Lean in Healthcare: An Evaluation of Lean Implementation in NHS Lothian

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A thesis submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy in Business.

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Declaration

This work is presented here in partial fulfilment of the award of Doctor of Philosophy.

I hereby declare that the work presented in this thesis is solely carried out by myself at Edinburgh Napier University, except where due acknowledgement is made and that it has not been submitted for any other academic credit or degree award.

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List of abbreviations for Appendix 4

4AT – Rapid Assessment Test for Delirium

A&C – Administration and Clerical Staff

A&E – Accident and Emergency

AHP – Allied Health Professional

APEX – Laboratory Information System in use at NHS Lothian

Appt. – Appointment

ARU – Acute Receiving Unit

CAA – Combined Assessment Area

CE – Chief Executive

CEPOD – Emergency Operating Theatre

CHCP – Community Health and Care Partnership

CHP – Community Health Partnership

CMHT – Community Mental Health Teams

COO – Chief Operating Officer

CT – Computerised Tomography

CTC – Community Treatment Centre (Leith)

DCN – Department of Clinical Neurosciences

DNA – Did Not Attend

DVT – Deep Vein Thrombosis

ECC – Emergency Care Centre

ECG – Electrocardiogram

EDD – Estimated Date of Discharge

EMA – Early Medical Abortion

ENT – Ear Nose and Throat

FY2 – Foundation Doctor Year 2

GORU – Geriatric Orthopaedic Rehabilitation Unit

GPASS – General Practice Administration System for Scotland

GPs – General Practitioners

HAN – Hospital at Night

H&S – Health and Safety

HEAT – Health Improvement, Efficiency, Access and Treatment

IRD – Initial Referral Discussions (used in Child Protection)

LAC – Looked After Children (pathway)

LOS – Length of Stay

MDM – Multidisciplinary Meetings

MOE – Medicine for the Elderly

MP – Member of Parliament

MRI – Magnetic Resonance Imaging

MSP – Member of Scottish Parliament

NICE – National Institute for Health and Care Excellence

OP – Outpatients

OPD – Outpatients Department

ORS – Orthopaedic Rehabilitation Service

ORSOS – Operating Room Scheduling and Office System (used by NHS Lothian)

OT – Occupational Therapy

PA – Per Annum

PAA – Primary Assessment Area

PAS – Patient Admission Service

POC – Package of Care

PPM – Preventative Planned Maintenance

PT - Physiotherapy

QIS – Quality Improvement Scotland

R&D – Research and Development

RFID – Radio Frequency Identification

RHSC – Royal Hospital for Sick Children

RIE – Royal Infirmary of Edinburgh (also known as ERI – Edinburgh Royal Infirmary)

RTT – Referral to Treatment Time

RVH – Royal Victoria Hospital

SAS – Scottish Ambulance Service

SBAR – Situation, Background, Assessment and Recommendations.

SCI Gateway – Scottish Care Information Gateway

SJH – St John's Hospital (Livingston)

SLNB – Sentinel Lymph Node Biopsies

SOP – Standard Operating Procedures

SSESC – Short stay Elective Surgery Centre

TARC – Treatment and Recovery Clinics

TPOT – The Productive Operating Theatre

TRAK – TRAKCare IT system used in NHS Lothian

WGH – Western General Hospital

Y-O-Y – Year on Year

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Publications

<u>Book Chapter</u>

- **Lindsay, C.F.,** Kumar, M. (2015), A lean healthcare journey: the Scottish Experience, in ed. Radnor, Z.J., Bateman, N., Esain, A., Kumar, M., Williams, S.J., Upton, D.M. (2015), Public Service Operations Management: A Research Companion, Routledge: Abingdon (Oxon).

<u>Conference Papers</u>

- **Lindsay, C.F.,** Kumar, M. (2014), The Agency Contract in Lean: The Clinician as Agent, 20th-25th June, 21st Annual EurOMA Conference, Palermo, Italy.

- **Lindsay, C.F.,** Kumar, M. (2013), Cynicism or support? The role of clinicians in Lean implementations in healthcare, 9-13th July, 20th Annual EurOMA Conference, Dublin, Republic of Ireland.

- **Lindsay, C.F**., Kumar, M. (2012), How perceptions on Lean thinking affect Lean implementations and their future sustainability, 1st-5th July 2012, 4th World P&OM Conference/19th International Annual EurOMA Conference, Amsterdam, Netherlands.

- **Lindsay, C.F**. (2012), Lean thinking in a Scottish NHS Board: the impact of perceptions and knowledge on Lean implementations, 11th-13th September 2012, British Academy of Management (BAM 2012) Conference, Cardiff University, Cardiff, UK.

- **Lindsay, C.F.** (2012), Lean in healthcare: perceptions on Lean thinking impacting Lean sustainability, 17-20 November 2012, 43rd Decision Science Institute Annual Meeting, San Francisco, USA.

Abstract

The overarching aim of this thesis is to critically evaluate the implementation of Lean in NHS Lothian, a National Health Service (NHS) Health Board in Scotland. Against challenging financial times, Lean has been endorsed for adoption in the provision of healthcare by The Scottish Government and NHS Scotland and so the objectives are to understand how Lean is implemented in healthcare, the impact on the organisation and what role(s) are held by front-line staff including medical staff, in this implementation.

This is an exploratory and descriptive interpretivist case study incorporating content analysis, observational and interview data which is based on a qualitative and inductive approach. The interpretative and inductive nature of the research is used to identify emergent themes and to afford greater insight into the implementation process, outcomes and the role of healthcare staff. The sociology of professions is used to evaluate the role of the medical professional within Lean from the emergent data, with the focus being on behaviours expected and demonstrated in Lean implementations.

