and the "supportive" functions that reflect an empathic understanding of the user's situation and enable his adaptive response to its evolving aspects – the things that make one instance of a user and an information system different from another in a similar, but not identical, context.

Where the "operative" function serves to minimise 'unacceptable variation' of process, the "supportive" function accepts that non-standard situations require non-standard, improvisatory responses, albeit guided by conventions or models of practice that are performed in ways that combine defensibility with fluency.

The clinical situation, illustrated in **Figure 8.7.2**, combines model order with contingency. Information systems have the capacity to enforce practice and constrain processes within prescribed boundaries. It is argued here, that strategic benefits from the information system will derive from its operational impact, permitting individuals to respond and adjust their tasks to a fluid and dynamic situation.

Management Information from Operational Systems implies an emphasis on the relevance of information systems to the clinical workplace. However, this is not enough.

**Figure 8.7.2 : Managing the Problem Situation From Within**
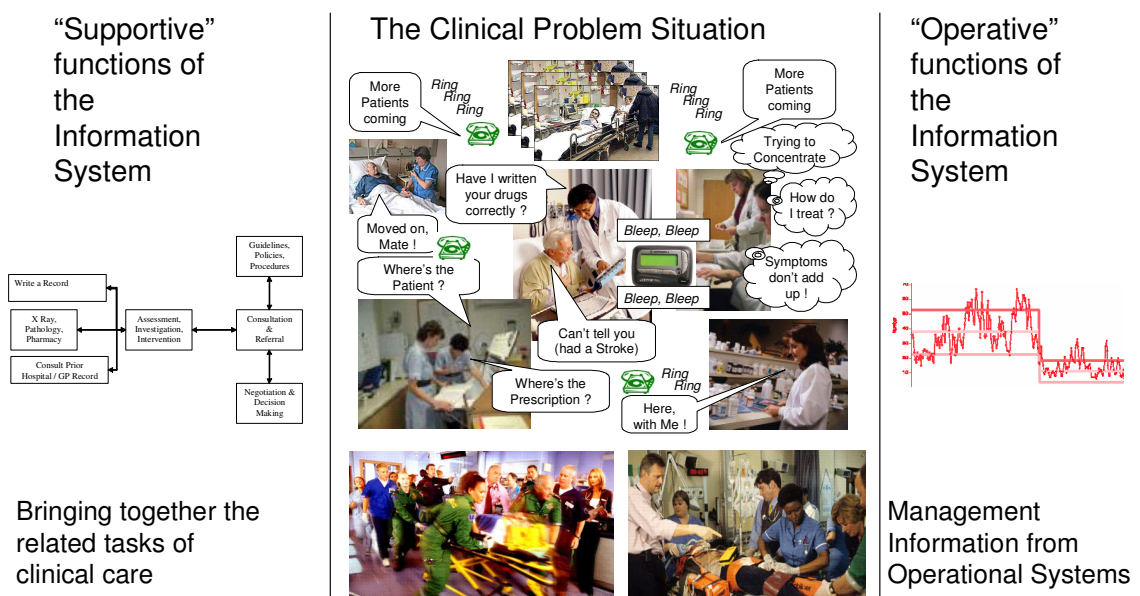


As well as being relevant, information systems need to be accessible and acceptable to the staff who will use them. They ought to contribute to efficient and effective clinical practice by drawing together the related tasks of clinical care in order to mitigate the conflict between computing and care-giving.

Between registration and the patient's discharge, the system has to provide a mechanism to collect Management Information from Operational Systems in the form of financial and activity codes to support the Trust's financial stability. It has to collect information about the pacing of clinical management along evidence-based clinical pathways to support the Trust's claim to be a Top Ten performer.

To provide Value for Money, it has to allow people to negotiate between the different pathway rules that steer patients from various streams to the same resource but it also has to balance the rules that maximise the availability of the resource to any given pathway against the rules that ensure the optimal efficiency of its overall utilisation.

To be the Provider of Choice, the Trust needs an information system that can manage its beds to match demand with supply. The vacation of a bed and the electronic reporting of this event are more likely to coincide if reporting is linked intimately to one or more fundamental tasks associated with transfer or discharge from the ward, such as the preparation of a clinical continuity document or discharge summary, than if this is seen as a 'stand alone' task that can be batched after other more important tasks have been completed.

Functions like bed management and resource scheduling cannot be subsumed within a logical hierarchy, as if all the strands of organisational logic could be integrated through alignment in a single, convergent and consensual stream. To be a Great Place to Work, the Trust has to appreciate the limits of automation. This means giving equal expression to varied strands of logic whose mutual coherence is limited. Systems integration requires a human element, to assess and respond to contingencies that cannot be anticipated in a set of rules.

Equally, to be a Great Place to Work, the Trust needs its information system, as much as possible, to put the user in control of his own working day. This means a minimising the need for the constant interruption of one professional by another, establishing rules as reference resources rather than constraints and allowing documents to be visible simultaneously in more than one location.

In a Great Place to Work, people communicate with each other as colleagues. They are free to interpret their own situation without undue domination by a single authority. Information from the computer is complemented and sometimes contradicted by evidence from the user's own eyes and ears as well as from their colleagues. The information system is a resource to support both teamwork and individual accountability. It supports the prioritisation and delegation of tasks and the processes of delegation and referral.

## 8.8 : L O O K I N G   T O   T H E   F U T U R E

The model presented in **Figure 8.8.1** presents a form of evaluation that avoids generalities and focuses on understanding the specifics of the situation and the occasion.

The model is intended to be used in successive iterations, as in the ALTAR project described by Shah, Eardley and Wood-Harper (2007), where learning from each implementation phase of an information system in a large organisation was played into the next, by actors at successive levels of operation, management and strategic policy making.

**Figure 8.8.1 : Putting *SuperVision* To Work**

INTERVENTION :
New Information Systems

CONTEXT

MECHANISMS :
What worked,
for Whom,
In What Context ?

- Use Multiview to Model Problem Situation etc. at Various Organisational Levels.
- Avoid Premature Synthesis.
- Compare and Contrast Models instead.

OUTCOME :
*Strategic* benefits realised.

What were the *Operational* benefits ?

