A Socio-Technical Systems perspective of the operational delivery of Secondary Care in the NHS

by

Ann Elizabeth Esain

A Thesis Submitted in Fulfillment of the Requirements for the Degree of Doctor of Philosophy of Cardiff University

Lean Enterprise Research Centre, Logistics and OM Section of Cardiff Business School, Cardiff University

August 2011

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

DECLARATION

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

Signed: ..... (candidate)

Date: 31-08-2011

STATEMENT 1

This thesis is being submitted in partial fulfillment of the requirements for the degree of .....PhD.....

Signed: ..... (candidate)

Date: 31-08-2011

STATEMENT 2

This thesis is the result of my own independent work/investigation, except where otherwise stated.
Other sources are acknowledged by footnotes giving explicit references.

Signed: ..... (candidate)

Date: 31-08-2011

STATEMENT 3

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed: ..... (candidate)

Date: 31-08-2011

ACKNOWLEDGEMENTS

The work presented in the next pages, while being challenging and an outcome of a significant period of research, could not have been achieved without the direct and indirect contributions of many people. To them, I dedicate the following paragraphs as a token of my appreciation.

In the first place I would like to thank Prof. Peter Marlow, Dr Nick Rich and Prof. George Boyne for their time, advice and continued support during the process of researching and completing this thesis. I have been truly privileged to have them as my supervisors. I would also like to thank the case study organisation and the fantastic members of staff I have met and who helped me for such a long period. My supervisors, those in the case study organisation and those I have met along the way were all an inspiration to me. Thank you, you know who you are.

Furthermore, I would like to thank all of my current and past colleagues at the Lean Enterprise Research Centre, Cardiff Business School and Clinical Systems Improvement, Warwick Medical School for their support. In particular, I would like to thank Dr Sharon Williams for her guidance on healthcare matters and Dr Pauline Found for reading the final version in advance of submission.

To such a wonderful group of family and friends to whom I am eternally thankful. I have appreciated their sacrifices, errands, encouragement and time to listen to me, but most of all, for not giving up on me during the solitary process of writing this thesis.

Most importantly to my awesome partner, Derek, and my sister, Helen, who have been selfless in their support and have given me confidence in this endeavour. Without their care, love and patience, I could never succeed. Thank you for always knowing what to do and say. You kept me on the road to complete this work. Be well, be happy.

ABSTRACT

Waiting has been widely acknowledged as a source of patient dissatisfaction in the UK, especially the time spent in Hospitals waiting for safe, effective treatments and personal care. Comparison between healthcare systems in the UK and US informed managers, professionals and policy makers seeking to improve patient satisfaction with limited budgets. An emergence of literature regarding Lean Thinking as a significant global influence in healthcare improvement has followed these comparison. Yet the NHS, with its unique history relating to policy shift, professional dominance and its sheer scale, has been portrayed as slow to change. What then, enables and inhibits healthcare organisations when implementing improvement strategies to reduce patient waiting?

Taking an holistic approach, this study investigates the enablers and inhibitors for implementation of premised high performance principles (Lean Thinking). Theoretically this study is significantly influenced by socio-technical systems theory and is argued from a realist stance. Using a single case, the research investigates major patient flows in secondary healthcare (NHS) to gain insight into the process and outcome of implementation. Performance results were validated through comparison with two similar organisations. Primary analysis comprises a multi-method, triangulated approach of interviews, questionnaires, process and performance measurement. The main limitations of the study are a direct result of the complexity and diversity of the NHS.

Findings show differences in implementation that arise from the degree of closeness of sub-systems related to patient contact. The importance of middle managers on improvement implementation emerges. The impact of Professionals and senior managers is greater at the extremes of performance.

The empirical findings from this study provide a contribution of knowledge regarding the factors required for implementation of improvement (Lean Thinking) to achieve high performance, culminating in models for practitioner and policy makers, derived from an original research procedure for theory building.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

6σ	Six Sigma
A&E	Accident and Emergency
AHP	Allied Health Professionals
ALOS	Average LOS
ASM	American System of Manufacturing
BPR	Business Process Re-engineering
C&C	Command and Control
CHI	Commission for Health Improvement
COS	Chiefs of Staff (Clinical)
CRB	Criminal Records Bureau
CSI	Clinical Systems Improvement[1]
CSSD	Central Sterile Services/Supply Department
DNA	Do Not Attend
DOH	Department of Health
DRG	Diagnostic Related Group
DTOC	Delayed Transfers of Care
EAU	Emergency Assessment Unit[2]
EDD	Estimated Discharge Date
ELOS	Estimated LOS
EOC	Episode of Care
EOQ	Economic Order Quantity
EWTD	European Working Time Directive
GDP	Gross Domestic Product
GP	General Practitioner
GST	General Systems Theory
HDU	High Dependency Unit
HRM	Human Resource Management
IHI	Institute of Healthcare Improvement
IPD	Institute of Personnel Development
IPH	Improvement Partnership for Hospitals
JIT	Just in Time
KP	Kaiser Permanente
KPI	Key Performance Indicator
LOS	Length Of Stay
LT	Lean Thinking
LTC	Long Term Conditions
MA	Modernisation Agency
MAU	Medical Assessment Unit
MDT	Multi Disciplinary Team
MMR	Measles, Mumps and Rubella
MRP	Materials Requirements Planning

[1] See Rogers et al (2004) for discussion on this term.

[2] Emergency Assessment Unit is sometimes known as the Medical Assessment Unit (MAU) or Surgical Assessment Unit (SAU). These are deemed interchangeable abbreviations for the purposes of this thesis.

NHS	National Health Service (UK)
NHSi	NHS Institute for Innovation and Improvement
NICE	National Institute for Clinical Excellence
NLIAH	National Leadership and Innovation Agency for Healthcare
NPM	New Public Management
NSF	National Services Framework
OECD	Organisation for Economic Co-operation and Development
OM	Operations Management
OST	Organisational Systems Theory
PAM	Process Activity Map
PAS	Patient Administration System
PCT	Primary Care Trust
PDSA	Plan, Do, Study, Act
QFD	Quality Function Deployment
QPR	Quarterly Performance Reports[3]
RBV	Resource Based View
RIE	Rapid Improvement Events
SAU	Surgical Assessment Unit
SCO	Secondary Care Organisation
SMR	Standard Mortality Ratio
SPC	Statistical Process Control
STS	Socio-Technical System
TCE	Transactional Cost Economics
TI	Tavistock Institute
TOC	Theory of Constraints
TPS	Toyota Production System
TQM	Total Quality Management
TTH	To Take Home (prescription drugs)
TTO	To Take Out\Away
UK	United Kingdom
US	United States (of America)
VFM	Value for Money
VMMC	Virginia Mason Medical Centre
WTE	Whole Time Equivalent

[3] Case organisations senior management key performance indicators

CHAPTER 1 INTRODUCTION

'Work expands to fit the time available for its completion'
C. Northcote Parkinson, 1958

1.1. Delay as a service issue in the NHS

At the end of the 1990s and into the new Millennium, the UK National Health Service (NHS) was heavily scrutinised and criticised by the UK tabloid media and political sources for a perceived underperformance. This negative focus was generally in regard to poor time based performance of Hospitals. Numbers waiting for treatment in 1997 were the highest the NHS had ever recorded and continued to rise early into the New Labour administration. By the year 2000, a target to reduce patients waiting to 100,000 below that number which New Labour had inherited upon entering office was achieved. The number of patients on waiting lists for treatment was only one dimension of the NHS system problem. The real concern of patients was a second dimension i.e. the time individuals actually spent waiting. This concern remains a key issue to this day (Harrison 2000, Harrison and Appleby 2005). The culprits of underperformance cited by the media were secondary care organisations (e.g. Hospitals and/or Hospital Groups) and, at the initiation of this research in 2002, there remained a pragmatic and academic need to understand how clinical systems and performance/service improvements could be enacted to compress time.

The NHS is a significant public sector organisation and accounts for 5.5% of United Kingdom (UK) Gross Domestic Product (GDP) (Martin and Smith 1999) with the greatest proportion of this expenditure devoted to the secondary care sector. Secondary care organisations (SCOs) are some of the most complex of organisational systems (Spear 2009) employing as many people as a typical Toyota car assembly facility (from whence the Lean Thinking (LT) improvement model has been distilled). What was unclear from the criticism levelled at the NHS was whether the management of resources within SCOs was the source of an overall poorly performing system, or underperformance resulted from the political and environmental context of UK healthcare (Laing and Shiroyama 1995, Martin et al. 2003, Radnor and Bucci 2008).

A research need was determined regarding how best to address patients waiting or inversely how to achieve flow performance (defined as reduced waits for patients during an Episode of Care[4] (EOC) similar to the concept of a waiting line (Martin and Smith 1999). This public concern for waiting in a secondary healthcare system was against a backdrop of scarce resources. Thus, how could flow performance, or time compression (Stalk and Hout 1990) be achieved without compromising the quality of care administered for direct and indirect patient activities that support clinical flows (Bohmer and Romney 2009).

The rising cost of health provision, reducing operational budgets and seemingly insatiable demand, created a requirement to do more with the same human and technical resources to satisfy the need for treatment (Locock 2000, Martin et al. 2003). Yet, queues and waiting are seen by some in the NHS, as an implicit mediator for demand, in the absence of pricing (Laing and Shiroyama 1995, Locock 2000), and by others as a consequence of the complexity of service attributes such as perishability and inseparability given the perceived inability to generate additional capacity, or use private sector methods such as outsourcing. Even with recent increases in funding, the shortfall between 'service need' and 'patient wants' remain (Department of Health 2000, 2004). Policy makers have also looked to reduce demand for NHS secondary care services using a wide range of interventions, including the prevention of illness and redeployment of treatment to non-hospital locations (Department of Health 2000, 2001, 2006, Harrison and Appleby 2005). This objective has also been pursued to satisfy the public who express the desire to be treated closer to their own homes (Department of Health 2000, 2004, Wistow 2001). Yet there still remains waiting in the system.

Views of rationing and service complexity are at odds with the policies of the modernisation agenda (Cm 4310 1999) that seeks to address public concerns i.e. reduce waiting whilst ensuring good value (as a consequence of service productivity). Yet in the last 10 years, despite such policy objectives, the NHS has seen a decline in productivity

[4] Episode Of Care is the common term used within NHS hospitals to describe the care package required to treat the presenting and diagnosed condition of an individual patient. An 'Episode Of Care' can be simple or complex and will be coded on completion of stay to reflect the treatment received. This is in turn used primarily to ensure payment. and secondly to provide some management statistics for decision making and reporting.

(Kings Fund 2010). The hypothesis of a relationship between inpatient bed shortages/lack of surgical provision etc. versus waiting times has been called into question (Martin and Smith 1999, Yates 1987). These studies tended to lack a focus on whole organisational systems and used generalisation to establish performance gaps via modelling (Martin and Smith 1999).

Whatever view is favoured, there is a gap of understanding regarding the remedy for delays and waiting which patients experience. Given the size, complexity, and financial scale of an SCO[5], the most important setting for a contemporary academic study is the management of flow processes within an SCO. Taking an SCO as the focal point for a study, answers the academic shortfalls in previous studies that have lacked a whole organisational perspective to improvement and flow. Such a study of a complex organisation is also likely to expose system design weaknesses as well as identifying potential dependencies between parts of the organisation and the service provided to the patient. The study will also identify contradictions regarding capacity and its impact on waiting times. Few Operations Management (OM) studies in this field have sought to understand these issues and contribute to the academic body of knowledge in an area of OM that has, despite obvious need, been largely ignored in favour of a reductionalist approach to small parts of healthcare systems.

At this point in the thesis, the concept of 'waiting' needs further definition. It is the waiting line rather than the waiting list which is the focus of this study (Martin and Smith 1999) and this concept is inextricably linked to the OM concept of continuous flow (uninterrupted flow and no waiting) which in turn is the central tenet of high performing and lean organisations (Womack and Jones 1996). In this manner, the researcher adopted these concepts and sought to understand how multiple elements of a healthcare organisation could improve to reduce time and improve 'flow' of patients or indirect services. By researching these issues and knowing that if all departments in a healthcare system were to compress time (Stalk and Hout 1990), then delays would reduce. Rather

[5] While secondary care is the unit of analysis for this thesis, cognisance of the whole system (up and down stream) was implicitly necessary, much as the design for the Modernisation Agency (MA) Improvement Partnership for Hospitals (IPH) programme (2003) for which the author was a technical advisor.

than focusing on the regional economics of patients and delays to service, this study focuses on a healthcare Trust within the pragmatic constraints of a doctoral study.

Another reason for the selection of an SCO was that this represents a series of discharge points from a journey which a patient may have entered at primary care. Any improvement in the organisational design for flow of patients (reduced waiting in line) is likely to result in measurable and positive impact for patients returning home or moving more effectively to their next care destination. However, in the public sector, the concept of flow is not well understood (Radnor and Bucci 2008), hence this research theme had and has national importance – particularly for UK policy which inevitably focuses on the notional concept of 'Value For Money' and efficiency – or more often inefficiency of the current system design (Ham 1999, OPM 2003). There is a long history of time compression and continuous improvement in the manufacturing sector (Stalk and Hout 1990) and particularly the actions that add value when experiencing a service (Womack and Jones 1996) so there can be little surprise that healthcare managers and clinicians have looked to this sector and sought to emulate many of its practices. Imported methods, that are associated with manufacturing high performance include LT (Womack and Jones, 1996; Fillingham, 2008), Theory of Constraints (TOC) (Goldratt and Cox 1986, Young et al. 2004) and Six Sigma (6σ) (Breyfogle and Salveker 2004, Harry 1988). In the last three decades manufacturing enterprise design and associated practices, principally LT, have gained the position as 'dominant model' that is widely perceived to underpin high performance organisations in general and healthcare in particular (Bohmer and Ferlins 2006, Brandao de Souza and Archibald 2008, Piercy and Rich 2009, Radnor and Boaden 2008, Radnor et al. 2006, Rogers et al. 2004, Spear 2005, Swank 2003). Despite these recent innovations and growing awareness in the healthcare sector of these models, there is still a gap in how to implement high performance (Eccles et al. 2009, Maddock 2002, Proudlove et al. 2008, Radnor and Howleg 2010). Just as in manufacturing, this new model and its associated practices have been perceived in the healthcare sector as a means of simplifying complex business systems and rejuvenating performance levels in terms of value for money and patient satisfaction (Fillingham 2008, Mathieson 2006, Radnor and Bucci 2008).

One challenge to the migration and adoption of manufacturing thought is that commercial industrial organisations use these practices for profit enhancement which is not the case for the public sector where profits are notional and not the primary motivation of care personnel (Fryer et al. 2007). Many of these manufacturing innovations have sought to improve flow through simplification, variation reduction and redeployment of resources and here too, there is a gap in NHS understanding of how variation of demand, systems designs and patient flow can be aligned for higher performance of whole systems (Radnor and Bucci 2008, Radnor and Howleg 2010, Radnor et al. 2006).

Given these issues that impact on flow performance and the gaps outlined from the literature on high performing healthcare systems, the objective of this thesis is to contribute to the academic understanding of organisational and operational principles which enable, or inhibit, such performance. The thesis is driven from a practical need to understand these systems and to build theory so as to inform managers about the strategies they may use to and gain high performance. It intends to address the criticism from existing literature which lacks scientific quality (Øvretveit 2003). A contribution of the study is to directly influence management practice through robust research practice and provide practical utility for managers and policy makers.

To achieve the goals of this thesis it was considered necessary to evaluate a whole system transformation programme in an SCO (as the unit of analysis) and to apply a standardised method to diagnose operational improvement[6] founded on LT (Womack and Jones 1996). The use of a standard approach would allow all improvement interventions and implementations to be evaluated in terms of the factors and features that enabled or inhibited improvement/time compression. In this respect, the focus will be on the enablers and inhibitors to improvement particularly relating to patient flow.

Consequently the questions posed by this thesis are shown in Figure 1.1.

[6] The standard method used was not based on those which are often discussed in literature such as rapid improvement events or kaizen blitz but rather one developed by the researcher to better understand implementation issues which is noted as the main gap in understanding.

Figure 1.1 Research Questions for this thesis

Given the success of high performance organisations in manufacturing utilising the principles of Lean Thinking and subsequent research claiming the suitability of replication in the secondary healthcare system:

1. What features enable or inhibit secondary healthcare organisations to implement, improve and achieve higher performance of patient flow?

2. How and why do these enablers and inhibitors impact on the existing organisation socio-technical system?

Source: Author

1.2. Justification and Key Concepts

There is timely justification for this study to provide an understanding of how complex healthcare systems are designed, how they function and what factors enable successful adaptation (learning to improve). At the heart of t his research problem is OM and a body of literature and research which has failed to provide an integrated understanding of healthcare systems (Øvretveit 2003), when compared with the large amount of theory and practical application of OM in the manufacturing and most recently, retail and financial service sectors (Piercy and Rich 2009). However, the key concepts of OM remain the same – improved flow of a system that uses processes to convert inputs to outputs. The key concepts that relate to effective and efficient flow remain the design of a system to accommodate demand in dynamic alignment with user wants, and to provide services in a timely manner. In order to achieve reduced waits for patients during an EOC (without deterioration in clinical treatment quality), paced and timely action is required by the organisational system i.e. the patients' journey through the system is a flow of activities rather than a stop start series of discrete activities. This requires alignment and time compression, hence non-clinical departments can have an equal effect on continuity of flow as clinical processes (Feachem and Sekhri 2005, Feachem et al. 2002). Whichever OM model is favoured, improved ways of working and efficient and effective healthcare must include:

1. Better use of available capacity (no loss of capacity through safety and quality incidents). If improvement methods are used to reduce or eradicate these events, then capacity may be reassigned for more productive use;

2. A reduction of the impact of demand variability, amplified through inappropriate hand offs or other decision choices, which result in greater peaks and troughs of activity that would otherwise be necessary;

3. Challenge the set of service design principles that are premised on Fayol's "body corporate" (Fayol 1916) towards a new holistic approach to system design and regulation. Fayol's approach impacts on organisational practices such as speed of decision-making, roles and responsibilities. Challenging some or all of existing practices that enable system redesign is required to deliver better performance (such as satisfaction to staff, patients and users of the service).

As a result of these practices to liberate 'flow', it is hypothesised in the literature that 'more can be done with less' and that leaner OM systems designs will positively influence the number of EOC/service delivery which can be undertaken with the same resources (where demand is constant).

Given the previously noted gaps in current academic knowledge, the objective of this study is to build theory and develop a model for managers and academics alike to close the gaps in understanding patient flow in the context of operational organisational design. This study therefore seeks to contribute to how redesigned healthcare systems and OM practices positively (or negatively) correlate with higher performance. To achieve the research outcomes, access to an SCO was justified because waiting times are an outcome of how a system is designed and subsequently implemented and how an EOC interact from the point of referral, usually by a General Practitioner (GP), through Accident and Emergency (A&E) departments and wards to the final exit of the patient to their next care destination. Recent research has equated EOCs with activities within a factory (Brandao de Souza 2009), most critically with vehicle assembly, from which the LT model originates. Indeed, such analogies intrigued the researcher who had extensive research experience in the repair and overhaul of complex products and the application of improvement methods to government agencies and local councils. The researcher could see direct parallels with healthcare systems. As such, one of the motivations to conduct this research was the authors own experiences with healthcare in the late 1990s when it

was found many systems conform to the typology of a repair and overhaul industrial system rather than that of vehicle assembly. It was this interest that stimulated this study and is an area of OM that is poorly researched and understood (Knod and Schonberger 2001, Samaranayake 2006).

1.3. Research Framework

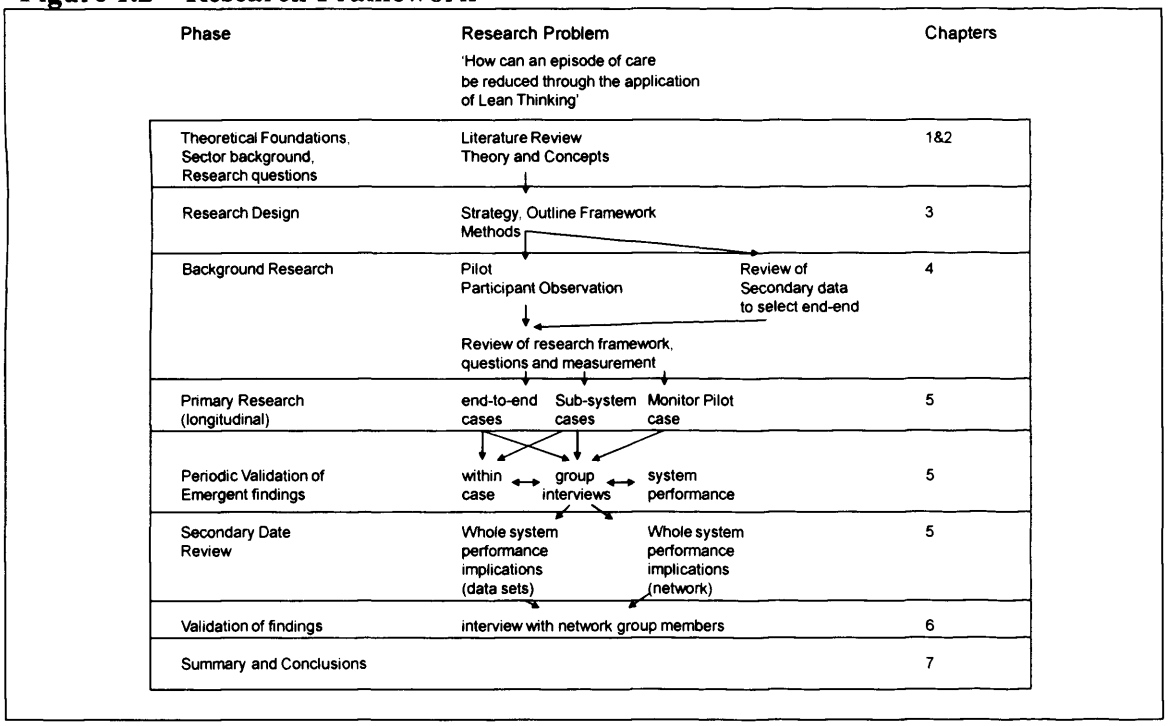
To address the complex subject of healthcare management, the research design for this study followed a realist and iterative route (Figure 1.2) which included various review stages where the findings at each key stage were subject to reflection. These learning points are identified in each chapter of this thesis and each chapter will build towards a final model and contribution to this thesis. The approach is consistent with the sociological theory building approaches to complex organisations as outlined by (Miles and Huberman 1994).

To assist the understanding of the reader, the chapter outlines of the thesis are now presented and explored. CHAPTER 1 sets the scene for this study and the pressing need for OM investigations within the field of SCOs. CHAPTER 2 provides a literature review and locates this study within the management of healthcare delivery systems and performance. The chapter explores the influences from manufacturing and other healthcare thought leaders (published at the commencement of and during the research). These ideas were being popularised around the year 2002 and the researcher provides a critique of these hypothetical debates.

CHAPTER 3 explores the background theories that underpin this research and argues that the only meaningful way to study patient journeys and improvement activity is as a socio-technical system; how these adapt, and can generate systems improvement. The main foundation of CHAPTER 3 is that of systems theory when applied to organisational management and in particular, the ideas of systems adaptation and how this approach to complex human organisations is aligned with modern OM thinking. In particular, how operations systems can adapt to higher levels of performance without investment or radical changes to existing structures or personnel.

Following a preliminary review (of literature and theory current in 2002), an investigation was conducted to test these ideas and this field research informed the design of the five year longitudinal case study which was used to gain an unprecedented depth of understanding. Such a holistic and major case study was considered appropriate to satisfy the questions that guide this contribution to knowledge. The detailed development and justification of the research strategy, methodology and limitations is presented and discussed in CHAPTER 4. This Chapter explores the alignment of research philosophy, methodology, and quality assurance processes in depth. On completion of the in-depth field work, a further review of performance data was assessed to establish the impact on the system. Validation of the findings was a key component of the research design as both qualitative and quantitative results were reviewed.

Figure 1.2 Research Framework



Source: Author

CHAPTER 5 explores the case study, its statistics, pressures, and recent improvement activity before presenting the results of this study in CHAPTER 6. CHAPTER 6 concludes by bringing together the results of the study and adds to the body of knowledge by offering a model to assist managers in delivering healthcare improvement through patient flow. Finally, CHAPTER 7 reflects on what has been learnt and suggests new

avenues for future exploration including the generalisation of the findings to other organisations and sectors.

1.4. Chapter Conclusions

This chapter provides the rationale for this research and the questions that guide the thesis. The motivation for, and focus of the research, is grounded in a real life problem which has far reaching consequences not only for managers in healthcare in the UK, but policy makers and the general populous. The time delays which are central to this research can range from inconvenience to life threatening. The impact may also be on both quality and length of life. While the research is longitudinal, the features examined have remained a problem throughout, albeit with increasing contribution from varied sources which have been embedded in this research in an iterative manner (when such research evidence became available). CHAPTER 2 critically reviews the managerial implications of policy shifts since the inception of the NHS, and explores the potential effects on operational design related to patients waiting during an EOC.

CHAPTER 2 THE HEALTHCARE ENVIRONMENT IN PERSPECTIVE

2.1. Introduction to the Policy, Professional & Managerial Domain of UK NHS Service Operations from the 1940s to 2002.

The UK NHS and its processes are a complicated system of patient flows and systems that have evolved over time. It is not often easy to determine why certain features exist and how they have come about without a contextual sensitisation for the reader. This chapter explores the history of healthcare organisation in the UK since the 1940s, describes the system for an episode of care, provides a brief overview of the proposition about the transfer and possible application of manufacturing organisational redesign in addressing contemporary issues facing the NHS, and finally reviews the influences of the American healthcare systems in the context of scope of this research and the present-day debate.

In order to understand the contemporary pressures affecting the NHS, it is necessary to reflect on the political, professional and managerial influences that have shaped the current service. Each of these domains (Talbot 2003) influences the construction of working practices current at the commencement of this research. The current devolved structure of healthcare management is not a model of local and complete autonomy and a number of UK Government policy shifts have directly shaped the design of the current system. Three major policy directions can be clearly identified, the first is best defined as the 'administration' approach, the second 'managerialisim' or 'marketisation' and the third phase is that of 'collaboration and partnership'. These three phases have affected all the home nations[7] in terms of the structure of healthcare provision. Each of these policy-led cycles has implications and an impact on the operational practices of the health service of today.

2.1.1. The Administration Phase

Early in its history, secondary care services were divided up into divisions intended to create, combine, and group medical specialties. These divisions also reflected the

[7] England, Scotland, Wales and Northern Ireland.

demarcation of professions (professions at this point referred to doctors, dentists and the like). Hospitals, in which the professions practiced, were owned by the state. Staff were salaried, GPs/dentists formed partnerships and were sub-contracted to regional health authorities (Oliver 2005). While the names of organisations and their form have changed since the 1950s, the essence of these operational relationships still exists.

The administration system exhibited the features and characteristics of a traditional Command and Control (C&C) structure and operated with centralised planning and data collection which has been described as slow and bureaucratic in nature (Ham 1999). In the 1940s/50s, policy in hospitals was set at a senior level, converted into tasks, distributed between divisions, and administrators would monitor and report progress against the tasks. The Porritt Report (1982) called for a removal of boundaries between suppliers to reduce the dysfunctions of an overly-bureaucratic organisation/healthcare delivery process. Whilst this was not implemented at the time, it has enjoyed a contemporary rejuvenation since the millennium and authors have called for its introduction (Feachem and Sekhri 2006).

Table 2.1 Central Tenants of the NHS

UK Government Report/Paper	Date	Recommendation	Intention/Assumption
'Social Insurance and Allied Services Welfare Report'	1942	Sought to eliminate idleness, squalor, hunger, disease, and ignorance from the UK population	
'A National Health Service'	1944	Irrespective of means, age, sex or occupation, everybody should have equal opportunity to benefit from the best and most up-to-date medical treatment available on a national scale free of charge at the point of demand, including the promotion of good health as much as the treatment of sickness and disease.	To offer a standard service across the UK
National Health Service Created	1948	Core objectives of the system: - 'universal in offering coverage to all members of the population in time of healthcare need'; - 'comprehensive'; - 'free at the point of use' (Oliver, 2005).	Secondary objectives have emerged since 1948 including concepts of improving efficiency, extending choice, and the management of 'health outcomes'.(Oliver, 2005)

Source: Hallet (2000) as amended by Author

By the 1970s, structural reorganisation became the order of the day (Hallet 2000) although specialties have remained largely unchanged at an operational level (Ackroyd 1996). Management by consensus followed, which according to the Griffiths Report (1983), gave healthcare professionals power over their organisations but discouraged autocratic leadership in favour of general collaboration (Oliver 2005).

2.1.2. The rise of Managerialism

In 1979, a change in the governing UK political party brought with it a second major policy shift. While the central tenets of the 1948 objectives (Table 2.1) were still supported in general the terms; 'comprehensive' and 'free' have increasingly been subject to interpretation. The evolution of healthcare reform, detailed in Table 2.2 inspired a new business ethic to improve efficiency[8] (Oliver 2005) and thus shift away from an emphasis on bureaucracy (administration) toward an emphasis on commercial managerial values (Hewison 2003).

Government policy at this time espoused efficiency and proposed it would be achieved by the introduction of a hierarchical management system. This system was intended to enable the identification of the responsibility for (poor) performance and empower managers to improve system efficiency (Oliver 2005). The incentives affecting hospital management were changed so that productivity improvements did not incur penalties as a result of the budget allocation process[9] (Ham 1999). Information and data collection across the system was still collected centrally, although clinical professionals found little of the captured data useful in their day to day work with most data stored and analysed independently after conclusion of an EOC (Millard 1994b).

[8] Efficiency has a number of meanings. In the context of Table 2.1, it means 'greater technical or allocative efficiency': an example is hospital activity, that is, cases treated in hospitals (Oliver, 2005).
[9] These budgeting and economic issues are symptomatic of large scale and complex adaptive systems as noted by Johnson and Broms (2000).

Table 2.2 Implications of NHS policy led system changes, 1979-2005

Government Administration	Structural Change (Oliver 2005, OPM 2003)	Government's Intention (Oliver 2005)	OM Implication
First Thatcher administration (1979-1983)	Area health authorities abolished: district management teams elevated to district health authorities	Cut costs of bureaucracy	Reduce Administration. Role conflict. Reorganisation. Cost flows
Second Thatcher administration (1983-1987)	*Griffiths Report* proposes introduction of stronger management at all levels of the NHS. Reorganisation from this was the first such policy to aim at process rather than structure. (Pettigrew et al. 1992)	Create leadership and accountability across the NHS - referred to as New Public Management (Hood 1991)	Introduce strategy. Value for Money (VFM)
Thatcher-Major administration (1987-1992)	*Working for Patients* proposes introduction of the internal market: *The Patient's Charter* sets out patient's rights and aspirations for national standards of care; family practitioners committees abolished; *The Health of the Nations* proposes targets to reduce mortality	Improve supply side efficiency; improve responsiveness to patients; improve population health	Reduction of patient time in the operational setting. Introduce competitiveness. Introduce standards
Major administration (1992-1997)	Regional health authorities abolished	Cut cost of bureaucracy	Reduce cost
First Blair administration (1997-2001)	Proposed the abolition of GP fund holders and the introduction of Primary Care Groups (later replaced by Primary Care Trusts (PCT's)); district health authorities abolished and replaced by smaller number of health authorities (later replaced by strategic authorities); National Institute for Clinical Excellence (NICE), National Services Framework (NSF) and Commission for Health Improvement (CHI) (later the Healthcare Commission) established; the Private Finance Initiative is extended; *The NHS Plan* outlines how to commission private sector capacity	1997 New Labour Manifesto - access to based on need alone. Tackle the 'two tiered' primary healthcare system; empower primary care; cut costs of bureaucracy; reduce postcode prescribing; improve cost effectiveness, quality and accountability; reduce waiting lists and times	Health outcomes improved through performance management centrally driven. Measures include quality, efficiency and consistency to remove differences in geographical service patterns. Clinical Governance introduced as a means of managing quality (Buetow and Roland 1999)
Second/Third Blair administration (2001-2007)	Health inequality targets; introduction of Foundation Trusts; introduction of a comprehensive case-payment system based on Diagnostic Related Group (DRG) type methods. Introduce 'The Third Way' (Ham 1999)	Reduce inequalities; increase hospital autonomy and efficiency; increase competition and quality; extend choice and reduce waits	Deploy policy. Reduce backlogs of patient waiting and ensure those who join the queue wait a shorter time. Throughput to reduce cost per patient. Collaborate to Improve (Øvretveit 2002)

Source: Author

McNulty and Ferlie (2002) note that during this phase, the whole public sector was'...increasingly exposed to intersectional transfer of generic models of organisation and management. Differences between contemporary private sector firms and public sector healthcare organisations appear to be less pronounced through a process of intersectional blurring, or rather the convergence of public sector organisations onto private sector templates. The greater the convergence, the weaker the argument that models cannot be exported into the public sector because the work undertaken is intrinsically different.' p.50 (McNulty and Ferlie 2002).

The term used by academics to describe the policy shift was New Public Management (NPM) and this involved a series of campaigns to become more businesslike (Hood 1991) and manage healthcare systems tactically (Table 2.3). The doctrinal components which Hood (ibid) identifies, suggests the proposed new system design allowed greater transparency, visibility and review by management and policy makers with a new management prerogative. However, the new approach had many weaknesses - not least the ability and willingness of individual managers to understand the system within which they controlled key processes, the ability of managers to engage in successful and effective change, and to actually work together to exploit dependencies between managers and professionals so that tasks could be allocated in the most logical manner. Additionally, there remained a reliance on highly skilled professionals to ensure operational quality (Tucker and Edmondson 2003). These issues, and a general lack of preparedness for commercialism, severely limited the real impact of the managerial efforts and overestimated vastly the ability of managers to design/improve processes from the comfortable era of administration (McNulty and Ferlie 2002).

Table 2.3 The Doctrinal Components of the NPM

Doctrinal Components (Hood, 1991)	Theme (Esain, 2006)
'Hands-on professional management' in the public sector	Change & commercialism
Explicit standards and measures of performance	Visibility
Greater emphasis on output controls	Visibility
Shift to desegregation of units in the public sector	Fragmentation
Shift to greater competition in the public sector	Uncertainty
Stress on private sector styles of management practice	Management Led Control
Stress on greater discipline and parsimony in resource use	Management Led Control

Source: Adapted from Hood (1991)

During the evolution of policy, each government assumed implicitly that all that went before would be erased and dismantled in favour of a new vision of healthcare. No strategy or action explicitly made this occur. As such, healthcare management has faced a continuous state of policy flux. This does not engender a desire of healthcare staff to engage with policy other than merely to react to the most pressing policy implications. Such dysfunctional managerial behaviour has been previously identified (Brooks and Brown 2002, Currie 1997). It is not surprising that the inherited system has made systems improvement challenging, considering potential for selective implementation of policy and the proliferation of patient routing (thereby increasing variety and complexity). This is an aspect of healthcare management, sometimes referred to as 'layered' (Cooper et al. 1996) where little is understood in the context of OM and there is a gap in the body of knowledge. In turn, this reinforces the importance of this study to both the academic understanding of effective healthcare OM and necessary linkages to policy, as much as the practical benefits that can be gained by a review of current practice.

As a policy, Commercial Managerialism was intended to make the NHS more efficient but whilst improvement was made, the policy in itself did not deliver the intended efficiency (Hood 1991). This view is supported by a comparative study of 200 hospitals from 1991-1994 with the conclusions that productivity had not been an outcome of competition or the internal market (Soderlund et al. 1997). The Conservative Government were also later criticised for ignoring health disparities, although policies were introduced to reduce mortality rates for certain conditions (Oliver 2005).

Indeed, some commentators have gone further in their criticism, proposing that these changes increased inefficiency and dysfunctional OM practices (McNulty and Ferlie 2002). It is also claimed that there was insignificant evidence to support a movement of UK hospital doctors away from their peers or professional associations (Buchanan and Wilson 1996, Kitchener 1999). This professional group was indifferent and sometimes hostile to 'corporate management' and used the founding objectives of the NHS as their doctrine to justify care over commercialism. This highlighted a divorce between the intent of policy makers and the translation of policies/behaviour changes within the

healthcare system and emerging conflict between managerial and clinical professionals. Hence a friction between the intent to care, the need for collaboration and a priority to be commercially aware developed. These conditions, however, provided the watershed point for the third phase of policy making and that of 'partnership' in management.

2.1.3. Partnership

The focus of reform evolved, to its position at the commencement of this research, where a vision of UK public health service is based upon collaborative improvement (Øvretveit et al. 2002) and the engagement of best practices (in a manner similar to the promotion of industrial models of best practice, Table 2.4). Within the new manifesto, there were debates concerning patient choice, which is a theme for the NHS in England (Harrison and Appleby 2005) as a means of defusing demand and creating competition (demand-led). Policy decisions could once again be accused of creating proliferation of patient routings and increasing variety for those managing the operations of SCO.

Table 2.4 Summary of the phases of management focus and operational parameters of whole systems improvements in industry, 1979-2005

Improvement Phase	Industrial Management Focus (Rich, 1999)	4 stages of whole system improvement (Weisbord, 1992)	Operational Parameter of Improvements
Phase 1	Internal Functional Focus	Experts solve problems	An isolated closed system within an organisation
Phase 2	Integrated Business System	Everybody solves problems	Alignment of organisation functions to satisfy changing customer demands
Phase 3	Customer Integrated System	Experts improve whole systems	Movement to an open system with the 'customer element of the conversion process equation' being incorporated. Seeking to reduce any adversarial interfaces. Establishing customer value to align systems design.
Phase 4	Partnered Integrated System	Everybody improves whole systems	Enhancing the open system to integrate suppliers vertically, to increase the systems overall operations capacity. Moving away from adversarial procurement practices to connected work process for the mutual good (Esain and Rich, 2006)

Source: Author

Challenging and redesigning healthcare services such as providing specialist treatment safely at the GPs surgery (primary sector) has stimulated a process of questioning how best to provide services and where it is best to make this delivery transaction with the

patient. This new approach has stimulated an interest in process efficiency, process effectiveness and better OM performance within secondary care and the domain of the large hospital groupings. Throughout England and Wales, initiatives to reform OM systems have emerged during the research phase of this thesis. This highly funded promotional activity has created awareness of different operations models of high performance, including the introduction of lean enterprise systems (e.g. NHS Institute for Innovation and Improvement (NHSi) mandate).

The concept of 'partnership' is used in conjunction with modernisation (Giddens 1997), which Ham (1999) contends is a means of enabling the NHS to equip itself with a variety of tools for improvement. Ham states the policy rejects the notion of 'one best way' to gain performance improvement and concentrates instead on management selection of what and how to provide value for patients (and win their selection as provider of choice). Two particular elements of modernisation relate to healthcare. Firstly, that of the improvement of the delivery and secondly, a newer dimension that promotes the eradication of problems and inequalities (Wistow 2001). The solution posed was a movement towards partnership across and between separate organisational entities from all sectors in society. This was deemed central to the delivery of policy for a healthy nation. It implied a process focus where those being treated for illnesses are regarded as flowing horizontally across healthcare organisations (Feachem and Sekhri 2006). In this new way of thinking, dependencies and aligned performance of different stakeholders and providers, along the patient or care pathway, implied the need to review, understand, segment and redesign work flows (Esain and Rich 2005). The objective was to improve the quality of experience and improve timeliness which in turn may result in more effective utilisation or efficiency gains.

A picture of the NHS and its policy shifts and tensions has already been described. Contemporary issues and the current era of healthcare management and its very recent emphasis on process redesign makes this study relevant at this juncture. In a period where adoption of new systems is promoted by policy makers, the issue is that of organisational adaptation of existing structures and processes to result in better performance (Giddens 1997). Such adaptive processes are not studied or documented at

an operational (micro) level within the NHS, but it is argued that these changes hold the key to radical systems improvement (Werner et al. 2007). As such, this study addresses directly the capability of OM systems to adapt and improve.

The emphasis on a *'quality-first'* service echoes the advice offered by Slack et al. (2004), that high performance organisations evolve from primary attention to system quality and that this is the principle level of OM mastery on a path towards high performance. The promotion of 'quality first' for clinical procedures and treatments has resulted in the creation of NICE which is responsible for the creation of standards for new treatments, hence providing an enabler for the removal of differences in geographical practice as well as the assessment of interventions for clinical and cost effectiveness. Conversely, with the information from NICE, the possibility of explicit management rationing emerges (Martin and Smith 1999), an implication of which could be an additional decision making route embedded in operational care delivery. A further institute was CHI which has evolved into the Healthcare Commission, which monitors the standards set by NICE and NSF. A literature review on clinical professional attitudes towards quality and quality improvement, reported wide support for the idea but a significant divergence on the definition, recognition and treatment to rectify and improve quality in the healthcare setting (Davies et al. 2007). Table 2.5 summaries the unique characteristics of the UK Public Healthcare Sector and the tensions that link clinicians, managers and patients.

Table 2.5 Unique characteristics of the UK Public Healthcare Sector

Political Profile	High, located in the public sector with little to suggest holistic privatisation.
Legislative based restructuring	Greater than in the private sector.
Political controversy	Greater than in the private sector. Issues and decisions can quickly move into the political or public arenas.
Defensive behaviour	Greater than in the private sector. Constraints on public sector management behaviour and power can typically be more than in the private sector. Trait of not encouraging 'bad news' which restricts radical experimentation on alternative futures.
Property rights	Public rather than private.
Market forces	Few functioning price mechanisms.
Hyper-bureaucratisation	Trait which restricts radical experimentation on alternative futures.
Risk Aversion	Bad political news on interventions, which may provide efficiencies or other stated benefit, may be stopped and seen as too risky. Trait which restricts radical experimentation on alternative futures.
Highly professionalised	Professional workers can enjoy power and autonomy over work practices. Resistant to formalisation and rationalisation of knowledge.
Power	Management power often restricted to facilitative role, hence limited in ability to impose radical change. Historically, power has rested with a 'loose coalition' of local clinical groups. The general approach to change has been incremental and macro and strategic change seems disconnected and out of touch.
Management Capacity/Capability	This may be underdeveloped in the area of complex change in large organisational structures.
Complexity and Differentiated nature of work	Is the setting too complicated for redesign due to the range of variables in detecting illness?

Source: McNulty and Ferlie (2002)

2.1.4. Contribution to the study

It is not true to argue the conflicts of past healthcare regimes have been eliminated. Even under the 'partner approach', there remains an uneasy relationship between caring, commercialism and the rate of process improvement that can be achieved without incurring industrial relations concerns/resistance to change. However, the scale of the problems are much less than those of the managerial era (McNulty and Ferlie 2002). Improvement through systems redesign has continued with new case studies of improvement emerging albeit without any rigorous testing (Øvretveit 2003, Radnor and Boaden 2008).

In summary, the following contextual characteristics and issues have been identified:

a) 'Layering' of macro level policy shifts create implications and issues at the meso and micro system level (McNulty and Ferlie 2002) including:

- Where new policy was applied, this was undertaken in addition to the existing organisational design of hospitals.

  i. The unintended consequences have been proliferation of routes of care and increased variation of options for staff;

  ii. The intended consequence was patient choice of care closer to home (but with no mandate to 'retire' previous services).

- The policy shifts from administration, to managerialism brought with it the call for 'value for money' and the concept of efficiency.

  i. Staff remained largely unchanged apart from job titles. Willingness and ability to understand the system within which managers worked as a whole was limited (Hood 1991);

  ii. The number of centrally requested measurements increased. Measurement moved from reporting to a means of analysis after the fact (Millard 1994a, 1994b), which in some cases was perceived as punishment from the management;

  iii. Workload increased (for managers and staff) due to additional policy directives and lack or limited strategies to undo the old policies;

  iv. Individual managers learnt survival strategies in response to the imposition of 'responsibility' to limit impact on workload and avoid focus on their sub-system (the outcome of which was only partially in their own control);

  v. In turn, patients became dissatisfied with the service performance; hence policy emphasised 'patient' focus.

- A move in managerial focus to a defensive mode and a focus on internal sub-system performance (not process based).

- The move towards a more 'business like' model opened the possibility of comparison and learning from 'profit making' organisational forms.

  i. Improvement and adoption of 'best practice' ideology from business support by quango organisations such as the MA and subsequently the NHSi. Consequently, concepts of safety and quality have gained increasing prominence (Vincent et al. 2004) as well as flow improvement;

  ii. A call for collaboration across the system to achieve value for Patients (Ham, 1999) which challenges the point and place of delivery of care (Department of Health 2006).

b) The domains of management and profession were at odds:

- The professions did not support the movement to the 'commercial' model and loyalty remained with the professional associations (Kitchener 1999).

- Concepts of safety and quality are not consistent between managers and clinical professionals nor are they consistent amongst clinical professionals (Davies et al. 2007). This inconsistency constrains the challenge for improvement.

c) While structural reorganisation of secondary care staff and services has occurred in the UK, i.e. clinical directorates (Kitchener 1999, McNulty and Ferlie 2002), the model of delivery of service at a micro level has consistently been premised on technical specialties, hence at the commencement of this study, little had changed operationally in the delivery of care.

These issues have all influenced the desire to improve the performance of existing systems and to adapt current working practice to remove, or reduce, patient waiting. Clinicians and other healthcare professionals have also looked to methodologies from

outside the sector as helpful catalysts to improve performance (Berwick 2003, Young et al. 2004). These practices have drawn from dominant models of manufacturing management, which have also relied upon partnership collaborations and improvement. For the purpose of this study, the transference of private sector methods and the adaptation to the current healthcare system for improved performance presented a unique opportunity to truly understand a system undergoing change in practice. The focus on staff interventions to improve (rather than changes in performance resulting from capital expenditure, automation or improved information technology) is critical to understanding how systems are redesigned and how this enables or inhibits flow of patients and services. Understanding this aspect of OM is by far the most important academic gap to be closed (Roberts 2004).

For the purposes of understanding what latent improvements can be made within an existing system, a review of the current UK healthcare systems and 'the big factory' hospitals, is both timely and pertinent. Few studies of the health service have taken a broader approach to what can be achieved by redesigning the current system, resources, personnel and working practices. Before extending this discussion to include the transference of manufacturing working practices to the context of the UK NHS, it is firstly important to review the system itself and to highlight the critical role of the SCO and the complexity of services offered from even the smallest of hospitals.

2.2. Defining the UK NHS System and the patient interface - an Episode of Care (The Generic Value Stream and Patient Flow)

Many factors make this study germane and critical to OM knowledge. The focus explores further dimensions to the subject; that of how the overall system is structured and why a Trust[10] represents the most important and logical unit of analysis for this study.

The NHS is the largest public sector organisation managed by the UK government. Secondary care has the high cost impact on the healthcare system in the UK. Primary care has the greatest number of patient transactions but these tend to be brief episodes of

[10] As an organisation

care. Consequently, the primary medical services budget represented 11% of the total NHS budget in the period 2006/07 (Featherstone and Evans 2010). Hence, secondary care is the focus of this study.

In April 1999, the organisational structure of healthcare provision was changed as a result of political devolution of power to regional parliaments (Hallet 2000). However, in the process of devolution, the objectives of the NHS service with its new local emphasis did not change. In 2005, a review of the effects of the regionalisation policy concluded that activity and outcomes were dependent upon the effective management of resources. The focus of the English system on patient waiting times yielded improvement results, but otherwise there was no discernable difference in the performance of the devolved service (Alvarez-Rosete et al. 2005).

Despite a strategy of devolved responsibility, each constituent region retained a reporting responsibility to the Department of Health (DOH) with the objective to deliver *'fast, fair, convenient and high quality health and social care...'* p13 (Llewellyn 2005) and in particular, delivering the goals of the 10 year NHS plan (Cm 4818 2000). However, the management of healthcare resources is not as straight forward as other large scale businesses, even when viewed from a regional perspective. The NHS in England is the 5th largest employer in the world, allowing for suspected under-reporting by the NHS (Trefgarne 2005). Devolution means there is currently no single definitive figure for the number of employees engaged by the NHS, but DOH statistics show that in England approximately 1.3 million people worked for the NHS in September 2005. Llewellyn (2005) claims 140,000 staff are engaged in the Scottish NHS and approximately 90,000 in the Welsh NHS (Welsh Assembly Government 2006b). These figures support the fact that the sector is the largest employer in Wales. Statistics concerning Northern Ireland estimate employment levels at 77,000 (DHSSPS 2007). If combined, these figures would make the entire UK NHS employment equivalent to the 3rd largest employer in the world.

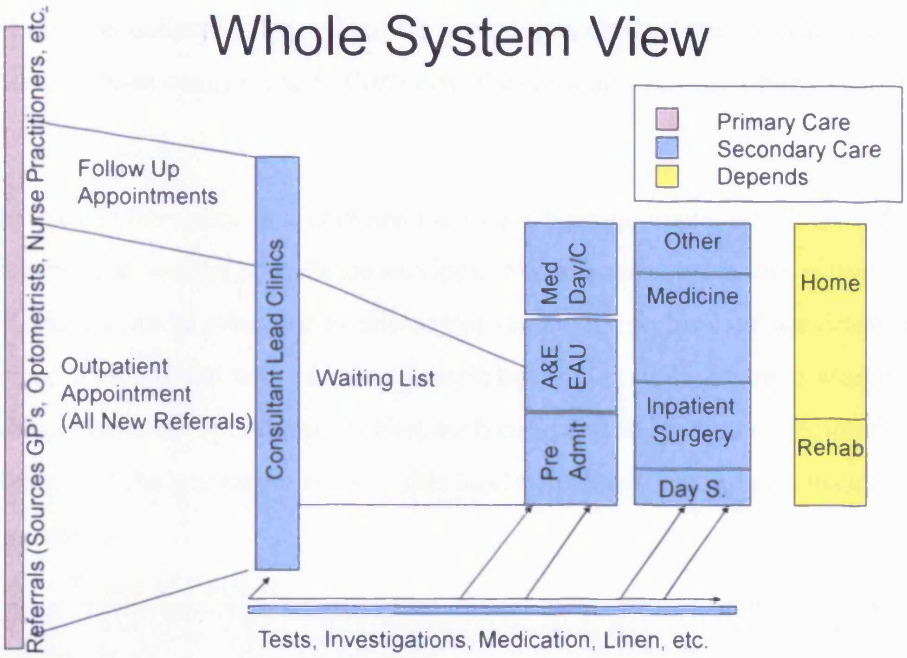
The devolved structure of the NHS has created many local 'employers'. These organisational groupings are known as 'Trusts'. In England there are PCTs, NHS Trusts, Foundation Trusts and Care Trusts. Additionally, local employers in England include

new strengthened roles for primary care organisations (such as local GPs) meaning they act as the purchaser of hospital and secondary care services. Such activity of local procurement is known as commissioning, and accounts for approximately 80% of funding available in the contemporary way the service is funded (Feachem and Sekhri 2006). Within the region of study at the commencement of this research, 22 commissioning authorities were established[11] which are coterminous with the 22 local authorities. These are accountable to the local communities they serve (Llewellyn 2005).

In terms of expenditure, resourcing the NHS in England is estimated to cost 'more than £70 billion a year to run' and is experiencing a year on year *'real-terms funding increase of 7%'* p8 (Brindle 2005). Scottish expenditure (2004/05) for core services was in excess of £7.5 billion and Wales consumed a further £4.2 billion in the same accounting time period (Llewellyn 2005). As a result of historical funding allocations, the home nations received an unequal share of health expenditure and in 1995/96 there was a 25% annual difference in funding between Scotland and England. Similarly, Wales accounted for an 18% per capita difference with their English counterparts (Dixon et al. 1999). Research also identified that differences in financial expenditure did not equate to improved health outcomes for the populations that benefited from greater relative expenditure (Connolly et al. 2010, Feachem et al. 2002, Kings Fund 2010). This inability to equate funding to improved performance reinforces the imperative for better management of resources and the role of local management to focus on issues that improve patient flow (Dixon et al. 1999). Given the focus on cost in the NHS, these findings support the notion that expenditure alone may not be the solution to improving the performance of the system. Consequently, this study is intended to be a contribution regarding potential improvements to existing OM systems through redesign processes, rather than the route of capital expenditure and investment in new systems capacity/resources (Allder et al. 2010).

[11] In April 2003

Figure 2.1 Pictorial View of the Healthcare System in the UK



Source: Author

There is no absolute ruling that bounds where the practices of each organisation in the NHS take place. Demarcation activities are often a result of evolution and history, estates investment and technology, as much as they reflect the national and regional need. However, the actual services conducted at macro level are very similar by region, regardless of which organisation undertakes the activity (although there have been changes in staff titles and span of control (e.g. nurse practitioner)). Much of the systems' infrastructure is as originally conceived by the post war government design i.e. GPs in local practices serving as the initial interface to the public (primary care), with specialist support provided by Hospitals for more severe and complicated health issues (secondary care). The system is summarised in Figure 2.1 and shows how GP referrals guide patients from primary to secondary care processes.

Primary care relates to health consultations undertaken with professionals who are collectively GPs, Pharmacists and Optometrists. Where patients cannot be treated locally, GPs refer patients to specialist services (clinics in secondary care staffed by nursing practitioners, Multi-Disciplinary Teams (MDTs) for specialist healthcare and/or consultants). During the course of this research, this aspect of the overall system has

been subject to policy changes and experimentation, which are intended to reduce referrals to the secondary sector (including 'one stop shopping' for specific conditions, poly-clinics, walk-in centres, etc.). Currently, these models have not been adopted nationally.

Secondary care is the sector that contains the major hospital assets which provide specialist advice as well as ambulance services. Some intermediate care activities (such as rehabilitation) can be allocated to primary or secondary sectors and are determined by local design. Comparison with existing generic hospital systems in any research design brings with it issues of replication. Whilst such comparison has been attempted through the application of the star rating system, this has been abandoned, in part because of the replication issues.

Table 2.6 Types of Patient

Patient Characteristics	Route To Healthcare
Outpatients (Health problem is known by GP)	Likely referral to a specialist in an SCO via a planned set of activities such as outpatients. From this consultation, or series of consultations, if a patient needs to have a procedure, then they may become either a day patient or elective patient which means that their attendance at a hospital is planned.
Emergency problem	Specialist attention received via the A&E route (emergency patients). The presenting condition may or may not already be known to the GP. Consists of a range of presenting conditions known as the 'walking wounded' to a life threatening incident. Combinations of minor and major conditions can be treated.
Assessment Unit Referral	Recently, a further means of entering the secondary care sector (also known as acute, although acute will not cover all aspects of secondary care) is via an Assessment Centre/Unit[12]. Patients are referred to these units by GPs where a patient needs urgent treatment. In some instances, patients are referred to the assessment unit from A&E if, for example, observations are necessary and/or the patient needs the services of specialists but treatment/diagnostics will be greater than 4 hours. Some acute Trusts have 'hot clinics' which are outpatient appointments for those patients needing access to specialist assessment quickly, which may negate the need to be admitted to a bed in an SCO.
Inpatient	When a patient is receiving treatment requiring admission to a hospital bed, they are referred to as an inpatient. Diagnostic tests and investigations are primarily available in a secondary care setting. The service level agreements for tests and investigations tend to be longer for GPs than if the patient needs these services as an inpatient.

Source: Author

The UK operates a referral system whereby patients are assessed by the GP, who acts as a judge of clinical need and determines the appropriate route of care before giving patients access to secondary care services. The exception to this is where the patient has

[12] These can be MAUs, SAUs or a combination of both – Emergency Assessment Unit (EAU).

experienced an emergency health event. The four main routes which a patient may enter a secondary care hospital together with the relationship to GPs' management, are described in Table 2.6. In recent times, Allied Health Professionals (AHP) e.g. physiotherapists, may also have the ability to refer patients to secondary care but this is an emerging route and is not included in this study.

This section described the NHS and provided a high level generic map of the route a patient may move through a secondary care hospital. It highlights that while tasks undertaken are likely to be similar for similar health conditions, where these take place may vary. It is interesting to note that the variety of routes for patient's treatments is increasing as well as those professionals who are able to transfer patients from one part of the system to another.

2.3. An overview of influences on the NHS for contemporary operational design

Section 2.3.1 outlines current influences on organisational design of an SCO and the debate about the transfer/emulation of manufacturing practices by healthcare professionals. This discussion should set the scene regarding the potential for the adaption, adoption or rejection of such practices.

2.3.1. Manufacturing influences on the NHS

Emulation of successful organisations by others is a common theme in management (Lawrence and Lorsch 1967, Peters and Waterman 1982) and equally in OM literature (Cusumano 1985, Liker 2004, Ohno 1988, Womack and Jones 1996). Institutional isomorphism of this nature often results from a limited number of alternative models to the existing way of working, from which managers can choose. Just as mass production met its nemesis of lean production in the 1990s, the traditional management practices of the NHS met with a new focus on process management (Buchanan 1998, McNulty and Ferlie 2002) and a transference of lean into the healthcare setting (Fillingham 2008, Radnor et al. 2006). This is not just in the UK but more publicly in the United States (of America) (US) (Bohmer and Ferlins 2006, Bohmer and Romney 2009, Bushell et al. 2002, Sirio et al. 2003, Spear 2005) and Australian healthcare systems (Ben-Tovim et al.

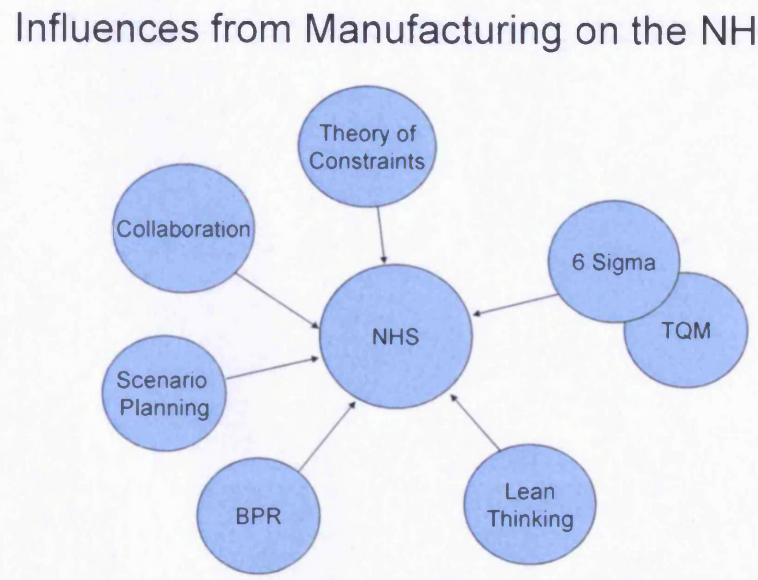
2007, Gubb and Bevan 2009). Case studies have emerged that show success, albeit at a sub-system level in healthcare, of what can be achieved by adopting a lean process view (Brandao de Souza 2009). Cases have often avoided the end-to-end process that is much larger than a ward (or series of wards) e.g. productive ward (Burgess et al. 2009) or a support service (e.g. blood testing, pharmacy, etc.).

Despite these limitations, the interest in taking manufacturing practices into the healthcare environment has grown. A recent literature review of operational improvement practices in the Public Sector noted *'that 51% of the sample focused on LT and 35% Health Services'* p.10 (Radnor 2010b). The selection of cases reviewed require caution as questions regarding the selection criteria have noted a possible skew towards successful outcomes. Similarly, there is a lack of comparative type studies[13] of sufficient rigor to add to the body of knowledge (Øvretveit 2003, Radnor and Boaden 2008). Practices, including LT, TOC and 6σ have been collectively renamed as Clinical Systems Improvement (CSI), a determination of the MA (Rogers et al. 2004) in an attempt to move beyond the functional level of study. CSI has also been used to provide comparative evaluation in England (Walley et al. 2006).

OM improvement initiatives associated with improved performance have been compiled by the researcher and are summarised in Figure 2.2.

[13] In common with other management research

Figure 2.2 Industrial Influences on the NHS in the UK



Source: Author

Business Process Re-engineering (BPR) is an approach for radical rapid redesign and organisational change through discontinuous improvement (Hammer and Champy 1993), McNulty and Ferlie 2002). Research by Buchanan and Wilson (1996), Buchanan (1998) and McNulty and Ferlie (2002) developed a research base for the evaluation of BPR in healthcare[14] and suggested the sector presented specific constraints to merely adopting BPR as a one best way of improvement. Similarly, Hammer and Champy (1993) noted in their review of BPR in the public sector that there may be distinctive implementation challenges.

Scenario Planning is a methodology for allowing managers to look at different courses of action, thus enabling a review of the relative advantages and disadvantages of different courses of action. This includes the use of creative thinking at one end of the scale and at the other end of the scale, systematic review such as analytical hierarchy process (Godet 1993) which is founded in systems dynamics (Jackson 2003).

[14] In the same case setting, Leicester Royal Infirmary

Table 2.7 Review of distinctive implementation challenges for BPR in the public sector.

Challenge	Description	Issue
Profit	Profit as a measure of improvement or impaired performance is not present in healthcare in the UK. An argument is put forward that those who provide measurable public services will more probably adopt re-engineering.	Measurement
Competition for jurisdiction	The complexity of public sector organisations and their relationships with other agencies make the process of re-engineering more arduous.	Power
Policy Centred	Government agencies focus on policy. The skills of OM are not central and hence improvement in OM capability and deployment is not seen as key.	OM

Source: Hammer and Champy (1993) as amended by author

Collaboration and more exactly, collaborative groups (Øvretveit et al. 2002) have been promoted by the Institute of Healthcare Improvement (IHI) as the mechanism for group learning and improvement. The MA adopted this learning style to roll out a mass campaign for improvement in particular specialities including cancer care and emergency care (Walley 2003a). These were emulated by the Scottish Executive and in Wales via the National Leadership and Innovation Agency for Healthcare (NLIAH), one of which was the Welsh Emergency Care Access Collaborative (Davies et al. 2006). While very useful in raising awareness and building capacity in OM concepts, collaborative initiatives in the UK have been short lived and this has been acknowledged as a shortcoming (Øvretveit 2002).

Total Quality Management (TQM) was being applied in the US (Bushell et al. 2002), but was rebranded in the UK as clinical governance and has been mandated as part of the government policy, previously described, to be the conduit for consistency of clinical practice across the NHS (Buetow and Roland 1999, Campbell et al. 2001). The adoption of this approach is interesting in that it reflects Fayol's (1916) model whereby improvement (and in this case quality improvement) sit outside of the day to day operational service delivery. Hence this policy, which has been widely accepted at a clinical professional level within the service, has been interpreted as meaning audit and inspection. An evolution of the concept of quality to that of total quality is still only at its early stages and is reinforced by Davis et al. (2007) in a report which found that even the definition of what quality represents to a clinical professional is not consistently agreed upon.

6σ is an approach that focuses on the elimination of variation in activity (Proudlove et al. 2008). 6σ adopts many features of TQM. An additional notion is that of process shift, which requires an organisation to aim for 6σ performance in order to achieve virtually zero defects (Bicheno and Catherwood 2005). 6σ has been more widely applied in the US, possibly due to its emphasis on cost reduction (Sehwail and DeYong 2003) but has also been applied within the UK at sub-systems level for healthcare (Proudlove et al. 2008).

TOC is an approach to scheduling, first tested in manufacturing, where 'the importance of planning to known capacity constraints, rather than overloading parts of the ... system and failing to meet the plan' (Slack et al. 2001) is a central operations management design principle. TOC focuses on a systems bottleneck, assumes that the goal of an organisation is to make money and is measured against throughput, inventory and operational expense.

Traditional operations management planning, in contrast, is to balancing capacity of operations rather than to balance flow. TOC argues that non-determinants and interdependence rather than evening out a production schedule will, over time, lead to increased inventory and delays. Thus even where capacities of operations are equal, statistical fluctuations will still exist and where production processes are linked together these fluctuations will accumulate inventory, queues and delays. Drum-buffer-rope is promoted as the TOC mechanism to balance the throughput of an operations management system through the identification scheduling, and strict management of the constraint process (rather than customer demand) and buffers the system with inventory to ensure that this point in the process is always operational (Greasley, 2009). This was of particular interest to the pioneers of healthcare improvement as it was seen as a means of addressing the mismatch of capacity and demand (Silvester et al. 2004). The assumption being that time lost at the bottleneck can never be recovered. To ensure the buffer is fed "the rope" becomes the means of ensuring materials/subassemblies are fed to the bottleneck in a timely fashion (Greasley, 2009).

A weakness of TOC is not challenging shared resources in the service context at the outset of analysis (Bicheno and Howleg, 2009). While the identification of a single point

in the process of delivering services as the constraint seems attractive, given the scarcity of resources in any organisation for improvement. TOC assumes the level of maturity in the segmentation of activity exhibited in manufacturing which is often not the case (Esain and Rich, 2006). Thus it is argued that in TOC, shared resources mean more buffer inventory i.e. patient queues in healthcare (Bicheno and Howleg, 2009), precisely the opposite of that which is being sought in this research study. This means that once analysis of shared resource has been undertaken then TOC (and particularly drum-buffer-rope) could provide utility to healthcare planning (Siha, 1999; Lubitsh et al. 2005; Ritsona and Warerfield, 2005; Wright and King, 2006).

'Thinking Process' techniques, methods associated with the TOC approach, were introduced to reflect that the operational system may not be the main constraining force of scheduling performance but instead, the constraint may be caused by management decision making and operational policies. The size of policy constraints cannot be underestimated and some researches have estimated the impact of such decisions as 90% of the inbuilt constraints and queues of a system, regardless of whether it is a production or service organisation (Reid, 2007). In this manner, there is much to support the TOC claim that it is as an overall theory for systematically running an organisation (Rahman, 1998). However, the practical engagement of senior management has been problematic for TOC advocates, partly due to the length of time required in mastering the approach, but also because it is seen as an operational activity rather than an organisational improvement philosophy (Watson et al. 2007) despite the addition of the 'Thinking Process'. This may well be a consequence of criticisms of tools used to apply the thinking process are seen as inherently unreliable (Boyd et al. 2001), not user friendly (Shoemaker and Reid, 2005) and mainly practice led and representing a rather a loose group of ideas than a coherent set of management rules (Kim et al. 2008).

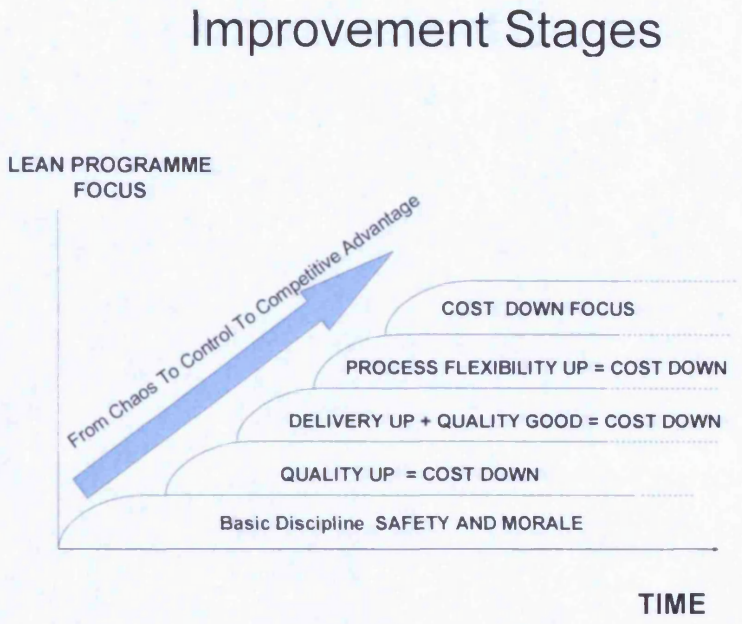
Hence, reflecting on the discussion with regard to BPR, Scenario Planning, Collaboration, TQM, 6σ and TOC; these were rejected as the foundation for this study. However, the concept of an operational constraint was considered important to the study and was duly incorporated into the methodology. The author also accepted the view that TOC offered holistic and synergistic properties that would be of interest to this study

(Siha, 1999; Slack et al. 2001; Reid, 2007; Watson, 2007; Bicheno and Howleg, 2009). The degree to which policy constraint exist within organisations was considered an interesting subject with impact on this research and this study seeks to identify alternative methods which avoid the accrued criticism of TOC, and in particular, that attributed to the 'thinking process' to engage with and distil policy and managerial practices which negatively impact on the performance of patient flow.

The popularity of LT has grown steadily as a means of change and improvement in healthcare (Radnor and Boaden 2008). A core principle of this approach stresses the importance of managers understanding what patient's value (Radnor and Howleg 2010). This, in conjunction with how activities are brought together to generate value-effectiveness (Piercy and Rich 2009) and how patients currently flow through a healthcare system is compared to establish ways and means of providing patient value (while remaining sufficiently flexible to react to changes in how patients value the service over time). This entails those providing the service to review different means of scheduling patient EOC through an assessment of patterns of real demand, and challenging work practices to deliver what is required. Finally, managers should promote continual improvement (Schonberger 1982, 1996, Spear 2005, Womack and Jones 1996) rather than discontinuous improvement (Hammer and Champy 1993). Proponents of LT have indicated that a whole scale transformation can take many years to deliver the systems design being sought (Womack and Jones, 1996; Hines, 2004). Rich, et al. (2006) contend[15] that there is a logical step wise process to the stages of focus for any Lean improvement programme over time (Figure 2.3).

[15] This assertion was based on a longitudinal study of large manufacturing organisations employing LT as a means to improve performance.

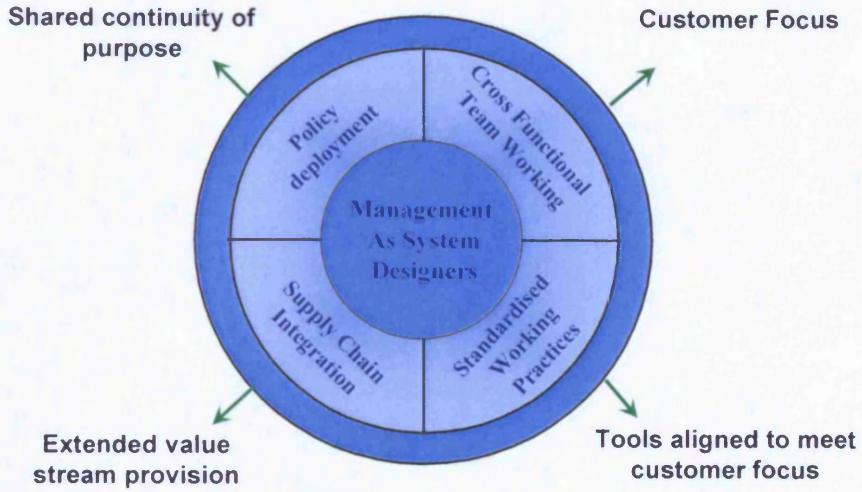
Figure 2.3 Improvements Stages in Manufacturing



Source: Rich et al. (2006)

Whichever approach is undertaken, each of the best practice models from the manufacturing literature relies heavily upon new organisational features that were either non-existent in the previous model or the essential use of these features was for 'profit maximisation' or zero-sum gaming rather than collaboration and partnership. These features are shown in Figure 2.4.

Figure 2.4 Boundaries of Lean Thinking



Source: Author

The emergence of literature in the healthcare environment related to LT will be subject to an in-depth review in CHAPTER 3. The high performance model will be placed in the context of management thinking and recent cases that show how these interventions have been adapted/adopted and sustained by the NHS.

From the manufacturing OM perspective, the debate on high performance organisations and LT has raged since the 1980s when the logic of operations system design beyond that of mass production cost efficiency was first explored (Hayes and Wheelwright 1984).

The boundaries of LT (Figure 2.4) relate to the means by which a shared continuity of purpose is created between the senior executives of an organisation, through the layers of management to those producing goods and services. This process is neither a 'bottom up' nor 'top down' approach to organisational design, rather the means by which alignment to organisational purpose can be enabled (Shook 2001). The process is recorded as a technique called policy deployment (Akao 1991). This process features involvement of all groups in the policy process and assumes that all staff have a part to play in both maintenance of the organisational system as well as improvement (Dale 1999).

Underpinning the whole approach is organisational learning (Crossen et al. 1999, Rich et al. 2006) which is then used to build capability and retain flexibility of resources. In essence, it requires the reduction of 'top down control' (Hammer 1996, Piercy and Rich 2009) and a reduction of rigidity of central planning against which previous organisational design was premised. Another differentiating factor which is intrinsically linked to the previous trait is an external customer focus accompanied by internal cross-functional working (Dimancescu et al. 1997). Such a focus enables identification of practices that have historically arisen as a consequence of departmental or functional boundaries (similar to those which exist in a hospital designed around health condition specialty).

Traditionally, LT has been described in the form of tools and techniques and while this has been challenged (Hines et al. 2008, Radnor 2010a), research has often focused on these, rather than the purpose behind their existence. Understanding the problems which face an organisation allows tools and techniques to be used to reveal a greater understanding of the problem permit actions at the appropriate level to enable managers to become system designers. LT case studies have often not considered the approach as a fundamental shift in managerial culture and roles alongside operational learning of staff, all of whom can approach improvement based on Lean Principles. From this emerge managers as system designers, who recognise the need for flexibility to react to both policy and customer needs and wants. It is a counter intuitive process of viewing an organisational system (Womack and Jones 1996).

Finally, the organisational system is rarely self-contained (horizontally, vertically or holistically integrated). The degree to which other organisations in the supply chain affect the performance of the system, needs to be managed and understood. Value chains (both internal and external to an organisation), as a source of competitive advantage (Porter 1985), suggest that the principles of supply chain management can be a critical stream of activity and need to be integrated and managed accordingly. The new operations and enterprise models, both based on collaboration for mutual improvement and higher systems performance, reflect a change in the essential design of the business away from one based on economies of scale and efficiency, towards one based on

effectiveness, efficiency and economies of scope (Esain and Rich 2006). The difference in the two models can be summarised as an older view of cost being the only meaningful measure of operations/system performance, and the newer view that time compression (Stalk and Hout 1990) is most important. Through the compression of time, better performance and lower cost can be achieved. The assertion requires changes in practice rather than stress of the workforce to squeeze more from the working day. Time is an important distinction for healthcare organisations especially in the UK context where current problems and inefficiencies have lengthened patient waiting times and created queues for services. Early work to reduce the number of patients waiting did not reflect a change in the average wait for many of procedures (Harrison and Appleby 2005) and may have been a consequence of 'special measures' such as waiting list initiatives where additional capacity and cost is added to reduce queues, rather than through redesign of practice.

Each of the improvement approaches reviewed earlier reflects the concern for improved time management (Stalk and Hout 1990) to deliver products and services, through the removal of activity which is of no added value to the customer, and through a systems approach to change. It is accepted implicitly that the better management of time will then lead to the reduction of cost of provision through quality and delivery improvements. In addition, resource redeployment becomes possible to provide a wider range of products and services to satisfy unfulfilled need when the basic flow has been improved (Radnor and Howleg 2010). Stabilised and latent capacity can be used to address additional activities. Hence, under the new NHS regime at the national and local levels, cost reduction is the outcome of improvement rather than the driver for it.

To achieve the goal of system improvement, successive governments and professional clinical bodies have looked outside the boundaries of the UK to understand healthcare elsewhere (Wistow 2001). An important comparison for the UK has been the advancement of health provision in the US and its improving health outcomes at lower costs in similar geographical and environmental conditions (yet the distinction is that this system has a greater propensity to profit and commercial motivation). Although some aspects of the comparison have been disputed (Feachem and Sekhri 2005), the influence

of these systems has been a great source of emulation by healthcare management in the UK. Technically, it may be argued that the profit motivation is not as significant as some would believe because clinical best practice is a form of quality improvement that creates less waste and improves patient flow (and that flow is the best determinant of how well an operations system is designed and operated when economics are discounted).

2.3.2. Influences of the American healthcare systems on the NHS

Two further themes of influence on the NHS were beginning to emanate from the US at the end of the 1990s. The first medical and commercial group is Kaiser Permanente (KP) and the second is the IHI through its co-founder, Donald Berwick.

Berwick's clinical and academic credentials made his call to address quality as a means of saving lives, touched on the clinical professional domain in a way that policy makers in the UK had not. Berwick's initial drive was through personal experience and academic coincidence (to get a masters degree in political science which delved into systems theory following medical training and enrolling in a course delivered by Deming in 1986 (Comarow 2006)). The IHI was formed in 1991 and its practitioner focused publications regarding improving clinical quality were beginning to influence the UK at the commencement of this study (Berwick 2002).

Berwick's focus was to improve the quality of healthcare in the US. The report 'To err is human' (2001) presented an opportunity for healthcare professionals to learn from error and make improvements to systems to prevent recurrence. The report indicated that medical error could account for as many as 98,000 unnecessary deaths in the US healthcare system (Institute of Medicine 2000). While the definition of error itself caused a debate, the IHI pressed on and announced their 100,000 lives campaign to reduce the number of deaths across America and close the gap (Kennedy 2008). A similar campaign has subsequently been taken up in the UK.

Berwick and the IHI represented an influence on UK policy and more particularly clinical practice. Berwick's clinical roots and standing[16] interested the medical profession in the UK, particularly relating to Clinical Governance. While Berwick and the IHI implicitly understood the foundations of quality as an enabler to flow (noted as delivery in Figure 2.3), this was not translated explicitly and it was not until recently that such a linkage has begun to be recognised by the clinical profession in the UK. Consequently, time based targets introduced in the UK, were misconstrued by clinical professions as a management drive towards cost reduction without due regard to appropriate clinical care. Managers in the NHS were not immune to the influence of the IHI with publications such as 'Escape Fire' (Berwick 1999) having an influence on those seeking to find new ways of addressing the policy agenda[17], and at individual organisational level for those seeking performance improvement.

There was a second clear debate emerging in literature concerning the relative performance of KP with the NHS. The debate rested on KP having similar health geography to the UK but also accommodating more patients with the resources available (Feachem et al. 2002). While there was heated discussion (editorials, letters, etc.) regarding the similarity between the two systems (Dixon 2002, Ham et al. 2003, Light and Dixon 2004, Talbot-Smith et al. 2004) potentially having the effect of discounting the findings of the study, the opposite emerged in the policy arena. The findings were of interest given the focus on cost versus performance (Ham et al. 2003). Feachem and his colleagues challenged the notion that the NHS was generally efficient and where poor performance was exhibited, this was due to underinvestment in services. The key message was that KP achieved more '*value from the resources used than the NHS*' p.143 (Enthoven 2002). The reasons for the differences of performance between the two systems were given as competition (Enthoven 2002), with preventative practices reducing access to care (Berwick 2002). Significantly, the cost differentiation was described by Berwick as the NHS using *'...three times as many days of hospital admission per capita than the best American care systems...* ' (2002, p.142). Towill (2006) argues that at

[16] Since 2002, Don Berwick has consistently been closest to the top of those who were the greatest 'movers and shakers' in the sector, most powerful or most influential (Romano, 2002) and in 2010 he was appointed to the Obama administration.

[17] The MA was central to this (in the UK) at commencement of the research.

whole system level, not only choice of access but also the difference arising from the *'successful elimination of the physician/manager interface.'* (p.311).

The 'competition issue' was taken up by politicians who called for consumer choice and market forces (Department of Health 2001). This, however, was seemingly premised on the existing organisational design of the NHS. In 2005, Feachem and Sekhri, reinforced the need for systems redesign and horizontal integration to achieve better outcomes, but with a focus on the internal resources rather than patients wants and needs. They stressed that the NHS 'enjoys a cohesive, single payer system', a point lost in the discussion on competition. Given the predominant policy of partnership that had emerged in the UK, the opportunity to redesign services and also to remove the cost of competition through co-operation was radical.

While these US led applications of improvement hold high attraction for policy makers and executives who struggle with the day-to-day problems of the UK health service, the underpinning features of the different systems were less well considered. Policy makers and executives were looking for solutions to fit their problem (Table 2.8). The potential lessons which have been gleaned from these cases of a capitalist and commercial system versus the central funding of the UK system were read using old organisational design concepts, such as economies of scale, hierarchy and division of work. For clinical professionals the discussion of 'quality' was directly linked with 'cost', where the view was held that poor performance was a consequence of poor investment. Berwick's arguments were a potential attack on professional capability and standards.

The UK healthcare system exhibited fewer degrees of freedom to manage organisations, where clinical professionals had not subscribed to being 'managed' in a hierarchical way. The UK system has an uncomfortable balance of policy and operations-centred initiatives which both promote, but also get in the way of, truly optimising the patient journey. The latter is an argument supported by Feachem and Sekhri (2005) who suggest that higher, and more cohesive, integration of the patient journey differentiates performance between KP and the NHS. In short, the NHS has a fundamental inability to truly harness collaboration to improve patient flow. In many respects this point mirrors the

development of OM and the movement from a functional myopia to that of supply chain thinking and addressing improvement at the systems rather than departmental level.

Table 2.8 Different dimensions to policy and operations

Focus	Orientation	Description
Policy Centred	Provide solutions to be implemented	Distant from the work place, impose solutions hence creates a 'why bother to challenge' attitude of workers. Belief in perfect answer hence inflexible. No need for learning.
Operations Centred	Reveals problems for action	Happens at work place, asks for solutions to problem, hence engaging workers. Belief that there is no perfect answer. Founded on learning

Source: Author

Despite the profit-motivation of the US cases and the cost-centred approach of the UK (a theme of UK healthcare since 1979), cost is not the only consideration for taxpayers and concepts of the patient as a consumer have become more embedded into policy. 'The customer' is the common feature of improvement approaches such as LT and 6σ. The 'lessons from America' have reinforced an operations led (Wistow 2001) customer focused approach to improvement and a similar transition as that experienced and documented by Hayes and Wheelwright (1984) regarding the externally-supportive evolution that was considered the hallmark of world class manufacturing businesses. As such, the recent emulation and adaptation of healthcare operations systems to embrace best practice, suggests that, within the constraints of a doctoral programme of study, the best unit of analysis remains that of the hospital and SCO. The gap in the academic body of knowledge concerns how improvement can generate better performance in patient flow or throughput[18], as it would be more accurately understood in the manufacturing sector.

2.4. The present-day debate UK NHS and Operations Improvement

The importance of OM in healthcare has been proposed by a number of authors (Davies and Walley 2000, Murray 2000, Silvester et al. 2004) as a means of achieving the goals of policy makers. As with other influences, this has not been without debate. OM, in this context is needed to create *'work processes for the mutual good' (p.27)* (Rich 1999) running across-functional and organisation boundaries and focused on the ultimate customer or patient (Feachem and Sekhri 2005). Maddock (2002) notes, however, that the '*know how*' (p.13) to enact public policy via improved OM is wanting in the

[18] Martin, et al (2003) define throughput in SCO as 'Speciality specific number of finished consultant episodes per year'.

healthcare sector and goes further to argue '*...huge professional and cultural gulfs between stakeholders, particularly between public sector staff and policy makers...*' (p.13) and refers to this gulf as the '*implementation gap*' (p.41). Her contention is that the focus of stakeholders is on '*inputs and outputs but rarely look at how to get from one to the other*' (p.14). In this regard, there is a perceived inability to engage in practice improvement even if the UK professional had the necessary skills and willingness to do so.