The findings provide a mapping of the process for implementing Lean. It is also demonstrated that although medical professionals are expected to hold a crucial role in Lean implementations, their identity as a professional with corresponding power and autonomy provides challenges for implementing Lean in hierarchical areas such as healthcare. This professional identity also impacts on project initiation and sustainability as other stakeholders recognise hierarchical constraints. However, evidence grounded in the data illustrates that Lean breaks down hierarchies and has resulted in improved working in services. The implementation of Lean has been programmatic in line with best-practice case examples and has been driven by strategy and target pressures faced by services.

This research provides a contribution to knowledge in three key areas: firstly through mapping the approach to Lean implementation which is a contribution to Programme Theory. Secondly medical professionals are explored through the lens of professionalism which has received limited attention to date within Lean; and finally a set of propositions are generated as a framework for Lean implementation in healthcare.

1.0 Introduction

1.1 Healthcare challenges

In the UK, healthcare provision is dominated by the National Health Service (NHS). The NHS has been facing multiple challenges with increasing reforms being discussed, debated and implemented (Bartram and Dowling, 2013). These reforms have been driven by challenges such as the severest economic crisis since the 1930s, rising costs, increasing demand and increasing complexity in patient cases. Healthcare providers are trying to manage these challenges and also focus on the need to provide safe, efficient and effective care (Gauld et al., 2014).

In Scotland, the challenges of an aging demographic are recognised as it is expected in the next ten years, the population of those in the age group of 75 years and above will increase by 25 per cent which will create more pressures on health spending whilst expenditure is expected to fall in real terms (ournhsscotland.com, 2015). In the period 2010-11 to 2015-16, the Scottish Fiscal budget has been cut by up to 10 per cent in real terms (Scottish.parliament.uk, 2014). Currently, although the NHS in Scotland is protected from budget cuts, the impact of inflation, rising demand, drug and staff costs means health boards have to make at least three per cent efficiency savings per annum. These efficiency savings are expected for every public body in Scotland and continue in the period 2015-16. In 2015-16, the health budget for NHS Scotland was to exceed £12 billion for the first time (Scottish.parliament.uk, 2014).

1.2 Applying and defining 'Lean' in healthcare

One solution proposed to challenges faced in healthcare over patients with complex needs requiring safe, effective and efficient care in challenging financial times, was the application of Lean, a quality improvement methodology which emerged from car manufacturing, which had spread across to services and healthcare (Jones et al., 2006). In Scotland evidence was provided from one study, commissioned by the then Scottish Executive, about how Lean was being applied in the public sector. Healthcare services were discussed as implementing Lean, although this was in its early stages in the organisations reported upon (Radnor et al., 2006). Lean has since been endorsed for use by the Scottish Government as enabling health boards to meet challenges in reducing variation in removing waste and eliminating harm in health services (scot.govt.uk, 2011).

In healthcare, Lean can be defined as maximising the value of activities and processes for the patient whilst removing waste and improving quality and safety to ensure no harm is caused to the patient in the hospital environment (Jones et al., 2006). Team work, communication and the breaking down of barriers for employee empowerment are social attributes required for success in Lean (Liker and Meier, 2006). Lean healthcare in the 2000s has been a popular field of study for researchers (Brandão de Souza, 2009; Taylor and Taylor, 2009) but is compared to manufacturing as being in its infancy (Al-Balushi et al., 2014). Reported projects have often singled out specific departments giving rise to Lean replicating the silo nature of healthcare due to the lack of studies focusing on service wide Lean implementations (Brandão de Souza, 2009). Studies reporting on Lean healthcare implementations (Dickson, et al., 2009; Holden, 2011) concentrate on the process and operational aspects of Lean, in line with the original literature (Womack et al., 1990; Womack and Jones, 1996). However, this means many Lean accounts neglect the sociotechnical aspects of Lean and healthcare as there is focus on the technical and less on the social aspects (Joosten et al., 2009). Latterly, the overall impact of Lean has been questioned due to the small project focus, rather than Lean being applied across and beyond the organisation (Radnor and Osborne, 2013). The need to consider the specific characteristics of healthcare delivery systems and the impact of their particular variations on complexity when designing, implementing and evaluating Lean improvement has also been argued (Mazzocato et al., 2014). This lack of impact and warning over complexities may be due to the nature of previous studies where Lean is reported and which are overwhelmingly positive and at an early stage (Mazzocato et al., 2014).

Where articles have focused on Lean in the healthcare, these have raised concerns over the future of Lean and how this is managed within this existing hierarchical environment (Waring and Bishop, 2010). Recently, Drotz and Poksinska (2014) examined Lean from the perspective of employees and discussed how Lean may be regarded as countercultural because of professional identity, the healthcare culture and power held by doctors as decision-makers. To date though, a focus on the social aspects of Lean has lagged behind the outcomes reported (Taylor et al., 2013). Publications focusing on healthcare and the role of the professions has illustrated how the successful attributes for Lean identified by Liker and Meier (2006) are challenged in the healthcare environment (Waring and Currie, 2009; Brown et al., 2011; Dixon-Woods et al., 2012).

1.3 Research Context

Although the work of Radnor et al. (2006) assessed the implementation of Lean in the public sector in Scotland and linked to healthcare implementations, these were in their infancy so there is a limited literature basis from which to explore the implementation of Lean in the NHS in Scotland.

The provision of healthcare in Scotland is comparable to that of the rest of the UK, though the structure of the NHS has differed over the years in all home countries due to devolution, government policy and influence (Irvine and Ginsberg, 2004; Davies, et al., 2007). The NHS in Scotland, known as NHS Scotland, is composed of 22 health providing bodies which include 14 regional health boards, seven special NHS boards (includes NHS24, Scottish Ambulance Service and NHS Education for Scotland) and one public health body (scot.nhs.uk, 2015). Changes in governments, budgets and politics have impacted the NHS in Scotland and the wider UK since its inception (Rivett, 1998; Webster, 1998; Ham, 2004; Gorsky, 2008; Klein, 2010). Since devolution, the politics of health have been at the forefront of public policy and investment has been made in healthcare to the extent that more money has been spent per head in Scotland than in England (Irvine and Ginsberg, 2004; nuffieldtrust.org, 2013). This has not been reflected in NHS Scotland performance, productivity, or mortality rates, and thus contradicts the common view of improved expenditure resulting in improved outcomes (Irvine and Ginsberg, 2004; Connolly et al., 2010; nuffieldtrust.org, 2013).