Who benefited ?

What factors promoted / hindered benefits realisation ?

What factors influenced benefits definition ?

The fluid characteristics of the clinical workplace provide the context that influences the production of *operational* benefits, considered as the mechanism that allows *strategic* outcomes to emerge from the intervention of the new information system.

The realisation of *operational* benefits, to users themselves, will reinforce a positive evaluation, every time a front-line user interacts with the information machine.

Although an evaluation will be influenced by the operational reliability and technical performance of the electronic machine and by the physical and operational characteristics responsible for its ergonomic evaluation, this will not be the only mechanism at work.

There are likely to be three key sources of operational benefits from the new information system.

The first of these will be its impact on users' capacity to provide a quality service to patients, and adopting a comprehensive description of quality, such that offered in Table 8.7.1, that can accommodate the Trust Wide Objectives.

The second will be the system's ability to support genuine clinical communication as distinct from data processing for accounting.

The third will be the system's impact on the liberty and facility of each individual to recognise and make his next required task, in contribution to the collective effort and in conformity with the opportunities as well as the constraints presented by a well managed clinical environment.

The point at issue is not to understand *whether* a given implementation has succeeded or failed but *how* clinical staff at the patient interface have balanced the requirements of computing and care-giving, given the characteristics of the problem situation presented by the clinical workplace.

## 8.9 : S U M M A R Y

## O F   P R A C T I C A L   R E C O M M E N D A T I O N S

- **The Front Line**

The Vision project will affect everybody. All front line staff need to adopt a critical and introspective stance towards the analysis of their own work patterns. This is different from time and motion study. It is about the way individuals working in teams construct their work from moment to moment.

To understand how new information systems will improve their own working lives as well as the efficiency of the parent organisation, individuals need to understand, from their own reflection, how their personal tasks cluster at key moments during a working day that is typical rather than an ideal.

This recommendation applies to administrative and clerical staff but it applies most intensely to clinical staff, who have to combine computing with the multiple, varied and simultaneous tasks of care-giving as part of a team.

- **The Implementation Team**

Process mapping is a valuable technique that brings people from the same workplace together to examine their work routines critically. Process maps focus on *what is done* rather than *what any given individual does*.

The distinction appears to be subtle but it is profound.

It is contended here, that information systems benefit patients and institutions because they benefit individual front line staff. A positive evaluation is the summation of the experience of each individual using the information system, on each successive occasion, under the circumstances that prevail at that time. The individual's focus during use is not on the computer but on the task in hand and its relationship with all the other things the individual is trying to accomplish at the same time, possibly for other patients.

For this reason, process mapping activities need to be complemented by a form of analysis that recognises that any individual, at any time, is likely to be managing multiple patients at multiple stages on multiple pathways.

- **Strategic Managers**

The Vision Project has been labelled, a "corporate enabler". The current capital development of the Urgent Care Centre is an example where there are opportunities to integrate services, streamline clinical pathways and develop new kinds of jobs.

To the extent that events can be planned, as opposed to evolving organically and sometimes coinciding, the Vision Project is an opportunity to bind together the different strands of organisational development, workforce planning, business process re-engineering and new building (**figure 8.9.1**).

**Figure 8.9.1 : Using Multiview to place IT Design in the context of Organisational Activities**

Problem
Solvers

Manage the
Stakeholders

Project &
Develop the
Vision

Problem
Situation

'Soft' Negotiations

'Hard Projects &
Programmes

Job
Design

IT
Design

Interpretive
Scheme

Organisational
Development

Alliances & Alignments,
Project & Programme
Control

Problem
Solving
Methodology

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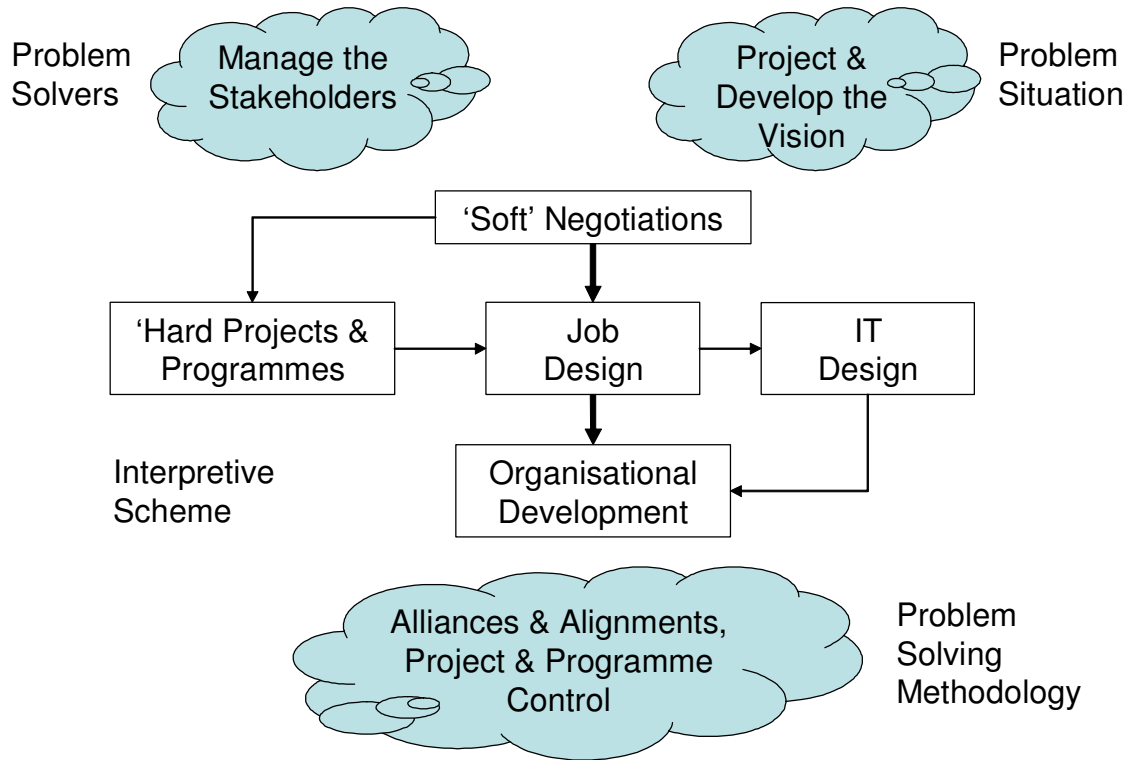
# C H A P T E R   N I N E

# P O L I C Y   I M P L I C A T I O N S

</div>

## 9.0  :  I N T R O D U C T I O N

Since the submission of this thesis, the Labour government responsible for the National Programme has been defeated and a new, Conservative and Liberal Democrat coalition government has taken its place. The National Programme seems unlikely to escape reappraisal. My examiners have encouraged me to assess the policy implications of the thesis for future 'Big IT' programmes.