Literature concerning the UK NHS does, however, describe patient and care pathways which are analogous with the routings of manufactured products and a precursor to engaging in the right type of improvement at the right point in the pathway to result in performance improvement (Bragato and Jacobs 2003, Schmid and Conen 2000). The concept of patient flow (Institute for Healthcare Improvement 2003) and the patient journey focus unite the lean approach and BPR[19]. Consequently, NHS professionals currently have a greater understanding of how the overall 'end-to-end' pathway is designed but are perceived to have only an embryonic understanding of how to engage in whole systems redesign (Burgess et al. 2009). The IHI's definition of patient flow suggests reducing variation in activity which, in turn, will reduce waiting time. While this may be an underpinning assumption, it may not be this simple. The need to challenge traditional classifications of patients in order to understand the demand for services is not easy (Esain and Rich 2006) and a problem that is, to a certain degree, absent from US models where organisations can choose to specialise or not offer services they deem uneconomic (Heskett 1983). Abdication of such activities is not typically associated with UK hospitals, instead it is likely that these uneconomic services will be offered. Brandao de Souza (2009) also provides a definition of patient flow as activity which is patient facing. This is useful in his classification of literature, but from an operational stance is simplistic. Removing waiting from the patient EOC is not merely dependent on patient facing activities but also those activities which occurs offline. Therefore a combination of activities enables the whole system to come together and deliver the most effective service for the current environment.

[19] Although there are other differences between BPR and LT, most noticeable of which is the anticipated speed with which transformation should occur.

Operations improvement, linked to customer value, enables dependencies between stages along the patient journey to be optimised by a collective of managers and clinicians who each (and at each stage) make decisions about capacity and other OM design considerations. NHS staff motivated to deliver improvement are often without any true understanding of the system and how to engage improvement activities (Greenhalgh et al. 2009, Ham 1999, Maddock 2002). Ham questions training as a standalone solution. Both training and other linkages identified above are considered pertinent to the research and embedded in the design of the methodology for this study. Hence the implementation gulf is unlikely to be so easily remedied. It presents itself as a window of opportunity to build theory and model what improvements can be achieved through pathway redesign at the most critical and complex stages of patient flow, housed within the specialism of the hospital. The next section summarises the context of this study and the justification for pursuing the research questions.

2.5. Healthcare at a Watershed

Since 1948, a history of policy shifts in the NHS has left a legacy of layering policies and practices in reaction to different political objectives that have emerged (problems such as cost, inequalities of care, etc.). The historic policies have been imposed on an organisational model/structure of C&C administration, where market forces have changed over time. Ham (1999) argues that the NHS has imported a variety of mechanisms to improve performance without fully understanding the context and organisations from which these models are drawn. Subsequently, a concern of application without modification to the uniqueness of healthcare's C&C organisation is highlighted (Maddock 2002). Concepts discussed in the relevant literature reinforce the multi-layered and potentially bewildering nature of the subject for managers and clinicians (Øvretveit 2003). These differing premises have made it difficult at an implementation level to construct a cohesive change and improvement system (McNulty and Ferlie 2002). The widely held belief of clinical professionals and others that quality of care was directly correlated to lack of investment (Feachem et al. 2002) hence provides a barrier to change. Policy shifts since the 1970/80s were deemed by some to be driven by cost efficiency measures and were deduced as being the cause of reduced quality

levels (Oliver 2005). In this mental model, the solution is simple, increased funds equals increased quality of care.

Evidence from the US challenged these beliefs (Feachem et al. 2002, Towill 2006). Managers and government funded organisations (e.g. MA) looked to experiment with models from different sectors and disciplines to comply with policy directives. A significant influence was through the emergence of the quality movement in healthcare the US. Similarly evidenced high performance models in manufacturing (Womack and Jones 1996), which sought to challenge trade-offs in cost, performance, and old organisational designs (Shingo 1988), became the subject of experimentation to fulfil policy directives.

At commencement of this thesis, only small-scale case studies in US healthcare OM was available (Bushell et al. 2002, Heskett 1983, Sirio et al. 2003) with others focusing on Quality Management (Bohmer and Romney 2009). These cases proved the transferability of high performance approaches to healthcare, but tended to focus on a limited range of clinical condition (reflecting the commercial ability to segment activity through volume and specialisation for commercial gain which is at odds with the NHS). Within the NHS, segmentation of this nature was not a choice open to managers and hence replication of the model was far from easy within the UK. Given the gap in knowledge of closing the implementation gap (Ham 1999, Laing and Shiroyama 1995, Maddock 2002), this study is pertinent and was designed to inform clinical and managerial professionals as well as adding to the body of knowledge for policy makers.

Studies of whole organisational improvement in healthcare in the UK were available, (though scarce). Although the focus of their contribution was that of process orientation, this concerned organisational development, organisational change and policy implications of re-engineering (Buchanan 1998, 2003, Buchanan and Wilson 1996, McNulty and Ferlie 2002). Whilst McNulty and Ferlie's work was founded in systems theory, the OM features and Socio-Technical Systems (STS) linkages were largely absent from their theories.

The research questions relate to the underlying UK policy of modernisation and the objective of reducing the time a patient is waiting in line. Waiting time within hospital systems is often unseen. Berwick (2002) challenged hospitals to reduce their length of stay by half which would reduce cost whilst also, it is reasoned, reduce waiting lists for planned interventions and activity. It is a pivotal question that links the theory of systems and OM with the scantily understood operations of the healthcare sector. The research questions were crafted to address the complexity of healthcare management and effective OM design, and more specifically implementation. To achieve an understanding of healthcare value streams and patient flow, clarity about the organisational activities which interface with the patient must be undertaken. Patients are cared for through the organisational system and sub-systems design. These systems and sub-systems involve points of contact with patients which need to be understood to evaluate if the assumptions for design are essential to the delivery of the service. It is analogous to the flow of blood in a living human system which needs to pass at a certain rate through the lungs in order to oxygenate the blood flow in readiness to pass through the heart. So it is, with a patient passing through the healthcare system. There are certain things which must be done by the sub-system to ensure the system is operating at its maximum. Operational factors are considered to be those aspects of the systems which enable the system to operate in a steady state (Emery and Trist 1969). Operations are not a separate entity and hence these factors will be connected in some way to the system and the means by which it achieves a goal or purpose (Emery and Trist 1969). Hence it is important to understand interactions of sub-systems and describe their relationship with the whole system. It is expected that an improvement in the sub-systems alone will not provide a magic answer to the complex issues within the healthcare sector. The idea that there may be one answer to the questions posed is considered unlikely. It is hypothesised that multiple factors will be in play in this setting (Schoen et al. 2005).

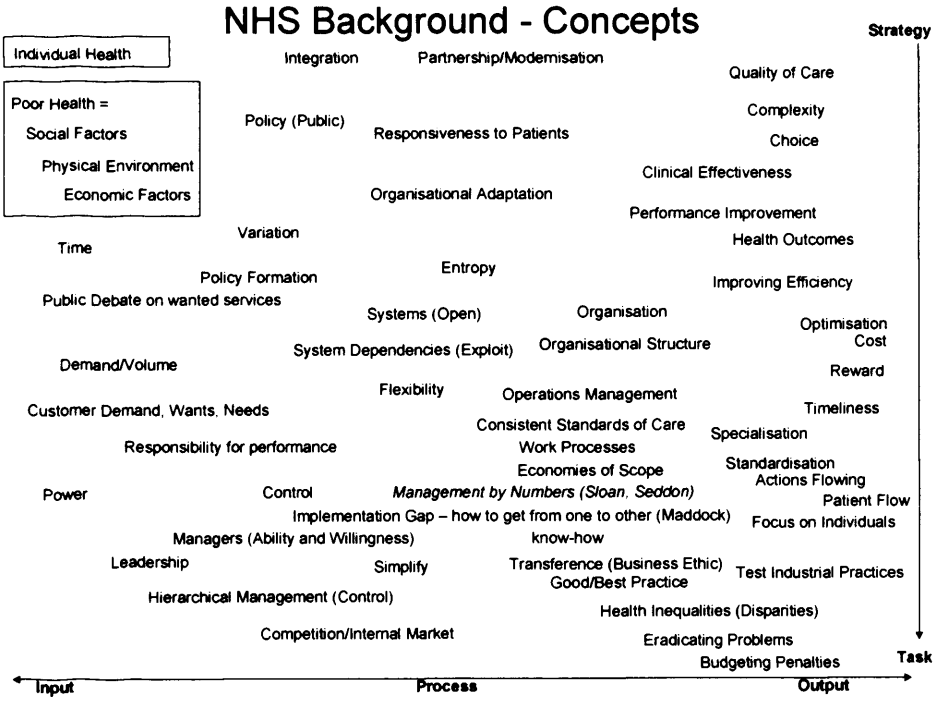
Table 2.9 Summary of authors addressing the same types of questions

Research Questions	Influential Authors studying Healthcare - Topic Areas
Question 1 – What features enable or inhibit SCO's to implement improvement and achieve high performance of patient flow?	McNulty, Ferlie and Buchanan – BPR Berwick, Radnor, Spear – LT Greenhaulgh – Implementation & Sustainability of Change Davis, Øvretveit, Proudlove, Tucker – Quality, Improvement and Implementation Silvester, Towill, Walley – Demand, Variation
Question 2 – How and why do these enablers and inhibitors impact on the existing STS?	

Source: Author

The questions used to guide this thesis have been touched upon previously at different times and from different perspectives. A summary of influential authors is shown in Table 2.9.

Figure 2.5 NHS Background literature – concepts



Source: Author

Many concepts have emerged from the review of literature on healthcare policies for the NHS and influences for change from manufacturing and other healthcare cases across the world. Figure 2.5 provides a visual and singular display to stimulate thinking and reveal gaps when considered in connection with cognate theory discussed in CHAPTER 3. While the literature reviewed in this chapter has revealed a multitude of concepts used as

a means of explanation of this field of study, it also affirms the multi layered nature of the topic of study.

2.6. Conclusion

Healthcare in the UK has been shaped from the original administrative-led centralised model, to one that has the same essential motivations as a purely capitalist and profit-focused approach. The NPM and its promotion of a 'business ethic' in public service and healthcare provision added to the commercialisation of the NHS, and began a process that resulted in a premium being placed upon operations improvement of the entire patient journey and pathway.

The combination of pressures and trends within the healthcare environment makes the study of improvement processes very timely. Even as some SCO systems have improved (Fillingham 2008), many are experiencing problems with achieving high performance by implementing changes to OM and organisational systems. Progress on a UK scale is inconsistent despite these organisations sharing common technology and working practices. Such 'underperformance' reinforces the continued importance of the topic and this study, from a standpoint of the practicing clinician, the healthcare professional manager and the local and regional governments of the UK.

The contribution this study is intended to provide is an explanation of adaptation of systems in the context of UK healthcare (Table 2.10). Theory building rather than theory testing is the intention, as little is understood about clinical systems process improvement (Young and McClean 2008).

Table 2.10 Contribution to the study

Theme	Contribution to the Thesis
Policy assumes brownfield organisations start from greenfield implementation.	Implementation of policy and its difficulties is a recurring theme and gap for managers.
Volume of concepts and the interchangeable use in management literature has potential incompatible focal theory.	Clarity of underpinning assumptions to assist managers in their learning (Argyris 1999) and application of improvement.
While the NHS is considered to be an organisation, it is large and is considered to have unique characteristics. Structural change is a commonly used technique for improvement and has resulted in an inconsistent design of multiple organisational messy entities, which are today commonly referred to as systems.	Organisational theory may not hold sufficient explanatory power and further theory generation in this area may be necessary. Management of boundaries in this messy environment is not explicitly discussed, but may be a gap which needs exploring.
Concept of patient flow is poorly understood in the context of SCO in connection with safety and quality.	A definition of patient flow in the context of theory for future testing.
Proliferation of routes in which patients may receive care as the intended and unintended consequences of Government policy.	The impact of variety as a factor of healthcare system complexity and its relationship to time compression.

Source: Author

This chapter has provided an introduction to the UK NHS service and the pressures that professional healthcare managers face when attempting to adapt existing systems and make lasting performance improvements. The chapter has highlighted the need for a systems approach to healthcare with a focus on the processes that combine to make a patient pathway or journey. The chapter has also set out the confused environment of secondary care process improvement challenges, and how policy makers have promoted a consensual and partnership model of improvement for the benefit of patient flow. In parallel, this chapter has also shown how 'best practices' are migrating on a global scale and how healthcare organisations have found utility in concepts from the manufacturing sector, albeit with reservations that these case studies have rarely looked at system flow and have chosen instead to look at departmental performance. As such, few studies have taken a truly holistic approach to the patient journey. Even less have sought to close this most important gap in knowledge (the gap in healthcare practice) and to understand how improvements can be made to environments that are more complex and diverse than that of manufacturing routings and flows.

CHAPTER 3 LITERATURE REVIEW

'What is the point at which something is no longer a system or a sub-system but becomes a process? I don't know. (When does a ship become small enough to be called a boat?)'.
Scholtes 1998.

3.1. Introduction

The preceding chapters have explored the context and motivation for this study together with the tensions that executives, managers, clinicians and other employees face as the NHS wrestles with improving its performance. It has been argued that investment and additional resources is not the solution to more effective patient flow. Focus on greater attention to the design of systems, engagement of staff that support patient flow in an 'end-to-end handoff' of responsibilities, and the improvement potential of implementing better OM practices have been proposed (Institute of Medicine of the National Academies 2006, Radnor et al. 2006, Spear 2005).

This chapter presents the findings of the literature review stage of this thesis and presents the enablers and inhibitors of adoption/adaption for high performance and reveals the gap in the academic body of knowledge concerning the concept of patient flow[20]. It should be noted that the process of conducting this literature review was not a single discrete period of time. The exercise was an iterative one, due to the unfolding nature of this subject and the increasing availability of new studies into this area of healthcare management, since the commencement of this research.

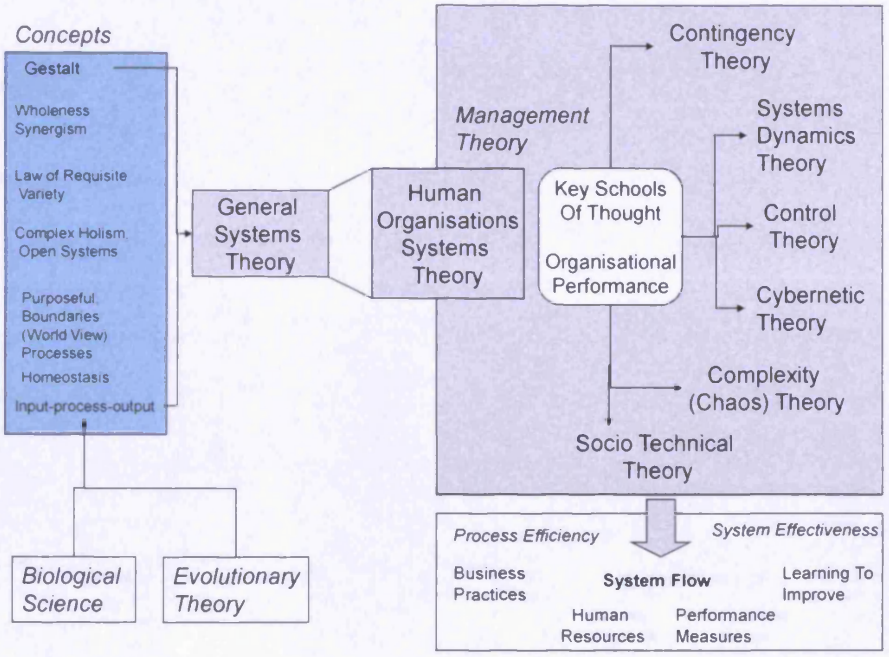
The literature presented in this chapter has two elements. The first phase of the review was conducted to explore the theoretical approaches potentially relevant to this research into OM. It shows how 'systems theory' provides the most appropriate theory within which to house this study. It provides insights to the adoption versus adaptation of high performing practice from manufacturing to healthcare. The second phase of the review concerns the focal literature base. This explores OM and studies of improvement within the context of the health service and global healthcare to codify the concept of flow within and without the healthcare sector. This literature review will inform the building of a model for managers to apply to patient flow.

[20] See Appendix 2.

3.2. Background Theory

The next section of this chapter presents the background theory within which this study is housed and explores competing theories which were subsequently, and justifiably, rejected by the author. Organisational Systems Theory (OST) is the main literature base within which this study is set. An underpinning metaphor, that an organisation such as a healthcare organisation is a living entity capable of adaptation and learning, reinforces this theory. From the basic acceptance that organisations are capable of evolution, the researcher reviewed a number of competing theories and shows how each has informed the study (Figure 3.1).

Figure 3.1 General Systems Theory and its relationship with different schools (that may inform this thesis)



Source: Author

3.2.1. General Systems Theory

General Systems Theory (GST), as proposed by Ludwig von Bertalanffy (1968), was counter to the focus of scientific knowledge of the early 1900s. His view centred on the Gestalt concept that a whole is greater than the sum of its parts, such that *'...in a system the parts are arranged'* p.26 (Angyal 1941). Angyal (1941) postulated *'that the type of connexions in a whole is very different from the connexions which exist in an aggregate'*

(p.20), thereby introducing the notion of 'synergy' (Table 3.3). A recurrent theme of the interdependence and interaction of parts on whole entities emerges (Table 3.1).

Table 3.1 Summary of Systems Concepts

Themes	Definition of Systems	Authors and Date
Entity, whole, and sub-systems.	'An entity which can maintain some organisation in the face of change from within or without.'(p.33)	Rapaport (1966), In Howleg, 2002
Interdependent parts	'The term 'system' is used to cover a wide range of phenomena. Initially a system can be broadly defined as any entity, conceptual or physical, which consists of interdependent parts.' (p.331)	(Ackoff 1960)
Interdependence	'...the problems of relationships, of structures, and of interdependence rather than with constant attributes.' (p.90)	(Katz and Kahn 1969)
System Definition	'...a grouping of parts that operate together for a common purpose....A system may include people as well as physical parts.' (p.1.1)	(Forrester 1971)
Hierarchal structures.	'A model of a whole entity; when applied to human activities, the model is characterised fundamentally in terms of hierarchical structures, emergent properties, communication and control.' (p.92)	(Checkland 1981)
System Boundaries	'...an organised, unitary whole composed of two or more interdependent parts, components, or sub-systems and delineated by identifiable boundaries from its environmental suprasystem.' (p.98)	(Kast and Rosenzweig 1985)
Interactions, Interdependencies, Parts	'Systems refer to interactions and interdependencies on a large scale. Systems consist of sub-systems or, if they are small enough in scope, process.' (p.58)	(Scholtes 1998)
Interaction and Flow	'...a complex whole the functioning of which depends on its parts and the interaction between those parts.' (p.3)	(Jackson 2003)

Source: Author

GST was found to offer a basis and means of exploring how systems combine and how flow of inputs into outputs is enhanced through structures, relationships and improvement processes. As such, GST provides broad view against which all types of systems may be examined (Kast and Rosenzweig 1985).

Boulding (1956) cited in Wilby (2006, p.686) created his 'Skeleton' (Table 3.2) in order to differentiate types of systems and assist different disciplines to move toward a *'system of systems which could perform the function of 'gestalts' in theoretical construction' (p.197)*. The skeleton framework is a continuum from level 1 (the least complex) to level 9 (the most complex). In terms of this research, the human organisation and

complexities of the NHS would rank at levels 7 and 8. His work implies there are no conflicts in studying organisations as systems.

Table 3.2 Boulding's Skeleton of Science

Level	Description	Characteristics	Examples	Relevant Discipline
1	Structures and Frameworks	Static, spatial pattern	Bridge, mountain, crystal, atom	Descriptive elements of all disciplines
2	Clockworks	Predetermined motion	Clocks, machines, solar system	Physics, astronomy, engineering
3	Control Mechanisms	Closed-loop control	Thermostats, homeostasis	Cybernetics
4	Open Systems	Structurally self-maintaining	Flames, cells	Theory of metabolism
5	Genetic Societal Systems	Society of cells, functional parts	Plants	Botany
6	Animals	Nervous system, self awareness	Birds and beasts	Zoology
7	Humans	Self-consciousness, knowledge	Human beings	Biology, psychology
8	Socio-cultural Systems	Roles, communication, values	Families, Boy Scouts, clubs	History, sociology, anthropology
9	Transcendental systems	Inescapable unknowables	God?	Philosophy, religion

Source: Wilby 2006

3.2.2. Organisations as Systems

Ackoff (1960) proposed that systems theory is applicable to any entity which can be conceptualised as a system, particularly the transferability of systems concepts to work organisations. Organisations are sub-systems of society (Kast and Rosenzweig 1985) and have goals. The quality guru Deming contended that without an aim (goal) there is no system (Neave 1990) and was a fervent believer in systems theory as a means of improving and optimising manufacturing and service systems. However, not all OM authors hold this opinion (Jackson 2003). The degree to which an organisation can influence its environment and have a purpose may be questioned, but the definition of organisations as open systems is not. As open systems, with or without a strategy, organisations must adjust to their environment and manage its internal relationships and processes to meet what is needed (Checkland 1981). In light of this discussion, it would be possible for an SCO work organisation to have a purpose (to deliver best possible care) and yet to lack a goal or a documented strategy. Indeed, there are layers of purpose which range from the individual to the group and higher to that of the organisation (Buchanan and Huczynski 1991). This is important because individual sub-systems may

have improvement processes, even though the host organisation may lack a formalised strategy of improvement. The main concepts that define OST are presented in Table 3.3.

The main tenets of OST concern the management of the enterprise as a single entity and the use of improvement methods to maintain an efficiency of flow through the organisation to meet the dynamic environment. To focus improvement activities is the responsibility of sub-system and system owners in terms of setting out a change agenda. To ensure an uninterrupted flow, internal departments must have set responsibilities and use control measures to detect when abnormalities occur and improvements must be undertaken to maintain the flow of work.

To survive, an organisation must match its environment and, when it changes, then the internal arrangement of work and improvements must equal the challenge needed (Ashby 1956). Time-lagged organisations that cannot respond quickly to change are therefore more likely to fail, or struggle to maintain a basic level of flow efficiency. The management of organisations and sub-system departments are not necessarily passive and reactive to the environment. Instead, improvement processes and changes to structure may be proactive and evolve to pre-empt changes in the environment or longer term trends. The concept that organisational structures can change originates from work conducted by Burns and Stalker (1961) who proposed that organic and decentralised structures enhance decision making and improvement when the environment is fast-paced and uncertain. They also proposed that bureaucratic and rigidly hierarchical structures were best suited to stable and predictable environments.

Table 3.3 Open Systems Features

Concept	Concept	Definitions
Holism	An organisation is more than the sum of its parts.	An argument for 'wholes' from a physics point of view (Koehler 1938). 'The whole is not just the sum of the parts; the system itself can be explained only as a total.' (Kast and Rosenzweig 1985)
Sub-systems	Internal divisions of work must link to result in better performance.	Systems as cycles of events (Katz and Kahn 1966), Sub-systems or Components (Kast and Rosenzweig 1985) located in a higher order both internal to the system and external to the system. To survive, a system is contained within larger systems capable of continuance and is therefore dependent upon those relationships.
Input, Process, Output	Throughput and flow via a Transformation process	The importation of energy, the throughput and output (Katz and Kahn 1966). A transformation model in a dynamic relationship with its environment (Kast and Rosenzweig 1985)
Purposeful	Joint goals unite the various elements of the system	Multiple goal seeking (Kast and Rosenzweig 1985). 'Social arrangements for the controlled performance of collective goals'(Buchanan and Huczynski 1991)
Homeostasis	The ability to reach equilibria with the environment through learning and improvement.	The steady state and dynamic homeostasis (Katz and Kahn 1966). Steady State Dynamic Equilibrium and Homeostasis (Kast and Rosenzweig 1985). For Open Systems represents a maximum rate of work and 'rate of progress' (Emery 1969). However, '...it appears probable that however adaptive the behaviour of organisms in learning and choice situations, this adaptiveness falls far short of the ideal of 'maximising' postulated in economic theory. Evidently, organisms adapt well enough to 'satisfice'; they do not, in general, 'optimise' (Simon 1969)
Control	Feedback, Measurement & Adaptation	Information input, negative feedback, and the coding process are used to control the flow of work across the organisation (Katz and Kahn 1966). Feedback can be positive and/or negative.
Flow	Pace of Input, process, output cycle	Design principle for 'input, process, output' concept (Womack and Jones 1996) linking this to concept of systems boundary through the idea of a pace/flow of a system

Source: Author

The modern view of organisations as systems defend the view that enterprises, such as healthcare organisations, should become more organic even though the profit motivation does not exist.

Modern approaches to organisational designs also promote learning and making continual improvement, internal and external collaboration, and teamwork within a management system that is focussed and where the direction of the organisation is documented and strategically planned (Akao 1991, Johnson and Broms 2000, Pasmore 1988, Womack and Jones 1996). Johnson and Broms (2000) have asserted that the role of management is to understand the organisations as systems of work, in order to improve the organisations capability to serve the environment i.e. needs of customers. The researcher duly accepted these views of healthcare organisations and found utility in the systems approach to

organisational research. These concepts match exactly the focal literature concern for the effective and efficient management of the input, process, output cycle.

For healthcare organisations, the environment is turbulent and the new decentralised responsibility for improvement allows each organisation to undertake its own activities and interventions (unless performance is so poor that the government and regulatory bodies intervene to restore basic system safety and flow). Whilst most healthcare organisations will engage in improvement activities (driven by the external environment and Governmental policy shifts), current research shows that it is rare to take an end-to-end organisational perspective (Burgess et al. 2009). The contemporary theme for improvement is to begin within a section of the hospital and then to move to the next internal customer/supplier to ensure patient flow improves rather than a single improvement and local optima approach. In some instances, the external environment has changed and hospital managers (and staff) may choose to wait to react to changes (often without serious penalty). Some healthcare organisations have attempted to improve flow, but due to an inability to change the fundamental design of the OM system, have made no real gain. Unlike the private sector for healthcare and industry, the lack of a structured change process that is consistent in achieving results (McNulty and Ferlie 2002) makes the NHS an ideal subject of study.

Open systems concepts have therefore been accepted by the researcher to enable understanding of the problem posed in this thesis. The complex nature of the delivery of healthcare services, the changing external environment and the degree to which the organisational design depends on sub-systems for the delivery of the whole EOC was considered suitable for systems theory analysis. It also allows for the apparent contradiction of change without action. Sensitivity towards a sub-system balance means systems theory is anticipated to assist, particularly as causation, solutions and questions may be multiple (Table 3.3).

3.2.3. Implications of Systems Theory for the Study of Organisations and Healthcare as a sector

As a means of explanation as to how human organisations will behave, GST could be regarded as limited and under-developed, but this criticism is also aimed at other theories such as process theory (Angyal 1941, Kast and Rosenzweig 1985). As discussed earlier, systems theory proposes that aggregation of the parts of a system (such as an organisation) is incorrect because it is the position in the system that enables the parts to perform as a whole (Angyal 1941). Hence when examining the question of patient flow, as is the case of this thesis, it is essential to understand the impact of sub-systems, their positions and the need to balance these in relation to how they collaborate to achieve the best operational outcome for the patient (i.e. technical system), organisation (i.e. economic system), patient and staff (i.e. social system). Insights into the OM of the healthcare sector in the UK through the use of systems theory, were considered important to overcome previous field research weaknesses and the reductionalist approach in particular. There is much reference to healthcare as a system in academic literature and also the need to treat the sector as a system (Bragato and Jacobs 2003, Feachem et al. 2002, Moore 2003, Rogers et al. 1999, Rosko 2004, Silvestro and Silvestro 2003).

Studies of healthcare organisations focus predominantly on theory building in the change or transformation arena (Buchanan 1998, McNulty and Ferlie 2002, Packwood et al. 1998, Pettigrew et al. 1992), evaluations of interventions (Boaden et al. 2005a, Boaden et al. 2005b, Greenhalgh et al. 2009, Olsson et al. 2007, Radnor et al. 2006), literature reviews (Brandao de Souza 2009, Mazzocato et al. 2010, Radnor 2010a, Vest and Gamm 2009) or the impact of sub-system or micro-systems feedback loops (Ben-Tovim 2007, Towill and Christopher 2005) which indicate some level of causality between the parts. However, little has been written about the need to balance the parts of the system in a manner appropriate to the environment (Olsson et al. 2007). Hence the contemporary need for this study.

The key lessons of GST suggest it is important to explore the plans, measures, and improvements that take place within existing sub-systems and how these are sustained.

Furthermore, as it has been proposed that without real penalties for non-compliance in improvement, it is key to understand why improvements do not work. Methodologically, the GST literature also shows how important it is for people to visualise and define their own system, how it works and what redesign could ensure better flow of services. It is this that has informed the design of the research strategy.

3.2.4. Criticisms of Systems Theory as a means of Organisational Analysis

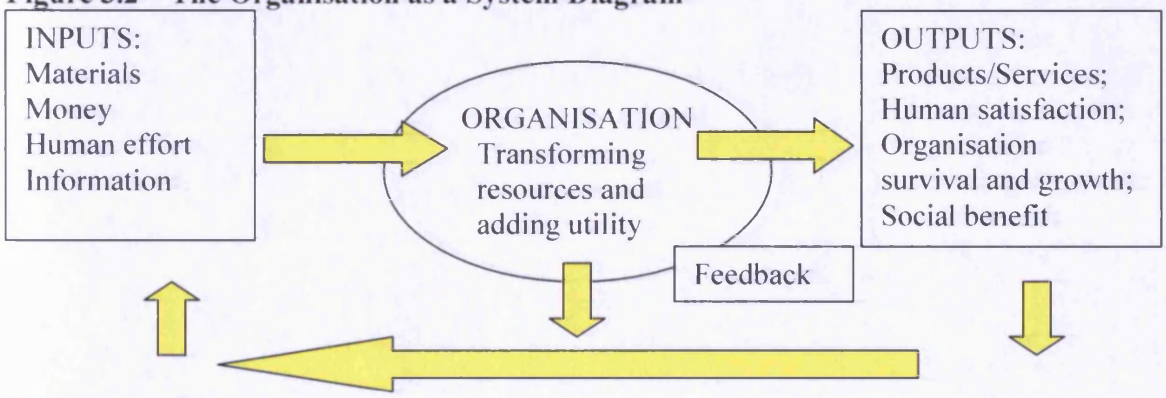
Whilst there is broad agreement that both the NHS and the UK healthcare provision are systems, the use of systems theory for the study of human organisations has attracted criticism. Checkland (1981) proposes that systems theory may be criticised on the grounds that much of the original thinking about systems was conducted in order to create a mathematical expression and laws of system behaviour. However, the researcher found that contemporary studies (see McNulty and Ferlie 2002) were less reductionalist. Another issue concerns that of system definition and a closely associated issue, that of whether the system is the subject of study or should be a method (the process of enquiry). The criticism rests on the assumption that organisations are learning systems ,therefore it is not possible to freeze such systems to allow study to take place effectively (Senge 1990). This infers that it is appropriate to study closed rather than open systems, as they exhibit mechanical predictability. Such an argument would mean much of today's management literature becomes unsupportable. Similarly, the idea held by positivist thinkers that it is possible to freeze dynamic situations to test independent variables (such as randomised control trials), has been subject to increasing challenge, particularly when subsequent research has shown the outcomes to be fallible (e.g. research into the Measles, Mumps and Rubella (MMR) vaccination). This criticism was also rejected by the researcher as this would invalidate any longitudinal study.

Management discourse has evolved to describe the hard and soft aspects of organisations referring to the hard, predictable aspects of part of the organisation, or its technology, and the soft, unpredictable aspects of human behaviour (Checkland 1981). While this thinking holds popularity, the distinction may well be unhelpful. Systems are often simplified in an attempt to account for cause and effect relationships. When analysing an

entity and an individual actor, both of which are capable of layers of contradicting behaviours within systems, there is a danger of the loss of depth of potential understanding. If systems feature arrangements of entities, (say functions, departments or units) then both soft and hard aspects combine to enable these arrangements. Checkland (2001) warned that it is rare in systems to be able to form a static consensus in arrangements of entities. Yet there remains a management preoccupation to seek generic checklists and static recipes to address organisational design issues (Kotter 1995). The impact of these criticisms do not invalidate GST and its foundation as a theoretical approach to study, but these concerns impact on the methodology and how the data is collected. There is a need to study the hard and soft aspects of the organisation and to understand what behaviours enable or inhibit performance improvement.

A criticism of systems theory is its operationalisation and the connection between the idea and the ability to use the idea to analyse complex work systems. To overcome the complexities of applying GST to organisations, researchers have separated the soft and hard dimensions for a more convenient means of analysis (reductionalist), hence the separation of the system leads to a disjointed account. The ability for systems theory to describe complex interactions is constrained by analysis methods which necessitate reviewing parts of the system. A number of analytical tools have been used in systems analysis, two of which have been embedded in the research design; these include Input-Output analysis and relational structure analysis. The latter enables the analysis of both hard and soft parts of an organisational system.

Figure 3.2 The Organisation as a System Diagram



Source: Kast & Rosenzweig (1985).

Leontief (1936) proposed GST should include an 'Input-Output' analysis to model economic systems and this approach has subsequently been adopted by others (Kast and Rosenzweig 1985, Kramer and DeSmit 1977, Leontief 1936). The technique traces resources within a system, as described by Figure 3.2 which recognises the dynamic nature of systems. The various sub-systems within and across the organisational boundary are analysed, in the context of the whole, in this way (Figure 5.6).

Figure 3.2 shows the importance of information as a means of achieving systems flow. The implications of information in conjunction with work flow within and across organisations have been observed to exhibit disconnects. These exist between information (feedback) and work (operation within the organisation) and between work (within the organisation and between organisations) and customer (environment). These disconnects are a consequence of assumptions of work design and must evolve/improve to maintain flow (Johnson and Broms 2000). The variety of products and services can amplify these disconnects. The implication for analysis is that both work and information tasks and their relationship will need to be examined as part of this study.

Systems dynamics is the study of information distortion on flow (Forrester 1971, Senge 1990). It has been criticised for simplistic and unscientific treatment of systems analysis (Jackson 2003). Given the underlying assumption that structure is the *'determining force behind systems behaviour'* p.81(Jackson 2003), the use of feedback loops are employed as the means of mapping structures such *'that it can unearth laws that govern behaviour of systems'* p.81 (Jackson 2003). However, the strength of systems dynamics is in the belief that there are deep *'patterns governing surface events'* p.82 (Jackson 2003) and systems dynamics provide the ability not to be diverted by investigation of surface complexity. While Packwood et al. (1998) observed that whole systems transformation in healthcare was difficult for managers; they did note that apparent success was achieved more consistently in coherent and integrated sub-systems. This was also the finding of Olsson et al. (2007). The implications of this literature concern the need to identify the variety and distortion of information that exists in a system or its sub-systems. The hypothesis in the literature is that highly distorted environments will perform at lower levels of flow.

The researcher duly accepted GST as an appropriate lens by which a picture of an SCO can be established in the context of its environment, the organisation itself and the sub-systems within the organisation. Concepts such as holism, balance and variety, are all pertinent to the research discussion on adoption and adaption of principles from one environment to another and their impact on patient flows. Various schools of systems theory were also reviewed to determine their contribution to provide an explanatory framework for the research questions of this thesis. These will now be reviewed.

3.3. Schools of Systems Theory

Other background theories, beyond those detailed above were reviewed and subsequently rejected. These are briefly summarised in section 3.3.1 to section 3.3.5.

3.3.1. Transaction Cost Economics

Transactional Cost Economics (TCE) is the economic and mathematical determination of the make or buy decision and therefore the boundaries of an organisation/system (Coase 1937). The main tenant of this theoretical construct is that transactions (whether internal or external to the firm) will remain unchallenged until the cost of transaction is equal to or greater than, the same transaction taking place on the open market. Businesses will then look to buy from outside rather than provide the service internally (Williamson 1986). This school of thought relates to the definition of a system and not its improvement. Burns also proposes that TCE does not consider the social technology of an organisation and instead focuses on costs and money (Burns 1963). Further, the assumption that transaction costs are set (Hines 1997) suggests a problem with TCE. Should this be the case, organisation governance structures that are similar could logically be deduced to perform against similar transaction costs. Yet benchmarking, particularly in the automotive sector, has proven that this is not a supportable assertion (Andersen Consulting 1992, 1994, Womack et al. 1990). Other criticisms relate the exclusion of alternative theoretical explanation such as cooperative economics, social networking and broader structural competing forces, which influence the rationale for retaining practices even if a transactional cost can be reduced through other means.

While transactional costs could have some credence in this study, the research questions focus on the flow of actions in a timely manner. It is the flow of actions rather than an attributed cost of a series of transactions along an internal network of sub-systems that is of interest to this research. The research focuses on how sub-systems currently operate and how these could be balanced to enable patient flow. The TCE framework could be a useful next stage of the research, particularly around evaluating flexibility in a governance structure to deliver care and inform commissioning agents on different strategic choices they may wish to use to deliver healthcare in the UK.

3.3.2. Process Theory

The term process management is used widely in the business community (Armistead et al. 1999), yet its theoretical development is only recent (Smart et al. 2009); partly because development of process is practitioner lead (Melao and Pidd 2000). The Quality movement, among the first to explore this theme, contended process thinking as a potential for competitive advantage (Denison 1997), although this has had little impact on organisational literature. Hence while techniques like Statistical Process Control (SPC) were emerging, challenges to C&C hierarchical principles as a means of organisational design were largely ignored.

Processes are considered to be the way in which things get done in organisations (Armistead et al. 1999). These are tasks which join together in a horizontal fashion. Porter (1985) described the flow of products or services as a value chain, connecting the organisation to its customers and suppliers. Hence the feature of a business process emerged and has been described alternatively as: end to end (Armistead and Machin 1997), value stream (Womack and Jones 1996) and processes families such as order fulfilment and new product development (Dimancescu et al. 1997). The term process has therefore become part of organisational language (Grover et al. 2000) with many applications. For healthcare, the processes can be within a department but are more typically a pathway of many departments that share different parts of the patient journey.

Two aspects of process for business are proposed. The first relates to maintenance of the organisation, the second is to enact improvement through individual processes (Hammer

2002). Buchanan (1998) warns of a potential incompatibility with the field of organisational development which centres on humanist approach. Process theory has several attributes in organisations such as understanding activities of the business and an imperative against which strategic action can be fulfilled (Smart et al. 2009). The context of linking strategy planning to deployment is recognised as a weakness of this theory for management, when attempting to integrate business processes, and proposed the concept of 'integrator' (Prichard and Armistead 1999).

It has been suggested that process are akin to systems (Smart et al. 1999). Firstly, due to the linkages when co-ordinated to reflect the whole organisation (Armistead and Machin 1997). Secondly, the shared principle of 'hierarchy' which is reflected by process architecture to exist at different levels of the organisation, i.e. explanation can be both at a broad or detailed level. These aspects of process theory are very relevant to this study. However, the integration between processes (previously discussed) is problematic as the dislocation of action and strategy direction (Maddock 2002) is a theme of literature in the NHS, which is similar to the criticism of process theory when attempting to integrate processes (Smart et al. 2009). This lack of integration supports rejection of process theory for this study.

In addition, the idea of process measurement through the form of statistical expressions (capability indices used to predict performance, control charts, etc.) has yet to be widely applied in healthcare (Adab et al. 2002, Proudlove et al. 2008). Prichard and Armistead (1999) note that linking performance based measurement systems with process based measurement systems is complicated and fraught with problems, not least of which is that most performance based measurement systems do not take into account customer focus or process orientated organisational learning (Simmons 2000). Process and process measurement are important, but it is process within the system theory which is deemed to provide greater integration and explanatory power for the research questions posed. Process theory provides a means of moving from the simple to the complex through the replication of form, and helps to determine why dynamic interactions happen as they do. However, these in themselves are not sufficient. Healthcare services exhibit multiple process routes and it is the interconnection and behaviour of the origination as a whole

that requires study. As such, studying the process of provision is interesting but not the main purpose of this thesis, which seeks to identify how processes can be improved.

3.3.3. Contingency Theory

Contingency Theory was developed in the 1960s to understand how an environment impacts on the structures of an organisation (the uncertainty of the environment being the most important feature that determines different structures that are more or less effective). The central view of contingency theorists is there is no 'best way' for managers to organise a firm, lead or make decisions. It was a counter to the Scientific Movement (Taylor 1912) and the Bureaucratic view of organisations (Weber 1924). Business planning is proposed as central to contingency theory when considering structural design choice and the negative consequences of a mismatch of design will result in underperformance (Child 1984).

The study of organic and mechanistic organisations and how organic structures best suited unpredictable environments is important, as decisions needed to be taken quickly, so that improvements (to flow) could be enacted (Burns and Stalker 1961). A study of high performing organisations set in three different environments concluded that managers should consider major internal relationships when designing and planning organisations, explicitly to address specific environmental conditions rather than adopting a prescriptive best way (Lawrence and Lorsch 1967). The notion of 'fit' was postulated. Where fit, i.e. management style, decision making and leadership aligned to the external environment, then high performance was more likely to occur. Such a notion holds value when discussing adoption and adaptation of practices from one sector to another. The proliferation of this theory has been mostly related to leadership (Hersey and Blanchard 1882), management style and decision making (Vroom and Yetton 1973).

Contingency theory has been criticised on account of the nature of studies being mainly positivistic and in particular, the general nature of the concept of contingency itself (Donaldson 1995). The implication that a particular management system has to be present in a firm to achieve maximise performance is argued to be unrealistic. Alternatively, it is suggests that choices can be both proactive and reactive from a number

of perspectives including individuals beliefs, attitudes and values within and without an organisation (Astley 1985). Efficient organisations, with well-developed adaptive capabilities, are proposed. Where inflexible, inefficient and 'time lagged' organisations remain conditions of environmental turbulence, uncertainty and complexity are considered more likely to fail (Morgan 1986). Failure of this nature is discussed in the light of commercial organisations. However, public sector organisations also face cost pressures where satisfaction of citizen value is considered central to best value public services (Welsh Assembly Government 2006a).

Schoonhoven (1981) rejects the contingency view as a theory and proposes that it's a means of conceptualisation or investigation, arguing it lacks well-developed propositions and true predictive utility. The theory was rejected because it focuses on administrative structures and not the management and improvement of work flow (Schoonhoven 1981). It is this particular issue, in conjunction with the implication that the law of requisite variety is constrained by structure, which has lead to the selection of STS as the lens of study (given the claim of the theory's integrative approach and the recognition of the technical, social and economic system operating within the whole).

3.3.4. Resource Based View

Resource-based theory views organisations as bundles of resources. The assertion is that firms must secure the correct type of resources in order to survive in addition to securing an appropriate flow of resources from the environment. Hence high performing commercial organisations should concentrate on the acquisitions and, more importantly, on the development and enhancement of those resources that are scarce, hard to replicate and central to existing and future customers (Dyer and Singh 1998).

The Resource Based View (RBV) has recently become popular in the OM literature. Pilkington and Meredith (2009) argue the concepts of operations capabilities and strategic assets are good explanators of higher performance. For this study of UK healthcare, the acquisition of technology and other assets is unusual because there is no commercial imperative as found by a variety of healthcare authors (Massey et al. 2009, Pope 2004). The concept of capabilities has utility, not for competitive advantage, but potential for

productivity of scarce resources through refinement of, and focus on, the limitations of such resource (Nelson 1991). This was duly accepted by the researcher as an aspect of thesis design, but not an important aspect of studying performance improvement. Given the contemporary criticisms that healthcare is underperforming with its current capacity, then it was decided to focus on improvement processes and not how best to invest in human or technical capacity to improve flow.

RBV centres on taking advantage of resource differences for survival, but public sector organisations are largely unconcerned with competition, and are more interested in the replication of practices (adoption) for productivity purposes. Hence the cost barriers to replication and the role of history, as previously discussed, become potential constraints to adoption (Barney 1991). The role of causal ambiguity, socially complex resources and capabilities also potentially represent challenges for replication in UK healthcare productivity.

Where UK healthcare is pursuing an agenda of adaption of practice 'causal ambiguity' can represent a constraint, as uncertainty exits regarding what makes a particular organisation more successful than another. This degree of uncertainty can make it costly for others to identify and imitate the critical success factors (Lippman and Rumelt 1982, Reed and DeFillippi 1990, Rumelt 1987). Hence the concept of tacit knowledge comes into play, as often, causal ambiguity is related to how and when knowledge is embedded within the processes and capabilities of an organisation. As such, tacit knowledge cannot be easily replicated or communicated (Tolbert and Zucker 1996).

Socially complex resources and capabilities include the culture of an organisation. The teamwork among its employees and its relationship with suppliers and customers (Barney 1991) are known, but still remains difficult to imitate. Western countries' early attempts of emulating Japanese management practices demonstrate this feature (Holweg 2007). Hopp (2004) in his summary of 50 years of management science noted that OM next paradigm shift is likely to be underpinned by behavioural factors.

RBV theory has value to the research questions posed in this thesis, particularly the notion of capabilities and strategic assets but in the inverse, as inhibitors to replication

rather than competitive differentiation. Hence RBV calls into question the utility of direct adoption of high performing practices. RBV does not provide sufficient holism, which is sought to elucidate the research questions; rather the RBV provides a greater explanation of the organisational social system and reinforces the issue of resources rather than the interplay between resources to deliver patient flow. Indeed, RBV could imply at its extreme that organisations achieve excellent performance as they have excellent resources, thus limiting its managerial applicability (Porter 1991). For these reasons, RBV has been discounted as the theory underpinning this research.

3.3.5. Systems Dynamics

The Systems Dynamics literature propose there are patterns of behaviour of a system. The first is the boundary of the system, next is the network of feedback loops, thirdly the 'rate' or 'flow' along with the 'level' or 'buffer' variables and finally the 'leverage' points (Jackson 2003). In complex systems, Jackson (2003) suggests that the variables in Systems Dynamics are often casually related and hence feedback loops emerge which may interact making causal relationships unclear. Forrester (1961) demonstrated how multi-loop, multi-state, non linear characteristics of real life organisational feedback created problems because information systems were unstable and this, in turn, unsettled the flow of materials and services. The contribution for managers is the opportunity to understand decision making patterns and show how they generate problems for flows of patients. These management policies could create interrupted flow (such as batching patients with the same conditions through theatres and thus having low requirements and then massive requirements for post surgery beds. Senge (1990) proposed that an important element of systems dynamics is learning from systems feedback loops.

Systems Dynamics along with STS have been described as integrative approaches, where the linkages rather than differences in systems approaches are investigated (Cavaleri 1992, Jackson 2003). Integrative approaches are multi-dimensional in perspective which can lead to criticisms that it lacks a proper theoretical basis.

The focus on feedback loops in Systems Dynamics, while relevant are not considered to provide sufficient explanatory value for this study, particularly because of the social

interpretation of information and the presumed use of existing feedback loops. A broader interpretation is sought of what feedback may assist in managers gaining a greater understanding of the dynamic context and the improvement agenda. While feedback loops are essentially part of this study, this is a means to enable reflection on the relationship between the technical and social system of an SCO.

Systems Dynamics was duly rejected as the underpinning theory for this study. However, some aspects of the theory have relevance and will be applied in the research, particularly the concepts of flow and feedback loops (i.e. the need to have efficient, effective and quick feedback to prompt improvements).

3.3.6. Socio-Technical Systems

(STS originated in the 1960s and proposed that any organisational system had at least two sub-systems. The first is the technical sub-system which consists of the artefacts with which a product and/or service are delivered and the process by which the goal of the organisation is achieved. The second is the Socio-Systems which is the human linkage, or glue, that enables the artefacts to come together to achieve the whole. It is the human socio-system that determines how well the technical system performs. The two main principles of the theory are firstly that organisational optimisation is achieved through the balance and alignment of the technical and social system. The second is that the demand of the external environment on the organisation must also balance (including flows/transactions with suppliers, customers and other stakeholders of the organisation). Implicit in this second principle is economic validity (Pugh and Hickson 2007).

Pasmore (1988) proposes the fit between the technical and social system determined the effectiveness of an organisation when considered in the context of the external organisational environment (APPENDIX 3). Organisational design is considered to be a set of choices (not always rational and often based on incomplete information) and presumes there are multiple ways in which an organisational design may be constructed alongside many ways in which a design may be changed (this philosophy was built upon by Weick, 1995). These are assumptions based in the systems thinking law of requisite variety (Table 3.3) and about synergy.

Features of STS theory and its history feature strongly with the Tavistock Institute (TI) which was instrumental in the emergence of this strand of systems thinking during the 1960s in the UK. Studies into the resistance to innovation, particularly automation, suggested that there was a need to more clearly understand the connections between the two systems if managers were to achieve the benefits of automating tasks within firms. The key concepts of STS are described in Table 3.4.

Table 3.4 Key Concepts of STS

Concept	Description	Authors
Interdependency	Technology places limits on work organisation. Work organisation itself has social and psychological properties independent of technology. These factors are mutually interactive as is a third factor which is economic validity.	Emery and Trist 1969, Trist 1981
Sub Optimisation	Optimisation of social, technological or economic systems of an organisation will not result in optimisation of the whole system. The aim is joint optimisation.	Emery and Trist 1969
Variety of work organisation	Many work systems can be applied even when the technical and economic system is the same, enabling management choice of work design to suit social and physiological aspects.	Trist 1981, Wilkinson and Pedler 1996
Boundary Management	Co-ordination of boundary conditions where necessary. Clarity and specific route of transfer at boundary condition. External management due to ambiguity, management role to reduce ambiguity.	Emery and Trist 1969, Churn 1976, Churn 1987, Spear and Bowen 1999, Niepce & Molleman 1996
Incompletion	Dynamic and reiterative process of work design.	Churn 1976, Churn 1987
Minimum critical specification/Vital Few, Skill as a co-ordination mechanism	Only those aspects of task design which are critical should be specified.	Churn 1976, Churn 1987, Graupp and Wrona 2006, Niepce & Molleman 1996
The Multi Functional Principle	Each element of the STS should possess more than one function, which should then be able to be performed in different ways.	Churn 1976, Churn 1987, Herbst 1976
Compatibility	The process of design must be compatible with its objectives	Churn1976, Churn 1987
Information Flow	Systems to supply information should initially be designed to provide information to the point where action on the basis of it will be needed.	Churn1976, Churn 1987, Towill 1999, Shingo 1988
Support Congruence	Systems of social support should be designed to reinforce the behaviours that the organisation structure is designed to elicit.	Churn1976, Churn 1987, Pasmore 1988
Design and Human Values	Design should provide a high quality of work.	Churn1976, Churn 1987, Niepce & Molleman (1996)
The socio-technical criterion	Variances, if they cannot be eliminated, must be controlled as near to their point of origin as possible	Churn1976, Churn 1987, Pasmore 1988

Source: Author

Drawing upon the theory of directive correlation (Sommerhoff 1950), it was proposed that achieving an objective that is dependent on independent but correlated systems, results in the inability of the overall systems to achieve performance optimisation i.e. the outcome is sub-optimal performance. The solution is joint optimisation of the correlated systems. Traditionally, the optimisation of the technical systems has not taken due regard for the social system. The reverse is also true, and either case interaction effects are ignored (Emery 1966). In this thesis, the potential interaction between the multiple technical systems and social systems along the patient journey present a significant opportunity for sub-optimisation.

Emery's (1966) view of 'independent', means that a sub-system can be classified as dependent through its adherence to the same laws of the overall system such as an organisation. He does not, however, rule out the possibility that different sub-systems within an organisational system could behave as independent and hence be subject to this phenomenon. Under these conditions, influence must be exerted by one system over another if optimisation is to happen. Within the context of healthcare, this could be the use of influence to change OM working practices between internal customers/suppliers along the patient pathway to result in higher performance.

Socio-technical thinking challenged hierarchy and looked to segment approaches to design (Herbst 1974, 1976). While some of these focused on job design, where a significant body of work has developed (Davies and Taylor 1972, Majchrzak and Broys 2001), the approach of evolutionary systems design is less prominent but of particular interest to this study. Starting from a point in time (this could be called a current state) the design of the organisation develops through active interaction of individuals within the organisation, in contradiction to the hierarchy imposing work practices. Emery and Trist (1965) argued that organisations *'tend to design their organisational structures to fit simpler environments than the complex turbulent ones which they are actually facing'* p.256 (Pugh and Hickson 2007). Much has been made of very specific design practices at task level in an organisation to enable a *'set of theoretical principles about how organisations and people within them function effectively'* p.220 (Majchrzak and Broys 2001). When analysed, the variety of emergent designs only invites a discussion on the

most robust. This is in contradiction to the philosophy which encourages the application of the law of requisite variety(Ashby 1956), making the practices themselves difficult for study, rather it is the underpinning principles which provide an explanatory power. It follows that a criticism of STS is its abstract feature. For example, the interpretation of the law of requisite variety exhibited as variation has been interpreted as a 'problem' to be solved rather than a useful concept which may enable alignment of the environment with the organisation. Indeed Churn includes this multi functional concept as a principle of STS design which is founded on the variety of skill processed, as well as the variety of functions that can be performed, and hence the combinations of these can be compounded (Churns 1976, 1987). Churn's view is that organisations where multi-skilling and learning occurs, are most likely to adapt well to changes in the environment and to succeed. His work implies that multi-skilling across a variety of functions increases the ability of the organisation to flex and share work across sub-systems. The concept of flex is important to the healthcare environment because of the variety and variability of patient demand on a system and how effectively organisations can respond to these changes.

Churn (1976, 1987) principles of design have been applied in the context of 'grouping tasks into jobs' (Majchrzak 1997). Majchrzak (1997) herself attempted to understand why the 'ideal' type of organisational design has not been adopted by more, given its presumed benefits. Unsurprisingly, the notion of 'ideal' brings with it the propensity for prescriptive rather than dynamic design. A specific feature that Majchrzak concluded was that *'compensatory effects among socio-technical variables help the organisation to overcome constraints' (p.556).* Child (1984) provided an overview of constraints which can emerge when poor organisational design is present (Table 3.5). Another impact of the STS approach is therefore the critical importance of 'sensemaking' (Weick 1995) and organisational learning (Pedler et al. 1991, Wilkinson and Pedler 1996). For the healthcare environment, these design principles suggest there is no one best way to organise, but rather the need to adopt those principles that most suit the environment and maintain them by learning.

Table 3.5 Penalties of Poor Organisational Design

Effect	Cause
Poor morale	Associated with inconsistent decisions, no standardised rules, and lack of delegation, lack of clarity, poor prioritisation and stress caused by ineffective support systems.
Decision time lags	A function of interrupted information exchange highly specialised decision making, insufficient delegation of decision making power, lack of procedures to evaluate the results of historic decisions.
Poor Co-ordination	Resulting from poor and conflicting structure of goals, lack of synchronisation, lack of regular information exchange and exclusion of key employees from the decision making process.
Low Innovation	Created by a lack of specialised jobs concerning forecasting, planning and environmental scanning, lack of senior management support for planned change, dislocation of departments with market intelligence and those tasked with change or technological responses.
Escalating Costs	The result of a long hierarchy and high amount of indirect to direct employees, bureaucracy requiring additional staff and the existence of some or all of the earlier problems.
Counter-measures	The operation of a formalised, regular, and participative process of decision-making. The use of a logical portfolio of performance measures for each goal established. A flexible business structure through which goals can be executed. Nurturing of consensus management, high levels of employee participation and widespread promotion of the 'need' to change (establishing 'continuous improvement' as the norm for all employees).

Source: Child (1984)[21]

To enable survival, these initial choices, and their underpinning assumptions about organisational design, need to be subject to reflection and action in order to bring together the social and technical system to match the external environment in a dynamic manner. This in turn enables the rectification of the inefficiencies of the original choices, sometimes referred to as unintended consequences (Hubber and Brown 1991). Similarly, it is assumed that the choices of organisational design bring with them agreements amongst people, implied or formal, regarding their work, role, etc. This implies the need for co-operation across peer groups as well as within teams and across hierarchies.

The potential for variety of organisational design has been deemed to be a weakness as the abstract principles are difficult to empirically test (Majchrzak and Broys 2001). Others reject this and suggest variety and variation is not an issue to be solved, rather these concepts are a means of understanding and learning (Taylor and Felten 1993). STS provides a lens to provide multiple explanations (Majchrzak and Borys 2001) as was the case of the British coal mining study where the overriding principle for explanation is variety (Trist and Bamforth 1951).

[21] The work of Simon (1959) and later Williamson (1975) reinforces the negative impact of decision making delays on the performance of the firm.

STS theorists place a high concern for information exchange through the concepts of '*social participation, interaction and concern*' (Maier and Rechtin 2000) and '*interactions mediated by technology*' (p.53) such as information technology (Davenport 2009). This central tenant includes the differentiation of information and knowledge, with the availability of information being the enabler for knowledge based management and innovation. The availability of information in itself is nothing without the social interpretation and 'sensemaking' (Weick 1995). This has particular interest to the information technology movement (Cullen 1998). Technology is not limited to that which services information, but all technology which enables work in conjunction with the staff and environment to enable the whole organisation to achieve economic validity. In a similar manner, the technical aspects of work have seemingly featured less strongly, for example in the work of Pasmore (1988) and Weick (1995) with greater emphasis on the social system. Neither lose sight of the technical system, but there is a danger of separation of emergent social concepts to other works without due regard to the technical. Hence the focal theory selected for this thesis is operational management, which can be criticised for focusing on the technical aspects of a system rather than the balance of socio, technical and economic design criteria.

It therefore follows that with the research questions centring on the possibility of improving the consistency of pace/flow in healthcare, attributes of both the technical and social system need to be considered together. An analysis of the sort proposed by the research questions will need to access and review detail of tasks (technical system) which when linked together provide the service, as such the implications for those who deliver the task as well as those who manage the linked tasks (social system) needs to be assessed. Similarly, the idea of adoption of high performing practice from one environment to another as a strategy for improvement is rejected, but the adoption of the deeper principles which are deemed to underpin high performing practice may be appropriate as a means of facilitating the integration of the technical and social organisational systems. Also, STS does not preclude the adaptation of practices which teams may find useful within the context of their environment to achieve their purpose/goals. The STS theory and its utility for the study of healthcare organisations were duly accepted as the foundation of this thesis within the overall context of systems

theory. Section 3.4 explores the features of organisational design which maintains the linkages between 'tasks' and enable flow, in particular the flow of patients in healthcare and the practices that serve to optimise the STS.

3.4. The implications of an STS approach to NHS and Patient Flow

Healthcare, provided in the UK through the NHS, is a large and complex system (McNulty and Ferlie 2002) that contains many levels of sub-systems which are both independent and correlated. This is exhibited in the boundaries of the organisational design i.e. Community Hospitals, GP Practices, Commissioning Groups, Acute Hospitals to name but a few, but it is also evident within organisational structures particularly hospitals where sub-systems may carry with them different identities. Such identities can be professionally driven (doctors, pharmacists, engineers, IT, etc), geographically driven (physically separated e.g. I.T. and executive located away from hospital) etc.

Hospitals have been proposed as STS (Trist 1981) which can exhibit contradictory purposes e.g. terminating pregnancies whilst also having staff and facilities for the care of premature babies. Models of STS have been explored in healthcare (Cullen 1998) reflecting on the London Lighthouse and the patient, carer and professional (healthcare, architects, etc.) approach to integrating packages of care for cancer patients.

For STS, the formation of a single ideal organisational design which accommodates the variety of social, technical and environmental dimensions as well as flexing to the dynamic nature of all these dimensions is not a valid proposition. Rather, the concept of interdependency and improvement unite STS theorists (Table 3.4) and that by optimising these concepts, patient waiting can be reduced during an EOC in an SCO. Authors have depicted many modern improvement approaches as STS theory in the modern era. These improvement approaches include those such as BPR (Keating et al. 2001, Mathews 1997, Probert et al. 1999) and LT (Niepce and Molleman 1996, 1998). More recently, LT has been reframed as an emergent STS (Paez et al. 2004, Rother 2010).

Some STS researchers prefer to build mathematical models (algorithms of waiting time reduction), however, the majority of authors highlight the management and OM design

practices that support superior system performance. The latter is of most interest to this thesis. While LT is a controversial intervention approach, in that it has not been conceived of as a general theory, and in early literature, it was the practices which were claimed to be the source of high performance in the automotive industry. Further, Womack et al. (1990) showed how these working practices were not limited to just Japanese industry and could be transferred with little need to adapt them. It is the method rather than the practices which are the key to high performance against organisational design (Balle and Balle 2005, Koichi and Fujimoto 2009, Rother 2010). Indeed the lack of a single definition for the LT (Paez et al. 2004) is a reflection of the need for a dynamic rather than a static framework. LT is therefore unique to an organisation and will be continually reinventing the explicit design to reflect the dynamic nature of a system.

Criticism of STS is that it is no longer a contemporary theory and as Mathews (1997) indicates, has not been readily adopted by managers. In contrast, technically led organisational design such as BPR has often failed to deliver the balance of the technical, social and economic elements so crucial to the STS approach. The research duly accepted the selection of the STS and saw the approach as suited to the description of modern ways of working and OM in the healthcare sector.

Indeed STS has its roots in production and operations systems and Mathews (1997), acknowledging the STS rule to look at the system as a whole, contends that *"...it is only when considering the total production system that alternative design strategies can realistically be formulated"(p.491).* He notes an approach to STS adopted in Holland[22] (Ulbo de Sitter et al. 1997) which first analyses the production system, followed by the control system and finally the information system, consistently iterating between these three systems thus enabling an *"...internally coherent and maximally "devolved" system ...for the total organisation"* (p.490). This is the approach selected by the author for this research. The combination of feedback systems and their relationship with socio and technical aspects of OM design offered the best insight into system and sub-system performance in a manner that allowed improvement (or the lack of it) to be assessed from

[22] See Appendix 4

multiple perspectives (informational, management, technical and social). Having duly accepted STS theory, the next section will introduce the focal theory of OM in the context of systems theory and STS.

3.5. Focal Theory

3.5.1. Introduction to OM

This section will provide a brief overview of the development of OM from a broad historical perspective (for a more detailed account see APPENDIX 5 for the various definitions of OM that have emerged over time). The section will develop the gaps and position the main research arguments in the field of high performing OM/organisational designs.

OM in its most basic form encompasses the input-process-output cycle (Slack et al. 2001). However, there is differing agreement as to the definition of modern OM. Galloway (1991) has a traditional manufacturing view that it is expressed as *'Those activities concerned with the acquisition of raw materials, their conversion into finished product, and the supply of that finished product to the customer' (p.2).* This definition was considered too tactical and limited in scope to adequately capture the essence of modern OM and instead adopted Knod and Schonberger (2001) definition *'...the set of activities for creating, implementing and improving processes that transform resource inputs into output goods and services. OM activities may be appropriately applied anywhere in organisations and may target any level of effort from a single step in a job sequence to the entirety of the company' (p.9).* This definition adequately covered those service activities that are features of a healthcare system.

3.5.2. OM through the Ages

Early OM can be traced to industrialisation and the rise of industrial engineering as a specialist body of knowledge. Prior to this period of the 1900s, it was known as 'craft' production where low volume products with high cost per unit and full customisation to 'purchaser need' dominated. Ironically, it was this era which relied most upon specialist

knowledge and skills in a manner somewhat equivalent to the skills of senior clinicians during an EOC.

During the second era and the rise of the large-scale factory, Operations became a department with responsibility to design and operate systems of production – typically involving 'batch-type' or a 'mass production' environment (Womack and Jones, 1996). The use of batches was deliberate and sought to exploit lower cost per unit (higher demand for products) through the use of automation and standardisation of products. Standardisation was also applied to skills and employees were deskilled to allow for greater efficiency of repetitive work. The key role of the engineer was to design the OM system and then to develop rules for employees to follow (also motivating them to achieve outputs by piece rate pay). The zenith of such factory systems was that of mass production. The 1910 factory designs of Henry Ford (Sprague 2007) where one product, the Model T Ford, was made in huge volumes. This was quickly followed by his River Rouge facility which was a totally integrated production system where iron ore entered the factory and finished cars left. In the context of healthcare, such processes do exist in clinical and non-clinical areas, so the 'mass production' organisational design, which was efficiency focussed, also applies to healthcare settings (such as provision of food, linen etc.).

Service from the functionally specialised mass producer also involved slower decision making as decisions were always referred up the organisational hierarchy. Increasingly, as markets began to quicken and competition increased, these organisations became unresponsive and created inventory or queues across boundaries. The neglect of customers as a consequence of organisational design (functionally based) was considered a key factor in dissatisfaction. Features of queues and customer dissatisfaction are reported in the UK healthcare setting and suggest that functional design may be a contributory factor to such poor performance levels (Oliver 2005). The dominant logic of the mass production organisation was scientific/classical management (Fayol 1916, Taylor 1911) and the subsequent evolution to a lean business system includes elements of craft skills and mass production practices. The main difference (Table 3.6) is the new

blend of these practices and the use of a new model of the organisation that is integrated and based on collaborating team structures (Roth and Miller 1992).

Table 3.6 New Requirements of OM

Traditional View: Mass production/Scientific Management Approach	New Requirements OM as an Integrated System Approach
Functional orientation	Business process orientation
Focus on internal operations	Focus on the value network and interfaces in the input acquisition and output disposal channels
Focus on the product or competition	Focus on the customer and competition
Focus on priorities	Focus on core competencies
Top down strategy	Top-down and Ground-up strategy
Decision oriented	Performance oriented
Generic strategy	Individualistic strategy (contingency)

Source: Miller & Roth (1992)

The Lean paradigm, which originates from Japan, has grown in popularity since the 1980s for manufacturing systems design (Bartezzaghi 1999). The approach (Institute for Healthcare Improvement 2005) has morphed into the healthcare environment (Balle and Regnier 2007, Ben-Tovim 2007, Ben-Tovim et al. 2007, Berwick et al. 2005, Brandao de Souza 2009, Esain 2004, Fillingham 2008, Institute for Healthcare Improvement 2005, Lodge and Bamford 2008, Long 2003, Manos et al. 2006, Mazzocato et al. 2010, Spear 2005, Young and McClean 2008). The new model is one of multi-skilling, team work and decentralised control to those employees that are best placed to make the decisions (Table 3.7). The lean approach has changed the focus of management from departmental specialism to that of process focus where the entire production system is built around the product (or patient) flow. The lean approach is also focused on an improvement model that is continual and involves all staff in reducing wasteful activities and learning rather than leaving such designs to individual or departments of engineers (Rich 2001).

The new way of working seeks to provide a modern alternative way of organising work. It was popularised in the 1990's when benchmarking of the automotive industry showed how lean systems (innovations that were particular to the Toyota Motor Corporation) operated at much higher performance levels than mass producers such as Ford and General Motors. The lean systems were twice as productive, produced a typical car in half the time and with a 100:1 quality advantage (Womack and Jones 1996, Womack et al. 1990).

Table 3.7 Old and New Management Control Strategies

Workforce Strategy	Old (Scientific) Management Control	New (Commitment-Based) Control
Job Design	De-skilled, fragmented, fixed	Emphasis on whole task, flexible, use of teams
Performance Expectations	Minimum standards, defined	Emphasis on stretch objectives
Management Structure	Many layers with rules and procedures and status symbols	Flat structure with shared goals and values and minimum status differentials
Rewards	Individual incentives, linked to job evaluation	Group incentives, with gain sharing, linked to skills and mastery
Employee Participation	Narrow with information given on a 'need to know; basis	Encouraged, with widely shared business information
Industrial Relations	Adversarial	Joint planning and problem-solving

Source: Rich (2001)

Table 3.8 shows the influences that have shaped the modern and commitment based approach to OM.

Table 3.8 Summary of historical influences and emergent themes related to OM

Timeline	Production	Service
Pre 1900s Examples of OM – in the predominantly craft era	Venice Arsenal, (Lane 1934 in Voss 2007) Pin Production (Smith 1776 in Voss, 2007). Difference engines and analytical engines. Building on the economy of Machine and Manufacturers (Babbage 1832 in Lewis 2007). American System of Manufacturing (ASM) including -Firearms (Eli Whitney, Samuel Colt); Sewing Machines (Oliver Evans, Isaac Singer); and Agricultural Machinery (Cyrus McCormack in Brown et al. 2001)	Atchison, Topeka and Santa Fe Railroad -Harvey System for meals (Brown and Hayer 2007) Formalisation of standards running homes -Beaton's Book of Household Management (Beaton 1869), Boston cooking school cook book (Farmer 1896), Settlement Cook Book (Kander and Schoenfeld 1903) US Army 'Shop-Order' System (Matcalfe 1885)
REVOLUTION		
Early Knowledge Transfer and Dissemination in OM (Early 1900s)	Production Management/Factory Management – Founded on Visits – precursor to case study	Manuals (as per Books in last section)
WAR II		
Emergence of Business Discipline (Mid 1900s)	OM and Management Science (Separation of Production and Personnel Management courses - Sprague 2007)	Taylor type Motion Study in healthcare e.g. Tonsils (Gilbreth and Carry 1948)
Focus of OM thinking	OM Internal Focus Manufacturing Strategy: Computer Based Support (e.g. MRP);	
Emergence of New OM paradigms 1970s	Japanese Manufacturing practices (Schonberger 1982, Shingo 1988). Supply Chain Management (Lamming 1993, Hines 1994)	Emergence of Service OM (Heineke and Davis 2007, Pilkington and Meredith 2008)
Prominent OM Paradigm 1980s-to-date	Lean or World Class Manufacturing (Womack and Jones 1996, Brown et al. 2001)	Lean in the Public Sector (Radnor and Bucci 2006, Radnor and Boaden 2008)

Source: Author

3.5.3. Modern OM

OM is inextricably linked to systems theory and the input-process-output cycle. The objective of operations managers is to ensure the efficiency and effectiveness of the cycle and maximise outputs so that the system is free to take in more inputs (in the case of this thesis – patients or support services). OM controls four critical elements of a system (Brown et al. 2001, Galloway et al. 2000, Greasley 2009, Knod and Schonberger 2001, Slack et al. 2001). These four attributes are defined as:

- ensuring an uninterrupted flow of inputs to a process;
- converting inputs via transformation process management;
- ensuring a constant flow of outputs;
- the transformation process and ensuring the system works effectively through the use of a robust feedback system of controls[23].

Slack (1991) goes further, to argue that from a systems perspective, an organisation is "...made up of a collection of smaller operations, where each department, unit or cell is an operation in its own right. Their performance can be judged using the same five performance objectives[24] and they all contribute to the performance of the whole" (p.160).

These four attributes of OM are consistent with systems theory (see section 3.2.1). As such 'the aim of systems thinking is to use an abstract view of the total system and then to operate each sub-system according to the defined 'best way' for the complete system' (p.630) (Boddy and Paton 1998). The implication of this statement is that the OM design of any system must be aligned with the intentions of the organisation, but also that each element of the OM system must be designed and aligned for optimum performance.

---

[23] Noticeable for its absence in Hill (1991)

[24] The five performance measures identified by Slack (1991) are displayed in Table 3.3 and reflect the modern approach to evaluating the performance of industrial organisations. Historic approaches, especially those associated with mass production and profit maximisation, focus almost exclusively on cost minimisation.

Seven principles of human aspects to seek a best way for any point in time vis. requisite variety, flexible units, communication expansion, external focus, direct authority, amplification and bounded chaos are proposed (Jenner 1998). These principles match the criteria for higher performance that is advocated by operations and lean improvement authors (Sprague 2007, Womack and Jones 1996). However, it was not until Skinner (1969) that OM was promoted as a source of competitive advantage. This work aligned an effective OM system design with high performance (Skinner 1969). He advocated the concentration of OM design on the achievement of a limited number of performance objectives (such as cost and productivity). His work served to promote OM as an integrated part of an organisation and closer to the externally integrated position of high performance that was described by Hayes and Wheelwright (1984). Skinners work remained largely unchallenged until the 1980s when Schonberger began to promote a thesis of 'no trade-off' as a route to high and 'world class' performance.

Until Schonberger's thesis, the OM world was set in the context of managing costs and saw the achievement of cost optimisation as a trade-off. For instance, it was perceived that high quality and low cost could not be achieved (or shortened) delivery times without the costs of lots of buffer stock etc. The 'no trade' view contradicted these traditional ideas. Instead, it suggested a process of incremental mastery whereby the achievement of performance objectives, in a set order, would result in sustainable performance improvement (and the outcome of lower costs). Schonberger argued that this process commenced with the mastery of the quality performance objective and the initial purpose of a system is to deliver quality products. From here, delivery and flexibility could be mastered until the ideal evolution of the OM system was achieved and a support to competitive advantage provided for the marketing department of the firm. It was argued that the same mastery was applicable to services and by implication, healthcare, even though these systems did not necessarily seek competitive advantage (Slack et al. 2004).

The process of mastery and external integration of OM was triggered by Schonberger's study of Japanese businesses, whereby OM was at the heart of the organisational model. His writing broadened OM (Hayes 2000) and took the specialist field of study from one of a tactical function, to the understanding of OM as a process which is equal to other

business functions. Much of the modern OM literature draws upon issues of performance improvement, Human Resource Management (HRM) and learning. These themes are probably the most important to any organisation and the researcher contends they are critical to theory building within a healthcare setting.

The modern approach to OM and the research agenda shows a renewed interest in an integrated systems approach (Table 3.7)[25]. Key themes include cross-functionality (of resource and team-based problem solving), especially within organisations that have emulated the Lean model of working in order to achieve flexibility through better quality and delivery performance.

Table 3.9 Six Laws of Manufacturing Systems

Law	Description
Gestalt	The sum is greater than the whole. A set of sub-optimal solutions can never produce a truly optimal solution
Material Flow	The efficiency of a manufacturing system is inversely proportional to the complexity of its material flow
Prescience	It is not given to human beings to foretell the future
Industrial Dynamics	If demand of goods is transmitted along a series of inventories using stock control (i.e. level triggered) ordering, then the aptitude of each transfer will increase with each transfer
Ordering Cycle	If the various components made in a factory are ordered and made to different cycle times, they will generate high aptitude and unpredictable variation in both stock and load as the many contributing component stock cycles drift in and out of phase
Connectance	A given direction of change in the value of any manufacturing system variable will induce, or be induced by, a given direction of change in at least one other variable

Source: Towill (1999)

OM authors have also found that the technical system of the lean ways of working (Schonberger 1982)[26] is easier to understanding than how teams of staff improve. It is the staff who determine what can be achieved by any technical design (Mathews 1997, Ulbo de Sitter et al. 1997). Interesting insights into these issues have been reported and show how many improvement projects fail due to social issues rather than the application of the wrong technical solution (Bateman and David 2002, Lucey et al. 2005). These Western findings mirror those found in Japan where the lean and TQM models of OM have been so successful, suggesting culture and context of OM are worthy of study and

[25] Systems are further identified as a key theme from the 2007 special issue of Journal of Operations and the most important approach for modern OM researchers.
[26] As assessed by Pilkington and Meredith (2009) and ranked 3rd in their citation analysis, although declining in the last decade

that that the improvement process itself must be understood too (Brown et al. 2001, Imai 1986). These findings provided evidence that the STS design principles and approach was an appropriate means of framing this research problem.

While citation of Schonberger's (1982) seminal work may be declining in OM literature (alongside that of other text on Japanese practices) (Pilkington and Meredith 2009), the principles of this and other significant works of the time may have been lost to the healthcare sector. The healthcare sector do not identify themselves with Japan in general and manufacturing in particular. Indeed there was a prevalent view at the commencement of this research, that the complexity of healthcare and its caring ethos did not fit with the ethos of commercialisation in the private sector. Further, the shift of focus from administration to managerialism in the 1980s (see section 2.1.2) caused a state of flux for those who may have had the greatest interest in such works. This, combined with the hostility of hospital doctors to commercialisation (Kitchener 1999), at best made such texts unimportant to the situations which the healthcare sector in the UK found itself. Hence, at commencement of this research, the testing of high performance OM approaches within the healthcare sector represented an area which was under-researched with a gap in knowledge for healthcare managers.

3.5.4. Performance Objectives and High Performance

Thus far this thesis has used the terms 'high performance' and 'performance objectives' without defining them in detail. Performance objectives are the measured purpose of an OM system (Slack 1991). His view is that all OM systems can be measured using the measures of quality, speed, dependability of delivery, flexibility and cost (Table 3.10). These performance measures were considered important to the study because they represented means of assessing and comparing improvement activity. High performance is therefore improvements in flow rates towards a theoretical optimum, in concert with the systems environment, the impact of which can be tracked over time. The level of performance, especially in healthcare systems, is often poorly measured or the measures themselves do not test the system but represent benchmarks between systems that could have been designed for different purposes.

Table 3.10 Five Forms of Manufacturing Advantage

Market Advantage	Role of OM	Key Performance Indicators (KPIs)	Supporting Authors
Quality	To make things right.	Internal & Customer defect levels.	Deming (1982, 1986), Oakland (1989), Garvin (1992).
Speed	To make things quick.	Value-adding ratio & throughput times.	Mather (1988), Plossl (1991).
Delivery	To make things on time.	On-time delivery, frequency of delivery & buffer levels.	Hall (1987), Plossl (1991).
Flexibility	Changing and updating what is made.	Changeover times & ability to late-configure products (customisation).	Shingo (1986), DeMeyer et al. (1998), Hamel and Prahalad (1994).
Cost	To make things cheaply.	Cost of manufacturing, supplies and indirect overheads.	Skinner (1969), Fine and Hax (1985).

Source: Rich (2001)

The concept of flow is central to high performing organisations (Laugen et al. 2006; Paez, 2004; Krafcik 1988; Womack et al. 1990; Anderson benchmarking, 1992, 1994; Boston Consulting Group, 1993; Oliver et al. 1995). The relationship between high performance and operational excellence has been subject to a comprehensive review which criticised methodological rigor (Davies et al. 2002). Subsequently, Laugen et al. (2006), addressing the issues raised by Davies et al. (2002), retested the effects of features of operations management on performance using a sample of 474 companies in 14 countries. The features tested were drawn from a comprehensive literature review which interestingly did not include TOC. Watson et al. (2007) noted 'The view of many TOC proponents is that while optimization results in elegant schedules, the schedules are infeasible due to assumptions that are invalidated by exposure to real world variability.' (p.398). Watson et al. (2007) also argue that confusion through ill-defined procedures have lead to a studies of TOC which show inconsistent results regarding inventory and output – as such the relationship between TOC and high performance is questionable.

The Laugen et al. (2006) study also concluded that Quality Management (including 6σ) no longer exhibits any correlation to high performance. Rather, they identify a combination of process focus (including features such as cellular design, a process/value stream focus and implicitly employee involvement) and

pull production (including set up time reduction, batch size reduction, Kanban) that they concluded to be differentiators in performance, a position previously found by Waterson and Clegg, (1997). All of the features related to high performance were found, during this literature review, to be techniques associated with lean ways of working and LT principles.

BPR in isolation was also found not to provide high performance (Laugen et al. 2006) and instead, the BPR approach tended to focus on indirect activities and the reconfiguration of processes that may or may not support better healthcare flows (McNulty and Firlie, 2002). The literature in this area was predominantly a practical approach to changing inter-departmental tasks and structures rather than a focus on flows. The operations management literature reviewed by the author was not considered of sufficient quality and predictive utility to house this research study. Hence manufacturing practices which do not focus on flow yet have been suggested as appropriate for healthcare improvement (Figure 2.2) including 6σ, BPR, and TOC were considered of insufficient depth and socio-technical systems foundations to support this study. These approaches have been rejected as the means of analysis for this study in favour of a socio-technical lean approach. In the light of the research results commencing with the IMVP (Krafcik, 1988; Womack et al. 1990) and later studies (Anderson benchmarking, 1992, 1994; Boston Consulting Group, 1993; Oliver et al. 1995) that focussed on high performance, it was the LT approach which was considered most pertinent to this study. LT offered a measurement system of assessing high performance as well as an exemplar organisation (Toyota) which exhibited the features of a high performance business and these socio-technical system features could be tested within a healthcare context.

The design of an OM system is therefore an important consideration when looking at and profiling systems and their purpose. Johnson and Broms (2000) point out the flaw of traditional OM assumption is that flow is only possible with high volume, low variety and low variation of products, patients or services. The concept of flow in high performing organisations is central and challenges OM designers to develop new ways of responding without trade off to achieve such an outcome (Paez, 2004). One such means is the

assertion of economies of scope rather than economies of scale (Esain and Rich, 2006) and the application of group technology (Parnaby 1988). The principle of challenging traditional organisational design trade-off (structures, people, processes and technology) lies at the heart of this thesis and is the central challenge facing the NHS and secondary healthcare in particular. Trade-offs already discussed in this chapter have included functional specialisation, quantity and quality, cost and quality, lack of multi skilling and flexibility, (Child 1984).

Slack et al. (2001) postulated four differing factors regarding operational design being:

- volume of transformation, input, output;
- variety of transformation, input, output;
- variation in demand for transformation and/or output;
- the degree of visibility which customers hold (or degree of customer contact).

These 'four Vs', they argue, have a profound impact on the design decisions of an operation, such that they determine where the activity is performed, what the layout of the activities look like, how much spare capacity should be held and how the operations should be scheduled. As such, these features relate to the core OM concepts of flow and how to blend these factors to optimise the system.

For commercial organisations, the choice of Vs and how to react to them is related to profitability. In a public sector organisation, e.g. the NHS, regardless of volume, variety or variation, it is assumed de-selection is not an acceptable organisational strategy[27]. Hence managers in healthcare particularly need approaches to operational design which are not premised in such trade-offs, and to enable efficient and effective delivery of services to all. The NHS drive towards long-term performance improvement translates into cost reduction, quality assurance and respect for humanity (Monden 1983).

[27] Although, these choices may be governmental strategy e.g. opening the market for public and private operations to co-exist.

3.5.5. Operations System Design and Performance

OM systems, which carry the product or service (Slack 2001), can be considered from the perspective of the flow curve (Shingo, 1988). The Japanese manufacturing OM expert Shingo had a profound impact on the development of this research (even though he drew only from manufacturing systems) and his work will now be reviewed. Shingo (1990) demonstrated that even simple systems had complex relationships between the alignment of capacity and demand i.e. the volume of capacity available to service demand directly affects the ability of an organisation to deal with changes in demand or supply. Slack et al. (2001) do not deal well with these dynamics of operations design and therefore flow performance. As such, improvements that lead to understanding demand or reducing supply variation, are important features of a highly performing system (that has learned how to reduce noise and deal with the issues of systems dynamics noted in the earlier discussion).

Such a view was tested by (Silvester et al. 2004)[28] in the UK healthcare sector. Their study concluded the use of capacity and demand was poorly managed and these issues had a major impact on waiting lists, even though they may not have impacted on the actual inpatient EOC. Further, they argue that the understanding of demand/capacity issues was rarely used for service redesign purposes. As such, Shingo's (1990) contention that better understanding of supply and demand results in better system management, was duly accepted and integrated with the study so that an improvement in this area of flow management would be considered as higher performance.

Shingo (1988) also demonstrated that the longer the cycle to respond to fluctuations in demand or supply, the more the need for inventory (or in service terms queues). This logic was then reversed to assert the need to keep cycle time short (time compression) which in turn enabled the organisations to be more flexible to demand and supply fluctuations and reducing or eliminating the need for inventory or queues. Again this work has been tested in lean case studies in the NHS (Fillingham, 2008) within the

[28] The paper also indicates the existence of 'many studies' that have 'demonstrated that there is typically no correlation between organisational capacity and patient waiting time' but no references were given to support this claim.

context of pathology tests, and it was found that short cycle time mitigated the impact of information variation. This aspect of higher performance management was also duly accepted as a means of assessing the flow of a sub-system and whether cycle times had reduced.

Capacity represents the resources in an organisation that are available to perform tasks. Whereas lead time is the sum of the production cycle time plus the sum of the process delays (simply put, the difference between the time in and out of the system). These delays often represent a greater proportion of time than the cycle time (Shingo, 1988). This means that focusing on cycle time alone may limit any resultant improvement (e.g. doubling capacity would not necessarily mean doubling output)[29] (Shingo 1990). This is because the steps in the process to deliver output exhibit process delays which are not directly affected by an increase in demand. Instead they are affected by the process steps themselves. Each process step exhibits delays dependant on preceding and subsequent steps. He asserted that it is therefore possible to reduce these delays regardless of the demand on the system, through balancing the sub-system (or steps) which combined to provide output. Again this argument was accepted and represents another dimension of flow performance for this study.