1.4 Research Focus

The focus of this research will be NHS Lothian (NHSL), one of the 14 regional health boards in Scotland. NHSL healthcare is provided by approximately 24,000 staff, serving a population of 800,000 and around £1 billion per year is invested in the provision of healthcare services. NHS Lothian serves the second largest residential population in Scotland (nhslothian.scot.nhs.uk, 2015).

1.5 Overarching aim of this research

This introductory section has discussed the rise in popularity of Lean and the limitations of the current literature base which includes a lack of studies focusing on system wide implementations and also implementations within the Scottish healthcare system. The desire is to provide research which focuses on these areas and may uncover why Lean in

the public sector in the UK and in healthcare specifically, has not had a greater impact. As Lean is endorsed for use in NHS Scotland, this will be the focus of the research and specifically will be undertaken with NHS Lothian who is known to have been implementing Lean. Subsequently, the overarching aim of this research is:

'To evaluate the implementation of Lean in NHS Lothian'

The objectives are to understand how Lean is implemented in healthcare given the increasing popularity of Lean research. The longer term impact of Lean has also received a lack of reporting to date and so the impact of Lean in this organisation will be explored. Given the aforementioned limitations in evaluating the social aspects of Lean, and especially in a highly professionalised environment such as healthcare, then an understanding of the roles of staff within Lean implementations is sought. It is expected this research will provide empirical evidence and understanding of the process and impact of Lean implementations, from an organisation that had been implementing Lean for six years at the time of the research. The focus on employees will also contribute to the growing knowledge base on the social aspects of Lean which has been limited to date.

1.6 Structure of the thesis

This thesis follows on with Chapter Two, the literature review, which explores the origins of Lean and its transfer beyond manufacturing, into the public sector and healthcare. The chapter concludes with a summary of the research gaps which have been identified within this review. This identification of these gaps has in turn informed the research questions which extend the objectives discussed previously and are articulated at the end of the chapter.

Chapter Three provides a discussion of the research philosophy and methodology that underpins this research. The researcher has adopted an interpretivist-social constructionist knowledge paradigm which has informed the research strategy. An interpretivist, case study strategy has been adopted. The multi-methods employed, (interviews, content analysis and observations) are discussed, as is the coding process and analysis, in terms of their contribution to answering the research questions previously identified in Chapter Two.

Chapters Four and Five present the findings from the document and case study analysis respectively. These chapters are followed by a discussion of these findings in Chapter Six. The emergent themes are related back to the literature presented in Chapter Two.

Chapter Seven presents the conclusions of the thesis, with key findings articulated as well as acknowledgement of limitations. Discussion is also provided here on implications for research and practice.

2.0 Literature Review

2.1 Introduction

This chapter begins with an introduction to Lean and the key literature in this field covering the origins of Lean in manufacturing, through to its adaption to services and healthcare. Lean has grown in popularity in recent years, both from a focus on manufacturing but also in other areas such as healthcare (Taylor and Taylor, 2009). As this study is not an exhaustive account of Lean, but introduces the subject before discussing its transferral to healthcare, it was deemed important to investigate not only Lean as an improvement methodology, but also the factors facing healthcare, and specifically the NHS in the UK, to see what issues could potentially impact Lean implementations.

2.2 From the Toyota Production System to Lean

The identification of the use of the term Lean to describe the improvement philosophy which originated in Toyota was first identified by John Krafcik, a former engineer in a Toyota transplant in the USA and latterly a researcher at Harvard's Massachusetts Institute of Technology (MIT) (Krafcik, 1988; Holweg, 2007). The Lean terminology was subsequently used in the book *The Machine that Changed the World* (Womack et al., 1990) which brought the Toyota Production System (TPS) and 'Lean' terminology to public consciousness, although texts detailing the TPS had been available in the 1980s (Monden, 1983; Hines et al., 2004). The TPS was discussed as evolving out of need, post-World War II, in providing small batches of high variety products in times of low demand, with the starting concept being the increasing of production efficiency by the complete elimination of waste (Ohno, 1988). Ohno (1988) discusses how coming closer to this goal of waste elimination means coming closer to customers and their individual requirements. The identification of the TPS in formal documentation is estimated to be around 1965 (Holweg, 2007) though accounts from Toyota employees in the edited book by Obara and Wilburn (2012) illustrated how formal documentation for all elements of the TPS was still limited into the 1990s and beyond.

'The Machine' was a study of the automobile industry which was in crisis and demonstrated the rise of Toyota to become the largest automobile producer in the world. This work did not limit itself to just production capabilities but also investigated extended supply chains (Womack et al., 1990). The Machine compares Western manufacturing

practices, commonly described as 'mass production' (but also including the practices of workers and management) to Japanese practices which have helped the growth of the Japanese automobile companies, including those using the TPS (Womack et al., 1990). However, this phenomenon was not just restricted to Japanese manufacturers in Japan but could be evidenced with examples US based plants out-performing Japanese counterparts (Krafcik, 1988) thus proving that the TPS was not impacted by national culture (Schonberger, 1982).