Two important publications have emerged since submission. The new government's first white paper on health, "*Equity and Excellence: Liberating the NHS*", (United Kingdom Department of Health, 2010b) was published in July, 2010. The independent evaluation of the Summary Care Record and HealthSpace programmes (Greenhalgh *et al.*, 2010) was published in May, 2010.

Also in July, 2010, the Parliamentary Under-Secretary of State for Education announced the decommissioning of the ContactPoint children's database which had been established in response to the challenges epitomised in the Climbie Inquiry (Lord Laming, 2003).

There are significant areas of overlap between the issues relating to the care of vulnerable children and the care of patients, to whom clinicians and society have also traditionally acknowledged a duty of care.

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## 9.0.1 : The Structure of This Chapter

This chapter is constructed as follows :

In section 9.1, the *SuperVision* framework, identified in chapter eight is populated with reference to the outgoing government's e-Government strategy document, *Transformational Government Enabled by Technology* (United Kingdom, HM Government Cabinet Office, 2005). This strategy was the intervention intended to bring about identified policy outcomes.

The intervention had to rely on identifiable mechanisms for its effect. The mechanisms can be understood best in terms of the government as a problem-solving collective, the problem situation to which the strategy, *Transformational Government*, was a response, and the problem solving methodology, the strategy itself.

The mechanisms concerned operated 'in the world' rather than in isolation. In other words, they operated in a context. This was the then government's world view of the citizen, coupled with its world view of the public service as a policy instrument.

Section 9.2 moves the discussion from the general case, of policy for e-government enabled by (information) technology, to the specific case of government policy for the NHS and for NHS information.

Section 9.3 presents the perspectives of government, the National Programme for IT, provider organisations and patients towards the current policy environment.

Section 9.4 reviews key elements of NHS information policy.

Section 9.5 proposes a new approach to the National Programme, based on small, quasi-autonomous structures rather than a tightly integrated mega-structure.

Section 9.6. proposes a 'new model' form of clinical engagement.

Section 9.7 draws the chapter to its conclusion.

# 9.1 : THE *SuperVision* FRAMEWORK APPLIED TO TRANSFORMATIONAL GOVERNMENT

## 9.1.1 : The Intervention

*Transformational Government Enabled by Technology* was the outgoing government's intervention (as a problem solver) in a particular problem situation. The intervention was a massive overhaul of government IT infrastructure, within a broader overhaul of the organisation of public services and other arms of policy implementation.

## 9.1.2 : The Policy Outcome

The intended policy outcome was to be the assurance of national economic productivity, social justice and public service reform. Public services were to become more responsive and more efficient.

## 9.1.3 : The Mechanism : an Interaction between the Problem Solver, the Problem Situation and the Problem Solving Methodology

The mechanism operating between the intervention and its desired policy outcomes was, in effect, an interaction between the problem solver, the problem situation and the problem solving methodology : a 'Big IT' programme.

**The Problem Situation**

The problem situation was defined by the perceived need for transformational government enabled by IT. This was the need to improve the efficiency of "transactional" public services (eg taxation, administration of public functions : e.g. hospital appointments) and the effectiveness of "transformational" public services (eg health and social care). The transformation to be enabled was to structure new systems around the customer of public services instead of around the product of service.

To these ends, there was to be a substantial improvement in the availability of information for management and a 'lifting of heads' away from the self-serving

drudgery of bureaucratic paperwork, towards the achievement of benefits for the users of public services :

*"Modern government – both in policy making and in service delivery – relies on accurate and timely information about citizens, businesses, animals and assets. Information sharing, management of identity and of geographical location, and information assurance are therefore critical." (Transformational Government : para 10)*

*"Many systems and processes are still paper-based and staff-intensive. The underlying assumption is that customers will fill in forms and staff will process them by routine rather than by risk-managed exception." (Transformational Government : para 14)*

**The Problem Solving Methodology : 'Big IT'**

*"Modern governments see technology as a strategic asset and not just as a tactical tool". (Transformational Government : para 4)*

Information Technology was to be deployed as a strategic resource to improve matching between differentiated need, supply and demand for transformational services ("choice", competition, contested service provision), and to develop customer-centred forms of service provision. Standardisation would enable the simplification and sharing of service delivery methods between different public services. Data protection and measures to protect the security of personal information and identity would mitigate the risks of national scale data structures.

## 9.1.4 : The Context for the Mechanism's Operation

The context for the mechanism's operation was the Government's view of the citizen and the service provider

**Perspectives on the Citizen**

Without defining them explicitly, *Transformational Government* aimed to cater for three citizen constituencies :

- The articulate, IT capable citizen

- The vulnerable citizen or victim

- The criminal offender.

**Perspectives on the Service Provider as an Instrument of Government Policy**

These implicit perspectives on the citizen translated into three perspectives on the service provider as an instrument of government policy, reflecting orientations towards :

- Emancipation and Empowerment : of the articulate citizen

- Protection : of the vulnerable (eg a victim of systematic child abuse)

- Control and Dominance : of the criminal, defined as a significant deviant from the norm (eg. a potential child murderer, a serially homicidal doctor).