However, Shingo's argument relates to a linear progression of activities to deliver a product or service which is not necessarily true of a health system. As previously stated, systems are rarely designed in such a simplistic manner. Hence Shingo (1990) goes on to discuss the fallacy of efficiency and flexibility through the use of machine centres (i.e. groups of the same or similar machines capable of delivering the same output are gathered and scheduled together. These are potentially analogous to functional groupings of similar skills). In skill terms, this combination of like-skills was the basis for functional specialisation as per the tenets of scientific management. Delays which arise in this situation of specialisation are related to the difference between machine load or committed work (the amount of hours' worth a task uses) versus capacity (the amount of

[29] A claim repeated by Silvester et al. 2004 based against four hypotheses all relate to aggregate discussions i.e. demand is greater than capacity; a mismatch between variation in demand and variation in capacity; a queue as a means of being efficient with 100% of capacity; queues as a means of rationing. None of which deal with cycle time vs. process delays explicitly but rather the outcome of this.

available time to perform such tasks). Invariably, this equation is not equal due to natural variation (Neave 1990). Hill (1991) notes that *'...capacity will need to take into account... adjustments for appropriate levels of non productive time, rework and customer changes to the process' (p.146)*, suggesting that failure is inevitable and some allowance must be designed into the system. Shingo (1990) also observed that compound variation occurs as a consequence of the number of interfaces and if the interfaces are reduced, then it follows the variation can be reduced. In this manner he is implying a reduced number of handovers, and multi-skilling of staff to do more at any point in the flow process. The use of multi-skilling and 'one stop' care or service provision was considered important and again duly accepted as a means of testing improvement activity. Spear and Bowen (1999) also note the importance of this issue and propose it is important to design clear interfaces, not just related to the technical system, but also associated with the social system to reduce the impact of natural variation in activity (Deming 1986). Clear interfaces therefore suggest the improvement process will lead to better clarity of roles and boundaries between systems and sub-systems.

Shingo (1990) also contributes to the understanding of flow by proposing it is impacted by the size of a production batch (often determined for organisational efficiency[30]) and how this can result in excess capacity. Shingo asserts that where excess capacity for the preceding step is greater than the current task/step then there will be a delay/queue (imbalance) forming at the current task/step. The solution, in addition to the idea of balancing and clear routes of transfer of products along the process, is the reduction of batch size and the increased frequency of production. Additionally, the issue of variety is managed through the idea of adding this into the design of continuous flow and is often referred to as mixed model production. This deviates from existing OM thinking, but enables flexibility through closer linkages of capacity and demand. The idea of mixed model production has potential to satisfy the needs of the NHS to accommodate all presenting demand types. Counter intuitively, continuous flow increases the available capacity of the factory to enable the inclusion of additional work and hence make it higher performing by achieving more with the existing resources (increased throughput).

[30] To ensure the sub-optimal return on machines usage, that is in turn, disconnected from customer demand.

Shingo (1990) detailed a new design approach and new rules to move towards balancing the sub-system in a process to ensure high performance. Yet Ford (1926), at his 'River Rouge' plant had sown the seeds of these idea through achieving flow of work through the principle of taking the work to the man, not the man to the work. This underlies the plant's design, where the solution was a conveyor, but it was stressed that a conveyor was only one way that this could be achieved (Sprague, 2007). The absence of direct reference to the social system in this early work may have been more a reflection of the now espoused pattern of addressing the production system first (Ulbo de Sitter et al. 1997), or that the underpinning learning element of Plan, Do, Study, Act (PDSA) and quality circles were embedded in the organisational design and the implicit assumptions were that these would enable further refinement of the principles described, rather than an imposed solution (Monden 1983).

Schonberger (1988) proposed that stock turns (a measure of flow) is a good systems measure where an increase in stock turns automatically means the sources of variation are being reduced: both internally to the organisation, and to the value chain[31]. Stock turns also provide a measurement of the increase in demand, enabled through the system design. Similarly, the idea that waste is a constraint to capacity is also embedded in the approach to organisational design. Ford (Ford 2003), as far back as 1926, noted that waste *'...is not something, which comes after the fact. Restoring an ill body to health is an achievement, but preventing illness is a much higher achievement. Picking up and reclaiming the scrap left over from production is a public service, but planning so there is no scrap is a higher public service' (Ford, 2003 (p.113) in Sprague, 2007 (p.227).* While his comments were an illustration for manufacturing, the issue of prevention is well made for this thesis. Thus any improvement that reduced such errors would be considered a means of higher performance.

The combination of design considerations and improvement targets for better flow performance is contained in Table 3.11

[31] Assuming that (1) the mix of products manufactured remains consistent over time (or in healthcare, case mix) and (2) there is increasing or unsatisfied demand.

Table 3.11 Features of Failure Capacity & Demand which effect flow, effectiveness, efficiency and responsiveness of a whole system (Literature Review)

Type	Description	Design Remedy	Possible Measures	Authors	Healthcare Authors
Long length of elapsed cycle time (demand in vs. demand out).	The longer the elapsed cycle time, the more the management need for inventory/queues as a control technique.	Continual focus on reducing the elapsed cycle time to reduce the inventory/queues and retain a line of sight to actual demand. Question if steps are necessary to product or service. If yes, clarify and design a simple interface.	Reduce mean and deviation of elapsed cycle time.	Shingo, 1990; Spear and Bowen, 2005.	Murray, 2000; Silvester et al. 2004; Esain et al. 2004; Berwick et al. 2005; Fillingham, 2008; Allder et al. 2010.
Process delays or waste.	The difference between the operational time for a single cycle and the elapsed cycle time.	Continually focus on the delays in the first instance, rather than the operational time. Described as 'Waste' by Ohno.	Trend to reduce the difference between the operational time for a single cycle and the elapsed cycle time.	Shingo 1990, Womack and Jones, 1996.	Murray, 2000; Esain et al. 2004; Fillingham, 2008.
Unbalanced steps.	Steps in a process may have different times/batch sizes etc. Aiming to achieve flexibility to subsequently increase variety.	Reorganise from specialist to multi-skilling. Where possible, balance the steps through levelling and synchronisation (coordinating starting and finishing times).	Parallel lines over time for demand in and out (stability). Measures of utilisation at sub optimal points will be counterproductive.	Shingo, 1990, Monden, 1983, Towill, 1999, Drew et al. 2004.	Murray, 2000; Esain et al. 2004; Spear 2005; Allder et al. 2010.
Failures which amplify imbalance.	Failure points in the process such as defects against standard, staff absences, equipment breakdowns, delays to compensate for setup changes (batching), etc.	Focus on prevention using quality techniques.	Task level analysis of points of failure (run charts for trends).	Shingo, 1990; Womack and Jones, 1996.	Esain et al. 2004; Massey et al. 2009.

Type	Description	Design Remedy	Possible Measures	Authors	Healthcare Authors
Sub-optimisation.	Optimising the parts will potentially cause imbalance and amplification.	Focus on balance of products as they flow through the system rather than point efficiency. Compressed layout to flow patient not staff. Different layouts for different segments of demand.	Do not measure the activity of machines and staff, the consequence behaviour can add to the imbalance of the system. Rather, measure the flow (pace) of products/service through the system.	Towill, 1999; Womack and Jones, 1996; Proudlove et al. 2008.	Gemmel and Van Dierdonck, 1999.
Complex Material Flow.	The more complex the material flow, the less efficient the OM system.	Focus on the least amount of variety in materials used (e.g. don't use three types of cleaning fluid for one task). Simplify material delivery processes to be close to the point of use.	Design for manufacture/service to reduce parts/materials to deliver product or service. Where possible deliver to line rather than to store.	Towill, 1999; Shingo, 1990.	Esain et al. 2004; Towill and Christopher 2005.
Industrial Dynamics.	The batching rules for re-ordering of materials can amplify the 'process delays'.	Reduce batch sizes, move towards 'pull' systems which do not rely on forecasting and rules (educated guess work) to linking real demand to work pace where ever possible.	Design in equal size batches measure reductions across the system over time. More towards decoupling forecasting and replace with a means of responding to direct demand – measure this i.e. day by the hour/kanban etc.	Monden, 1983; Towill 1999.	Gemmel and Van Dierdonck, 1999; Institute for Healthcare Improvement, 2003.

Type	Description	Design Remedy	Possible Measures	Authors	Healthcare Authors
Connectance.	Impact of change on one sub-system to other sub-systems.	Use of PDSA cycles to evaluate intended and untended consequences, Bounded Chaos – small scale test of change.	Study part of this cycle part of management review.	Monden, 1983; Towill, 1999; Jenner 1998.	Walley and Gowland, 2004; Fillingham, 2008.
Failure in satisfy demand first time.	Failure points in the social system which lead to representation of demand.	Evaluate measurement of demand to establish if new or repeat (and why). Information at the source. Immediate rather than time delayed.	Demand which is new, demand which is repeat (due to satisfaction and/or dissatisfaction). Look for the themes in repeat demand due to not right first time).	Monden, 1983; Weick, 1995; Jenner, 1998; Seddon, 2005.	Berwick, 1999; Walley, 2003a; Fillingham, 2008.

Source: Author

One of the major problems with OM research and the healthcare sector in particular, is that of a poor understanding of flow processes (Radnor, 2006) and how sub-systems (which combine to form supply chains and end-to-end pathways) are managed and function (Fillingham 2008). These represent the same OM issues but on a higher level of the systems hierarchy, and as such, the researcher accepted that the issues at the sub-system (department or team) level would be present at the full EOC and end-to-end levels.

These issues are summarised as imperfections and differences between capacity and demand along a pathway, with information channel distortion which generated unnecessary activity (Forrester 1958). This has become known as the 'Forrester effect', 'demand amplification', the 'Flywheel effect' (Houlihan 1985) and 'Bullwhip effect' (Lee et al. 1997). These issues are largely the result of poor, or time lagged communication systems and they act negatively to slow flow or create confusion in the co-ordination of the system.

Seddon (2005) also exposes problems with system-level demand management which he calls value demand and failure demand. His work in call centres illustrated the existence of demand which is not satisfied when first presented (failure demand). The reasons for this are many, but include measurement systems (feedback loop) which drive behaviour optimal to the worker (social system) rather than that which is optimal to the customer. It relates to failure on the part of the worker to do something. The consequence of this inaction is the amplification of demand. This is the inverse of Porter's (1985) value chain concept which was used to understand how functions interrelate to provide customer value. A value chain being those processes steps within and across organisations which primarily deliver customer value and those steps which are support activities. This is often known as 'end-to-end' in healthcare (Burgess et al. 2009) where treatment of support processes (Fillingham 2008) is either ignored or separated into 'factory like' in its description (Branado de Souza 2009). Failure as defined by Seddon (2005) did not feature in Porter's (1985) work, nor in the discussion regarding end-to-end processes in healthcare. In this manner, greater information transparency and movements of roles to

reduce time in decision making were also considered key elements of this study and potential outcomes of an improved state of team performance.

The researcher therefore accepts changes in structure to dampen information distortion or reduce reaction time were tests of the social system roles necessary to meet the needs of the environment that the system serves. Furthermore, it has been suggested that '*the very purpose of the hierarchy is to prevent information from reaching higher levels. It operates as information filter and there are little waste baskets all along the way*' (Mintzburg and Quinn 1991). To improve the flow of information to managers (feedback) and in pursuit of better performance, one strategy has been for organisations to reduce the layers within the hierarchy, in order that decisions could be made more quickly (Suzaki 1993). This feature of the improving STS is congruent with multi-skilling and a reduction of dependency on specialist skills. It does, however, present a threat to the installed management system.

Flow, which is to be examined in this research, can therefore be defined as the balancing of sub-systems to optimise the whole, akin to the concept of continuous flow discussed by Shingo (1990). Two key factors, capacity and demand, are central to achieving flow. These two factors connect the organisational system with the outside environment. More explicitly, it is the impurity of these two factors plus the strategies for removal or management action which is sought to be better understood through this research. These concepts will be referred to as failure capacity and failure demand. The features detailed in the text above are summarised in Table 3.12. It is these features which the research will test to establish if replication of techniques from OM and LT can help evaluate and redesign sub-systems in healthcare, to deliver high performance.

Table 3.12 summarises the main performance objective measures as presented in the OM literature and the associated STS system design themes.

Table 3.12 Measures of input-process-output-feedback flow for high performance[32]

Measures from Literature related to Patient Flow	Level of measurement in the system	Authors
Demand In to System	Input - Whole System	Walley (2003a), Laing and Shiroyama (1995), Silverster et al (2004)
Failure Demand. Not satisfied first time	Feedback- Sub-system	Seddon (2005)
Output from System	Output -Whole System	
Cycle Time	Process-Sub-system	Shingo (1988), Towill (1999)
Process Delay: Defect against Standard: Staff Absent: Equipment unavailable.	Process – Task: Process – Sub-system: Process – Sub-system.	Shingo (1988), Rich (1999), Massey et al. (2009)
Batch Size Balance	Process – Task Process – Sub-system	Shingo (1988), Forrester (1958), Houlihan (1985)
Mixed Model/Economies of Scope	Process – sub-system	Shingo (1988), Esain and Rich (2006)
Material Flow: Variety: Delivery steps away from point of use.	Process – Task: Process – Task.	Towill (1999)
PDSA (Study Outcomes): Intended: Unintended.	Feedback - Sub-system: Feedback – Sub-system.	Deming (1986), Walley and Gowland (2005), Esain et al. (2010), Towill (1999)
Stock Turns in production (for service increased throughput with no additional resources)	Feedback - Whole system	Schonberger (1988)

Source: Author

[32] The purpose of translating these measures is to provide a range of technical indicators of healthcare system performance. These measures were duly integrated into the methodology so as to assess what areas of technical improvement had been achieved by informants during the study.

3.5.6. Supporting Flow Management

Commonly cited 'management' principles and practices of the lean STS approach include:

- policy deployment (Akao 1991) and the establishment of stretch performance objectives;
- cross-functional teams (Dimancescu et al. 1997), self managed operating teams that are empowered to make changes (Maidique and Hayes 1984) based upon a pursuit of customer and total quality control (Hayes 1981), better skill sets (Graupp and Wrona 2006);
- cellular working: where demand is segmented, teams can service a range of products/services (Shingo 1988);
- at the heart of the system is a keen attention to problems solving, and learning how to improve systems (Bicheno and Holweg 2009, Esain et al. 2010, Rich et al. 2006, Walley and Gowland 2004).

Table 3.13 reviews the main management aspects of a highly performing flow system.

Table 3.13 Features of a high performance system

Feature	Authors	Assumptions
Continual Quality Improvement	Schonberger (1982)	Rejecting the notion of 'acceptable quality levels'.
Quality as the responsibility of the worker	Schonberger (1982)	Quality as the responsibility of the worker rather than an external function
Defect Prevention	Schonberger (1982)	Prevention of defects rather than inspection of selected random lots
Visual Quality Measurement	Schonberger (1982); Walley and Gowland (2006)	Visual, simple & understandable measurements of quality for all. Linking defect prevention with measurement feedback
Systems Barriers to avoid defects	Schonberger (1982), Hayes (1981)	Measurement devices to enable prevention of quality defects occurring
Economies of scope	Hill (1991), Esain and Rich (2006)	Development of expertise in repetitive manufacture through economies of scope, rather than economies of scale to leverage efficiencies of the manufacturing system

Feature	Authors	Assumptions
Real time feedback for local planning and flexibility	Schonberger (1982)	Rejection of predetermined rule based computer planning models e.g. Materials Requirements Planning (MRP) in favour of rapid feedback manual systems enabling real time linkage with customer demand e.g. Just In Time (JIT)
Task repetition one at a time (or multiples of one)	Schonberger (1982), Hayes and Wheelwright (1979)	Correlation between task repetition and higher quality and productivity outcomes. Rejecting the Economic Order Quantity (EOQ) rules around set up time as not taking into account impact of poor quality, impact on worker motivation, etc. Indeed smaller inventories which resulted in awareness of the source of delay and error. Improvement in quality and productivity in turn make the product(s) more attractive to consumers, which can therefore increase market share. Note while Schonberger (1982) describes this repetition in terms of high volume of the same task, later this was deemed to also reflect repetition of common tasks through such techniques as group technology. In part, enabling the idea of mixed model production.
Job protection	Hayes (1981), Radnor and Howleg (2010)	If there is increased demand, the outcome of one piece flow, if operationalised, has the added benefit of released capacity as a consequence of improvement. The deployment of this newly acquired capacity to satisfy increasing demand, enabling job protection and increased productivity through cost per item reductions.
Segmentation	Schonberger (1982), Parnaby (1988), Burbridge (1975)	Understanding and challenging the way in which consumer demand may be satisfied in terms of operational design.
Group Think	Hayes (1981), Schonberger (1982), Maidique and Hayes (1984), Spear and Bowen (1999)	Focus on co-operation, dedication, harmony, and group think discussion to resolve problems. Founded on clarity of work links (clarity of before and after tasks). Leading to better bonds between workers and timely feedback loops.
Short interval material and information cycles	Schonberger (1982), Hayes (1981)	Rejecting large order quantity as a means of cost reduction (economies of scale) in favour of small lot availability at the point of need and related to the pace of customer demand. Augmenting or replacing feedback loops of performance with short interval information feedback for the purposes of improvement.
Quality Training	Shingo (1988)	Building the capacity in both the underpinning assumptions of total quality control, and the means by which to apply the ideas in practice.

Source: Author

From the literature review, it is clear that most studies in manufacturing and recently in healthcare, have focused on the technical design of an OM system and here lies a gap in understanding that is longstanding and well recognised. The findings of the Institute of Personnel and Development (IPD) studies, reflect this issue (Kinnie et al. 1997, Rees et al. 1997). The case-based surveys were conducted concerning the emulation of lean HRM practices and found *"...the term 'lean organisation' was being used to describe a plethora of activities and processes. This was further complicated by the extent of*

change apparent in UK organisations at that time. It was apparent that organisations were using the same tools to achieve very different results and it was difficult to differentiate between cause and effect or to identify typical examples of organisations where lean techniques had been applied in their pure forms defined in the literature. Despite the considerable body of work in the area only a small proportion discussed the impact on employees or the 'human dimension' of lean techniques and systems and even less considered the role of the personnel and development function in both their design and implementation" (p.2).

Few studies have focused on this aspect of the operations system in healthcare, yet the criticisms found in the manufacturing literatures are relevant. These criticisms concern the ability to translate Japanese working practices to the UK environment and to non-automotive sectors (Ado 1994, Delbridge 1998, Walton et al. 1994). The process of emulation is regarded as largely unproblematic despite no evidence in the literature concerning the stages through which to achieve 'high performance' (Schonberger 1986, Storey 1994, Suzaki 1993). Kast and Rosenzweig (1985) demonstrate this 'unproblematic' approach and argue most Japanese HR practices were originated in the West. They highlight again 'fit' over culture, stating *'There is nothing secret or magic about the productivity improvement programs ...or the measures of productivity that* **[the Japanese]** *employ. In fact, most of the programs and measures were developed in the U.S. and subsequently borrowed by the Japanese ...What is unique about the Japanese system is not the ingredients or pieces that go into the system, but how the pieces are put together. Productivity is like a jigsaw puzzle – all the pieces must be fitted together before the entire picture can be seen. Japanese companies seem to have mastered the art of putting together a workable productivity system'* (p.601). In this manner, the application of a lean improvement methodology to the healthcare setting rests upon an effective OM design and a process of aligning activities. Further, it has been argued (Goss et al. 1993), lean methods are *"...organisational practices whose fundamental "genetic logic" can be successfully inserted into another society and can then begin to successfully reproduce in a new environment. In this sense, the system is independent of Japanese culture and society"* (p.8).

The latter concerns the ability of staff within a system to learn how to improve it (Pedler 1997). Learning how to improve is a critical element of STS and modern OM models of high performance. Learning organisation theorists present three levels of learning which commences with a reactive and individual management approach to problem solving and reaction to events. This is the typical status of managers in operations systems (Hill 1991). At stage two learning, teams of managers and their subordinates learn how to improve systems and reduce system noise (how to do things better). Finally at stage three, the learning process is organisation-wide and involves a process of learning how to do things differently (questioning the existing operations system design). Given the criticisms of the healthcare system as being empowered to change, but not knowing what and how to change (Maddock 2002), this aspect of high performance organisations is important in understanding whether teams sustain the improvement process and learn how to change systems. The researcher duly accepted the need to teach teams how to visualise systems, in order for them to engage in improvement and also to use the learning organisation features as a means of assessing whether this 'sustainable' capability had been created as a result of an intervention.

Operations authors are, however, divided when it comes to change management and the processes that lead to learning. Most authors propose models of continuous improvement (small changes and adaptations – see Imai 1986), whereas some prefer a process-based form of BPR (Brown et al. 2001) and others propose a more extreme form of intervention. The latter is known as kaikaku (Womack and Jones 1996) or Rapid Improvement Events (RIE) (Fillingham 2008) and is a radical and short-term sharp shock, as a team of staff conduct an improvement blitz within a system. The learning literature suggested a gap in understanding how a change process should begin, and how a standard diagnostic method could be used to begin the cycle of learning and improvement. Such an approach is conducive with Senge's (1990) calls to create a common mental model of change and improvement. These issues were seen as both a means of contributing to the body of knowledge by developing such a method for healthcare improvement, and secondly for understanding how 'change teams' sustained/spread or otherwise. The learning organisation therefore completes the socio elements of a service system.

3.5.7. Flow In Summary

Thus far the concepts associated with the management of continuous flow include throughput, cycle time, variation and capacity. These concepts, it has been argued, are well understood in the field of manufacturing OM, but are less well defined in the healthcare sector where demand for services is segmented by health condition rather than common technological/process steps (Esain and Rich 2006). Studies in healthcare seem to focus on either the relationship between capacity and demand (Lodge and Bamford 2007, Silvester et al. 2004) or forecasting demand (Murray 2000) or more rarely patent satisfaction (Balle and Regnier 2007).

The poor definition of OM (which will be explored in later sections of this chapter) implies healthcare systems are not designed using OM principles and features of high performance and by implication, the system is not designed to flow. Without flow it is difficult for operations managers to distinguish abnormality, delays and errors – also flow is an outcome of an OM design and results when high quality, delivery and information (planning and feedback) systems have been implemented effectively.

It has also been argued that healthcare systems include both direct clinical activities and support activities that must come together to ensure patient flows in a timely manner. In this respect, a study of a healthcare Trust should include both direct and indirect activities and how these systems develop to result in better flow of the service that they provide. If the mastery thesis is to be believed, then the model implies all interventions to improve flow performance will commence with stabilising the system and improving service quality.

In the context of this research, a gap exists in the OM body of knowledge that relates to whether hospital systems share similar properties to manufacturing OM systems in the manufacturing sector. The important difference at this stage is not to study the end-to-end patient pathway, but to assess improvement activities that result in better flow performance. The broad gap in the body of knowledge is therefore the management of the improvement process in the context of an OM system and healthcare organisation that

is not profit motivated and where time compression will not result in profit[33]. Whilst issues will arise through the research relating to these flows of finance, these will not be explicitly researched other than how these specifically relate to the research questions in this thesis which particularly focus on the flow of the patient during an EOC. The cycle of cash management is not central as the organisation is not seeking profit as a means of driving choices in organisational design, hence falls outside the remit of this study.

This section has demonstrated how the study of information flow related to feedback loops, process delays and design choices should be examined, but in the context of the EOC to ensure patient flow and the STS. Feedback loops which may be of interest can be at task level, sub-system level, whole systems level (organisational or linking organisations). In this regard it is important to gather views from these levels of the organisation to inform the research and this has influenced the selection of informants.

3.5.8. Improving Existing Systems: Adaptation Not Adoption

Where OM systems exist, the main issue that impacts on service performance improvement is that of adaptation of systems and not adoption at 'brownfield' sites. The emulation of manufacturing systems is associated with adaptation of existing processes, rather than establishing entirely new systems and just adopting a new model. This is an important consideration and a criticism that has been levelled at many healthcare studies to have looked at merely the hypothetical adoption of manufacturing concepts, to service improvements in the healthcare setting (Radnor et al. 2006). Adaptation implies learning about improvement. A high performance organisation has been directly linked with effective learning processes (Senge 1990). For the purpose of this study, the adaptation process is associated with emulating lean assumptions.

The need to determine the degree to which adaption or adoption of technical principles for LT is relevant in SCO, and more explicitly, relevant to achieve performance outcomes (such as government targets). A model will be proposed (later in this thesis) to assist management in balancing the system under review. The research questions are based firstly on the premise that current SCO systems are designed against the inflexibilities of

[33] However, this may result in savings.

the Fordist mass production model, and secondly, on an expectation that the adoption of LT concepts (Paez 2004) will enable the socio-technical aspects to challenge practices and performance, enable organisational redesign and in turn, achieve better customer (or internal customer) satisfaction (Radnor et al. 2006).

STS and Lean has been contrasted (Dankbaar 1997, Niepce and Molleman 1998), presented as overlapping (Mathews 1997) whilst Paez et al. (2004) contented there is no difference. Mathews (1997) argued that STS failed in one important aspect i.e. STS is not appealing to the practitioner. He also noted that economic imperative discussed in STS was advanced in the LT approach through the addition of business effectiveness. STS theorists, as previously reviewed, place a high premium on effective adaptive skills which implies that high performance is not a static level of achievement, it evolves as with all aspects of an effective STS organisation (Pasmore 1988). These features are also embodied in the LT approach (Womack and Jones, 1996).

Schonberger (1982) proposed that the real differentiator of high performance is the break with the closed loop, one time performance increase in productivity. High performance operations design establishes current performance but expects that there will be a continual sequence of compounded improvements and hence provide an amplification in productivity performance. More recently, authors have added that techniques of LT are the aspects of high performance which are observable, whereas the hidden components required to enable high performance rests with the integration of OM, the management system and the social system through the mind sets and behaviours of staff in the organisation (Drew et al. 2004, Rich et al. 2006, Hines et al. 2008).

Shingo (1988) warned that the techniques being discussed relating to high performance operations would not provide results if purely adopted in new contexts. He proposed that the underpinning concepts (and therefore the implications of their application) needed to be understood to really capture the amplification of performance being sought. Many of the underpinning concepts have been defined within the context of STS. As such, the implementation of improvement activities, be they TQM or lean, requires the parallel development of a learning organisation.

3.5.9. Defining Service Organisations

As early as the 1960s Ted Levitt noted organisations should be customer led not product led (Levitt 1960). Table 3.14 sets out the distinguishing features of service operations.

Table 3.14 Distinguishing characteristics of Service Operations and Implication for the NHS

Characteristics	Description	Characteristics as witnessed in the NHS
Intangibility	At the extremes, products are tangible and services are intangible. In reality, the two states are present in both products and services, or bundles of both. The psychological benefits are those considered to be intangible. Intangibles yielding satisfaction directly (insurance), tangibles yielding satisfaction directly (transportation, housing), intangibles yielding satisfaction jointly when purchased either with commodities or other services (credit, delivery) (Regan 1963).	Tangible aspects – diagnostic tests, medication, catering. Intangible aspects – diagnostic decisions, dignity whilst being treated or being cared for.
Perishability	A service is not a physical thing and hence cannot be stored. It is a process which is consumed when required, otherwise it will perish. Similarly, unused resources cannot be reused. The relationship between demand and capacity in this situation becomes more sensitive. Where demand and capacity meet (so are balanced), the effectiveness of the organisations can be achieved. Otherwise losses occur through under or over use of resources (Greasley 2009, Lodge and Bamford 2007). It could be concluded that services cannot use 'safety' stocks of materials to buffer fluctuations in demand (Bitran and Lojo 1993). Queues may replace stock as a means of managing fluctuations in demand, capacity or a combination of both. Further strategies could be to pre-process tasks (filling in forms prior to receiving the service), or to explore differentiated pricing e.g. to simulate demand at quite times.	Unplanned Care – A&E could be classified as perishable as a consequence of demand fluctuations. Planned Care – Surgical Pre Assessment/Operating Lists etc. cannot reclaim capacity if patients 'Do Not Attend' (DNA). The NHS mantra stops the use of pricing strategies to influence demand patterns.
Heterogeneity	Relates to the behaviour of services delivered by people and the consequential variability which may arise particularly when related to consistency of encounters with service, particularly the quality of such encounters.	Variety of treatment routes
Simultaneity	This is where services are produced and consumed at the same time. Not all services are consumed at the point of use and exhibit this characteristic. Where services are simultaneous, either the consumer or the providers have to travel to receive its benefits. This results in services of this nature often being geographically limited. Therefore the operational design of such services will need to have many locations if it is intended to achieve increased market share. Technology may have an impact on this characteristic e.g. call centres.	Technological solution in the NHS - NHS Direct

Characteristics	Description	Characteristics as witnessed in the NHS
Transferability	The steps which together deliver services are often similar, while the objective of the service may be different i.e. paying a bill and having your child's face painted seen unrelated yet the steps which the customer goes through is similar i.e. queue, transact, receipt. Hence customers can transfer expectations from one service. The implication is that managers need to be cognisant of development in their own sector and also those in other areas.	Comparison to improvement to other sector service waits. Comparison to the hospitality sector
Cultural Specificity	Relates to the experience that cultural influences have on expectations. On the one hand, the familiar may be reassuring and comfortable for customers; on the other hand, the experience of new forms of service from other cultures (e.g. through travel) may be desirable, such that variety is also appropriate.	Outsourcing elective surgery to European Hospitals

Source: Author

A further difference highlighted by Chase and Apte (2007) was that services are less likely to benefit from economies of scale as they are more labour intensive and suffer higher degrees of variation in quality (Heterogeneity). Esain and Rich (2006) discuss the possibilities of segmenting demand by adopting economies of scope as a means of achieving a greater balance in the use of available capacity and time which patients spend while in a hospital system. They suggest the application of group technology (Burbridge 1975). The general lack of application of group technology in healthcare belies underlying issues of the hospital system design and its implicit objective of not only being a delivery system, but also a teaching system.

The economic emergence of service from reactive to proactive also has impact on the UK healthcare provision which was designed in 1948 (in one set economic conditions) which are different to today's economic expectations. Drawing on STS, a modern high performance organisation must provide a balanced and timely service to patients which satisfies the time scarcity of their lifestyles. More fundamentally, the STS model provides a way of framing the study of healthcare organisations as they adapt technology and working structures needed to deliver at a higher level of performance, and represents an under researched gap in knowledge (Johnston 1999, 2005).

3.5.10. The NHS Performance Improvement Imperative

UK public services have been perceived as not having the same drivers for change as private sector in general or manufacturing in particular. Historically, this partly stems from public services lacking competition, the absence of shareholders and the lack of pressure to achieve profit margins, return on investment and customer satisfaction.

The Public Sector in the UK has, over the last two decades, come under increasing pressure from successive Governments to improve the service provided to its customers. In particular, this is in connection with increasing costs, countered by a drive to become more accountable, the perceived need to improve efficiency and the improvement in responsiveness to customers (Oliver 2005) similar to the pressures experienced in the Private Sector shown in Table 3.15 (Suzaki 1993). In response to these pressures to change public services, organisations have sought inspiration and innovative ideas on how these aims might be met by examining practices adopted in the Private Sector.

Table 3.15 Change in environmental factors over time

	Past	Future	Reason for change
Predictability in business	Predictable	Unpredictable	Fast rate of innovation
Stability in people's values	Stable	Changing	Fast pace of modern lives
Profile of customers	Mass	Diversified	Diversified individual tastes
Importance of employee skills	Low	High	More complex jobs
Pace of progress	Periodic	Continuous	Contributions from more people
Profile of managers	Directing	Leading	Higher dependence on people
Management systems	Results oriented	Process and results oriented	Assurance is gained from managing the process well

Source: Suzaki (1993)

Governments portray that the era of 'mass production' in relation to public services is over (Department of Health 2001, 2004, Welsh Assembly Government 2006a). To meet what people want, requires services to be customised to the needs of the individual, whether patient, pupil or job seeker. This reflects the thinking of Suzaki (1993) and is further supported by Hammer (1996) who asserted that traditional systems that depended on segregating wisdom and decision making cannot possibly offer the speed and agility customers demand.

Public services were designed and organised by subject and professional discipline, e.g. Economists and Statisticians working alongside administrators in the case of the Office for National Statistics. This design was intended to centralise expertise on discrete autonomous areas. A design considered to be appropriate to enable the effective development and implementation of government policy. Instead, these organisational designs facilitated public servants often without thought of the convenience of the customer (Byrne 1998).

The pressure to improve customer services through the best value agenda NPM (as discussed in Section 2.1.2) across the public sector resulted in the assessment of alternative approaches to organisational design, which could deliver proven, results (mainly cost) orientated alternatives to what was in place. Public services were influenced not only by manufacturing, but also the emergence of the concepts of service operations which are discussed in section 3.5.11.

3.5.11. Service Operation definition and potential differences vs. similarities to manufacturing and production

Scholars have more recently devoted considerable attention to understanding the dynamics of OM in service industries (Allway and Corbett 2002, Chase and Apte 2007, Levitt 1972, 1976, Schmenner 1986, 2004, Silvestro et al. 1992). While many of the principles of OM apply to the service domain as well as the manufacturing domain, there are some which need different emphasis and some which are more or less relevant (Bitran and Lojo 1993). The Schmenner et al, (1986) matrix compares dimensions of labour intensity against interaction and customisation, while Silvestro et al. (1992) have developed service definitions[34]. 'Professional services' is the definition which is considered to fit with healthcare (Holm and Åhlström 2010). The matrix has subsequently been updated by Schmenner (2004) to reflect a means of explaining productivity using relative throughput time against the degree of variation exhibited.

The growth of interest in service (as opposed to profession) was as a consequence of the change in its perceived value from poorly paid, unskilled servitude prior to the 20th

[34] Professional, Service Shop and Mass

century, to a significant force of economic activity during the 20th century. In the UK, the numbers of workers employed in the service sector increased from just under 50% in 1960 to just over 75% in 2004 (Source: US Department of Labour; in Heneke and Davis 2007). Heneke and Davis (2007) describe the evolution of service types starting at infrastructure services which includes healthcare and moving through five further stages to the Service Experience (Table 3.16). Customers want more than just good service, they want to be presented with holistic solutions to their problems (Womack and Jones 2006) and may be prepared to pay more for the added value proposition e.g. Starbucks chain, with comfortable seating, good quality coffee etc. packaged into a memorable experience for customers.

Table 3.16 Change in emphasis of services in an economy and resulting implications on healthcare in the NHS

Changing emphasis of service as an economy develops (Heineke and Davis 2007)	Description	Changing emphasis of service – impact on NHS healthcare
Infrastructure Services	Population tends to be self sufficient as little or no income for purchased services. A reflection of an agrarian economy.	Healthcare available to those with wealth.
Support Services	Trade develops and support services such as restaurants, hotels and banks emerge to satisfy the development needs.	Improvement in healthcare service is also considered a need (either driven by economic consideration of employers e.g. insurance, or through governments e.g. publicly provides services such as the NHS, or a combination of both.
Recreation and leisure Services	With growth in production of goods, standards of living increase and surplus income is available to both leaders of trade and workers. This is spent on holidays, eating out etc.	The hospitality industry improves its service offering. Users of a free healthcare provider compare the experiences from one domain to the other (e.g. cleanliness of hospitals).
Educational Services	As service provision expands, the workforce moves from unskilled to skilled and demands formalise higher education.	Improves literacy and numeracy of a population which in turn increases expectation on availability of scientific healthcare services.
Time Saving Service	To further increase or sustain a standard of living, longer hours are worked. Consumers look for time saving enablers such as shop- at-home, mail order and childcare.	Use of time becomes a priority. Not waiting is a feature which emerges as a priority for users of the healthcare services. Emergence of new forms of service such as one stop clinics
The Service Experience	Expectations of service moves from being good to being memorable and more holistic (e.g. power by the hour - buying a solution not a product, or buying a lifestyle not a product).	Emerging approach to Long Term Conditions (LTC), etc. Potential link to 'partnership' philosophy discussed in CHAPTER 1.

Source: Author

Analysis of service literature in OM indicates a similar trend to that seen in Pilkington and Meredith (2009) for the overall field of study. The early literature relates to the transference of traditional manufacturing approaches to service, which evolved to a focus on cross-functionality and service quality, and more recently a focus on the services and their strategic importance alongside customer loyalty (Heineke and Davis 2007). Both papers describe a journey of inward focus on OM (micro system) to a focus on the external environment (macro system).

The analysis of the emergence of service shown in Table 3.16 also alludes to a historical pattern of organisational design which needs to be flexible to meet the changes in emphasis for production of services for consumers. Such changes hold some similarity to those of physical production. Academics have explored much of the underpinning thinking regarding movement from bureaucratic organisational design to reflect the relatively stable external environment[35] to more flexible forms[36] (Burns 1963). These organisational design change are often attempted by managers in response to the external environment (adoption), whist still retaining old assumptions primarily due to the absence of specific education and training e.g. in healthcare OM has not been part of the managerial or clinical circular (NHS Institute for Innovation and Improvement 2008). This research should help understand the consequences of the mix of influences on organisational design.

3.6. OM and UK Health Service (NHS)

Service operations as a field of academic study is contended to be in decline according to the citation and co-citation analysis undertaken by Pilkington and Meredith (2009). The imbalance between papers published in operations journals regarding service, against those focusing on manufacturing, has a disproportionate emphasis on manufacturing, which only accounts for a relatively small part of the economy (Slack et al. 2004). Lane, 2004, undertook a similar study of the volume of journal papers on operation management in healthcare and hospitals. The size of the workforce in this sector was one of the motivating factors, alongside the pressures for improvement in expenditure against

[35] Known as 'Mechanistic'
[36] Known as 'Organic'

a climate of increasing demand for service and dissatisfaction in outputs, such as medication errors. The review focused on advanced Organisation for Economic Co-operation and Development (OECD) countries. Of the 10 top ranking journals reviewed from OM and healthcare management, from 1993 to 2003, several themes of focus have emerged. The first involves studies into the design of decision support systems related to evidence based medicine; the second relates to the design for medical information systems. The Brandao de Souza (2009) systematic survey of literature for LT in Healthcare, stated that publication in this field starts in 2002[37] and grew annually from thereon. Similar conclusions were reached in a review of LT in the service sector, but this did uncover one article published in 1994 (Holm and Åhlström 2010, O'donnell 1995) due to their different search criteria. The narrow nature of these studies may limit the volume and chronological assertions as text such as the work at Shouldice Hospital (Heskett 1983) exhibits the principles of lean. Similarly, the reporting of high performance approaches may be housed in the change management literature, in particularly BPR (Buchanan 1998; McNulty and Ferlie 2002, etc.), which is also absent in Brandao de Souza (2009) review. Further deficiencies are of academic publications regarding Berwick and the IHI as well as that of KP and Ham (1999). These deficiencies belie the lag of academic publications versus practitioner interest, the early hesitancy to use manufacturing based language, etc. A further systematic literature review of peer reviewed articles on LT and 6σ[38] identified 19 papers[39], 9 of which were related to LT (Vest and Gamm 2009). This review concluded that rigor was generally lacking in studies of implementation leading to a gap in knowledge. A view reinforced by Mazzocato, et al. (2010).

With the exception of the work of Vest and Gamm (2009), little cross referencing from healthcare management literature to OM was noted. Lane (2004) postulates that OM 'models and theories lack validation in the service contexts'. This assessment is in contradiction to the historical review of service operations conducted by Heineke and

[37] Search criteria such as - JIT, Toyota Production System (TPS) and other literature such as quality, systems dynamics, etc. were excluded.
[38] Searching Medline, Web of Science, ABI/Inform, Cochrane Library, CINAHL and ERIC.
[39] Articles were included if they: appeared in a peer-reviewed journal; described a specific intervention; were not classified as a pilot study; provided quantitative data; and were not review articles.

Davis (2007) which indicated that scholars used the healthcare environment to test their theories. Examples are the testing of queuing theory in obstetrics (Long and Feldstein 1967), and scheduling related to nursing levels against expected demand (Abernathy et al. 1971) etc. Hence the scope of this research aims to address the gap of theory building in the healthcare setting rather than testing.

Measures of input-process-output flow may well be new to the sector, given its administrative roots and the layering of strategic choice over time (Gidden 1984)[40]. In the US, the impact of adoption of LT has been tested (Table 3.17) which has acted as a catalyst for healthcare managers who are under pressure to improve their organisations.

Table 3.17 Impact of Lean Thinking

Category	Industry Averages[41]	Virginia Mason[42]
Productivity Improvement	45-75%	36%
Inventory Reduction	60-90%	53%
Space Reduction	35-50%	41%
Lead Time Reduction	50-90%	65%

Source: IHI (2005)

These types of improvement are impressive and given the universal nature of technology and healthcare/clinical practices, it is little wonder that LT (as implemented in the USA) began to attract the attention of UK organisations. The publication by the NHS Confederation (Jones and Mitchell 2006) the benefits that could be accrued using LT and the willingness of the sector to embrace these automotive sector innovations.

These assertions were accompanied by a list of improvement areas that would enable 'high impact' of flow and satisfaction. The set of High Impact Changes (NHS Modernisation Agency 2004), whilst not offering any rigorous methodological justification of Fillingham's (2008) claims that they were evidenced based, nonetheless offer a contribution to the OM literature for improving patient flow. The enablers identified to achieve flow are shown in Table 3.18. Much of the detail is unclear about exactly that which stimulates the high impact, however, the author has made an attempt to assess this in retrospect (Table 3.18).

[40] The notion of structuration – change is seen as an inter-play between human agency and context.
[41] These are summarised results, subsequent to a five year evaluation, from numerous companies (more than 15 aerospace related) Companies ranged from 1 to >7 years in lean principles application/execution.
[42] These results are summarised from 175 Rapid Process Improvement weeks at Virginia Mason Medical Center; source Virginia Mason.

Table 3.18 Ten High Impact Changes for Service Improvement and Delivery

Change No	What	Enabler
1	Treat patients as day cases rather than inpatients	Demand Avoidance (Segmentation)
2	Access to key diagnostic tests (inpatient focus)	Co-ordination
3	Manage variation of patient discharge process	Narrow range - SPC
4	Manage variation of admission process (elective scheduling focus)	Scheduling via prediction of incoming demand on historical patterns, increasing throughput
5	Avoid unnecessary follow up (outpatients focus)	Demand Avoidance
6	Increase reliability of clinical interventions through care bundles	Standards – Training Within Industry, SPC
7	Apply a systematic approach to care for people with Long Term Conditions (LTC)	Patient centred care (case management), Holism, demand avoidance
8	Improving patient access by reducing the numbers of queues	Simplification
9	Optimise patient flow using process templates	Standards and processes
10	Redesign roles and match against skills and competencies	

Source: MA as amended Author

These high impact areas show a strong correlation with time compression and improvement. They further reinforce the gap in the body of knowledge concerning time compression in direct clinical and indirect support processes. The proposals also show the relevance of a socio-technical approach to organisational design to support patient flow.

More recently, a taxonomy for different types of lean implementations has been developed to assess different approaches (Burgess et al. 2009). This research is not intended to test the rigid prescriptions of implementation approaches, rather understand the deeper issue associated with the dynamic STS attributes. In 2009 five English SCO claim a whole system approach to lean implementation[43] (Burgess et al. 2009). It took the lean archetype, Toyota, over 50 years to perfect its lean systems design and yet the belief in the UK healthcare sector is that the majority of gains can be exploited in a matter of years because flow processes stabilise.

Table 3.19 shows the major research programmes in the healthcare environment and it can be seen that most lack a full insight into the design of an OM system (features) and processes of learning/improvement. This review confirms the need for greater depth and

[43] From a sample of 152

a longitudinal dimension to any study. Critically, these studies have ignored the STS tenet that high performance results from an effective OM design matched with an improvement culture/learning organisation approach.

Table 3.19 Methods for healthcare studies into improvement and waiting

Authors (by year)	Research	Respondents	Sampling	Orientation	Focus
Bagust, Place, and Posnett (1999)	Dynamics of bed use in accommodating emergency admissions: stochastic simulation model	Not setting specific	1 area emergency admissions	Positivist	A&E
Kim, Horowitz, Young, and Buckley (2000)	Flexible bed allocation and performance in the intensive care unit	Not setting specific	1 area intensive care	Positivist	ICU
Bowers and Mould (2002)	The deferrable elective patient	District General Hospital Single Organisational Entity	1 area orthopaedics trauma theatre session	Economic	Surgery
Moore (2003)	Capacity Planning – modelling unplanned admissions in the UK NHS	Plymouth Hospitals NHS Trust Single Organisational Entity	One part of the service (unplanned admissions)	Process	Unplanned Admissions
Martin, Sterne, Gunnell, Ebrahim, Smith and Frankel (2003)	NHS waiting lists and evidence of national or local failure: analysis of health service data	Department of Health Quarterly Returns	England Elective Waiting Data	Positivist	Acute Healthcare
Towill and Christopher (2005)	An evolutionary approach to the architecture of effective healthcare delivery	None	Untested	Process/ Supply Chain	N/A
Greenhalgh, Humphries, Hughes, MacFarlane, Butler and Pawson (2009)	How do you Modernise a health service?	Guys and St Thomas's Single Organisational System	3 end to end processes	System	Stroke, Kidney and Sexual Health

Authors (by year)	Research	Respondents	Sampling	Orientation	Focus
Laing and Shiroyama (1995)	Managing capacity and demand in a resource constrained environment	Single Organisational Entity	1 project - orthopaedic outpatients services	Process	Outpatients
Buchanan and Wilson (1996)	Re-engineering operating theatres: the perspective assessed	Leicester Royal Infirmary Single Organisational Entity	1 process flow for elective surgery. Broken into 9 sub-processes 1 hospital	Process	Surgery
Buchanan (1998)	Value of a process orientation	Leicester Royal Infirmary Single Organisational Entity	'The surgical inpatient trail'. 6 main operating theatres, 2 orthopaedic theatres, and 2 day case theatres (over 200 beds)	Process	Surgery
Probert, Stevenson, Tang and Scarborough (1999)	The introduction of patient process re-engineering in the Peterborough Hospitals NHS Trust	Edith Cavell Hospital Single Organisational Entity	2 areas of re-engineering were reviewed – the admissions process and dermatology diagnostics 1 hospital	Process	Unclear
Hill, O'Grady, Millar and Boswell (2000)	The patient care development programme	Royal United Hospitals Bath NHS Trust (Intended Replication but not reported on Surrey and Sussex Healthcare NHS Trust). Single Organisational Entity	39 projects 39 patient focused 1 hospital	Process	Mixed
McNulty and Ferlie (2002)	Re-engineering Healthcare	Leicester Royal Infirmary Single Organisational Entity	6 nested cases 6 patient focused 1 hospital	Process	

Authors (by year)	Research	Respondents	Sampling	Orientation	Focus
Bragato, and Jacobs (2003)	Care pathways: the road to better health services?	Single Organisational Entity – Scotland	2 cases – both orthopaedics 2 hospitals	Process	Surgery
Walley (2003a)	Designing the accident and emergency system: lessons from manufacturing	North Cheshire Lewisham Duel Organisational Entities	2 hospitals A&E process	Process	A&E
Lee and Silvester (2004), Silvester et al. (2004)	Reducing waiting times in the NHS	Breast Unit, City Hospital, Birmingham Single Organisational Entity	1 case	Process (run charts)	Breast Unit
Esain (2004)	Length Of stay (LOS) reduction	Un-named single organisational entity	1 case	Lean	General Surgery
Esain and Rich (2005)	Streaming to improve flow of patients	Un-named Multiple organisational entities	3 cases	Process	Surgical and Medical flows
(Lodge and Bamford 2007)	Capacity and Demand	Diagnostics and Clinical Support Division in One Hospital	Waiting list management for radiological examinations	Lean	Radiology Services
Brando de Souza (2008)	LOS reduction	Elderly Care	LOS	Lean	Elderly Care
Lodge and Bamford (2008)	Waiting times for Radiology	Diagnostics and Clinical support. Single Organisational entity	Waiting list Management	Lean	Radiology Services
This Research (2010)	Patient Flow	UK Integrated NHS Trust. Single Organisational Entity	30 nested cases 10 patient focused 2 acute hospitals and multiple community hospitals/sites	System (Lean)	Mixed

Source: Author

However, some limited case studies exist, but few are UK based, Shouldice Hospital in the US is one such example that demonstrated the application of many OM principles which generated improvement. This case achieved its results before the improvement trends reported by KP and the IHI (Haskett 1983). The case proved how specialisation and standardisation were the mechanisms by which a hernia operation can be replicated. This standardisation of practice allowed study of the operation, which ultimately resulted in a reduction in the number of repairs to the original operation and consequently improved health outcomes, alongside avoidance of readmission and the consequential bed days associated with this. With a reputation of such high quality for health outcomes, the demand from patients wanting to travel to have their operation at this organisation is consistently high.

Another case is the organisational turnaround experienced by the Virginia Mason Medical Centre (VMMC) USA as part of their adoption in 2002 of the principles of LT (Bohmer and Ferlins 2006: Womack and Jones 1996). The whole systems approach and organisational adoption of techniques from a manufacturing source (the TPS) have resulted in this organisation achieving the highest ranking in national quality assessments as well as financial recovery.

These cases are now accredited as the benchmarks for organisational improvement practices in healthcare organisations and as such, dominate citations in the literature. However, unlike the UK environment, these organisations are hybrids – they are profit motivated but they do exhibit features of learning organisations as well as using the lean approach as the central improvement methodology for change.

In summary, the lean system requires careful technical design such that the correct OM choices follow the 4Vs that create a profile for operations systems. The literature also highlights the importance of the social engagement of workers within the system to engage in standardised work, problem-solving and maintaining system flow. These principles are key to the creation of a system that is stable and capable of continuous improvement of service flow. However, there remains a gap – even when the previous

issues have been solved – in the application of change and what processes enable or inhibit improvement/learning.

3.7. Gaps and implications for research questions

Radnor et al. (2006) report gaps of understanding for public sector organisations, in the context of OM, specifically variation of demand, systems thinking and patient flow. This related to work by Silvester et al. (2004) who challenged the understanding of concepts of capacity and demand. Johnston (1999, 2005) highlights the gap in service research between performance measurement and operations improvement.

Little has been written about the need to balance the parts of a healthcare system within an SCO in tandem with the environment, i.e. the dynamic need for organisation design to flex (supporting the idea of spontaneous reorganisation as promoted by STS) to internal and external context. A tendency towards segregation of the technical and the social system has influenced the whole system review which is a gap in the research literature.

The adopt and adapt discussion (Radnor and Bucci 2006) for healthcare to acquire high performance is lacking in practical advice and models to support decision making. This is compounded by the profit motive in the Private Sector which is largely absent in SCO in the NHS. This is further compounded by the lack of in depth whole organisational system studies. Even where such studies exist, the models do not reflect the philosophy of STS and hence testing of existing models is rejected as a research strategy. Instead, a theory building approach is needed to reflect the evolving subject area (Brandao de Souza 2009; Young and McClean 2008).

The preceding discussion supports the relevance and timeliness of research into what enables or inhibits successful improvements, and in which areas improvements can be made. The literature calls for an in-depth study of change so as to inform practice and theory building as opposed to providing a limited account of change.

To date, few studies have attempted to understand the dynamics of improvement and how to improve flow using teams from the healthcare sector. Instead, authors call for improvements and point to the application of lean ways of working by US organisations,

and also highlight the huge improvements achieved by organisations. But the US is profit motivated and close in profile to a private manufacturing business. Whilst the same duty of care exists, the UK NHS organisations can be more complex and potentially lack the necessary commercialism to embrace change and exploit better system flow.

Methodological rigour, drawing generalisations from part systems rather than whole systems, has been lacking in previous studies of healthcare organisations and this is a weakness that must be corrected if credible outcomes are to be achieved. As such, the literature suggests a more theory-building approach needs to be undertaken. This needs to be sympathetic to the many different contexts of OM and sub-systems that exist (from high volume and low variety, to low volume and high variety) as well as clinical and non-clinical process activities. To contribute effectively, any study needs to follow a multiple case replication method, whereby the same process and methods are used to identify what features enable or inhibit improvement. It is this area of OM that offers the greatest learning and advancement of the healthcare field of study.

This chapter has presented the background theoretical literature review and defended the selection of systems theory (and STS in particular) as the most appropriate foundation for this study. The chapter then continued to refine the research problem, and house the study within the OM field of study. OM provides the most pivotal impact on the performance of a system, especially that of a manufacturing or healthcare organisation. The review of extant literature shows many gaps in understanding, and the current level of academic understanding of the management of patient flow within the healthcare system may be described as poor, with some studies lacking rigour.

The trend in OM is to reverse a history of research that has left OM separated from key HRM/OM issues. OM debates, concepts and theories in the 1980s may have been ignored, given the structural impact of managerialism at the time. This research seeks a deeper understanding of OM and organisational management that lead to improvements within a healthcare setting. Theory building is the main intent of this work as well as to provide utility to practicing managers, who are wrestling with the practicalities of changing complex systems. Practices that are well known and embedded in

manufacturing sectors have interest to healthcare professionals (Lane 2004, Pilkington and Meredith 2009, Young and McClean 2008). The interest in new ways of working originates from a number of sources. Most recently, the need for a greater transparency of operations systems for scrutiny, as a result of environmental pressures to reduce costs, greater patient expectations and a general dissatisfaction with the current system (Heineke and Davis 2007).

CHAPTER 4 will develop and defend the chosen research strategy and methodology that has been crafted to answer the guiding research questions and build OM theory.

CHAPTER 4 RESEARCH DESIGN, STRATEGY AND METHODOLOGY

4.1. Ontology and Epistemology

A review of philosophical debate and epistemological issues concerning management research will be reviewed in this Chapter. What is considered valid knowledge and 'how' (through which methods) knowledge will be captured is discussed. CHAPTER 3 has reflected on OM knowledge within the context of healthcare management and exposed many gaps and inadequacies where theory building research is needed. Research design enables justification for closing gaps in academic knowledge. Additionally, a number of significant problems with the current research approach to the healthcare service and a reductionist approach to studying the provision of healthcare were uncovered. This chapter therefore presents the philosophical, methodological, and practical aspects of the chosen research design and clarifies design choices, concluding with limitations and ethical considerations.

Saunders et al. (2003), note that the phrase 'research method' refers to the tools and techniques used to obtain and analyse data. Such tools include questionnaires, observations, and interviews, whereas techniques consist of statistical and non-statistical analysis. These methods are derived from the research strategy designed to meet the key research questions, and how research is undertaken. Philosophically there are no right or wrong methods aligned to a research strategy, rather, methods that are more or less appropriate. Therefore each method has its own strengths and weaknesses depending on the type of research question asked, the control an investigator has over actual behavioural events and the focus on contemporary as opposed to historical phenomena (Yin 1994).

Ontology is concerned with the nature of reality within which there are two critical philosophical perspectives. The first argues that social entities can or should be considered as objective entities, and the second, argues that these are merely social constructions. Objective entities have a reality external to social actors and social constructions built up from the perceptions and actions of social actors. This

philosophical argument has two main and opposing ontological perspectives (Burrell and Morgan 1979):

i) There is one reality and it is observable by an enquirer who has little if any impact on the object being observed;

ii) A reality consists of an individual's mental constructions of the objects with which they engage, and the engagement impacts on the observer and the situation being observed.

Epistemology is, therefore, a philosophy concerned with the nature, origin and scope of knowledge and how we know what we know. Burell and Morgan (1979) suggest the relationship can be established by accepting that knowledge can be viewed as being either objectively knowable or only subjectively knowable. In relation to this, Healy and Perry (2000) conclude that ontology is the reality under study, epistemology is the relationship between that reality and the researcher, and methodology is the technique employed by the researcher to investigate that reality.

Wass and Wells (1994) present a comprehensive account of these competing theories by defining the relevancy of three epistemological viewpoints, namely, positivism, realism and naturalism to management research (Table 4.1). The detail of each perspective will be discussed in Section 4.1.14.1.1. Positivism to Section 4.1.3, but essentially there are three positions along a continuum of the observable to the perceptual. The first position is that of 'positivism' which defends the argument that reality is observable. At the opposite end of the scale, 'naturalism' adopts the perceptual position. The third point, realism, lies between the two and contends the real world contains both the observable and the perceptual.

4.1.1. Positivism

The positivist approach originates from the natural sciences and a belief that only objective 'value free' and empirical evidence of the world are legitimate forms of knowledge (Meredith 1993, Swingewood 1975).

Table 4.1 Research perspectives in business and management research

Epistemological Perspectives	Ontological Assumptions	Epistemological Assumption	Scientific Objectives	Nature Of Scientific Knowledge	Cycle Of Enquiry	Methodology	Type Of Data	Techniques For Data Collection	Bias
Positivism	Ethic 'realist', real world exists independently of subjective consciousness; this latter is irrelevant to explanation; enquiry can converge on reality.	i) Phenomenalism: only that that is objectively observable is valid knowledge; ii) Empiricism: explanation comprises of causal laws inferred from empirical regularities; subjects subservient to definition of knowledge, subjective consciousness is meaningless.	Nomothetic with natural science; abstract from subjective idiosyncrasies to uncover general laws; replicability generalisability.	From hermeneutics, to uncover and explain individual conceptualisation and interpretation of external factors; internal validity and ecological validity.	Deductive: Abstract theories; Operational hypotheses; Observations; Inference using statistical tests 'predictive'.	Nomothetic: e.g. census or sample survey; quasi experiment, operationalism; outsider looking in; extensive and general.	Quantitative, systematic and precise; directly observable and measurable.	Self completion questionnaires, structured interviews, simulation, use of secondary data.	Concern to account for measurement error and missing data; use of statistical controls.
Realist	Real world exists independently of subjective consciousness but experience of the real world is through subjective consciousness.	i) Knowledge includes the observable and the intangible; ii) General laws are not deterministic, they only partially explain human action; equally subjective interpretations are partially explained by the external world; human action open to various interpretations; possibility of indeterminates.	Inclusion of subjective in traditional model of science to uncover laws and how these are interpreted by subjects; laws are tendencies, i.e. not deterministic; often applied research, practitioner driven.	Personal, value bound, multicausal, plausible, indeterminate, particular.	'Retroductive': Iterative cycle; Observation; Theory.	Methodological pluralism, triangulation, iterative, participatory, action research; method determined by subject of research.	All data that are relevant to subject; quantitative and qualitative observable and interpretative.	Complete tool kit of techniques often in context of a case study.	Methods are combined with a view to compensate for weaknesses in a single method.
Naturalism	Emic 'idealist' real world does not exist outside of consciousness of the individual, hence multiple conceptions of reality and enquiry cannot converge on a single reality.	i) Phenomenalism: valid knowledge comprises individual comprehension of the external world; ii) Empericism: explanation comprises causal laws inferred from actors' subjective perception of their social world; definition of knowledge is determined by the subject; generalisation beyond context is meaningless.	From hermeneutics, to uncover and explain individual conceptualisation and interpretation of external factors; internal validity and ecological validity.	Personal interested, value-bound, uncertain, non-rational, indeterminate and particular.	Inductive: theory grounded in empirical world; Observation; Reflection; Construction of abstract concepts 'descriptive' explanations.	Ideographic: e.g. 'ethnography' insider seeking 'verteshen' with subjects.	Qualitative, intangible, subjective conceptions and interpretations of actors; intensive and contextual, detailed, penetrating 'processual' written texts.	Participant observation, unstructured interviews, textual analysis.	Concern to account for reactivity and reflexivity in data; and reflective accounts.

Source: (Wass and Wells 1994)

Positivism uses valid knowledge as a basis upon which predictions and hypotheses could be based and tested or disproved to generate new hypotheses (Table 4.1). Objective analysis is key to the positivist and so too is proper statistical treatment of the collected data. Statistical manipulation includes data tests of reliability and validity to ensure a rigour to the interpretation of broad patterns of behaviour and to test hypotheses (Ragin 1994).

A positivist researcher considers 'reality' to be external to the individual, and is observable through quantified and manifest patterns of behaviour that form a structure of determinate relationships (Kolakowski 1993). The positivist uses deductive reasoning to postulate theories that they can test. Based on the results of their studies, they may learn that their theory does not fit the facts well or needs to be revised, for better prediction reality. Positivists believe in 'empiricism' and the controlled experiment is the most preferred methodology for scientific evaluation whereas the large-scale surveys and large-scale comparative studies are preferred for studies of human organisations.

This approach was not considered appropriate for this research programme due to the inability to control the subject of the study and the requirement that the study provide in-depth analysis. Moreover, the subject is not well understood and there are no agreed constructs that could be operationalised so that a large-scale survey could be conducted with any accuracy or validity.

Table 4.2 The deductive positivist research model

Researcher Test A Theory
Leading To
Researcher Tests Hypotheses or Research Questions Derived From The Theory
Leading To
Researcher Operationalises Concepts or Variable Derived From The Theory
Leading To
Researcher Uses An Instrument To Measure Variables In The Theory

Source: (Creswell 1998)

4.1.2. Naturalism

The naturalist approach is directly opposed to the positivist tradition. It is a comparatively newer branch of philosophy which accepts, as legitimate, subjective consciousness. For naturalists, 'value freedom' cannot be assured and the ability to

manipulate human systems (such as hospital staff and systems) and statistical analysis of limited value where it is impossible to control any subject (Layder 1994). Therefore reality cannot be measured through observed behaviour and may only be understood at the individual level (Morgan and Smircich 1980). Hence "*Once one relaxes the ontological assumption that the world is a concrete structure and admits that human beings far from merely responding to the social world may actively contribute to its creation, the dominant models become increasingly unsatisfactory and indeed inappropriate. The requirement for effective research in these situations is clear; scientists can no longer remain as external observers measuring what they see; they must move to investigate from within the subject of study and employ research techniques appropriate to that task"(p.491).*

Table 4.3 presents the naturalist form of research. A wide range of methods support the naturalists collection of data and these include participant observation, symbolic interactionalism and linguistics. This form of research emphasises the entering of the world and reality of the subject of study so as to study it from within. The protocol needed to execute such a research activity is very rigorous and was considered inappropriate for this research due to difficulties during the interpretation of results, and problems with narrowing and refining the research project. Furthermore, it would not be clear when the study had ended (the point of saturation) so this would generate additional problems for an inexperienced researcher (Glaser and Strauss, 1967). Miles and Huberman (1996) also suggest that the naturalist approach is not recommended for young, inexperienced or doctoral researchers due to the conflict between reconciling epistemological issues and practical considerations during research. In addition, the researcher was unable to extract themselves from the 'politics' of the organisation or social setting to manage interaction with individuals.

Table 4.3 The inductive research model (Naturalism)

Researcher Gathers Information
Leading To
Researcher Asks Questions
Leading To
Researcher Forms Categories
Leading To
Researcher Looks For Pattern (Theories)
Leading To
Researcher Develops a Theory or Compares Pattern With Other Theories

Source: Cresswell (1994)

4.1.3. Realism

The realist perspective is a 'middle ground' between positivism and naturalism that syntheses the extremes and proposes a natural cycle between extremes in any given piece of field research or research activity (Giddens 1984. Wass and Wells 1994). Realists contend that positivism provides only a partial account of reality and that no form of science relies exclusively on empirical evidence. Realists argue, as a consequence, valid knowledge consists of both observable and non-observable data.

Realist approaches are promoted by Bhaskar (1975) who proposes three overlapping domains of reality: empirical domain, actual reality and events, and also real structures. The empirical domain relates to the experiences and observation of realty and actual reality. The approach believes (Bahaskar 1975):

a) No positivist study can be free of subjectivity; there is no value freedom;

b) Anecdote; rich source of theory building;

c) Positivism only works when constructs and variables are well known;

d) People's perceptions influence the features that positivists test;

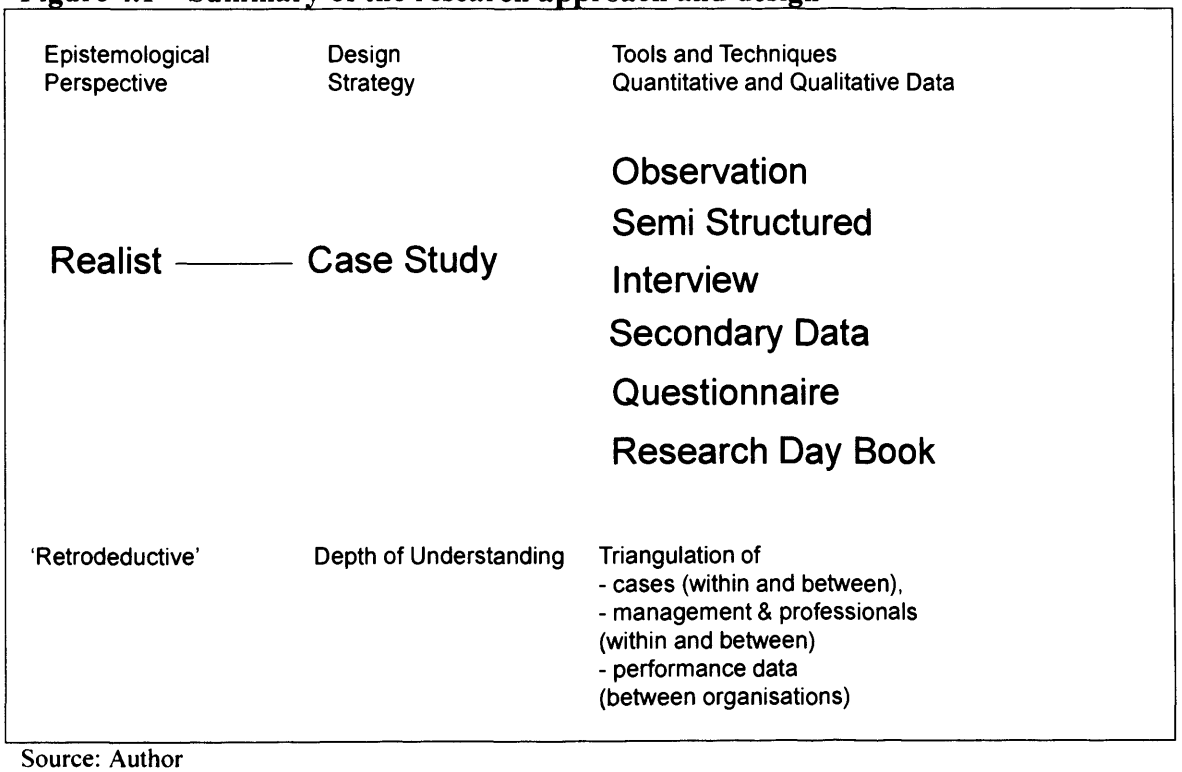
e) Positivist studies were average.

The 'cycling' between qualitative and quantitative observation is a powerful way in which the realist approach can gain greater insight into complex social phenomena (Miles and Huberman 1996). In this manner, qualitative observations can be blended with quantitative analyses and such a means of interpreting data suited this research in the

healthcare context, where little is known about the management of patient flow, yet there exists a significant amount of this study where measures and statistical inference can also be applied.

In relation to this research, the researcher employed a realist approach because it was the most appropriate paradigm for generating in-depth understanding of the complex social phenomenon of healthcare OM and system flow (Leonard-Barton 1992, Miles and Huberman 1994, Yin 1994). This included leadership, process management, human resources and culture. This approach also offered a much greater range of methods and techniques with which to triangulate data and yet be flexible within the study process (Wass and Wells 1994). Furthermore, it allowed the researcher to explore and explain the study undertaken in greater depth and with greater insight into an under-researched subject and upon which to found a model based upon theory building.

Figure 4.1 Summary of the research approach and design



Source: Author

Despite the attraction of the realist approach from a practical point of view, it is difficult to triangulate qualitative and quantitative data and identify problems in term of comparability and meaning (Bloor et al. 1990). However, the researcher decided that

such methods could be combined using qualitative data to reinforce quantitative findings. Based on this argument, the realist approach was selected as the most appropriate grounding for this study, and united the elements of the main research question that are identifying the features of patient flow and offering insight into management practices.

Furthermore, OM literature offers high support for a realism approach to understanding complex phenomena versus the problems of positivist "snapshot" and subsequent data "smoothing" (Scudder and Hill 1998, Sousa and Voss 2001) and the vagaries of the naturalist approach. The realist perspectives therefore allowed a deeper exploration of issues and potential "outlier" cases where new theory was most likely to be found. From all the potential approaches within the realist perspective, the case based approach was selected for the purpose of this study and this selection was consistent with other doctoral studies in similar fields (Voss et al. 2002). Furthermore, it was decided that a mixed methodology should be employed that included cycles of qualitative and quantitative investigations to be conducted. Such a design is advocated by (Creswell 2003)

In conclusion, the realist approach offered many advantages over that of positivism and permitted a holistic system perspective to be taken in the context of organisational complexities and dynamism of healthcare OM. A reductionalist or single-method approach was rejected because data would be hard to triangulate and positivist statistical manipulation would result in a mathematical robustness of a subject that is vague (Easterby-Smith et al. 1991). If positivist approaches have been undertaken, then a risk existed that very high, or very low, performing OM sub-systems would be eliminated or smoothed away. The positivist approach is not suitable for this study because of the research questions and the desire to build theory rather than test an existing theory.

Naturalism provided an equally unsuitable means of study that would offer greater insight into the emotions and individual understanding of OM, but was duly rejected because it did not suit a management focus and also, the testing of employee emotions was not conducive with assessing organisational features and how such features generated flow performance (as defined by measures adopted by OM by Brown (1996) and Slack et al. (2004)).

4.2. Methodology

4.2.1. Triangulation

As described earlier, the realist approach permits the combination of qualitative and quantitative methods also known as multi--methods or a triangulated methodology (Bryman and Bell 2003, Denzin and Lincoln 2000, Miles and Huberman 1994, Patton 1990). It is argued that triangulation is the combination of methodologies or the use of different research approaches in the study of the same phenomena, so as to improve the reliability of results by counteracting the weaknesses of any individual method through the use of a portfolio of methods (Ghauri and Gronhaug 2005, Hussey and Hussey 1997). There are two major advantages to employing multi-methods in the same study (Saunders et al. 1997). Firstly, the researcher can employ different methods for different purposes, and secondly, the data can be triangulated to ensure that it tells what is supposed to be told. The combination of methods improves the accuracy of judgments as well as results through different methods of data collection (Hammersley 1992). According to the expert views of Miles and Huberman (1996), acknowledged experts in the use of case study methods, triangulation for case studies and theory building should support findings and is a way to obtain the finding in the first place, by seeing or hearing from different sources by different methods. Denzin and Lincoln (2000) reinforce this view and argue it leads to greater validity and reliability. Four types of triangulation have been distilled (Easterby-Smith et al. 1991):

a) Data triangulation refers to the data being collected at different times or from different sources in the study of a phenomenon;
b) Investigator triangulation refers to the use of different researchers working independently to collect data on the same phenomenon and compare the results;
c) Methodological triangulation refers to when both quantitative and qualitative methods of data collection are used;
d) Triangulation of theories refers to when the theory taken from one discipline is used to explain a phenomenon in another discipline.

These sources were accepted and were duly integrated with the design of the case study approach which will be explored later in this chapter. However, it is noted that Hussey

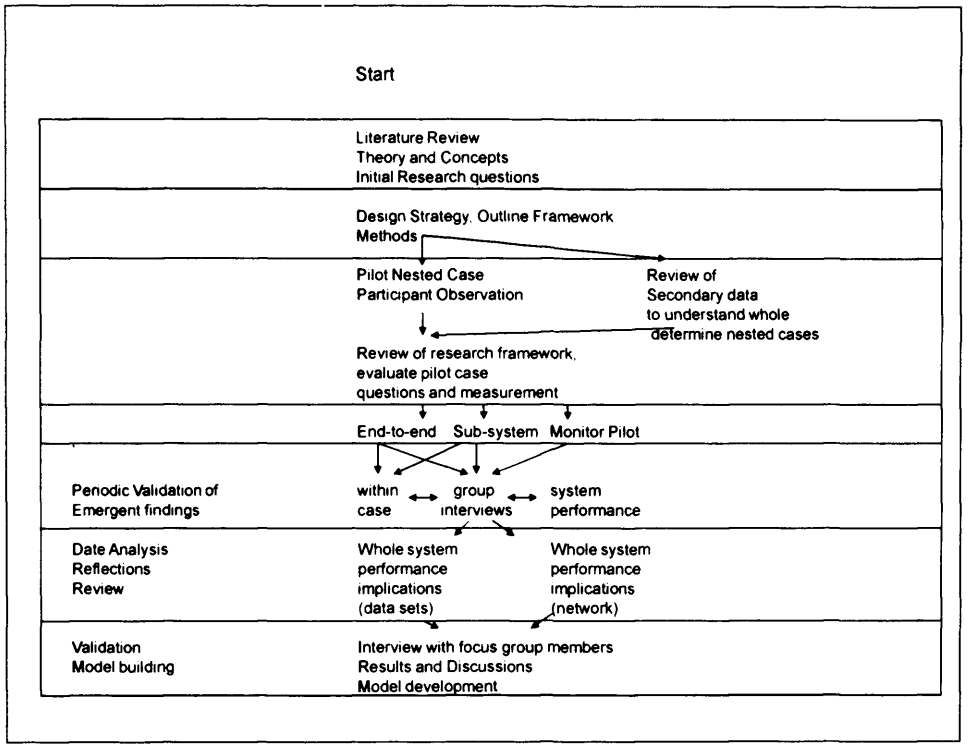
and Hussey (1997) argue that triangulation might not be suitable for further replication, especially when generating qualitative data. Furthermore, they claim that such data collection and analysis is very costly and time consuming. As a means of investigation, the importance of a triangulated methodology was duly accepted and integrated with the selection of a multi-method approach to data collection. The primary data collection techniques included the use of observation, data analysis, semi-structured interviews and a research day book for primary data collection. In addition, secondary data such as annual reports were also gathered for references and clarification. The strategy of this research design was to triangulate the methods used, but not to engage in comparative triangulation between nested cases, rather, this was for pattern matching and theory building. These design considerations will now be discussed.

4.2.2. Research Strategy

This Section will provide an overview of the research before defending the design choices and acknowledging the limitations of the study. A research strategy allows the researcher to house conflictions in "causal relations among the variables" under examination (Nachmias & Nachmias, 1992 p.77-78 cited in Yin, 1994 p.26), and as such, is deemed a plausible form of proof. It is the plan that leads the researcher in the process of examining, collating and clarifying observations. Figure 4.2 displays the research plan for this study to assist the reader during this thesis.

This thesis began with a wide-ranging literature review to establish the knowledge gap, identify and shape the research problem and design research questions.

Figure 4.2 An outline of the Research Process for this thesis



Source: Author

The approach continued with the review of philosophical debate concerning research approaches and design. It was apparent from the literature review that the study was best served by adopting a realist perspective and investigating performance/systems design in healthcare organisations.

From the literature review, the major gap in the body of knowledge concerned the need for (yet perceived inability of) managers to enable change in their own OM systems designs and to make better use of the facilities they operated (better efficiency and effectiveness). As previously stated, the literature gap that was identified implied questions that relate to how systems can be improved and the two chosen questions were stated as:

1. What features enable or inhibit secondary healthcare organisation to implement, improve and achieve higher performance of patient flow?
2. How and why do these enablers and inhibitors impact on the existing organisation STS?

Having established the general framework of the research and review of the alternative approaches (Table 4.5). the most appropriate strategy was considered that of a case study strategy with the use of pluralist methods (Voss et al. 2003). Case study also attends to the issues of organisation-level context (Greenhalgh et al. 2004) and the need for a holistic approach to enablers and inhibitors (Found et al. 2007, Hines et al. 2004). The methods included structured interviews. observation and secondary data analysis. The most appropriate subject of study was considered to be an organisation and the use of multiple replicated and nested case studies within the organisation.

A pilot study was undertaken to assess the validity and reliability of the research methods. The analysis of the pilot study was performed to identify the weaknesses of data collection modes to address the research questions, reflect upon the research questions and to identify areas for further improvement. To meet the needs of the research strategy and to add further robustness to the research methodology, a series of 29 further nested cases (30 in all) were evaluated over a three year period. These cases cover both clinical and general services within the organisation because direct clinical activities support patient flow and a poorly performing secondary or 'back office' operation would inhibit clinical flow.

The objective of the research was to understand factors related to implementation of improvement. The research design required a standard method for diagnostics and deployment of that method to identity what to improve (as opposed to how to improve). The researcher was involved in training for this standard method. As part of the 30 cases, multiple facilitators from the case organisation lead the diagnostic activity within the nested cases thus negating potential bias of findings. The researchers prime objective in this study was to observe the process of implementation through a case study strategy.

The fieldwork was carried out and the data gathered was analysed and interpreted before the results and discussion were presented. Finally, the model for assessing the potential for improvement. in the time taken for an EOC was validated by personnel in the focal organisation including the senior executive and those responsible for improvement.

Having provided a synopsis of the study, the next section will add more depth and clarity to the methodological design.

4.2.3. Methodological Design

A methodological design is the collection of methods, drawn from epistemological appropriateness, for data capture to generate legitimate knowledge. The quality of management research can be affected if the researchers fail to think through philosophical issues (Easterby-Smith, et. al. 1993). Wass and Wells (1994, p.18) argue a research design is *"a technical decision whereby the strengths and weaknesses of various techniques, in relation to the research problem are optimally combined"*.

The research approach of this thesis employed multiple methods (pluralist approach) involving multiple embedded cases within a single organisation (as per Leonard-Barton 1992). The selection of a single organisation to address the research question was deliberate and supported by similar studies of organisations (Eisenhardt 1989) and healthcare (Table 4.4).

The integration and combination of methods and cases was considered to offer a better understanding of the phenomenon being researched (Bryman and Bell 2003) and thus the research would be considered more robust by limiting the weaknesses of any individual method or case (Miles and Huberman 1996). The multiple methodology was deemed necessary to achieve the objectives of the study and to answer the research questions in a manner that identified the important and emerging issues as employees learned and then changed their OM systems designs.

Analysis of earlier organisational studies suggests that mixed methods are more commonly used to answer questions of the organisational system while simulation is used to evaluate small areas of the system (Table 4.4), while OM modelling is often intended to develop *'...rules of what should be done in constructed settings, and not what is actually done in real-world settings...(p.739)'* (Bendoly et al. 2006).Multiple methods are an effective means of improving the rigorousness of the research and the quality findings, and would reduce or eliminate the deficiencies of using a single research method. In selecting the combination of methods, the author rejected the utility and practical benefits

of a single questionnaire approach (favoured by the positivist) and an over-reliance upon observational data without qualitative triangulation (favoured by the naturalist) and therefore uses the strengths of both individual approaches whilst minimising the weaknesses of each. This was considered a better approach to the study than using a single method and without cycling between qualitative and quantitative methods. Such an approach ensures that data is not contaminated or researcher-bias leads to poor interpretation of the data, or seeing in the data what the researcher would like to see.

Based on a review of the literature and previous work in the field (Table 4.4) the author adopted a realist approach to the study using a combination of qualitative and quantitative methods. The most appropriate strategy to investigate the complexities of healthcare management was considered to be that of a case study design (Table 4.5).

Table 4.4 Methods, Sampling and Focus of previous studies related to UK SCO

Authors (by year)	Research	Respondents	Method (by type)	Sampling	Orientation	Focus
Bagust, Place and Posnett (1999)	Dynamics of bed use in accommodating emergency admissions: stochastic simulation model	Not setting specific	Simulation Modelling	1 area emergency admissions	Positivist	A&E
Kim, Horowitz, Young and Buckley (2000)	Flexible bed allocation and performance in the intensive care unit	Not setting specific	Simulation Modelling	1 area intensive care	Positivist	ICU
Bowers and Mould (2002)	The deferrable elective patient	District General Hospital Single Organisational Entity	Simulation Experiments	1 area orthopaedics trauma theatre session	Economic	Surgery
Moore (2003)	Capacity Planning – modelling unplanned admissions in the UK NHS	Plymouth Hospitals NHS Trust Single Organisational Entity	Simulation Modelling	1 part of the service (unplanned admissions)	Process	Unplanned Admissions
Martin, Sterne, Gunnell, Ebrahim, Smith and Frankel (2003)	NHS waiting lists and evidence of national or local failure: analysis of health service data	Department of Health Quarterly Returns	Quantitative	England Elective Waiting Data	Positivist	Acute Healthcare
Towill and Christopher (2005)	An evolutionary approach to the architecture of effective healthcare delivery	None	Theoretical Power of Analogy	Untested	Process/Supply Chain	N/A
Greenhalgh, Humphries, Hughes, MacFarlane, Butler and Pawson (2009)	How do you Modernise a health service?	Guys and St Thomas' Single Organisational System	Realistic Evaluation	3 end-to-end processes	System	Stroke, Kidney and Sexual Health

Authors (by year)	Research	Respondents	Method (by type)	Sampling	Orientation	Focus
Laing and Shiroyama (1995)	Managing capacity and demand in a resource constrained environment	Single Organisational Entity	Case Study Design Mixed Methods	1 project -- orthopaedic outpatients services	Process	Outpatients
Buchanan and Wilson (1996)	Re-engineering operating theatres: the perspective assessed	Leicester Royal Infirmary Single Organisational Entity	Case Study Mixed Methods Process mapping and patient trail, interviews / questionnaires of key informants. Validation through available data and reflection with teams	1 process flow for elective surgery. Broken into 9 sub-processes 1 hospital	Process	Surgery
Buchanan (1998)	Value of a process orientation	Leicester Royal Infirmary Single Organisational Entity	Case Study Design. Process Mapping (Multi method approach)	'The surgical inpatient trail'. 6 main operating theatres, 2 orthopaedic theatres, and 2 day case theatres (over 200 beds)	Process	Surgery
Probert, Stevenson, Tang and Scarborough (1999)	The introduction of patient process re-engineering in the Peterborough Hospitals NHS Trust	Edith Cavell Hospital Single Organisational Entity	Case Study. Interviews with management and staff	2 areas of re-engineering were reviewed – the admissions process and dermatology diagnostics 1 hospital	Process	Unclear

Authors (by year)	Research	Respondents	Method (by type)	Sampling	Orientation	Focus
Hill, O'Grady, Millar and Boswell (2000)	The patient care development programme	Royal United Hospitals Bath NHS Trust (Intended Replication but not reported on Surrey and Sussex Healthcare NHS Trust). Single Organisational Entity	Case Study Design Mixed Methods	39 projects 39 patient focused 1 hospital	Process	Mixed
McNulty and Ferlie (2002)	Re-engineering Healthcare	Leicester Royal Infirmary Single Organisational Entity	Case Study Design Mixed Methods	6 nested cases 6 patient focused 1 hospital	Process	
Bragato, and Jacobs (2003)	Care pathways: the road to better health services?	Single Organisational Entity – Scotland	Case Study Design Open ended interviews	2 cases – both orthopaedics 2 hospitals	Process	Surgery
Walley (2003a)	Designing the accident and emergency system: lessons from manufacturing	North Cheshire Lewisham Duel Organisational Entities	Mixed Methods Process Mapping, Data Analysis structured interviews	2 hospitals A&E process	Process	A&E
Lee and Silvester (2004), Silvester et al. (2004)	Reducing waiting times in the NHS	Breast Unit, City Hospital, Birmingham Single Organisational Entity	Case Study, Hypothesis testing	1 case	Process (run charts)	Breast Unit
Esain (2004)	LOS reduction	Un-named single organisational entity	Case Study Multiple Methods	1 case	Lean	General Surgery
Esain and Rich (2005)	Streaming to improve flow of patients	Un-named Multiple organisational entities	Case Study Multiple Methods	3 cases	Process	Surgical and Medical flows
(Lodge and Bamford 2007)	Capacity and Demand	Diagnostics and Clinical Support Division in one Hospital	Case Study Design, Action Research	Waiting list management for radiological examinations	Lean	Radiology Services

Authors (by year)	Research	Respondents	Method (by type)	Sampling	Orientation	Focus
Brando de Souza (2008)	LOS reduction	Elderly Care	Case Study	LOS	Lean	Elderly Care
Lodge and Bamford (2008)	Waiting times for Radiology	Diagnostics and Clinical support. Single Organisational entity	Case Study Action Research	Waiting list Management	Lean	Radiology Services
This Research (2010)	Patient Flow	UK Integrated NHS Trust. Single Organisational Entity	Case Study Design Mixed Methods	30 nested cases 10 patient focused 2 acute hospitals and multiple community hospitals/sites	System (Lean)	Mixed

Source: Author

Section 4.3 presents an overview of the case study strategy and how multiple methods were combined to provide the greatest understanding of an SCO. The methods used to explore the STS design, its features and dynamics. This review is undertaken with a focus on adaption and adoption of high performing practices. To fully explore such a complex system, a total of 30 nested cases were combined to provide a robust understanding of the system.