Krafcik (1988:45) discusses the exemplar plants like Toyota who applied the TPS as being 'lean operations' with minimal inventory, quality issues detected and resolved quickly, the continuous flow of production and team working. Working on from this definition, Womack and Jones (1996:15) defined Lean as *"lean because it provides a way to do more with less and less – less human effort, less equipment, less time and less space – while coming closer and closer to providing customers with exactly what they want."* This focus on Lean and the inclusion of all concerned parties in value and the pursuit of the removal of waste saw a focus on Lean enterprises as it encompassed relationships, behaviours and transparencies from firm-to-firm (Womack and Jones, 1996). The authors decided that techniques in use in automobile manufacturing across the USA and Europe were still those mass production practices adopted by Henry Ford and manufacturing organisations were not learning from new competition in their markets (Japanese manufacturers). The Toyota Production System is viewed as having its roots in Fordism (which grew out of Scientific Management) with the same concentration on standardised working, efficiency, production flow due to the removal of waste and vertical integration. However, the TPS, is viewed as taking Fordism forward (Krafcik, 1988; Ohno, 1988). Although Womack and Jones (1996) focus on the idea of the 'lean enterprise' in the follow up to The Machine, the book's title 'Lean Thinking' was to highlight the view that Lean was more than a set of tools and should be viewed as a philosophy. This philosophy would involve cultural change in the organisation so all employees would behave with a Lean thinking mind set in the way they worked and approached problem solving and continuous improvement (Womack and Jones, 1996). This view that the originally defined TPS was more than a set of tools and involved culture and mind-set was also echoed by Ohno (1988) and Schonberger (1982).

2.2.1 Lean principles

The evolution in Lean literature predominantly followed the original publication of 'The Machine that changed the World' (Womack et al., 1990). This literature followed The Machine, despite Womack et al., (1990:225) uncertainty as to whether Lean production in manufacturing would prevail. There had been publications prior to this such as Monden (1983) and others detailing the TPS prior to 1990 (see for example Schonberger, 1982; Schonberger, 1986; Ohno, 1988). However, it was Womack and Jones (1996) who took their discussion on the original TPS further through their study of the automobile industry and Toyota by defining principles of Lean and the philosophy of this new approach (Hines et al., 2004). The discussion of the philosophical nature of Lean was further endorsed by other authors in later literature (Bhasin and Burcher, 2006; Liker and Meier, 2006; Mann, 2009).

After Krafcik's (1988), description of the TPS as Lean, Lean was described as being set apart from process reengineering as efficiency is about work creation, not the removal of jobs (Womack and Jones, 1996). In referring back to the original definition of Lean defined by the five principles of; "precisely specify *value*, by specific product, identify the *value stream* for each product, make value *flow* without interruptions and let customer *pull* value from the producer and pursue *perfection*" (Womack and Jones, 1996:10), then these five principles adapted from Womack and Jones (1996) can be explained below in Table 2.1 to further complement the other facets of the TPS, discussed in section 2.2 and expanded upon in section 2.2.2. The key objective of the focus on waste is also very much present in the principles of Lean in the discussion of value, flow and perfection and expanded discussion on these principles is provided in Table 2.1 below. The five Lean principles from Womack and Jones (1996) have been widely accepted for implementation (Hines et al., 2004).

2.2.2 Lean Concepts and Techniques

The five principles are aligned to the concepts, techniques and tools which can be applied to process improvements in determining value and waste. Although Lean is more than a set of tools, there has been a strong focus on these in their contribution to achieving the aforementioned Lean principles and these are discussed in Table 2-1. Ohno (1988) and Monden (1983) discuss the two main pillars of the TPS as being Just in Time and Autonomation as both pillars support the aim to eliminate waste from the production

process. Visual tools such as Kanban and value stream mapping, link into the five principles in order to determine any wastes inhibiting flow and value.

Table 2-1 The Five Lean Principles

Identification of the Value - in Lean thinking terms is to give this value in the product and/or service definition through the specific product/service and its capabilities, based on customer requirements.
Value Stream – all actions required for the provision of goods and/or services, from concept to final delivery to customer in their required form. Value Stream Mapping (Analysis) reviews all points along the Value Stream. Some of this analysis will identify non-value or waste (Waste = Muda), some steps will be identified as adding value to the product/service and others will not be perceived as adding value to the customer, but are necessary in the production/provision of the goods/services.
Flow – of value, with no holds ups or delays, where employees actively contribute to the value and flow. Moving away from batches of products or queues, or the provision of services in separate silos where delays and communication breakdowns hamper the flow and damage value by allowing waste to occur.
Pull – customer will 'pull' products or services from suppliers when they are required, instead of having products/services which have been 'pushed' on them, which may not be required at that point in time.
Perfection – the four previous points work together so value which flows through a system will expose waste in the value stream. Any further issues over 'pull' will highlight further areas impeding the process. Collaboration with suppliers and customers will improve the process, so ways of identifying value, value streams, flow and pull can lead to the fifth point of perfection.