## 9.2 : THE NHS AS AN EPITOME
## OF THE PUBLIC POLICY ARENA

The NHS epitomises the challenges faced by all public services in the United Kingdom at present. It is expected to match differentiated need, supply and demand. Its "transformational" service aspect caters for changes in people's health, well-being and potential, whilst its "transactional" aspect caters for patients as the incidental objects of stepwise administrative processes. The health service sets great value on data protection and measures to protect the security of personal information. 'Standard arrangements' have been proposed or introduced to provide electronic booking of appointments and electronic prescriptions. There is also an institutional enthusiasm for standard pathways of management for individual clinical conditions. It is hugely important to identify patients correctly in order to ensure that the right patient gets the right treatment. Equally, it is essential to protect the identity and confidentiality of individuals.

As articulate citizens, patients are to be emancipated and empowered by the policies of both governments. This emancipation extends to ownership by the patient of at least part of his own medical record. When a patient's significant deviation from the norm of health becomes frank illness, it was the outgoing government's plan that the records of all patients should be available throughout the NHS, in case any patient became ill far from home. The status of the potentially vulnerable patient has become a matter for societal concern. As a general object of social control, it was the plan for his personal data to be shared between interacting medical, social and educational services but it was also argued that, as an individual with the same rights as the most articulate citizen, his right to individual confidentiality and privacy was to be preserved.

# 9.3 : FOUR PERSPECTIVES

# ON THE POLICY ENVIRONMENT OF THE NHS

## 9.3.1 : Present Government Perspective

**Table 9.1** summarises the Government level view of the present situation.

**Table 9.1 : Problem Solvers :  UK Government**

| Problem Situation | Problem Solving Methodology | Interpretive Scheme |
|---|---|---|
| Stringent economic climate, demanding public with high expectations from tax-funded public services, political preference for 'big' society and 'small' government. | White Paper "*Liberating the NHS*".<br><br>The NHS will scrutinised and held accountable through its capacity to generate information for defined audiences (Monitor, Care Quality Commission).<br><br>This central accountability will be complemented by accountability to individual patient preferences, as money follows patients to their preferred providers.<br><br>Choice', Contested provision, Payment by Results ; Devolved, centrally-regulated commissioning by GP consortia. | An "Information Revolution".<br><br>Enable choice & Drive accountability : centrally and to patients.<br><br>Centrally mandated information flows continue.<br><br>In addition :<br><br>Internet resources,<br><br>Patient Reported Outcome Measures,<br><br>Transparency / candour comparative information at clinical team level.<br><br>Patients will have control of own record : able to share with third parties.<br><br>Third party advisors on choice.<br><br>Anonymised research databases. |

The problem situation faced by the new government includes the country's state of near bankruptcy, necessitating an efficiency saving by the NHS of £15-20 billion by the end of 2013-2014 (United Kingdom, Department of Health, 2010c). A demanding public continues to express high expectations from tax-funded public services, and the government has expressed its policy in terms of 'big' society and 'small' government. This philosophy proposes that a market empowers individual patients more efficiently than an organised hierarchy. The same philosophy transfers the ownership, control and custody of personal data from institutions to individuals and to any third parties with whom they might wish to share their data.

The government's problem solving methodology is its white paper. *Liberating the NHS* announces (para 3.4) the cessation of time-oriented process targets and the adoption of "clinically credible and evidence-based measures that clinicians themselves use". It will continue the policy of contested provision and Payment by Results, outlined by the previous government in "*The NHS Modernisation Plan*" (2004). Providers will face continued independent scrutiny by Monitor and the Care Quality Commission. Strategic Health Authorities and Primary Care Trusts are to be abolished and the commissioning of provider services will be devolved, within a National Commissioning Framework, from Primary Care Trusts to General Practice Consortia.

The relevant interpretive scheme – the world-view or way of looking at things – is an "Information Revolution" that will enable choice and drive accountability : centrally and to patients.

The form of centrally mandated summary information flows will change, but not the requirement to confirm compliance with standards set externally. In future, Monitor will

oversee economic regulation. The Care Quality Commission will exert other forms of governance, partly based on Patient Reported Outcome Measures. Summary information will be presented at the level of the individual clinical team.

Patients are to have access to similar information, published by other interested agencies with access to the centrally submitted returns but will also have access to internet resources that will help them to understand their own conditions and the associated clinical best practice.

## 9.3.2 : National Programme Perspective

**Table 9.2** summarises the view at the level of the National Programme.

**Table 9.2 : Problem Solvers : National Programme**

| Problem Situation | Problem Solving Methodology | Interpretive Scheme |
|---|---|---|
| Six 'worlds' :<br><br>political, commercial, technical, clinical, personal (societal), academic (*Greenhalgh et al., 2010*) | Centrally determined Standards and Procurement.<br><br>'Clusters' of providers pool expertise to supply national level infrastructure as well as generic, 'best of breed' systems from limited market, to replace local systems.<br><br>Clinical Engagement. | Person-based information, integrated systems, electronic records, Management Information from Operational Systems, "secure and confidential" information flows.<br><br>National Systems Architecture.<br><br>NELH<br>NHS Direct (On-Line)<br>NHS Choices<br>HealthSpace<br><br>National Care Records Service. |

At the National Programme level, the problem situation that problem solvers face represents the social and cultural interplay of the six 'worlds', identified by Greenhalgh *et al.* (2010) : political, commercial, technical, clinical, personal and academic.

In the political 'world', the unitary structure of a national programme, in which a single political entity is furnished by a tiny number of commercial suppliers, is placed in apposition with a plural NHS where differentiated forms of provision are presently being encouraged to proliferate.

In the commercial 'world', companies who have invested now wish to profit by selling their products to the market. The inherent risk is that suppliers pre-empt clinicians' own appreciation of their needs.

The clinical 'world' is seen as an information-rich environment where computers can automatically transfer and disperse 'information', minimising human agency and enabling strategic goals.

The personal 'world' refers to the patient and I prefer to designate a societal 'world' to locate the issues, of confidentiality, privacy, information governance and ownership of the medical record, that concern not only individuals but also the broadest social groups.

The academic 'world' exists to identify and enlighten zones of incomplete understanding, within and between these other 'worlds'.

The problem solving methodology for the National Programme has included :

- Centrally determined Standards and Procurement : both of infrastructure (national networks and databases) and systems to replace the existing systems of individual Trusts. Bacon & Pugh (2006) have argued the economic case for the local, rather than the national commissioning of replacement systems.