4.3. The Case Study Strategy

A case study strategy is a well-established means of studying organisations (Yin 1994) asserts that the case study is a method which is *'one of the most powerful research methods in OM, particularly in the development of new theory (p.195)'* (Voss et al. 2003). It provides a means to evaluate "why" something happens as well as "how" it happens (Saunders et al. 1997). The selection of a single case study is appropriate and justified, according to Yin (1994) where the case:

- represents a critical test of a formulated theory;
- represents a rare or unique circumstance;
- represents a representative or typical case;
- serves revelatory purpose – observing and analysing a rarity previously inaccessible to social science inquiry;
- serves longitudinal purpose – studying the same single case at two or more different points in time.

For the purpose of this thesis, the case study strategy represented an ideal means of studying a contemporary healthcare phenomena over a longitudinal period and to add to the body of knowledge. Single case studies are valuable in adding to the body of knowledge (Remenyi et al. 1998) and, after due reflection of the criticisms of case studies, it was considered that given the context of the research and the general acceptance of a single case in previous similar research studies (Table 4.4) a typical case organisation was sought (Section 5.2 provides a statistical justification of this).

Table 4.5 The Appropriateness of Different Research Strategies

Strategy	Form of Suitable Research Question	Requires Control Over Behavioural Events?	Focuses On Contemporary Events?
Experiment	How and Why?	Yes	Yes
Survey	Who, What, Where, How Many, and How Much?	No	Yes
Archival Research	Who, What, Where, How Many, and How Much?	No	Yes and No
History	How and Why?	No	No
Case Study	What, How and Why?	No	Yes

Source: Yin (1994, p.6)

Yin (1994) highlights three concerns surrounding case studies and highlights a potential lack of rigour in research if a robust methodology is not crafted to meet the research objectives. Case study research design has a potential shortcoming when cross checking information due to the amount of data collected, which could lead to practical problems, bias, and distortion. Table 4.5 offers tactics to overcome such potential disadvantages. All the tactics were used through the various stages of research design, data collection and analysis.

A potential criticism also concerns the difficulties when generalising findings. Such criticism relates to the selection of a case which is similar to the population as a whole (Denscombe 1998). This research is essentially interested in exploring the current organisational system which delivers inpatient care in one organisation (i.e. an intensive study), how sub-systems impact on the dimension of time within that system, points of resistance within the system which offers the opportunity for improvement and the extent to which the opportunity for improvement was realised. The selection strategy for the case study organisation was undertaken purposefully to reflect such similarity.

Pettigrew (1997) suggested generalisation of research from single case studies should be designed to include the following:

- Embeddedness - where analysis is undertaken at interconnected levels, including inner and outer context of the organisation. Particularly where process may be the unit of analysis;

- Temporal interconnectedness – recognising the impact of time i.e. past, present and future, to evaluate antecedent conditions that may shape potential futures;
- Exploring context and action – revealing the interlinking actions where features of context may be used to support action;
- Causation is neither linear nor singular – the search for multiple holistic patterns rather than singular cause and effect. How over time, interacting forces cycle to reveal causes and outcomes;
- Complexity reduction: linking process/sub-systems to organisational outcomes – where differences in outcomes linked to process/sub-systems are the unit of analysis, which in turn enable a simplification of research design and subsequent data collection. This does not imply positivist qualitative data collection and analysis, rather, any data which can provide insight into underlying dimensions which are unlikely to be revealed through statistical analysis.

Finally, Yin (1994) points out that a further concern surrounding case studies is that they can last a long period of time and result in too much documentation that is impossible to read. To counteract the quality and validity issues raised, Yin (1994) proposed a number of countermeasures and argued for the following (Murphy et al. 1998):

- an explicit account of the research process;
- the production and presentation of clear concepts, which have been produced within such research;
- the conclusion drawn should relate clearly to the data presented;
- the presentation of 'rich data' within the analysis as well as synoptic concepts;
- an extensive period of fieldwork spent in the site;
- the consideration of alternative plausible explanations;

- an empirical generalisability of their findings through negative or disconfirming cases and the use of systematic sampling;
- the use of a multiple stakeholder perspective;
- researchers should seek to enhance theory.

In line with similar studies (McNulty and Ferlie, 2002, Buchanan, 1998), a number of guiding design principles are duly accepted and built into the methodological design. The first was the recognition of the dynamic nature of organisational systems and sub-systems/processes and the need to document every stage of the research and take multiple stakeholder views. This dynamic nature is interpreted through calendar time (when sub-systems analysis took place in relation to other sub-system analysis), spread (the accumulation of analysis within similar bounded groups) and support (the accumulation of sponsor analysis) where each could be attributed as non linear factors on the findings.

Another test of goodness was the recognition that sub-systems may lack standards. Therefore, a greater depth of longitudinal understanding was needed. The researcher also accepted there would be some level of inconsistency of agreement by those studied (multiple stakeholder involvement and secondary data would be used to test these inconsistencies). The researcher also determined that a common intervention approach (based on the framework of the five principles of LT – see Womack and Jones 1996) was used to collect data in a common way (Table 4.6). These quality checks were considered necessary to counteract the complexities of studying social/technical sub-systems that are part of a complex organisational suprasystem.

The researcher also found it important to use multiple perspectives at the data collection and validation stages of the research. Healthcare organisations are made up of many roles and professions which may have different lenses of interpretation. The focus of the research is the decision making interactions, the application of a series of treatments and connecting events (which are delivered by sub-systems in the organisation, to conclude an EOC) in connection with managerial rules and rituals. As in earlier research designs

(McNulty and Ferlie 2002), the service user was not directly interviewed as part of the research design as these generally do not encounter the management decision arena. This provides a means of considering management systems in the context of social and technical sub-systems.

Table 4.6 Lean Thinking Principles

Principle	Description
Value	The value that the product or service (or a mixture of both) represents to the ultimate customer of the product or service.
Value Stream	All the specific actions required to bring a specific product or service (or a mixture of both) through the three critical management tasks: The problem solving task; The information management task; The transformation task.
Flow	Make those specific actions which are value-creating occur so that the product or service occurs in a seamless manner at a consistent pace.
Pull	Make and/or deliver the product/service or combination of both to the pace of customer demand. This recognises the dynamic nature of the external environment of the organisation.
Perfection	Recognises that as the previous four principles are a cycle which provide an ability to learn about the organisation and adjust, change, improve in a continuous way to reflect the inter and extra organisation social, technical and economic needs.

Source: Womack and Jones (1996), as amended.

As previously discussed, the realist and the case study approach have available to them the greatest number and potential configuration of research methods. Case study is also considered to hold strength in theory building which is the intent of this research (Voss et al. 2002). The multiple methods selected for this study were combined in such a way as to minimise their potential weakness. Thus allowing multiple means to reduce bias through pattern matching or to allow the findings of one method to contradict/ reinforce that of another. Section 4.4 defends the selection and application of the methods that were designed for this study.

4.4. Methods Review

The methods used for this thesis vary and are related to each stage of research. Data collection specifically focused on the sub-systems (within and between nested cases) and the whole SCO system. The use of a mixed portfolio of methods was designed and tested to enable an effective triangulation of data and also suitable for consistent replication across the nested cases. Triangulation of organisational performance was used to validate outcome performance.

Table 4.7 Data sources for input-process-output-feedback flow for high performance

Literature related to Patient Flow	Primary or Secondary Data	Method	Validation Method	Triangulation	Possible Measures from literature (Table 3.11)
Demand into System	Secondary	Data Set – Demand Amplification	Validated by cross-functional teams and Process Activity Map (PAM)	Run Chart & Learning to See	Mean shift and deviation reduction.
Failure Demand. Not satisfied first time	Primary	Quality Filter	Validated by Customer Value Discussions through cross-functional teams	Process Activity Map	Reduced elapsed time to operation time. Demand right first time. Task level point of failure reduction.
Output from System	Secondary	Data Set – Demand Amplification	Validated by cross-functional teams and PAM	Run Chart & Learning to See	Mean shift and deviation reduction.
Cycle Time	Primary	Learning to See	Validated by output data sets, cross-functional teams and where available, BUPA standards (i.e. hernia score).	Process Activity Map	Reduced elapsed time to operation time.
Process Delay: 1. Defect against Standard; 2. Staff Absent; 3. Equipment unavailable.	Primary and Secondary	Quality Filter. Variety Funnel. Learning to See	Validated by cross-functional teams	Demand Amplification & Perception issues collected through interviews for Process Activity Map	Parallel line over time of incoming against outgoing demand. Task level point of failure reduction.
Batch Size and Balance	Primary and Secondary	Learning to See	Validated by cross-functional teams and scheduling rules for theatre lists etc.	Demand Amplification & Process Activity Map	Parallel line over time of incoming against outgoing demand. Reducing batch size. Day by the hour measured.

Literature related to Patient Flow	Primary or Secondary Data	Method	Validation Method	Triangulation	Possible Measures from literature (Table 3.11)
Material Flow: 1. Variety; 2. Delivery steps away from point of use.		Process Activity Map (comments)	Validated by the cross-functional team	Perception issues collected through interviews for Process Activity Map	Reduction of different types of parts/materials used in process (and alternatives).
PDSA (Study Outcomes): 1. Intended; 2. Unintended.		Monitoring System	Validated through cross-functional teams and reflective practice	Interviews & Barrier Analysis	Part of management review process.
Stock Turns in production (for service increased throughput with no additional resources)	Secondary	Continuous Flow Design from future state	Secondary Data validated by cross-functional teams and PAM	Run Chart	Reduced elapsed time to operation time. Day by the Hour.

Source: Author

Similar method combinations to those adopted for this study have been applied previously in research (Childerhouse et al. 1999, Lewis et al. 1998).
Methods are:

- Secondary data drawn from documentation and electronic records such as those held by the Patient Administration System (PAS) enabled Input-Process-Output analysis (i.e. how many patients admitted, when and where), and when they moved between parts of the organisation during the course of their EOC. Particular data was sought in line with the literature review in CHAPTER 3 (Table 3.12 and

- Table 4.7):

- Semi Structured interviews - purposeful discussion between two or more people whereby themes and tailored questions are related to the particular context, allowing greater flexibility to alter the order and to add additional questions according to the flow of the conversation (Saunders et al. 1997). Interviewees were involved in the nested case studies. Data collected was validated, generally within interdisciplinary groups to check on accuracy to improve construct validity of the data;

- Graphical relationship structure analysis enables the visualisation of connectivity between entities (cases) to show the flow of patients/services and gain agreement about the process under reviewed. Flow charts are an example of such an analytical tool and have been used widely (Krammer and DeSmit 1977). Flowcharts and a number of other visualisation techniques, known as mapping (Hines et al. 2000, Hines and Rich 1997, Rother and Shook 1999) are consequently used to create a consensual picture of the NHS system both as is and as is to be;

- A questionnaire - a way of obtaining information speedily providing that it is well structured and managed. It enables the same questions to be answered in the same conditions, so that the resultant information can be analysed, patterns mapped and comparisons made. Casual relationships can rarely be proved via the survey questionnaires alone (Bell 1999) and bias can also enter into the designing of questionnaires (Sudman and Bradburn 1982). A targeted survey of a small population of senior clinicians and managers in the SCO in combination with the aforementioned data collection instruments is adopted in this research.

Table 4.8 summaries the data collection methods selected and their potential strengths and weaknesses.

Table 4.8 Methods of data collection adopted in this research

Source of Evidence	Description	Strengths	Weaknesses
Documentation	Reports, meeting notes,	Stable, unobtrusive,	Biased selectivity,

	complaints and compliments.	exact and broad	reporting bias
Interviews	Semi structured	Targeted and insightful	Bias, inaccurate recall, reflexivity
Observation	Walking the patient and service flows	Real and contextual	Selectivity, time consuming
Questionnaire	Closed statements	Quantifiable, targeted, quick	Bias
Electronic Records	PAS data, Performance data, presentations, etc.	Stable, accessible, exact	As per documentation

Source: Adaptation of Yin (1994, p.80)

The combination of methods allows for the strengths of each method to be combined with others whilst limiting any weaknesses of individual methods (Table 4.9). In line with the authors realist stance, mixed and pluralist methods is an accepted form of data collection (Miles and Huberman, 1994). Methods applied are drawn from management literature and comply with the socio-technical focus of this study (Table 4.9).

Table 4.9 Link between theory and practice in the methods used

Concept (Table 3.4)	Features	ACTION Method (what stage deployed Table 4.12)	ACTION Validity of Method
Interdependency	Complexity of Systems Design	Physical Structure (Stage: Group Diagnosis)	Validation of method grounded in literature (Table 4.7) though triangulation of techniques, data sources (i.e. Documentation, Observation, Electronic Records - Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
	Variation Complexity	Variety Funnel Run Charts; Basic Statistical Analysis regarding Demand, Service/condition Varity, etc.; Heijunka (Patternisation - Mixed Model Concepts) – (Stage: Group Diagnosis, Secondary Data Prep, and Data analysis)	
Joint Optimisation	Error/Deviation/Loss	Quality Filter Run Chart Spaghetti Diagram (Stage: Group Diagnosis, Secondary Data Prep, and Data analysis)	Validation of method grounded in literature (Table 4.7) though triangulation of techniques, data sources (i.e. Documentation, Observation, Electronic Records - Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
Variety of Work Organisation	Flexibility	Demand Amplification; Basic Statistical Analysis regarding Demand, Service/condition Varity, etc; Heijunka (Patternisation - Mixed Model Concepts) - (Stage: Data Prep, Group Diagnosis, Secondary Data Prep, and Data analysis)	Validation of method grounded in literature (Table 4.7) though triangulation of techniques, data sources (i.e. Documentation, Observation, Electronic Records - Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
Boundary Management	Learning through Feedback	Learning to See, Compliments and Complaints (Stage: Group Diagnosis and Group Analysis)	Validation of method grounded in literature (Table 4.7) through semi structured interviews, observation and electronic records (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
Incompletion	Testing of plan in real world situations and adjusting to real world dynamics.	Learning to See – Ideal State (Stage: Group Diagnosis and Group Analysis)	Validation of method grounded in literature (Table 4.7) through semi structured interviews, observation and electronic records (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)

Concept (Table 3.4)	Features	ACTION Method (what stage deployed Table 4.12)	ACTION Validity of Method
Minimum Critical Specification/ Vital Few/Skills as a co-ordination mechanism	High Quality of Work	COCD, Variety Funnel (Stage: Group Prep, Group Diagnosis and Group Analysis)	Validation of method grounded in literature (Table 4.7) through observation and documentation (Table 4.8) and triangulation of facilitation.
The multi functional principle	High Quality of Work	Mixed Model (multi skilling) – (Stage: Group Analysis)	Validation of method grounded in literature (Table 4.7)
Compatibility	Common Mental Models	All Pre-diagnostics, Group Prep and Group Analysis Methods (Stage: Pre-diagnostics, Group Prep and Group Analysis)	Validation of method from literature (Table 4.7) through interviews and observations (Table 4.8)
	Alignment of Delivery of Service (Means + Feed Forward)	Customers/Services /Stakeholders and Measures, Cycle of Service/MOT/ Kano (Stage: Group Prep)	
Information Flow	Bounded System	Learning To See (Stage: Group Diagnosis and Group Analysis)	Validation of method grounded in literature (Table 4.7) through semi structured interviews, observation and electronic records (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
	Input/Output steps	Process Activity Mapping (Stage: Group Diagnosis and Group Analysis)	
Support Congruence	Common Mental Models for Problem Solving	Creative Thinking Exercises, Cycle of Service, Moments of Truth, Kano Model, COCD, QFD. (Stage: Group prep)	Validation of method grounded in literature (Table 4.7) through semi structured interviews, observation and questionnaire (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
Design and Human Values	Goal Alignment and Improvement	QFD (Stage: Group prep)	Validation of method grounded in literature (Table 4.7) through interviews, observation and questionnaire (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)
The socio-technical criterion	Fast Feedback – Feedforward	Quality Filter (Stage: Group Diagnostics, secondary data prep and Group Analysis)	Validation of method grounded in literature (Table 4.7) through semi structured interviews, observation and documentation (Table 4.8) and triangulation of facilitation through standard methodology (Table 4.12)

Source: Author

The combination of methods allows the strengths of each method to be combined and limit the weaknesses of any individual method. In addition, the use of a researcher day book allowed the researcher to cross compare accounts provided by informants. Interviews allowed one person's account to be compared with another and secondary data allowed the testing of opinions. Panel reviews during the research activities that were used with the teams also allowed the researcher to test and compare team views, interviews and the use of graphical maps allowed the research to see the common mental models of the future 'improved' state of the healthcare system and tie back interview questions to areas of contention and disagreement.

A generic standardised structure for the diagnostic phases provided an instrument to enable comparison of implementation, sustainability, spread and corresponding performance. The implications for performance, OM and strategic alignment were sought via semi structured interviews and questionnaires. The method is designed, not to test tools and techniques, a critique of previous studies (Proudlove et al. 2008), rather to utilise a standard methodology against which the progress of improvement over time can be judged in relation to high performance organisations. The purpose of which is to gain a deep understanding of the factors which enable or inhibit high performance distilled from literature.

The technical sub-system was evaluation at four points, the completion of a standardised diagnostics (for 30 nested cases within one SCO), the implementation of the findings, a fixed point at the end of the detailed field research in 2005 and the fourth point was only at whole system level to evaluate performance changes in 2007. The human system was evaluated using structured observation of teams during the diagnostic and implementation phases, questionnaires (of senior managers and professionals), semi structured interviews to reflect on findings of the progress and findings of the cases.

Table 4.10 Research Timeline

Year	Main Activities
2002	Literature review and research methodologies Course (Cardiff University), Methods Review and Access Granted and Case 1 Pilot Testing Reflection
2003 – 2005	Field research and dissemination
2006 – 2007	Field Research (Whole System Level) and Data Analysis
2008 – 2010	Write up and reviews

Source: Author

The research was undertaken over a five year period between 2002 and 2007 (Table 4.10). The timeline of case studies is displayed in Figure 5.1.

4.5. Case Study Sampling Rational and Participant Selection

Having determined the gap in the literature, most appropriate research questions and methods, the issue of selecting and gaining access to a subject for study remains. The research questions are related to patient flow, particularly regarding the time spent in an SCO. The limitation of previous research at the process level of analysis relates to the selection of the case site (most researchers have focused on very small scale accounts of change). Such research implies representation of the whole system is weak and does not reflect the wide range of activities that are undertaken in even a small SCO in the NHS. Such organisations draw upon clinical diagnostics and therapies, centralised and decentralised services who must each come together to deliver care and ensure safe patient flow (exploit the designed capacity of the system). Table 4.4 illustrates the gap of whole system analysis, indicating that analysis has been mainly at either single entry point to the organisation (i.e. either planned or unplanned, which is also known as elective/scheduled and unscheduled respectively) or through one presenting condition e.g. orthopaedics (Laing and Shiroyama 1995). The failing with this approach is that the capacity used, related to demand on that capacity, is not discrete. That is, both planned, and unplanned, activities share the same capacity, or the presenting condition may determine patient classification for treatment into a specialty, which may have dedicated staff. However, the whole pathway the patient will experience will necessarily require sharing capacity used by other specialties.

For the technical system, shared capacity of the nature described will have an effect on the potential for response times of the sub-systems. Hence, the need to clearly define the whole system under analysis as well as the sub-systems and the potential for compounding factors which cannot be controlled (e.g. junior doctor intake in August). Yin (1994) advocates the choice of undertaking a single case study with embedded or nested cases (as opposed to multiple case studies) when seeking an in-depth understanding and in order to generate theory. The main difference between nested and multiple cases lies in the design is the relative importance of relating the research back to

the organisational level. Yin (1994, p.44) highlights that this approach allows opportunity for extensive analysis of the sub units, which can enhance the insights into the single case study.

The implication of Yin's work is that a sufficiently representative organisation needs to be found, and access gained to multiple cases over a longitudinal period of study. Previous studies have not gained such access and the quality of generalisation and theory building has been significantly reduced (Burgess et al. 2009). The researcher sought to gain access to a large complex SCO with complex patient flows that would grant access and comply to the strict rules of a doctoral study (as opposed to believing the work to be more of a consultancy relationship and agreement). After a meeting with the deputy Chief Executive of the case study organisation, an agreement was reached to provide access to multiple nested cases. The sampling strategy for the nested cases was a purposive sampling framework where cases were selected on the basis that they would offer greater insight into the change/learning process (positively or negatively). This strategy enabled cases which either were major concerns in the healthcare system, and/or major flows to be selected for analysis or was used deliberatly to balance the needs of the organisation with the objective of the research. Two key issues for the organisation existed, firstly to be able to demonstrate impact following the application of the standard method, and secondly, to avoid the risk of 'untested' approaches drawn from industry being applied to the critical patient facing processes until such assurance was evidenced. In contrast, the researcher's sampling strategy was designed to draw upon patient-facing cases and those which constituted high volume demand on the operations system (high volume patient care represent the main input-process-output flow for the organisation). It is argued that these systems should be the most efficient and effective processes and therefore offered greater insight to the research questions and change processes at the host organisation.

The initial cases were selected to prove the impact of the standard methodology (Table 4.12) through demonstrable improvement. A set of selection criteria was agreed between the deputy Chief Executive and the researcher which enabled a clear process for case selection (Table 4.11 Sampling Selection Criteria for Nested CasesTable 4.11).

Table 4.11 Sampling Selection Criteria for Nested Cases

Criteria	Why	Comment
The Case scope was a process in the organisation	To avoid micro process problems like discharge planning	During the analysis phase, cases which did not concur with this requirement were highlighted and excluded from the research[44].
The boundary of the case crossed was designed to examine processes which crossed functional boundaries	To avoid the potential for sub optimal solutions being drawn.	Table 5.4 provides details of how the cases crossed organisational or geographical boundaries to reduce the impact of this as a factor.
The case is of critical importance to the organisation (recognised need to change) or responsible for high volume demand patient facing services i.e. General Surgery/General Medicine.	The critical importance is as determined by the deputy Chief Executive and the high volume demand of patient facing services was determined through demand analysis of the organisations from 2001/2.	Initially, cases were selected to support organisational issues (see Table 5.5) and purposefully were not patient facing to reduce risk to organisational performance. The first case was used as a pilot to prove the standard methodology.
Cases selected would be balanced between patient facing, indirect patient support and support services.	Thus ensuring that the analysis across these aspects of the system could be undertaken and reduction of bias due to cases being reviewed.	No constraint was placed on these cases being related to other cases already underway.
A sponsor from the organisation would support the 'pump priming' of staff time to undertake the standard methodology.	Political motivation to be involved was thus included in the data collection as was the level of the sponsor within the organisation to understand any potential bias.	The level of the sponsor was reviewed against performance to ensure that this was not a contributory factor in itself to the implementation results.

Source: Author

Reflecting upon these criteria, the nested cases selected provided a whole system penetration to understanding more clearly the impact of interfaces on process flow. The sampling criteria i.e. patient-facing processes which constituted the high volume demand on the organisational system alone, would have been less demonstrable. At this meeting the practicalities of research and ethical considerations were also reviewed and understood.

A criticism of previous research has been the limited definition of a system or a case study. For the purpose of this thesis, the unit of analysis is a single healthcare

[44] This was due to the change of sponsor at the latter stages of the research.

organisation and the boundary of the system is the handover of the patient to their next care destination and the inbound dimension is the referral process to the hospital. Each nested case study, as a sub-system, is defined as the functions and methods needed to produce a service or clinical/directly patient supporting process for an EOC (process level).

A distinguishing part of this research is considered to be the necessity to understand the system not only at process level (the technical delivery system) but also the high level of executive systems management (the highest level of organisational decision making).

To eliminate bias, the selection of informants is important. For STS research of OM systems, the key informants are supervisory grades (and above) because they determine many aspects of the operations system (policies, working practices etc.). The informants for the study were drawn from healthcare experts, managers, staff within the process and clinical experts. The need for inclusion of multiple informants and stakeholders in the analysis and change process is essential to gain differing stakeholder perspectives (Lynch and Cross 1991), also power and preferences, may change over time (Freeman 1984).

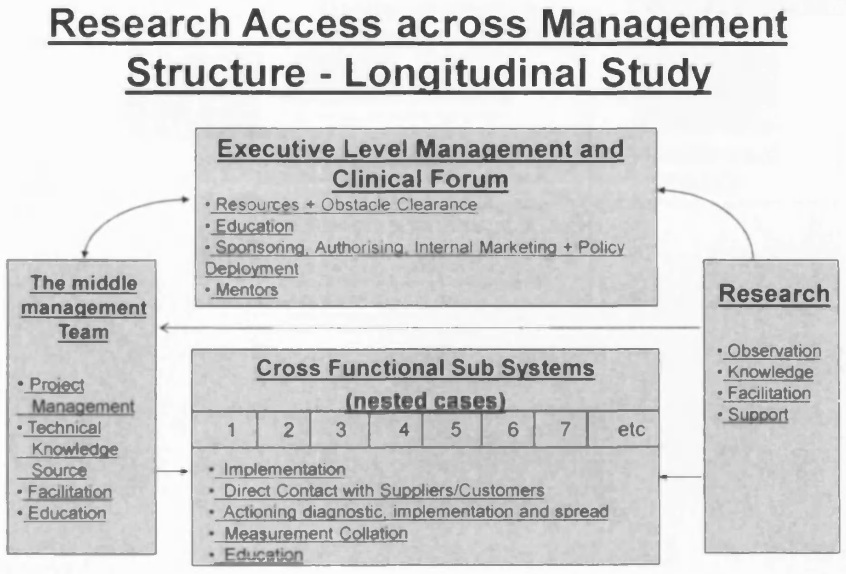
The research also operated with a group of senior managers and executives who formed a steering group and were designed as a place where the research could be fed back and reviewed by the most senior decision-makers in the organisation. The group also met less frequently than the main research informants and as such, allowed a second set of reflections to supplement the main reflective periods of the researcher. This form of quality checking group is a practice that is associated with case research and the social sciences (Miles and Huberman 1994). This group will be used to define a representative group of organisational stake holders[45] (nominated by the executive management group and drawn from each of the directorates and departments that make up the organisation). The purpose of this network was to allow the author to gain feedback throughout the research process.

The deliberate engagement of senior clinical and managerial stakeholders was considered necessary to add credibility (also to maintain patient and process safety) when tracing the

[45] This group is known as 'The Network'

longitudinal nested cases. These levels of professional management also shape the OM system and are key 'gatekeepers' who can accelerate or block improvement activities. To supplement the managerial and decision-makers of the process stages, staff were selected to engage in the change interventions. These staff were not purposively selected, beyond the fact that they were personnel who worked within the system. The researcher found this to be important because, as evident in the literature (Pasmore 1988) the best designed technical system will work only to a level of efficiency that is determined by the staff that work within the system. These informants were closest to the delivery mechanisms for patients or clinical departments. It is this level of the organisation that would deliver the improvement programme and modify customary practice (as a result of any identified need to change during the intervention case studies).

Figure 4.3 Research Access to various levels of the Management Structure



Source: Author

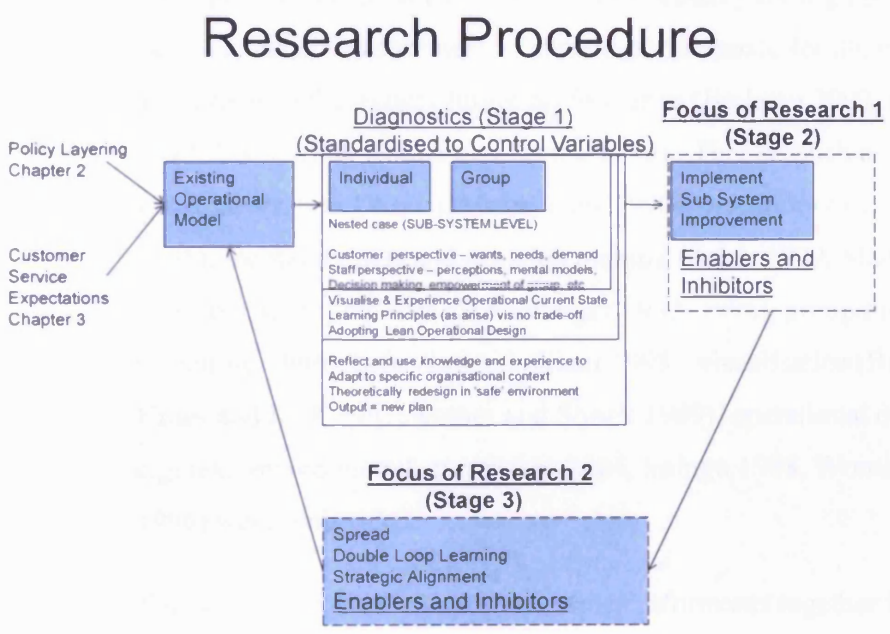
For the purpose of clarity, in any individual nested case study the term 'improvement team' will be used to denote the personnel acting as informants during the process review and intervention. As such, the personnel will change dependent on the actual nested case study.

4.6. Research Procedures

4.6.1. Execution of the Research

Having gained access to a case study organisation, the researcher developed and piloted the intervention approach (Figure 4.4). This approach ensured data collection throughout the study period (performance and process measurement) at case/sub-system and organisational level (primary and secondary data). In addition, construct validity was ensured using data from interviews, questionnaires and observation (Table 4.8) and enabled internal validity for data analysis.

Figure 4.4 Research Procedure for thesis



Source Author

The research procedure consisted of three stages of activity (Figure 4.4) - diagnostic stage, an implementation stage and finally sustainability and spread phase. The first stage is described below:

1. The first stage – hereafter known as 'diagnostics', consisted of a set of diagnostics, learning and reflection. This was required to provide a standard approach to enable measurement of improvement. The diagnostics formed a

purposeful stage against which the process of implementation and spread, thereafter, is evaluated:

a. The timeline (Figure 4.5) visualises the first engagement and task undertaken with the case informants. This is to identify the sub-system and define the problem statement at the management level (2 days of activity). To quantify process and performance gaps, the researcher decided research problem statements for every case needed to be determined (Cockburn 2004, Elg and Kollberg 2009).

b. The second step uniquely combines OM, LT and STS techniques and principles presented in CHAPTER 3 as necessary for high performance. The design enables measurement of current performance for the nested case and also predict a theoretical future performance (Bicheno 2002, Hines and Rich 1997, Liker 2004, Rother and Shook 1999). Themes such as customer focus/integration (Womack and Jones 1996), proximity of customers (Weick 1995), mental models and decision making (Adair 1999, Maddock 2002), elimination of trade-offs (Schonberger 1982, 1996), group think and reflection (Schuring 1996), behaviour (Emiliani 1998), visualisation (Bicheno 2002, Hines and Rich 1997, Rother and Shook 1999), operational design principles e.g. takt, mixed model, etc. (Liker 2004, Shingo 1988, Womack and Jones 1996) were embedded.

c. The second step of the first stage brings informants together for the purpose of validating a problem statement, conducting a 'voice of the customer' analysis and other opinion gathering activities (from those closest to the workflow). Quality Function Deployment (QFD) is used to enable the informants to link voice of the customer 'wants', to potential solutions 'hows' (Bicheno and Howleg, 2009). The QFD approach has been used in design and manufacturing since the early 1990's (Akao, 1990; Day, 1994; Cohen, 1995) although its application in this study is limited due to the potential difficulties in the selection of which chart is best used for the individual nested cases, and

the potential for too wide a scope (given the nested cases arise from different parts of the organisation and have differing boundaries) causing difficulty of focus (Dale, 1999). Dale (1999) recommends one strategy for the practical application of QFD is by 'keeping a realistic perspective on the detail entered about customer needs focus on the important, the difficult and the new.' It is this strategy which is accepted for this research, in the light of the immaturity of the organisation and its internal quality and Continuous Improvement processes. In each case, this took 2 days over a period of a month. In parallel to the work group activities, secondary data from the PAS was interrogated to see performance levels and the results are fed into step three where the team meet again to conduct more diagnostic activities.

d. At step three, the team engaged in structured observation of the process/sub-system under study and a review of quantitative data to enable conceptual learning (Adair 1999, Lapre and Wassenhove 2002). At the end of this step, the team gained consensus about the current state of the process/sub-system (measure Point A).

e. The next step consists of a group analysis (still part of the diagnostic phase) where iterative team exercises were designed to yield a theoretical 'future state' and a common mental model of how things could be (a key stage in the process of organisational learning – see Lapre and Wassenhove 2002). This is measure Point B.

The standard approach was designed to combine tools and techniques (Table 4.12), and, to embed the features of high performance flow systems as distilled from the literature review (Table 3.13) and install methodological triangulation to reduce the potential for bias in findings.

Table 4.12 Design that constitutes the Standard Approach to enable consistent Measurement of Improvement used during the Diagnostic stage of the nested cases

Stage in Standardised Framework	Tool/Technique or Method	Author(s)	Why		Contribution and Embed learning about high performance feature (Table 3.13)
			Strengths	Weaknesses	
Pre Diagnostic	Perception – Limit – Validation – Act Cycle	Cockburn, 2004; Elg and Kollberg, 2009; Esain et al 2011	Focuses on the problem and its perceived significance. Deals with the potential for perception differences from the outset. Requires little or no data analysis. Provides a safe form of dialogue and common agreement between sponsor and team on scope and boundaries	Takes time and involves a reiterative cycle prior to action. Is not a factual understanding of organisational problems which exist, hence could spend time on an insignificant area (although multiple respondents are sought at this stage to avoid individual bias)	Provided a consistent means of determining what was the subject of study, and enabled the teams to collate and evaluate facts to support or otherwise these initial perceptions. An enhancement to the PDSA cycle (Esain et al, 2011) Link to Feature: Group Think
Group Prep	Creative Thinking Exercises Customers/Services Stakeholders and Measures Cycle of Service/ Moments of Truth/ Kano Model Compliments and Complaints Killer Ideas or Idea Killers (COCD) Quality Function Deployment	Adair, 1999; Rother, 2010; Bicheno and Catherwood, 2006	Challenges professional and hierarchical status regarding propensity to problem solving. Reinforces redesign is focused on the service user but without investment as the primary solution. Provides some control for the participants by enabling them to challenge basic assumptions of the problem statement. Deals with the issue of how to determine optimum solutions rather than popular ones. Reduces bias through a strong personality in the group. Encourages reflection.	Takes time to build the confidence in the team. Less appealing to clinicians with a positivist bent. Necessary, when groups are unfamiliar with the type of improvement hence as the improvement process in an organisation matures, this element was considered less important and streamlining was discussed	Recognises the socio system elements of improvement which is not present in the early works on Value Stream Mapping (Hines and Rich, 1997; Rother and Shook, 1999) Link to Features: Continual Quality Improvement, Defect Prevention, Group Think and Quality Training.
Data Prep	Review Available Data (PAS)				Assess alignment of data boundaries to Process boundaries. Link to feature Segmentation and Task Repetition
Group Diagnosis (see Table 4.7 – data sources for input – process – output – feedback for High Performance)	Brown Paper Model Process Activity Map Spaghetti Map Demand Amplification Quality Filter Production Variety Funnel Physical Structure Map Supply Chain Response Matrix Learning to See – Current State	Hines and Rich, 1997; Hines et al, 2000; Rother and Shook, 1999; Bicheno, 2002; Liker, 2004.	Requires staff to go to the place of service provision and watch. Enabled reflection on practice and 'fresh pairs of eyes'. Where team members would consider implications of what they had seen and reported in other areas of work. Reinforced the focus is on the niggles and time related to indirect inaction which is the focus rather than staff being asked to speed up what they do. Highlights critical issues to be addressed. Engages staff in their own process redesign and the think process behind the choices for redesign.	Time consuming. Challenging for some staff who were not confident with numbers/computers for data analysis and entry. Sometimes required data collection to get data not available in the current system and this was seen as an extra pressure on those delivering services. Needs someone with reasonable knowledge of I.T to facilitate. Need an understanding of dependent events (for planning implementation).	Principle of Triangulation of Method used. Links to Features: Quality as the responsibility of the Worker, Real Time Feedback, Defect Prevention, Economies of Scope, Task Repetition, Job Protection, Segmentation and Short Interval Cycles.

Stage in Standardised Framework	Tool/Technique or Method	Author(s)	Why		Contribution and Embed learning about high performance feature (Table 3.13)
			Strengths	Weaknesses	
Secondary Data Prep	Basic Statistical Analysis regarding Demand, Service/condition Varity, etc	Clegg, 1982; Pallant, 2001	Provides a means of validating perceptions raised. Enables the presentation of findings from simple statistical analysis to be validated by the team.	Limits on data sets which could be made by duration (e.g. 1 month rather than years). The time for coding meant that often groups were working with data from months previously. Data cleansing was always necessary (e.g. double counting, incorrect data, lack of data entry)	Links to Features: Economies of Scope, Short Interval Cycles, Segmentation and Task repetition
Group Analysis	Learning to See – Ideal State Heijunka (Patternisation - Mixed Model Concepts) Measurement – Run Charts, Control Charts, SPC	Rother and Shook, 1999; Liker, 2004.	Provides a logical means thus enabling staff to believe they can achieve a change to the current to achieve better service without high external investment. Can provide the mathematical evidence for change. Provides a pattern (which staff find useful) as a means of understanding how staff can contribute	Requires the facilitator to have I.T knowledge to help create an idea state, although even without it, some progress was always made	Links to Features: All those features in Table 3.13

Source: Author

II. Stage 2 of the research procedure sought to understand the process of implementation (or not and hence the inhibitors to implementation) which followed Stage 1. The objective of the research was to gain better understanding of this process. This stage (Figure 4.5) could begin as early as the development of the current state (Stage 1), as informants could change practices that were easy to do so (known in the operations/improvement literatures as 'Just do its' – see Womack and Jones, 1996). Implementation is not time bound, and improvement teams/individuals will take as long or as little time as they need. This stage of the research has been noted as under-researched by Proudlove et al (2008) and Maddock (2002) and it is from this phase where most of the thesis results are drawn. The standard approach was designed and crafted in order to understand how teams reached the point of implementation/spread and it was deemed necessary to have a standard diagnostic for purposes of replication, validity and reliability. The implementation stage is not standardised and no attempt is made to encourage the team to act, either through implementation or to sustain or engage in second+ generation of improvements.

Four points of data collection were undertaken and later reviews were conducted to see whether sustainability of improvement had been embedded and had led to new generations of self-initiated improvement. The key monitoring points in the improvement process for each nested case are declared as:

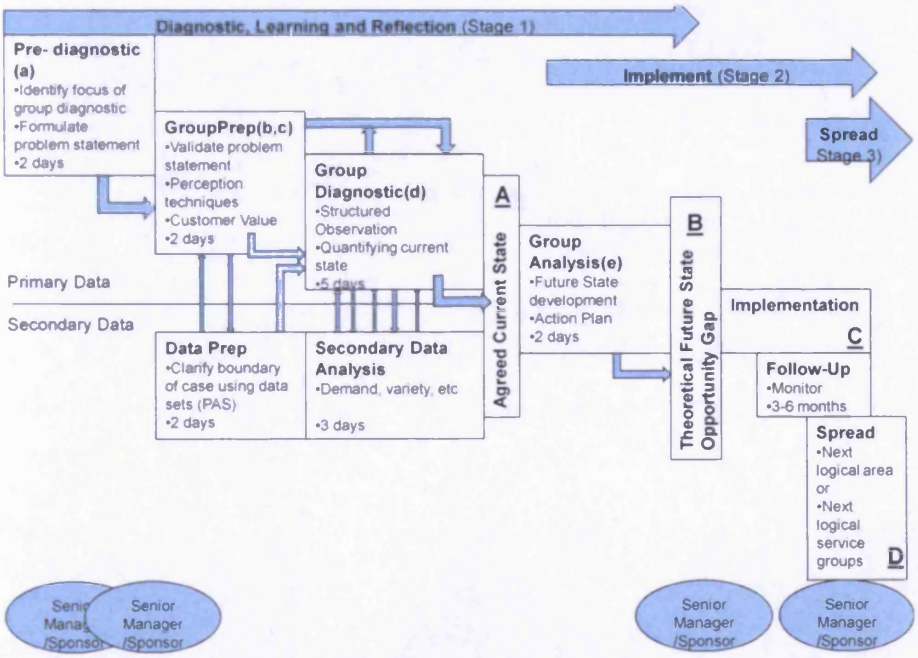
Point A - data was collected as the baseline at commencement of each case (termed 'current state' in Table 5.10);

Point B - the theoretical potential for improvement, following detailed analysis of the secondary and primary data at completion of the diagnostic stage (termed future state). Such measurement is a consequence of a proposed new work design, agreed by the cross-functional teams;

Point C - the actual results collected after implementing the new work design. This was collected through interview with the sponsor and/or the nominated person to oversee implementation of each case ('achieved during 2005').

Point D – to assure external validity organisational performance (over time) was compared to two regionally co-located Trusts.

Figure 4.5 Standardised Framework for the Research Procedure



Source: Author

A research pilot was designed to test outcomes. These were considered robust and effective as a means of collecting data regarding the focus of the research i.e. enablers and inhibitors for implementation and spread (operational learning).

The nested cases of improvement will, due to the nature of each case, have different KPIs and calibrations of measure. The researcher reviewed common measures of quality and delivery for each case, but the selection of improvement focus and measure was left to each group (as a result of their analyses and learning). Time compression was a key measure of improvement.

4.6.2. Triangulation

The early stages of the research and each case were subject to a validation process including the expert review and testing of the methods, the reporting of findings to the network group, and testing of the data. Miles and Huberman (1994, p.277) list a series of fifty checks for 'research goodness', of which, four generic areas emerge concerning the validation of the design and conduct of 'good scientific' qualitative research. The first category of valid research concerns the objectivity and conformity of the work, and concerns whether or not the findings are reasonably free from researcher bias and are 'auditable'. The thesis reporting mechanisms and reflective periods were used for purposes of assuring accuracy and verification.

The second concern area was for the reliability and dependability of the research. Miles and Huberman (ibid) advocate the promotion of the theoretical framework, research questions, role of the researcher and the explicit thought processes during the study. The researcher developed a theoretical framework within which to house this study and had, on many occasions, presented the model at conferences and disseminated to peer and sector experts (Table 4.13). Triangulation and manipulation of data, using data displays, were used during the research to support the validity of the work and also the dissemination activities (academic conferences and papers) allowed credibility to be assessed by third parties.

Table 4.13 Research Method and Findings Disseminated

Dissemination	Audience
Journal Papers (2+1 in review)	Peer Group
Conference Paper (6)	Peer Group and Sector Experts
Chapter in Edited Book (1)	Peer Reviewed
Working Papers (3)	Peer and Public Review
Seminars to Policy Makers – Nationally (8)	Designers of whole systems
Seminars to Professionals, Clinicians and Users (24)	Sub-system experts, clinical experts and patient representative bodies
Seminars to Policy Makers, Professionals, Clinicians and Users – Internationally – Australia, USA, Greece, Sweden, Denmark (7)	Designers and sub-system/clinical experts

Source: Author

Finally, Miles and Huberman (1994) acknowledge the external validity, replicability and transferability of the research. This issue concerns the provision of enough information upon which subsequent studies can be founded. The field research chapters (CHAPTER

5 and CHAPTER 6) were used to present data displays including a high level of detail of each case, both in terms of the firm and its sub-systems.

4.7. Limitations of the study

Every research study involves decisions to accept or reject methods, and to refine the scope of the study. These decisions are taken carefully and set within the constraints of a doctoral programme. As such, it is acknowledged that this work does have limitations which will now be reviewed.

- The first limitation concerns the time period of the study and the focus on improvement activity leading to quality improvement, delivery improvement or cost reduction. At the point of the study, these issues were commonplace in the NHS but to defend this thesis, the measures of enacting and sustaining change were neither refined nor well researched. This fact allows this research an opportunity to contribute to the methods of studying large complex healthcare organisations.

- The second limitation is that a single case study (to allow for depth of study) means that other organisations cannot be directly compared during the study, to see whether other cultures in other hospitals have a bearing on the innovation or sustainability of improvement or indeed if the issues faced by the teams were latent problems in other parts of the NHS.

- The actual number of cases is within the number of multiple case replications advised by Pettigrew (1997) and Leonard-Barton (1990) but each phase is below that appropriate for (even if desirable) the application of positivistic statistical testing (Dimantopoulos and Schlegelmilch 1997). Given a greater amount of time, and access, a second hospital organisation would have been studied.

- Bias in informant responses cannot be ignored during such research and neither can the impact of current events upon the responses of the informant(s). To counteract these limitations, the researcher adopted a multiple informant approach. 'Special circumstances' were also reviewed (at both the interview and

data pattern-matching stages of the study) to see if there were any factors that accounted for very high or very low performance. Reviewing these outlier cases is preferable to the 'smoothing of problems' that happens when data is merely averaged and not interrogated using data displays.

Table 4.14 Main Limitations of Scope and Methodology

Concern	Cause	Countermeasures
Underpinning of Theory	Findings and discussions should be rooted theoretical underpinning – in this case General Systems Theory	Methods should reflect the theoretical stance of the research and hence techniques such as input-process-output analysis recognised in the field of systems theory have formed part of the research design
Bias in response	Findings are bias as a consequence of the particular sub-system assessed	30 sub-systems, from three organisational levels assessed to negate bias
Observer bias	Preconceived deductive analysis to confirm views	The research design includes the triangulation of evaluation through robust methodology in order that researcher bias was limited
Inappropriate Methods	Method selection is based on habit of use by the researcher, rather than the most appropriate use of methods for the questions being posed	The design of the research included reference to past industrial and public sector studies where similar methodology was employed. The learning from that previous activity influenced the design presented for this study
Compatibility of methods from different stances	Ontological assumptions poorly understood	Realist stance taken hence mixed methods appropriate to understanding the implication of quantifiable performance

Source: Author

The main limitations of scope and methodology for this study are shown in Table 4.14. In summary, the validation and tests conducted on the field research were considered appropriate for the research questions that were drawn from the literature gap in OM knowledge. These tests conform to case based research models and guidance (Eisenhardt 1989, Miles and Huberman 1994). Section 4.8 deals with the ethical issues of researching complex organisations.

4.8. Research Ethics

The ethical implications of both conducting this research and the dissemination of the potential impact of this study have been subject to the guidelines of the British Sociological Association (2001). Undertaking this research has been for the purpose of the furtherance of knowledge, all due care has been taken to ensure that the rights of those involved in the study as individuals or collectively are preserved.

Pettigrew (1997) indicates that there is a need for the free choice of participation in research studies while stressing the need for individual and organisational confidentiality. This formed part of the initial discussions with the participating organisation and subsequently the participants of each case, questionnaire, group and individual interviews. Dealings with the gatekeepers of the organisation (Burgess 1984) and the potential effect has also been considered. The previously observed practice of sociologists (Nader 1969, Warren 1980) focusing away from the organisational hierarchy has been challenged through regular participation at the most senior level in the case study organisation.

Additionally, the collection of sensitive information from the participants and subjects of the study has been key to the research, hence this data has been made anonymous.

4.9. Chapter Conclusions

The healthcare field of study is highly topical and is a context that fascinates OM researchers. OM knowledge of the sector is still poor and not well 'joined up'. As such, calls for theories of how the NHS works as a system can be understood, are at a premium. Much of the current knowledge is local and lacking in an holistic approach. The research questions and contribution sought by this work imply that a systems approach is adopted by design, and the use of a case study was imperative given the need for depth of analysis rather than more traditional OM studies involving positivistic methods. Such traditional methods do not work well when subjects are not very well understood and no true concepts/constructs can be operationalised effectively. This chapter has set out and defended the research strategy and methods that underpin this study. It has also provided an account and audit trail of the major decisions that have been taken to delimit the scope of study, and has made visible the acknowledged limitations of the study. CHAPTER 5 discusses the findings of the research.

CHAPTER 5 RESEARCH FINDINGS

'I was to learn later in life, we tend to meet any new situation by reorganising, and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency, and demoralisation.'
Petronius Arbiter 65 AD

5.1. Introduction, Case Context and Findings

This chapter will provide an introduction and overview of the research focal organisation and the nested case studies within. The purpose of introducing the cases in this way is to assist the reader in becoming aware of the issues that face the embedded cases and as a means of contextual sensitisation which is a favoured method advocated by qualitative researchers (Eisenhardt 1989, Leonard-Barton 1990). The embedded cases will be presented and explored using data displays as summary tables, which comply with the protocol proposed by Miles and Huberman (1994). In addition, the cases are enhanced by results of interviews/questionnaire with both middle management, senior management and clinicians to ascertain an holistic view as discussed in CHAPTER 4.

5.2. Case Study Organisation Context[46]

The cost of healthcare provision for the population of the SCO is in the lowest quartile for the region. The organisation, at commencement of the study, served a population of 600,000 and employed many thousand members of staff across 125 sites, of which 20 sites have bed capacity. This bed capacity can be used for community, acute or mental health patients, or a combination of these. The organisation is mature and has been in existence (in many different structural forms) for over 100 years. Some of the existing buildings date back to 1901. The property in which the SCO is housed is in varying degrees of repair. More than 50% of the portfolio is considered to be operational but would require major repair or replacement soon i.e. within 3 years for building work and 1 year for engineering. The nested case studies described in Table 5.3 were situated in this single SCO.

[46] Using an internal Trust Profile report published in 2003, the following data has been summarised and reflects the status as at 2001/2, unless otherwise stated. Full reference to this document has been removed as it would identify the organisation studied.

5.2.1. Population Served

The age spread of the population served by the SCO is representative of the regional statistics (Table 5.1). The growth of the population has been in line with the regional position since 1994. The population is therefore considered representative of the region in which this SCO is situated. The region itself has the highest proportion of over 65s in the UK. The population is both urban and rural with corresponding diverse needs (Healthcare Commission 2004). For the case SCO, social services funding for older people is variable and reported as being the cause of 18% of patients deemed to be Delayed Transfers of Care[47] (DTOC) at commencement of the study.

Table 5.1 Age of Population which SCO serves

Age	Proportion of population served of SCO	Proportion of population in the region
Over 75	7%	8%
Over 65	16%	17%
Population Under 4	6%	6%

Source: Internal Trust Profile Publication data 2001/2

Most other statistics for the SCO are representative of the health of the region as a whole with the exception of people's weight (marginally higher) and levels of exercise (marginally lower). Child poverty affects more in this region than the UK average. The SCO has a higher percentage of adults being treated for heart disease, cancer, respiratory disease, asthma, diabetes, arthritis, or mental health problems than the region within which it is located. It also has the highest Standard Mortality Ratio (SMR) in the region.

5.2.2. Staff Profile[48]

Staff groups comprise nursing, administrative and clerical, ancillary, medical, professions allied to medicine, technicians, scientists, maintenance, dental, and estates. Nursing staff are the largest proportion of those employed (45%). Nursing consists of 66% registered and 34% unregistered.

[47] A DTOC is a patient who is medically fit to be discharged but is still resident in an acute facility due to a place/financial package being unavailable to safely discharge that patient.

[48] Using an internal Trust Profile report published in 2003, the following data has been summarised and reflects the status as at 2001/2 unless otherwise stated. Full reference to this document has been removed as it would identify the organisation studied.

Generally, the numbers of consultants is lower than that recommended by the Royal College's guidelines per capita of population.

Table 5.2 Split of employment contracts vs. gender

	Full Time	Part Time
Male	75%	25%
Female	40%	60%

Source: Internal Trust Profile Publication data 2001/2

More than 50% of the work force was over 40 years of age at commencement of the study. The workforce is made up of 80% females and 20% males. 49% of the workforce is employed on full time contracts and 51% on part time contracts. Table 5.2 suggests that there is a skew towards females having part time contracts of employment.

5.2.3. SCO Service Characteristics – Baseline Information[49]

The average LOS for an acute patient for the period 2000-2001 was 7 days and for all patients it was 8.2 days which was very close to average for the region. However, (by broad speciality) average length of stay for geriatrics is the worst in the region (almost double that of the next organisation) at 70.5 days. LOS was increasing over time in the SCO generally in line with the regional average.

A&E attendances[50] were increasing faster than the regional average (between 5% and 8% over the last 5 years) and the wait in A&E in 1999 (for over 2 hours for treatment) is in the highest quartile for the region. Emergency readmissions within 28 days are lower than the regional average. Emergency admissions[51] have increased over the last 5 years and while generally in line with regional increases on the largest acute site, this has represented significantly greater swing.

Outpatients repeat attendances are the same as the regional average. Day cases per 1000 population are slightly less than the region but increasing in numbers over time. Cancelled operations for inpatients are the second highest for the region. Discharges and deaths are representative of the region.

---

[49] Using an internal Trust Profile report published in 2003, the following data has been summarised and reflects the status as at 2001/2 unless otherwise stated. Full reference to this document has been removed as it would identify the organisation studied.

[50] An attendance is when a member of the public attends an A&E facility and is different to an emergency admission, which is when the patient is admitted to an inpatient bed.

[51] Ibid.

Patients who were not residing in the wards which were related to their primary condition are known as 'outliers'. The SCO was the second highest in the region for daily outliers. This represents 22% of the patients who daily found themselves in an inappropriate ward in the whole region where the SCO resided. The bed capacity for the SCO per thousand resident populations is slightly below the regional average for the acute need.

The total bed stock capacity for the organisation was 2184, of which 1376 were allocated to acute inpatient beds (the focus of this study). At the commencement of the study, 494 (36%) of these acute inpatient beds were considered medical beds. The beds per 1000 resident population have been decreasing and are less than the region's average, but are comparable to England as a whole. Total inpatients for the whole organisation in June 2002 were 7798 and in June 2003 the number was 8278.

In summary, the SCO at commencement of the study (2001/2 data), spent less per head for healthcare than its comparators in the region and had lower consultant numbers. The facilities for acute services were not new, but of varying age and standard. Bed capacity was slightly below the regional average, yet the LOS was representative of the region. This is the case even though medical conditions such as respiratory disease represent a higher proportion than the regional average, and geriatric patients stay in the acute setting significantly longer than other organisations in the region. A patient wait at A&E is likely to be longer than the regional average, and the volume of demand in A&E attendances has increased. Emergency inpatient admissions and discharges are representative of the region, with the exception of the largest acute hospital in the SCO. There is an overall picture of increased volume of cancelled operations and patient outliers.

The SCO is considered generally representative of the regional picture and has been selected for analysis on this basis, to understand the implications of an improvement programme.

5.2.4. Changes in the Environment of the Trust

The trust has undergone many organisational structural changes over the past decade, including a merger. The Chairman of the Trust was particularly concerned with the lack

of speed in which change was enacted. During the initial research at the SCO, secondary data in the form of management reports and interviews with key informants confirmed this gap in expectation.

Frequent restructuring had occurred within the SCO. Concern was expressed particularly regarding the community division which had experienced four structural changes in two years. Another example of restructuring was as a consequence of policy guidance changes on child protection (Healthcare Commission 2004). Restructuring of commissioning arrangements resulting from the dissolution of the Health Authority in 2003 (Healthcare Commission 2004) were all forms of shock[52] to the infrastructure of the SCO.

The sponsor of the programme's objective was to pursue a LT improvement approach as a new methodology for strategic change. A commitment on behalf of the executive team was secured that no redundancies would result from the use of the methodology. The executive considered that the organisation was not providing the range and depth of services which it was required to, and as such, they perceived that people's roles may need to change but not that the number of people employed would have to reduce. Staff involved in the cases were informed of this prior to their (voluntary) involvement.

Improvement activities at the commencement of the research were individually initiated and led, and often had limited connection to strategy or the whole system. Much improvement was focused on technical care and professional interest.

5.3. Nested Cases - description and characteristics

The complete list of nested cases[53] is detailed in Table 5.3 and shows the chronological order in which the cases were initiated[54]. Overall, the cases ran from 2002 and the

[52] Shock in this context means a drag on the human capacity of the organisation (staff, clinical and managerial) impacting normal operations, without any compensatory allowance for the impact.
[53] The term 'nested' was used by McNulty and Ferlie, 2002 in their discussion of business process re-engineering in an SCO.
[54] Date used is the starting point when case was initiated with a team, pre work with sponsor would have occurred.

timeframe for detailed analysis of these cases concluded at the end of 2005, a period of almost 4 years.

The description of the cases in Table 5.3 relates to the main focus for problem resolution. While sponsors provided the focus of the case, teams determined their own problem statements which often were more comprehensive than shown; sample cases will be explored in detail, later in this chapter (Section 5.5). The scope of the investigation for the initial cases was not patient facing. This was a deliberate decision on the part of management. Particularly, this was to ensure sufficient evidence of success of the method of analysis, prior to applying this to critical activity related to patient contact. Hence this reduced both personal (sponsor), and organisational risk of failure.

Table 5.3 Nested Case Studies

Case		Description of intended improvement	Start Date
1	IT Installation of new PC to Desk	Lead time for the installation of standard PC's and peripherals	Apr 02
2	Recruitment	Lead time for Nursing Auxiliary recruitment	Nov 02
3	Linen	Lead time for the linen and laundry process to the bed. Theatre Blues available for staff prior to operations. Personal Laundry for long stay patients	Mar 03
4	Telephone Installation	Lead time for the installation of standard telephones	Jun 03
5	Bank and Agency Invoicing	Lead time for the payment of bank and agency invoices	Jul 03
6	Radiology – Barium Enema	Lead time for barium enema inpatient service across 5 sites	Jul 03
7	General Surgery	Lead time from decision to admit, to discharge	Jul 03
8	Central Sterile Services/Supply Department (CSSD)	Turnaround time of theatre trays	Dec 03
9	Urology	Lead time between referral and decision to admit, or add to inpatient waiting list for Cancer patients	Mar 04
10	TTH's (To Take Home prescription drugs)	Lead time of delivery of drugs to wards, for patients to take home	Mar 04
11	General Medicine	Lead time from decision to admit, to discharge for medical patients	Apr 04
12	Manual Payments	Lead time from receipt of invoice to payment	Apr 04
13	Month End Reporting	Lead time to produce month end reports for Managers	Apr 04
14	Community	Lead time for the inpatient community stay	May 04
15	Echo's	Lead time from decision to refer an inpatient for an echocardiograph, to obtaining results.	Sep 04
16	Day Surgery	Increase throughput of day surgery unit	Oct 04
17	Procurement	Lead time of medical and surgery supplies to wards	Oct 04
18	A&E	4 hour throughput of patients	Dec 04
19	IT Faults	Lead time from receiving PC and telephone faults and requests to resolution	Jan 05
20	Risk	Lead time for reporting and recording incidents	Feb 05
21	Respiratory Medicine Outpatients	Lead time from GP referral to Outpatient Chest clinic appointment	Feb 05

Case		Description of intended improvement	Start Date
22	Medical Day Unit	Throughput of haematology and oncology patients	Feb 05
23	Occupational Health	Lead time for staff referral to Occupational Health	Feb 05
24	Medical Staffing	Lead time for the recruitment of junior medical staff	Apr 05
25	Ultra Sound	Lead time for ultrasound inpatient service	Apr 05
26	Clinical Coding	Lead time for clinical coding	Apr 05
27	GPs Out of Hours	Throughput of triage	May 05
28	Fleet	Service review	Jun 05
29	Rheumatology	Lead time from referral to booking for outpatients	Jul 05
30	Infection Control	Service review	Sep 05

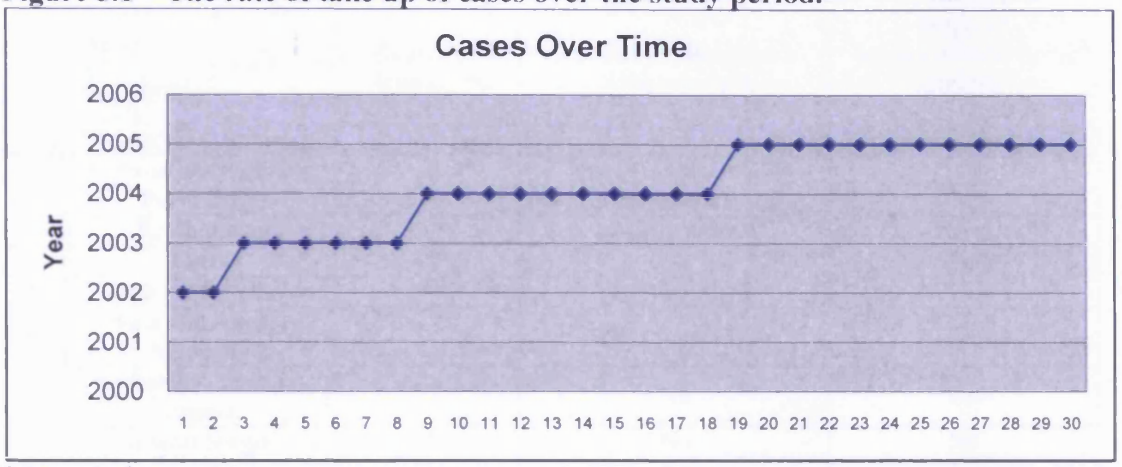
Source: Author

An explicit prerequisite for all nested cases was the aim to do more with the same resources. This was included as a boundary to challenge teams who were perceived, by the executives, to show a preference in spending their way out of a problem.

Following an initial detailed review, cases 28 and 30 have been excluded from the study as they were primarily service reviews and the application of the standard methodology was questionable. GP out of hours (case 27) represents an addition to the organisations normal mandate as a consequence of legislation changes around the European Working Time Directive (EWTD) and GP contracts during the research period (representing a drag on the organisations resources[55]). This service is based on a call centre model and a pool of GPs, hence this case does not represent the main business of the organisation. This case has been excluded as a comparator due to its newness and different characteristics. Further study in this area could be informative particularly relating to the operational integration into the organisational system, but falls outside the scope of this research.

[55] This is a further example of infrastructure shock, with no corresponding resources to manage the required changes. There is an assumption that excess capacity is available to enact such changes without impact on day to day operational service.

Figure 5.1 The rate of take up of cases over the study period.



Source: Author

The rate of take up of cases increased over the period (Figure 5.1). Chronologically, the seventh nested case directly relates to patient facing services and was the 'General Surgery' case which started in July 2003, more than a year after the first case. By 2004 there were four cases directly related to patient contact (Table 5.3). Ten nested cases (a third of the sample) were immediately patient facing, ensuring a critical mass of cases exploring direct patient flow (Table 5.3).

The nested cases were initiated by a sponsor (Table 5.5), who determined the initial boundary of the case. However, the nature of patient flow meant that some cases were adjusted during the scoping stage, including activities external to the organisation. Some nested cases included individuals, who were representatives of the customer and/or supplier such as Social Services, Staffing Agencies, etc. (Table 5.4). With the exception of the cases excluded from the study and the day units (cases 16 and 22), the initial scope of all the nested cases generally crossed a number of functional and site boundaries encompassed as part of the defined scope. Hence a cross section of the organisation's staff participated, thus minimising the influence of peculiarities of any particular site within the SCO.

Table 5.4 Cases which include Implementation External to the Organisation

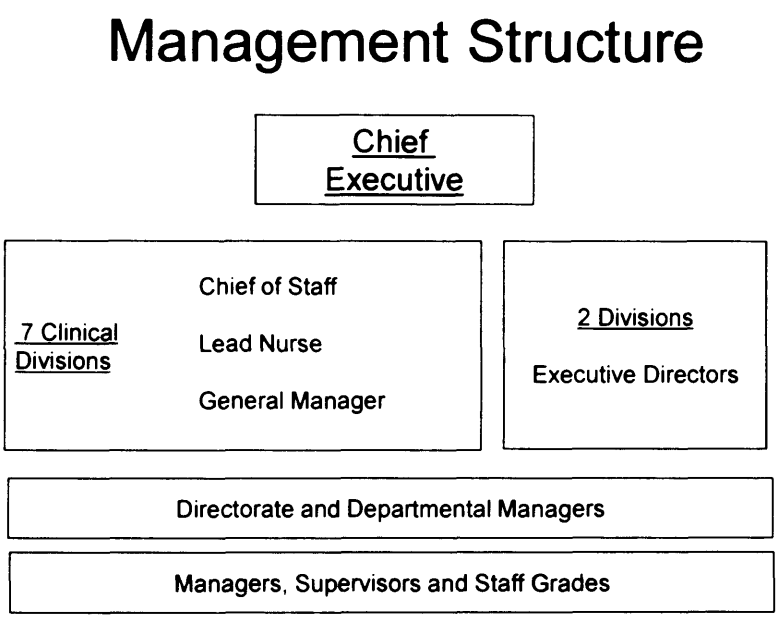
Case		Degree of closeness to Patient Flow	Proposed Implementation Scope crossed organisational boundaries	Proposed Implementation Scope crossed geographical/site boundaries
1	IT Installation of new PC to Desk	3rd	Yes (Customers and Suppliers)	Yes
2	Recruitment	3rd	Yes (Suppliers)	Yes
3	Linen	2nd	No	Yes
4	Telephone Installation	3rd	Yes (Suppliers)	Yes
5	Bank and Agency Invoicing	3rd	Yes (Suppliers)	Yes
6	Radiology – Barium Enema	2nd	No	Yes
7	General Surgery	1st	No	No
8	CSSD	2nd	No	No
9	Urology	1st	No	No
10	TTH's	2nd	No	Yes
11	General Medicine	1st	Yes (Community)	Yes
12	Manual Payments	2nd	Yes (Suppliers)	No
13	Month End Reporting	3rd	No	No
14	Community	1st	Yes (Acute)	Yes
15	Echo's	2nd	No	No
16	Day Surgery	1st	No	No
17	Procurement	2nd	Yes (Wards)	Yes
18	A&E	1st	Yes (Wards)	Yes
19	IT Faults	3rd	No	Yes
20	Risk	2nd	No	Yes
21	Respiratory Medicine Outpatients	1st	Yes (GPs)	No
22	Medical Day Unit	1st	Yes (GPs)	No
23	Occupational Health	3rd	No	Yes
24	Medical Staffing	3rd	Yes (Suppliers)	Yes
25	Ultra Sound	2nd	No	Yes
26	Clinical Coding	3rd	No	Yes
27	GPs Out of Hours	1st	Yes (GPs)	Yes
28	Fleet	3rd	No	Yes
29	Rheumatology	1st	No	Yes
30	Infection Control	2nd	No	Yes

Source: Author

Proposals for implementation of improvement were varied in their ambition to move outside the organisation's span of control (less than 50%). There was more of a propensity to be cross cutting geographically with $^{2}/_{3}$ of the cases including multiple sites in their plans. The absence of any patients in teams was a purposeful decision relating to ethical approval (although a small amount of teams did include patients for parts of the diagnostic stage, this was without the researcher being present) and hence is an area which requires further study.

Sponsors for the cases were line management or clinical Chiefs of Staff (COS) drawn from the seven clinical divisions responsible for the operational management of the organisation (Healthcare Commission 2004)[56]. Management sponsors were either at general manager, directorate or departmental level. Divisions were uneven in size and scope of activity. The Chief Executive did not sponsor any cases (although took a very hands on interest in the A&E (case18) as this took place at a time when there was specific regional pressure on performance). COS were the counterparts of the managers of the divisions as were lead nurses (Figure 5.2). Two further divisions were lead by executives and managed the significant bulk of 3rd level activities in the Trust.

Figure 5.2 Management Structure of Focal Organisation



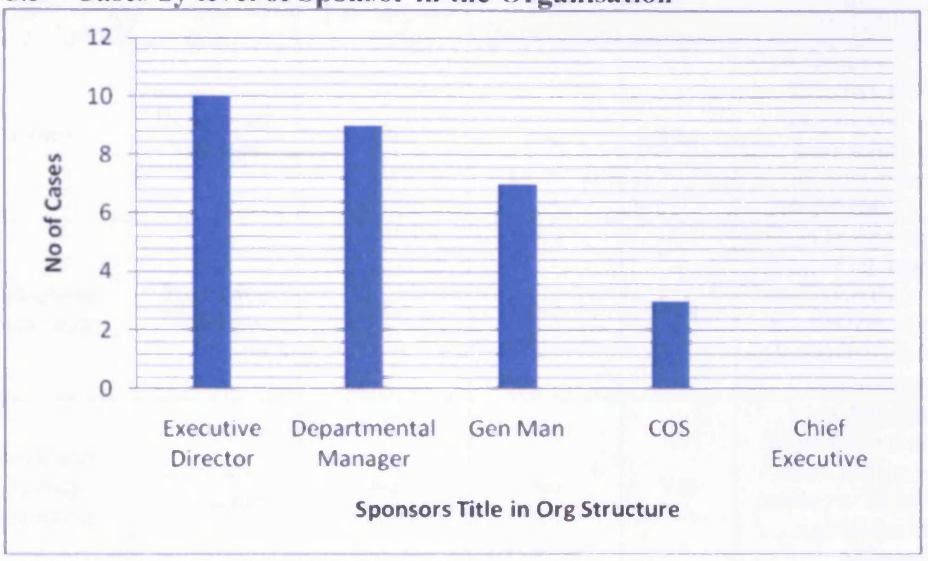
Source: Author

Managers or COS (who were sponsors) role was typically a leadership one rather than being directly involved in teams, whereas nurse leads were often part of the team. Sponsors would explicitly attend the early part of the first day and last day of analysis. Following which they would lead or sponsor (through a member of their management

[56] Each division had a leadership team consisting of a COS, general manager and lead nurse, who reported to the Chief Executive.

group) the implementation of any potential findings. Middle managers, supervisors and all staff, clerical and administrative grades could also be participants within cases.

Figure 5.3 Cases by level of Sponsor in the Organisation



Source: Author

The initial cases were sponsored by the director of the whole programme. This sponsor also initiated more cases than any other sponsor. However, there is no evidence to suggest that the person sponsoring a case affected the progress and outcome (a statistical analysis was not possible due such a small sample size). The Chief Executive did not sponsor any cases since it was believed that doing so would potentially undermine the operational mandate of the reporting structure.

Table 5.5 Sponsors Initial Motivation

Case		Sponsor	Reduced Cost/Increase Productivity in Department	Intended Specifically to Reduce Cost in other Department	Improve Service Levels	Comment
1	IT Installation of new PC to Desk (Pilot to Prove)	Executive Director	Yes	No	Yes	High Profile across the Trust as all departments seemed to have had bad experiences of service. Head count increase had been requested
2	Recruitment N/A	Executive Director	No	Yes	Yes	Executive level scrutiny. Impact on the costs of external staff. High level of vacancies for nursing staff within Trust.

Case		Sponsor	Reduced Cost/Increase Productivity in Department	Intended Specifically to Reduce Cost in other Department	Improve Service Levels	Comment
3	Linen	Department Manager	No	No	Yes	Contribute to: 1 Effective Discharge of Patients: 2. Availability of beds for admission of inpatients
4	Telephone Installation	Executive Director	Yes	No	Yes	High Profile across the Trust as all departments seemed to have had bad experiences of service. Headcount increase had been requested.
5	Bank and Agency Invoicing	Executive Director	No	No	Yes	Time for payment, volume of invoices and reconciliation causing problems. Some 'stop' on supply due to non payment
6	Radiology – Barium Enema	General Manager	No	No	Yes	Queues for patients were weeks
7	General Surgery	Chief of Staff	No	No	Yes	Queues for patients were months and the clinical staff were frustrated at the current system to enable consistent work through the operating theatres.
8	CSSD	Departmental Manager	No	No	Yes	Supply of surgical trays for lists was a key problem identified in the General Surgery case
9	Urology	Chief of Staff	Yes	No	Yes	Key target for cancer services
10	TTH's	General Manager	No	No	Yes	Supply of drugs to take home was a key problem identified in the General Surgery case for discharge
11	General Medicine	General Manager	No	No	Yes	Bed capacity is critical to the system. Improvement in General Medical patient flow can help bed availability for the peaks in demand and stop A&E patients having to be held on trolleys in A&E

Case		Sponsor	Reduced Cost/Increase Productivity in Department	Intended Specifically to Reduce Cost in other Department	Improve Service Levels	Comment
12	Manual Payments	Executive Director	Yes	No	Yes	Impact on suppliers result in instances of the Trust being put on hold and no supply disrupting the system. Time for manual payments requiring additional staffing
13	Month End Reporting	Executive Director	No	No	Yes	Key process for sponsor - pressure to provide data in shorter time intervals means (Leadership) this process must lead by example
14	Community	General Manager	No	No	Yes	Identified as key to both General Surgery and General Medicine to provide capacity for patients who require non acute/critical care beds
15	Echo's	Departmental Manager	Yes	No	Yes	One of the investigations which impact on the Inpatients LOS (mainly medical). Headcount increase had been requested
16	Day Surgery	General Manager	No	No	Yes	Volume of day surgery cases which were being undertaken were stated not to be sufficient (Audit Commission)
17	Procurement	Executive Director	No	Yes	Yes	Supply of materials to wards had been a common theme throughout the cases undertaken to date. Preliminary to transfer of budgets to departmental heads rather than central planning.
18	A&E	General Manager	No	No	Yes	A&E performance against 4 hour target
19	IT Faults	Executive Director	No	No	Yes	Length of time to wait for answer initial call and number of callers hanging up due to wait

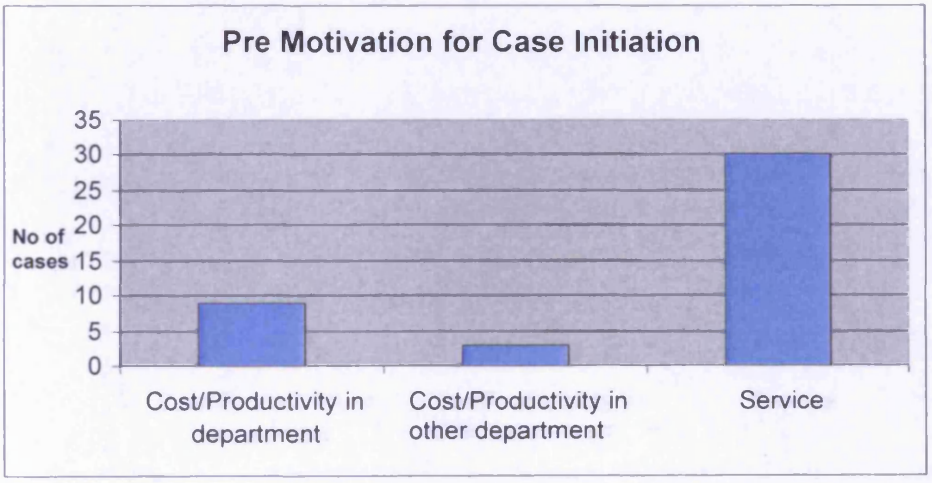
Case		Sponsor	Reduced Cost/Increase Productivity in Department	Intended Specifically to Reduce Cost in other Department	Improve Service Levels	Comment
20	Risk	Departmental Manager	No	No	Yes	To improve feedback timescales to improve ability to resolve problems
21	Respiratory Medicine Outpatients	General Manager	No	No	Yes	Time for outpatient appointment reduced, improving health of patient as a consequence of earlier treatment
22	Medical Day Unit	Departmental Manager	No	No	Yes	Time for patients to be treated
23	Occupational Health	Executive Director	No	No	Yes	Linked to the Recruitment Project - where time to get Occupational Health checks for new staff/bank and agency were highlighted as a problem
24	Medical Staffing	Executive Director	No	No	Yes	Linked to the Recruitment Project - using the success of the first project as a platform to replicate success in service to the Trust
25	Ultra Sound	General Manager	Yes	Yes	Yes	Service was delaying discharge of patients
26	Clinical Coding	Departmental Manager	No	No	Yes	Coding was an issue in all the patient focused projects as recent data could not be used due to lack of complete records
27	GPs Out of Hours	Chief of Staff	No	No	Yes	New Service Introduction. Poor performance required immediate improvement of response to patients
28	Fleet	Departmental Manager	Yes	No	Yes	Review of logistical support to other services. Trust under cost pressure. Service review (returned to focus on departmental optimisation)

Case		Sponsor	Reduced Cost/Increase Productivity in Department	Intended Specifically to Reduce Cost in other Department	Improve Service Levels	Comment
29	Rheumatology	Departmental Manager	Yes	No	Yes	Trust under cost pressure
30	Infection Control	Departmental Manager	Yes	No	Yes	Trust under cost pressure. Service Review (return to focus on departmental optimisation)

Source: Author

Table 5.5 and Figure 5.4 codify the initial operational motivation for selecting the cases. Clearly some sponsors had a greater span of control of resources than others. While the initial motivation focuses on cost improvement, the main bulk of middle order cases are focused on service and then at the end of the study (in year four) a re-emergence of cost as the focus can be seen. Safety, particularly patient safety, was not a prime motivator of sponsors.

Figure 5.4 Motivation to initiate the case



Source: Author

Given the nature of the study, the motivation for the sponsors to initiate the cases was recorded. Table 5.6 classifies this background at the time of the initiation of the cases. The initial cases were within the span of control of executive directors. The first case was to trial the approach and the second was to engage another executive in the process

to politically gain their support in adoption of this method for change. Subsequently, the first executive applied the approach to deal with direct problems and issues which his division was experiencing. Table 5.6 also demonstrates the political impact on the organisation. Initially directorates became involved through a mixture of control of finances (if the directorate/department was asking for an increased budget or capital equipment then they may have been asked to participate as part of a validation of need) and personal recommendation. Cases 7, 9 and 27 were different in that they were sponsored by the clinical lead in the area (Table 5.6) with the general manager being passive in 7 and 9 (case 27 has been previously discussed).

Table 5.6 Political Motivation of Sponsors

Case		Start Date	Sponsor	Risk for Sponsor	Importance to Sponsor	Political
1	IT Installation of new PC to Desk (Pilot to Prove)	Apr-02	Executive Director	High	High	Sponsor of total programme. Needed to have case in own division (leadership). IT regarded by sponsor as a microcosm of the organisation. Secondary motivations to use methodology to test if additional staff requests were warranted. IT departmental manager did not consider this to be the biggest problem with the department
2	Recruitment N/A	Nov-02	Executive Director	High	High	Important to get another executive director to support case methodology to enable spread across Trust
3	Linen	Mar-03	Departmental Manager	Medium	Low – seen as hurdle to get capital investment	Undertaken as a training activity – Departmental Manager pressured to be the lead as service was 'more like manufacturing'. Secondary motivation of Executive Managers was to test the need for requested capital expenditure
4	Telephone Installation	Jun-03	Executive Director	Low	Medium	Shows ability to spread across departmental boundaries - links to Case 1
5	Bank and Agency Invoicing	Jul-03	Executive Director	Low	Medium	Sponsors main area of responsibility. Prepared to move into core departmental activity. Issues with payment timeliness impact staffing levels
6	Radiology – Barium Enema	Jul-03	General Manager	High	High	Engaged a high influencing General Manager who requested to be involved with the research, in particular to use standard method to help solve operational issues. Process considered more like 'manufacturing'
7	General Surgery	Jul-03	Chief of Staff	Low	High	Clinical Sponsorship. Perception (and frustration) that operations were cancelled due to lack of appropriate and available beds. Intellectual enthusiast, chief of staff of surgery (Trust wide) attended the initial events. First clinically lead case, with general manager's indulgence
8	CSSD	Dec-03	Departmental Manager	High	High	Spin Out following General Surgical case highlighted difficulties. Offered opportunity to address trend in surgical requests for 'special' trays supplied externally to the organisation
9	Urology	Mar-04	Chief of Staff	Medium	Medium	Initiated as a learning case for a member of the 'Network'. Cancer waiting time target of 2 weeks

Case		Start Date	Sponsor	Risk for Sponsor	Importance to Sponsor	Political
10	TTH's	Mar-04	General Manager	Medium	Low	General Manager asked to sponsor following General Surgical case highlighted difficulties. Departmental manger already had a solution (using capital investment for a robot for dispensing). Saw this project as an imposition and distraction (underlying this was the perception of professional capability being challenged)
11	General Medicine	Apr-04	General Manager	High	High	Pressure for performance for this sponsor was high as remit was Trust wide. Perception was that poor performance in unscheduled care (timely discharge) was the cause of cancellations in surgery (no bed availability). A&E/MAU services had intervals of Ambulances with patients not admitted
12	Manual Payments	Apr-04	Executive Director	High	High	When something goes wrong (increasing) - manual payments was an outcome hence an increasing need for resources and a big deal for service if staff/supplier payments delayed. Recognised as underlying multiple causes
13	Month End Reporting	Apr-04	Executive Director	Low and Increasing	Medium	While service expectation low from customers the example was key for Sponsor to demonstrate going through the same process as clinical departments
14	Community	May-04	General Manager	High	High	New sponsor increasing range of divisions engaged and increased clinical area support. Spin out of General Medicine project but not seen as imposed, rather, as an opportunity
15	Echos	Sep-04	Departmental Manager	Medium	High	Had tried to resolve waiting list problem and had not been able to do so. Asked to be involved in research, in order to use standard methodology to achieve operational results
16	Day Surgery	Oct-04	General Manager	Medium	High	Enthusiastic converter (departmental manager). Independent of top management, applied standard methodology as a way of solving her problem of queues.
17	Procurement	Oct-04	Executive Director	Medium	High	All cases, thus far, highlighted difficulties with the supply of materials, hence a spin out from other nested cases
18	A&E	Dec-04	General Manager	High	High	Chief Executive personally requested project to resolve the issue of time of waits in A&E and impact of ambulance queues
19	IT Faults	Jan-05	Executive Director	Medium	Low	Reinforce the initial success in IT and show the organisation spread
20	Risk	Feb-05	Departmental Manager	High	High	Incident reporting considered a chore by managers and the response times were outside the prescribed 28 days
21	Respiratory Medicine Outpatients	Feb-05	General Manager	Medium	High	Used to enable thinking across the whole of outpatients in one hospital. Case included a known issue with dominant manager. Availability of outpatient clinics slots were perceived constraint to planned waiting time
22	Medical Day Unit	Feb-05	Departmental Manager	High	High	External pressure to maximise opportunity to defer demand from inpatient and hence improve waiting time
23	Occupational Health	Feb-05	Executive Director	Medium	High	Highlighted as an area of delay in recruitment case 2
24	Medical Staffing	Apr-05	Executive Director	Low	Medium	Natural next step for recruitment
25	Ultra Sound	Apr-05	General Manager	Low	High	Natural next step for this directorate, delay in outpatient appointments due to perceived shortage of skills and hence capacity

Case		Start Date	Sponsor	Risk for Sponsor	Importance to Sponsor	Political
26	Clinical Coding	Apr-05	Departmental Manager	High	High	Enthusiastic converter pulls rather than top down push. Coding a particular problem for clinical projects as the delay for coding meant data sets were not recent
27	GPs Out of Hours	May-05	Chief of Staff	High	High	New service introduction due to changes in GPs' contracts. Issues with launch and case designed to iron out these 'introduction' problems and make service safe for patients
28	Fleet	Jun-05	Departmental Manager	Medium	High	Political manoeuvring of directors ('take over' of the programme from originating executive) hence increase in this departments activity
29	Rheumatology	Jul-05	Departmental Manager	Medium	High	Motivated by queue lengths for patients. Enthusiast looking to replicate success of earlier outpatient cases
30	Infection Control	Sep-05	Departmental Manager	High	High	Political manoeuvring of directors ('take over' of the programme from originating executive) hence increase in this departments activity

Source: Author

As time passed, the perceived success of the approach initiated a power struggle regarding the place in the structure to where the work should most logically report. Following conclusion of the research phase, the lead sponsorship for LT has moved from finance to HRM. Section 5.4 presents a taxonomy for patient flow and flow performance.