Source: Adapted from Womack and Jones, 1996

Table 2-2 Common Lean Concepts and Techniques

Lean Concepts/Techniques/Tools	Description
Just in Time (JIT) – key concept in TPS	- Production of the necessary parts, in the right amount, as they are required. This also applies to inventory which is bought in, thus reducing the amount of waste and space for storage of inventory and parts.
Autonomation	- Automation or human touch in applying human intelligence to the working of machines. Equipment to be stopped immediately if the potential for waste/defects. - Linked into visual controls as Autonomation supports "*management by sight*" (Ohno, 1988:129).
Elimination of Waste as a key concept in the TPS - 'Seven deadly wastes'	- This relates to any activity, both human and processing which adds no value. 'Seven deadly wastes' were identified by Taiichi Ohno (1988) and are; - <u>Overproduction</u> – production of more than what is required; - <u>Waiting</u> – downtime when machines and workers are idle; - <u>Transportation</u> – movement of goods when not required; - <u>Processing</u> – processing steps which do not contribute to the process and end value; - <u>Inventory</u> – storage of inventory and goods when they are not required; - <u>Motion</u> – wasted motion of workers to retrieve materials; - <u>Defects</u> – faulty products produced, which will waste time in correcting or scrapping.
Kanban System – key concept in TPS	- An information system which is used to control the amount of production at each process stage, through the use of cards for removing and showing what is required at each stage of production.
Flexible Workforce	- Having the correct amount of workforce available to meet increased/lower demand patterns.
Production Smoothing	- Minimising production variation in the assembly line resulting in each sub-assembly producing their products at a fixed speed or quantity within a set timeframe. This production smoothing will also impact suppliers as it should mitigate the bullwhip effect.
Set-up time reduction	- Set up time of machines can impact production smoothing. It is the aim to reduce set up time, through the advance preparation of the subsequently required tools and materials, so that the minimal time is taken for changeovers.
Standard Operations	- Standardisation of operations in so far as a set sequence of operations is given to workers that should be followed and will be the same for other processes the worker will be involved in.
Improvement activities	- Workers can propose improvements. This allows for worker participation in the process, as well as

Lean Concepts/Techniques/ Tools	Description
	improvement in quality and a reduction in costs by preventing defects.
5S	- Organisation and cleanliness of the work environment for control and working in a Lean manner (the original Japanese terms are given with a definition (Womack and Jones, 1996)): - <u>Seiri:</u> Organisation of work environment through separation of equipment, materials and instructions; - <u>Seiton:</u> Tidiness of environment where the correct equipment is available for use when it is required; - <u>Seiso:</u> Clean-up of working environment; - <u>Seiketsu:</u> Maintain of condition of working environment through seiri, seiton and seiso; - <u>Shitsuke:</u> Be disciplined and maintain the first 4S.
Poka Yoke	- Checklists for 100 percent inspections to aid in elimination of mistakes and defects.
Work Flow (Value Stream Mapping)	- Understanding how work flows through the system and where the value is added to the product in this flow.
Real Cause (5 whys)	- Each problem has a 'real cause' or hidden reason for the problem so why must be asked 5 times in order to determine the real solution to the problem.
Kaizen	- Continuous improvement in order to remove waste and consequently add more value. - Later manifested into Kaizen events where groups of workers involved in a process come together to improve the process through flow, removal of waste and greater value adding steps. Also known as RIE or Rapid Improvement Events. These events involve advance preparation to scope problems, form a team and arrange the event which will run for five days and involve follow-up in the form of an action plan.

Source: Created by the author from Monden (1983); Shingo (1986); Ohno (1988); Womack and Jones (1996); Liker and Meier (2006).

2.2.3 Mapping the TPS

The work of Monden (1983), Ohno (1988) and Shingo (1986) provided insights to Toyota and the TPS. Ohno (1988) provides a timeline from 1945 to 1975, which includes the introduction of JIT, Autonomation and the internal and external use of Kanbans. Shingo (1986) concentrates on inspection and Poka-yoke. Monden (1983) mapped the full TPS, demonstrating that although cost reduction and waste elimination were the main aims, a focus on people was crucial. All activities are expected to contribute which included not just tools and the technical aspects of controlling the manufacturing process but also the

use of company-wide quality circles to promote quality, training and continuous improvement in order to contribute to an increase in company revenue. This human touch is vital for Poka-yoke, as although human error in employees is inevitable, it is also these employees who will take corrective action and will use feedback to avoid this happening in the future (Shingo, 1986). This diagram (see Figure 2-1) from the Monden (1983) text pre-dates the work of Womack and Jones (1996) who are associated with the term 'Lean Thinking' and have further explained this philosophy and methodology. However, as the Monden (1983) diagram is based on the original TPS, then it explains the system-wide aspects of TPS, which have been taken forward and are recognised now as Lean. Within this diagram of the TPS, people and their involvement in Toyota's overarching aims of growing profits and increased revenues are shown.

Questions may be asked over the section on workforce cutting and it may be perceived in a negative way. However, it is not about simply cutting jobs but utilising all resources (including people) in a more effective way, as if it were about job losses, then this would affect 'workforce morale' (Bhasin and Burcher, 2006). In Toyota and 'World Class Manufacturing' organisations, less staff may be required (workforce cutting) as a result of efficiencies in managing inventory and purchasing, but these staff can be employed in new roles, including auditing, to continue the continuous improvement process (Schonberger, 1986). This is echoed in an early Lean study in Europe, where an organisation being researched had committed to a policy of no job losses and moved people into other areas when their original position was no longer required (Karlsson and Ahlstrom, 1996).

The importance placed on 'respect-for-humanity' which includes the treatment and well-being of employees in the workplace, which follows 'increase of workers morale', is shown by its position near the top of the diagram rather than placed around the key tools and techniques which can be associated with Lean. The key tools and techniques identified in Monden's (1983) diagram, e.g. explanation of Kanban and Autonomation are earlier discussed in Figure 2-1. This demonstrates, at least in the early English language Lean literature there is a focus on the human elements of Lean which is strongly built around respect and well-being in the workplace. Hines et al., (2004:998-1000) reiterate this in their review of Lean in stating; "*Lean should be regarded as more than a set of mechanistic hard tools and techniques and the human dimensions of motivation, empowerment and respect for people are very important.*"

2.3 People in Lean

Monden's (1983) original text is describing the Toyota Production System (TPS) but highlights the principle of respect for humanity and that this is a key point in achieving the key goal of the TPS. The mantra from Ohno (1988) of "We Don't Just Build Cars, We Build People" is emphasised by an analogy of a tenderly prepared and maintained garden, in which the gardener (Toyota) is patient, supportive, providing growth and development, with a belief in their employees skills and contributions rather than viewing them as a derogatory description of head count or numbers (Monden, 1983; Liker and Meier, 2006). Ohno (1988) explains that workers should be making judgements autonomously and act as tortoises, not hares, so to not race ahead in their work but should take the time to do things properly and this must be understood by supervisors and managers.