- 'Clusters' of providers which pool expertise to supply national level infrastructure as well as generic, 'best of breed' systems from limited market, to replace local systems.

- Clinical Engagement, whereby 'clinical champions' are appointed to 'span the boundaries' between Greenhalgh's six worlds and to recruit the commitment of clinical colleagues to support the introduction of information systems and the strategic goals they inscribe.

The 'world-view' ('interpretive scheme') of the National Programme has been constructed in terms of integrated systems, electronic records, Management Information from Operational Systems, "secure and confidential" information flows, and a consent model for the storage, use and dissemination of personal information. A National Systems Architecture has developed electronic records, e-prescribing and electronic booking of appointments, complemented by the National Electronic Library for Health, HealthSpace (where patients can browse their own medical record and store their own information) and various NHS-branded sources of health information for professionals and the public.

In this world view, all of these resources appear problem-free. They are 'there', ready to be used and people can be trained or helped towards complete, accurate and committed participation in prescribed forms of computer use.

### 9.3.3 : Service Provider Perspective

The view at the level of the service provider is set out in **table 9.3**.

**Table 9.3 : Problem Solvers : Service Providers**

| Problem Situation | Problem Solving Methodology | Interpretive Scheme |
|---|---|---|
| Downward pressure on organisational costs.<br><br>Need to generate mandated information returns in the new forms required by *Liberating the NHS*.<br><br>Contested provision.<br><br>Need to use summary information as a basis for organisational learning.<br><br>Local IT programmes independent from other programmes of organisational change.<br><br>Local expertise in technical informatics not supported by equivalent expertise in social informatics. | Commission useful and usable information systems.<br><br>Local clinical champions span organisational and cultural boundaries between the six worlds. | Information systems seen as a source of immediate and concrete costs, compared with remote and uncertain benefits. |

The dominant feature of the problem situation faced by service providers is the downward pressure on organisational costs, required by an external economic regulator and intensified at present by the economic climate. Contested provision will heighten both the insecurity of revenues and the need to develop local capacity, to generate information and to respond to information, in a process of organisational learning.

Phased out as national indicators, the time-limited waiting list targets, which have driven the enthusiasm of non-clinical NHS planners and managers towards structured models of clinical care (clinical pathways), are likely to persist as locally important indices of access and institutional competitiveness. They will be supplemented by the 5-10 nationally mandated quality statements which NICE will develop over the coming five years, applicable to every patient assigned to each of 150 diagnoses (United Kingdom Department of Health, 2010b : para. 3.12-3.13). These will serve as local indices of clinical effectiveness and Value for Money and feed into the providers' quality accounts.

The limited responsiveness of nationally mandated IT providers to local priorities is a second important feature of service providers' problem situation, allowing the suppliers of systems to pre-empt local specification of information systems users' needs. Local expertise in technical informatics is not supported by equivalent expertise in social informatics. As a result, users' needs are inadequately expressed and service providers can only purchase information systems from a supplier-driven market.

In a climate of contested service provision, NHS service providers need to adapt in an agile fashion to ensure their own survival. They need information systems that not only

provide third party monitors with summary reports and feed intensive local organisational learning but also help clinical teams to work as productively as possible.

Providers' problem solving methodology will overlap with that of the National programme inasmuch as local clinical champions will lead the 'clinical engagement' that is intended to facilitate clinicians' acceptance of pre-specified information systems.

Clinical champions will exercise their ambassadorial role between managers and clinical colleagues by virtue of their capacity to span boundaries : between their own organisation, the National Programme's officers and the commercial providers of information systems. Their advocacy for the institutional aspects of the project will be one-sided unless it also provides the conduit for an articulate presentation, to the commercial 'world', of front-line users' own 'world'.

For the local information programme not to be interpreted primarily as a source of costs, it is crucial to incorporate it within a broader world view. Its inescapable context is the wider concerns of the parent provider institution. These include the 'soft' debates about the organisation's place within an interdependent health economy, compared with its struggle for survival in a contested environment, as well as the 'hard' debates which link the various concurrent projects and programmes likely to be to be present in any provider organisation whose building and capital programmes and management structures have not yet reached their final perfection. Hand in hand with the introduction of new IT and new business processes goes the reconfiguration of roles and jobs and the whole is supported by an overall programme of organisational development (**figure 8.9.1**).

### 9.3.4 : Patients' Perspective

**Table 9.4** presents a Patients' perspective.

**Table 9.4 : Problem Solvers : Patients**

| Problem Situation | Problem Solving Methodology | Interpretive Scheme |
|---|---|---|
| Poor access to 'my' GP Bewildered by 'choice'.<br><br>Dented confidence in public-funded healthcare inflamed by politicians and pressure groups.<br><br>Variable commitment to maintenance of a personal, patient-held record. | Comparison websites and word of mouth inform mobility between providers. | Safety, convenience and personal cost of healthcare. |

For patients, the problem situation is characterised by poor access to 'my' general practitioner, intensified by policies which have rewarded the accumulation of large practice populations. General practitioners operate appointment systems and can ration short notice (emergency) appointments in their own surgeries.

A variety of alternative providers of different services have sprung up. Within the NHS, these include NHS Direct call centres, Walk-in Centres and GP Out of Hour Centres. As a result, many members of the public are bewildered by choice.

It has been useful for policy makers to mobilise public anxiety and loss of confidence in healthcare providers in order to drive change, both in clinical practice and organisation and in the emotional affiliation of the general public with their traditional providers.

Personal ownership of health data is encouraged through patient-held records and MyHealthSpace. Patients vary both between individuals and over time. The intensity of current health experience influences personal commitment and capacity to maintain the patient-editable portion of a personal health record, so that these factors cannot be taken for granted .

Politicians and pressure groups have emphasised the safety and convenience of healthcare as the battleground for change in the quality as well as the efficiency of state-funded healthcare. The personal cost of healthcare is minimised by the social solidarity enshrined in the founding principles of the NHS.

The policy of the last government as well as the new coalition has been to encourage public use of comparison websites to inform mobility between providers on a rational basis. Members of the public will also base their choices on more socially constructed forms of word of mouth exchanges : of personal preference and experience, between individuals.