5.4. Classification of Nested Cases in relation to direct patient contact and dependencies

Some of the nested cases were 'spin outs' of earlier cases. These focused either on identified constraints to the achievement of the overall objective of the original case, e.g. To Take Outs (TTOs) to enable surgery to redesign the service or the next logical area for review e.g. General Medicine. Interdependencies between sub-systems within healthcare SCOs are rarely discussed in literature possibly because of the focus of studies on parts of SCO systems (Table 4.4). One attempt to profile types of lean healthcare case studies (Brandao de Souza 2009) using a literature review, proposed possible classifications as 'manufacturing like', 'managerial and support', 'patient flow', and 'organisational'. Although these classifications recognise that there are inherent constraints in the adoption of LT in differing sub-systems, the classification is rejected by the author as insufficiently sensitive to the dependencies between sub-systems (Table 5.8). The suggestion that the

unique feature of 'ethical concerns' for work redesign is only applicable to 'patient flow' and in particular direct patients contact, is too simplistic (Proudlove et al. 2008). These classifications also implicitly reject adoption of OM concepts arising from manufacturing other than those which exhibit 'manufacturing like' characteristics[57]. Once again this is unhelpful when exploring new types of work design in healthcare. Therefore a taxonomy has been developed by the author to enable an in depth analysis of sub-systems relating to the closeness of contact with a user of the service. This then facilitates a review of the implications of sub-systems dependencies in delivering whole systems improvement and flow performance.

The taxonomy consists of three levels. The first is 'direct patient contact'; where a case was predominantly related to the route and treatment which the patient experienced in the organisational system (1st level contact). The second level is related to specialist groups, often located geographically away from the patient but whose activities are time essential to patient flow and may or may not require direct contact with the patients e.g. tests, investigations, prescription drugs to have before discharge from hospital etc. These could be described as 'indirect patient contact'. Finally the third level cases do not relate to patient contact, yet are intended to enable the organisation to operate and in that context related to patient flow. These have been referred to as 3rd level (Table 5.7).

[57] 'Manufacturing like' relates to the concept of a mass production model rather than a range of OM approaches as described in Section 3.5 of this thesis

Table 5.7 Relationship of cases to patient contact

Case		Start Date	Degree of closeness to Patient Flow	Scope crossed departmental boundaries
1	IT Installation of new PC to Desk	April 2002	3rd	Yes
2	Recruitment	November 2002	3rd	Yes
3	Linen	March 2003	2nd	Yes
4	Telephone Installation	June 2003	3rd	Yes
5	Bank and Agency Invoicing	July 2003	3rd	Yes
6	Radiology - Barium Enema	July 2003	2nd	Yes
7	General Surgery	July 2003	1st	Yes
8	CSSD	December 2003	2nd	Yes
9	Urology Surgery	March 2004	1st	Yes
10	TTH's	March 2004	2nd	Yes
11	General Medicine	April 2004	1st	Yes
12	Manual Payments	April 2004	2nd	Yes
13	Month End Reporting	April 2004	3rd	Yes
14	Community	May 2004	1st	Yes
15	Echo's	September 2004	2nd	Yes
16	Day Surgery	October 2004	1st	No
17	Procurement	October 2004	2nd	Yes
18	A&E	December 2004	1st	Yes
19	IT Faults	January 2005	3rd	Yes
20	Risk	February 2005	2nd	No
21	Respiratory Medicine Outpatients	February 2005	1st	Yes
22	Medical Day Unit	February 2005	1st	No
23	Occupational Health	February 2005	3rd	Yes
24	Medical Staffing	April 2005	3rd	Yes
25	Ultra Sound	April 2005	2nd	Yes
26	Clinical Coding	April 2005	3rd	Yes
27	GPs Out of Hours	May 2005	1st	Yes
28	Fleet	June 2005	3rd	No
29	Rheumatology	July 2005	1st	Yes
30	Infection Control	September 2005	2nd	No

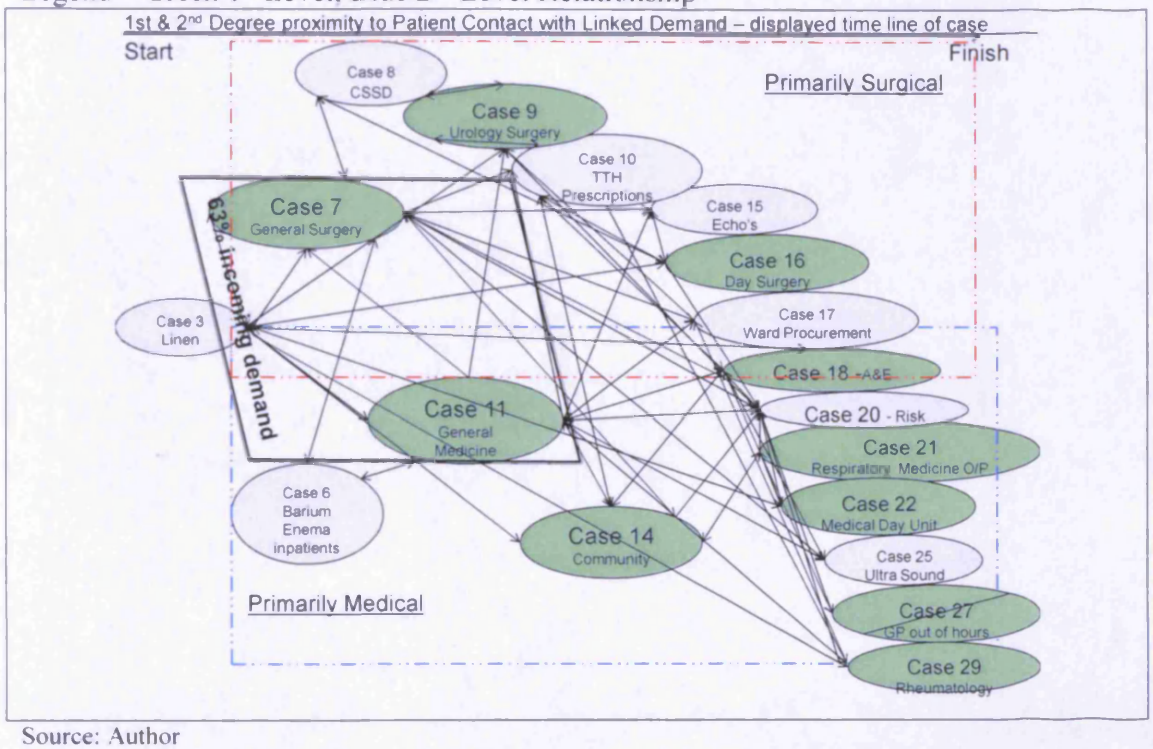
Source: Author

The connections between 1st and 2nd level cases have been visually displayed by this taxonomy (using a colour code) against their chronological order (Figure 5.5). This analysis revealed that there had been an unintended shift during the research from cases which were within the surgical domain to those which were situated in the medical domain of the organisational structure (surgical highlighted by red boundary and medical highlighted as blue boundary, Figure 5.5). In Table 4.4 the literature review highlighted a focus on surgical cases (which is in contradiction to the findings of Mazzocato et al. 2010, where only LT literature was reviewed). While this was not the focus of the study, further research is warranted into the differences in application of improvement

methodologies between surgery and medical disciplines, through which an understanding of difference in these disciplines relating to implementation can evaluated.

Figure 5.5 Relationship of 1st and 2nd degree proximity to patient Nested Cases over time and with one another

Legend – Green 1st Level, Blue 2nd Level Relationship



Source: Author

Secondary data, from the PAS for 2001-2002, indicates that two of the cases investigated as part of this research, general surgery[58] and general medicine (cases 7 and 11) represented 63% of inpatient demand (this includes planned and unplanned admissions). In addition, PAS data from the SCO dating from January 2004[59] to March 2007[60], has been reviewed and will be discussed more in section 5.8, in relation to impact of the cases on whole system performance and patient flow.

The nature of the organisational system means cases are nested i.e. interrelated with shared demand, capacity, and or skill dependency for the fulfilment of tasks to enable

[58] Patient flows focusing on surgical specialism have featured heavily in healthcare literature, yet represent a smaller proportion of the inpatient demand of an SCO than medical flows.
[59] Chosen because the implementation of improvement was anticipated to have started to have an effect on the whole system.
[60] 15 months after the formal conclusion of the research.

flow performance. The connecting arrows in Figure 5.5 highlight that there are direct relationships between the first and second level cases. The number of links by type (Table 5.8) has been analysed and indicate that 2nd level relationships are not dependant on each other, but they are linked by multiple demand streams from 1st level cases. This suggests for 2nd level cases, understanding the whole and the parts of the system are of equal importance, i.e. understanding whole demand across the service as well as the specific patterns and variability of demand of differing patient facing services. With this comes the need to consider the potential of segmenting work to ensure appropriate service characteristics are met.

Where resources are shared by sub-systems, this tends to be related to a clinical skill or the bed capacity in which a patient will reside during their EOC. For 2nd level cases it is easily possible to substitute materials, such as linen or common drugs (either a direct replacement or equivalent[61]), with those supplied in neighbouring wards, thereby maintaining patient flow (dealing with effects rather than root causes). The ease (or not) with which clinical skills or beds can be substituted while a feature of both 1st and 2nd level cases is not so clear. Where resources are shared, these can affect the performance of the related cases. Case 3 did not affect the safety performance of the service.

Shared resources may be planned e.g. the scheduling of skills in outpatients as well as surgery and ward rounds, or not planned e.g. in the case of specialist ward bed capacity in times of peak demand on the system (hence the emergence of patients residing in 'outlying' wards which do not specifically cater for their clinical condition). Shared resource means that the resource can be substituted out of another area. Doctors or fully staffed bed capacity can sometimes be substituted for other doctors or beds. It is recognised that true substitution is not always possible i.e. fully staffed bed capacity may not be appropriate for the patients needs e.g. High Dependency Unit (HDU) beds are rarely shared but they may be occupied by patients who no longer have a clinical need to be in those beds because beds in the most appropriate place are not available. The degree to which sharing of resources is expected and part of the underlying assumptions of the system design was observed as strong (implicitly a rule) within the case organisation.

[61] This would only be related to the packet size or tablet weight, as appropriate.

Table 5.8 Classification of relationships of case to demand, resource and hence ability to perform (S=Safety, Q=Quality, D=Delivery)

Legend – green 1st level patient contact, blue 2nd level patient contact

Nested Case	Links 1st Level	Links 2nd Level	Shared Demand	Shared Resource (dependency)	Resource	Material Substitution (kit robbing)	Shared Performance (dependency)	Type of Performance
3	8	0	Yes	No	-	Easy	Yes	Q, D.
6	2	0	Yes	Yes	Skill (Dr)	Hard	Yes	S, Q, D.
7	**3**	**8**	**No**	**Yes**	**Bed Capacity**		**Yes**	**S, Q, D.**
8	3	0	Yes	No	-	Hard	Yes	S, Q, D.
9	**2**	**5**	**No**	**Yes**	**Bed Capacity**		**Yes**	**S, Q, D.**
10	7	0	Yes	No	-	Range: Easy (simple surgical procedures) to Hard	Yes	S, Q, D.
11	**3**	**6**	**No**	**Yes**	**Bed Capacity**		**Yes**	**S, Q, D.**
14[62]	**3**	**3**	**No**	**No**	-		**Yes**	**S, Q, D.**
15	3	0	No	No	Skill (Dr)	Hard	Yes	S, Q, D.
16	**0**	**5**	**No**	**Yes**	**Surgical Skill (Dr)**		**Yes**	**S, Q, D.**
17	4	0	Yes	No	-	Easy	Yes	S, Q, D.
18	**3**	**2**	**No**	**Yes/No**	**Bed Capacity, Skill (Dr)**		**Yes**	**S, Q, D.**
20	10	0	Yes	Yes	Skill (Dr)	Relative	Yes	S, Q, D.
21	**2**	**1**	**No**	**Yes**	**Skill (Dr)**		**Yes**	**S, Q, D.**
22	**1**	**2**	**No**	**Yes**	**Skill (Dr)**		**Yes**	**S, Q, D.**
25	2	0	No	No	Skill (Dr)	Hard	Yes	S, Q, D.
29	**1**	**4**	**No**	**Yes**	**Skill (Dr)**		**Yes**	**S, Q, D.**

Source: Author

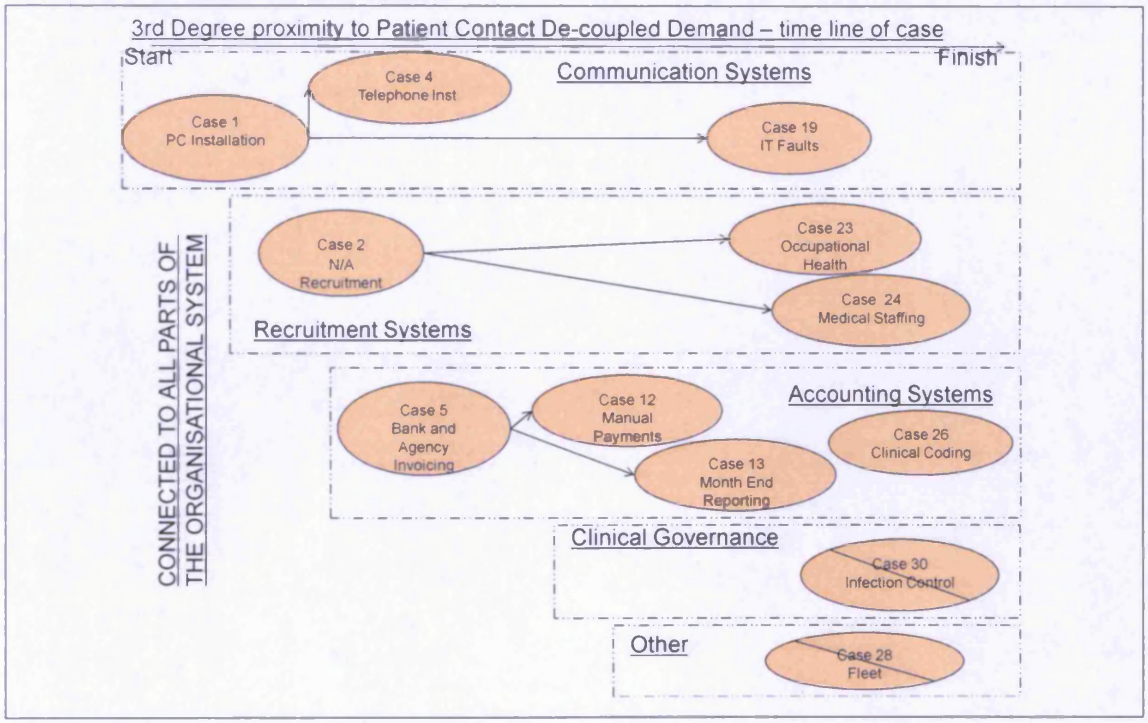
Neither clinical skills nor bed capacity necessarily affects patient flow if there is capacity of these features in the system. However, the multiple options for patient flow attribute to the notion of healthcare complexity (Spear and Bowen 1999) rather than flexibility. Additionally, when moving towards an 'efficient' system, these dependencies will have the potential to become inhibitors to flow. As indicated in section 5.2.3, the organisation reported a shortage of consultants which could deliver such an impact. OM

[62] Case was across organisational boundary with social services and community occupational therapy

organisational design and improvement strategies include four possible solutions to this type of constraint by eliminating, combining, rearranging or simplifying work to overcome the constraint (Graupp and Wrona 2006). The findings in Section 5.5 (and as proposed by Ohno 1988 [see Section 3.5]) indicate that teams that reduce the effect of shared resources on the system (which often arose as a consequence of an inspection activity), and hence improved sub-system performance and with it, whole system performance.

The 3rd level cases were primarily independent of patient demand. They did not share resources although the teams in the nested cases did highlight the 3rd level cases as issues. Indeed 3rd level cases could have a causal impact on service safety[63], quality[64] and delivery[65].

Figure 5.6 Relationship of 3rd degree proximity to patient Nested Cases over time and with one another



Source: Author

[63] e.g. data not being available via communications systems.
[64] e.g. levels of staffing being available to conduct an appropriate service.
[65] e.g. material supplies not being available due to non payment of suppliers invoices.

The effect of performance of the 3rd level cases was dampened because of the potential for substitution (i.e. a different product/service which is not exactly right can be substituted to deal with immediate need) and often the problem goes unreported officially. Hence, these cases differed from 2nd level cases because constraints were perceived as generally less severe (more of an irritant) to the service as a whole (or unseen) and did not require immediate resolution, following the occurrence of poor performance (abnormality). The unique properties of these particular 3rd level cases therefore, are the reduced immediacy of response time to satisfy a need e.g. provision of IT, staffing, etc.

Substitution, or work-around, practices were common (e.g. doctors would buy a PC from high street chains; bank and agency nursing would be used to cover nursing shortages, etc.). Hence, substitution may be a short term solution for patient flow, but represented a drag on efficiency i.e. services cost more than budgeted. While 3rd level services were necessary to the organisation (Figure 5.6), they were not the prime purpose of the organisation. Hence the improvement of 3rd level cases were motivated by management as standalone hot spots for cost reduction (independent of the organisational connectivity) and investment avoidance which in turn had de-motivated the staff. Teams that redesigned their sub-system to ensure substitution was no longer necessary (without spending more money) and tested the new model of work design, enabled improved customer satisfaction and reduced the opportunity for failure in patient flow. The direct impact on the whole system performance for patient flow is not clear, but through this research it is possible to quantify this at sub-systems level.

In summary, the feature of the nested cases from this analysis is shown in Table 5.9.

Table 5.9 Characteristics of types of cases within healthcare

Dependency	1st Level	2nd Level	3rd Level
Description	Direct Patient Contact	Indirect Patient Contact	No Patient Contact
Demand	Primary demand (segmented by diagnostic). Multiple potential routes through the system (an implicit preferred route)	Multiple demand streams from 1st level with differing service characteristics	De-coupled
Resource/Skill	Yes (Bed/Clinical)	Yes (clinical) and No	No
Performance	Linked to other 1st level cases e.g. A&E – General Medicine - Community. Critically linked to 2nd possible to substitute for 3rd	Critically linked to 1st, not linked to 2nd and possible to substitute for 3rd	Linked to 1st and 2nd

Source: Author

While much improvement literature is focused on the sub-system level within the NHS (Table 4.4), the implication of this research is that the management should focus on clarity of the interface of sub-systems. Through redesign of sub-systems focusing on the needs of the whole, it is possible to avoid sub optimisation practices, such as substitution, which in turn enables an improved patient flow and staff satisfaction.

5.5. Quantifiable performance results from the Nested Cases

Table 5.10 details quantifiable performance related to the problem statement (Elg and Kollberg 2009) of the all the nested cases at three points of time in the improvement process.

These points in process were defined as:

a) when data was collected as the baseline at commencement of each case (termed 'current state' in Table 5.10);

b) the theoretical potential for improvement following detailed analysis of the secondary and primary data at completion of the diagnostic stage (termed future state). Such measurement is a consequence of a proposed new work design, agreed by the cross-functional teams;

c) the actual results collected after implementing the new work design. This was collected through interview with the sponsor and/or the nominated person to oversee implementation of each case ('achieved as at 2005').

Table 5.10 Assessment of Nested Cases against operational measures related to the technical sub-system

Legend – green 1st level patient contact, blue 2nd level patient contact

Case		Current State	Theoretical Future State	Achieved as at 2005	Implement Involved in diagnostics	Additional Notes	Completed
1	Installation of new PC to Desk (Pilot to Prove)	Mean 18 weeks	< 14 days	< 10 days maintained for 2 years, mean 4, range 2 – 12 days	Yes	Additional activity has been added to this work stream without increase in staff	Yes, Higher
2	Recruitment N/A	Mean 35 vacancies, 16.5 weeks lead time	0 N/A vacancies	1.8 N/A Vacancies end 2003, 5 N/A 05/08/2005, lead time < 4 weeks	Yes	N/A = nursing auxiliary	Yes, Lower
3	Linen	Mean 5.5 days elapsed time for sheet from bed to bed	<5.5. days	Not Completed	Not defined	3 flows reviewed, bed linen to the ward, theatre blues and personal clothing	No
4	Telephone Installation	Mean 21 days, range 1 – 78 days	< 10 days	< 10 days	Yes		Yes, Achieved
5	Bank and Agency Invoicing	> 30 days	< 30 days	Not measured	No		No
6	Radiology – Barium Enema	Mean = 12 weeks, range 2 to 16 weeks across 5 sites	2 weeks waiting time	< 2 weeks waiting time on 3 sites, 3 weeks on 1 site, maintained for 12 months	Yes		Yes, Lower
7	**General Surgery**	**Up to 18 months**	**14 days**	**Not measured**	**Yes**		**No**

Case		Current State	Theoretical Future State	Achieved as at 2005	Implement Involved in diagnostics	Additional Notes	Completed
8	CSSD	Not defined	No operations cancelled due to lack of trays	Not measured	Yes	While performance from this case was not measured it did highlight the increase of specialist surgical equipment required from external sources	No
9	**Urology**	**90% compliance < 10 days, range is 1 – 40 days, mean 16 week for biopsy, range 1 - 360**	**100% compliance < 2 weeks, 1 stop clinic**	**84% June 2005**	**No**		**Yes, Lower**
10	TTH's	Mean 8.45 hours for Surgical wards	None, project stopped 21/07/2005 at request of Head of Pharmacy	Not Completed	N/A		No
11	**General Medicine**	**Mean 7.2 days length of stay**	**60% of patients with a LOS of 4.5 days, 30% assessed out, 90% of observed patients with > 72 hour LOS**	**LOS of 4.5 days not measured, 32% assessed out, 82% observed patients with > 72 hour LOS**	**No**		**Yes, lower**
12	Manual Payments	Number and type of payments per month	95% payments < 30 days, resulting in reduced manual payments	Not completed	Yes		No
13	Month End Reporting	Mean 16 working days	5 working days	Not measured	No		No
14	**Community**	**Mean 38 days**	**< 28 days**	**27.5 days August 2005**	**No**		**Yes, Achieved**

Case		Current State	Theoretical Future State	Achieved as at 2005	Implement Involved in diagnostics	Additional Notes	Completed
15	Echo's	Mean 7 days. range 1 and Hospital B = 20 days Hospital C = 35 days Hospital A= 60 days	100% < 2 working days	100% < 2 working days	Yes		Yes. Achieved
16	**Day Surgery**	**Run hours for theatre lists are 70% of planned elective. Baseline activity day surgery unit 2004/05**	**Run hours for theatre lists are 90% of planned elective. Increase activity by 813 cases 2005/06**	**Not measured**	**Yes**		**No**
17	Procurement	92% within 3 days	Not defined	Not measured	No		No
18	**A&E**	**58% against 4 hour Target**	**95% against 4 hour Target**	**85% July 2005**	**No**	**4 hour target as defined by Regional Authority**	**Yes, Lower**
19	IT Faults	Mean 340 calls fixed per month. no target completion time from receipt to resolution	90% < 1 working day from receipt to resolution. 'extension 5000' answered < 3 minutes	Not completed	Yes		No
20	Risk	> 28 days > 200 forms	< 7 days	< 7 days June 2005	No		Yes. Achieved
21	**Respiratory Medicine Outpatients**	**15 month maximum waiting time**	**Maximum 2 week wait for all outpatient Chest clinic appointments**	**4 weeks wait for general referrals and 44 week wait for asthma referrals**	**Yes**		**Yes, lower**
22	**Medical Day Unit**	**Haem 100% Oncology 90%**	**100% Compliance on both**	**Not measured**	**No**		**No**
23	Occupational Health	2 – 16 weeks	2 weeks waiting time	Not measured	No		No
24	Medical Staffing	Range 700 – 1000 applications per vacancy	< 100 applications per vacancy	Not measured	No		No

Case		Current State	Theoretical Future State	Achieved as at 2005	Implement Involved in diagnostics	Additional Notes	Completed
25	Ultra Sound	Mean 36 hours, range 1 – 80 days. 13 – 15 scans per working day	100% 2 working days. 20 – 21 scans per working day	Not measured	No		No
26	Clinical Coding	Range 7.5 minutes to 33 days, maximum can be > 200 days	Not defined	Not measured	Yes		No
27	**GPs Out of Hours**	**< 70% of calls triaged within 60 minutes**	**95% < 60 minutes**	**98% < 60 minutes**	**Yes**		**Yes, Higher**
28	Fleet	10 staff	Agreed	Progress	No		No
29	**Rheumatology**	**Not defined**	**Not defined**	**Not measured**	**No**		**No**
30	Infection Control	10 staff	Not defined	Not measured	No		No

Source: Author

Table 5.10 shows 16% (5/30) non response (indicated by 'not defined') for cases that did not conclude with a tangible measurement for a theoretical future state design. Two cases were better, four achieved and six were less than the theoretical future state. Significantly, eighteen nested cases (including the five already mentioned) did not have an ongoing measurement for improvement in place at conclusion of the research phase in 2005[66]. Although perceived impact and progress was reported by the respondents, hard evidence was not forthcoming. This inability to measure has also been noted as a feature of UK regional healthcare improvement initiatives (Proudlove et al. 2008, Taylor and Shouls 2008) and re-engineering in USA Hospitals (Walston and Chadwick 2003). The research design had embedded time for the teams to consider the design of a measurement system but thereafter had assumed management competence in implementation and utilisation of measurement systems for improvement (Elg and Kollberg 2009). Hence this was an unexpected outcome. The issues of confidence with data (particularly on the part of management without IT or specific clinical backgrounds),

[66] These nested cases were noted as incomplete for this reason.

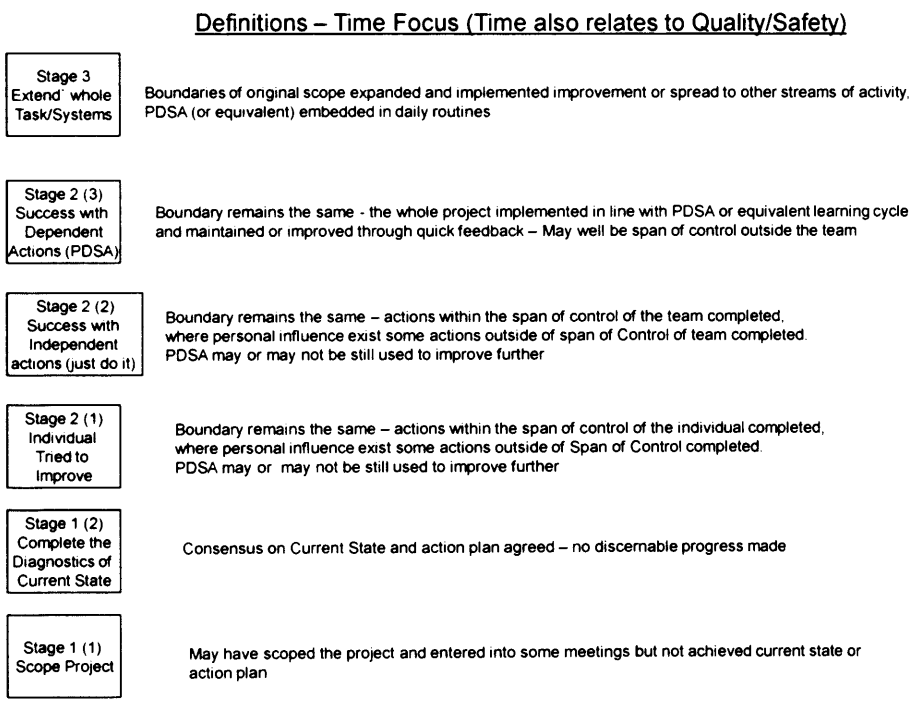
the skill of analysing data and the timing of central data processing (not in real time) were cited by respondents as issues. Furthermore, the sheer complexity and volume of data which was perceived to be required to provide meaningful measurement at the micro level of the system was noted as a potential barrier to learning. Collecting data at the work level (manually) was perceived as an additional workload on front line staff and managers. Additionally, Proudlove et al. (2008) highlights an issue of indiscipline when faced with a rigorous approach to improvement in the NHS. However, it cannot be construed that where tangible measurement was achieved this was as a consequence of the presence of the competency factors in measurement mentioned by Kennerley and Neeley (2002). An example was Case 2, where tangible measurement was reported in Table 5.10 and used dynamically for improvement, but was as a consequence of a facilitator from IT being coincidentally involved in the diagnostic phase of the case, who helped in the development of automatic tracking systems to support the team in understanding the progress which was being made). Kennerley and Neely (2002) highlight an additional barrier, not reported in this research, of the absence of a process for reflection about measurement in the organisation.

Healthcare management familiarity with measurement, such as run charts/SPC, is stressed in the literature as an enabler for improvement (Balestracci 2003). During the diagnostic phases of the nested cases, it was observed that data collection and analysis was considered to be a job for a specialist (data analyst) within a separate department. Managers, clinicians and staff, in general, did not review raw data. This has some parallels with the findings of Weisbord (1992) who noted that there have been four stages to move to whole systems improvement through the process of social action. These stages are:

- experts solve problems;
- everybody solves problems;
- experts improve whole systems;
- everybody improves whole systems (APPENDIX 8).

However, in healthcare, if the data analysis is seen as the domain of an expert, but is a dependent variable for problems solving at an individual level, it could be argued that SCO organisations evolution towards whole system improvement is only at the first stage. Hence the high level of non response highlights that the lack of local measurement for improvement is an inhibitor, i.e. not to action but to learn about the impact of action. The measurement instrument was founded on the progress of cases against the standard methodology process (section 4.6) of diagnostics (Stage 1), implementation (Stage 2) and spread (Stage 3). Grading within these stages was also developed and definitions produced (Figure 5.7). These definitions were then used in interviews with middle managers who were asked to classify how much progress had been made in cases for which they had responsibility.

Figure 5.7 Measurement instrument for Nested Cases regarding progress against standard methodology



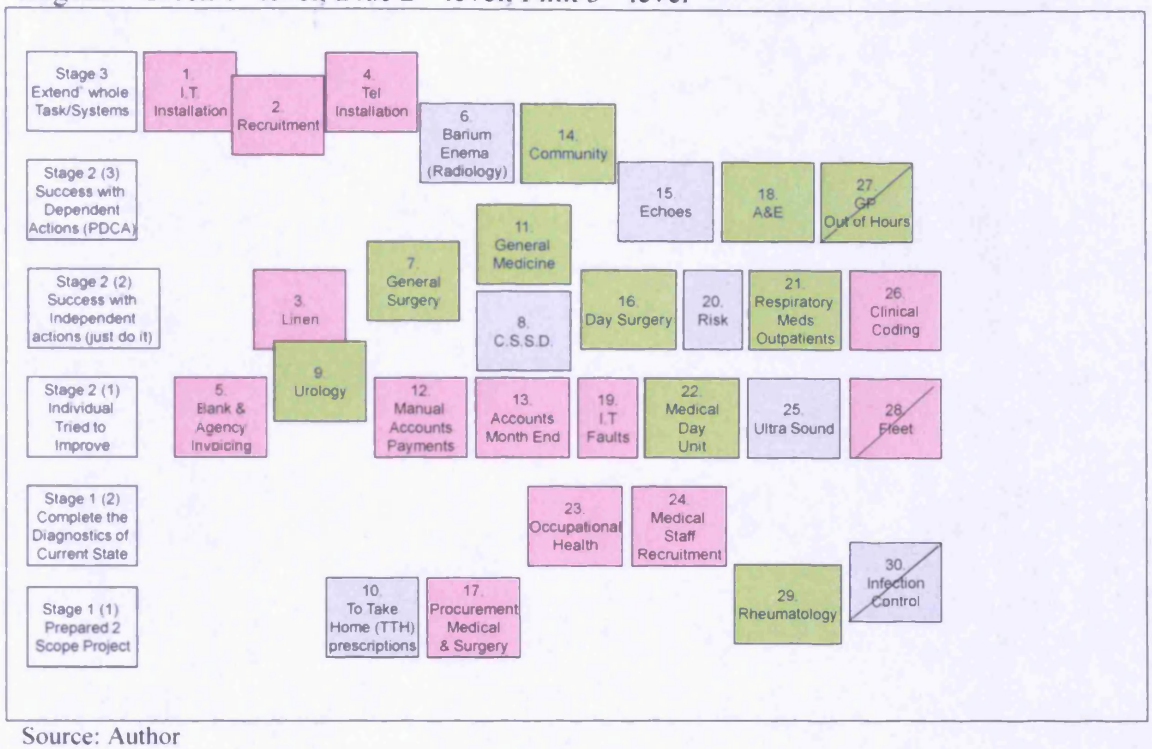
Source: Author

From each nested case at conclusion of Stage 1 there were explicit tasks for improvement which were considered appropriate by the team to achieve the future state. These were classified in terms of immediacy and ease of implementation (referred to as short, medium and long). The short term tasks were usually within the span of control of those

who were participants in the team. The objective for all cases was that following the current/future state review, implementation of activities would necessarily raise issues which may not have been initially considered (in Stage 1), or establish that assumptions in the planning stage were not correct. PDSA as an NHS standard process for the management of improvement provided the dynamic means to address real life issues rather than theoretical issues (Lapre and Wassenhove 2002). Hence PDSA provided the implementation process which could adapt to the work design along with the dynamic nature of the system being examined. This then meant that 'complete' (Table 5.10) will not necessarily mean the outcome is exactly the future state projection.

Progress at stage 2 was divided into three levels, the first is where an individual tried to implement the change (such as the manager made responsible for implementation or an enthusiastic converter (Esain et al. 2008)). The second level is where completed actions were in the span of control of the group. The third level was where the future state objectives implemented were outside the current span of control of those within the group (Figure 5.7).

Figure 5.8 Evaluation of the nested – progress against improvement methodology
Legend - Green 1st level, Blue 2nd level, Pink 3rd level



Source: Author

The six point cumulative assessment framework for progress (Figure 5.7) enabled middle management to classify the position of all the cases[67] (

[67] All 30 cases have been included regardless of previous exclusions.

Figure 5.8). To aid the reader, colour coding has been used to help visualise if there is any pattern in case results and level of patient contact (Table 5.4) or as a consequence of the chronological order in which the cases were undertaken. The earlier cases seemed to exhibit greater progress. First and Second level cases seemed to exhibit greater overall progress than those at 3rd level and will be a feature discussed later in CHAPTER 6.

The degree to which future state targets were a 'stretch' for the group was not examined but could have had an impact on progress.

The next section details the findings of an in-depth review of six of the nested cases to elevate enablers and inhibitors and subsequently review middle management and senior management perceptions of enablers and inhibitors.

5.6. In depth review of a sample of the Nested Cases

5.6.1. Sampling justification

To permit greater insight to the rich data of the nested case studies, a sample of two of each case type from the taxonomy for patient flow (section 5.4) has been further appraised. The first two nested cases selected represented 63% of inpatient demand. These are general surgery (Case 7) and general medicine (Case 11) which also have more cumulative links to the other cases at 1st and 2nd level (Table 5.8) and hence have the potential to provide an insight into the complex interaction of many of the cases investigated. For both cases, the political risk to the sponsor was high (Table 5.6). Also, any potential differences and similarities between surgical and medical inpatient flows can be tested. Hence these two cases were considered to provide the greatest explanatory power to add to the understanding of the healthcare STS. Additionally, as representative of key features of an SCO system, these cases can provide a basis for generalisation of findings.

Two 2nd level cases will also be examined in detail. These are Case 6 which won national awards for patient service, and Case 10 where there was little progress in reviewing the sub-system (

Figure 5.8). Selection of cases on the basis of demand would not be appropriate because of the findings in section 5.4, which showed that 2nd level cases had shared incoming demand from many departments. Indeed the shared demand from the 1st level cases is a relevant feature for patient flow, and in particular, how this impacts performance. Case 6 had limited shared demand, whereas Case 10 had high shared demand (Table 5.8). In both cases, the political risk for undertaking such a case was medium.

Finally, two of the 3rd level cases were selected for in depth study. Firstly, Case 1, because of its technical features. This case provided the longest timeline of those selected for in depth review and hence is the richest source of longitudinal data. Case 1 provided an opportunity to analyse sustained activity both in the implementation of systems improvement, and also with regard to spread through the additive nature of new service delivery which the group continued to undertake with no additional resources as at 2005. Secondly, Case 2 was selected for in depth review for its social features. Consultants shortages were noted at commencement of the research (Section 5.2.3). Early in the research study, the increase in cost of temporary nurse staffing (known as bank and agency staffing) became an issue which linked to the turnover and emerging shortage of nursing grades (Massey et al. 2009). Hence Case 2 addressed a critical operational and cost pressure in the organisation. Cases 1 and 2 were both considered a high risk to the sponsoring manager. These managers were, however, on the executive board and they saw their sponsorship as part of their leadership, i.e. signalling their commitment to the implementation of LT.

While six nested cases are studied in detail (two cases from each level of the taxonomy), the remaining cases are used to validate findings (Table 4.5).

5.6.2. Analysis of Detailed Nested Case Studies

This Section reviews the sample cases against the features distilled from focal literature for high performance (Table 3.12). Features relating to measures of input-process-output-feedback flow were studied and additional factors emerged from the cases, namely backlog, customer feedback loops and segmentation. Both feedback loops and segmentation are features of OM literature, whereas the management of a backlog in

the context of improvement is absent from texts.

Table 5.11 to Table 5.20 are consistently designed to show 1st level cases on the left, 2nd level cases in the middle and 3rd level cases on the right. For guidance, performance (

Figure 5.8) is also included as the objective is to identify possible patterns in factors which link to high or low performance.

Table 5.11 focuses on the presence of features and application in organisational design related to demand. Understanding demand on a system is a key factor in designing effective organisation (Shingo 1988. Silvester et al. 2004). Basic demand information was not easy to retrieve through the organisational IT systems and therefore not generally used to manage the day to day operations of the system (

Table 5.11). Collection of manual data at the workplace occurred infrequently (and was connected to the availability of technology). Where manual data was collected, it was generally for external audit purposes (and seen as additional workload). A constraint in obtaining and using demand data was clinical coding[68]. It could take up to 200 days[69] after patient discharge, to complete the coding and for this data to be available for management decisions. Hence real time feedback of demand (and other operational data connected with coding) was not available to managers. Coding was an important issue as initial data[70] was considered to be unreliable for OM purposes (i.e. initial diagnosis is likely to have multiple routes to treatment e.g. having a headache can have many possible causes). Given the issues detailed above, activity[71] was the concept normally used by managers (Soderlund et al. 1997) to understand volume of work and draw conclusions on OM. Demand, as a measurement, is noted to provide a greater propensity for understanding patient flow (Lodge and Bamford 2007, Silvester et al. 2004) and 'activity' is misleading to managers by concealing variation. The findings of this research indicate that management do not use demand information for two specific reasons. The first is that activity has always been the accepted unit of measurement[72] and the second, is that real time demand requires a manual system or IT data systems redesign (requiring investment in both process and technology). It is assumed that right first time demand information (e.g. availability, understanding and application) is not required for organisational design and the achievement of patient flow because the assumption is 'activity' will satisfice. Hence variation in demand, which can be problematic for OM planning purposes, is not used for design, or management, of work (

[68] See Appendix 1 for a definition.
[69] The delay in coding was longer at the commencement of the research.
[70] Based on an initial diagnosis.
[71] Activity is the amount of work which is currently in the system. See Appendix 1 for a full definition
[72] See Laing and Shiroyama (1995) who explain the historically, assumptions held by healthcare professionals has been that demand is regulated by the existence of queues; hence the embedded practice is that knowledge of demand is not relevant because not all those in the queue will be treated. The latent impact of this assumption prevails but highlights the disconnect between demand avoidance and the knowledge of demand for OM design and improvement.

Table 5.11). These issues are categorised as **planning disclosure** where information required to design, maintain and improve a system is not clear to those planning, organising and involved in the work.

Table 5.11 Comparative analysis of Demand

Feature DEMAND for OM planning and improvement	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance (Figure 5.8)	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Flow Level (Table 5.7)	1st	1st	2nd	2nd	3rd	3rd
Was demand data formally used prior to case?	No	No	No	No	No	No
Was activity data used?	Yes	Yes	Yes	Yes	Yes	Yes
Was demand data readily available from information systems?	No	No	No	No	No	No
Did manual data collection occur at the work place for OM?	Irregular audit	Irregular audit	Irregular audit	Irregular audit	Irregular audit	Register of vacancies, audit
Did cross-functional team identify issues with case demand data?	Yes	Yes	Yes	N/A	Yes	Yes
What were the issues?	Not real time (clinical coding). Missing data.	Not real time (clinical coding). Missing data[73].	Not real time (clinical coding). Missing data.	Unit of measure	Missing data	Manual system. Unit of measure[74]
Following case was demand data used for daily management?	Increasingly	Increasingly	Yes	N/A	Yes	Yes
Use of control charts for daily management?	No	No	No	N/A	Yes	No
Barrier to control charts	Work to produce manually	Work to produce manually	IT skills	N/A	N/A	IT skills

Source: Author

The case SCO recovered costs (revenue) for EOC from commissioning agents using input and output data collected through their PAS system and subsequently coded with the clinical tasks performed. Accuracy of this data was considered of utmost importance from an organisational survival prospective. Yet the accuracy of data recorded at source

[73] Some medical day cases not recorded.
[74] A vacancy could be for one candidate or open (multiple candidates).

was noted as an issue by teams (

Table 5.11). Data input was usually done by staff when time became available and, understandably, was not considered to be equal in importance to the clinical tasks which needed to be performed. In the main, data input regarding an admission was entered (but not always the complete data set). In Case11 it became apparent through data analysis and observation that medical day cases were being undertaken without any record being made of the work (with implications for staffing and cash flow lost to management), another issue of planning disclosure. Data analysis (Case 18) revealed potential for double counting of patients through the Emergency Assessment Unit (EAU) when a patient was being admitted from A&E. The team attributed this to unclear operational definitions, data input accuracy and general misunderstandings. At discharge (or conclusion of outpatient treatment) data accuracy was also a problem. Analysis of data against patient records (Case 21) showed that patients on the 'current' waiting list had been referred to other treatment or back to their GP. Thus a greater volume of activity and waiting list was being reported. The accuracy of activity data sets for healthcare research has also been highlighted in other studies (Adab et al. 2002, Alvarez-Rosete et al. 2005). Further, the findings of the nested cases revealed that staff (usually, but not always nurses) saw the input of data into PAS as administrative and of little value. They were frustrated due to the lack of computer terminals on the wards, which in turn created a need to queue for these at busy times of the day. This was in contrast to managers, the vast majority of whom had a personal computer in their office. Computer 'ownership' was implicitly a symbol of status due to the resource constraint rather than an operational imperative.

Nurses were often not consciously aware of the data use, the implications for finance and potentially, issue which affected their working lives – such as staffing. As noted in

Table 5.11. data was rarely used to enable staff to understand their own work or performance (Laing and Shiroyama 1995) and was seen as some separate management imposition (often for reporting outside the organisation). Following the implementation of the plans in the nested cases, those cases which improved most, used daily demand (

Table 5.11) information to organise their work. The call for the use of control charts (Adab et al. 2002. Balestracci 2003) and hence greater insight into variation was not so readily taken up. Case 1. which was the highest performer. did use control charts to manage their work. They had the skill to manipulate the computer systems to provide such data in an easily assessable format.

Table 5.12 Comparative analysis of Failure Demand

Feature FAILURE DEMAND	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Failure Demand (Data not complete on receipt/Not satisfied first time)	Statistics for day before or same day of surgery. 3.23% DNA/Self Cancel. 5.65% deemed unfit for surgery. 6.86% no bed or out of time (for surgical list)	All patients re-examined on admission to ward. 200 people (excluding visitors) visit a general medical ward during a day shift – which is a potential interruption every 3.6 minutes[75].	5% letters not received by patients. 4% of letters returned (not known at address) 10% DNA. 18% cancellation attendance. 27% of appointment rearranged from original data	Incomplete, Un-intelligible and incorrect scripts (not quantified but reported by group and observed on other projects)	70% of initial request for quote information incomplete, 75% query on budget code/ signature for order	50% of forms received by recruitment were incomplete

Source: Author

Table 5.12 uncovers constraint at the first point of the system because of 'failure demand'[76] (Seddon 2005). For clinical cases, the significant issue was patients who 'do not attend' (DNA). DNAs have been increasingly highlighted as an inhibitor to patient flow (Laing and Shiroyama 1995, NHS Modernisation Agency 2004). However, Case 11 is different because medical patients are, by their very nature, mainly entering the system as an emergency. The team considered that a measure of potential for 'failure demand' here was admission into an inpatient bed and then the subsequent discharge at 'post

[75] While not strictly failure demand, this does provide a measure of potential for failure.
[76] Full definition at Appendix 1.

take[77]' ward round (less than 24 hours after being admitted). Observation by the doctor (on the team) of this ward round reported that most of the admissions at A&E were discharged at this point because of the inexperience or lack of the application of most up to date protocols (e.g. 'risk scoring') by doctors at A&E (although this was not quantified by the team, the Trust acknowledged this as an issue). A&E represented the entry route for 50% in Hospital A and 63% in Hospital B of all general medical ward admissions, therefore reducing those admitted inappropriately would have an impact on patient flow (i.e. making capacity available for those who truly needed to be in an acute bed). This failure suggested that skills and standard at the right place in the system would ensure appropriate inpatient admission. The countermeasure suggested by the team was to appoint 'Acute Care Physicians[78]' within A&E. Funding was established and a pilot on one of the acute sites was undertaken which showed that although demand on the A&E department increased, the inpatient admissions did not experience a corresponding level of admissions. Those patients who had been discharged were monitored for readmission within 30 days. No increase of the normally expected admission rate was found over the pilot period.

For level 2 cases, incomplete information is also an issue and in the limited work undertaken on TTHs (Case 10), is usually from unintelligible and incorrect information supplied by script authors. This 'failure demand' resulted in time required to clarify information with the originator or consultants. Such failure demand obscured manager and staff knowledge of the pattern (Laing and Shiroyama 1995) and pace of work (Womack and Jones 1996) which needed to be satisfied (a further reason why activity is a poor measurement for OM purposes). Similar issues were noted in level 3 cases (Table 5.12) with almost three quarters of all initial information being incorrect or absent. Failure demand is therefore an inhibitor to patient flow at all levels of the system. This clouds knowledge of 'real demand' (APPENDIX 1) and uses capacity inappropriately (due to Clutter and the Layered Supposition of past assumptions and rules in the system).

[77] 'Post Take' ward round refers to the on duty doctor/clinicians ward round immediately following admission to an inpatient bed which will take place within 24 hours of a patient being admitted.
[78] An Acute Care Physician was a specialist in A&E, whereas attending physicians at A&E had been drawn from a rota of clinical specialities.

Table 5.13 Comparative analysis - cycle time

Feature CYCLE TIME	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Current State Cycle Time	Intuitively known – College recognises 'Collins Intermediate Equivalent'	Intuitively known	Royal College Guideline is 6 per session (210mins)	Intuitively known	Intuitively known	Intuitively known
Current state - Standard work	No	No	No	Not Established	No	No
Cycle Time(s) – Future State	Partially established Estimated LOS (ELOS) or utilised Estimated Discharge Date (EDD)	Partially established ELOS or utilised EDD	Established	Not Established	Established	Established standard for short listing and interviewing
Service/ Procedure Variety	High	High (35 conditions = 80% of load)	Medium	Unknown	Low	Medium
Future state – standard for planning	Partial	Partial	Yes	No	Yes	Yes
Future state – standard for improvement	No	No	No	No	Yes	No
Comment	Seen as a threat to professionals	Partly a threat to professionals . Also changed emphasis to shorten every patients LOS by ½ day	Spread of introducing standards slow (main facilitator went on maternity leave)		Also used to acquire similar work as capacity becomes available	Spread of introducing standards was slow (due to resistance/ seen as complex)

Source: Author

Cycle times for tasks (Table 5.13) while known intuitively by clinicians or specialists, are not used by managers to plan effective use of capacity. Standard work is not normally used and healthcare tends to follow professional practices, protocols and policies, used to enable diagnosis and treatment. Cycle time for a complete treatment may be

inappropriate as doctors use standard methods (know why) for diagnostics which are then matched to appropriate solutions (know how). The solution is often a consequence of a combination of their skill, evidence and experience[79]. Intuitively, there is a tacit knowledge of the elapsed time that a patient would potentially need to stay in an SCO with a particular clinical condition (or if a patient had complex needs and would reside in the SCO over certain duration)[80]. The impact of variation (in method, skill and experience) is increased because of a patient's general health. This is amplified further by variety in terms of symptoms and potential treatments. Hence there is a strong view in SCO that this complexity makes planning inappropriate. Case 11 was an example of this. Yet an analysis of the time[81] that the complete chain of work takes (Table 5.14) shows the magnitude of delay (where nothing is happening with the patient or service being provided) is significant. It is this aspect which is of critical importance as it provides the context of an opportunity to improve. For managers in high performance organisations, the cycle time and standards are not used so much for traditional planning (which inherently will be incorrect because of the dynamic nature of the variables within and without an organisation) but rather through approaches like heijunka[82] (Liker 2004) for understanding the potential for redesign. The cycle time discussion and its implication are absent from literature presenting lean measurement in healthcare (Kollberg et al. 2007).

[79] A position paper in January 2008 Annals of Internal Medicine, 148(1) stated 'Americans receive appropriate preventive, short-term, and long-term health care as recommended by professional guidelines only about 55% of the instances in which those recommendations would apply.' (p.55).
[80] ELOS or EDD for planning purposes were introduced. This was very cautiously applied due to professional fear e.g. time pressure diminishing quality of care.
[81] Structured observation tracking a single patient or service from initiation to completion, based on the boundaries agreed at the outset of the case.
[82] See Appendix 1 for a definition.

Table 5.14 Proportion of time for 1 item to pass through the system (PAM) as observed by cross-functional teams

Feature CYCLE TIME	Case 7 General Surgery	Case 11 General Medicine		Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3		Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st		2nd	2nd	3rd	3rd
Operation	< 1%	A 3%	B 3%	< 1%	N/A	1%	1%
Inspection	< 1%	1%	1%	< 1%	N/A	0%	12%
Transport	< 1%	2%	1%	2%	N/A	5%	1%
Delay	98%	94%	95%	97%	N/A	94%	86%

Source: Author

The levels of delay in these findings (Table 5.14), match the concept of the flow curve (Shingo, 1988). Cycle time (Table 5.13) is directly linked to demand (a check on effectiveness) and amplified through variation against standard etc., but the residue of time in Table 5.14 indicates the level of the opportunity gap (Table 5.15). Table 5.13 illustrates that all but Case 10 moved towards a standard (and coinciding cycle time) and in the most successful Case (1), the standard was used to help improvement. The opportunity gap provided a quantifiable, feasible target for change for cross-functional teams (a goal) which counter-intuitively focuses on the hidden practices. APPENDIX 6 highlights the largest element of delay that contributed to the proportions detailed in Table 5.14. The collection of data by the cross-functional teams enabled fresh eyes to see why such a high level of delay occurred (Case 11) when comparing two hospitals practices, Case 6 compared five sites and Case 2 compared two teams. This also impacted on the creation of standards through awareness raising and learning across the organisation (Spread of ideas and knowledge).

Table 5.15 Comparative analysis of Flow Curve Data

Features FLOW CURVE	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Current Range of Elapsed Time for an EOC (a)	0-18 months	0-14 weeks (7.2 days mean)	0-16 weeks	No Data	0-16 weeks	10-16.5 weeks

Features FLOW CURVE	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Potential Elapsed Time for an EOC (b)	0-14 days	60% by 4.5 days max)	0-14 days (three sites) 0-21 days (1 site), 5th site capacity unnecessary and removed from system	No Data	0-14 days	0
Opportunity Gap (a-b)	Waiting list reduced by 17 months and 2 weeks	Agreed as ½ day improve all LOS (½ patients improved by 1 day)	Reduced waiting time by 13 weeks	N/A	Reduce staff waiting for PC and ancillaries by 14 weeks	Reduce nursing vacancies to 0 on ward.
Redistribution of time	Potential to see 24% more (average) patients	Potential for 20% more (average) patients	Increased demand. Reduced clerical time 8 hrs/week. radiographer 15.75 hrs/ week, consultant radiologist 15.75hrs/ week and nursing 15.75hrs/ week	Unknown	Increased demand and more services taken on (estimated 2 Whole Time Equivalent (WTE) cost avoidance)	Increased demand through taking on bank recruitment. 1 WTE redeployed to consultant recruitment, 0.6 WTE to Criminal Records Bureau (CRB) checking (15% of staff time redirected to this work)
Current state demand pattern for In vs. Out (data set)	No Pattern known. Perceived highly variable	No Pattern known. Perceived highly variable	No Pattern known. Perceived highly variable	N/A	No Pattern known. Perceived highly variable	No Pattern known. Perceived highly variable
Future state demand pattern for In vs. Out	Yes	No	Yes	N/A	Yes	Yes
Was time for teaching an unspoken expectation	Yes	Yes	Yes	Don't know	No	No

Source: Author

Table 5.15 takes the opportunity gap and illustrates that all cases (except Case 10) used standards and cycle times (for planning purposes). This enabled the illustration of a potential pattern of work (premised on mixed model planning) and in Case 1, further tasks (second generation improvements) were subsequently embedded into this pattern. Patterns of this nature, in high performing organisations, are used to enable flexibility (Rich et al. 2006) and manage variety as is needed to satisfy the dynamic nature of the environment. Case 1 (as at the end of 2005) worked as a self managed team determining their own work design to accommodate incoming variances in demand, staff absence etc. and improvement. Management role changed from a traditional C&C to facilitating external changes to enable further improvements.

For Cases 1, 2 and 6 where the number of variants being considered within the organisational designs is low, the complexity for 1st level cases became more complex. The complexity was related to variety of conditions[83] (as per the clinical coding) and hence the limited number of variants offered by Cases 1, 2 and 6 did not satisfy the requirements of the system. In addition, staff were unfamiliar with strategies to manage variety such as concepts of segmentation either by speed and complexity[84] of resolution e.g. runners, repeaters and strangers or by common steps e.g. group technology (Esain and Rich 2006). Classifying work to subsequently manage work variety through segmentation, although well understood in OM, were unknown to managers and staff[85], which historically uses clinical condition as a means of specialisation. When the classification system was challenged, it revealed a further requirement of clinical professionals to teach (Dillon 1994), and specialise (for promotion) a generally unspoken expectation in the design of levels 1 and 2 of SCO systems. This represents work unaccounted for in capacity planning and demand management (Table 5.15). In Cases 15 and 18, the diagnostic stage revealed the priority given (or taken) by staff to teach,

[83] Clinical coding provided a framework of classification of condition which was either very high level i.e. by speciality, or very detailed i.e. the very specific procedure. So a hernia and a double hernia was the same procedure in many aspects, but were classified separately. Indeed a hernia could represent a very straightforward procedure, or very complex one dependent on the patient's holistic state of health, yet these variables were not formally considered.

[84] An example would be co-morbidities.

[85] Literature has recorded the use of group technology in A&E but not in the management of admissions flow.

negatively affected the capacity and impacted on the service of the SCO. While teaching is necessary for skill retention and development, this is hidden (a form of planning disclosure) which dislodges the flow of patients in favour of what individuals consider as important (thereby adding to the clutter of activities which they need to perform).

The potential elapsed time (Table 5.15) projected how presenting demand and the variation in that demand could be accommodated, given the cycle time and the potential for variation in cycle time. The difference between the figures (a and b in Table 5.15) is the opportunity to achieve high performance. In the opportunity gap is the hidden amalgam of factors which provide the significant opportunity for an organisational system to become high performing.

The problem definition and the rituals of analysis and reflection on data from secondary sources as well as observations by the teams (staff, professionals and management) provided two parallel mechanisms for improvement. The first was that tangible 'evidence' was distilled; the second was that the teams were able to see what contribution they could make to change the current status quo.

Table 5.16 Comparative Analysis of Process Reliability

Feature Process Reliability	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Defect against Standard (current state)	No Standard, use policy/ professional standards	No Standard, use policy/ professional standards	No Standard, use policy/ professional standards	No Standard, use policy/ professional standards	No Standard, use procedure	No Standard, use procedure
Measure of Quality established	Reducing level of DNA on day of surgery, increasing level of trays available, TTO available within 30 minutes of discharge	Reducing level of readmissions following 30 day discharge, TTO available within 30 minutes of discharge	Test to take place correctly every time i.e. always prepared, no waits for patient, barium results always useable	N/A	Customer feedback developed by team and used daily to adjust design	Staff turnover 6 and 12 months after recruitment and numbers reducing being taken through disciplinary
Counter-Measure	DNA monitored, trays monitored monthly	Readmission measures, reviewed monthly	Measured daily	N/A	Measured daily and acted upon	Measured with feedback into standard for selection and interview
Staff Absence	28% of theatre list days cancelled due to annual leave (clinical team)	12% nursing sickness and absence reduced to 4% (see Case 2 focus)	15% of all staff not available when required.	N/A	Not measured but high long term sickness	Not measured
Counter-Measure	National phenomena - clinical contracts renegotiated to ensure all leave has to be requested 90 days in advance	Reduction as a consequence of Case 2 removing excuse of stress at being under resourced			Staff rarely took sick – owned process and worked as a team	Staff rarely took sick – owned process and worked as a team
Equipment availability	None highlighted	Unknown	90% equipment availability during examination	N/A	90% equipment availability for ghosting	N/A

Source: Author

The flow curve is not the only means of understanding delays in the system. Reliability through 'right first time' also provides such insights. All cases experienced quality and resource issues (with staff and equipment) making the process reliability unreliable (Table 5.16). In all cases strategies (countermeasures) were devised to remove or reduce the issues. Where equipment was concerned, this fell outside the team's knowledge and required working with suppliers (internal and external) to resolve.

Table 5.17 Comparative analysis of Material flow

Feature MATERIAL FLOW	Case 7 General Surgery	Case 11 General Medicine	Case 6 Barium Enema	Case 10 TTH Pharmacy Lowest Performer	Case 1 IT New PC Highest Performer	Case 2 Nursing Recruitment
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Material Flow	High	High	Low	High	Low	Low
Predictability	High	Medium	High	Medium	High	High
Ease of substitution	Medium High (trays)	Medium (drugs)	N/A	Medium to high (drugs)	Medium to high (to highest pressure)	N/A
Increased variety due to professional preference	Yes (requests for specialist theatre trays increasing)	Yes	Yes	Yes	Yes	No
Key Material Issue	8% of theatre lists delay due to lateness/ absence of equipment trays from CSSD	TTO's – not being available in a timely manner to discharge patient (otherwise robbing materials from other wards accepted practice)		Perception of 'stock outs' across the range but of particular frustration was those drugs frequently prescribed	PC batch size 10 due to supplier cost breaks, moved to new supplier – daily delivery and batch size 1 (increased supplier work i.e. ghosting)	

Source: Author

Material shortfalls were an issue reported during the diagnostic phase of cases. Yet the predictability of use of materials was shown to be reasonable (Table 5.17). What transpired is that material usage in areas was distorted through the substitution of materials (Section 5.4). In some cases the material issue was not highlighted because the practice of substitution was the normal route for satisfying material needs for patient

flow(Turner and Slack 1993). However, this was not an effective design as the predictability quickly became unpredictable through amplification of information systems (Burbridge 1983, Forrester 1958).

Backlog is a term most frequently used in manufacturing to describe the waiting load for capacity to satisfy (equivalent to inventory). Inventory was the focus of the book 'non stock production' (Shingo 1988) which postulates that inventory is a potential cause for delay in a production system. Clearly where waiting occurs, there will be a backlog. When implementing a new organisational design, the results of the study shows that the management strategy to remove this 'work to do' queue, counter-intuitively has an effect on the performance outcomes. Backlog was important as it had the potential to cloud the feedback data regarding the success or otherwise of implementation of the new design. Yet clearing the backlog as a separate task (rather than as part of a gradual integrated approach) did not have the same results. This is an issue not discussed in literature and one which could contribute to the contemporary debate about implementation science (Eccles et al. 2009).

The cases adopted two strategies to deal with backlog. The first was a 'pump prime' initiative to clear the backlog in one go, and the second was to remove over time as part of workload (Table 5.18). While it was preferable to managers to clear the backlog via a 'pump prime' initiative, the cases which had greatest success were those that embedded the reduction and removal of the backlog into the new design and removed the backlog over time.

Table 5.18 Comparative analysis of the management of Backlog while implementing a new work design

Features from Field Research for Patient Flow BACKLOG	Case 7	Case 11	Case 6	Case 10 Lowest	Case 1 Highest	Case 2
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Backlog current state	Yes	Yes	Yes	N/A	Yes	Yes
Multiple backlogs	No (queue of elective patients)	No (patients waiting in A&E)	No (queue of patients waiting for investigation)	Unknown	No (queue of PC to be installed)	Yes (paperwork & filled vacancies)
Unit of measure used to describe the backlog	Weeks	Hours	Weeks	N/A	Weeks	Weeks
Backlog cleared	Partly	Partly (A&E performance against 4 hour target improved)	Remove 40% of waiting list in 3 months	-	Reduced queue to 2 weeks or less.	10 weeks to remove backlog of outstanding employment contracts (paperwork), 6 months to reduce outstanding vacancies
Strategy to clear	Pump Prime (through waiting time initiative - theatre sessions)	Multiple – overall strategy to engage all staff in reducing all patients LOS by ½ day – part of workload	As part of workload	-	As part of workload	Pump Prime (through overtime)
Measure installed	No	Yes	Yes (trend to reduce the numbers waiting for investigation)		(Yes) Trend to reduce unfulfilled PC orders	(Yes) Trend to reduce outstanding paperwork
Speed (once strategy deployed)	Slow	Slow	Medium	N/A	Medium	Slow

Source: Author

By embedding the removal of the backlog into the new design, the group learning was surprisingly enhanced. In particular, the notion that the plan was a framework to understand the dynamic nature of work and that the design of the system could be adjusted with the small feedback loops of a series of PDSA cycles. It also helped the team learn about the potential for improvement over and above that which had been

planned (Stage 1. Figure 5.7). However, those groups that selected pump priming, lost such learning as the activity was independent of the work as a process. These groups were less likely to achieve Stage 2 (3) or Stage 3 performance (Figure 5.7). Backlog has the propensity to mask progress or confuse those working to the new design.

Table 5.19 Comparative analysis of segmentation

Features from Field Research for Patient Flow SEGMENTATION OF DEMAND	Case 7	Case 11	Case 6	Case 10 Lowest	Case 1 Highest	Case 2
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Segmentation at current state	No	No	No	No	No	Yes (by skill type)
Scheduling Means	Theatre Lists	Bed Manager (progress chaser)	By consultant	Local time split	By site rounds	None
Batch Size	½ day	None	½ day	AM/PM	½ day	None
Segmentation recommended at future state	Yes	By Speciality	No	N/A	Yes	Yes
Type of Segmentation Recommended	Mixed procedure(s) by recovery time (in an inpatient bed)	Postponement of specialisation (Runners, Repeaters and Strangers – next step Group Technology)	N/A	N/A	Mixed task by incoming demand	By volume and skill
Did scheduling change	Partially	Partially	Yes	No	Yes	Yes

Source: Author

With the exception of Case 10, all teams selected a means of segmenting as part of the new organisational design (Table 5.19). High performers adopted segmentation and embedded new scheduling practices (Cases 6, 1 and 2). It is also interesting to note that in Cases 1 and 2, work was being undertaken to some extent, in advance of order, due to confidence of need (i.e. pre ghosting computers or recruiting to bank) which does not fit with the concept of perishability attributed as a unique characteristic of service organisations (Section 3.5.9).

Table 5.20 Comparative analysis of approach to customer feedback

Features Patient Flow and CUSTOMER FEEDBACK	Case 7	Case 11	Case 6	Case 10 Lowest	Case 1 Highest	Case 2
Performance	Stage 2.2	Stage 2.3	Stage 2.3	Stage 1.1	Stage 3	Stage 3
Patient Closeness	1st	1st	2nd	2nd	3rd	3rd
Current State Customer Feedback	Yes	Yes	Yes	Yes	Yes	Yes
Type	Complaint	Complaint	Complaint	Complaint	Complaint	Complaint
Future State Customer Feedback	Yes	Yes	Yes	N/A	Yes	Yes
Type and Frequency	Compliment and complaint	Compliment and complaint	Questionnaire	N/A	Questionnaire	Compliment and complaint
How used	Punishment	Punishment	CI	N/A	CI	Punishment
Named point of contact for customer	No	No	No	N/A	Yes	Yes

Source: Author

While customer feedback was a feature of all cases, the focus was complaint management (Table 5.20). Following implementation of the new work design, Cases 6 and 1 uniquely used customer feedback to continually improve. Cases 1 and 2 also provided a named contact for customers so they had a direct contact for feedback. The results presented so far enabled the cases to be examined against the features of a high performing system (Table 5.21).

Table 5.21 Alignment of results to features of a high performance system (Table 3.13)

Feature (Table 3.13)	Assumptions (Table 3.13)	Present Before Implementation	Present After Implementation
Continual Quality Improvement	Rejecting the notion of 'acceptable quality levels'.	No	Yes, Cases 1, 2, 6 and 11
Quality as the responsibility of the worker	Quality as the responsibility of the worker rather than an external function.	No (External Customer Complaint focus)	Yes, Cases 1and 6
Defect Prevention	Prevention of defects rather than inspection of selected random lots.	No	Yes, Cases 1, 2, 6 and 11
Visual Quality Measurement	Visual, simple & understandable measurements of quality for all. Linking defect prevention with measurement feedback.	No	Yes, Cases 1 and 2
Systems Barriers to avoid defects	Measurement devices to enable prevention of quality defects occurring.	No	Yes, Cases 1 and 2
Economies of scope	Development of expertise in repetitive manufacture through economies of scope, rather than economies of scale to leverage efficiencies of the manufacturing system.	No	Yes Cases 1, 2 and 6
Real time feedback for local planning and flexibility	Rejection of predetermined rule based computer planning models e.g. MRP in favour of rapid feedback manual systems enabling real time linkage with customer demand e.g. JIT.	No	Yes Cases 1 and 2

Feature (Table 3.13)	Assumptions (Table 3.13)	Present Before Implementation	Present After Implementation
Task repetition one at a time (or multiples of one)	Correlation between task repetition and higher quality and productivity outcomes. Rejecting the EOQ rules around set up time as not taking into account impact of poor quality, impact on worker motivation, etc. Indeed smaller inventories which resulted in awareness of the source of delay and error. Improvement in quality and productivity in turn make the product(s) more attractive to consumers, which can therefore increase market share. Note while Schonberger (1982) describes this repetition in terms of high volume of the same task, later this was deemed to also reflect repetition of common tasks through such techniques as group technology. In part, enabling the idea of mixed model production.	No	Yes Case 1
Job protection	If there is increased demand, the outcome of one piece flow, if operationalised, has the added benefit of released capacity as a consequence of improvement. The deployment of this newly acquired capacity to satisfy increasing demand, enabling job protection and increased productivity through cost per item reductions.	No	Yes, Cases 1 and 2 (partially 6, 11 and 7)
Segmentation	Understanding and challenging the way in which consumer demand may be satisfied in terms of operational design.	No	Yes, Cases 1, 2, 6 and 11
Group Think	Focus on co-operation, dedication, harmony, and group think discussion to resolve problems. Founded on clarity of work links (clarity of before and after tasks). Leading to better bonds between workers and timely feedback loops.	No	Yes, Cases 1, 2 and 6
Short interval material and information cycles	Rejecting large order quantity as a means of cost reduction (economies of scale) in favour of small lot availability at the point of need and related to the pace of customer demand. Augmenting or replacing feedback loops of performance with short interval information feedback for the purposes of improvement.	No	Yes Case 1
Quality Training	Building the capacity in both the underpinning assumptions of total quality control, and the means by which to apply the ideas in practice.	No	Yes, Cases 1, 2 and 6 (Partially 11)

Source: Author

All these factors alongside those distilled from the earlier discussions are presented in

Table 5.22. This fits with the sensemaking literature (Weick 1995) and STS theory.

Table 5.22 Key technical system attributes for improvement

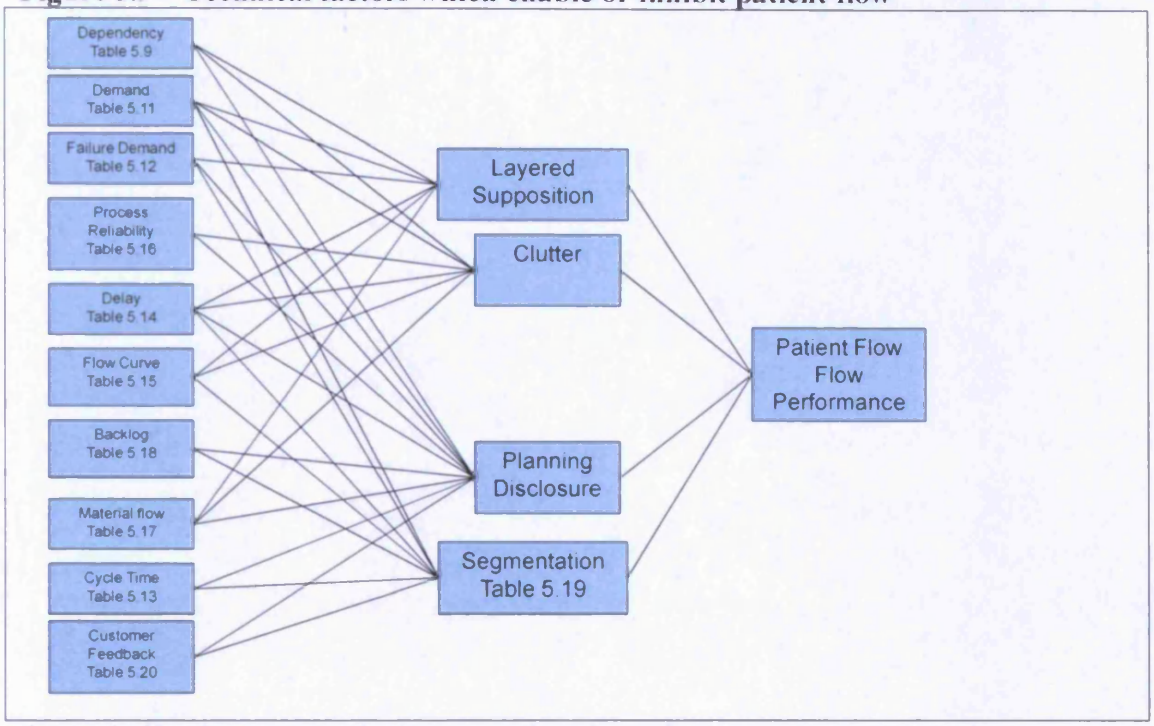
No	Factor	Table	Findings	Authors
1	Data (inhibitor)	Table 5.11	Problems with: availability at work place of computers for data input; accuracy of input data; timeliness of coded data (not real time feedback); data not used by front line staff (links to (b) as no line of sight regarding use of data); data often audit based, so perceived as used to punish; activity data used in daily management; intuitive decision making with less reliance on facts and data more on experience.	(Adab et al. 2002, Alvarez-Rosete et al. 2005, Balestracci 2003, Laing and Shiroyama 1995, Taylor and Shouls 2008)
2	Failure Demand (inhibitor)	Table 5.12	Significant level of incomplete information supplied by customers of 3rd level demand (with an expectation that any omissions will be rectified by the supplier); Small proportions recorded at 1st level important because of high total numbers of demand. These issues contribute to clouding the real demand which needs to be satisfied.	(Laing and Shiroyama 1995, NHS Modernisation Agency 2004)
3	Cycle time (absence - inhibitor)	Table 5.13	Importance of cycle time for different clinical conditions: as a standard against which to measure variation; to assist teams in understanding exceptions i.e. what is occurring vs. what would be expected (not implying by this that cycle time should be used for scheduling).	
4	Standard (enabler)	Table 5.13	For workload levelling planning, heijunka (Liker, 2004); improvement used in conjunction with quick feedback loops. An attribute of high performance.	
5	Calculating delay & visualising independent relationship to demand (enabler)	Table 5.13 & Table 5.14	Inversing view that work demand (that is cycle time or operations) is directly related to capacity usage (all cases showed in excess of 80% delay disproving this assumption); To reduce delays – non-operational activity, independent of demand (97% plus of elapsed time) is focus for improvement; Exposing variation, rules, assumptions, habits etc. as causes as well as variety/case mix (held view of this difference); Activity measure hides this key opportunity. (c) Moved individuals teams from 'I can't' to 'I can' improve. (d) Breaking the held view that variety is variation so that variation is not tolerated but variety is; Caused managers (and sometime professionals) to feel inadequate because 'we should have known'. Or to try and disprove the methodology, data etc. to deflect from a potential criticism.	(Shingo 1988)

No	Factor	Table	Findings	Authors
6	Patterns of work demand (enabler)	Table 5.15	Determining demand patterns challenged perception of high variability for teams. Teams liked patterns of work as a means of making sense of their contribution. Recognition of teams that patterns are predictable but not static. Case 11 shows impact of case variety and need, to consider strategic implications (segmentation/innovation of service modes, etc).	(Walley 2003b)
7	Work inclusion (enabler)	Table 5.15	Time for training was hidden yet needs to be accounted for and managed. Clinical training implicit to survival of organisation system. Move from individuals to decide how to organise to balancing with work demand patterns.	(Dillon 1994)
8	Distortion through substitution (inhibitor)	Table 5.17	Demand patterns for 2nd and 3rd level, distorted through substitution habits causing frustration and breakdowns in personal relationships. Underlying causes not addressed, instead developing system 'workarounds'.	
9	Backlog (enabler)	Table 5.18	Understanding explicitly the implication of backlog; Used as a mechanism for teams to lean about new design through removal as part of daily work rather than task; Management learning re implication of speed to change.	
10	Segmentation (enabler)	Table 5.19	As a strategic means of gaining new understanding and insights into work design.	(Esain and Rich 2006)
11	Customer Feedback (enabler)	Table 5.20	As a means of CI (no punishment).	

Source: Author

The preceding review has been further codified to recognise interconnectedness and summarise the emergent factors (Figure 5.9). It is recognised that these features can have the potential to both enable and inhibit and so represent a continuum rather than a pass/fail measurement.

Figure 5.9 Technical factors which enable or inhibit patient flow



Source: Author

The presence of these factors will be tested against all of the cases as a means of internal validation (Yin 1994) and to understand the degree of impact these have on achieving patient flow (Section 5.8). This section has focused on the technical issues to have emerged from the Cases, while Section 5.6.3 focuses on the human characteristics observed.

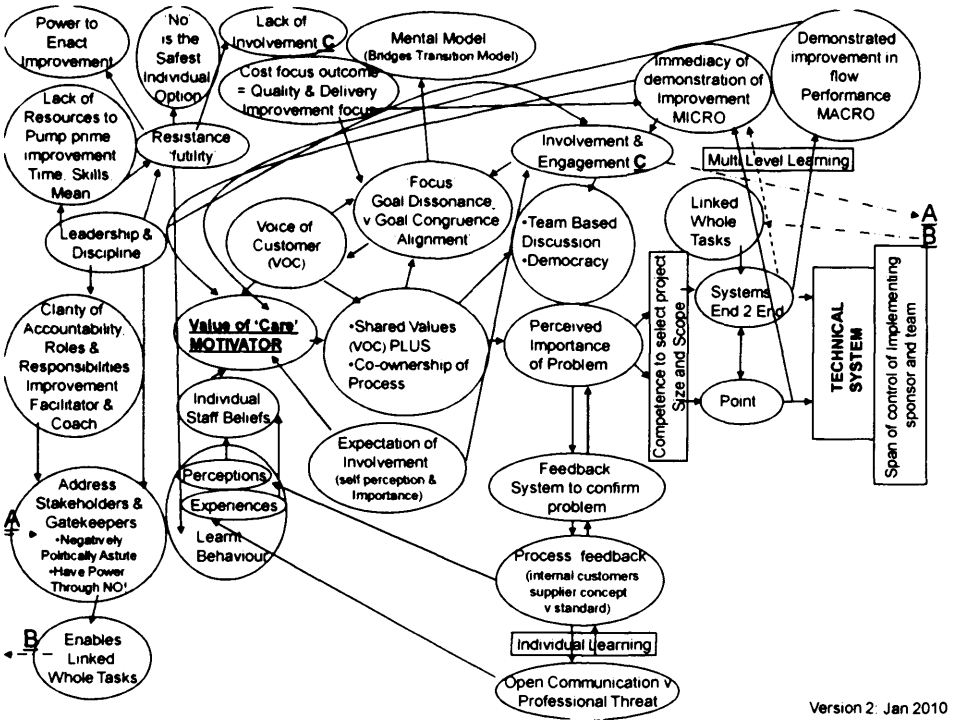
5.6.3. Human features of the Nested Cases

The author reflected on the case studies[86] from the perspective of the underlying forces at an individual level, group and organisational level (Crossen et al. 1999) to achieve or constrain the technical design and implementation of patient flow features (Section 5.6.2). These were then validated by the middle management group. A senior manager commented that the health-service has not been 'taught to think in this way' and whilst it was not considered difficult, the need to introduce and experiment with new ways of thinking was fundamental to achieve innovation.

[86] Including the output from Middle Management Network meetings during the research period (see Appendix 7 for examples).

The results of these observed forces or themes have been displayed following the protocols of Miles and Huberman (1994) in Figure 5.10.

Figure 5.10 Human characteristics/themes observed while designing and implementing the technical system for all Nested Cases



Source: Author

Connections between the observations were calculated and scored as either an enabler or inhibitor to patient flow (Table 5.23). A characteristic of both the technical system and human system is that factors are more likely to be present as a range rather than an absolute. These were then ranked to include any cumulative scores of five or more (as a filter for low impact features).

Table 5.23 Key psychosocial themes from evaluation of Nested Cases

Observation (In order to linkages)	Links TO other contribution (direction of arrow)	Links FROM other contribution (direction of arrow)	Enabler	Inhibitor
Value of 'care' MOTIVATOR	1	5	'Care' where this included the patient/carer view – motivation due to reinforcing 'care' most important	'Care' where this was linked with professionalism

Observation (In order to linkages)	Links TO other contribution (direction of arrow)	Links FROM other contribution (direction of arrow)	Enabler	Inhibitor
Involvement & Engagement	3	3	Individual Motivation - To make a difference (professional, manager, staff)	Individual Motivation -To protect status quo (professional, manager, staff)
'Focus' goal dissonance vs. goal congruency 'Alignment'	2	4	Goal Congruency provided management 'permission'	Goal Dissonance restrained progress within end-to-end but where motivation existed improvement occurred
Resistance 'futility'	2	4	Resources and Leadership support combined with leadership discipline (consistency) and clarity of authority, roles and responsibilities	'No' is the safest option for career, for day job, etc. A belief of having no power or support to improve system more likely to be 'detrimental to me'
Shared Values ('care' or 'professional pride', etc) PLUS co-ownership of the process	2	3	Combination of 'the will' of the team/professions with 'span of control' and 'immediate reporting of resources' management	Absence of all previous elements although improvement would be made to some degree with some 'enthusiastic converters' in place
Learnt Behaviour (perceptions/ experience)	3	2	Open to Formal and Informal Feedback loops – able to assess to what degree this information supports the new organisational practices and improvement. Able to adjust without negative criticism	Formal Feedback loops do not exist. Informal feedback does not support the new organisational practices and improvement. Assume change = 'right first time'
Perceived Importance of the problem	3	2	Robust measurement systems to confirm problem. Individual open to investigating the problem. Trade off against other pressures for use of	Inaccurate/ untrustworthy measurement system. Trade off for time – maintenance of system rather than improvement

Observation (In order to linkages)	Links TO other contribution (direction of arrow)	Links FROM other contribution (direction of arrow)	Enabler	Inhibitor
			their time. Degree of impact the problem is having in Policy. Professional and Managerial domain	

Source: Author

The implication of these factors will be tested against all the cases, to understand the degree of impact these have on achieving patient flow (Section 5.8). This section has focused on the psychosocial issues which have emerged from the cases. Section 5.7 builds on the psychosocial features, with questionnaire results from the senior executive of the case organisation.

5.7. Senior Executive/Managers and Chiefs of Staff View of the Nested Cases within the Whole System

In 2003, after the initial two nested cases, the executive team formally commented that they recognised organisational processes were complex due to many years of "adding solutions" and the lack of time made available to organisational redesign. At this point, the executive's approval was given to review a clinical process.

To provide an understanding of the context of change from the senior teams perspective in the SCO, a group of fourteen executives, senior managers and chiefs of staff (both management and clinical) were asked to complete a questionnaire. The fourteen respondents answered all the questions posed. The first of which enquires into this groups' installed competency in change.

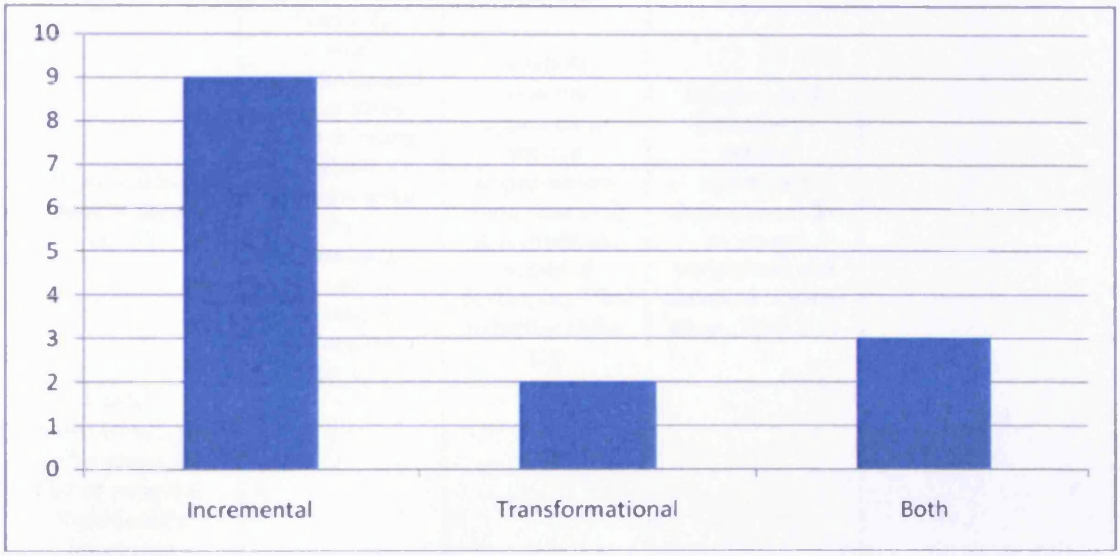
Have you witnessed / experienced other periods of significant change in your history with the Trust or NHS?

The responses confirmed that all had experienced change. Just over 50% of this experience had been structural, with 3 respondents (two of whom were clinical) indicating that the changes had no evidence of success. If this was the case for

executives, it could be construed that this would also be the experience of staff. While modernisation and operational change was mentioned, this was in a very limited way (as was commissioning-led change). One comment reflected that 'few planned changes targeted [the] whole organisation'.

When asked what impact the cases had on the organisation, most answered that it reflected an incremental approach (Figure 5.11). Interestingly, the Chief Executive of the organisation saw the approach as transformational.