Dahlgaard and Dahlgaard-Park (2006) also argue that fundamentally, the TPS was not just a quality system but a human based system of continuous improvement through leadership and empowerment, supported by training and education. Although the TPS overarching goal is for cost reduction (Monden, 1983; Ohno, 1988), three key principles are highlighted to enable the TPS to achieve this. It must be noted that Monden (1983:2) states that the ultimate aim cannot be achieved without all three sub goals noted below:

1. Quality control in which the system can adapt to demand fluctuations (both in quantity and variety);
2. Quality assurance in which each stage will only produce good units for moving through the process;
3. Respect-for-humanity through all processes in the utilisation of human resources in moving towards the overarching goal of cost reduction
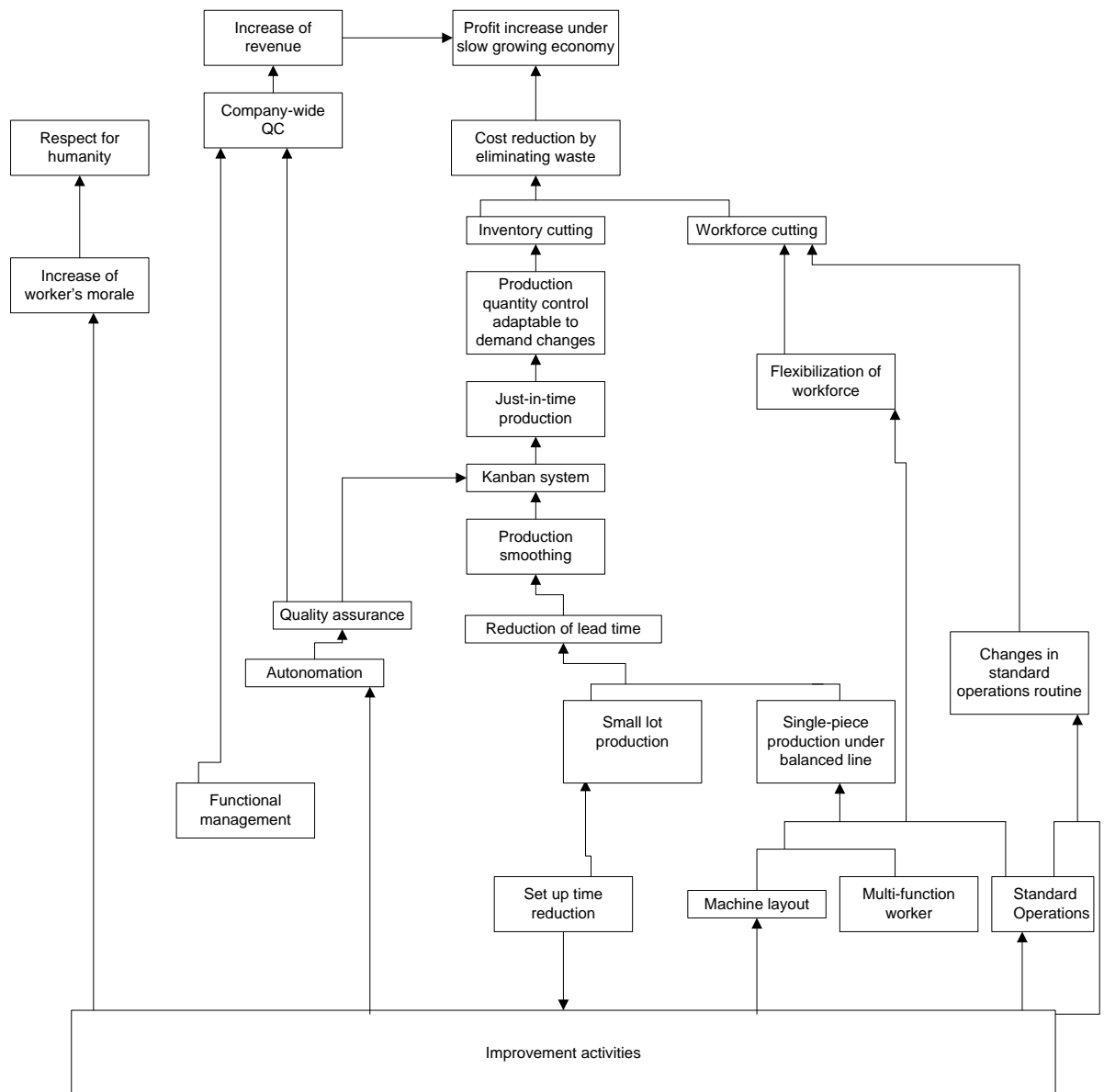
Figure 2-1 The Toyota Production System

Source: Reproduced from Monden, 1983

The sub goal of number three is crucial in the TPS and is further discussed in relation to associated concepts. Monden (1983) makes further references to the importance of people in the TPS as two 'key' concepts are highlighted which include having a 'flexible workforce' in order that workers are available to meet demand and also having these workers being 'creative thinkers' and coming up with 'inventive ideas' where workers can actually propose improvements to their own work sites. Although Monden's text concentrates on improvement activities, these improvement activities are designed to

increase worker morale, whereas traditional activities to improve productivity (Fordism is cited as an example) have resulted in greater demands on the existing workforce (Monden, 1983:117).