## 9.4 : POLICY IMPLICATIONS OF THE RESEARCH

### 9.4.1 : Should Information be Person Based ?

The first promise of *Information for Health* was, "information will be person based".

Patients do not exist as such until there is a health problem and a care-giver. At that point, a complex relationship comes to life, between each of these three elements and an

aspect of an information system. The NHS needs patient-centric information systems to be complemented by institution-centric systems, which enable organisational learning about the care-giving institution to be translated into effective and possibly radical organisational change, and disease-centric systems that enable the refinement of clinical knowledge and methods.

### 9.4.2 : The Concept of Integrated Systems Needs Radical Reappraisal.

When *Information for Health* promised integrated systems, it addressed the salient problem that there were too many providers, of too many information systems that could not exchange data across incompatible electronic interfaces.

The concept of integrated systems now needs radical reappraisal : radical, because data processing functions are relatively easy to reduce to a closed system of electronic interfacing rules with general effect but the integration of interactions between people and the demands, constraints and choices within any given situation is a complex, open system, whose primary component is a human judgement, made in a specific context.

The reappraisal of systems integration is, therefore, radical in a second sense : integration at the electronic level is safely regarded as a logistical outcome but integration at the human, social level can only be a deliberative process, determined immediately by the technical aspects of the problem situation on a given occasion, influenced secondarily by ethical, legal and procedural externalities, and often negotiated with other occupants of the problem situation. The level of justifiable

confidence in likely outcomes, shared between participants in the clinical situation determines whether a patient can be passed safely from one process step to the next.

The third reason to reappraise the concept of integrated systems is that the codified and commodified 'information' they are supposed to distribute is not information at all. It is no more than data.

Data represent a situation stripped of context and nuance by the sender and interpreted, in at least partial ignorance of the sender's knowledge and intentions, by the receiver. We need to distinguish more clearly between the data that can be transferred uncritically from one sink to the next and the information which is actively constructed in the clinical environment, by people with access to other data.

### 9.4.3 : Management Information from Operational Systems is an Obvious but Insufficient Primary Rationale for Planners and Managers to provide Clinical Staff with Healthcare Information Systems.

The dissolution of 'Big Government' in favour of 'Big Society' has its parallel in the orientation of managers and planners towards the clinical workforce.

Current policy for health is to eliminate unnecessary external control of local activity. To enable the *representation* of performance to the outside world and score satisfactorily on planners' key performance indicators, clinicians within the production system will need information systems that enable *the thing in itself* : the capacity to work fluently and autonomously and 'pull' work along the healthcare production chain.

## 9.4.4 : Electronic Records

To date, the National Programme has concentrated on the feasibility of patient-owned records and the use of the Summary Care Record to facilitate clinicians' decision making, when patients cannot provide a complete oral account of their own medical history and management plan.

A major challenge for clinical engagement will be for clinicians to switch from unstructured, paper records to more structured, electronic forms. Amongst the implications are the following :

- The clinician, the planner/manager and the patient can all be expected to have conflicting claims on the purpose of the record and it cannot be assumed that these will be reconciled easily

- The form of the record will dictate whether the designer's theory of its use will correspond with its use in practice

- The goodness of 'fit' between the accounting and the clinical collaborative functions of the record will affect the fluency of clinical work and the patient's 'experience' of clinical care

- The difference, between the data suitable for logistic, accounting purposes and the more expressive forms of communication needed to support safe clinical activity, may mean that information is not a free good. Strategic gains in the form of reduced head count, from the automated abolition of data processing

tasks, may be diluted by the need to re-deploy back-room coding staff into new forms of clerical activity nearer the point of clinical care.

Policy, legislation and ethics related to medical records need to take account that :

- Patients see the medical record as a repository for their confidential medical data

- Clinicians see the medical record as a place to describe, explain and justify their own actions and to record the outcomes of their personal practice, within the "transformational" aspect of public service

- Planners and Managers see the record as a source of data for accounting, within the "transactional" aspect of public service.

### 9.4.5 : Secure and Confidential Information, Shared Throughout the NHS

*Information for Health* promised that secure and confidential, person-based information would be shared across the NHS. It emphasised data distribution and ignored the critical question of data input.

Data distribution implies the mechanical organisation of data within an inherently stable, internally consistent, closed system. It implies a single clinician, describing some aspects of a single patient to an anonymous third party, represented by a machine.

Clinicians do not distribute data to an impersonal machine as their primary task. They communicate on a human level, with each other and with patients, who can consent to specific actions when the occasion requires. When they receive data, they browse from one source to the next. The integrating factor not the machine but the reader.

Clinical communication takes place within a social system which is open to external cues that nuance the matter communicated, alter the conditions for communication and introduce complexity. It implies a total situation, in a busy surgery, clinic or ward, where clinicians, faced with multiple patients at multiple stages on a variety of 'patient journeys', consult a variety of electronic resources and communicate with other clinicians, directly as well as through the data machine.

**The implication for 'Connecting for Health' is that a change of emphasis is required : to look beyond electronic compatibility between data processing systems, and to focus on the detailed nature and context of clinical communication. The programme should now be re-designated, '*Communicating* for Health'.**

## 9.5 : A NEW APPROACH TO THE NATIONAL PROGRAMME

### 9.5.1 : The National Programme as a Mega Structures

The success of the National Programme has been to establish the standards necessary for electronic interfacing, to establish national databases and to enhance massively, workplace access to computers.

In turn, for example, access to national databases allows reception staff to identify a patient's GP from minimal information. Clinicians are better equipped to access the British National Formulary from the bedside or to refer to any of number of clinical guidelines or knowledge repositories such as TOXBASE (the National Poisons Information Service database) or the National Library for Health.

Access to local databases enables staff to identify their own tasks as well as enhancing operational control and audit by supervisory staff. PACS (Picture Archiving and Communication System) is a special form of local database, from which images can be disseminated locally or internationally through electronically compatible, intermediate channels. Despite this, the remote interpretation of images often raises questions which cannot be resolved without reference to the original patient.

The first significant failure of the National Programme has been to create conditions for provider-capture of the market for the products that clinicians will use. The supplier is able to place limits on what is feasible to alter within the purchased specification. The urge is to achieve transfer of risk, from the supplier to the local clinicians, through the signing of acceptance agreements, within the time-scale set for the project.