Figure 5.11 Do you view the impact of Lean Thinking on your organisation as incremental or transformational?



Source: Author

The contribution of LT was generally considered to be positive, but many considered that the impact and potential was in its early stages.

Table 5.24 What do you think is the ultimate contribution of the Lean Thinking?

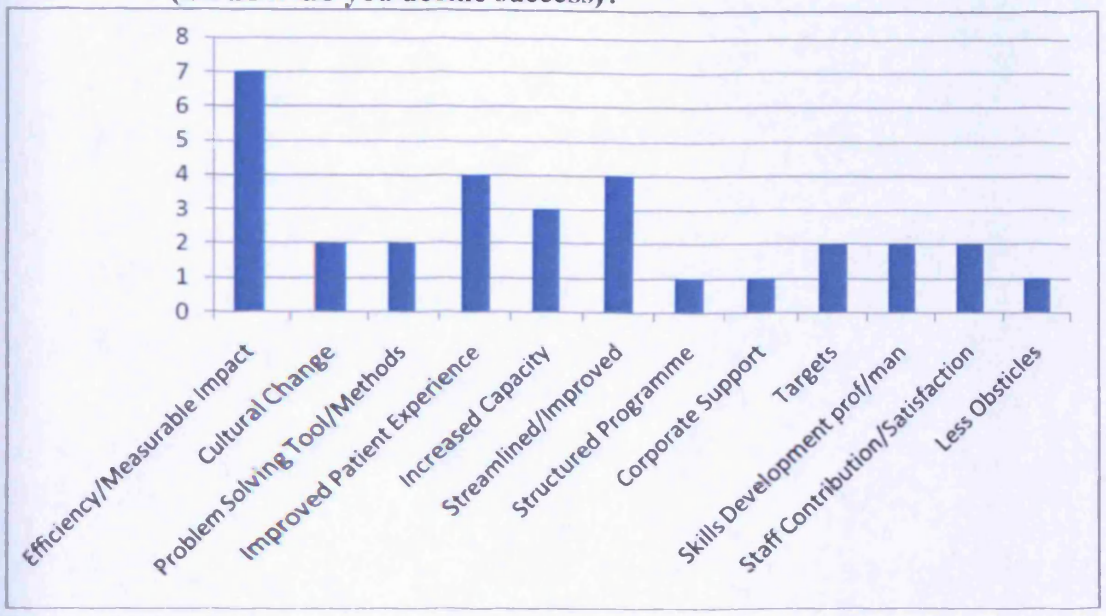
Doctors	Managers 1st	Managers 2nd	Managers 3rd	Chief Exec
Large potential benefits for repetitive processes. Some already realised in trust. Potential for clinical process application (Dr 1).	Structured process for removing waste from day/day activities, reduction in errors and pace to demand (Directorate Man 1.1)	Methodology for identifying inefficiencies to improve service processes. Intended to become a culture applied by all staff (Man 2.1)	Improving efficiency & removing waste. Ultimately about improving patient experience by timely & co-ordinated care (Man 3.1)	Main vehicle for efficiency and effectiveness improvement

Doctors	Managers 1st	Managers 2nd	Managers 3rd	Chief Exec
Methodology for evaluating (improving) our systems which mainly involves those who actually do the work. Sound academic basis. Initial experience in the trust has been very encouraging e.g. barium enema project (Dr 2)	In its infancy. Understanding what & why we do things the way we do. Process evaluation tool? -catalyst for proving the need to change – efficiency & systems redesign process (Directorate Man 1.2)	Series of tools to improve the overall quality of the service within the resources that are currently available by reviewing/ challenging existing systems and processes (Man 2.2)	Programme of continuous improvement to assist managers to improve efficiency & effectiveness of services and create their own resource for development (Man 3.2)	
Promised but limited at present (Dr 3)	A work program/project that enables better thinking behind everything we do. Streamlining services & resources (Directorate Man 1.3)	A whole systems approach to service improvement using lean tools & techniques. Aimed at developing local expertise (Man 2.3)	Program with potential to deliver significant improvement but as yet not understood and accepted in some areas (Exec 3.3)	
Useful, underutilised, not well understood. Full of potential. Significantly improving performance (Dr 4)				

Source: Author

Figure 5.10 reflects the focus on efficiency rather than targets alone. Efficiency is the only measure of success according to the Chief Executive, whereas the Directorate Managers all said that an 'Improved Patient Experience' was a success factor, perhaps due to their services proximity to the patient. The Doctors did not mention patient experience, mortality or morbidity, perhaps because they saw LT as a management practice which was about efficiency, rather than the causal relationship between quality of service and efficiency. Two of the Doctors' responses considered efficiency as the single factor of success. Otherwise there was no clear pattern of responses from the doctors.

Figure 5.12 If the Lean programme is to be considered to have been a successful program/initiative three years from now, what will that mean to you? (i.e. how do you define success)?



Source: Author

Figure 5.12 shows that having a measurable impact for efficiency is a key to success, followed by improved patient experience and streamlined work practices (for staff).

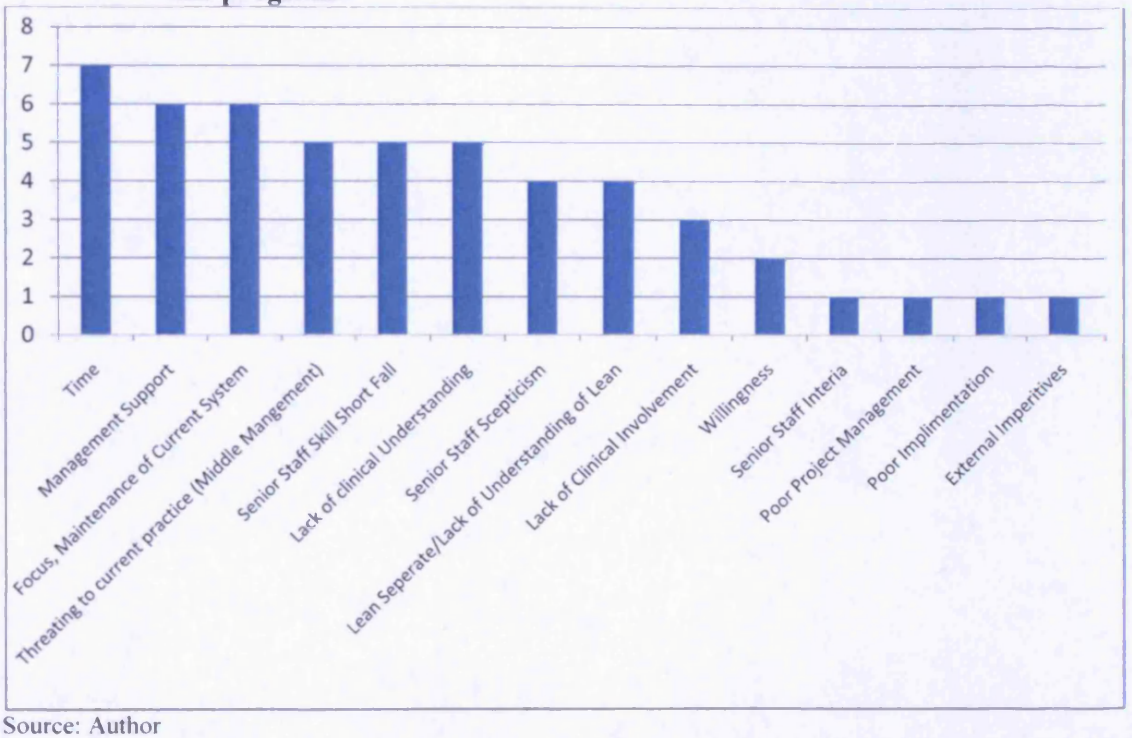
Table 5.25 What do you think is the Lean program's relative importance to the organisation as a whole, given the pressures of competing priorities for resources?

Doctors	Managers 1st	Managers 2nd	Managers 3rd	Chief Exec
HIGH (Dr 1).	INTEGRATED (Directorate Man 1.1)	CONDITIONAL (Man 2.1)	INTEGRATED (Man 3.1)	HIGH
UNCERTAIN (Dr 2)	INTEGRATED (Directorate Man 1.2)	HIGH (Man 2.2)	HIGH (Man 3.2)	
UNCERTAIN (Dr 3)	INTEGRATED (Directorate Man 1.3)	VARIED (Man 2.3)	VARIED (Exec 3.3)	
UNCERTAIN (Dr 4)				

Source: Author

Table 5.25 reflects that directorate managers understand the need for the integration of activities to achieve patient flow, and the doctors are unclear of the relative importance of the programme even though the chief executive ranks it as highly important.

Figure 5.13 What do you see as the major obstacles to successful implementation of this program?



Source: Author

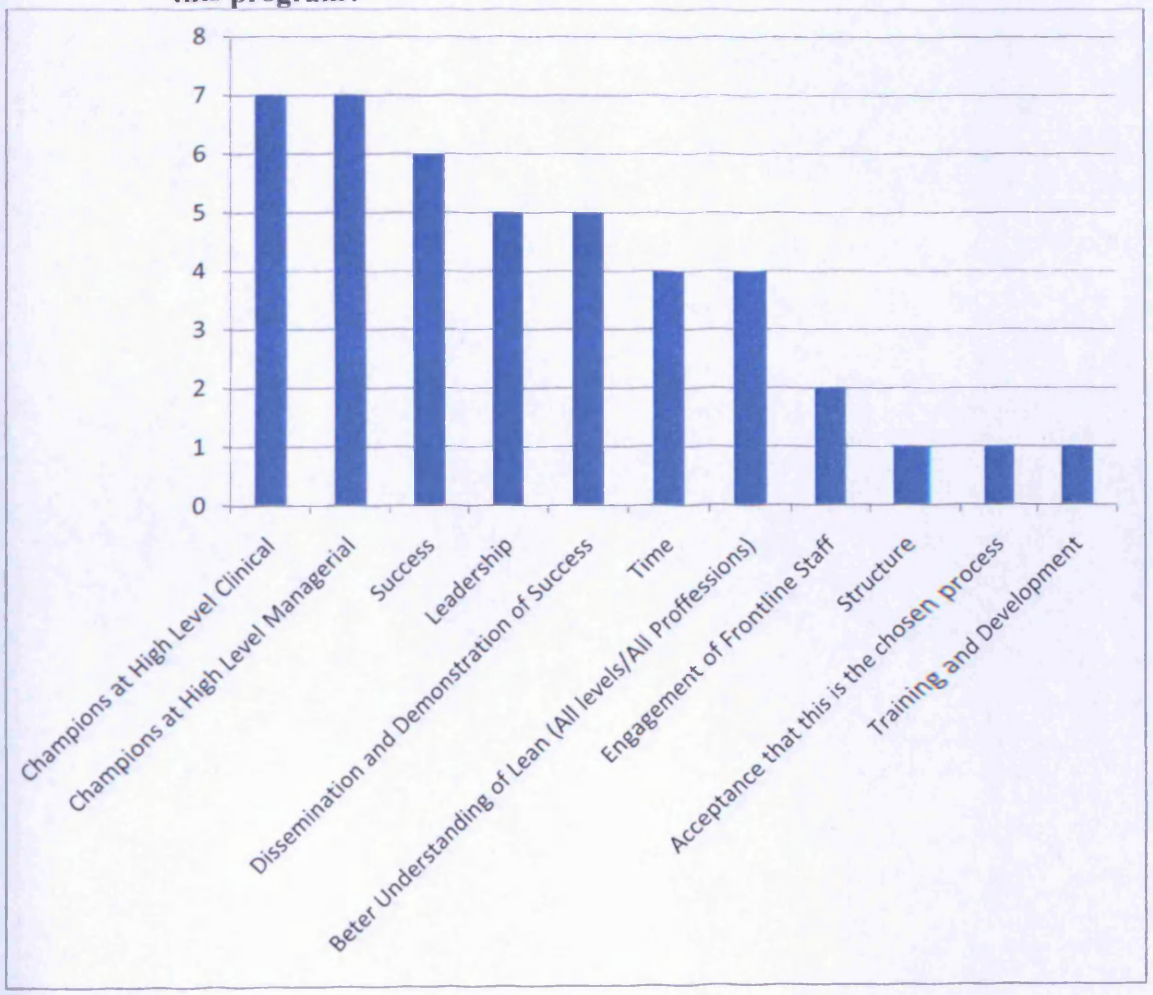
Inhibitors to whole system improvement relate to available time, which in turn is reinforced by the need to focus on maintenance of the system i.e. no time for anything but maintenance of the current way. In turn 'management support' could provide clarity of focus, as was seen with the work of Walley et al. (2006) where a feature of good performing organisations was the ability of managers to help steer a path to achieve system balance.

Another group of connected reasons for obstacles to implementation could be the threat change poses to the current practices of middle management and a skills shortfall for senior management in conjunction with a lack of clinical understanding of how the approach may fit (both influenced by scepticism). All those managers who were managing departments which were 2nd removed from patients stressed that time was an

obstacle to successful implementation. All the executives indicated that Management Support was a potential obstacle to implementation.

This group set the direction of the organisation and these results conclusively show a concern to establish the features of a learning organisation (i.e. time and management engagement to question the current systems and adapt roles and responsibilities towards greater value added outcomes) and an emphasis on the changes to the technical system that impact upon roles, responsibilities and engagement. The top 4 inhibitors may reflect the organisations, inability to reflect and adapt an OM system.

Figure 5.14 What do you see as the key enablers to the successful implementation of this program?



Source: Author

As for enablers for implementation, the key issues raised were related to senior clinical and managerial champions, particularly the Chief Executive and Clinical Chiefs of Staff and general Leadership. This is closely followed by success[87] which is communicated and disseminated. All the executives saw that Champions at a high level of management were an enabler. This is counter-intuitive in that these are the senior management and potentially have the political influence to provide that leadership and championing, and indeed were sponsors of the cases but their role was not understood.

Championing the change agenda and leading adaptations of the STS are critical as is demonstrable OM success (higher performance).

Table 5.26 Who are the key players for the Lean Thinking?

	Total	Dr 1	Dr 2	Dr 3	Dr 4	Dir Man 1.1	Dir Man 1.2	Dir Man 1.3	Man 2.1	Man 2.2	Man 2.3	Man 3.1	Exec 3.2	Exec 3.3	Chief Exec
Everyone	2	1						1							
Senior Managers and Executives	7		1				1			1	1	1	1		1
Middle Managers	3		1										1		1
General Managers	5		1						1				1	1	1
Chiefs of Staff	5								1	1	1			1	1
Trust Board	2						1		1						
Consultants	2					1									1
Clinicians	1										1				
Unsure	2			1	1										
Lead Nurses	1												1		

[87] Success being the delivery of the planned outcome of new organisational design (see Table 5.15 – planned elapsed time as the outcome) reflecting a view of discontinuous change rather than continuous change and potentially not understanding the dynamic need for such change to remain flexible in an open system.

	Total	Dr 1	Dr 2	Dr 3	Dr 4	Dir Man 1.1	Dir Man 1.2	Dir Man 1.3	Man 2.1	Man 2.2	Man 2.3	Man 3.1	Exec 3.2	Exec 3.3	Chief Exec
Non Executive Directors	1												1		
CEO	1													1	
Commissioners	1							1							
Patients	1							1							

Source: Author

When asked who the key players were for LT (Table 5.26), two of the senior doctors in the organisation were unsure, and none of them considered the Chiefs of Staff or Consultants as key, while one Directorate Manager saw Consultants as the only key player. The Managers whose departments were 2nd level to patient flow all considered Chiefs of Staff as vital, as did the Chief Executive. The most commonly cited key player category was Senior Managers and Executives, while the Senior Executives saw the General Managers as vital also. Hence the designers of the operational system require management support to deliver improvement.

The interviewees believed the ultimate leaders of change are the Senior Managers and Executives (these people hold responsibility for the economic and macro system performance). The Chiefs of Staff hold responsibility for the redesign of end to end clinical processes through their technical capability to redesign individual roles and responsibilities, handovers between teams and clinical/operational policies.

The enablers and inhibitors emerging from the Senior Management (some of which reflected the features from section 5.6) of the organisation are:

- management leadership (as per 'resistance futility' Table 5.23);
- alignment of goals in top team – efficiency, targets patients (Table 5.24) which links to goal congruency/dissonancy in Table 5.23;

- champions at senior level – both clinical and managerial (goal congruency/dissonance – Table 5.23).

The following enablers and inhibitors are additional to those already discussed:

- measurable impact/streamlined process/improved patient experience (Figure 5.12):

- demonstrated management support to encourage organisational learning (i.e. sanctioning time to undertake initial review - Figure 5.13, providing small levels of evidenced investment to support flow, working with teams to balance maintenance and improvement activities – Figure 5.13);

- Skills at Senior Management level (Figure 5.13).

These enablers and inhibitors will be added to the technical features to be tested (Figure 5.9) the psychosocial features to be tested (Table 5.23) in Section 5.8.

5.8. Enablers and inhibitors for high performance patient flow

The factors distilled from the case organisation are now used to test the implications of their presence for patient flow and flow performance using a matrix with the factors on the x axis and the cases in order of successful performance (Table 5.8) on the y axis to enable the identification of any patterns which may exist. For Cases 25 and 29, it could be construed these were not far enough along in the process to draw valid comparisons with the other cases, hence caution has been used if anomalies occurred in these cases. Cases 27, 28 and 30 are excluded from the analysis (as discussed in Section 5.4). Factors and definition of the range for enabler and inhibitor (where both can be present) are:

A = Layered Supposition – rules and assumptions embedded in the organisation are positively challenged (enabler), rules and assumptions embedded in the organisation are to be followed (inhibitor);

B = Clutter – individuals scope of work is aligned to the organisational goal (enabler), individuals scope of work is determined in isolation of organisational goals

(organisational goals are often absent hence personal goals substituted) – (inhibitor):

C = Planning Dissonance – simple line of sight of design (pattern) and operation, accurate and timely data feedback, all tasks performed which are necessary included (enabler), lack of the aforementioned (inhibitor);

D = Segmentation – skill and application of experiments with new forms of design for demand (enabler), lack of the aforementioned (inhibitor).

E = Enabler.

I = Inhibitor.

Table 5.27 Technical Factors vs. Performance (Pattern Matching)

D	E	E	E	E	E	E	E	E	I	E/I	E/I	E/I	I	E/I	I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	I
C	E	E	E	E	E	E/I	E/I	E/I	I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	I	E/I	E/I	E/I	I
B	E	E	E	E	E	E/I	E/I	E/I	I	E/I	E/I	E/I	E/I	E/I	E/I	I	E/I	I	I	E/I	E/I	E/I	I	E/I	E/I	E/I	I
A	E	E	E	E	E	E/I	E/I	E/I	E/I	E/I	E/I	E	E/I	E/I	I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	I	E/I	E/I	E/I	I
Case	1	2	4	6	14	11	15	18	3	7	9	16	20	21	26	5	8	12	13	19	22	25	17	23	24	29	10
Perf.	3	3	3	3	3	2(3)	2(3)	2(3)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	1(2)	1(2)	1(2)	1(2)	1(1)

Source Author

Table 5.27 shows that presence of all four factors delivers highest performance for patient flow. Segmentation (D) was also apparent in high stage 2 performance which could suggest that segmentation on its own is not an enabler but in conjunction with planning dissonance it is. Absence of all these features was observed in Case 10 which was abandoned on the request of the pharmacy manager. Where some progress was made but low performance, there was a tendency towards dual forces both to enable and inhibit. Case 17 was particularly interesting for the resistance to challenge assumptions and rules, individual work arounds and poor data e.g. materials ordered, if not delivered, would need to be reordered by ward (there was no feedback loop between ward and procurement), work arounds for material distribution and no joined up information system, which resulted in decisions being made on experience rather than data. The implications of the pattern matching will be reviewed in more detail in CHAPTER 6.

Next socio factors have been distilled from Table 5.23 (full definitions are available) and treated as per the previous analysis. Factors and definition of the range for enabler and inhibitor (where both can be present) are:

F = Value of care (emotion to stimulate improvement – enabler, care as a means of rejecting change);

G = Involvement and engagement (enabler is where all groups staff/managers/professions jointly participate – lack of is the inhibitor);

H = Goal alignment (enabler)/Goal dissonance (inhibitor) for senior manager;

J = Resistance Futility (senior management leadership – enabler, lack of inhibitor);

K = Shared values (with the voice of the customer – enabler, lack of inhibitor);

L* = Learnt Behaviour (feedback alters personal and group perception – enabler to learn and improve, inhibitor to reinforce old rules, linked to factor A – inhibitor);

M = Perceived importance of problem – high importance encourages innovation (enabler), lack of high importance reinforces trade off rather than innovation (inhibitor).

Table 5.28 Socio Factors vs. performance (Pattern Matching)

M^	E	E	E	E	E	E	E	E	E/I	E/I	E/I	E/I	E/I	E/I	E	E/I	E/I	E/I	E/I	E/I	E/I	E	I	I	I	E/I	I
L*	E	E	E	E	E	E/I	E/I	E/I	I	E/I	E	E/I	E/I	E/I	I	E/I	E	I	E/I	E/I	E/I	E/I	I	I	I	I	I
K	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	I	I	I	E	I
J	E/I	E	E	E	E	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E	E/I	I	E/I	E/I	I
H@	E/h	E/h	E/h	E/h	E/h	E/I	E/h	E/h	I/h	E/I	E/h	E/I	E/I	E/h	E/h	E/I	E/I	E/h	E/h	E/I	E/I	E/h	I/h	E/h	E/h	E/h	E/h
G*	E	E	E	E	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I
F@	E/h	E/h	E/h	E/h	E/h	E/I	I/L	I/L	I/L	I/h	E/h	I/L	I/L	I/L	I/L	E/L	I/L	E/L	E/L	E/L	I/L	E/h	E/L	I/L	E/L	E/L	I/h
Case	1	2	4	6	14	11	15	18	3	7	9	16	20	21	26	5	8	12	13	19	22	25	17	23	24	29	10
Perf.	3	3	3	3	3	2(3)	2(3)	2(3)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	1(2)	1(2)	1(2)	1(2)	1(1)

^ colour coded to reflect lack of importance by group with blue = senior manager/professional, pink = middle manager/mid professional grade and green = command and control by middle management that stopped group.
@ further resonance of measurement where h=high and L=low presence
* further analysis in Table 5.29 to establish the impact of the combination of professional/senior manager, middle manager and staff
Source: Author

Table 5.28 clearly shows that high performers and poor performers show similar socio factors such as the presence of resistance futility (J) or the absence of a perception of

importance of the problem (M). It emerged during analysis that factor M had an added feature where different groups were observed to have different views of importance (lack of). In the case of poor performing cases the command and control style of middle management inhibited progress in engaging with LT organisational design practices for patient flow. These findings will be discussed further in CHAPTER 6. Factor G required further analysis as it became apparent that the impact of professions, senior and middle management as well as staff needed to be understood as a combination rather than a single entity.

Table 5.29 Factor G (Involvement and Engagement) matrix analysis by key groups

G*	E	E	E	E	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I
Prof	A	A	A	A	B	A	B	B	B	C	B	B	B	B	A	B	B	C	C	B	B	B	B	C	B	C	C
S.M	A	A	A	A	A	B	A	A	B	B	A	B	B	A	A	A	B	A	A	A	B	A	C	A	A	A	A
M.M	BA	A	A	A	A	A	A	A	CA	A	A	A	A	A	B	B	A	B	B	B	A	A	C	C	C	B	C
Staff	A	A	A	A	A	A	A	A	A	A	A	A	B	A	B	B	A	B	B	B	A	A	C	B	B	A	C
Case	1	2	4	6	14	11	15	18	3	7	9	16	20	21	26	5	8	12	13	19	22	25	17	23	24	29	10
Perf.	3	3	3	3	3	2(3)	2(3)	2(3)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	1(2)	1(2)	1(2)	1(2)	1(1)

Key Groups are Prof = Clinical professionals, S.M = Senior Managers, M.M = Middle Managers and Staff = day to day teams. High motivation = A: Low Resistance = B: High resistance = C. Middle Managers could be more than one level of the organisation and where differences in these levels occurred, they are shown with highest level first (i.e. the last letter = the manager closest to the work).
Source: Author

The influence of the different levels of management on involvement and engagement helped to gain a better understanding of the role each played. While senior management were considered as key by the senior management team (Section 5.7) the impact on this factor was not as significant as the staff and the manager closest to managing the work. Staff often progressed towards action and implementation despite some resistance. Middle management therefore are significant in terms of progress made (often they were able to progress parts of the design if not all) with either senior managers and/or professional resistance constraining implementation of the whole design. Middle management's role is reflected in the findings of Probert et al. (1999). Where little progress was made, three groups resisted with only one motivated. This analysis also raised the question of respect of the group who were resistant e.g. the professional in Case 14 was not respected and hence this resistance was less constraining to involvement and engagement than in Case 7 where the professional was a very respected clinician. This dimension would be worthy of testing in further research.

The final factors are drawn from the senior management interviews and reviewed in Table 5.30 where pattern matching analysis has been undertaken:

N = Measurable impact (enabler being streamlined process/improved patient experience, inhibitor being the lack of the aforementioned alongside the lack of measurement);

O= *NOT USED;*

P = Demonstrated management support to encourage organisational learning (enabler such as sanctioning time to undertake initial review, providing small levels of evidenced investment to support flow, working with teams to balance maintenance and improvement activities, inhibitor the dismissing of the aforementioned without rational explanation and discussion with teams);

Q1 = Skills at senior management level (Enabler), lack of inhibitor;

Q2 = Skill of cross-functional team (enabler), lack of inhibitor

Table 5.30 Managerial Factors vs. Performance (Pattern Matching)

Q2	E	I	E	I	I	E	E	E	E	I	E	E	E	E	I	I	I	I	I	E	E	E	I	I	I	E	E/I
Q1	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
P	E	E	E	E	E	E/I	E/I	E/I	I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	E/I	I
N	E	E	E	E	E	E/I	E	E	I	E/I	E/I	E/I	E	E/I	E	E/I	E/I	E/I	E/I	E/I	E/I	E	I	I	I	E/I	I
Case	1	2	4	6	14	11	15	18	3	7	9	16	20	21	26	5	8	12	13	19	22	25	17	23	24	29	10
Perf.	3	3	3	3	3	2(3)	2(3)	2(3)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(2)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	2(1)	1(2)	1(2)	1(2)	1(2)	1(1)

Source: Author

Emerging from the pattern matching analysis was the lack of skill held by senior leaders of the organisation (Table 5.30). For cross-functional teams, the analysis highlighted that where a skills shortfall existed (in cases which performed at stage 2(2) and above), these teams proactively sought out skills (either internally or from external training such as data skills, six sigma, project management, customer service) to address the gap that emerged. For factors N and P, their presence enabled high performance and in the case of N, the absence caused poor performance. This reinforces senior management's view (section 5.7) that measurable evidence is required to stimulate action to adopt LT.

The results of these findings are distilled in CHAPTER 6, to provide guidance to managers about the relevant factors needed to ensure organisational redesign in order to achieve patient flow. Section 5.9 reviews the holistic organisational results of the application of LT, and high performing practices over time to understand if an impact resulted at the whole system level and what can be learnt from this.

5.9. Longitudinal Results for the whole system improvement for patient flow

The discussion to date has been related to sub-systems in the organisation, and improvement through interventions designed to achieve high performance. In order to validate the findings of the study, secondary data was reviewed with regard to two co-located regional Trusts. This was undertaken using an in-depth regional study of performance from Jan 2004 to March 2007. All three Trusts were subject to the same national policy directives, with Trust X adopting an improvement programme based on TOC, Trust Y undertaking no specific programme to their organisation, other than those being enacted as part of national directives (which all three Trusts were involved with). The improvement in acute inpatient Average LOS (ALOS) statistics for the three Trusts is shown in Table 5.31. All three Trusts have improved over time with the consistent capacity and increasing demand. The case study organisation has improved by an additional third on this metric.

Table 5.31 Whole system improvement regional comparison for acute ALOS

	2001/2002[88] ALOS	2004 - 2007[89] ALOS	Difference (Days)	Proportionate Difference	Improvement Programme
Trust X	9	6.5	2.5	27%	TOC
Trust Y	8	6.1	1.9	23%	None
Case Study Trust	7.4	4.2	3.2	43%	Lean

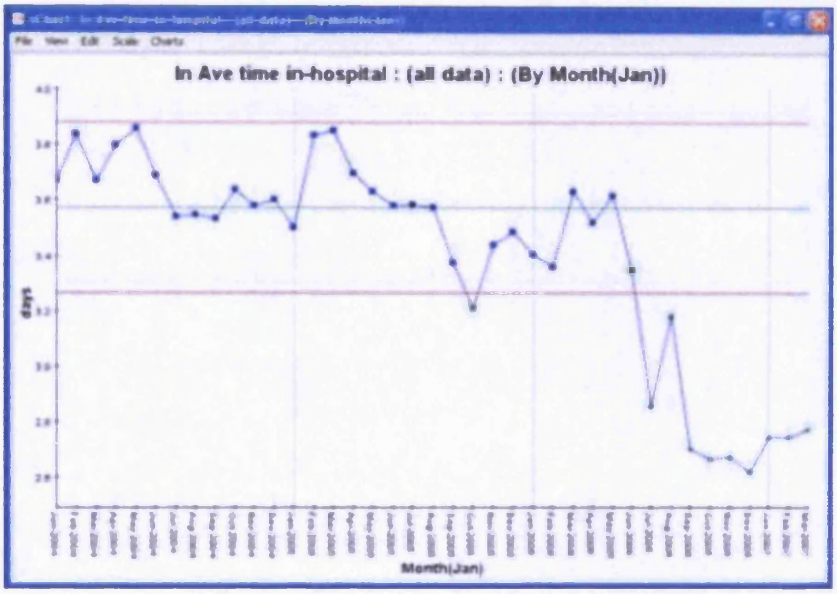
Source: Author

The ALOS figures presented in Table 5.31 relate to two different time periods (a consequence of the secondary data being assessed) which would more likely dampen the degree of improvement. ALOS as a measure has limitations (Millard 1994a). Its use here is related to trends rather than absolutes. This approach to measurement was

[88] Data source internal Trust Profile published 2003.
[89] Data source regional profile published 2007, concealed to protect identity of organisations.

selected as a proxy for improvement to waiting 'in line' and it is the difference in time that patients spent in the system that is of interest, not the absolute number. The nature of a dynamic organisational system will mean capacity and demand in healthcare will always be subject to variation (e.g. due to seasonality), as will LOS.

Figure 5.15 Run chart of largest Hospital performance for average LOS for unscheduled care inpatients



Source: See footnote 87

Run charts of data were used to evaluate where a narrowing of the distribution and/or a shift in performance occurred in the case study Trust. In Figure 5.15 a 22% reduction in ALOS was recorded for the largest acute hospital in the case study organisation for unscheduled care. It indicates a shift in trend starting in August 2005 and having a further change starting in March 2006[90].

The results were fed back to the executive team of the Trust to validate the findings, who indicated that following on from the sub-system diagnostics, the executive team had been working with staff in an attempt to flex capacity (i.e. have more or fewer beds available) to match the seasonality of demand patterns. While the Trust concluded they had not succeeded completely, they were satisfied that they were becoming increasingly

[90] SMR has also been recorded as being the lowest quartile for the region i.e. reduced mortality rate, internal Trust document 2009 (validated by the CHKS report to the Trust).

knowledgeable about how to evaluate a baseline and then were working towards the ability to rapidly increase bed availability particularly around winter pressures. The Trust indicated that this was the reason for the slight increase in Jan 2007 – Mar 2007 figures (Figure 5.15). The regional profile[91] provided an insight into the source of the increase which was due to a relatively small increase of patients (over 60) being admitted by ambulance, and staying longer than would be estimated if they were admitted with the same complaint in the summer. Their next step was to test the hypothesis that these patients were known to healthcare professionals, and if this was the case, whether it would be possible to design preventative strategies to avoid the patients' admission, thus reducing the annual winter pressure bed crisis.

This section validates that a high performance intervention relating to sub-systems (not processes alone) and management groups focusing on the opportunity gap and work redesign can deliver higher performance. This research provides a theme of systems improvement for patient LOS.

5.10. Chapter conclusion

The findings from this chapter relate to the application of LT in an SCO as a means of achieving high performance. An emergent taxonomy was developed by the author to understand the implications of improvement results relative to the proximity of patient contact and impact to flow of patients through the organisation. This taxonomy is initially used to scrutinise resource and performance dependencies. The potential for this taxonomy to be applied by managers when designing improvement programmes with the intent of gaining whole system performance improvement, will be discussed in CHAPTER 6.

This chapter has also reviewed, in depth, sample nested cases and validated key findings against the complete suite of nested cases. This is undertaken firstly through examination of technical features arising from literature; secondly, a review of clinical, middle and senior management views was undertaken and finally, the relationship between performance at sub-system level (nested cases) and whole system level is explored. The

[91] Data source regional profile published 2007, concealed to protect identity of organisations.

emergent findings provide a number of different stances against which further factors have been synthesised as enablers and inhibitors to whole systems improvement. These findings address previous criticism levelled by Radnor and Bucci (2008) regarding the blurred picture of success factors.

CHAPTER 6 discusses these findings in concert with the preceding literature and implications of methods employed.

CHAPTER 6 RESEARCH DISCUSSION AND MODEL DEVELOPMENT

How can we avoid the two extremes: too great bossism in giving orders, and practically no orders given?...My solution is to depersonalise the giving of orde{Foster, 2007 #515}rs, to unite all concerned in the study of the situation, to discover the law of the situation and obey it.
Mary Parker Follett, 1941.

This chapter discusses the implications of the findings from the preceding chapters in relation to the research questions, and offers a model combining both technical and human features to assist in the development of approaches to whole system design for patient flow. This model presents a means by which service organisations can develop into high performing effective organisations.

6.1. Towards the concept of patient flow

The consistent thread of discussion in this thesis has been that of patient flow, a concept seen as poorly understood (Radnor, et al. 2006). From discussions in earlier chapters, it can be seen that patient flow has numerous meanings although it is implicitly used as a metaphor for the inverse to waiting. In CHAPTER 1, differentiation is made between waiting lists (numbers waiting for treatment) and waiting 'in line' (delays experienced by patients) (Martin and Smith 1999). The latter, being the focus of this study, requires a deep understanding of how organisational systems currently work in conjunction with their environment. In particular, how large scale public sector organisations create and build improvement given an existing system and the implications relating to the concept of flow. Flow is now discussed in relation to the literature review and field work.

An analysis of literature reveals seven categories of patient flow, these are:

Flow as a means of visualisation in a structured manner, i.e. a number of steps; a complete journey (Batalden and Davidoff 2007, Burgess et al. 2009); or layout/configuration. Linked methods would be flow charts, value stream mapping etc.

Flow and work design - work practices of clinicians (Reinertsen et al. 2007), laboratories (Harrison and McDowell 2008), etc.

Flow as an outcome measure of the service provided by SCO's, hence the hypothesis that reducing variation in work practices results in improved patient flow, i.e. less waiting 'in line' (Allder et al. 2010, Institute for Healthcare Improvement 2003). This implicitly encompasses a reduction in safety and quality issues, which would inhibit patient flow. There is general agreement by commentators that patient flow is a desirable outcome.

Flow as a motivation for innovation - Feachem and Sekhri (2005) describe cohesive integration of patient journeys and flow as a differentiator in performance between different global healthcare systems. Others are motivated to provide different modes of service e.g. 'one-stop' (Pedler and Abbott 2008), 'see and treat' (Lamont 2005), etc. Underlying the aspiration of innovation is implicitly a movement from functional to integrated and partnership organisational focus (Rich 1999). Innovation as both goal lead and actor stimulated (Adler et al. 2003).

Flow as a means of patient orientation (Foster et al. 2007) within which the previous four categories fit. As positive perceived implications in achieving a state of 'patient flow' which becomes a framework for conveying and communicating patient's needs and wants (Young and McClean 2008: Radnor and Howleg 2010). These are in addition to the clinical needs, and reflect the emergence of service as a set of expectations (Section 3.5.7). The importance of this is reinforced by the research findings (Table 5.28) where 'shared values' stimulated through the voice of the customer, was a consistent attribute in all cases which implemented some improvement (stage 2 (Figure 5.7) and above).

Flow absence, (inward organisational orientation) - the concept, interesting by its absence, where high performance work practices in healthcare revolve around human systems (Garman et al. 2009). A reflection of the divergence of OM and HRM (Section 3.5).

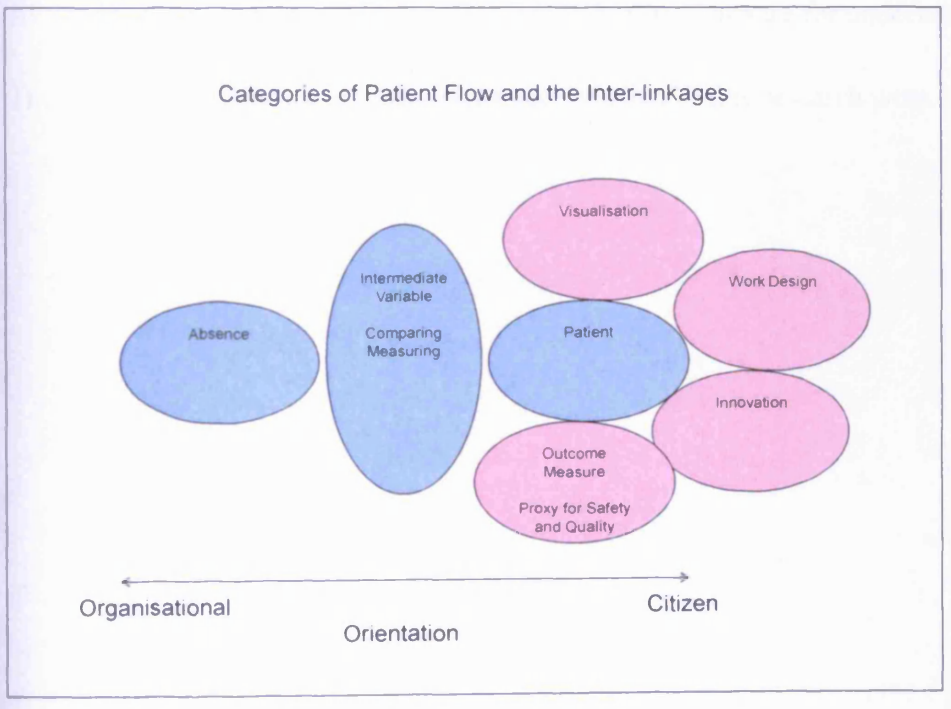
Flow as intermediate variable - which enables evaluation of progress of change in healthcare towards a lean model of working i.e. how lean you are (Kollberg et al. 2007). Additionally in modelling, when evaluating the performance affects of a limited number of input variables on an SCO, e.g. demand and capacity against numbers treated

(Silverster et al. 2004) or, current and new capacity[92] on effectiveness (Harrison and Appleby 2005) or, between proposed actions and satisfaction of target (The Royal College of Surgeons of England 2008). It is suggested that this category acts as a means of comparison, evidence, measurement, etc. between an outward patient organisational focus and inward organisational centred focus.

In categorising patient flow, it is clear that this concept is also an enabler, or the absence of it an inhibitor, for whole systems improvement. This has implications on attaining high organisational performance. These categories also assist in closing a gap of understanding (Radnor et al. 2006) for practitioners, policy makers and academics.

Figure 6.1 proposes a model of relationships between these categories of patient flow. In doing so, patient flow can be seen to be a dynamic concept. Implicit with this is a shift of perspective from organisational to citizen.

Figure 6.1 Proposed model of the relationship between categories for patient flow



Source: Author

[92] Referring to emerging capacity such as privately run treatment centres.

The concept and categories of patient flow will also be used as a means of understanding the findings of the field research, particularly related to inhibitors and enablers, the implications of which are now discussed.

6.2. Patient Flow and the findings from the Nested Cases

6.2.1. The significance of the technical system

The results of the nested cases (i.e. inhibitors and enablers are summarised in section 5.8) and in particular, the findings from a technical system perspective, provides a lens of understanding regarding the transition from organisational orientation to a citizen orientation (Figure 6.1). While understanding the underlying mechanisms for whole system improvement is an objective of this study, literature confirms organisations typically move from one model of work to another through firstly focusing on sub-systems (Burgess et al. 2009). Therefore most service based studies of LT have focused on the technical system and the application of tools and techniques (Holm and Åhlström 2010). STS would support this as a starting juncture for understanding.

The stages of improvement which have been studied in this research were classified (

Figure 5.8) as:

i. Diagnostics (Stage 1):

ii. Implementation (Stage 2):

iii. Sustainability and spread (Stage 3):

iv. Spread to whole systems (arising from Stage 3 – accumulation of changed practices, human attributes and managerial practice).

CHAPTER 5 reported on the emergent attributes which were tested for their stimulative and reflective properties, which in turn enabled or restrained, changes of practices to achieve high performance. Table 6.1 focuses on the vital differentiators (arising from the study of the technical attributes) to progress from point/sub-system improvement (below stage 2.1 (Figure 5.7)) to sustainable improvement (stage 3). These in turn have impacted on whole systems performance improvement.

Table 6.1 Differentiators for whole systems improvement

Attribute	2005			2007
Level	Stage 2(2)	Stage 2(3)	Stage 3(0)	Whole System
Demand data used daily for management by teams (Table 5.11)	No	Yes	Yes	Yes – demonstrated knowledge of using demand info for system change
Use of control charts (Table 5.11)	No	No	Yes	Yes – noted need to use these for longer than 12 month durations
Standards known and used for work levelling (Table 5.13)	No	Yes	Yes	N/A
Standard known and used for continuous improvement (Table 5.13)	No	No	Yes	Visual and regular CI increases access for management
Backlog was dealt with as part of workload management (rather than pump prime removal) (Table 5.18)	No	Yes	Yes	N/A
Applied new models of segmentation (Table 5.19)	No	Yes	Yes	Yes. Moving from a tactical to a strategic mechanism
Used feedback questionnaire from customers to CI (Table 5.20)	No	Yes	Yes	Data driven and available to evaluate the whole
Named point of contact for customer/patient (Table 5.20)	No	No	Yes	N/A

Source: Author

These results reflect the literature regarding daily demand, use of control charts, standards and linkages, though feedback as close as possible to the customers time of use, which is standard in High Performing organisations. These findings are in addition to other service research which relates more to the stage 1 aspects of lean and high performance thinking than to the whole, primarily as many are only starting this journey (Burgess et al. 2009, Holm and Åhlström 2010).

The segmentation attribute is of interest as this area has been a strong theme in manufacturing strategy literature, but is virtually unknown to operational managers in healthcare. This is an area worthy of investigation regarding translation and innovation to help the NHS (and healthcare in general) create a different model of organisational design, to appropriately suit the increasing variety of clinical and service variants necessary to meet patient and carers future needs and wants.

Finally, the Backlog attribute is interesting by its absence in healthcare literature on improvement. Backlog is generally discussed in terms of the queue carried over at the end of budget periods (known as 'referral to treatment' and based on activity). It is not considered as a management action in transforming from one organisational design (which is underperforming), to another (intended to perform under quite different assumptions). Pump priming to remove backlogs of work was considered the best management option. Yet, the opposite was true. Counter intuitively, the management of backlog by the team, in a gradually but structured way, provided teams with a learning opportunity (through PDSA) and gave them an opportunity to experiment. Individuals and teams could learn and adjust to many attributes as they investigated why the Backlog had occurred. This also required the manager to change his/her style, particularly concerning impatience for speed of results. This illustrates that management's focus on time, itself, may have some negative impact on the process of improvement (an area for future research).

The output results also show that at completion of the main study phase, case studies 7 and 11 (which represented 63% of the demand at commencement of the study), had achieved stage 2(2) and 2(3) performance improvement. It was predicted at the end of

stage 1 of the research, that if fully implemented, these could reduce patient LOS by 20% (case 7) and 24% (case 11)[93]. In 2007 when the results for the organisation as a whole were reviewed, a figure of 22% LOS reduction for all inpatient demand was recorded[94]. This suggested that with 30 cases over 3½ years, and in conjunction with a structured programme (means rather than solution), sufficient capacity was in place to improve this proxy measure of patient flow, hence patient experiences. Further research is necessary to understand improvement in the context of the supply network of the NHS as a whole. This research also provides an insight into the time an improvement programme may take to yield results at a whole systems level. Indications from Womack and Jones (1996) that it would take 5 years to yield organisational results are confirmed to be true in this research (which started in 2002 with a major shift in organisational performance in 2006). The time between engagement of 1st level cases and a shift in whole system performance was approximately 4 years.

6.2.2. Reflections on research procedure - theory building

This research has developed and tested a methodology for the purposes of understanding the technical and human dynamics within an organisation from a realist perspective. The focus of this study was to understand the factors effecting the implementation of improvement, related to the context of a dynamic organisational environment and grounded in STS. The author proposes the methodology developed here for theory building, due to the robust nature of the finding in this thesis, is a valuable contribution and has utility for future research concerning large scale complex organisations, where depth of understanding is sought.

The key strengths of this approach include:

1 A consistent, repeatable and transferable procedure for the initial intervention (see Table 4.12) that is described so that other researchers can apply and/or test the methods through case cross comparison. The strength of the standard

[93] Given the dynamic nature of the system, this prediction is a guide rather than an absolute. It provides the logic against which motivation to improve should follow.
[94] The theoretical figures recognised the dependency of other services such as TTOs, procurement etc. Therefore this argument is not suggesting that looking at high volume patient flows alone will bring with it high performance, rather performance is interdependent.

methodology comes from the utility of the approach and the results it has generated by allowing comparative measurement of different organisational processes. It enables cross comparison of these processes through a systematic, theoretically grounded, and well defined approach to undertaking organisational research (Table 4.9). The standard methodology also has utility which is derived from the application of the process by others and the "easy to follow" nature of the method that has been designed. Reflecting upon the application of the methodology shows that similar results are achieved regardless of the researcher, which suggests a limiting of bias and a consistency in result is derived by following this designed process of research. The author proposes that this offers a very robust and defendable methodology for the investigation of complex organisational systems and is aligned to and extends the quality tests of Eisenhardt (1989) and Miles and Huberman (1994).

2 The clarity of the problem-statement required by the standard methodology offered an opportunity to discuss and detail the actual problem faced by the teams and is in itself a means of learning and questioning. Such an addition to the methodology offered many benefits, not least in reducing organisation and inter team politics or defensiveness. Further, if the problem statement was wrong and teams had selected a 'non process' or 'non improvement' subject for analysis, this would be brought to the attention of the author and a decision would be made to exclude the project from analysis on the basis that the project did not meet the quality criteria for this research (examples include simple audits rather than learning based/LT improvement processes). As a consequence, some cases were excluded and this has been declared in CHAPTER 5.

3 Validation of secondary and primary data formed the process of cycling and testing findings and results. The standard methodology was also applied during the learning phases of the research to test and gain consensus from the team (for the current and future state mental models). This cycle is consistent with change theories (individual group readiness) and also the organisational enablers of high performing businesses as outlined by authors such as Senge (1990).

4 Measurement – calibration method used to assess the rate and extent of change by the teams providing a comparison of current (starting) state and future states that follow from the process of problem-focus, analysis and improvement interventions. The use of measures provided a robust way of assessing change rather than comparing tools that had led to improvement. As such, measures tell a story of how far teams had progressed, thereby enabling deeper study of the means by which cases had achieved this change or lack of change. In effect, performance measures show how far away a team is from its ideal future state or how far it has travelled to achieve its future state. This enabled the generation of a more granular and comprehensive evaluation process regarding the process of implementation and the socio-technical factors which impact on such performance measures.

5 Evaluation of the change process and the implications of management/clinical governance hierarchy allowed the research to build a strong relationship between changes in practice over time, learning, different measurements and attributes which enabled changes in relationships between the levels of the organisational hierarchy (teams, middle managers, senior managers and senior clinicians). This holistic review is important and adds new insight into a study of this nature, offering an understanding of how managers engage with performance. Previous operation management studies have ignored this critical aspect of high performance organisational designs.

6 Another strength of the standard methodology was the use of cross case comparisons and comparisons of the organisation with its local peer organisations. This element of the research adds a significant robustness to the results, given that healthcare organisations tend to use the same socio-technical systems (equipment and processes, skills and structures), so differences found by this study can only be explained by differences in the learning how to improve. The results show a third better performance from the aggregated cases within this study which is a significant performance differential and therefore a significant

contribution that would have been undetected by traditional studies and research designs.

It could be argued that the weaknesses of this methodology is the length of time required to undertake the evaluation, yet other studies which have been more rapid in their evaluation have been reported as methodologically weak

The depth of data required to draw robust findings, shares the same weakness as case study research in general i.e. the sheer volume of data. However, case study research is a significant research strategy of choice in this arena, hence such a disadvantage is acceptable to gain the knowledge being sought.

6.2.3. Reflections on research findings focusing on difference

Reflecting on the pattern matching of technical factors (Table 5.27) case 3 and case 17 are interesting for their differences (Miles and Huberman 1994). Case 3 is a high performing case yet the factor analysis shows there were more technical inhibitors than enablers. Both these cases were 3rd level sub-systems. 3rd level sub-systems are perceived by the organisation as simpler and by implication, simpler to enact improvement (assumed to be less complex to manage). However, the general performance of the 3rd level group was more likely to be 2(1) and below (

Figure 5.8) where individuals rather than groups were more likely to engage in improvement. Third level cases also feature when an analysis of differentiation of performance versus patient closeness is undertaken (Table 6.2).

Table 6.2 Presence of enabler/inhibitor for Technical factors vs. closeness to patient vs. performance – differences and contradictions

Technical Enablers and inhibitors

1st Order (samples size 9)

	layered supposition	clutter	planning dissonance	Segmenta tion	N=
1(1)	[redacted]				0
1(2)	E/I	E/I	E/I	E/I	1
2(1)	E/I	E/I	E/I	E/I	1
2(2)	E/Ix3, Ex1	E/Ix4	E/Ix4	E/Ix4	4Layer
2(3)	E/Ix2	E/Ix2	E/Ix2	Ex2	2
3(0)	E	E	E	E	1

Note - cannot draw any pattern from level 1(1)

Exception 1 2(2) 1st Order layered supposition - contradiction

Findings Improved performance the more existing rules are assumptions are challenged

Exception 2 2(2) 3rd Order layered supposition - contradiction

Findings Improved performance the more existing rules and assumptions are followed

Expectation 3 2(1) 3rd order clutter - contradiction

Findings Actors of 3rd processes are more likely to take individual actions and protect the right to do so

2nd order (sample size is 6)

	layered supposition	clutter	planning dissonance	Segmentation	
1(1)	[redacted]				0
1(2)	I	I	I	E/I	1
2(1)	E/Ix2	E/Ix2	E/Ix2	E/Ix2	2
2(2)	E/I	I	I	I	1(CASE 3)
2(3)	E/I	E/I	E/I	E	1
3(0)	E	E	E	E	1

Exception 4 Case 3 different that others in the technical section of performance

Findings Defence of group - took action but not in conformance - learning through objection

Observation 3rd order was either high performance or medium to low

3rd order (sample size is 12)

	layered supposition	clutter	planning dissonance	Segmentation	
1(1)	I	I	I	I	1
1(2)	E/Ix2	E/Ix2 E/Ix1,	E/Ix2	E/Ix2	2
2(1)	E/Ix4	Ix3	E/Ix4	E/Ix4	4clutter
2(2)	E/Ix1, Ix1	E/Ix2	E/Ix2	Ix2	2Layer
2(3)	[redacted]				0
3(0)	Ex3	Ex3	Ex3	Ex3	3

Source: Author

Exceptions 1 and 2 (

Figure 6.2) suggest that performance improvement is a function of the act of challenging rules and assumptions (layered supposition) in a structured methodology (not the act of changing or altering such rules and assumptions). This could be a Hawthorn effect (Mayo 1949) but further study is required to understand this finding. For 3rd level cases (exceptions 2 and 3 in

Figure 6.2) observation elucidates behaviour in staff who are removed from patient contact can be protective (case 3) or, introverted (response to follow rules) or, individually maverick. The levels of failure demand (Figure 5.12) which 3rd level cases experience may have a bearing on the behaviours exhibited. It is concluded that when moving from diagnosing to implementing improvement, 3rd level sub-systems may require differing strategies and more, rather than less, support through the process. This infers that at 2005, the integration of functions (Rich, 1999), as a stage in development towards high performance, was problematic.

6.2.4. The significance of the human and managerial system

Of the 30 nested cases studied, 28 were focused on the improvement of timeliness (Table 5.3), so shared a common interest in waiting/delay. Yet, as has been seen, not all of these cases have direct contact with patients. When assessing themes arising from the application of the standard methodology, in these cases, the attribute 'value of care' was shown to have significant linkages (Table 5.23). Subsequently, evaluating the attribute 'value of care' against the progress of improvement made by the nested cases (Table 5.28) it becomes apparent that this attribute can be used both as a means of resistance, as well as a means of visualising why and how work can be changed. Case 7 (Table 6.3) illustrates this (due to the difference in pattern) and is an example of the sensitivities of interpreting changes in work design, where 'value of care' greatly influenced the resistance (risk aversion) to experimentation with the theoretical future state. It can be concluded that it is not just the positive attribute of 'value of care' which is important, but the way in which these feelings are channelled by individuals, and through them, into teams, to achieve an elegant route to improvement.

Further assessment of the attributes related to the classification of patient contact, performance and the presence of these as enablers or inhibitors is shown in Table 6.3.

Table 6.3 Presence of enabler/inhibitor for Human factors vs. closeness to patient vs. performance – differences and contradictions

Human Enablers and inhibitors

1st Order (samples size 9)

	Value of Care	Goal Dissonance	Resistance Futility	Learnt Behaviour	Shared Values	Perceived Importance	
1(1)	[redacted]						0
1(2)	E	E	E/I	I	E	E/I	1
2(1)	I	E/I	E/I	E/I	I	E/I	1
2(2)	E/Ix3, Ex1	E/Ix2, Ex2	E/Ix4	E/Ix3, Ex1	Ex4	E/Ix4	4 Value of Care, Learnt Behaviour, Goal Dissonance
2(3)	E/I, I	E/I, E	E/Ix2	Ex2	Ex2	Ex2	Value of Care, 2 Goal Dissonance,
3(0)	E	E	E	E	E	E	1

2nd order (sample size is 6)

	Value of Care	Goal Dissonance	Resistance Futility	Learnt Behaviour	Shared Values	Perceived Importance	
1(1)	[redacted]						0
1(2)	E	I	E/I	I	I	I	1 Case 17
2(1)	Ex1, Ix1	E/Ix1, Ex1	E/Ix1, Ex1	E/Ix1, Ex1	Ex2	E/Ix1, Ix1	2 All but Shared Value
2(2)	I	I	E/I	I	E	E/I	1
2(3)	I	E	E/I	E/I	E	E	1
3(0)	E	E	E	E	E	E	1

3rd order (sample size is 12)

	Value of Care	Goal Dissonance	Resistance Futility	Learnt Behaviour	Shared Values	Perceived Importance	
1(1)	I	E	I	I	I	I	1 Case 10
1(2)	Ex1, Ix1	Ex2	E/Ix1, Ix1	Ix2	Ix2	Ix2	2
2(1)	E/Ix4	E/Ix2, Ex2	E/Ix4	E/Ix3, Ix1	Ex4	E/Ix4, Ex1,	Goal Dissonance, Learnt 4 Behaviour
2(2)	Ix2	Ex2	Ex2	Ix1, Ex1	Ex2	E/Ix1	2 Learnt Behaviour, Perceived Importance
2(3)	[redacted]						0
3(0)	Ex3	Ex3	Ex2, I3E/I Ex3		Ex3	Ex3	3 Resistance Futility

Note

1 Note - cannot draw any pattern from level 1(1)

2 2(2) 1st Order contradiction for Value of Care, Learnt Behaviour and Goal Dissonance

3 2(3) 1st Order contradiction for Value of Care, Goal Dissonance

4 2(1) 2nd Order contradictions in all factors but shared value

5 Case 17 inconsistent in responses

6 Case 1 enabler in Goal Dissonance Unexpected

7 2(1) 3rd Order contradiction for Goal Dissonance, Learnt Behaviour

8 2(2) 3rd Order contradiction for Learnt Behaviour, Perceived Importance

9 3(0) 3rd Order contradiction for Resistance Futility

Discussion

The most sensitive factors is Learnt behaviour and the least sensitive is shared value

Middle order cases show variation in enabler and inhibitor patterns

Limitation

Where a single case no contradiction between cases can be made but within case

Source: Author

Resistance futility in case 1 is interesting because of its difference against similar performing cases (Table 5.28 and Table 6.3). Case 1 was the highest performing case (out of all 30 and also out of 3rd level cases) as well as being the first case pilot. Senior management leadership was perceived as an enabler and an inhibitor. This was due to the transition of leadership that the senior management group were learning. While this case became a high performer, it revealed learning points for senior management, in addition to workings of the team and the implementation. Policy makers and organisational leaders would need to recognise this specific aspect of any organisational transformation programme, and invest alongside the change in appropriate mentoring for senior managers.

As indicated in Section 5.8, poorly performing cases exhibited a combination of lack of perceived importance of the problem, feedback (reinforcing held beliefs rather than challenging them) and resistance to collecting customer views (often because these were perceived to be 'known'). This was accompanied by a middle management C&C style (Table 5.28). Table 6.4 indicates that 3rd level cases exhibit exceptions, firstly related to

the force required by senior managers to enable improvement and secondly, the manner in how improvement is achieved rather than what was achieved. While cases 1 and 3 were early in the programme, the very fact that 3rd level cases subsequently did not achieve high performance suggests an issue. An explanation could be that the effort on the part of senior managers to facilitate such change, needs to be greater than the resistance of middle managers and staff. This suggests an opportunity to develop new ways of working with these groups, to unlock the potential. This concept of patient flow as a means of orientation towards patients when compared with the value of care attribute (Table 5.27), also reveals that there is potentially less motivational value, the more removed the sub-system is from patient contact. This raises further discussions around the nature of connectivity of 3rd level service, i.e. how linkages need to be made (in the process of improvement) such that the implications of poor performance of these sub-systems on the patient journey, are explicit. In CHAPTER 5, the potential causal impact of 3rd level service on safety, quality and delivery of patient flow was highlighted. This is an issue for managers when designing whole system improvement programmes.

Table 6.4 Motivation for key staff groups vs. closeness to patient vs. performance – differences and contradictions

Involvement and Engagement by Key Groups (table 5.28)

KEY

High resistance = C. Middle Managers could be more than one level (table 5.28)
Low Resistance = B
High motivation = A

1st Order (samples size 9)

	Prof	S.M	M.M	Staff	N=
1(1)	[redacted]				0
1(2)	C	A	B	A	1
2(1)	B	B	A	A	1
2(2)	CBBB	BABA	AAAA	AAAA	4
2(3)	AB	BA	AA	AA	2
3(0)	B	A	A	A	1

2nd order (sample size is 6)

	Prof	S.M	M.M	Staff	
1(1)	[redacted]				0
1(2)	B	C	C	C	1
2(1)	BB	AA	AA	AA	2
2(2)	B	B	(CA)	A	Note 1: manager between S.M and day2day manager; high 1resistance (CA)
2(3)	B	A	A	A	1
3(0)	A	A	A	A	1

3rd order (sample size is 12)

	Prof	S.M	M.M	Staff	
1(1)	C	A	C	C	1
1(2)	CB	AA	CC	BB	2
2(1)	BCCB	AAAA	BBBB	BBBB	4
2(2)	BA	BA	AB	BB	Note 2: Case 20+26 -MM took on implementation with staff 2being told what to do
2(3)	[redacted]				0
3(0)	AAA	AAA	(BA)AA	AAA	Note 1: Resistance by senior MM re implementation Case 1 3(See resistance futility)

SUMMARY OF NOTES

Note 1	Case 1 and 3, where managers who are located on the hierarchy between the ones running the day to day operations and SM are resistant
Findings:	Both early in the programme (Case 1 and 3) which may be related to risk to career, lack of appropriate countermeasure in the improvement process
Note 2	3rd order cases which achieved middle ranking performance did so through pressure of senior management

Source: Author

Table 5.29 drew out that improvement is made as a consequence of staff and middle managers being motivated (Probert et al. 1999), despite resistance in the professions or senior management. This contradicts other studies which suggest that professional resistance is a significant factor in the lack of process improvement in healthcare (McNulty and Ferlie, 2002). Certainly middle managers cited that lack of improvement is a consequence of professional resistance, yet despite this they have developed strategies to achieve performance improvement. Middle management represents a rich source of further investigation for academics regarding the mechanisms used to achieve performance improvement. Policy makers and senior managers need to consider how to engage this group, and build skills to tackle the challenges of such change. Middle managers have an understanding of how to navigate in these systems and change the system from within. Table 6.5 suggests that even when skills are absent (Buchanan and Wilson 1996) from the team they are still sufficiently resourceful to be able to make improvement. It is co-operation across this group which may hold the key.

Table 6.5 Presence of enabler/inhibitor for Managerial factors vs. closeness to patient vs. performance – differences and contradictions

Management Enablers and Inhibitors
1st Order (samples size 9)

	Measurable Impact	Demonstration of Support	S.M. Skills	Team Skills	N=	
1(1)					0	Case 2, 14 and 15 are interesting as they show skills shortfalls in Exception 1 teams - yet high performance
1(2)	E/I	E/I	I	E/I	1	
2(1)	E/I	E/I	I	E/I	1	
2(2)	E/Ix4	E/Ix4	Ix4	Ex3, Ix1	4	
2(3)	E/Ix1, EX1	E/Ix2	Ix2	Ex2	2	
3(0)	E	E	I	I	1	Case 14

2nd order (sample size is 6)

	Measurable Impact	Demonstration of Support	S.M. Skills	Team Skills		
1(1)					0	
1(2)	I	E/I	I	I	1	
2(1)	E/Ix1, Ex1	E/Ix2	Ix2	Ex1, Ix1	2	
2(2)	I	I	I	E	1	
2(3)	E	E/I	I	E	1	
3(0)	E	E	I	I	1	Case 15

3rd order (sample size is 12)

	Measurable Impact	Demonstration of Support	S.M. Skills	Team Skills		
1(1)	I	I	I	E/I	1	
1(2)	Ix2	E/Ix2	Ix2	Ix2	2	
2(1)	E/Ix4	E/Ix4	Ix4	Ix3, Ex1	4	
2(2)	Ex2	E/Ix2	E/Ix2	Ix2	2	
2(3)					0	
3(0)	Ex3	Ex3	Ix3	Ex2, IX1	3	Case 2

Source: Author

Senior management skills were noticeable by their absence and at the end of 2005, the team (including senior doctors) underwent a training programme to start them on the journey towards greater understanding of the underpinning principles of high performing organisations. In the review in 2007, it was reported that doctors and managers were often leaders of the internal awareness programme for improvement.

6.3. Unlocking dependencies towards a high performance system

Complexity in healthcare is seen as an issue of case mix (Soderlund et al. 1997) rather than a combination of external variety and internal resource dependency, i.e. factors discussed in Section 5.8. Indeed, internal interdependency is not understood (Weick and Sutcliffe 2003). Clinical coding did not elucidate the interconnections between sub-systems, as the coding was either at a very high level, or so detailed so as not to provide the clarity of nature of the dependencies which exist. The virtual absence of the explicit implications of time devoted to clinical training (Table 5.15) in regard to resource dependencies for patient flow, and the subsequent impact on sub-system performance, were just accepted as normal.

This is an important issue to be addressed if organisations can move beyond point improvement (Burgess et al. 2009). Hence, a technical factor inhibitor to achieving patient flow (Figure 5.9). Performance can be achieved through the engagement of both motivated middle management and staff, who will find ways to achieve despite the system, not because of it (Wanless 2003). However, more is achieved when professional and senior management are motivated to be involved and engage in the process (Table 5.28, Table 6.5). Given the nested cases were just that, nested, the implications of success in one case could mean problems in another. Hence, the dependencies provide managers with a means of understanding the implications for whole system performance. This was highlighted in Section 5.9, where decisions to reduce bed stock, in line with predicted patterns of demand, impacted upon the waiting time for ambulances. The impact, while serious, was understood and adjustments made swiftly to rectify the balance (Kast and Rosenzweig 1985) which is a feature of whole system performance.

Likewise, capacity in SCO is generally interchangeable and interdependent. Such capacity has to flex to accommodate both planned and unplanned admissions patient flows. However, the implication of the demand on the whole capacity at level 1 of the system must also be understood at level 2. Essentially, understanding the effect of resource dependencies at different levels (once process/sub-systems are redesigned) providing an opportunity for further improvement and reduction in potential waiting in the system. This is in direct contradiction to the standard practice of separating the elective (planned) activity and unscheduled care (unplanned) when undertaking improvement analysis and implementation adopted by national agencies such as the NHSi and NLIAH.

While the positive and negative forces to diagnose, implement and sustain/spread of sub-system improvement have been discussed so far. The findings of the research indicate that the existing dependencies which are both of a technical nature (skill or facility) and a human nature (co-operation) represent an opportunity to move from sub-system (or process) performance (and with it, improvement in the 'outcome' of patient flow) to whole system improvement. A key point, regarding these dependencies, are the strategies which can be used to remove (case 6), segment (case 11) or innovate.

Radnor and Bucci (2008) note the gap in knowledge related to organisational readiness and success factors for public sector adaptation of LT. This study begins to close this gap in knowledge through the development of enablers and inhibitors that deliver improved performance which, in turn, is the objective of LT. Burgess et al. (2009) asserts the importance of variables such as empowerment at all levels, all engaged in experiments and improving on a continuous basis as well as policy and strategy alignment. Due to the very small numbers of organisations at this stage in their development, statistical tests were inconclusive. The findings of this study augment Burgess et al. (2009) assertions and expand the key factors which are required to attain whole system improvement.

The distinction between variation and variety is also a theme through this research. Radnor et al. (2006) refer to the gap in understanding of variation in relation to demand, systems and patient flow but the topic of variety is absent. For all cases in this research,

where a theoretical future state was calculated by the team (Table 5.9), change occurred. Variety implicitly required testing in the 'real world' setting and as such, is difficult to plan for. A key enabler to reflect the needs of variety is the 'opportunity gap'. The implementation phase of cases shows that where process improvement is enacted as a prescription, and without team experimentation (case 26), the achievement did not enable sufficient learning (factor G) about the organisational design to continuously improve. Hence the improvement in timeliness for patients needs to be accompanied with an improvement in learning (and re-learning where learnt behaviour is a constraining force – factor L), as demonstrated by those teams who proceeded to support other areas in the organisation to change and management support (factor P). This in turn requires skills at both cross-functional team and senior management levels (factor Q1 & Q2).

The opportunity gap provides a mechanism (rather than a solution) to install feedback for future flexibility towards a changing work design, as well as installing the human capacity, through action and reflection within teams (and implicitly as individuals) and management (including the importance of the problems being addressed by teams – factor M). The model shown in

Figure 6.2 has been developed to enable learning (given the gap in measurement highlighted by this research – see factor N), with the intent of achieving patient flow at an operational level, and high performance at a whole systems level. The model also recognises the potential for variety (in terms of demand on the system, implementation of solution etc.) which require flexibility of management to achieve performance improvement.

This model is intended to provide a gauge to assist policy makers, management, teams and individuals to assess the impact of reducing the opportunity gaps measured range. Given that a dynamic (open) system is assumed, there will also need to be a level of excess capacity at stages within a process if balance is to be achieved. When undertaking the diagnostic activities to determine the current state of the process/value stream (and subsequently evaluating the potential future state), a list of potential barriers can be classified against the four technical factors (A, B, C and D – see CHAPTER 5) identified through the research. The model proposed in

Figure 6.2 enables an assessment to what extent these represent a drag on the organisational system and links these back to the Opportunity Gap and how these interact with the remaining factors (F-Q2). Similarly, the model itself provides a means of addressing resistance futility (factor J) through the focus on the key enablers for improvement.

The Opportunity Gap takes current process performance level, and through cross-functional group analysis, to determine a theoretical future performance level. This is drawn from the concepts of value (factor K), value stream and flow and requires diagnosis of qualitative data to determine the gap. This is calculated by understanding:

- the difference between the current elapsed time to deliver an EOC (or service) and the potential cycle time (for activities which are of value to the safety, quality and delivery of care – factor F) in a patient episode or service. The range and mean are evaluated (using segmentation methods) to understand the impact of the mix (i.e. variety):
- the available time for care to be administered as is, and what could be;
- the variation in demand for the type of care services (possibly through segmentation):
- impact of other factors which may need to be taken into account, which emerge as part of the analysis e.g. skills mix, equipment unavailability etc.

The analysis also requires qualitative data from cross-functional process teams (and validation with those teams) to help provide the 'why' alongside the 'what' answers. The standard methodology applied in this research provided the means of calculation and combination of both assessment of social and technical features as well as leadership (Section 5.8)

The opportunity gaps for the nested cases analysed were found to be measureable (Table 5.15). This opportunity represented a range and combination of features which when addressed in combination, exhibited measureable impact on process/value stream (factor

N) and whole system. Thus the model is designed to assist managers in their understanding of these features in combination and in the context of a number of dynamic features of systems (factor H):

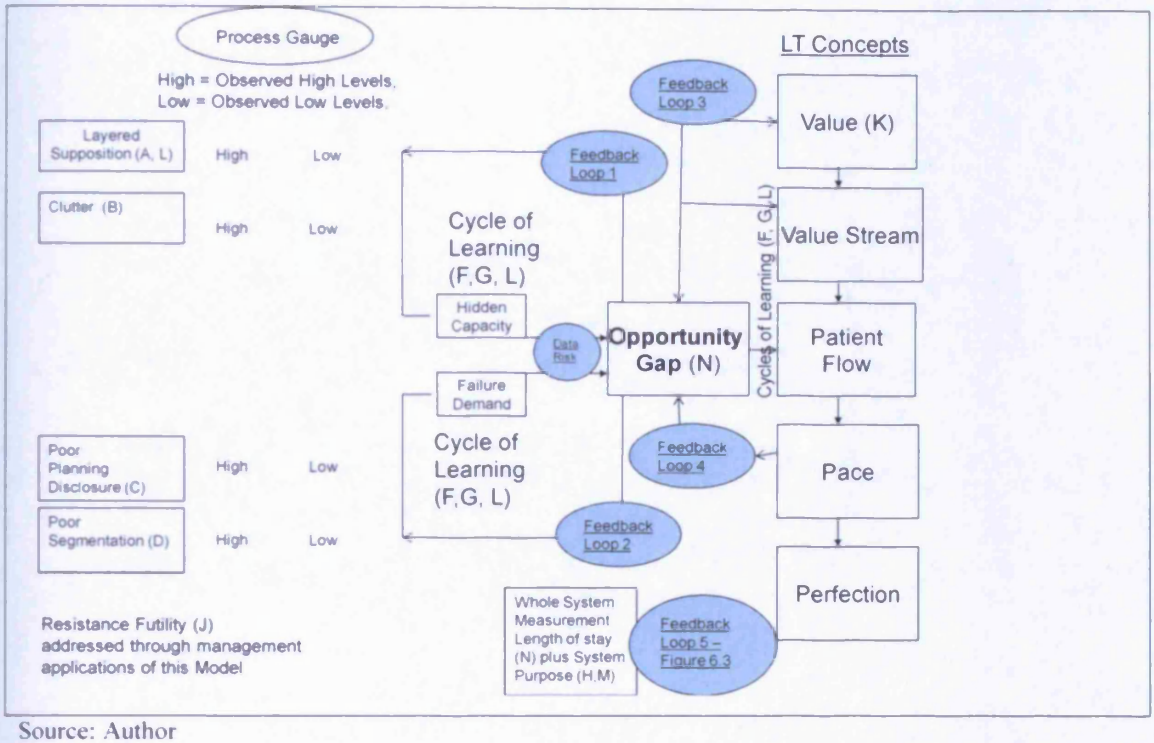
- the changing external environment – e.g. demand for services may go up or down;
- the changing political environment – e.g. different goals, different funding;
- the changing policy domain – e.g. different management emphasis on new roles for clinical staff;
- the changing social norms – e.g. rejecting the notion of working long hours/unsocial hours.

For these reasons, there will always be an opportunity gap. It is not the existence of the gap which is conceptually important, rather the knowledge of the range between what is, and what could be, for policy makers, managers and staff to use in decision making. The leadership factors P, management support, Q1, skills at senior management level and Q2 skills of cross-functional teams need to be evaluated separately from the model.

Finally, the model in

Figure 6.2 presents 5 feedback loops which management can use to evaluate improvement. Feedback loop 1 and 2 are related to the enabling or inhibiting features of the technical factors A, B, C and D in relation to their existence or removal and the impact on the opportunity gap range. Feedback loops 3 and 4 relate to the constant evaluation of the process/value stream in connection with the dynamic concept of value (wants, needs and demand of customers). Thus the effect on the opportunity gap of real world attributes of change can be accommodated and managers can assess the impact on the process/value stream. The final feedback loop is related to performance measurement of the whole system, and links this model to Figure 6.3 which in turn links the cycles of progress to performance and a means of understanding the elapsed time for improvement to be reflected in performance measures such as those used in this thesis (i.e. run charts).

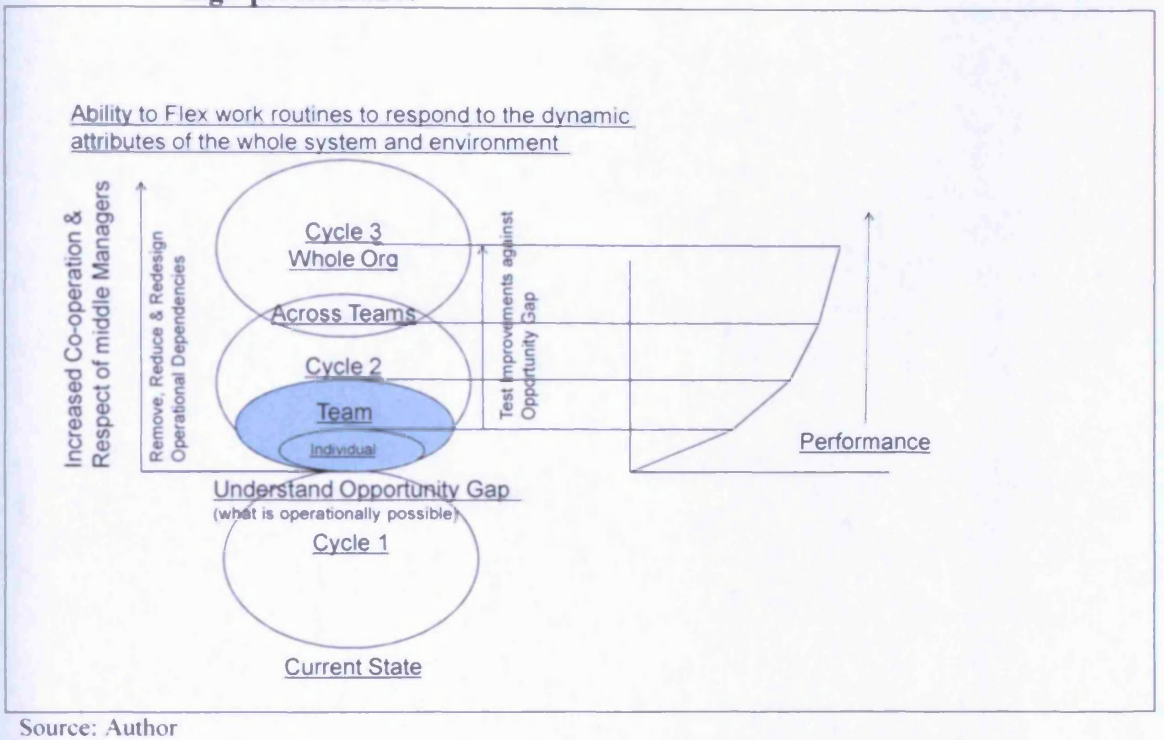
Figure 6.2 Model to explain the opportunity gap system gauge



Source: Author

Hence the measurement of an opportunity gap should be more of a barometer than an absolute measure. It acts as the means of aligning the goal of the organisation. It represents a different mechanism to manage a dynamic alignment between the goal and the technical (in combination with) the social system. The opportunity gap is not the system design, rather the friction in the system design.

Figure 6.3 Reflection on the cycles of process to whole system improvement and high performance



Source: Author

The importance to this research of the opportunity gap is its utility in exposing the factors (as an outcome of this research) which are the enabling and constraining forces in the implementation of improvement, and more specifically, enable managers to facilitate the removal of aspects hindering systems' performance. Figure 6.3 illustrates the potential to move from point/sub-systems improvement to become a high performing dynamic organisational system. This illustrates the critical aspect of cycle 2, about which this research has focused. Where enablers and inhibitors exist, it is at this point that their management is critical to the degree of improvement which an organisational system can achieve.

6.4. Conclusion

CHAPTER 6 has presented a classification of the patient flow concept as a means of gaining insight into healthcare STS. It has reflected on the process of theory building and pattern matching arising from this research. It has uncovered differences in the nested cases which elucidate the human and management aspects of the organisational system.

It has highlighted some unexpected features, such as the dislocation of 3rd level activity and the significant role of the middle manager in contrast to the professional, which has been the perceived wisdom in professional service. The findings of the research have culminated in the development of an evaluation approach. Theory building and consequent development of a model to enable feedback measurement for improvement, and reflect the cycles of improvement that link to achieve high performance (and with it, patient flow). This is in response to the gap in approaches to measurement available in the public sector, which relate to historical foundations of administration in the public sector.

CHAPTER 7 summarises the contribution made to literature, method, policy and practice through this research. It lists the opportunities for future research and reflects on the limitations.

CHAPTER 7 CONTRIBUTION AND CONCLUSIONS

7.1. Introduction

The objective of this research process, regarding large scale public sector organisations in general and the UK NHS in particular, was to clarify the operational factors which either enable or inhibit high performance, particularly relating to improved patient flow (as an outcome) and flow performance (as a gauge). These findings address the gap in knowledge for UK healthcare, regarding how to deliver high performance (Johnston 1999, 2005, Maddock 2002). In achieving these objectives, a STS approach was used. The technical sub-system performance was evaluated at three points:

- completion of a standardised diagnostics (for 30 nested cases within one SCO) to understand the current design and performance;
- theoretical design potential and anticipated performance;
- implementation of the theoretical findings at a fixed point at the end of the detailed field research in 2005.

Whole system performance was evaluated using secondary data (PAS) from 2004-2007. To establish external validation of findings (Yin, 1994) research results were compared with two co-terminus NHS Trusts. It was found that LOS was a third less than the next best performing Trust, and notable in that each of the 3 Trusts compared, improved over time (regardless of any type of improvement intervention). This represents an empirical addition to the study for rigor of findings. In addition, as previous literature has been significant by its reliance on a sample of a single case organisation, a further contribution is the requirement to build mechanisms for external validity when considering high performance analysis.

The human sub-system was evaluated using observation of teams during the diagnostic and implementation phases. Questionnaires (of senior managers and professionals), semi structured interviews to reflect on performance, and the findings of the nested cases provide validation and explanation. Overall, this thesis has explained and summarised

the enablers and inhibitors to high performance. The following outline the content of these chapters.

CHAPTER 1 introduced the research, objectives and research questions.

CHAPTER 2 provided historical context and analysis of the NHS, culminating in the competing contemporary pressures and concepts that managers are presented with as the golden key to achieving high performance.

CHAPTER 3 determined the appropriate focal theory and a framework for the adopt/adapt debate regarding tools and techniques for LT (Radnor, 2006, 2008). Literature relating to emerging OM concepts in the 1980s were (at that time) considered irrelevant to public service. Service evolution and the emergence of customer focus and time responsiveness have also impacted on the policy of healthcare without a corresponding shift in grass roots implementation (Maddock 2002). Studies of high performance reviewed in CHAPTER 3 provide clarification of the research questions.

CHAPTER 4 detailed the research strategy and methods appropriate to gaining the insights to the research objectives and questions posed in CHAPTER 1.

CHAPTER 5 presented the overall performance of the nested cases over time. Findings established the consistent existence of an opportunity gap. This represented the potential for improvement and high performance, thus making the practice of improvement 'possible' for individuals and teams. Shifting focus and effort to the process delay, rather than the traditional efficiency of value added task. Enablers and inhibitors arising from this research provide a means to leverage the opportunity gap. Finally, the results of secondary data relating to the whole system performance results were compared to co-terminus Trusts. In doing so, a taxonomy of the complex nature of dependency of sub-systems in an SCO was distilled.

CHAPTER 6 discussed the findings in conjunction with the literature presenting firstly the various meaning of patient flow and how these relate, secondly, the enablers for whole systems improvement. Thirdly, a gauge is proposed for managers to assess the dynamic nature of the internal and external features using the LT principles (Womack

and Jones 1996) in relation to the 'opportunity gap', thereby incorporating the enablers and visualising inhibitors to high performance. Finally a model for whole systems improvement is presented for future testing.

CHAPTER 7 relates to conclusions, limitations and issues for further research.

7.2. Research Findings

The objective of this thesis was to address the following research questions:

Question 1: What features enable or inhibit SCO's to implement improvement and achieve high performance of patient flow?

Question 2: How and why do these enablers and inhibitors impact on the existing STS?

This research has determined what influences impact on SCO systems design and how these have emerged. Furthermore, it has sought to understand what operational features impact on patient flow in SCOs. It clarifies patient flow and its contribution to high performance. Patient flow at sub-system level will not in itself deliver the level of high performance seen in manufacturing and could lead to sub-optimisation given the lack of clarity and management of dependencies in the whole system. Patient flow as a means of patient orientation, can emerge as the driving force for a whole system improvement of high performance. Table 6.1 classifications are all important in adding to the concept of patient flow as they are a prime source of motivation for individual improvement.

The features which enable high performance improvement as detailed in this research are:

- Measurement (specifically knowledge of incoming demand[95] in relation to output[96]) alongside customer/patient feedback regarding the service, needs to be promptly fed directly into teams for their use in adjusting and improving. Measurement data is team based and hence owned by the team rather than seen as a punishment. Measurement needs to be visual. Hence, the role of management

[95] Admissions
[96] Know as deaths and discharges in PAS data sets

changes, with key focus on data trends and impacts of this variation with interfacing departments (based often on exceptions).

- Standard work, owned by the teams that enabled flexibility of response. Standards are of a size that can be combined for the specifics of the demand for any work period. Achieved by stripping back the tasks to understand a basic block (whole task), then reducing or removing dependencies which effect flow (cases 1 and 2 co-located; case 6 redesigned the work tasks to reduce the number of steps and dependency on scarce resources etc.). This resulted in the teams being enabled to construct work in a flexible manner in response to demand. While studies have correctly focused on variation of practice, the need for the system design to accommodate variety emerged as being a key design requirement. This differentiation has not been clearly stated in studies related to variation. Standard work implemented as an enabler, was not a rigid externally managed entity. Rather, standards were understood by the team and used for continuous improvement, enabling greater flexibility when variation or problems occurred. The principle of following a standard and challenging a standard[97] was embedded in this approach.

- A single point of contact within the team for the patient/customer was shown to be important. While other studies have voiced issues with definition of 'customers' and what should or should not be included in the 'value'/'voice of the customer' process, this research embedded a means of defining customers, stakeholders and staff values into the standard diagnostic framework. Thus conclusions regarding definition of the customer etc. in healthcare improvement are not an intended outcome (Radnor and Howleg 2010; Proudlove et al. 2008). However, it was observed that teams were able to form consensus around customer wants, needs and demands, where such teams had previously been fraught with competing priorities. The findings regarding a single point of contact reinforces that those teams which achieved sustainability and spread, had

[97] Toyota's recruitment practices are to test a new partner in their ability to follow a standard and then challenge a standard. This is undertaken as two separate activities. Following a standard provides the stability against which to challenge a standard.

devised means to be closely aligned to the customer. This provides an insight to influences on cultural attributes and empowerment previously reported in literature on high performance as key, but this research suggests these are required within the context of a unifying force. In this study, the customer provided the unifying force.