2.3.1 Origins of Lean in Scientific Management

However, Lean ideals such as standardised work for efficiency, the removal of waste (includes motion studies) and the need for communication and recognition of lower level workers can be directly traced back to the roots of Scientific Management and the work of Frank and Lillian Gilbreth (Gilbreth, 1914; Gilbreth and Gilbreth, 1917). The development of Scientific Management in the late 19th Century from the work of Frederick W Taylor, was to influence industry but it was the Gilbreths who were to use scientific management in hospitals and specifically in the operating theatre. The Gilbreths concentrated on performance and satisfaction in the workplace, using scientific management and psychology (Baumgart and Neuhauser, 2009). Although the Gilbreths concentrated on performance and worker satisfaction, their work can be specifically linked to Lean, as they specifically define the need for the removal of waste, both in time and motion, through the use of motion studies and the use of what is now known as process mapping (Baumgart and Neuhauser, 2009; Towill, 2009). This is evident and aligned with the activities mapped out in Figure 2-1 in Monden's (1983) mapping of the TPS where respect for humanity, increase of worker morale, waste, cost reduction and standard operations are all discussed

Lean can be shown to have its origins in Scientific Management, but in those areas highlighted by the Gilbreths (Gilbreth, 1914; Gilbreth and Gilbreth, 1917) concerning the value of human work contribution to the industrial process, rather than treating workers as a commodity as Monden had alluded to in relation to Fordism (Monden, 1983). The work of Monden and the Gilbreths link together in highlighting education, worker influence on process improvement, cooperation between management and employees, job rotation and allocation, standardised work for efficiency and the importance of communication (Gilbreth, 1914; Gilbreth and Gilbreth, 1917; Monden, 1983).

As it has been discussed at least in the early Lean literature, from its origins in Scientific Management, a key component of Lean is endorsing 'respect for humans.' However, this is not always reflected in literature, where the focus is mainly on tools and techniques

which have been identified with Lean (Hines et al., 2004; Stone, 2012; Taylor et al., 2013).

2.3.2 Identifying Lean as a sociotechnical system

Although the earlier Lean literature has discussed respect for people, 'The Machine' and the follow up, 'Lean Thinking' (Womack et al., 1990, Womack and Jones, 1996), concentrate on process improvement and technical systems in thinking in a Lean way. These texts make minimal references to the human dimensions of Lean. Indeed, human issues around Lean are not explicitly discussed in the seminal Lean text of 'The Machine' but could be construed by certain references such as to unionisation, professional skills and management layers (Womack, et al., 1990).

However, Lean is viewed as being in constant evolution and so any definition or perceptions are based on the accepted view of that particular period and can lead to different interpretations by different authors (Hines et al., 2004). This is recognised as having caused issues in its definition in terms of those who have defined Lean and others who question the appropriateness of the definition (Pettersen, 2009) but Radnor evaluates that Womack and Jones' (1996) definitions of Lean and Lean principles (sections 2.2 and 2.2.1) are the most commonly accepted in literature (Radnor, 2010).

Paez, et.al, (2004) further define Lean production as being viewed as "*an evolutionary sociotechnical design since it relies on the active interaction of individuals within the work design*" (Paez et al., 2004:286). Geels (2004:900) defines sociotechnical systems as "*encompassing production, diffusion and use of technology*" but also adds "*socio-technical systems do not function autonomously, but are the outcome of the activities of human actors.*" Hadid and Mansouri (2014) a decade later than Paez et al., (2004), also view Lean as a sociotechnical system but this implies balance of the socio and technical, and criticism of Lean questions the role of individuals in work content and environment (Berggren, 1993; Hines et al., 2004).

Niepce and Molleman (1996) view Lean and sociotechnical systems (STS) as separate, identifying that although elements of the 'socio' aspects may appear to be similar to Lean, there are differences in the organisation of work, worker autonomy and in multi-skilling in deference to the technical aspects. Shah and Ward (2007) define Lean as being a sociotechnical system but in their work, focus on the technical aspects of Lean and plant performance with limited focus on the social. However, by 2013, Dabhilkar and Åhlström

(2013) assess Hines et al., (2004) discussion of Lean's evolution and state that as a result of this evolution, there is now convergence rather than opposition of Lean and STS.

2.3.3 Lean criticism

In criticism of Lean, key concepts and workers within Lean are discussed. Cusumano (1994) is critical of the results of Just in Time (JIT) and Lean in Japan, highlighting what are perceived as its limitations. Environmental concerns over JIT are argued when applied to deliveries and inventories due to increased road use and impracticalities over what is now a global market place in the exchange of goods and services in small batches. Workers who leave their jobs as they are unsatisfied and a shortage of short-term working capital for new investments, due to always taking a long term view, are just some of the key aspects which are highlighted (Cusumano, 1994). This may affect other companies worldwide, depending on how these limitations of 'Lean' are recognised and managed going forward (Cusumano, 1994). Much of the criticism of Lean is directed at the 'social' and the perceived negative impact on employee's health and well-being with Lean operations.

Berggren (1993) is critical of Lean in 'transplant' operations. The examples of Toyota and Mazda's operations based outside Japan, where examples of frantic work pace, performance demands and health and safety concerns are cited. These observations of a frantic work pace are at odds with Ohno's endorsement for workers to be tortoises and not hares (Ohno, 1988). Conti et al., (2006) however note certain sources such as the CAMI study used by Berggren (1993) have been widely challenged for bias and poorly constructed measurement systems. Ezzamel et al., (2001) cite issues of resistance from employees to management attempts as introducing Lean production, team working and multi-skilling into a UK automotive supplies operation. However, some of these issues are attributed to management decisions, rather than Lean per se (Ezzamel, et al., 2001). This impact of management decisions was also found by Conti et al., (2006) where Lean was not deemed to be inherently stressful.

As Lean started to spread beyond manufacturing, criticisms are voiced. These criticisms highlight the vulnerability of Lean in managing variation, preparing for contingencies and a lack of strategic thinking within Lean which has potentially impacted the sustainability of Lean implementations (Hines et al., 2004). One key element again has been recognised; the lack of focus on social aspects within Lean (Hines et al., 2004).