A 'market' with a single consumer (the National Programme) and an oligopoly of providers is destined to fail in its twin purpose, of efficiently matching demand, supply and price, and disaggregating decision making by 'sovereign' consumers with differentiated profiles of need.

Bacon & Pugh (2006) have suggested a policy of local procurement according to national standards. This policy would develop the market. It would create pressure for

information systems accurately to reflect users' needs and for software and data models to be resilient to the natural tendency of people, to improvise rather than follow prescribed routines of computer use.

An inventory of required 'functionalities' will not be enough. A policy of local procurement will require clinicians to develop a plan of understanding and expression that will enable their critical appraisal of information systems in the context of clinical work.

The National Programme's second major shortcoming has been in taking a step too far by shifting custody of the medical record from the general practitioner to an anonymous electronic megastructure. There is a parallel with information policy to protect vulnerable children.

Announcing the decommissioning of the ContactPoint children's database the Parliamentary Under-Secretary of State for Education stated :

*"Instead of a database containing millions of children's details, accessed by hundreds of thousands of practitioners, we are examining the case for a more proportionate approach to supporting front line professionals to help protect vulnerable children from harm……… it was disproportionate and unjustifiable to hold records on every child in the country, making them accessible to large numbers of people. Accordingly, we are exploring the practicality of a new national signposting service which would focus on helping practitioners find out whether another practitioner was working or has previously worked, in another authority area, with the same child." (United Kingdom : House of Commons Hansard ; Ministerial Statements for July 22nd. 2010).*

The introduction of electronic patient records has been mired in controversy over the appropriate (opt-in *vs* opt-out) national-level consent model for access to the summary care record, because patients have feared the intrusion of anonymous third parties on random occasions. The role-based access controls intended to assure confidentiality have been designed without a clear understanding that collaborating clinicians often act as each others' proxies, so that many information-related roles are highly ambiguous. Because of this, the construction of rule sets may prove unmanageably complex.

The National Programme has envisaged a strategic treatment of the patient as an information subject within a national data processing system. It ought to have treated the patient at a more human level, as a participant in equitable clinical discourse with a clinician.

### 9.5.2 : Microstructures : Bringing the National Programme Down to Earth

The images of a unitary NHS and a unitary information programme have provided a useful 'label on the can', a succinct representation of the megastructure to the outside world. However, the simplicity of expression has failed in both cases to convey the complex, open and chaotic nature of the 'whole system' that is represented.

The 'can' is a can of worms. The 'whole system' is a writhing mass of interacting sub-systems with different orientations and different purposes, each aligned with the whole but never, necessarily, fully aligned with its neighbours. There is no absolute, rigid and static structure of relationships. They are fluid and dynamic, even if there is a strong tendency for similar alignments to recur, time after time. The source of stability over

time is not physical but social : a result of human agency, based on values, beliefs and organisational policies that are susceptible to the-influence of events. Ethics and malleable social conventions contribute to stable and resilient structures alongside automated, inflexible, mechanistic rules.

These observations argue for a concept of integration, whether of social or computer systems, that is focused locally, on a small scale. Integration is not automated but 'performed' by members of identified practice communities who understand their own, as well as each other's business intimately.

The NHS and its National Programme for IT encapsulate complex aggregations of individual interactions between structures on a smaller scale. Every interaction represents at least two individuals or groups, each with more than one commitment. There is necessarily a mutual commitment but this is limited by the force of each party's other, asymmetrical commitments, external to the relationship.

As a concrete example, the architects of the Choose and Book system have assumed a mutual and symmetrical commitment, by appointments officers and GP's, to the concept of patient choice. Despite this, the design has ignored important aspects of the relationship between enacting the political philosophy of 'choice' and other events within the GP consultation, even if it has successfully aligned booking with other aspects of hospital administration.

In a political climate that rejects 'Big' government in favour of 'Big Society', the use of information technology as a wholesale arm of e-government is less important than its role in facilitating individual interactions between clinicians and patients. To be

successful instruments of policy, information systems in the NHS now need to be closely aligned with the actuality of clinical practice, where ethical goals are achieved through the alternation of disciplined and improvisory deployment of rules. 'Big Society' favours a form of electronic record lodged near to the patient rather than in a national repository and it favours an occasioned model of consent for access to the medical record, similar to the consent a patient gives before an operation.

## 9.6 : 'NEW MODEL' CLINICAL ENGAGEMENT

Clinical engagement has been proposed as a political means, to recruit clinicians to help manoeuvre an apparently self-justified information juggernaut into place, to support the strategic goals of the NHS megastructure.

These goals are only achievable through the operation of interacting microstructures, constituted and mediated by people in the front line of clinical activity, in countless contacts between patients and clinicians.

### 9.6.1 : A New Model of Change

The model of change required in 'New Model' Clinical Engagement is shown in **table 9.5** :

**Table 9.5 : The Change Model Implicit in 'New Model' Clinical Engagement**

| Old Change Model | New Change Model |
|---|---|
| Linear, programmatic. <br> Goal-oriented. <br> Reductive. <br> Impact of context is eliminated from goal definition. | Recursive, exploratory. <br> Learning-oriented. <br> Emergent. <br> Impact of context is fully acknowledged as goals emerge from exploration of consensus and dissensus. |

### 9.6.2 : A Shift in Emphasis

'New model' clinical engagement will transform an emphasis on mass data flows into a concentration on the place of information inputs and information access in the clinical context. The 'soft' discourse that negotiates the purpose and orientation of information systems will adequately reflect the voices of front line clinical teams who will need to reflect closely on personal experience of data input and data access in busy clinical settings. The 'hard' discourse about the information model at the heart of a clinical information system will shift from a model of data transfer, to a broader appreciation of the way clinicians actively assemble their working understanding in their own specific clinical situation and align data input with primary clinical tasks.

### 9.6.3 : Representation Out, Participation In

It is difficult to develop this debate in an assembly of representative clinicians from different workplaces, especially if their brief is restricted to comment on aspects of the human computer interface that might impede acceptance. It needs clinicians and

managers from the same workplace to place this aspect of planning and problem solving in the wider context of their own specific organisation, where the IT development programme sits alongside its building programme, its clinical management structure and its human resource programme.