- Alignment of senior, middle managerial, professional and staff in their focus and objectives for sub-system improvement. At a sub-systems level, middle managers alone can enact considerable change in the face of resistance of other key parties. This provides an insight into previous studies (Buchanan and Wilson 1996, McNulty and Ferlie 2002) which highlight the disengagement and blocking by professionals as an inhibitor. While this was certainly an inhibitor to complete implementation of improvement, nonetheless, significant improvement was made between customer facing staff and middle managers where they had gained confidence through the new knowledge that they acquired at diagnostic stage. Indeed the greatest likelihood of no improvement was when a middle manager (i.e. the person with authority over staff closest to the daily work) did not believe the effort was worth the outcome. This group represents a largely under researched dimension with most studies focusing on individuals or policy makers/senior managers.

- Learning from sub-system improvement and building confidence such that all levels (including senior managers) understand testing changes in the dynamic system.

- Implementing OM design through action at a working level rather than through directives from senior managers, which in turn builds confidence in the individual, team and organisation to continually change. Discontinuous change is discouraged particularly in relation to a one best way solution.

The features which inhibit patient flow in SCOs are the reverse of the enablers. Those which have been uncovered specifically by this research are:

- Lack of understanding and clarity of dependencies across, and between, the sub-systems;
- Lack of a means to resolve dependency constraints across professional and managerial boundaries;
- Planning dissonance where data is unknown which could be critical in work design and challenging assumptions underpinning sub-system design.

7.3. Research Methodology

The research methodology presented is considered appropriate given the exploratory nature of the study. It creates an analytical framework for the separation of conceptual and operational learning for improvement (Lapre and Wassenhove 2002); providing a procedural mechanism for the development of theoretical improvement/redesign, against which factors for implementation can be better understood. Primary and secondary data is used in concert to reveal contradictions and, in so doing, provide a deep understanding of enablers and inhibitors for improvement of a complex organisational system. The research methods have been combined in a suitable framework for understanding states (i.e. diagnostics, implementation, sustainability and spread of a process of improvement). More frequently, research has limited its boundaries to one of these 'states' thus issues such as dependency, examined in this thesis, have not emerged. This methodology enables evaluation and explanation of both technical and human aspects of an organisational system with regard to these 'states' and in concert with quantitative performance. The literature reviewed, highlighted studies of human interaction through change or organisational behaviour, which was less concerned with the analysis of performance data in conjunction with behaviour, but was more concerned with the interactions of groups to enable change. Statistical operations studies in healthcare focus on parts of the system for queues. Where waiting in line is studied, the focus has been on techniques for improvement, rather than understanding the attributes of implementation across a whole organisational system (Proudlove et al. 2008, Radnor et al. 2006, Rogers et al. 1999). The limited numbers of cases (Table 4.4) have also hampered the ability of past research to determine a deep understanding of internal SCO sub-systems.

The research method presented here contributes to knowledge in the following ways:

a) A design for data collection which is replicable for future studies of implementation, whilst controlling diagnostics through standardisation. The diagnostics phase provided a standard to control the process for selection of area, problem and tools (within a set time frame). It included creativity and reflective time (Lapre and Wassenhove 2002) with training to impart high performance principles of work design. It embedded customer focus, team empowerment, training and operational learning through data collection, reflection and evaluation (Fryer et al. 2007). While the process is standardised, the outcomes remain in the control of the work team enabling them to decide on the exact nature of what could be changed, by whom and when. In this way, a replicable framework against which consensus on current sub-system performance can be articulated, along with a theoretical future state.

b) The generalisable mechanism for performance and process data comparison through two separate yet complimentary measurement systems. The first is simply drawing on performance data at specific points in time, to understand discrete change points. The second provides location of progress through a standard set of steps for sub-system redesign at points in time. This positioning measurement provides insight into implementation issues, which is an area in need of research (Johnston 1999, 2005, Proudlove et al. 2008). The 'opportunity gap' is a critical element in the framework. The human need to understand what is possible is created through the opportunity gap (Lapre and Wassenhove 2002). This measurement mechanism also operationalises the concepts of single loop vs. double loop learning (Argyris 1999; Senge 1990). While performance measurement provides absolutes, the process measurement takes account of environmental factors, emergent from the dynamic attributes of a system. The comparison of the two measures highlighted that where performance exceeded the measurement but indicated limited progress in implementation, therefore provided a greater understanding for staff and managers (operational learning), or vice versa. The combinations of measurement are far better suited to open systems

theory which is less concerned about absolute performance and more concerned about system balance. Thus this dual measurement also addresses a real concern about sub-optimisation of whole systems through sub-systems optimisation via both qualitative and quantitative enquiry. Current SCO performance measurement was exposed, through this research, as weak in its ability to support improvement supporting claims in literature (Silvester et al. 2004). Indeed this provided a greater insight into issues with measurement system rather than the factors which enabled and inhibited the improvement process. Subsequent to the field research, a body of literature in this area has emerged, suggesting further study into this issue is required, with which the author would concur (Taylor and Shouls 2008).

This unique methodology provides the triangulation of data and embeds a process of validation which enables investigation of sub-systems through to a whole system performance. The generalisation of this research can be undertaken by applying the standard methodology (Table 4.12) to other healthcare organisations and comparing activities with similar socio-technical designs. The testing of the methods show significant predictable utility within this multiple case study research and it is argued that – in similar settings – good and robust results will be achieved. In terms of generalising to other sectors, the author argues that this is possible in two specific contexts. The first would be to entities which exhibited characteristics of a service shop as defined by Schmenner (1986). This classification argues that healthcare services exhibit the general characteristics and hence generalisation repair services. The second is based on services of 'professional-equivalence" or sector where professionalism and management systems co-exist. These represent ideal targets for future research, where the standard methodology can be applied with a significant chance of success and the generalisation of new insights. The scenarios that are most likely for generalisation include other professional services setting such as universities, the legal profession, architecture, and such like. These organisations have highly professionalised staff, processes, and very similar technologies.

The standard methodology can also be applied to sectors where improvement processes and methods are less well developed or where there was a complex supply chain of activities such as the police service and armed services. The benefits of applying this work would include the ability of these teams to create current and future states together with an ability to learn how to improve and how this reshapes relationships in the management hierarchy.

7.4. A taxonomy of secondary healthcare sub-systems.

The findings presented regarding the dependencies which exist in complex organisational systems have been absent elsewhere. This may be due to the limited nature of OM studies into the holistic implementation of LT (Burgess et al. 2009). Alternatively, it may be due to many OM texts being statistical studies which have used existing data sets, noted in this thesis as containing issues with granularity and completeness.

The taxonomy of secondary healthcare sub-systems, starts to answer the question posed by Proudlove at al. (2008) 'Are processes the basis of analysis and improvement' for healthcare. From the taxonomy, it is clear that there is a need to understand not just the horizontal processes but also the dependencies of sub-systems and the whole system. This research shows that a sub-system focus will deliver improvement, but the dependencies enable construction of an operational strategy and holistic means of explanation. The potential for unintended consequences become more obvious as the relationships between processes are better understood.

The taxonomy suggests that the demand profiles of the different levels of the organisational resources require differing strategies to offer the flexibility which the whole system requires. It challenges the Schmenner (1986) service matrix, but is much more aligned to the Schmenner (2004) revised version. Indeed the results of this study suggest the existence of all the service classifications within one organisational boundary.

7.5. A classification of patient flow

The use of the term flow and in particular patient flow in healthcare represented a gap of use and understanding. The classification presented in CHAPTER 6 provides an

arrangement not only of the different meanings attributed to the term in literature, but also the relationship between those meanings and the ontological and epistemological stance taken by the authors, particularly relating to the inward and external view of the world. Such a set of definitions may also have value in other public sector organisations that have historical routes in administration, but are increasingly moving towards a more flexible and customer reactive stance.

7.6. Enablers and Inhibitors – a dynamic model of feedback loops

The dynamic model presented in CHAPTER 6 is designed to enable a better understanding of the gap in literature about the process of how to bring about improvement in an SCO. It also responds to the question regarding what issues to consider for individuals and teams (Proudlove, et al. 2008). In particular, this assists managers in understanding the design of local measurement feedback loops with multiple factors, to enable dynamic and continuous change, which is not purely organisation focused.

Real situations require the capability to resolve unexpected issues and it is this that is critical to sustainable improvement. There is also a need for shared understanding of work design principles, and where appropriate, dependencies in the system. The mechanism provided an opportunity to combine quantitative and qualitative evidence to gain depth of understanding for those who undertake the work, as well as those who managed the work: stimulating change in underpinning assumptions. It is the change in these assumptions which provide a platform for sustainability and spread.

An overarching idea 'the opportunity gap' has emerged which provides a means to classify the themes which have arisen from the research, which need to be considered as part of the adaption/adoption debate for LT within the healthcare sector. Specifically, the idea of 'patient flow' which is intended to deliver timely service to patients as part of their EOC. The end-to-end measurement used to evaluate this was cumulative LOS for the system, where it was assumed that if improvement within the cases occurred, then a change in LOS over time would result.

The opportunity gap concept also seeks to explain how and why these factors impact on the current organisational system. In turn, a model has been developed for management to have a clearer understanding of the role which they can play. This role is in both improving and subsequently stabilising the system, to dynamically compensate for contextual changes i.e. in the external environment or in the organisation itself.

7.7. Limitations.

Effective organisational adaptation is a management research theme that has endured since Arbiter and his writings in 65 AD. Despite around two thousand years of subsequent management contemplation, his views may be those of the management of the NHS today. Limitations of this study were:

- The time period required for a study of this nature, focusing on improvement, implementation, sustainability and spread of quality improvement and delivery improvement. To be able to defend this thesis, the absence of well defined, well researched measures of enacting and sustaining change have allowed the researcher an opportunity to contribute to the methods of studying large complex healthcare organisations;

- The second limitation is that the single case study (to allow for depth of study). This means that other organisations cannot be directly compared during the study. Issues such as other cultures as well as other hospitals which may have a bearing on the innovation or sustainability of improvement, or indeed if the issues faced by the teams were latent problems in other parts of the NHS were not studied. Reliability of findings were tested through comparison of other geographically situated organisations. These were also shown to have made improvement over time, yet the case study organisation had improved by a third more than the better of the comparison organisations;

- The actual number of cases is within the number of multiple case replications advised by Pettigrew (1997) and Leonard-Barton (1990), but each phase is below

that appropriate for (even if desirable) the application of positivistic statistical testing (Dimantopoulos and Schlegelmilch 1997).

- Bias in informant responses cannot be ignored during such research and neither can the impact of current events upon the responses of the informant(s). To counteract these limitations, the researcher adopted a multiple informant approach. 'Special circumstances' were also reviewed (at both the interview and data pattern-matching stages of the study) to see if there were any factors that accounted for very high or very low performance. Reviewing these outlier cases is preferable to the 'smoothing of problems' that happens when data is merely averaged and not interrogated using data displays.

7.8. Future research

Due to the in-depth nature of this research, this study has opened up a wide field of potential questions for future research.

The early focus on surgical cases which arose in this research, and following discussions with members of the NHSi Safety and Improvement faculty, it emerged that the operational approaches such as lean, have a propensity to be more easily adapted from manufacturing to surgical (as opposed to the medical) specialties. This could be as a consequence of the way in which procedures are coded, it may be for reasons of variation in practice or variety of need in terms of treatment, or service channels to meet the needs of different society groups. Further research into the differences in surgery and medical OM related to improvement methodologies, and in particular implementation, is required to understand if or what significant features need to be better understood.

This research has revealed the existence of 'opportunity gaps'. These present the potential for an organisational system to be high performing. These gaps are revealed through the analysis of patient flows within nested cases at various levels of the organisation. Implicitly, the gap analysis brings with it a means of quantifying 'what is' versus 'what could be'. It provides an alternative approach to benchmarking which has been criticised for drawing implications between entities which are not subject to the

same environmental pressures. Unlike benchmarking, the opportunity gap relates to the dynamic context i.e. the organisation itself rather than an external organisation. Such information brings to management the possibility of improving information for decision making regarding both what and how improvement may be pursued. The concept also provides a means of evaluation stages of improvement against individual flows.

The research has suggested a means of linking to whole organisational system performance through evaluation of length of stay measurement. This is an area for further study relating to several aspects. Firstly, a significant time lag between improvement action at a case/process level and the impact on the system as a whole was observed. To assess if this is a typical situation is of value to management who often wish to have 'quick results'. To reliably understand if this is a consistent feature of whole systems improvement will require an assessment of multiple organisations undertaking the implementation of LT, and is hence outside the scope of this research. Secondly, the relationship between the opportunity gap and whole system measurement, needs to be evaluated to further understand the resistance in the system, i.e. the law of diminishing marginal returns. The attributes of TCE may also add a further layer of understanding, particularly given the number of internal and external boundaries of the healthcare system. This similarly falls outside the remit of this research but would be of value to management in the context of decision making, e.g. outsourcing activities etc.

The objective of the study is to determine if patient flow could be improved across a secondary care healthcare system. Systems theory recognises the need for balance in a system design and due cognisance of this principle was made during the analysis. The analysis of the system has been across sub-systems which are not independent of the system and hence cannot be enacted in themselves. The opportunity gap has been detected at the sub-system level of an organisation, but this does not mean the constraining factors are specific to a sub-system, or that the factors should be corrected at sub-system level. The constraining factors revealed through the research may be appropriate, not only to this organisation, but organisations generally. Hence, further testing of this concept in other organisations in healthcare and other sectors would be a next step in the research process.

This analysis in Table 5.29 also raised the question of respect of an individual by the group who were resistant e.g. the professional in case 14 was not respected and hence this resistance was less constraining to involvement and engagement than in case 7 where the professional was a very respected clinician. This dimension would be worthy of testing in further research.

An opportunity for further research is the relationship between the outcome (patient flow) and the degree to which the implementation plan has affected the outcome. This reflects the call for more research into implementation science (Eccles et al. 2009). While change is a separate theme of research, generally it is the process itself that is assessed such as BPR (Bucanan 1998, McNulty and Ferlie 2002) rather than a commentary on the degree to which implementation occurs. The degree to which future state targets were a 'stretch' for the group was not examined, but could have had an impact on progress and hence would enhance this potential area for future research. Similarly, the role of the middle manager is a key aspect which requires further investigation to inform policy makers about how such a group may be best supported to enact implementations for sustainability and whole system improvement.

Further study into the implications of infrastructure shock and structural change on implementation of improvement for whole system high performance would be timely, given recent announcements in NHS reform.

High performance was identified in literature through the proactive sourcing of clinical evidenced care and subsequent knowledge transfer, between clinicians to ensure most up to date care e.g. Intermountain (Bohmer and Romney 2009). Future research into the differences and similarities between these organisations may reveal further inhibitors and enablers which will help policy makers and managers in their need to continually improve, with no additional resources.

7.9. The Next Step

In view of the findings and conclusions drawn from this research, policy makers need to move from strict fixed target for performance measurement (which implies a pass/fail

criteria) to a mechanism to combine trends of improvement. Middle management play a critical role in the success or otherwise of improvement at a sub-systems level, and changes of this type from policy makers would enable them to more consistently and readily strive to improve. Discussions with regional policy makers are already underway to enact such a high level shift, with the intent to encourage SCOs towards high performance dynamic organisational design.

Investment in middle managers and staff to equip them with appropriate OM skills in cooperation with human relation tools is required. Skills which allow challenge of dependencies are particularly emphasised. OM debates in manufacturing have been absent in healthcare and while adoption of these manufacturing strategies is not being suggested, the underpinning theory and debates could be advantageous to healthcare, particularly relating to segmentation of activity. This research shows that, by investing in this manner, significant strides can be made in terms of improvement.

In order to convert this investment into whole system high performance, alignment of professions, senior managers, middle managers and staff is required. Through this research, the emergent interest of professionals, senior managers, middle managers and staff migrated to a pull to understand high performance principles (and to learn from those undertaking the implementation). This pull provided the platform for change in attitude. Change in strategy and policy ensued.

Language and history between professionals (perceived to be care focused) and management (perceived to be cost focused), belied a common issue in the customer, safety, quality and delivery of care. It is this which needs to feature at all levels of healthcare to achieve high performance. In these austere times, this may be the policy constraint on a movement for improvement in healthcare which should be encouraged not denied.

REFERENCES

Abernathy, W.J., et al. 1971. The nurse staffing problem: issues and prospects. *Sloan Management Review* 13(1), pp. 87-109.

Ackoff, R. 1960. *Systems, organisations, and interdisciplinary research.* In: F. E. Emery. Systems Thinking. Vol. Harmondsworth, Middlesex: Penguin Books, pp. 330-347.

Ackroyd, S. 1996. Organisation Contra Organisations: Professions and Organisational Change in the UK. *Organisational Studies* 17(4), pp. 599-621.

Adab, P., et al. 2002. Performance League Tables: the NHS deserves better. *British Medical Journal* 324, pp. 95-98.

Adair, J. 1999. *Decision Making and Problem Solving.* London: Institute of Personnel Development

Adler, P., et al. 2003. Performance Improvement Capability: keys to accelerating performance improvement in hospitals. *California Management Review* 45(2), pp. 12-31.

Ado, T. 1994. *Hybrid factory: The Japanese production system in the United States.* Oxford: Oxford University Press

Akao, Y. ed. 1991. *Hoshin Kanri, policy deployment for successful TQM.* Portland, OR: Productivity Press

Allder, S., et al. 2010. Managing capacity and demand across the patient journey. *Journal of the Royal College of Physicians, Clinical Medicine* 10(1), pp. 13-15.

Allway, M. and Corbett S. 2002. Shifting to Lean Service: Stealing a Page from Manufacturers' Playbooks. *Journal of Organisational Excellence* 21(Spring), pp. 45-54.

Alvarez-Rosete, A., et al. 2005. Effects of diverging policy across the NHS. *British Medical Journal* 331, pp. 946-950.

Andersen Consulting 1992. *The Lean Enterprise Benchmarking Project.* London: Andersen Consulting.

Andersen Consulting 1994. *Worldwide Manufacturing Competitiveness Study.* London: Andersen Consulting.

Angyal, A. 1941. *A Logic of Systems.* In: F. E. Emery. Systems Thinking. Vol. Middlesex: Penguin Books, pp. 17-29.

Armistead, C. and Machin S. 1997. Implications of Business Process Management for Operations Management. *International Journal of Operations & Production Management* 17(9), pp. 886-898.

Armistead, C., et al. 1999. Strategic business process management for organisational effectiveness. *Long Range Planning* 32, pp. 96-106.

Ashby, W. 1956. *Self Regulation and Requisite Variety.* In: F. E. Emery. Systems Thinking. Vol. Harmondsworth, Middlesex: Penguin, pp. 105-124.

Astley, W. 1985. Administrative science as a socially constructed truth. *Administrative Science Quarterly* 30, pp. 497-513.

Bahaskar, R. 1975. *A Realist Theory of Science.* Leeds: Leeds Books

Balestracci, D. ed. 2003. Creating Organisational Data "Sanity". *IPH Masterclass, Modernisation Agency.* Manchester.

Balle, F. and Balle M. 2005. *The Gold Mine: a Novel of Lean Turnaround.* Cambridge, MA: Lean Enterprise Institute

Balle, M. and Regnier A. 2007. Lean as a Learning System in a Hospital Ward. *Leadership in Health Services* 20(1), pp. 33-41.
Barney, J.B. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17, pp. 99-120.
Bartezzaghi, E. 1999. The evolution of production models: is a new paradigm emerging? *International Journal of Operations & Production Management* 19(2), pp. 229-250.
Batalden, P. and Davidoff F. 2007. What is 'quality improvement' and how can it transform healthcare. *Quality and Safety in Health Care* 16, pp. 2-3.
Bateman, N. and David A. 2002. Process Improvement programmes: a model for assessing sustainability. *International Journal of Operations & Production Management* 22(5), pp. 515-526.
Bell, J. 1999. *Doing your Research Project*. Buckingham: Open University Press
Bendoly, E., et al. 2006. Behaviour in operations management: Assessing recent findings and revisiting old assumptions. *Journal of Operations Management* 24(6), pp. 737-752.
Ben-Tovim, D.I. 2007. Seeing the picture through Lean Thinking. *British Medical Journal* 334, pp. 169.
Ben-Tovim, D.I., et al. 2007. Lean thinking across a hospital: redesigning care at the Flinders Medical Centre. *Australian Health Review* 31(1), pp. 10-15.
Berwick, D. 1999. *Escape Fire, lessons for the future of Health Care*. New York, NY: The Commonwealth Fund
Berwick, D. 2002. Same price, better care. *British Medical Journal* 324, pp. 142-143.
Berwick, D. 2003. Disseminating Innovations in Health Care. *Journal of American Medical Association* 289(15), pp. 1969-1975.
Berwick, D., et al. 2005. No Toyota yet, but a start. *Modern Healthcare* 31(1), pp. 10-15.
Bicheno, J. 2002. *The Quality 75, Towards Six Sigma Performance in Service and Manufacturing*. Buckingham, UK: PICSIE Books
Bicheno, J. and Catherwood P. 2005. *Six Sigma and the Quality Toolbox*. Buckingham: PICSIE books
Bicheno, J. and Holweg M. 2009. *The Lean Toolbox 4th Edition, The Essential Guide to Lean Transformation*. 4th Buckingham: PICSIE Books
Bitran, G.R. and Lojo M. 1993. A framework for analyzing service operations. *European Management Journal* 11(3), pp. 271-282.
Bloor, M., et al. 1990. *Focus Groups in Social Research*. London: Sage Publishing
Boaden, R., et al. 2005a. *Quality Improvement: Theory and Practice in the NHS and Evaluation of the NHS Modernisation Agency Six Sigma Initiative*. Manchester: Manchester Business School.
Boaden, R., et al. 2005b. *Lean Six Sigma in the NHS: a review of the training provided by the Juran Institute for the NHS and possible directions for the future*. Manchester: Manchester Business School.
Boddy, D. and Paton R. 1998. *Management: An Introduction*. Harlow: Prentice Hall
Bohmer, R. and Ferlins E. 2006. Virginia Mason Medical Centre. *Harvard Business Review*, pp. 1-28.
Bohmer, R. and Romney A.C. 2009. *Performance Management at Intermountain Healthcare*. In: ed. Harvard Business School Cases. pp. 1-29.
Boston Consulting Group 1993. *The Evolving Competitive Challenge for the European, Automotive Components Industry*. London: Boston Consulting Group

Bragato, L. and Jacobs K. 2003. Care Pathways: the road to better health services? *Journal of Health Organisation and Management* 17(3), pp. 164-180.
Brandao de Souza, L. 2009. Trends and approaches in Lean Healthcare. *Leadership in Health Services* 22(2), pp. 121-139.
Brandao de Souza, L. and Archibald A. ed. 2008. The use of lean thinking to reduce LOS in elderly care. *Operational Research Applied to Health Service*. Toronto, ON.
Breyfogle, E. and Salveker A. 2004. *Lean Six Sigma in Sickness and in Health*. Austin, Texas: Smarter Solutions
Brindle, D. 2005. *Introduction*. In: A. Llewellyn. NHS and Social Services Directory. Vol. London: Guardian Books and Sage Publishing, pp. 8-10.
Brooks, I. and Brown R. 2002. The role of ritualistic ceremonial in removing barriers between subcultures in the National Health Service. *Journal of Advanced Nursing* 38(4), pp. 341-352.
Brown, S., et al. 2001. *Operations Management: policy, practice and performance improvement*. Oxford: Butterworth Hienemann
Bryman, A. and Bell E. 2003. *Business Research Methods*. Oxford: Oxford University Press
Buchanan, D. 1998. Representing process: the contribution of a re-engineering frame. *International Journal of Operations and Production Management* 18(12), pp. 1163-1188.
Buchanan, D. 2003. Demands, Instabilities, Manipulations, Careers: The Lived Experience of Driving Change. *Human Relations* 56(6), pp. 663-684.
Buchanan, D. and Huczynski A. 1991. *Organisational Behaviour*. 3rd Hemel Hempstead: Prentice Hall
Buchanan, D. and Wilson B. 1996. Re-engineering operating theatres: the perspective assessed. *Journal of Management in Medicine* 10(4), pp. 57-74.
Buetow, S. and Roland M. 1999. Clinical governance: bridging the gap between managerial and clinical approaches to quality of care. *Quality in Health Care* 8, pp. 184-190.
Burbridge, J.L. 1975. *The Introduction of Group Technology*. New York: John Wiley and Sons
Burbridge, J.L. ed. 1983. Automated Production Control with Simulation Capability. *IFIP Conference*. Copenhagen.
Burgess, N., et al. ed. 2009. Taxonomy of lean in healthcare: A framework for evaluating activity and impact. *EUROMA Managing Operations in Service Economies*. Porto, Portugal.
Burgess, R. 1984. *In the Field*. London: George Allen &Unwin
Burns, T. 1963. *Mechanistic and Organismic Structures*. In: D. S. Pugh. Organisational Theory. 3. Vol. London: Penguin, pp. 64-75.
Burns, T. and Stalker G.M. 1961. *The management of innovation*. London: Tavistock Publications.
Burrell, G. and Morgan G. 1979. *Sociological Paradigms and Organizational Analysis*. Heinemann
Bushell, S., et al. 2002. Discovering Lean Thinking at Progressive Healthcare. *The Journal for Quality and Participation* 25(2), pp. 20-25.
Byrne, D. 1998. *Complexity Theory and the Social Sciences. Routledge*. Routledge

Campbell, S., et al. 2001. Improving the quality of care through clinical governance. *British Medical Journal* 322, pp. 1580–1582.
Cavaleri, S. ed. 1992. Systems Dynamics: A Form of Integrative Systems Approach. *International Systems Dynamics Conference*. Utrecht University, Utrecht, The Netherlands, July 14-17.
Chase, R.B. and Apte U.M. 2007. A history of research in service operations: What's the big idea? *Journal of Operations Management* 25(2), pp. 375-386.
Checkland, P.B. 1981. *Systems Thinking: Systems Practice*. Chichester: John Wiley & Sons
Child, J. 1984. *Organisation: A guide to problems and practice*. 2nd London: SAGE
Childerhouse, P., et al. ed. 1999. A Quick Scan Method for Supply Chain Diagnostics. *International Symposium on Logistics*. Florence, Italy, July.
Churns, A.B. 1976. The principles of socio-technical design. *Human Relations* 29, pp. 783-792.
Churns, A.B. 1987. Principles of socio-technical design revisited. *Human Relations* 49, pp. 153-162.
Clegg, F. 1982. *Simple Statistics*. Cambridge: Cambridge University Press
Cm 4310 1999. *Modernising Government*. London: HM Stationary Office.
Cm 4818 2000. *The NHS Plan: A plan for investment, a plan for reform*. London: HM Stationary Office.
Coase, R. 1937. The nature of the firm. *Economica* 4, pp. 387-405.
Cockburn, J. 2004. Adoption of evidence onto practice: can change be sustained. *The Medical Journal of Australia* 180(6), pp. s66-s67.
Cohen, L. 1995. *Quality Functional Deployment: How to make QFD work for you*. Reading, MA: Addison Weasley
Comarow, A. 2006. *Seeding a simple dream: do no harm?* US News and World Report Ranking.
Connolly, S., et al. 2010. *Funding and performance of healthcare systems in the four countries of the UK before and after devolution*. London: The Nuffield Trust,.
Cooper, D., et al. 1996. Sedimentation and Transformation in Organisational Change: The case of Canadian law firms. *Organisational Studies* 17(4), pp. 623-647.
Creswell, J. 1998. *Qualitative Inquiry and Research Design; Choosing Among Five Traditions*. London: Sage Publications
Creswell, J. 2003. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 2nd Thousand Oaks, California: Sage
Crossen, M., et al. 1999. An Organisational Learning Framework: From intuition to institution. *Academy of Management Review* 24(3), pp. 522-537.
Cullen, J. 1998. The Needle and the Damage Done: research, action research, and the organisational and social construction of health in the "information society". *Human Relations* 51(12), pp. 1543-1564.
Currie, G. 1997. Management development and a mismatch of objectives: the culture change process in the NHS. *Leadership and Organisation Development Journal* 18(6), pp. 304-311.
Cusumano, M. 1985. *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota*. Cambridge, Mass: Harvard University Press
Dale, B. 1999. *Managing Quality*. 3rd Oxford: Backwell

Dankbaar, D. 1997. Lean Production: Denial, Confirmation or Extension of Socio-technical Systems Design? *Human Relations* 50(5), pp. 567-583.
Davenport, D. 2009. *The Social Derivation of Technical Systems*. In: B. Whitworth and A. Moor. Handbook of Research on Socio-Technical Design and Social Networking Systems. Vol. 1. Hershey, New York: Information Science Reference, pp.
Davies, A. and Kochhar A. 2002. Manufacturing best practice and performance studies: a critique. *International Journal of Operation and Production Management* 22(3), pp. 289-305.
Davies, C., et al. 2006. *Welsh Emergency Care Collaborative: final report*. Llanharan, Cardiff: National Leadership and Innovation Agency for Healthcare.
Davies, C. and Walley P. 2000. Clinical Governance and Operational Management Methodologies. *International Journal of Health Care Quality Assurance* 13(1), pp. 21-26.
Davies, H., et al. 2007. *Healthcare professionals' views on clinician engagement in quality improvement. A literature review*. London: Health Foundation.
Davies, L. and Taylor J. 1972. *Design of jobs*. Harmondsworth: Penguin Books
Day, R. 1994. *Quality Functional Deployment*. Milwaukee, WI: ASQ, Quality Press
Delbridge, R. 1998. *Life on the Line in Contemporary Manufacturing*. Oxford: Oxford University Press.
Deming, W.E. 1986. *Out of the Crisis*. Cambridge: Cambridge University Press
Denison, D.R. ed. 1997. *Towards a Process Based Theory of Organisational Design: Can Organisations Be Designed around Value-Chains and Networks?* Greenwich, Conneticut: JAI Press
Denscombe, M. 1998. *The Good Research Guide*. Buckingham: Open University Press
Denzin, N. and Lincoln Y. ed. 2000. *Handbook of qualitative research*. Sage Publications
Department of Health 2000. *The NHS Plan: A plan for investment, a plan for reform*. London: HM Stationary Office.
Department of Health 2001. *Shifting the Balance of Power in the NHS: securing delivery*. London: Department of Health.
Department of Health 2004. *NHS Improvement Plan, putting the patient at the heart of public services*. London: Department of Health.
Department of Health 2006. *Our Health, Our Care, Our Say: a new direction for community services*. London:
DHSSPS 2007. *DHSSPS Business Plan 2007-08*. Belfast: Department of Health Social Services and Public Safety.
Dillon, A. 1994. *What the General Manager Needs*. In: P. Millard and S. McClean. Modelling Hospital Resource Use: A different approach to the planning and control of Health Care Systems. Vol. London: Royal Society of Medicine Press Ltd., pp. 3-6.
Dimancescu, D., et al. 1997. *The Lean Enterprise, designing and managing strategic processes for customer- winning performance*. New York: AMACOM
Dixon, J. 2002. Funding is not the only factor. *British Medical Journal* 324, pp. 142.
Dixon, J., et al. 1999. Is the English NHS underfunded? *British Medical Journal* 318, pp. 522-526.
Donaldson, L. 1995. *Contingency Theory*. Aldershot: Dartmouth

Dyer, J.H. and Singh H. 1998. The relational view: co-operative strategy and sources of interorganisational competitive advantage. *Academy of Management Review* 23(4), pp. 660-679.
Easterby-Smith, M., et al. 1991. *Management Research: An Introduction.* London: Sage
Eccles, M., et al. 2009. An Implementation Research Agenda. *Implementation Science* 4(18), pp. 1-7.
Eisenhardt, K. 1989. Building theories from Case Study Research. *Academy of Management Review* (14), pp. 532-550.
Elg, M. and Kollberg B. 2009. Alternative arguments and directions for studying performance measurement. *Total Quality Management and Business Excellence* 20(4), pp. 409-421.
Emery, F.E. 1966. *The Democratisation of the Work Place.* London: Tavistock Institute.
Emery, F.E. and Trist E.L. 1969. *Socio-technical systems.* In: F. E. Emery, Systems Thinking. Vol. 1. Harmondsworth: Penguin Books, pp.
Emiliani, M. 1998. Lean Behaviours. *Management Decision* 36(9), pp. 615-631.
Enthoven, A. 2002. Competition made them do it. *British Medical Journal* 324, pp. 143.
Esain, A. ed. 2004. An Elegant and Effective Process for Acute Healthcare - The Hidden Hospital: A Case Study for General Surgery.. *EUROMA 2004, Operations Management as a Change Agent.* Instead, Fontainebleau, 27-29 June 2004.
Esain, A. and Rich N. 2005. *Exploring Patient Pathways: A Grounded Approach to Managing Complexity.* In: M. Tavakoli and H. Davies. Reforming Health Systems: Analysis and Evidence, Strategic issues in health care management. Vol. St Andrews: University of St Andrews, pp. 83-97.
Esain, A. and Rich N. ed. 2006. Streaming in Acute Healthcare. *EUROMA, Moving Up the Value Chain.* Glasgow, June. University of Strathclyde.
Esain, A., et al. 2010. Healthcare Quality Improvement - Policy Implications and Practicalities. *International Journal of Health Care Quality Assurance* (accepted waiting publishing date), pp.
Fayol, H. 1916. *General Principles of Management.* In: D. S. Pugh. Organization Theory, selected readings. 3rd. Vol. Harmondsworth: Penguin Books, pp. 181-202.
Feachem, R. and Sekhri N. 2005. US and UK health care: a special relationship? Moving towards true integration. *British Medical Journal* 330, pp. 787-788.
Feachem, R. and Sekhri N. 2006. Moving towards true integration. *British Medical Journal* 330, pp. 787-788.
Feachem, R., et al. 2002. Getting more for their dollar: a comparison of the NHS with California's Kaiser Permanente. *BMJ* 324, pp. 135-143.
Featherstone, H. and Evans N. 2010. *Controlling Public Spending: The NHS in a period of tight funding* [Online]. London: The Policy Exchange. Available at: [Accessed: 7th June 2010].
Fillingham, D. 2008. *Lean Healthcare, Improving the patient's experience.* Chichester: Kingsham
Ford, H. 2003. *In collaboration with Crowther, S., Today and Tomorrow.* Updated 1988 reprint of the 1926 original. Portland Oregon: Productivity Press
Forrester, J.W. 1958. Industrial Dynamics - A Major Breakthrough for Decision Makers. *Harvard Business Review* 36(4), pp. 37-66.
Forrester, J.W. 1971. *Principles of Systems.* Portland: Productivity Press

Foster, T., et al. 2007. Using a Malcolm Baldridge framework to understand high performing clinical microsystems. *Quality and Safety in Health Care* 16, pp. 334-341.
Found, P., et al. ed. 2007. Creating a sustainable lean business system within a multi-national group company. *International Symposium on Logistics: Developing Sustainable Collaborative Supply Chains.* Budapest, Hungary, 8-10 July.
Freeman, R.E. 1984. *Strategic Management a: A Stakeholder Approach.* Boston: M. A. Pitman
Fryer, K., et al. 2007. Critical success factors of continuous improvement in the public sector: A literature review and some key findings. *The TQM Magazine* 19(5), pp. 497-517.
Galloway, L., et al. 2000. *Operations Management in Context.* Oxford: Butterworth Heinmann
Garman, A., et al. ed. 2009. High-Performance Work Practices in Healthcare Management: An Evidence-Based Review and Synthesis. *Academy of Management.* Chicago. Academy of Management.
Gemmel, P. and Van Dierdonck R. 1999. Admission scheduling in acute care hospitals: does the practice fit with the theory? *International Journal of Operations & Production Management* 19(9), pp. 863-878.
Ghauri, R. and Gronhaug K. 2005. *Research methods in business studies: a practical guide.* Prentice Hall
Giddens, A. 1984. *The Constitution of Society.* Cambridge: Polity
Giddens, A. 1997. *The Third Way: the renewal of social democracy.* Cambridge: Polity Press
Godet, M. 1993. *From Anticipation to Action: a handbook of strategic perspective.* UNESCO.
Goldratt, E. and Cox J. 1986. *The Goal, A Process of Ongoing Improvement.* Revised New York: North River Press
Goss, T., et al. 1993. The reinvention roller coaster: Risking the present for a powerful future. *Harvard Business Review* 71(6), pp. 97-108.
Graupp, P. and Wrona R. 2006. *The TWI workbook, essential skills for supervisors.* New York: Productivity Press
Greasley, A. 2009. *Operations Management.* 2nd Chichester: John Wiley and Sons
Greenhalgh, T., et al. 2009. How do you modernise a health service, a realist evaluation of whole-scale transformation in London. *The Milbank Quarterly* 87(2), pp. 319-416.
Greenhalgh, T., et al. 2004. *How to Spread Good Ideas: A systematic review of the literature on diffusion, dissemination and sustainability of innovations in health service delivery and organisation.* London: National Co-ordinating Centre for NHS Service Delivery and Organisation R&D.
Grover, V., et al. 2000. Business Process Change in the 21st Century. *Business and Economic Review* 46, pp. 14-18.
Gubb, J. and Bevan G. 2009. Have targets done more harm than good in the English NHS? *British Medical Journal*, pp. 338.
Hallet, L. 2000. *HSJ Guide to What's happening in the NHS?* London: EMAP Public Sector Management
Ham, C. 1999. Improving NHS performance: human behaviour and health policy. *BMJ* 319, pp. 1490-1492.

Ham, C., et al. 2003. Hospital bed utilisation in the NHS, Kaiser Permanente, and the US Medicare programme: analysis of routine data. *British Medical Journal* 327, pp. 1257-1261.
Hammer, M. 1996. *Beyond Reengineering: How the Process-Centered Organization is Changing Our Lives*. New York, NY: Harper Business
Hammer, M. 2002. Process Management and the future of Six Sigma. *Sloan Management Review* Winter, pp. 26-32.
Hammer, M. and Champy J. 1993. *Reenginering the Corporation: a manifesto for business revolution*. New York: Harper Collins
Hammersley, M. 1992. Some reflections on ethnography and validity. *Qualitative Studies in Education* 5(3), pp. 195-204.
Harrison, A. 2000. Can we win the waiting game? *Public Finance*, pp. 20-21.
Harrison, A. and Appleby J. 2005. *The War on Waiting for Hospital Treatment, what has Labour achieved and what challenges remain?* London: King's Fund.
Harrison, J. and McDowell G. 2008. The role of laboratory information systems in healthcare quality improvement. *International Journal of Health Care Quality Assurance* 21(7), pp. 679-691.
Harry, M. 1988. *The Nature of Six Sigma Quality*. Motorola Inc
Hayes, R.H. 1981. Why Japanese Factories Work. *Harvard Business Review*, pp. 56-66.
Hayes, R.H. 2000. Towards a "new architecture" for POM. *Production and Operations Management* 7, pp. 94-98.
Hayes, R.H. and Wheelwright S.C. 1984. *Restoring our Competitive Edge: Competing through Manufacturing*. New York: Wiley
Healthcare Commission 2004. *Clinical Governance Review*. Norwich: The Stationary Office.
Heineke, J. and Davis M.M. 2007. The emergence of service operations management as an academic discipline. *Journal of Operations Management* 25(2), pp. 364-374.
Herbst, P. 1974. *Socio-technical design*. Birkenhead: Willmer Brothers
Herbst, P. 1976. *Alternatives to Hierarchies*. Leiden: Martinus Nijhoff
Hersey, P. and Blanchard K.H. 1882. *Management of Organisational Behaviour: Utilising Human Resources*. 4th Englewood Cliffs, NJ: Prentice Hall
Heskett, J. 1983. Shouldice Hospital Ltd. *Harvard Business Review* Case 9-683-068, pp. 1-18.
Hewison, A. 2003. Qualitative management research in the NHS, a classic case of counting to one? *Journal of Health Organisation and Management* 17(2), pp. 122-137.
Hill, T. 1991. *Production and Operations Management: text and cases*. 2nd Hemel Hempstead: Simon and Schuster
Hines, P. 1997. *A comparative typology of intercompany networking*. In: A. Cox and P. Hines. Advanced Supply Management. Vol. Earlsgate Press, pp.
Hines, P., et al. 2008. *Staying Lean, thriving, not just surviving*. Cardiff: Lean Enterprise Research Centre
Hines, P., et al. 2004. Learning to evolve. *International Journal of Production and Operations Management* 24(10), pp. 914-1011.
Hines, P., et al. 2000. *Value Stream Management*. Horlow, England: Prentice Hall
Hines, P. and Rich N. 1997. The Seven Value Stream Mapping Tools. *International Journal of Production and Operations Management* 17(1), pp. 46-64.

Holm, M. and Åhlström P. ed. 2010. Lean Service – a literature review. *EUROMA Managing Operations in Service Economies*. Porto, Portugal, 6-9 June.
Holweg, M. 2007. The genealogy of lean production. *Journal of Operations Management* 25, pp. 420-437.
Hood, C. 1991. A public management for all seasons? *Public Administration* 69(Spring), pp. 3-19.
Houlihan, J. 1985. International Supply Chain Management. *International Journal of Physical Distribution and Logistics Management* 15(1), pp. 22-38.
Hubber, V. and Brown K. 1991. Human resource issues in cellular manufacturing: a socio-technical analysis. *Journal of Operations Management* 10(1), pp. 138-159.
Hussey, J. and Hussey R. 1997. *Business Research: A practical guide for undergraduate and postgraduate students*. London: Macmillan Press
Imai, M. 1986. *Kaizen: The key to Japan's Competitive Success*. New York: McGraw-Hill
Institute for Healthcare Improvement 2003. *Optimizing Patient Flow, Moving Patients through Acute Care Settings*. Institute for Healthcare Improvement.
Institute for Healthcare Improvement 2005. *Going Lean in Health Care*. Cambridge, MA: Institute for Healthcare Improvement.
Institute of Medicine 2000. *To Err is Human: building a safer healthcare system*. Washington, D.C.: National Academy Press.
Institute of Medicine of the National Academies 2006. *Performance Measurement: Accelerating Improvement*. Washington DC: The National Academies Press.
Jackson, M.C. 2003. *Systems Thinking: Creative Holism for Managers*. First West Sussex: John Wiley & Sons
Jenner, R. 1998. Dissipative Enterprises, Chaos and Principles of Lean Organisations. *International Journal of Management Science* 26(4), pp.
Johnson, H.T. and Broms A. 2000. *Profit Beyond Measure, extraordinary results through attention to work and people*. London: Nicholas Brealey Publishing
Johnston, R. 1999. Service operations management: return to roots. *International Journal of Operations & Production Management* 19(2), pp. 104-124.
Johnston, R. 2005. Update: Service operations management: from the roots up. *International Journal of Operations & Production Management* 25(12), pp. 1298-1308.
Jones, D.T. and Mitchell A. 2006. *Lean Thinking for the NHS*. London: NHS Confederation.
Kast, F.E. and Rosenzweig J.E. 1985. *Organisation and Management*. New York: McGraw-Hill
Katz, D. and Kahn R., L 1969. *Common Characteristics of Open Systems*. In: F. E. Emery, Systems Thinking. Vol. Harmondsworth, Middlesex: Penguin, pp. 86-104.
Keating, C., et al. 2001. A Methodology for analysis of complex Socio-technical Processes. *Business Process Management Journal* 7(1), pp. 33-49.
Kennedy, C. 2008. *The Best Practice: How the New Quality Movement is Transforming Medicine*. New York: Public Affairs
Kim, S., et al. 2008. The theory of constraints thinking processes: retrospective and prospect. *International Journal of Operations & Production Management* 28(2), pp. 155-184.

Kings Fund 2010. *A High-Performing NHS? A review of progress 1997-2010.* London: Kings Fund.
Kinnie, N., et al. 1997. *The People Management Implications of Leaner Ways of Working.* London: Institute of Personnel and Development.
Kitchener, M. 1999. *'All fur coat and no knickers': Contemporary organisational change in United Kingdom hospitals.* In: D. M. Brock, et al. Restructuring the Professional Organisation. Vol. London: Routledge, pp. 183-199.
Knod, E. and Schonberger R. 2001. *Operations Management: Meeting Customers' Demands.* 7th New York, NY: McGraw-Hill
Koehler, W. 1938. *Closed and Open Systems.* In: F. E. Emery. Systems Thinking. Vol. Harmondsworth, Middlesex: Penguin, pp.
Koichi, S. and Fujimoto T. ed. 2009. *The Birth of Lean.* Cambridge, MA: Lean Enterprise Institute
Kolakowski, L. 1993. *An Overall View of Positivism.* In: M. Hammersley. Social Research: Philosophy, Politics and Practice. Vol. London: Sage, pp. 1-8.
Kollberg, B., et al. 2007. Measuring lean initiatives in health care services: Issues and findings. *International Journal of Productivity and Performance Management* 56(1), pp. 7-21.
Kotter, J. 1995. Leading change: why transformation efforts fail. *Harvard Business Review* 73(2), pp. 59-67.
Krafcik, J. 1988. The triumph of the lean production system. *Sloan Management Review* Fall, pp. 41-52
Kramer, N. and DeSmit J. 1977. *Systems Thinking - Concepts and Notions.* Leiden: M Nijhoff Social Sciences Division
Laing, A. and Shiroyama C. 1995. Managing capacity and demand in a resource constrained environment: lessons for the NHS? *Journal of Management in Medicine* 9(5), pp. 51-67.
Lamont, S. 2005. "See and Treat" spreading like wildfire? A qualitative study of factors affecting its introduction and spread. *Emergency Medicine Journal* 22, pp. 548-552.
Lane, R. ed. 2004. Medical Operations and Service Operations. *EUROMA Operations Management as a Change Agent.* INSEAD, France.
Lapre, M. and Wassenhove L. 2002. Learning across lines; the secret to more efficient factories. *Harvard Business Review*, pp. 107-111.
Laugen, B., et al. 2006. Best manufacturing practices, What do the best-performing companies do? *International Journal of Operation & Production Management* 25(2), pp. 131-150.
Lawrence, P. and Lorsch J. 1967. *High performing organisations in three environments.* In: D. S. Pugh. Organisation Theory, selected readings. 3rd. Vol. Harmondsworth: Penguin Books, pp. 76-94.
Layder, D. 1994. *Understanding Social Theory.* London: Sage Publications
Lee, H., et al. 1997. Information Distortion in a Supply Chain: The Bullwhip Effect. *Management Science* 43(4), pp. 546-558.
Leonard-Barton, D. 1990. A Duel Methodology: Synergistic Use of a Longditudinal Single Site with Replicated Multiple Sites. *Organisational Science* 1(3), pp. 248-266.
Leonard-Barton, D. 1992. Core capabilities and core rigidities: a paradox in managing new product development. *Sloan Management Review* 13, pp. 111-126.

Leontief, W.W. 1936. *Input Output Analysis*. In: H. D. Kurz, et al. Qualitative Input and Output Relations in the Economic System of the United States. Vol. Cheltenham: Edward Elgar, pp.
Levitt, T. 1960. Marketing Myopia. *Harvard Business Review* 38(4), pp. 45-56.
Levitt, T. 1972. Production-Line Approach to Service. *Harvard Business Review*, pp. 41-52.
Levitt, T. 1976. The industrialisation of service. *Harvard Business Review*, pp. 63-74.
Lewis, J., et al. 1998. Quick Scan Your Way to Supply Chain Improvement. *Control* 24(5), pp. 14-16.
Light, D. and Dixon M. 2004. Making the NHS more like Kaiser Permanente. *British Medical Journal* 328, pp. 763-765.
Liker, J.K. 2004. *The Toyota Way*. New York: McGraw-Hill
Lippman, S. and Rumelt R. 1982. Uncertain imitability: An analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics* 13, pp. 418-438.
Llewellyn, A. 2005. *NHS and Social Services Directory 2005-6*. London: Guardian Books and Sage Publishing
Locock, L. 2000. The Changing Nature of Rationing in the UK National Health Service. *Public Administration* 78(1), pp. 91-109.
Lodge, A. and Bamford D. 2007. Health service improvement through diagnostic waiting list management. *Leadership in Health Services* 20(4), pp. 254.
Lodge, A. and Bamford D. 2008. New development: Using lean techniques to reduce radiology waiting times. *Public Money and Management* 28(1), pp. 49-52.
Long, J. 2003. Healthcare Lean. *Michigan Healthcare Hospital* 39(4), pp. 54-55.
Long, M.F. and Feldstein P.J. 1967. Economics of hospital systems: peak loads and regional coordination. *American Economic Review*, pp. 119-129.
Lucey, J., et al. 2005. Why major Lean transitions have not been sustained. *Management Services*, pp. 9-14.
Lynch, R.L. and Cross K.F. 1991. *Measure Up: the essential guide to measuring business performance*. London: Blackwell
Maddock, S. 2002. Making Modernisation Work, New Narratives, Change Strategies and People Management in the Public Sector. *The International Journal of Public Sector Management* 15(1), pp. 13-43.
Maidique, M. and Hayes R.H. 1984. The art of High Technology Management. *Sloan Management Review*, pp. 17-31.
Maier, M. and Rechtin E. 2000. *The Art of Systems Architecting, 2nd Edition, CRC Press, Boca Raton, Florida*. 2nd Boca Raton, Florida: CRC Press
Majchrzak, A. 1997. What to do when you can' have it all: Towards a Theory of Socio-technical Dependencies. *Human Relations* 50(5), pp. 535-565.
Majchrzak, A. and Broys B. 2001. Generating testable socio-technical systems theory. *Journal of Engineering and Technology Management* 18, pp. 219-240.
Manos, A., et al. 2006. Make Healthcare Lean. *Quality Progress* 39(7), pp. 24.
Martin, M., et al. 2003. NHS waiting list and evidence of national or local failure. *British Medical Journal* 326, pp. 1-10.
Martin, S. and Smith P. 1999. Rationing by waiting lists: an imperical investigation. *Journal of Public Economics* 71, pp. 141-164.

Massey, L., et al. 2009. Managing the complexity of nurse shortages: A case study of bank and agency staffing in an acute care Trust in Wales, UK.. *International Journal of Nursing Studies* 46(7), pp. 875-1034.
Massoud, M., et al. 2006. *A Framework for Spread: From Local Improvements to System-Wide Change*. Cambridge, Massachusetts: Institute for Healthcare Improvement.
Mathews, J. 1997. Introduction to the Special Issue. *Human Relations* 50(5), pp. 487-496.
Mathieson, S. 2006. Wait Watchers. *Health Service Journal*, pp. 4-9.
Mayo, E. 1949. *Hawthorne and the Western Electric Company*. In: D. S. Pugh. Organisational Theory. 3rd. Vol. London: Penguin Books, pp. 345-357.
Mazzocato, p., et al. 2010. Lean thinking in healthcare: a realist review of the literature. *Quality & Safety in Health Care* Online August 19, pp. 1-7.
McNulty, T. and Ferlie E. 2002. *Reengineering Health Care*. Oxford: Oxford University Press
Melao, E. and Pidd M. 2000. A conceptual framework for understanding business process modelling. *Information Systems Journal* 10, pp. 105-406.
Meredith, J. 1993. Theory Building through Conceptual Methods. *International Journal of Operations & Production Management* 13(5), pp. 3-11.
Miles, M. and Huberman A. 1994. *An expanded sourcebook qualitative data analysis*. 2nd Thousand Oaks, California: Sage Publishing
Millard, P. 1994a. *Current Measures and their Defects*. In: P. Millard and S. McClean. Modelling Hospital Resource Use, a different approach to the planning and control of health care systems. Vol. 1. New York: Royal Society of Medicine Press, pp. 29-37.
Millard, P. 1994b. *What the Clinician Needs*. In: P. Millard and S. McClean. Modelling Hospital Resource Use. Vol. 1. London: Royal Society of Medicine Press, pp. 13-17.
Mintzburg, H. and Quinn J. 1991. *The strategy process: Concepts, contexts, cases*. 2nd Englewood Cliffs, California: Prentice Hall
Monden, Y. 1983. *The Toyota Production System*. Atlanta: Institute of Industrial Engineers
Moore, S. 2003. Capacity Planning - Modelling Unplanned Admissions in the UK NHS. *International Journal of Health Care Quality Assurance* 16(4), pp. 165-172.
Morgan, G. 1986. *Images of Organisation*. Thousand Oaks, CA: SAGE
Morgan, G. and Smircich L. 1980. The case for qualitative research. *Academy of Management Review* 5, pp. 491-500.
Motwani, J., et al. 1996. The theory of constraints in services: part 2 - examples from health care. *Managing Service Quality* 6(2), pp. 30-34.
Murphy, E., et al. 1998. *Qualitative Research Methods in Health Technology Assessment: A review of Literature*. University of Southampton: NCCHTA.
Murray, M. 2000. Modernising the NHS, Patient Care: Access. *British Medical Journal* 320, pp. 1594-1596.
Nader, L. 1969. *Up the anthropologist - perspectives gained from studying up*. New York: Random House
Neave, H. 1990. *The Deming Dimension*. Knoxville, Tennessee: SPC Press
Nelson, R.R. 1991. Why do firms differ and how does it matter? *Strategic Management Journal* 14(3), pp. 179-192.
NHS Institute for Innovation and Improvement 2008. *Clinical Systems Improvement, Curriculum*. Warwick: NHS Institute for Innovation and Improvement.

NHS Modernisation Agency 2004. Ten Ways to Shake the World. *Health Service Journal* (An HSJ Supplement), pp. 1-13.
Niepce, W. and Molleman E. 1996. A case study: Characteristics of work organisation in lean production and socio-technical systems. *International Journal of Operations & Production Management* 16(2), pp. 77-90.
Niepce, W. and Molleman E. 1998. Work Design Issues in Lean Production from a Socio-technical Perspective: Neo-Taylorism or the next step in Socio-technical design? *Human Relations* 51(3), pp. 259-287.
O'donnell, M. 1995. Empowerment or enslavement?: Lean production, immigrant women and service work in public hospitals. *Labour and Industry* 6(3), pp. 73-94.
Ohno, T. 1988. *The Toyota Production System: Beyond Large- Scale Production.* Portland, Oregon: Productivity Press
Oliver, A. 2005. The English National Health Service: 1979-2005. *Health Economics* 14, pp. S75-S99.
Oliver, N., et al. 1996. The European auto components industry: Manufacturing performance and practice. *International Journal of Operation & Production Management* 16(11), pp. 85-97.
Olsson, J., et al. 2007. System characteristics of healthcare organisazations conducting successful improvements. *Journal of Health Organisation and Management* 21(3), pp. 283-296.
OPM 2003. *Learning from the NHS in Change. A study on the management of major structural change in the NHS.* Office for Health Management.
Øvretveit, J. 2002. How to run an effective improvement collaborative. *International Journal for Health Care Quality Assurance* 15(5), pp. 192-196.
Øvretveit, J. 2003. *What are the best strategies for ensuring quality in hospitals?* Denmark: World Health Organization Regional Office for Europe's Health Evidence Network (HEN).
Øvretveit, J., et al. 2002. Quality collaboratives: lessons from research. *Quality and Safety in Health Care* 11(4), pp. 345-351.
Packwood, T., et al. 1998. 'Good medicine?' A study of business process re-engineering in a hospital. *Policy and Politics* 26(4), pp. 401-415.
Paez, O., et al. 2004. The Lean Manufacturing Enterprise: An emerging sociotechnological system integration. *Human Factors and Ergonomics in Manufacturing* 14(3), pp. 285-306.
Pallant, J. 2001. *SPSS Survival Manual.* Buckingham: Open University Press
Parnaby, J. 1988. A systems approach to the implementation of JIT methodologies in Lucas Industries. *International Journal Production Resources* 26(3), pp. 483-492.
Pasmore, W. 1988. *Designing effective organisations, the sociotechnical systems perspective.* New York: John Wiley & Sons
Patton, M. 1990. *Qualitative Evaluation and Research Methods.* Newbury Park, California: Sage
Pedler, M. ed. 1997. *Learning in Practice.* 3rd. Aldershot: Gower
Pedler, M. and Abbott C. 2008. Lean and learning: action learning for service improvement. *Leadership in Health Services* 21(2), pp. 87-98.
Pedler, M., et al. 1991. *The Learning Company: A strategy for sustainable development.* Maidenhead: McGraw-Hill

Peters, T. and Waterman R. 1982. *The value Streams of Excellent Companies.* In: D. S. Pugh. Organisational Theory, selected readings. 3rd. Vol. Harmondsworth: Penguin Books, pp. 266-277.
Pettigrew, A., et al. 1992. *Shaping Strategic Change: Making change in large organisations, the case of the National Health Service.* London: Sage
Piercy, N. and Rich N. 2009. Lean transformation in the pure service environment: The case of the call service centre. *International Journal of Operations & Production Management* 29(1), pp. 54-76.
Pilkington, A. and Meredith J. 2009. The evolution of the intellectual structure of operations management-1980-2006: A citation/co-citation analysis. *Journal of Operations Management* 27, pp. 185-202.
Pope, N. 2004. *Consultant crisis doubles waiting times in Wales.* London: The Sunday Times Good Hospital Guide.
Porter, M. 1985. *Competitive Advantage: Creating and sustaining superior performance.* New York: The Free Press
Porter, M.E. 1991. Towards a Dynamic Theory of Strategy. *Strategic Management Journal* 12(Winter Special Issue), pp. 95-117.
Prichard, J. and Armistead C. 1999. Business Process Management - lessons from European business. *Business Process Management Journal* 5, pp. 10-35.
Probert, D., et al. 1999. The introduction of Patient Process Re-engineering in the Peterborough Hospital NHS Trust. *Journal of Management in Medicine* 25(1), pp. 305-334.
Proudlove, N., et al. 2008. Lessons for lean in healthcare from using six sigma in the NHS. *Public Money and Management* 28(1), pp. 27-34.
Pugh, D.S. and Hickson D.J. 2007. *Great writers on organizations, the third omnibus edition.* Third Aldershot, UK: Ashgate
Radnor, Z. 2010a. *Review of Business Process Improvement Methodologies in Public Services.* London: Advanced Institute of Management.
Radnor, Z. 2010b. Transferring lean into government. *Journal of Manufacturing Technology Management* 21(3), pp. 411-428.
Radnor, Z. and Boaden R. 2008. Lean in Public Services - Panacea or Paradox? *Public Money and Management* 28(1), pp. 3-6.
Radnor, Z. and Bucci G. 2008. *Literature Review of Business Process Improvement: Full Report.* Warwick: The National Audit Office.
Radnor, Z. and Howleg M. ed. 2010. From Tools to Systems: A critical approach to Lean Healthcare implementations. *EUROMA Managing Operations in Service Organisations.* Porto, Portugal, June 6-9.
Radnor, Z., et al. 2006. *Evaluation of the Lean Approach to Business Management and its use in the Public Sector.* Scottish Executive Social Report.
Ragin, C. 1994. *Constructing Social Research: The Unity and Diversity of Method.* Pine Forge Press
Rahman, S. 1998. Theory of Constraints, a review of its philosophy and its applications. *International Journal of Production and Operations Management* 18(4), pp. 336-355.
Reed, R. and DeFillippi R. 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review* 15, pp. 88-102.
Rees, C., et al. 1997. *The People Management Implications of Leaner Ways of Working.*

Regan, W. 1963. The Service Revolution. *Journal of Marketing* 47, pp. 57-62.
Reid, R. 2007. Applying the TOC five-step focusing process in the service sector A banking subsystem. *Managing Service Quality* 17(2), pp. 209-234.
Reinertsen, J., et al. 2007. *Engaging Physicians in a Shared Quality Agenda*. Cambridge, Massachusetts: Institute for Healthcare Improvement.
Remenyi, D., et al. 1998. *Doing Research in Business and Management*. London: Sage
Rich, N. 1999. *Total Productive Maintenance, the Lean approach*. Wirrel: Tudor Business Publishing
Rich, N. 2001. *Turning Japanese?* University of Wales, Cardiff.
Rich, N., et al. 2006. *Lean Evolution, lessons from the work place*. Cambridge: Cambridge University Press
Ritson, N. and Waterfield N. 2005. Managing change: the theory of constraints in the mental health service. *Strategic Change* 14, pp. 449-458.
Roberts, J. 2004. *The Modern Firm: organizational design for performance and growth*. Oxford: Oxford University Press
Rogers, A., et al. 1999. Improving access needs a whole systems approach. *British Medical Journal* 319, pp. 866-867.
Rogers, H., et al. 2004. *NHS Modernisation Agency's way to improve health care*. Letter to: Received 21 February.
Rosko, M. ed. 2004. The Impact of Membership in Different Types of Systems on Hospital Efficiency. *Strategic Issues in Health Care Management*. St Andrews.
Roth, A. and Miller J. 1992. Success Factors in Manufacturing. *Business Horizons* July/August, pp. 73-81.
Rother, M. 2010. *Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results*. New York: McGraw-Hill
Rother, M. and Shook J. 1999. *Learning to See, Value Stream Mapping to Create Value and Eliminate Muda*. Boston: Lean Enterprise Institute
Rumelt, R.P. 1987. *Theory, strategy and entrepreneurship*. In: D. Teece. The competitive challenge. Vol. New York: Haper Rowr, pp.
Samaranayake, P. ed. 2006. Current Practices and Problem Areas in Aircraft Maintenance Planning and Scheduling – Interfaced/Integrated System Perspective. *7th Asia Pacific Industrial Engineering and Management Systems Conference*. Bangkok, Thailand, 17-20 December 2006.
Saunders, M., et al. 1997. *Research Methods for Business Students*. London: Pitman Publishing
Schmenner, R. 1986. How Can Service Businesses Survive and Prosper? *Sloan Management Review* Spring, pp. 21-32.
Schmenner, R. 2004. Service Businesses and Productivity. *Decision Sciences* 35(3), pp. 333-347.
Schmid, K. and Conen D. 2000. Integrated patient pathways: "mipps" - a tool for quality improvement and cost management in health care. A pilot study on the pathway "Acute Myocardial Infraction". *International Journal of Health Care Quality Assurance* 13(2), pp. 87-92.
Schoen, C., et al. 2005. Taking the pulse of Health Care Systems: experiences of patients with health problems in six countries. *Health Affairs* (W5), pp. 509-525.
Scholtes, P. 1998. *The Leader's Handbook*. New York: McGraw-Hill

Schonberger, R.J. 1982. *Japanese Manufacturing Techniques: Nine Hidden Lessons in Simplicity*. New York: Free Press
Schonberger, R.J. 1986. *World class manufacturing: the lessons of simplicity applied.* New York: Free Press
Schonberger, R.J. 1996. *World Class Manufacturing: The Next Decade*. New York: Free Press
Schoonhoven, C. 1981. Problems with Contingency Theory: Testing Assumptions hidden within Language of Contingency Theory. *Administrative Science Quarterly* 26, pp. 349=377.
Schuring, R. 1996. Operational autonomy explains the value of group work in both lean and reflective production. *International Journal of Operations & Production Management* 16(2), pp. 171-182.
Scudder, G.D. and Hill C.A. 1998. A review and classification of empirical research in operations management. *Journal of Operations Management* 16(1), pp. 91-101.
Seddon, J. 2005. *Freedom from command and control, a better way to make the work work*. 2nd Buckingham: Vanguard Education
Sehwail, L. and DeYong C. 2003. Six Sigma in health care. *Leadership in Health Services* 16(4), pp. 1-5.
Senge, P.M. 1990. *The Fifth Discipline. The art and practice of the learning organisation*. London: Century Business
Shingo, S. 1988. *Non-Stock Production. The Shingo System for Continuous Improvement.* Portland, Oregon: Productivity Press
Shingo, S. 1990. *Modern Approaches to Manufacturing Improvement : The Shingo System*. Portland, Oregon: Productivity Press
Shoemaker, T. and Reid R. 2005. Applying the Theory of Constraints Thinking Process, A Case Study in the Government Sector. *Human Systems Management* 24, pp. 21-27.
Shook, J. ed. 2001. Presentation - Organization and Leadership for Effective Value Stream Leadership. *Lean Summit*. Birmingham, UK. Lean Enterprise Institute.
Siha, S. 1999. A classified model for applying the theory of constraints to service organizations. *Managing Service Quality* 9(4), pp. 255-264.
Silvester, K., et al. 2004. Reducing Waiting Times in the NHS: is a lack of capacity a problem? *Clinician in Management* 12(3), pp. 105-111.
Silvestro, R., et al. 1992. Towards a classification of service processes. *International Journal of Service Industry Management* 3(3), pp. 62.
Silvestro, R. and Silvestro C. 2003. New Service Design in the NHS: an evaluation of the strategic alignment of NHS direct. *International Journal of Operations & Production Management* 23(4), pp. 401-417.
Simmons, R. 2000. *Performance Measurement and Control Systems for Implementing Strategy*. Upper Saddle River, NJ.: Prentice Hall
Simon, H., A. 1969. *Rational Choice and the Structure of the Environment*. In: F. E. Emery. Systems Thinking. Vol. Hamondsworth, Middlesex: Penguin, pp. 214-229.
Sirio, C., et al. 2003. Pittsburgh regional healthcare initiative: a systems approach to achieving perfect care. *Health Affairs* 22(5), pp. 157-165.
Skinner, W. 1969. Manufacturing -The missing link in corporate strategy. *Harvard Business Review* 47(3), pp. 136-145.

Slack, N. 1991. *The Manufacturing Advantage: achieving competitive manufacturing advantage*. Didcott, UK: Business Books 2000
Slack, N., et al. 2001. *Operations Management*. 3rd Harlow: Pearson Education
Slack, N., et al. 2004. The two worlds of operations management research and practice: can they meet, should they meet? *International Journal of Operations & Production Management* 24(4), pp. 372-387.
Smart, P., et al. 1999. *Supporting Business Process Reengineering in Industry: towards a methodology*. In: R. Gulladge and J. Elzinga. Process Engineering: Advancing the state of the art. Vol. Boston, MA: Kluwer Academic, pp. 283-319.
Smart, P., et al. 2009. Understanding business process management: Implications for theory and practice. *British Journal of Management* 20(4), pp. 491-507.
Soderlund, N., et al. 1997. Impact of the NHS reforms on English hospital productivity: an analysis of the first three years. *British Medical Journal* (315), pp. 1126-1129.
Sommerhoff, G. 1950. *Analytical Biology*. London: Oxford University Press
Sousa, R. and Voss C. 2001. Quality Management: Universal or Context Dependent? An empirical investigation across the manufacturing strategy spectrum. *Production and Operations Management* 20, pp. 91-109.
Spear, S. 2005. Fixing Health Care from the Inside, Today. *Harvard Business Review* September, pp. 78-91.
Spear, S. 2009. *Chasing the Rabbit, how market leaders outdistance the competition and how great companies can catch up*. New York: McGraw Hill
Spear, S. and Bowen H. 1999. Decoding the DNA of the Toyota production system. *Harvard Business Review* 77, pp. 97-106.
Sprague, L.G. 2007. Evolution of the field of operations management. *Journal of Operations Management* 25(2), pp. 219-238.
Stalk, G. and Hout T.M. 1990. *Competing Against Time*. The Free Press
Storey, J. 1994. *New Wave Manufacturing Practices: Organisational and Human Resource Management Dimensions*. London: PCP
Sudman, S. and Bradburn N. 1982. *Asking Questions: a Practical Guide to Questionnaire Design*. Jossey-Bass
Suzaki, K. 1993. *The New Manufacturing Challenge*. New York: Free Press
Swank, C.K. 2003. The lean service machine. *Harvard Business Review* 81(10), pp. 123.
Swingewood, A. 1975. *Marx and Modern Social Theory*. London: Macmillian
Talbot, C. 2003. How the public sector got its contradictions - the tale of the paradoxical primate. Integrating the idea of paradox in human social and organisational systems with evolutionary psychology. *Human Nature Review* 3, pp. 183-195.
Talbot-Smith, A., et al. 2004. Questioning the claims from Kaiser. *British Journal of General Practitioners* 54, pp. 415-421.
Taylor, F.W. 1911. *The Principles of Scientific Management*. New York, USA: McGraw-Hill
Taylor, F.W. 1912. *Scientific Management*. In: D. S. Pugh. Organisational Theory. Vol. London: Penguin Books, pp. 203-222.
Taylor, J. and Felten D. 1993. *Performance by Design*. Englewood Cliffs, NJ: Prentice-Hall

Taylor, J. and Shouls S. 2008. Transforming access: the role of data within service improvement to transform access to services. *Clinical Governance: An International Journal* 13(1), pp. 8-18.
The Royal College of Surgeons of England 2008. *The Emergency Department: Medicine and Surgery Interface Problems and Solutions, A report of the working party 2004, review date 2008*. The Royal College of Surgeons of England.
Tolbert, P.S. and Zucker L.G. 1996. *The Institutionalisation of Institutional theory*. In: S. Clegg and C. Hardy. Studying Organisation: Theory and Method. Vol. London: SAGE, pp.
Towill, D. 2006. Viewing Kaiser Permanente via the logistician lens. *International Journal for Health Care Quality Assurance* 19(4), pp. 296-315.
Towill, D. and Christopher M. 2005. An evolutionary approach to the architecture of effective healthcare delivery systems. *Journal of Health Organisation and Management* 19(2), pp. 130-147.
Trefgarne, G. 2005. *NHS reaches 1.4m employees*. In: ed. The Telegraph. London: pp.
Trist, E.L. 1981. *The Socio-Technical Perspective*. In: A. van de Ven and W. F. Joyce. Perspectives on Organisational Design and Behaviour. Vol. Wiley Interscience, pp.
Trist, E.L. and Bamforth K.W. 1951. *Some Social and Psychological Consequences of the Longwell Method of Coal- getting*. In: D. S. Pugh. Organisational Theory. Vol. London: Penguin Books, pp. 393-416.
Tucker, A. and Edmondson A. 2003. Why Hospitals Don't Learn from Failures: Organisational & Psychological Dynamics that Inhibit Systems Change. *California Management Review* 45(2), pp. 55-71.
Turner, K. and Slack N. 1993. *Hillingdon Hospital*. In: R. Johnson, et al. Cases in Operations Management. Vol. London: Pitman, pp. 263-277.
Ulbo de Sitter, L., et al. 1997. From Complex Organisations with Simple Jobs to Simple Organisations with Complex Jobs. *Human Relations* 50(5), pp. 497-534.
Vest, J. and Gamm L. 2009. A critical review of the research literature on Six Sigma, Lean and StuderGroup's Hardwiring Excellence in the United States: the need to demonstrate and communicate the effectiveness of transformation strategies in healthcare. *Implementation Science* 4(35), pp. 1-9.
Vincent, C., et al. 2004. Systems Approaches to Surgical Quality and Safety From Concept to Measurement. *Annals of Surgery* 239(4), pp. 475-482.
Voss, C., et al. 2002. Case Research in Operations Management. *International Journal of Operations & Production Management* 22(2), pp. 195-219.
Vroom, V.H. and Yetton P.W. 1973. *Leadership and Decision-Making*. Pittsburgh: Pittsburgh Press
Walley, P. 2003a. Designing the accident and emergency system: lessons from manufacturing. *Emergency Medicine Journal* 20, pp. 126-130.
Walley, P. 2003b. *A Report into the Implementation of the Modernisation Agency's "Ideal Design of Emergency Access" (IDEA) Project*. Warwick: Warwick Business School.
Walley, P. and Gowland B. 2004. Completing the circle: from PD to PDSA. *International Journal of Health Care Quality Assurance* 17(6), pp. 349-358.
Walley, P., et al. 2006. *Clinical Systems Improvement in NHS Hospital Trusts and their PCT's - a snap shoot of current practice*. Warwick: NHS Institute for Improvement and Innovation.

Walston, S. and Chadwick C. 2003. Perceptions and Misperceptions of Major Organizational Changes in Hospitals: Do Change Efforts Fail Because of Inconsistent Organizational Perceptions of Restructuring and Reengineering? *International Journal of Public Administration* 26(14), pp. 1581-1605.
Walton, R., et al. 1994. *Strategic Negotiations*. Harvard Business School Press
Wanless, D. 2003. *The Review of Health and Social Care in Wales. The Report of the Project Team advised by Derek Wanless*. Welsh Assembly Government.
Warren, C. 1980. Data presentation and the audience: responses, ethics and effects. *Urban Life* 9(3), pp. 282-308.
Wass, V.J. and Wells P.E. 1994. *Research Methods in Action: An Introduction*. In: V. J. Wass and P. E. Wells. Principles and Practices in Business and Management Research. Vol. 1. Aldershot: Dartmouth Publishing Company, pp. 1-34.
Watson, K., et al. 2007. The evolution of a management philosophy, theory of constraints. *Journal of Operation Management* 25(2), pp. 387-402.
Weber, M. 1924. *Legitimate Authority and Bureaucracy*. In: D. S. Pugh. Organisational Theory. Vol. London: Penguin Books, pp. 3-15.
Weick, K. and Sutcliffe K. 2003. Hospitals as Cultures of Entrapment. *California Man. Review* 45(2), pp. 273-284.
Weick, K.E. 1995. *Sensemaking in Organizations*. Thousand Oaks, California: Sage
Welsh Assembly Government 2006a. *Making the Connections - Delivering Beyond Boundaries. Transforming Public Services in Wales*. Cardiff: Welsh Assembly Government.
Welsh Assembly Government. 2006b. *NHS Wales* [Online]. Cardiff: Health of Wales Information Service. Available at: www.wales.nhs.uk [Accessed: 15th May 2006].
Werner, R., et al. 2007. Does Hospital Performance on Process Measures Directly Measure High Quality Care or Is It a Market of Unmeasured Care. *Health Service Research*, pp. 1-14.
Wilkinson, d. and Pedler M. 1996. Whole systems development in public service. *Journal of Management Development* 15(2), pp. 38-53.
Williamson, O.E. 1986. *Economic Organisation*. New York: New York University Press
Wistow, G. 2001. Modernisation, the NHS plan and healthy communities. *Journal of Management in Medicine* 15(5), pp. 334-351.
Womack, J.P. and Jones D.T. 1996. *Lean Thinking*. London: Simon and Schuster
Womack, J.P., et al. 1990. *The Machine That Changed the World*. New York: Rawson Associates
Wright, J. and Kings R. 2006. *We All Fall Down: Goldratt's Theory of Constraints for Healthcare Systems*. Great Barrington, Mass: North River Press
Yates, J. 1987. *Why are we waiting?* Oxford: Oxford University Press
Yin, R. 1994. *Case Study Research: Design and Methods*. 2nd London: Sage
Young, T., et al. 2004. Using Industrial Processes to Improve Patient Care. *BMJ* 328, pp. 162-164.
Young, T. and McClean S. 2008. A critical look at Lean Thinking in healthcare. *Qual Saf Health Care 2008* 17(5), pp. 382-386.

APPENDIX 1 GLOSSARY OF TERMS

Activity – this is the term used in healthcare to describe the number of patients which are present within the hospital system at a point in time (normally at midnight). This can be either presented as an absolute number or an average. It is unusual to have activity numbers described as a range. In the absence of cycle times (LOS against groupings of patient either by condition or seriousness of condition) historical 'activity' is used to determine capacity required i.e. for x level of activity y level of beds are required.

Backlog - is the work which is waiting to be fulfilled. Backlog of work is, in effect, the volume of demand not satisfied by the current organisational design. It can be the work itself or relate to some part of the task.

Business Process Re-engineering/Management - Radical redesign or rationalising of processes to eliminate unnecessary practice and procedure (rather than the more gradual process of continuous improvement (Hammer and Champy, 1993)

Clinical Coding – the coding which is undertaken regarding an episode of care taken from the patient notes for that episode and used primarily to claim appropriate financial compensation for the work carried out. This data also feeds into operational data systems to provide information on what wards, clinics etc. were attended, start finish dates, etc.

Capacity - is the ability (how many hours worth) to perform a task (Shingo 1988 p.336)

Continuous Flow – focus on product and/or service to make the actions that matter to the customer continuous.

Cycle Time - is the normal time to complete a task without delays. (If cycle time for every operation in a complete process can be reduced to equal (takt time), products can be made in single-piece flow (Womack and Jones, 1996)).

Delay - is a state in which time passes without the performance of processing, inspection or transportation. Shingo (1988) indicated there are several types of delays – delays associated with materials not being available in the right place at the right time in the right quantity and quality, delays between tasks in an organisation (e.g. when a task is held waiting for a the complete batch to be completed, any time of imbalance, etc) and between the organisations and the customer (i.e. the delay waiting to be admitted as an inpatient for a planned procedure).

Demand – the demand by final clinical classification that actually flowed through the system for treatment and discharge.

> Real Demand – the demand on services known or unknown (latent). Real demand is noted to reflect the perception of clinicians that reducing waits will increase the demand on services. Real demand for the purposes of this thesis is not calculated and outside of the scope of study but is recognised as this may have an impact on the service design.

Presenting Demand – the classification of a potential condition given to a patient when first entering the system. The classification of the condition may change as a consequence of further investigation and on final clinical coding.

Empowerment – Passing considerable responsibility for operations management to individuals and teams (rather than keeping all decision making at the managerial level) (Senge 1990).

Effectiveness - is 'delivery of appropriate healthcare - to recognise that fair access must be to care that is effective, appropriate and timely and complies with agreed standards.' This is listed as:

- fair access to healthcare;
- effective delivery of appropriate healthcare;
- efficiency;
- the patient/carer experience in the NHS;
- health outcomes of NHS healthcare' (NHS Executive 1998).

Episode of Care (EOC) – the treatments received over time to enable safe discharge from the SCO.

Just in Time (JIT) – Making products in direct response to internal or external customer demands (rather than building in advance to maintain stick levels) (Womack et al. 1990)

Failure demand – '*demand caused by a failure to do something or do something right for the customer*' (Seddon 2005 p.26), to which I would add – first time.

Flow performance – reduced waits for patients during an 'episode of care'.

Heijunka – the classic scheduling approach in LT with the objective of simultaneously levelling a schedule of work and making the schedule visual to those tasked to deliver the work, so that early problems are highlighted (Bicheno and Howleg, 2009).

Kanban – Is the class visual signalling device for production 'pull' systems. It is considered an effective way of reducing waste, unevenness and overload in production (Bicheno and Howleg 2009).

Lead time - is the sum of the task cycle time plus the sum of the process delays (simply put the difference between the time in and out of the system)

Load - is the amount of (how many hours worth) of a task (Shingo 1988 p.336).

Material Requirements Planning (MRP) – a computerised system used to determine the quantity and timing requirements for materials used in a production operation (Womack and Jones 1996).

Nested – '*where one process or sub-system is directly related to other process or sub-system within a centralised organisational structure*' (Massoud et al. 2006).

Nested case study - the functions and methods needed to produce a service or clinical/directly patient supporting process for an EOC (process or sub-systems level)

Productivity (individual) - is the reduction in input (cost) per inpatient episode of care (Soderlund et al. 1997) or increase of throughput (numbers of EOC) without a comparative increase in resources used by the system (whole system).

Spread – referring to the second generation activity for improvement, which assumes knowledge transfer and motivation for action (double loop learning – Argyris 1991).

Sustainability (of improvement) – the maintenance of performance resulting from an improvement and potential enactment of further improvement (Bateman and David 2002) note there are different levels of sustainability. In their model Class A, sustainability includes spread.

Task - is the discrete step which needs to be performed often in conjunction with other tasks to complete treatment during an episode of care

Throughput – is the volume of work which is completed through the available capacity. Throughput is in OM often assumed to be dependent on physical work (which is the case if throughput relates to sign point of work) but when throughput is considered as the cumulative volume across a number of operational points of work then it acquires a dependency on information flow.

Total Quality Management (TQM) – Seeking continuous change to improve quality. Making all staff responsible for the quality of their work (Dale 1999).

Waiting Line – is the physical waiting which is experienced to achieve the outcome of the service

Waiting List – where queuing is not undertaken in person and hence 'the utility derived from the consumption of the good [or service] declines the longer individuals have to wait for the good [or service]' (Martin and Smith 1999).

APPENDIX 2 LITERATURE SEARCH

Introduction

The literature for this thesis has been necessarily interdisciplinary. Searches have been drawn from the social science and those for the NHS. Medical literature has also been assessed within the context of the research questions.

2.1 Electronic Databases

The following databases were assessed for relevance and were selected for use in this research in addition to the Cardiff University online databases, which include but not limited to a large number of business management and medical academic peer reviewed journals, magazines, and trade publications.

DATABASE	Coverage of Literature	Types of literature available
Web of Knowledge/Web of Science	*Web of Science* is a collection of three citation index databases available via the Web of Knowledge portal. The Social Science and Science citation indexes cover journal articles published since 1970 and the Arts & Humanities Index dates back to 1975.	Full Text articles Academic and Trade Abstracts Conference proceedings Editorials
Science Direct	2500 journals and more than 9 million full text articles since 1994 are available for review. Including Social Science Literature and Healthcare Literature.	Journals Books
ABI Inform/Proquest	Contains information from over 2830 journals - business management and trade journals and other publications since 1971	Citations Abstracts Full Text articles Academic and Trade

Source: Author

SEARCH ENGINE	Coverage	Types of Literature Available
Google Scholar	Searches for scholarly literature across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites. A combined ranking algorithm is used to assess the full text of each article, the author, the publication in which the article appears, and how often the piece has been cited in other scholarly literature. The weakness of this search engine is the not comprehensive in its ability to show all linked citations of work. Not all journals are included in the database, and it is not clear exactly which ones are and which ones are not, or if there are any time limitations.	Citations Abstracts Full Text articles and Patients

Source: Author

2.2. Key words Used in this research

Search Key Words

Health and Health Care and Healthcare with:
OM
Lean
Lean Thinking
Toyota Production System/TPS
Clinical Systems Improvement
JIT

Hospital with:
OM
Lean
Lean Thinking
Toyota Production System/TPS
Clinical Systems Improvement
JIT

Specific Journals Searched
Journal of Operations Management
International Journal of Operations and Production Management
British Medical Journal
Milbank Quarterly.

A snowball strategy was also employed to gain breadth and increase the quantity of articles. This was necessary due to the interdisciplinary nature of the research.

APPENDIX 3 PASMORE'S (1988) PROPOSITIONS FOR EFFECTIVE ORGANISATIONAL DESIGN FROM THE STS PROSPECTIVE

While the following table shows columns of propositions regarding the aspect of organisational design contained in the heading (as determined by Passmore, 1988). It should be noted that there is no relationship implied across row i.e. no link intended between propositions displayed horizontally.

Relationship with the environment	Relationship with the Social System	Relationship with the Technical System
The higher the level of environmental provocation, the more likely it is that organisational adaption will occur	INDIVIDUAL The more the design of the organisation permits the satisfaction of unfulfilled needs through work, the higher the level of motivation of the worker	The job design will be more stimulating when the technology: (1) demands a variety of skills on the part of employees; (2) demands higher levels of skills which require time to learn and master; (3) requires higher levels of interaction among employees; (4) involves greater variability in inputs, conversion processes, and outputs (5)is a subject to continuous change or modification; (6)is designed to provide more direct and immediate feedback (7) allows greater flexibility in geographical movements and work patterns; and (8) leaves a significant degree of relevant decision making to employees.
The more complex the environment, the more likely it is that a design will fail to satisfy certain important environmental demands	Needs are neither static nor entirely understood. Therefore the more flexible the organisational design is, the more likely it is that continuous motivation can be achieved	To the extent that the technical system creates barriers to cooperation either among peer groups or between supervisors and subordinates, supervisors will be forced to utilise more coercive or political styles to extract required behaviours from others.
The more turbulent the environment, the more flexibility should be valued over optimisation as a design objective	Needs are socially determined. Therefore organisations which both create needs and satisfy them will be more successful than organisations which act only in response to stated needs	The ability to produce goods or provide services in a profitable fashion and in a way that responds to the demands of the external environment over time is in part a function of choices made about technology. Technological arrangements which minimise barriers t problem solving and maximise both cooperation and flexibility are more likely to result in organisational effectiveness over the long run.
The more the environment is viewed as a source of provocation, the more adaption will focus on solving immediate problems versus innovations in organisational design	To the extent that organisations are designed to meet lower-level needs exclusively, high performance is unlikely to occur	

Relationship with the environment	Relationship with the Social System	Relationship with the Technical System
Organisations which view the environment as a source of inspiration are more likely to change through innovation in design rather than short-run problem solving	The greater the involvement of employees in the design of process, the clearer the understanding of behaviours are linked to desired rewards	
The more turbulent the environment, the more important it is for innovative adaptations to transform the environment as well as the organisation	Designs created without the direct input of organisational members are unlikely to take into account the influence of unique population characteristics on reactions to design features	
To effect change in the environment, action taken by an organisation must be at least as powerful as the forces that originally created the environment	The greater the disparity between design features and the unique characteristics of organisational members, the less successful the design will be.	
In order to adapt to environmental demands, organisations must first be able to determine that demand exists and distinguish what requires response and what does not.	GROUP To the extent that the design of an organisation is consistent with naturally occurring group processes, performance will increase	
Response to environmental demands can take one of two forms: (a) reacting to the demands as they are presented; or (b) transforming the environment so as to eliminate or alter the demands.	The success of group-based designs for work varies directly with the amount of attention given to making group process effective	
Response to change in the environment requires resources proportionate to the changes	The effectiveness of groups in socio-technical systems is related directly to (1) the extent to which group members are technically proficient and, therefore, able to engage in technical problem solving; (2) the extent to which organisational reward systems promote cooperative behaviour in the group, (3) the extent to which the group is provided with the training, support and resources required to accomplish its purposes; (4) the extent to which additions and departures to the group are well managed; and (5) the extent to which the group is able to manage its relationships with the environment	

Relationship with the environment	Relationship with the Social System	Relationship with the Technical System
Environmental sensing devices should be at least as sensitive as the context to be understood	The effectiveness of group designs varies directly with the extent to which: (1) the task of the group is stable; and (2) the knowledge differences amongst group members is small	
The more sensitive the environmental detection device the more challenges will be available for response	To the extent that groups tasks are defined to encompass critical interdependencies in the work itself, group cohesiveness and performance will increase	
The greater the influence of tradition on decision making, the greater the expressed need to make 'rational' versus creative decisions.	MACRO LEVEL SOCIAL SYSTEMS DYNAMICS The stronger the culture of the organisation, the more it will constrain design possibilities	
The greater the perceived ability to influence the environment, the more innovative design decisions will be.	The more complex the external environment, the greater the potential for internal cultural diversity	
The more turbulent the environment, the more difficult it is to understand how current trends differ from past experiences.	The greater the cultural diversity within the organisation, the more difficult it will be to achieve consensus on design parameters	
Then more successful the organisation has been the less willing it will be to give up past behaviours	The greater the cultural differences between management and labour, the less receptive employees will be to designs proposed by management	
The success of adaptation to environmental challenges is directly related to the availability of alternatives for action	The better the fit between the organisation's culture and its environment, the more effective the organisation will be	
The more significant the adaption to the environment required, the more difficult it will be to gain acceptance of new behaviours associated with the change	The effectiveness of group and individual activities in an organisation is directly related to the extent to which the structure of the organisation supports the performance of those activities	

Relationship with the environment	Relationship with the Social System	Relationship with the Technical System
The greater level of experimentation in organisation design, the greater the likelihood that learning will occur and lead to more efficient future adaptations to the environment.	No single structural design will remain optimal over time; effectiveness is greater in the long run if a flexible structure is adopted	
The more involvement there is in the scanning process, the more commitment there will be to make changes in the organisation to meet the challenges uncovered.	The most effective structure in a particular organisation is one which fits with the realities of the environment and supports desired socio-technical systems design objectives	
The more energy is put into the scanning process, the more likely it is that attention will shift from exclusively internal to both internal and external opportunities for action.		
The impact of the vision statement varies directly with (1) the extent to which it is data-based and therefore convincing (2) the extent to which it captures important sentiments of those it is intended to effect (3) the extent to which it is viewed as realistically attainable (4) the extent to which it is demonstrated to be of true concern to organisational leaders; and (5) the extent to which it is inspirational versus non descript.		

Source: Pasmore, 1988

APPENDIX 4 EMERGENCE OF NATIONAL STS APPROACHES

Socio-Technical Systems approaches as emerged from different national studies

Country	Approach (van Eijnatten, 1993; Mathews, 1997; Majchrzak and Borys, 2001)	Authors
UK, India, Norway	Tavistock Institute	Trist and Murray (1993)
Australia	Participative Design	Emery (1993)
Scandinavian	Democratic Dialogue	Ulbo de Sitter et al. (1997)
Holland	Integrated Organisational Renewal (IOR)	Ulbo de Sitter et al. (1997)
Swiss	KOMPASS model	Ulich et al. (1990)
	Deliberation Model	Pava (1983)
USA Global (Hewlett Packard)	Bull's Eye Model	Majchrzak and Winby, (2001)
	Job Design Perspective	Davis and Taylor (1972)

Source: Author

APPENDIX 5 OM, DEFINITIONS AND HISTORY

Galloway (1991) defines a traditional view of OM as:

'Those activities concerned with the acquisition of raw materials, their conversion into finished product, and the supply of that finished product to the customer.'

Such a definition includes the artisan, craft based activities which have been a feature of human existence. The modern field of OM study is generally recognised as emerging from the Second World War (Brown et al. 2001, Greasley 2006). This belies the practical surfacing of ideas and knowledge accumulating over time (Sprague, 2007). Historical Figures such as Eli Whitney and Henry Ford were major contributors to the subject alongside Adam Smith, Fredrick Taylor, and the work of the Galbraith's etc, (Pugh and Jackson, 2007) who focused on methods for analysing and improving work within organisations. All these and more, in their way, influenced the emergence of OM (See Table 3.6 for a more comprehensive listing).

Voss (2007) argues that professionalisation typified through guilds of craftsmen lead to a protection of knowledge so texts prior to the industrial revolution are scarce on the range and scale of what we call OM today. Contemporary authors acknowledge that where written works exist it is possible to distil a picture of the linage of OM (Voss, 2007; Sprague, 2007; Womack and Jones, 1996).

Craft production is considered to be an operations model of low numbers of output with high cost per item. The idea of batch manufacturing was intended to reverse the output versus cost logic of craft by producing high volumes at low costs per item. The American System of Manufacturing (ASM) formalised the need to increase output and reduce cost through 'the sequential series of operations carried out on successive special purpose machines that produce interchangeable parts (quoted in Hounshell, 1984)'. Schonberger (1982) notes this type of manufacturing featured predominantly in the USA.

The term 'mass production', originated from Henry Ford's production line. Ford's system was premised on high volumes and lower unit prices, which in turn would make products affordable to the masses (assuming there was a market for such products which was not the case in Europe at that time (Spurge, 2007)). This mass production and batch model of operational design became dominant in the 20th century but has more recently come into disrepute due to the lack of ability to be flexible to the fluctuations in consumers demand changes and delivering poor quality (Womack and Jones 1996, Brown et al. 2001).

Slack et al. (2001) has situated OM within an organisation and primarily (although not exclusively) as management within the operations function of an organisation i.e. hierarchical groups which '... are devoted to the production and delivery of...' products and/or services. OM itself is defined as 'the term that is used for the activities, decisions and responsibilities of operations managers'. Where, operations managers, have the responsibility over resources which are intended to deliver products or services. OM as a function overlaps with research and development and marketing functions, which, Slack,

(2001) contends are the three core functions of an organisation. Other functional groups such as Human Resources, Accounting, Information Technology, Engineering etc. are deemed as supporting.

Unsurprisingly much of the current OM text is situated mainly in the batch and mass production paradigm (Tracy and Knight, 2008). Yet different schemes have emerged and in the last three decades the most dominant has been coined LT (Womack et al. 1990, Womack and Jones 1996, Brown et al. 2001, Howleg 2007). It could be argued that the emergence of this paradigm was already underway, with much of the earlier work positioned under the heading of 'Just in Time' or Japanese Manufacture (Schonberger, 1982; Schonberger, 1986, Shingo, 1988; Schonberger, 2007, Wilson 1998, In Voss, 2007 and Pilkington and Meredith, 2009). Ohno (1988) himself suggested that the founding ideas for this way of working had come from his visit to Ford's Highland Park (the precursor to River Rouge) facility but with adaptation to suit mixed products.

Knod and Schonberger (2001) in the seventh edition of their OM text book define OM as 'the set of activities for creating, implementing and improving processes that transform resource inputs into output goods and services. OM activities may be appropriately applied anywhere in organisations and may target any level of effort from a single step in a job sequence to the entirety of the company.' This move beyond Slack et al. (2003) narrow definition of management in an operations function and acknowledges a number of uses for the term 'operations'.

Knod and Schonberger (2001) definition reflects the idea that goods and services are delivered through horizontal processes rather than functions. Such an assertion means that processes from supplier organisations, not under the organisational 'control' of a buying organisation are also contained within OM. Works such as Porters 'Generic Value Chain' (Porter, 1985), the benchmarking of Toyota (Anderson Consulting, 1993, 1994), etc. all resulted in a realisation that effective OM also needed to be cognisant of both the supply and marketing channels (Christopher, 1997) as well as logistics which deliver products and services. This aligns with the propositions of STS (Passmore, 1988).

In the seventies, while new computer technologies and thinking on strategic alignment were central (Greasley, 2006; Pilkington and Meredith, 2009) a shift to recognising service operations also emerged, although even recently graduate courses in OM have been criticised for being heavily if not entirely focused on manufacturing (Heineke and Davis, 2007). A similar gap in research was recognised at the European OM Association (EUROMA) annual conference in 2003 (Slack, 2003). This reflects a shift in view that consumers buy combinations of services and products rather than products alone. The work of Pilkington and Meredith, 2009, suggests this area of research interest has reached a plateau or even decline for OM whereas manufacturing strategy remains the strongest theme over the 27 years. This decline may be more of a reflection of the numbers in the academic setting interested in production rather that the opportunity and need to provide theoretical models and guidance for service organisations.

What is striking from the literature is the seeming movement by academics, after the second world war, to disaggregate activities into manageable units i.e. OM being responsible for machines, methods and operational design whilst personnel and more recently human resource management seen as something separate (Spurge, 2007). This separation may be useful from an academic analysis and theoretical perspective. However, the practicality of such division is problematic. Hayes (2000) recalls similar discussions and concludes that OM should reflect that which operations managers are concern with 'managing people, flow, systems, communication with other groups, technological change, performance outcomes and improvement activities' not 'building models or optimising points on a semi-convex polyhedron'. Burns (1963; In Pugh, 1990) noted that '...industrialism is the product of two technologies, material and social'. These technologies while not necessarily developing in tandem do work in tandem with one another. This is not always reflected in academic disciplines. Disaggregation occurs (Buchanan and Huczynski 1991). Bendoly et al. (2006) particularly note the weakness of OM research regarding behavioural issues, the lack of which is even more prominent when compared with other management fields, like economics and marketing who extensively study such matters. Socio-technical Theory encompasses the connectedness of the two technologies and hence is pertinent to the questions being researched (Passmore, 1988).

Clarity of theory and concepts, their emergence, practical application and spread is rarely linear or respectful of predetermined boundaries which may occur through the dislocated nature of management research. In OM this has lead to criticism of the lack of theory (Westbrook, 1994), or lack of a unifying theory (Melnyk and Handfield, 1998) blamed on the fields focus on action. An accusation that OM 'borrow' theories from other fields such as management science, organisational behaviour and strategy and marketing.' (Melnyk and Handfield, 1998) implies to do so is a weakness. STS theory, whilst steeped in history, offers an alternative to resource-based theory which has gain more recent prominence in the field of OM (Pilkington and Meredith, 2007) as the means of addressing the separation of people from the systems which deliver services.

The disaggregation discussion and the historical journey of OM, its separation from human resource management, has resulted in separation of analysis. Separation could be seen as a means of synthesis but more often is used to exclude or assume that such factors are not appropriate to this subject area (Bendily, 2009). 'Borrowing' may actually allow the integration of think with that which is already integrated in reality. Pilkington and Meredith (2009) in their analysis of top cited OM publication in the last three decades have identified the 'adoption of accepted theory's from outside OM' as a theme.

APPENDIX 6 DETAILED DATA FOR THE SIX 'IN-DEPTH' CASES

1st level patient contact

Case 7 General Surgery

Management view - general surgery was selected as part of a Government NHS initiative focusing on operating theatre utilisation.

Clinical view – general surgery was selected due to the number of cancelled operations on the day causing significant frustration to surgeons. Change of support through the case with a view of a managerial initiative at conclusion.

Aspect	Description	Comments
Problem	• The total process time for general surgery takes too long and results in queues • There is broad variation in the time taken • Need to do more with the same	
Boundary	Time taken in the management of general surgery from the point where it is decided that surgery is required (scheduled will be at conclusion of outpatients appointment and potentially some testing or unscheduled will be at point transferred to general surgical physician from A&E/EAU) to the discharge of the patient following their procedure	Excludes Day Surgery[98] and Emergency Operating Theatre and Associated Resources.
No of people in team	25	
Staff Involved *'The Team'*	Porter, a pre-assessment nurse, catering, ward nurses at various levels, theatre nurses at various levels, a union representative, IT, pharmacy, occupational therapy, physiotherapy and administration, the Trust chief of staff for surgery, anaesthetists and management.	The workshops were not closed sessions and a number of other managers and professional representatives intermittently joined the group.

[98] Day surgery, in this case, is defined as a separate set of organisational resources which enable patients to undergo surgical interventions that require no overnight stay in an acute hospital and hence fall outside of the sub-system for analysis but could have an impact on that analysis.

Aspect	Description	Comments
Patient wants	• Short waits for treatment & results • Choice of convenient appointment • Know what's wrong • Asked for appropriate information - minimise duplication • Confidentiality • Not to be cancelled • Directions/access to site / dept/ parking • Clean environment • Appropriate information throughout the process • Dignity preserved / privacy • Treated kindly by friendly staff • To be free from pain/Infection • Feel safe / comfortable • Choice of food • Induction to ward routine • Peaceful - at night	Source: Staff member had recent experience as a patient and *the team* members view
Vital Few Actions - Cross-functional Team	• Rota's for Leave for all – coordinating the different groups – surgeon, anaesthetists, nurses, ODP, etc. • One stop clinic – MDT - Pre Assessment (All disciplines) to stop inappropriate admission • Lift – protected access for those in surgery gown (dignity) • CSSD (HSDU) – availability of equipment for surgical procedures (driven through in-balance of hours) • Free up beds to buy time for change 1. Timeliness of TTH's 2. Tests/Pending Investigations - speed up information for decisions 3. CSSD for surgery Quality and Flow • Foundation for System Change 1. Clinical Work Station and Day by the Hour 2. Predicted Length of Stay 3. Understand true Demand (Elective vs. Emergency as it arises)	Top Actions for improvement from team – based on perceptions. Actions based on completion of data collection and reflection of the team.
Project Plan for implementation of short/medium/long	Yes	

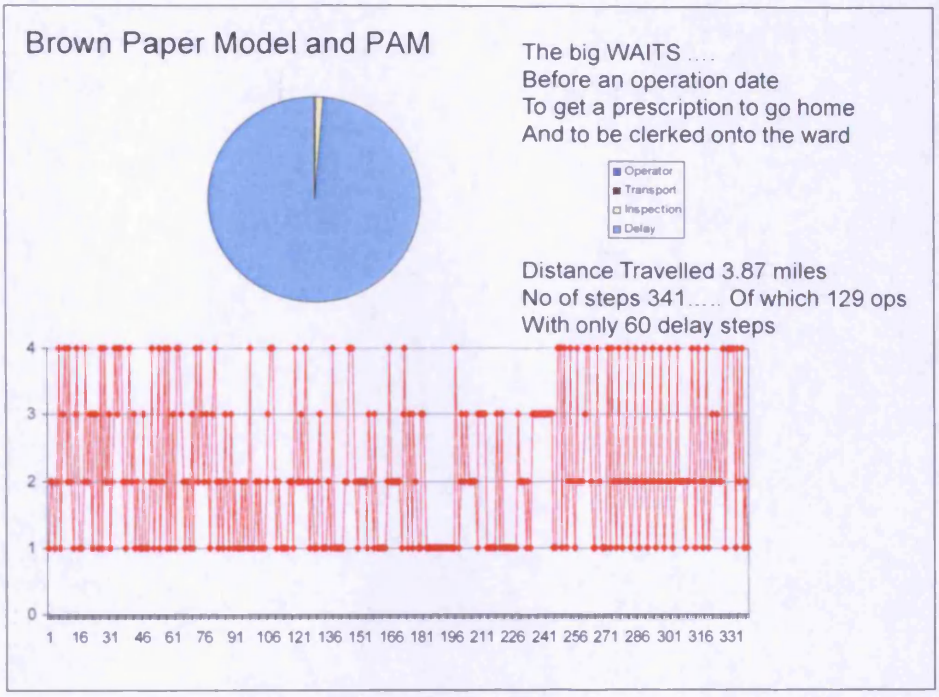
Aspect	Description	Comments
Implementation Issues	Whilst sponsored by a senior clinician, the chief of staff with drew support (he had been on sick leave when the project commenced). The senior manager for general surgery rejected a mandatory approach in favour of cherry picking those aspects which could be achieved without compromising the relationship with the chief of staff. The project manager for the improvement (a nurse) was reliant on personal power rather than positional power to achieve outcomes. Comments from the middle managers group on this case suggested that while a direct implementation had not been achieved the cross-functional team were driving actions forward within their span of control and through stealth.	

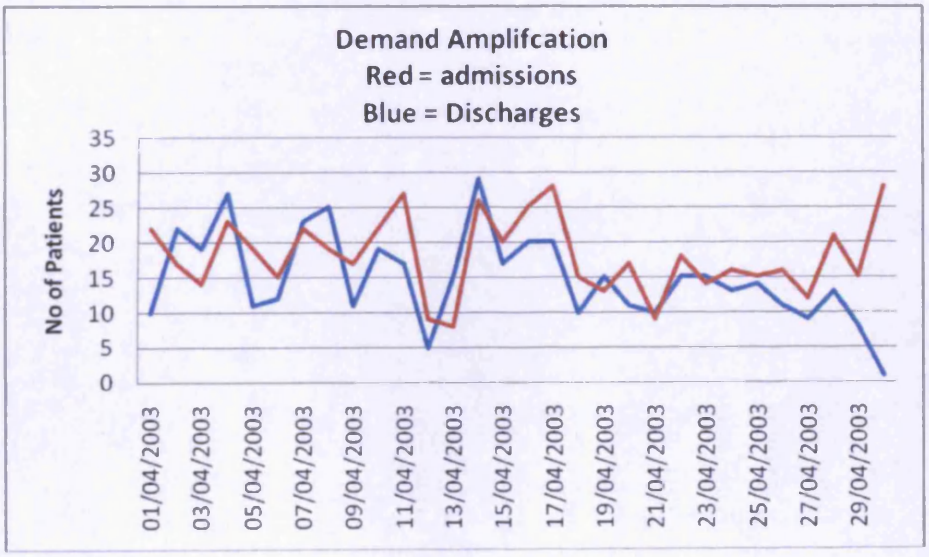
Source: Author

Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)	Hernia	One point in Time	Get team to understand the whole process and use to validate other sources of information.
Data set drawn from PAS	One Hospital, drawing on the data from three theatres and three wards (plus beds from an additional ward) – all of which were 'allocated' general surgery capacity	One Month's Data	Availability of recent data an issue re clinical coding (backdated six months to ensure a complete set). Data required needed significant manual manipulation - Day surgery[99] for the hospital was reviewed in response to the team's recognition of the impact on general surgery but not analysed in detail.

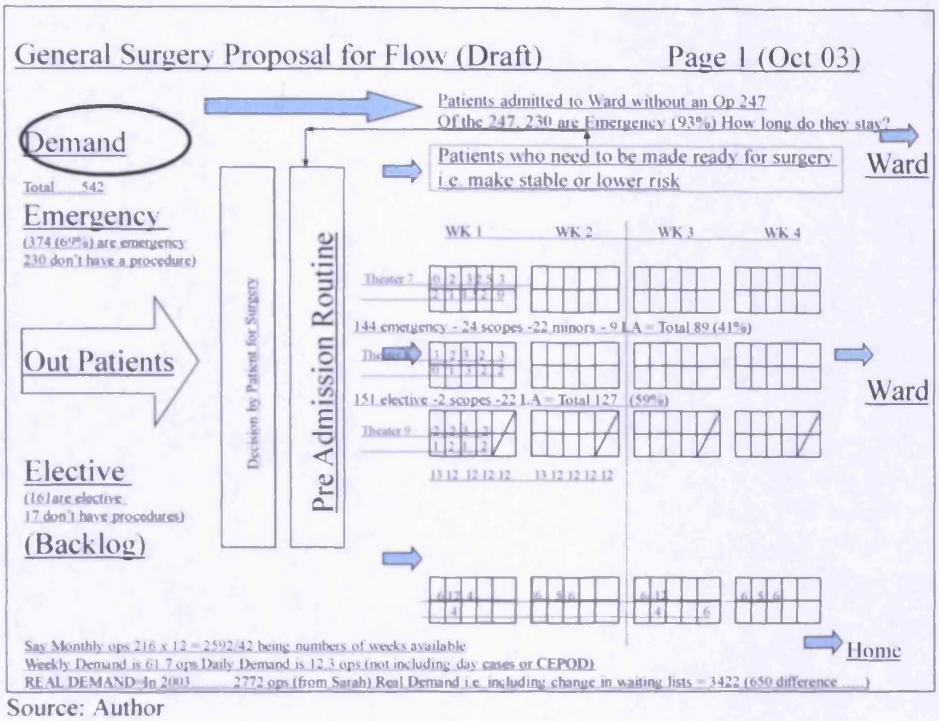
Source: Author

[99] ibid





Source: Author



Source: Author

Case 11: General Medicine

Managerial view - Selected because of the proportion acute demand which is serviced through General Medicine, impact of outliers on surgical performance and issues with geriatrics. Performance was under pressure due to increasing numbers attending A&E, inpatient admissions and DTOC.

Clinical View – interested, supported by SPR but no clinical need identified hence the range of clinicians involved with general medicine not fully engaged (seen as a management initiative for cost reduction).

Aspect	Description	Comments
Problem	• The perception is that the total time for a medical patient journey takes too long • There is a perceived variation in the experience of similar groups of patients by age, by condition, etc. • It is believed the demand on the ward is unpredictable and increasing, resulting in a spread of patients to non medical wards. • There is a need to do more with the same.	

Aspect	Description	Comments
Boundary	Once it is decided to admit a general medical patient to an acute bed to release (discharge) from that bed.	At the outset it was known that the outlying[100] of patients occurred and hence all general medical patients were reviewed for the period and number of internal moves evaluated
Patient wants	• Feel safe • Know what's wrong • Treated kindly by friendly staff • Short waits for treatment & results • No cancellations or trolley waits • Appropriate information throughout the process • Choice of convenient appointment • Private changing & examination facilities • Clean environment • Directions/access to site / dept - ward layout • Confidentiality • Not to catch an infection whilst in hospital • Involvement in treatment • Transport • Confidence in staff • Medication timely & explained • Safe & Timely discharge home	
No of people in team	27	
Staff Involved	SPR, Nursing, Managers, Porters, Ward Clarks, IT, Maintenance, Bed Manager, Community Labs, Med Records	
Vital Few Actions - Cross-functional Team	• Avoidance & Smooth Admissions • Stream Patients to ensure runners turnover rapidly • Review all patients who are readmitted (0-5 LOS admitted within 14 days same condition) for root causes • Estimate LOS for majority of patients	
Project Plan for implementation of short/medium/long	Yes	

[100] Patients who have been allocated to an available bed which is not allocated to a general medical ward are known as 'outliers'.

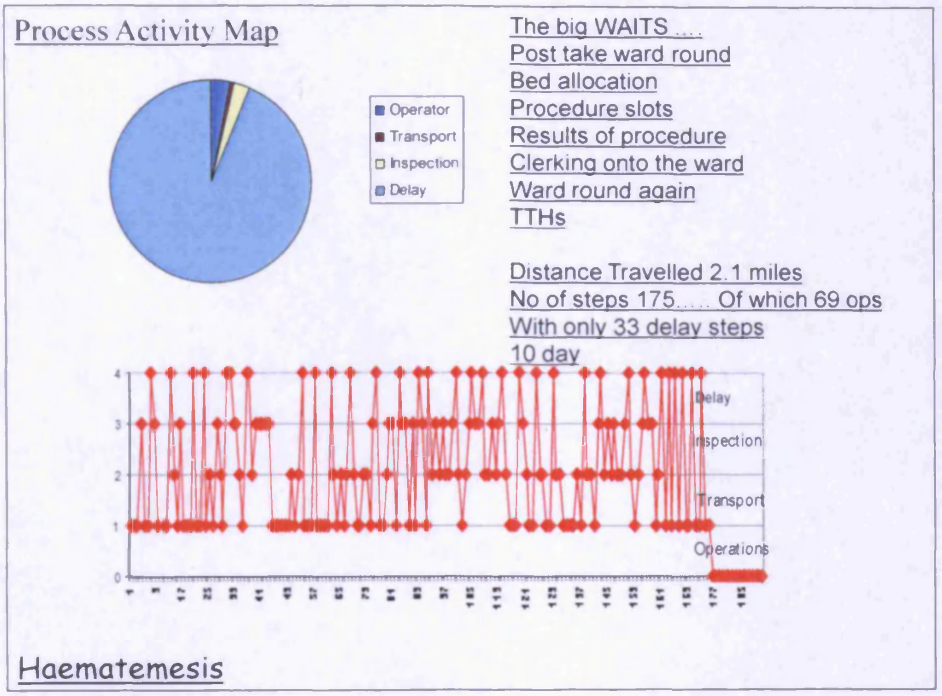
Aspect	Description	Comments
Implementation Issues	Whilst sponsored by a senior directorate manager, due to performance issues, it became clear that the approach to improvement was not understood. The senior director for general medicine rejected a mandatory approach in favour of cherry picking those aspects which could be achieved (potentially following peers lead). The project manager for the improvement was reliant on personal power rather than positional power to achieve outcomes. Comments from the middle managers group on this case suggested that while a direct implementation had not been achieved the enthusiasm of the cross-functional team had achieved significant improvement within ward and across wards helped through movement of managerial staff to other parts of the case process i.e. Ward nurse manager moved to A&E.	

Source: Author

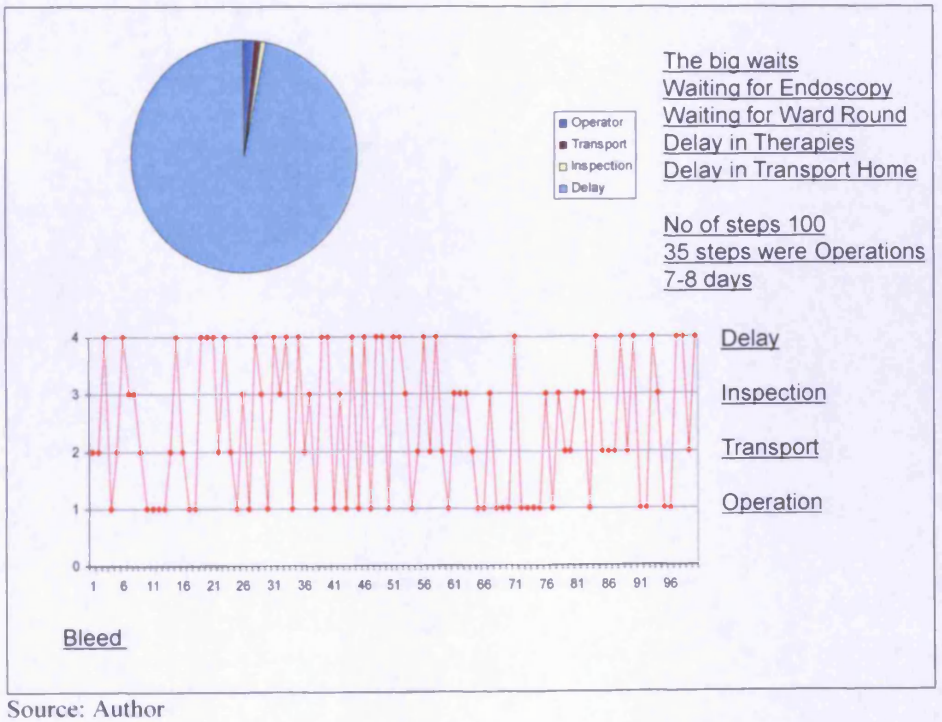
Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)	Two Hospital, drawing on the observations from two wards – tracking presenting conditions of 'a bleed'.	One point in Time	Team Observed the patient trail (Buchanan, 1998)
Data set drawn from PAS	Two Hospitals.	12 Month Data	Availability of data required needed significant manual manipulation - Day surgery[101] for the hospital was reviewed in response to the team's recognition of the impact on general surgery but not analysed in detail.

Source: Author

[101] ibid



Source: Author



Source: Author

2nd level of Patient Contact

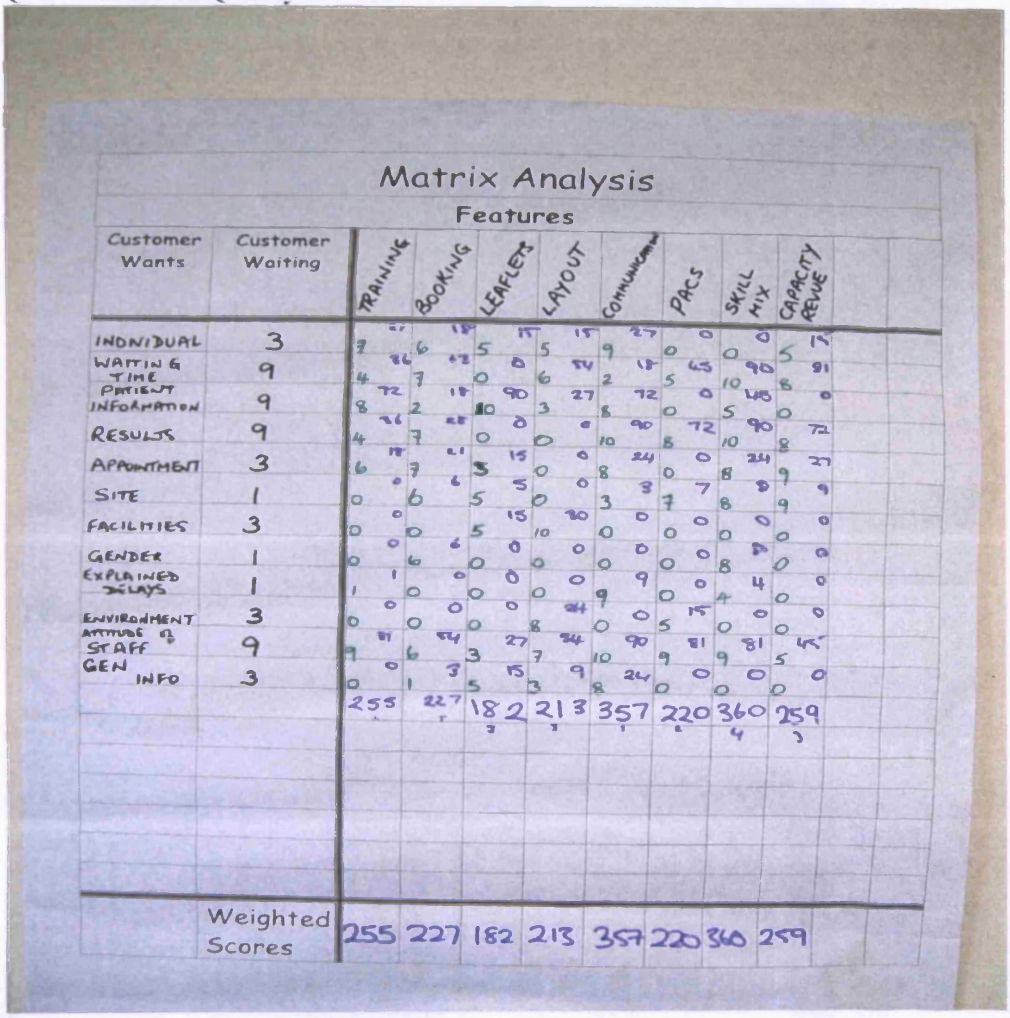
Case 6: Barium Enema

Aspect	Description	Comments
Problem	• Time between decision to screen and results too variable. • Changes in skill mix, with radiographers now undertaking the procedure and Consultant Radiologists retaining reporting responsibility prompts a review of how the service will be provided. • Need to do more with the same.	
Boundary	From medical decision to screen to the provision of barium enema examination report for medical review	
No of people in team	22	
Staff Involved *'The Team'*	Patient and referring Consultants, Consultant Radiologists, Radiographers, Clerical staff, Nurses, HRM, Managers and facilitators	Patient joined the group for part of one day (for input into question - what is value? (contact was without researcher involved).
Patient wants	• Treated kindly by friendly staff • Short waits for treatment & results • Appropriate information throughout the process • Choice of convenient appointment • Private changing facilities • Clean environment • "Know if anything's wrong" • Directions/access to site / dept	
Vital Few Actions - Cross-functional Team	• Appropriate skill mix • Capacity Review • Improved communication • Integrated Booking System	
Big Delays	• Waiting List for appointments for BE • Waiting for 'collection/delivery/admin/vetting and reporting'	
Project Plan for implementation of short/medium/long	Yes	

Aspect	Description	Comments
Implementation Issues	Reflections • Difficult to book large rooms • Chief of Staff busy diary • Not all staff on email • Involving patients - expenses etc • Enough people involved so that non attendances not critical • Plan dates ahead • Consultant doesn't understand why we are doing this • Staff realised how different processes were used across sites • How long it takes to book a patient • Differences in number of people involved in process • Individuals challenging why things are done • Self sealing envelopes vs. sellotape • Sharing good practice • Identified the delays lie with the process before the patient visits the department. • Took longer than expected to clarify the proposal • No such thing as a 3.5 hour session • Need for standardisation Implementation included the removal of doctors from the process (checking just in case with no evidence of need) – thus capacity increased for inpatient services (this was not a controlled transition i.e. clinicians withdrew immediately) but the team were able to quickly adjust practices to compensated (the solutions were owned by the team). The sponsoring manager was very supportive and initiated a formalised change in roles and responsibilities through HRM to reflect the new organisational design. The project manager implemented all the actions and also recognised the teams efforts through the submission of the change to a national patient improvement competition which the team won. While this project was a great success spread to other areas was slow.	
Backlog	YES	

Source: Author

QFD - House of Quality Exercise



Matrix Analysis

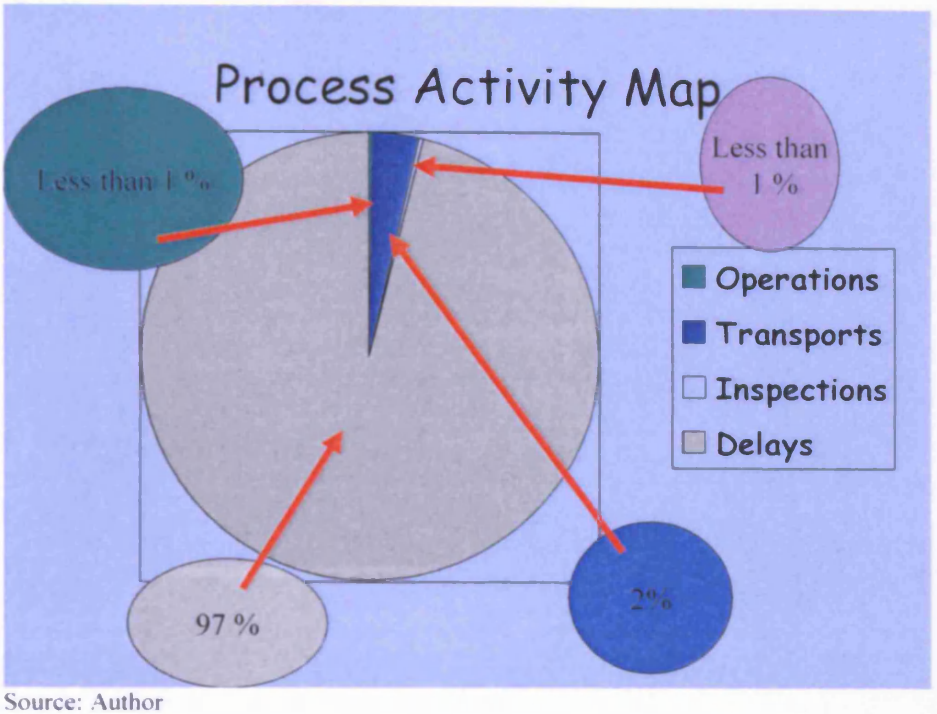
Features

Customer Wants	Customer Waiting	TRAINING	BOOKING	LEAFLETS	LAYOUT	COMMUNICATION	PACS	SKILL MIX	CAPACITY REVIEW
INDIVIDUAL	3								
WAITING TIME	9								
PATIENT INFORMATION	9								
RESULTS	9								
APPOINTMENT	3								
SITE	1								
FACILITIES	3								
GENDER	1								
EXPLAINED DELAYS	1								
ENVIRONMENT	3								
ATTITUDE OF STAFF	9								
GEN INFO	3								
		255	227	182	213	357	220	360	259
	Weighted Scores	255	227	182	213	357	220	360	259

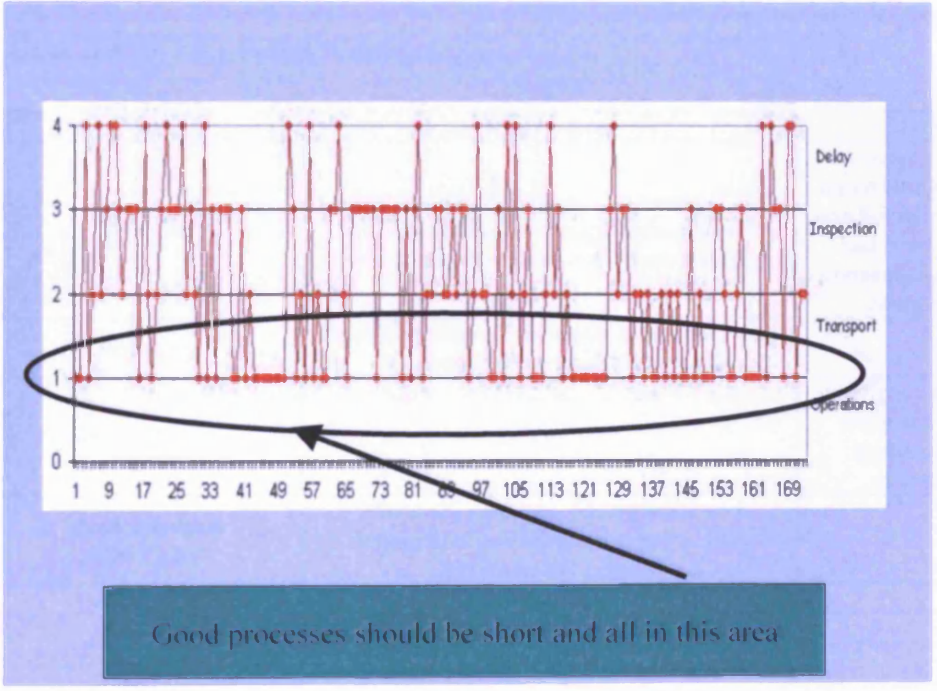
Source: Author

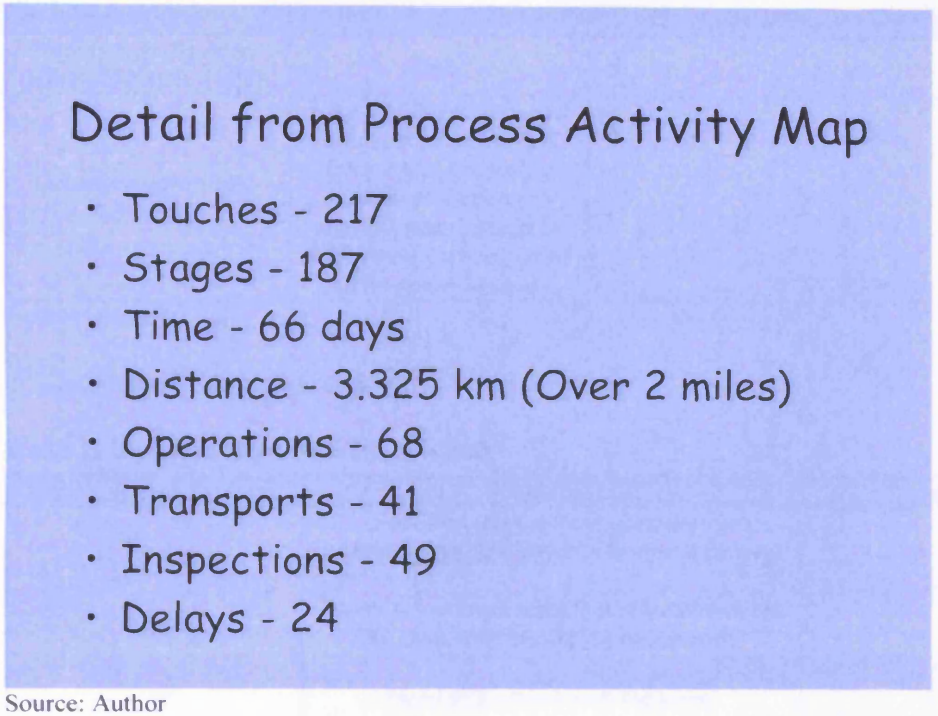
Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)		One point in Time	Team Observed the patient trail (Buchanan, 1998)
Data set drawn from PAS	Five Hospital, drawing on the data from these clinics	One Month Data	Availability of data required needed significant manual manipulation

Source: Author



Source: Author





Source: Author

Case 10: To Take Home Prescriptions

Aspect	Description	Comments
Problem	Linked to Surgery project – to ensure TTO's available in the morning for discharge – exact statement was never concluded	Pharmacy manager did not agree with need as 'robot' was being installed and this had been justified as a consequence of removing delays in service.
Boundary	From initiation of discharge to patient being discharged from an acute setting	
No of people in team	20 invited	Pharmacy staff were very enthusiastic, but were aware of Pharmacy managers views
Staff Involved '*The Team*'	Pharmacy manager, Pharmacists and administration staff in pharmacy, Bed Manager, IT, porters,	
Patient wants	Not defined	
Vital Few Actions - Cross-functional Team	Not defined	
Project Plan for implementation of short/medium/long	N/A	
Implementation Issues	N/A	

Source: Author

Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)	N/A		
Data set drawn from PAS	Note that Pharmacy used a separate data system from PAS. Obtaining data for management analysis was difficult as the system was primarily an inventory system.		

Source: Author

3rd Level of Patient Contact

Case 1: Installation of new PC to desk

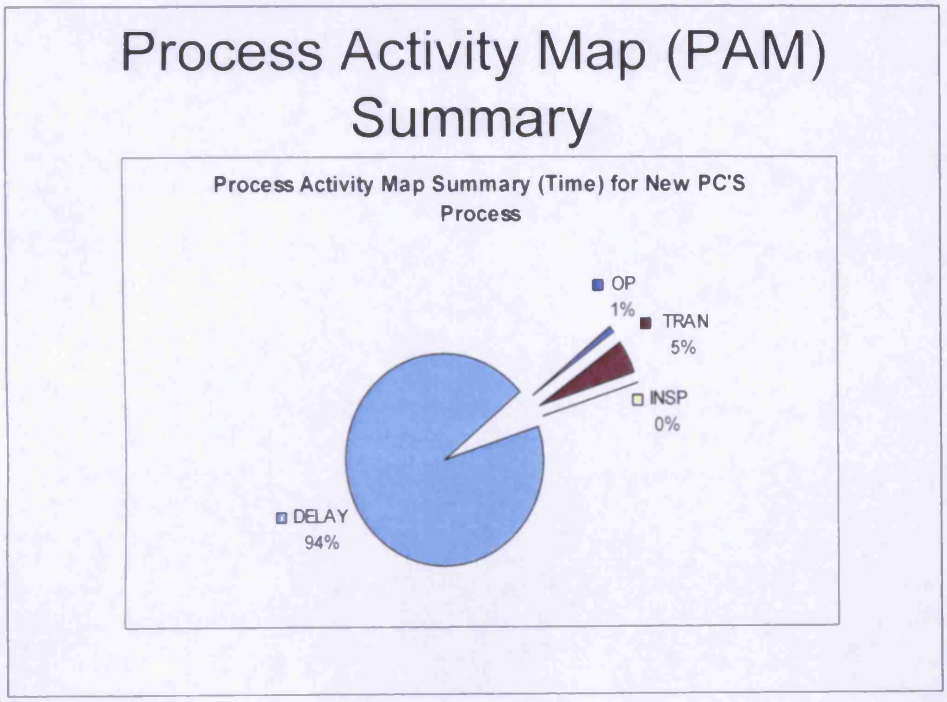
Aspect	Description	Comments
Problem	Speed of service from quotation to installation of desktop PCs is unsatisfactory. There is too much variation in total time for PC quotation through to installation. Need to do more with the same.	
Boundary	From request for quotation for new IT equipment and ancillaries, to installation at customers desk.	
No of people in team	23	
Staff Involved '*The Team*'	IT Manager, Installations engineers, Telephony, Call desk, Procurement, Administration, Customers Groups, Estates Project, Performance Improvement Manager, Quality Assurance	Customer groups were involved in the initial and concluding meetings and were interviewed by the team.
Patient wants	• Call wait time – short • Departmental visit customer to get complete correct data • Engineer installs PC • Engineer provides basic training • Online standard price list with options (questionnaire) • Quotations electronically • Online tracking of order • Pre arranged Delivery Slot • Engineer discusses bespoke training needs • Follow Up Call	
Vital Few Actions - Cross-functional Team	Agreed Installation and Delivery Time-scales for New PC's Cross-functional Management (Process management not functional management) Customer board/forum - monitor (& encourage transfer of skills across GCS?)	Last item insisted upon by middle manager

Aspect	Description	Comments
Project Plan for implementation of short/medium/long	See Brown Paper output	Prince 2 was used for the full Project Plan
Implementation Issues	• Scepticism about time for Implementation • Not "just a talking shop" • Question was asked 'Why have other Initiatives failed?'. As other initiatives have not so wanted to ensure there was action to complete & sustain • Earlier Appointment of a Project Manager • Earlier Allocation of Dedicated Resources to the Project • Earlier Creation of a Communication Plan • Maintain Customer Involvement throughout the Project • Long Pilot Phase to Reduce the Risk of Process Failure • Cross-functionality to Reduce the Risk of Process Failure • Staff Absence Does Not Delay the Process • Cross-functional Management (Process management not functional management) • Lean Techniques Must Become Part of Day to Day Operational Activities and Not Seen as Just Another Project • Actions Speak Louder than Words • Lean is About People	
Future Actions to sustain and spread	• Maintain continuous improvement • Investigate The Financial Process • Create A Customer Forum • The Provision Of A Network Point • Further Investigation Of The Supply Chain • Order Tracking Online • Lean the Remainder of the Trust IT Department Services	
Feedback	"I have just been through a process with our customers which demonstrates that 96% of the things we do, don't add value to the customer" PC Support	

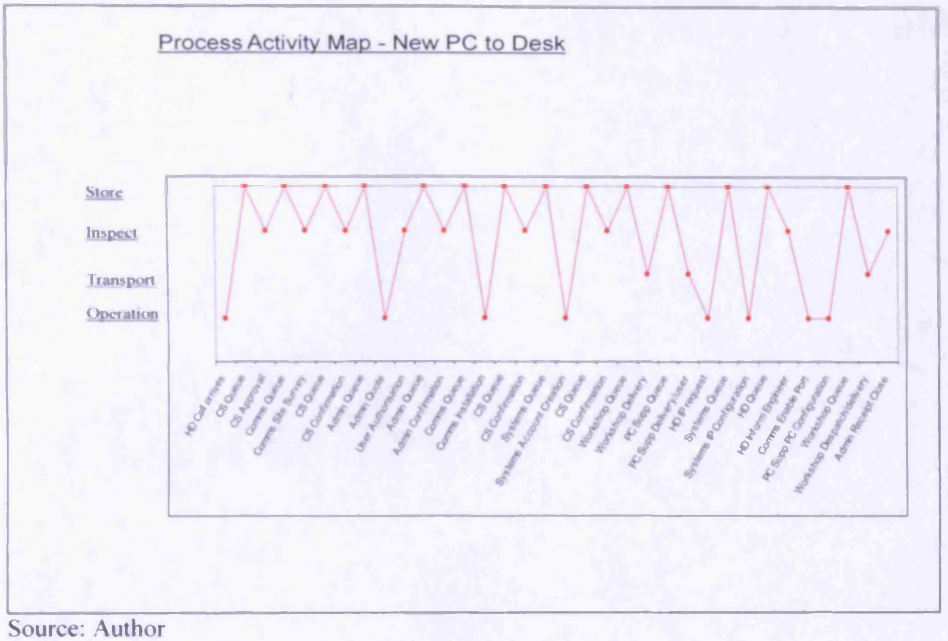
Source: Author

Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)	All Sites	One point in Time	Team Observed the patient trail (Buchanan, 1998)
Data set drawn from IT stand alone systems. Demand, work tracking and completion via a call centre package, procurement through an inventory based package.	All sites	One Month Data	Availability of data required needed significant manual manipulation

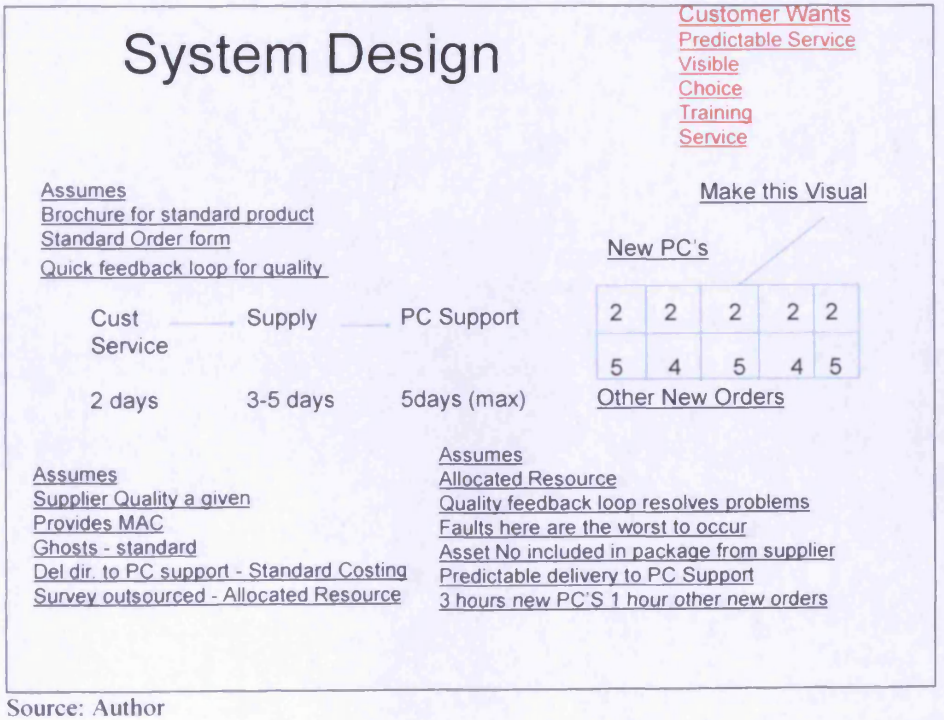
Source: Author



Source: Author

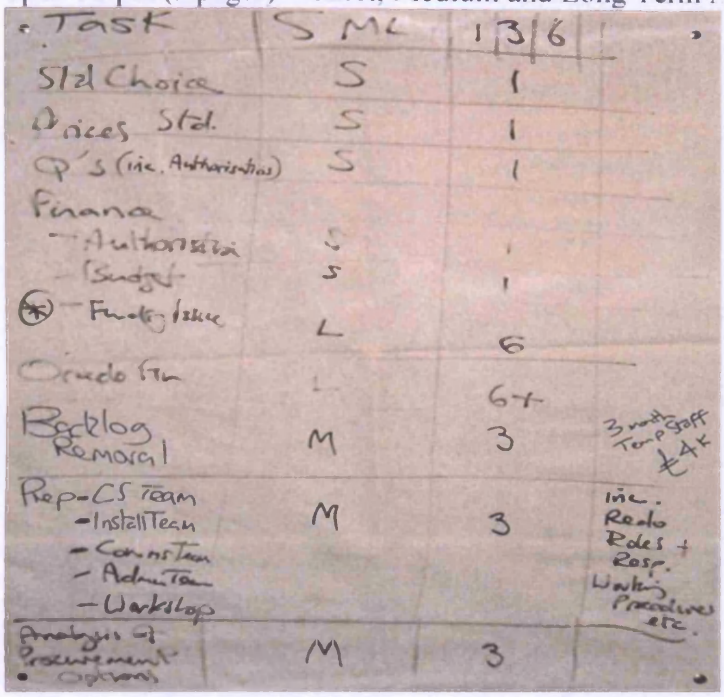


Source: Author

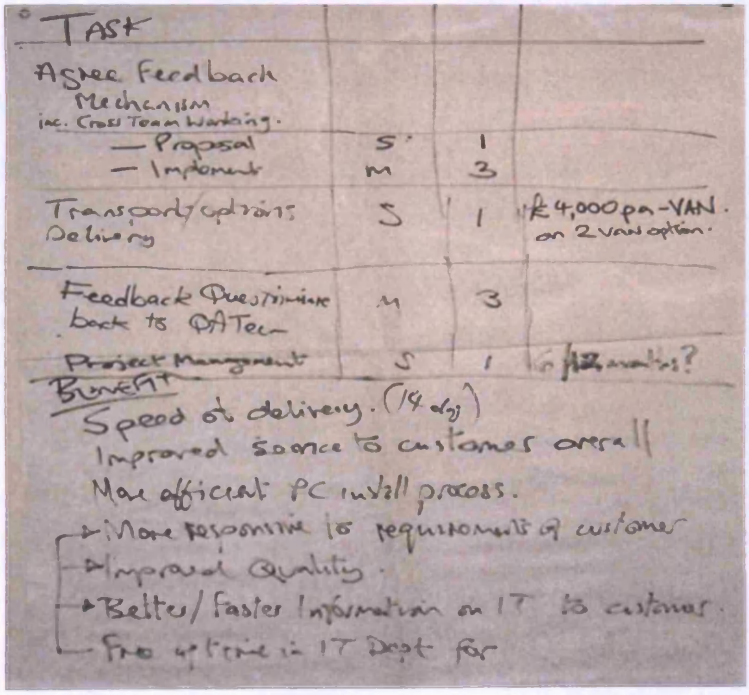


Source: Author

Brown Paper Output (3 pages) – Short, Medium and Long Term Actions



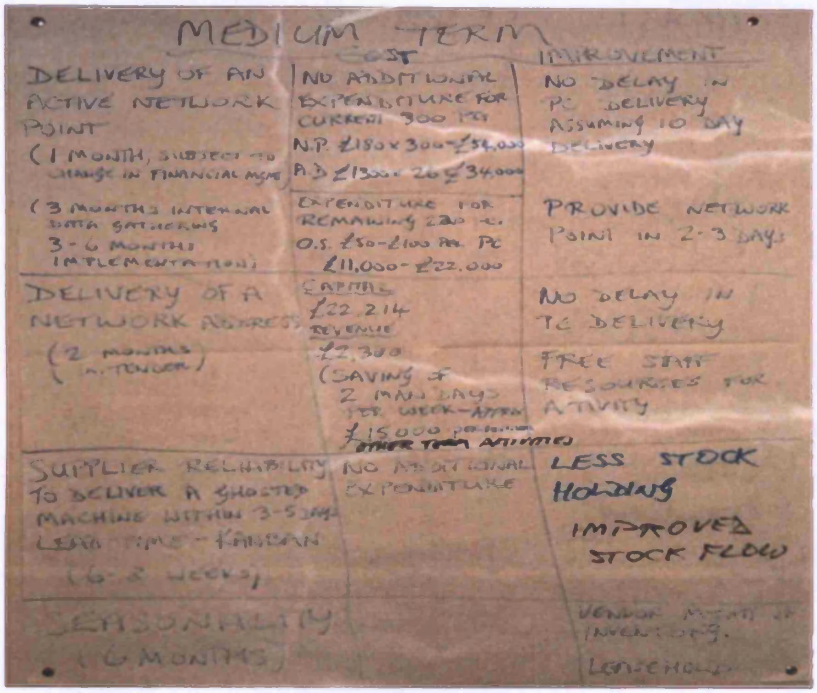
Task	S M L	1 3 6	
Std Choice	S	1	
Prices Std.	S	1	
QP's (inc. Authorisation)	S	1	
Financ			
- Authorisation	S	1	
- Budget	S	1	
(*) - Freeze/Issue	L	6	
Order Fm	L	6+	
Backlog Removal	M	3	3 work Temp Staff £4k
Rep-CS Team - Install Team - Comms Team - Admin Team - Workshop	M	3	inc. Redo Roles + Resp. Work Procedures etc.
Analysis of Procurement Options	M	3	



Task			
Agree Feedback Mechanism inc. Cross Team Working.			
— Proposal	S	1	
— Implement	M	3	
Transport/options Delivery	S	1	£4,000 pa - VAN. or 2 van option.
Feedback Questionnaire back to QA Team	M	3	
Project Management	S	1	6 [illegible] months?

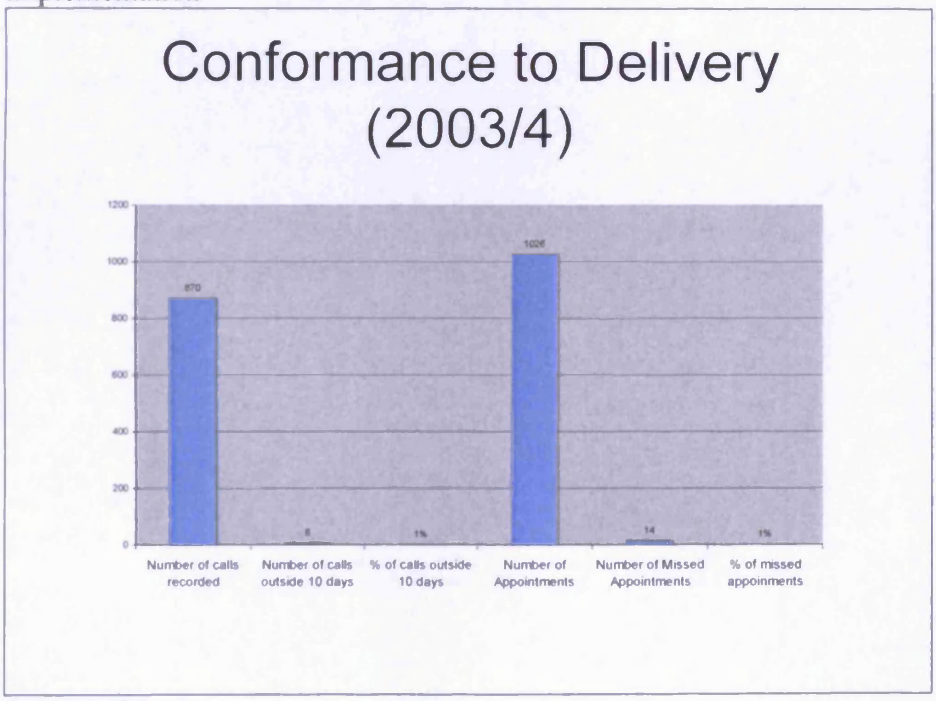
Benefit

- Speed of delivery. (14 days)
- Improved service to customer overall
- More efficient PC install process.
- More responsive to requirements of customer
- Improved Quality.
- Better/Faster Information on IT to customer.
- Free up time in IT Dept for



Source: Author

Performance of IT PC and Ancillary Equipment for a 12 month period following initial implementation



Source Author

Case 2: Nurse Recruitment

Aspect	Description	Comments
Problem	• The total time for the recruitment takes too long • There is broad variation in the time taken to complete the recruitment cycle • Applicants and Managers detect variation in the quality and consistency of the experience • Need to do more with the same.	
Boundary	From the point a	
No of people in team	19	
Staff Involved *'The Team'*	All recruitment staff including admin. from two acute sites (with the exception of one person in each to man the phones). IT. HRM	Patient contact was without researcher involved.
Customer wants	• Accurate advert always including closing date: in some posts interview date • Appropriate info provided • Job & Person specification • Job Pack - maps. local info car parking etc. • Interview Date - Manager needs to know when advert is published • Communications with candidates need to be clear. After interview candidates must be told when decision will be made. Contact details • Clearly defined process with clear responsibilities / roles • Agreed standards of service • Easy access to help (for applicants & managers) • Simple streamlined service with less 'red tape' • Shortlist packs. Invitation to interviews. • Prepare interview packs for manager (& collect afterwards) • Good Image of Trust • Right people for job for Trust • Accurate Information - Advertising Agencies • Staff Development opportunities • Accurate timely info/comms for occupational health • Staff provision/available for care for patients • Know of vacancies - staff. population of nurses and colleges	

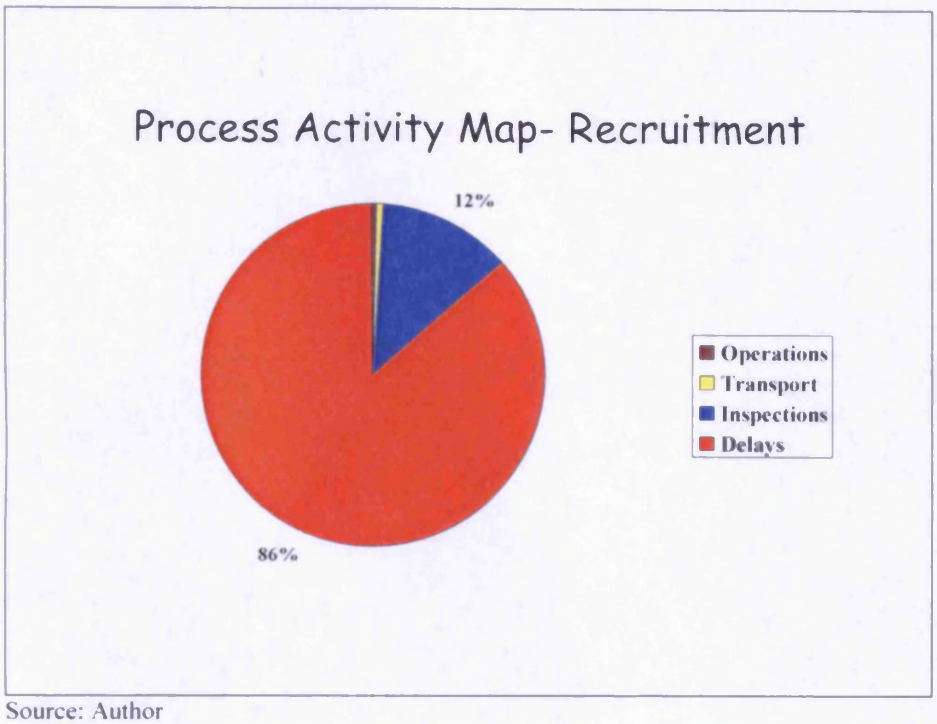
Aspect	Description	Comments
	• Advert includes interview date - speed process. • References. establish a standard agreed timescale • Quality paperwork. marketing & promotional 'stuff'. Producing professional documentation from scribble • Advice on process • Accurate Information – Workforce planning. • Internal bulletins • Staff checks for qualifications/registration & CRB • Recruit 100% of 'Local students'. • Happy staff/managers • Expenses - guidelines need developing • Occ Health - Improve process look at introducing with appointment letter. • Get best candidate & jobs filled every time. All post filled promptly with best candidates • Information for Government and Trust Board • Adequate numbers of appropriate staff. well motivated & dedicated • No Agency expenditure. No long standing vacancies • Low Turnover • "Easy. seamless route to employment", Single gateway • Easy access to senior nurses/ward managers. • 'Court staff to work for Trust' from local colleges.	
Vital Few Actions - Cross-functional Team	• Managers taking responsibility for accurate information 'up front'. • Provide training for all involved. Guide as per sickness absence guidelines. • Appropriate structures in recruitment to provide continuity. • Pick & mix appropriate literature (maps. directions Trust services etc) • Pick & mix framework for adverts ,job specs & job descriptions.	
Project Plan for implementation of short/medium/long	Yes	

Aspect	Description	Comments
Implementation Issues	Manager of the teams very supportive as inherited a dysfunctional team and used the process to team build. Described the process as:- • 2 Un-unified Teams • Poor Communication Between Teams • Low Moral • Extremely Busy/Chaotic • Very Poor Image Amongst customers • Little Organisation Confidence/Faith • Tense Working Relationships • Many, Many Complaints – Often Undeserved • Compliments - What Were These? • Very Hard Working, Very Committed. Had impact on service performance (time) quickly. Only impacted on the scope which was managed by the project manager (span of control). Spread was constrained.	
Feedback	'I am in the envious position of having no vacancies and being slightly over establishment - THANKS TO ALL YOUR TEAM AND THEIR EFFORTS' (Clinical Nurse Manager, July 2003)	

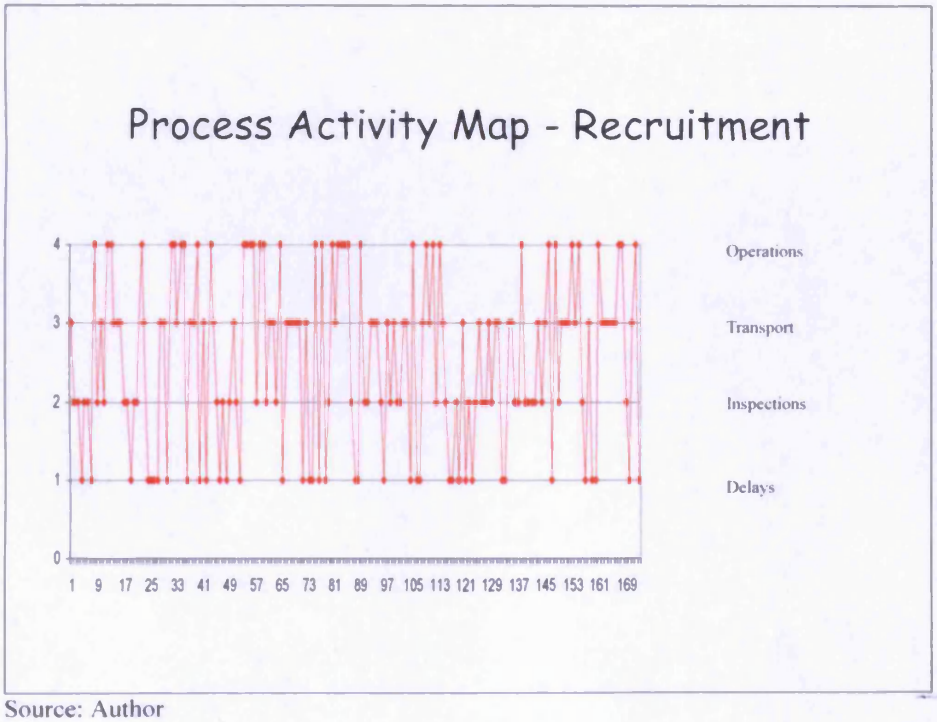
Source: Author

Data Source	Focus	Time	Rational
Process Activity Map (Hines and Rich, 1997)	Two acute sites	One point in Time	Team Observed the patient trail (Buchanan, 1998)
Local EXEL Data File	All sites input (starters) - output (leavers)	One Years Data	Data manually transcribed from

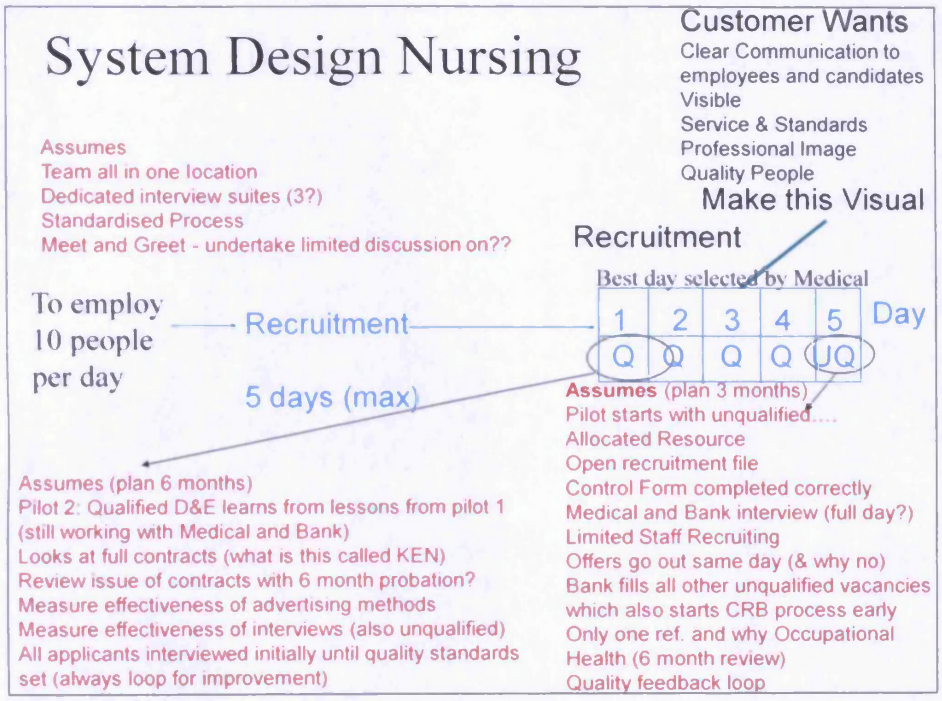
Source Author



Source: Author



Source: Author



Source: Author

Feedback on the change in recruitment process was given as follows

> *'Request from West[102] Ward for G Grade Nurse made on 19/08/03, advertised 26/08/03 and interviewed on 23/09/03 - 5 Weeks'*

> *'Emergency Vacancy for East[103] Ward requested on 28/08/03. Post filled on 09/09/03 from "over recruitment" - No additional Cost or Time'*

[102] Ward name changed to protect anonymity
[103] Ward name changed to protect anonymity

APPENDIX 7 MIDDLE MANAGERS VIEWS OF THE NESTED CASES WITHIN THE WHOLE SYSTEM

Formation of the Middle Management Group (Network)

The executives requested that a middle management group was formed by nomination of the executives to ensure full representation across the organisation. Each area of the organisation nominated a representative with the objective of being trained to facilitate improvement and communicating to the organisation as whole (through the existing structure) the activities. process and issues which emerged through the programme. In turn these individuals will train others. The objective was to build capability within the organisation and speed the process of improvement. The senior team also felt this approach would answer the concern that the approach was not developing the knowledge of the senior team(s) nor engaging senior team(s) in decision making on project benefits.

In 2005 the senior team requested that they be trained in the approaches used as it was becoming clear that the gap in knowledge of their staff and themselves was causing blocks in the process of organisational redesign.

Middle Management (Network)

Initially 18 people were nominated from the organisation by the executive team to represent the middle management of the organisation. This number was increased to 29 over the course of the research to greater reflect the organisations breadth.

The following details the skills and experiences that the middle management group felt they had which would influence their responses (Nov 2002).

Experience	Fresh pair of eyes
Most have changed roles	Some have worked in other Trusts and outside NHS
Team working	Most have experienced services as patients (or relatives of patients)
Financial	Facilitation skills
I.T. Web design	Focus & carers groups
Teaching / Learning	Logical Thinking
Clinical	Illogical Thinking
Business	Computer Literate
Action Research	Process mapping
Workplace Health	Challenge the status quo
Counselling / Bereavement	
Analytical skills	

Source: Author

The middle managers were asked what experiences they had with change in the past

Changes involved	What worked	What Failed
Trust Merger Trust formation Works and Estates Rationalisation Booking Systems Bed amalgamation and splits Innovations in care Skills mix review GP Contracts Nurse bank merger Care into localities ICU bed register Management restructuring Strategy and policy development Service change Clinical governance CHI Statutory policies	Involvement Access to resources Commitment/Ownership Realistic Timescales Appropriate Support Authority to make change Clear understanding Small projects No choice to implement Planned process with measurement Defined parameters/goals	Lack of all of column 2 People move on Priorities change Professional territorialism Lack of trust Not empowered Being exclusive Culture/sise – a constraint Doubts – long term funding Poor communication No measures of success Inadequate planning Resources not identified Managers not supported Can't see change is needed Management think change has happened but it has not reached the bottom Working in Isolation – no communication

Source: Author

Reflection of those who were involved in the first year of case analysis - themes which they raised were:

- Each time came up with something new. e.g. '192' service, training at installation
- Predictability in the process rather than speed etc
- Resulted in each case in both customer & service having a greater understanding of each other's pressures & responsibilities
- Team of cross-functional staff developed an agreement of how each would like the service to look like in future

The middle management group were then asked mid way through the research (14/26 = response rate 54%) by what means the lean methodology could be embed into the way in which the organisation undertook improvement. Once the ideas were generated by the group these were ranked independently by the group. Each individual was given up to 5 points which could be awarded to ideas that were important and 1 point which could be awarded to ideas which were very important. The results are in Figure A.1 show that the two with the highest most important scores were 'training and development' and 'linking to QPR's' (QPR's are quarterly performance reports). 'More involvement of the top team' was ranked second overall but had marginally less very important scores.

Figure A.1.
Source: Author

The Middle Managers were asked to reflect on the enablers and inhibitors for adaption/adoption LT in the nested cases half way through the research study.

	Reflections on nested cases (facilitating group)	Reflections on nested cases (sponsoring group)
Theme	• Services examined seen by customers as inefficient and unresponsive • These services felt under pressure of increased demands made of them • Services sometimes retaliate by blaming customers for their poor performance • Customers often don't supply info at start of process to allow the job to complete successfully • Traditional response to improvement.. more work - more resource • Very sceptical of Lean at beginning • What is the hidden agenda?	• Cooks out the fat (waste) • More consistently done • A better taste • Better for you – Safer – More consistent • Solutions to "can't do" problems • Sustainable Improvement • Enthusiasm of Individual participants • Organisational Development • New Skills • Projects - provided "the keys" • General – View from a different (more relevant) angle – Genuine "can do" – Trust needs more managers with these skills • Not yet a self - sustainable initiative • Not imbedded in mindset

	Reflections on nested cases (facilitating group)	Reflections on nested cases (sponsoring group)

	Don't expect it to make any difference...
	• Motivation increases in most participants very quickly
	• Techniques are robust even in hands of novices
	• Complex processes
	• Unpredictable outcomes
	• Too much variation
	• People know about the wastes
	• Keen to change but often sceptical of whether it will be seen through .... whether management will stick with it
	• Some of the projects thus far are related. New staff need
	• slick recruitment process to get them in
	• often a phone
	• often a PC package
	• etc
	• View emerging that all these should be managed together and completed before staff arrive
	• Still a view that this is a set of techniques that fix things - Need to promote it as a continuous improvement methodology
		• Some key road blocks remain
		• Lean Network
		  • 1 yr on - Impatient not disappointed
		  • Time input of network members
		  • Skill development - where are the network members in terms of skills development?
		  • Profile & Awareness is growing
		  • Pace - 1 new project per month
		  • Clinical & non-clinical
		• Emerging Issues
		  • Projects developing in an ad hoc manner
		  • Projects needed to focused around the patient experience and a clear strategic direction
		  • There was a need for sufficient time to learn & apply the techniques from General Managers & Heads of Service
		  • Network Members need to work both inside and outside the traditional boundaries of their jobs
		• Strategy
		  • Refocus projects around the patient experience
		  • Using two key value streams at operational level
		  • Medical
		  • Surgical
		  • Spin off training projects to generally come from issues arising from these two main value streams
		  • Measurement to be devised to understand organisational impact
		• Expected Impact
		  – Beds
		  – Congestion
		  – Understanding our capacity
		  – "Support" services
		  – Quality agenda
		  – Finance
		  – Organisation
		  • Divisions
		  • Projects
		  • Networks
		  – Skill Base of Managers
		  – "Top of the shop"

Source: Author

At conclusion of the study the Middle Managers Group were asked within and workshop and then as part of a reflective activity over two months to record what they believed to

be the enablers and inhibitors to improvement (LT). The output of which is recorded in the following two tables.

ENABLER Force Field Analysis Score	No of individual comments	Title	Comment by level (Rummler and Brache (1990) and Bicheno (2008) displayed in the following order: - Macro/Systems level Process Level Micro/Task Level
+4	10	Internal Pressure	CEO Job on the line, Nowhere else to go, Need to survive, Do or die targets, Lean is being accepted and promoted by the Trust, Network of Change Agents
			Keen change agents with appropriate skill
			I want to modernise, being left behind driving interests, lack of fast feedback on measurement
+3	9	Successes	Investment in change, Driver to be 'best' – capture our arrogance, Regional targets,
			Radiology and IT success stories, Progress recognised, Big award prizes, Kudos, Awards and recognition, Recognition for success individual/department/Trust
			The desire to improve the patients' experience
+3	7	External Pressure	Targets, Progress demonstrated in other Regions, Regional Agency, Modernisation Agency Projects, Reputation (vs. the rest of the region)
			Patient Involvement
			Willingness to change
+3	7	Discipline and Consistent Standards	Applied pressure to change, Management standard, hands off leadership,
			Process owner involved in lean project
			Good discipline, Close to problem, Does what staff want
+2	6	Training	'Right' people become motivators, Management trainees, Train the trainer, Training department
			Measurement increasing
			Qualified Lean/Six Sigma
+2	4	Professional Drive from the workplace	
			Clinical champions emerging
			Nurses want it as it helps them, Staff (at coal face) are generally receptive to Lean, Doctors are not a problem
+2	3	Recognition of problems Ideas Generation	
			Consciously incompetent recognised in network
			Innovative ideas, Lots of good ideas
+1	8	Targets	Ongoing performance monitoring, Lean vs. Financial targets, Blame culture, No ownership of Lean, Initiative overload
			Perverse targets, Imposed targets stifle innovation, don't share targets

ENABLER Force Field Analysis Score	No of individual comments	Title	Comment by level (Rummler and Brache (1990) and Bicheno (2008) displayed in the following order: - Macro/Systems level Process Level Micro/Task Level
+1	7	Support Infrastructure	Stable organisation. Improvements are not negotiable.
			Ability to exert pressure. Network. Positively benchmarking internal progress against others
			Staff involvement has been really positive & their enthusiasm. Sound appraisal system
+1	4	Executive/Senior Management Pressure	Verbalise that executive is behind this change. Senior management support. Knowledgeable and experienced leaders. support from senior managers
+1	2	Departmental/Divisional Pressure	
			Finance on board. HRM is on board (to help with redefined roles)

Source: Author

INHIBITORS Force Field Analysis Score	No of individual comments	Title	Comment by level (Rummler and Brache (1990) and Bicheno (2008) displayed in the following order: Macro/Systems level Process Level Micro/Task Level
-4	19	No Change Process and Improvement is extra	Conservative to change. Improvement not a real job. no improvement culture (an add on), £ to pump prime good ideas. Status of Champions low.
			Don't know how to move forward. Ideas need approval. don't want the pain of doing. Time management. 'Protected' time. Available time (perception). time to short. lack of incentives.
			People doing the job not allowed to/don't believe they can change. No process for change implementation. getting involved means more work. not seen as a way of working/extra. Improvement needs to be seen as work (not a distraction from work). Staff morale.
-4	17	Clarity of Decision Making and execution	No decision making. no corporate managers. no clear hierarchy. fragmented management structure. executive competition. snipers at senior level. lack of vision. no goal
			Passive Resistance. think in a complex manner. managers! Distance management. Narrow-minded individuals who are powerful influencers. control freaks. no responsibility. no process development
			It's ok here – everyone else problem

INHIBITORS Force Field Analysis Score	No of individual comments	Title	Comment by level (Rummler and Brache (1990) and Bicheno (2008) displayed in the following order: Macro/Systems level Process Level Micro/Task Level
-4	11	Status and Power Dynamics	Favourites "in"/"out", familiarity – senior management
			Managers compete with one another. Some people at meetings to be 'seen'. Managers have to be seen to be competent. Managers like meetings, critical for meetings: power =management, promotion is based on relationships, territory, PC'S in the wrong place
			Reputation of individual – may not reflect true capability
-4	10	Understanding of knowledge	Executives and GM's lack knowledge & skills required to 'lean', pressure from senior managers, executive do not believe it is possible, Top team are not fully bought in.
			Poor understanding of why, lack of mass education, lack of organisational knowledge and development, lack of understanding, skills acquisition (network)
-4	5	Use of data for change	Skills for managers e.g. SPC, Measurement
			Not enough measures, Traditional information analysis, timeliness of information e.g. activity, minimisation of data.
-4	4	Lack of Communicating Evidence	Not enough results!! Limited success stories,
			Poor communication, learnt behaviour
-3	9	Professions	Clinical directors not responsible for performance
			Clinicians get away with it! Professions think skills eradicated, waiting list=status, Consultants still see waiting lists as good, job roles to specialised, (perception) defined roles, intelligent workforce, resources.
-3	9	Management Engagement	Understanding of senior and middle management
			Middle management, mid management, managers are administrators, managers cannot challenge consultants, too big, don't need so many managers, like crisis – too busy crisis management, crisis management
-1	8	Targets	On-going performance monitoring, perverse targets, imposed targets stifle innovation, blame culture, no ownership of lean, initiative overload, don't share targets, lean and financial targets.

INHIBITORS Force Field Analysis Score	No of individual comments	Title	Comment by level (Rummler and Brache (1990) and Bicheno (2008) displayed in the following order: Macro/Systems level Process Level Micro/Task Level
-1	2	Cost	Costs could be an issue, delegated budgets (*this was about to happen and it was presumed that individual functions would become less co-operative as a consequence)*

Source: Author

APPENDIX 8 PHASES TOWARDS WHOLE SYSTEM IMPROVEMENT – COMPARISON AND IMPLICATIONS FROM THE RESEARCH FINDINGS

Improvement Phase	Industrial Management Focus (Rich, 1999)	4 stages of whole system improvement (Weisbord 1992)	Operational Parameter of Improvements	Implications regarding the findings of this research
Phase 1	Internal Functional Focus.	Experts solve problems.	An isolated closed system within an organisation.	3rd level cases exhibit these features, as do some 2nd level cases.
Phase 2	Integrated Business System.	Everybody solves problems.	Alignment of organisation functions to satisfy changing customer demands.	Literature shows evidence of patient flow concept. Alignment of professionals, senior managers, middle managers and staff = better outcomes. Middle Managers being key enabler for action, other groups key for the extent of action (achievement in closing the opportunity gap).
Phase 3	Customer Integrated System.	Experts improve whole systems.	Movement to an open system with the 'customer element of the conversion process equation' being incorporated. Seeking to reduce any adversarial interfaces. Establishing customer value to align systems design.	Part of the research design and elements adopted at whole systems level (Section 5.9).
Phase 4	Partnered Integrated System.	Everybody improves whole systems.	Enhancing the open system to integrate suppliers vertically, to increase the systems overall operations capacity. Moving away from adversarial procurement practices to connected work process for the mutual good (Esain and Rich, 2006).	The research recognises the need for co-operation and also the constraints to achieve this.

Source: Author

END OF THESIS.