## 9.7 : C O N C L U S I O N S   O N   P O L I C Y

Government and policy control the relationship between the state, powerful, interested groups and the individual. Applied to healthcare, these three elements map out in two triangular relationships.

First, they map onto the relationship between, respectively, the governance structure of the NHS, the institutions of the NHS and the individual patient.

Second, they map onto the relationship between the governance structure of NHS institutions, the commercial IT sector and the individual healthcare worker.

Within the first relationship, government faces an ethical dilemma : whether to apply a utilitarian ethic to the establishment of national scale databases, so that *all* are subject to the same regime in case *any* is at risk ; or whether to accept a higher risk for the unidentified, special individual to assure the privacy of the general individual.

*Transformational Government* presented information technology as the enabler of change aimed to emancipate the individual from the political mass. The impact in the

case of healthcare has been to create an information mega-structure, designed to cater for an assumed need and remote from the individual and the needs actually expressed.

The political philosophy of 'Big Society' corresponds with the future cutting down to size of 'Big' government and 'Big IT'. The future it implies includes data structures nearer to the patient and to the health professionals he is most likely to encounter : in his own locality rather than some remote town or city.

Plans in the new white paper, to transfer the commissioning of healthcare to consortia of GP's, will create an obvious demand for data flows across practice boundaries for strategic and transactional purposes as consortia grow, consolidate and become remote from communities. Patients will continue to need the focus to fall on the provision, to the professionals on whom they rely, of IT resources that facilitate operational communication on a human scale, within the context of the physical delivery of healthcare.

Within the second relationship, *Transformational Government* implied that the technology could be taken for granted as defined, supplied and put into place. It overlooked the reality that change is brought about by people who assimilate technology 'in order to' achieve specific goals and navigate specific constraints, within specific work situations on specific occasions.

It has been easy for front-line healthcare staff to be sidelined during the development of the relationship between an NHS institution and a commercial provider. After design, purchase and testing, it is only in the implementation phase that representative

individuals are recruited in a significant way as agents of pre-determined change. The terms of the relationship need to alter.

To assure the efficient delivery of effective, useful and usable information technology, capability building programmes must take account that genuine transformation of public services is not achieved directly by enabling the "transactional" data flows that process people and data. It is only achieved directly by enabling the "transformational" activities of those at the front line of service delivery.

Capability building programmes must avoid concentrating on the manipulation of clinicians' attitudes towards the new machines and instead must enable suppliers, institutional change agents and teams of clinicians themselves, in multiple workplaces, to appreciate and articulate the working context in which the technology is to be 'made at home' as a guest rather than a proprietor.

'New model' clinical engagement with the IT programme is, therefore, not an occasional activity, where prominent individuals represent the IT programme to the workforce and *vice versa*. It is a more intense and local activity, where front line teams participate in continuous quality improvement activities that clearly demonstrate the actual and effective introduction of information and communications technology, to solve immediately relevant, locally identified, operational problems. It takes place within the wider context of a local programme to reconfigure services and develop the capabilities of people to fulfil new clinical, informational and organisational roles.

It also requires a stimulus for commercial providers to develop their own capability, to engage with clinicians and develop their products in close and responsive partnership

with the clinical teams who will use them. This will lead to products that are highly customised by end-user teams, with maximum control over the process exerted locally rather than in the technical department of the software house.

The policy that moderates the two triangular relationships places rhetorical emphasis on the patient but the preference demonstrated in practice has been for the establishment of accounting structures over the facilitation of front-line clinical communication that underpins the patient's relationship with the NHS and its clinicians. Accounting structures can underpin and drive organisational learning but learning has to be implemented, in the form of better clinical practice. This requires better IT support for workplace documentation and communication.

In constructing a relationship between the governance structure of the NHS, the institutions of the NHS and the general patient, the National Programme for IT has isolated the individual patient from context with his care-givers and the situations where care is given.

The Programme has exemplified the careful construction of an effective relationship between the governance structures of NHS institutions and the commercial sector but this has yet to be paralleled in a similar, responsive relationship between the commercial sector and the teams of individuals who interact on a daily basis, at the clinical front line, where the policy outcomes of government interventions are created.

# **C H A P T E R   T E N**

# **C O N C L U S I O N   O F   T H E   T H E S I S**

The effectiveness of clinical engagement is presently limited by clinicians' opportunity and capacity to convey the complexity of information systems practice in the clinical situation. The purpose of the present thesis has been to recruit the contribution of the academic 'world' in the form of models and conceptual approaches that can equip clinicians, independent from external agencies - consultancies and commercial providers - so that they can express their perspectives to best effect themselves, alongside those of planners, managers and patients.

Review of the literature has uncovered contrasting depictions of the NHS, the National Programme and the individual clinical workplace, as problems for research to be conducted *about* and problem situations for research to be conducted *within*.

In the first instance, the only product can be theory. In the second, we come closer, if not to solving real, important problems 'in the world', then, at least, to assisting their negotiation in ways that are defensible even if they are not absolute.

The research, conducted in the context where the National Programme is to be implemented, has similarly highlighted the contrast in importance, between the circulation of data about the workplace and the more chaotic exchange of information within the work situation. It reminds us that the NHS, the National Programme and the individual clinical workplace are not inert 'things' which can be manipulated, physically or intellectually, in a strategic way. They are, fundamentally, collections of people and

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groups with commitments, to rules, social conventions and ethical value systems, that are not amenable to calculation and planning because they are situated and occasioned in regions of experience whose horizons only fuse partially. Together, they represent a problem situation that can only be approached successfully from within.

The intellectual journey represented by this thesis is from an initial position, stating and affirming a particular world view and aligning all other world views around it. The position reached is one where it is possible to comprehend and tolerate plural accounts of the same situation without the urge to effect an immediate reconciliation.

This is a move from a stance founded on a stable belief, about what the world '*is like*', to a stance that can adjust to a broader range of speculations, about what the world '*could be like*', *for a given set of events to occur, in the world as it is being appreciated, by different groups and individuals, in different ways that can be investigated and understood.*

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