This is further expanded upon by presenting views from literature that Lean can be viewed from a Marxist perspective as being "*exploitative and high pressure to the shop floor workers*" or other authors who cite Lean as being ''*de-humanising and exploitative*" (Hines et al., 2004:998). A further acknowledgement of how the 'human factor' of Lean has been neglected in favour of concentrating on tools and techniques as there is a deficiency in literature concerning the "*human behaviour side, focusing more on instrumental techniques for improving systems performance*" (Pettersen, 2009:135).

The lack of focus on the social aspects in Lean is noted again, recently, by Stone (2012), Taylor et al., (2013) and Al-Balushi et al., (2014), despite the focus in early literature by authors such as Monden (1983) or the work of Ohno (1988), where there was a focus on employee wellbeing, their contribution to their own role development and also organisational performance. Criticism about worker contribution to work content and the working environment is discussed in literature (Berggren, 1993; Hines et al., 2004; Pettersen, 2009), This criticism is at odds with literature which explores Toyota's principles and with the areas highlighted by Monden (1983) in section 2.3.

Pettersen (2009) argues that the human factors of Lean could be applied to McGregor's Theory X and Theory Y, with Lean being identified as Theory X. Theory X is associated with employees who do not want to work and need to be directed and controlled, whereas Theory Y describes workers who actively contribute to the organisational objectives and are willingly involved in problem solving in the organisation (McGregor, 1960). Pettersen's (2009) argument of Theory X may well be related to accounts of implementation which have purely dealt with Lean process improvements and have described people in Lean as 'components' (Kamata, 1982; Berggren, 1992, 1993 cited in Pettersen, 2009) and limited literature on the social aspects of Lean could lead to this viewpoint. Pettersen cites the work of Liker but Liker's work (Liker, 2004; Liker and Meier, 2006) includes a focus on the social elements in Lean, including empowerment in the problem solving process, management, knowledge sharing and training and development of employees. This would not lead to associating Lean with Theory X, but would instead be associated with Theory Y (McGregor, 1960). Latterly in reviewing literature on Lean in the working environment, Hasle et al., (2012) and Longoni et al., (2013) critique that there is no evidence in literature, either positively or negatively, to judge the impact of Lean in operations on employees.

2.4 Lean expansion – Service Industry, Public Sector and Healthcare

Where Monden (1983) focused on the TPS, 'The Machine' detailed the global automotive industry and the impact of Lean (Womack et al., 1990). 'Lean Thinking' was to take Lean further into other industries and cites construction, aeronautical manufacturing and retail (Tesco) in examples (Womack and Jones, 1996).

'Lean Thinking' was also to expand the ideas of Lean beyond automotive production and into other areas such as service organisations (Womack and Jones, 1996). Here, it was identified that Lean could be used in services and specifically healthcare due to "*a world of queues and disjointed processes*" (Womack and Jones, 1996:289) where the patient would be the focus of the healthcare system, like the customer in the production process. The focus would be on the flow of the patient (including the time taken and their comfort) being measured, who would be taken care of by multi-skilled teams in the idea of a 'cell', who are treated until the problem (illness/complaint) is resolved. In order to achieve this, associated tools to expedite diagnosis and treatment, such as medical equipment and laboratory facilities would require modification so they could provide the support to the medical staff with greater flexibility and speed than was currently on offer, thus leading to improved efficiency in the overall process. To aid this, although the focus on the patient would be paramount in the physical location of the healthcare provider, the patient them self could contribute to this improvement through increased knowledge and preventative measures in their home environment (Womack and Jones, 1996). Womack and Jones (1996) muse on the idea of Lean thinking in healthcare as a fundamental principle, highlighting quality improvement in the care process due to improved information flow between health professionals, fewer mistakes being made, the need for less information systems and complexity in these systems and less rework due to increased and effective problem solving.

The idea of Lean being used in the service industries is further supported by other researchers who cite early examples of 'Lean' in services and healthcare in the 1990s (Bowen and Youngdahl, 1998; Åhlström, 2004) but that it is a matter of adaption of Lean by making changes to, and accepting different interpretations of Lean, rather than a straightforward adoption. Bowen and Youngdahl (1998) highlight the importance of

achieving Lean goals of quality, productivity and flexibility, through the organisation's employees, and highlight what they see as being Lean service attributes.

What is key to acknowledge are these attributes are not vastly different from the Lean concepts and techniques highlighted in Table 2-2 for manufacturing, as production flow, JIT, value and removal of non-value-added activities (waste) are all highlighted as part of Lean service characteristics, but adapted to suit the service context. There is also a focus on employees and their development highlighted here, which is aligned with discussion in Monden (1983), over training and skills and the contribution this can make to the organisation.

This move in focus from Lean as purely manufacturing based to being suitable for services was not a new phenomenon. There already was a pattern of manufacturing logic being transferred to services but a warning that service firms had to accept new ways of working were becoming apparent in the same ways that manufacturing firms had (Bowen and Youngdahl, 1998). Service firms such as Taco Bell and Southwest Airlines are held up as being examples of using a Lean service production-line approach by focusing on delivering value to customers. Although the identification of creating customer value can be a challenge, the authors conclude how manufacturing techniques can transfer to services and as a result, employee empowerment is recognised and viewed as *"true of the Lean approach"* (Bowen and Youngdahl, 1998:217).

2.4.1 Lean in the Public Sector

Although the musings of Womack and Jones (1996) about Lean being suitable for services were acted upon in the 1990s (Bowen and Youngdahl, 1998). In some cases this was demonstrated before the publication of Lean Thinking as highlighted in other publications (Karlsson and Åhlström, 1996). In the UK, Lean would be reviewed for its suitability in public services. The mid 2000s saw Lean brought to Public Sector consciousness as the way to improve public sector efficiency and effectiveness (Bhatia and Drew, 2006; Radnor and Walley, 2006; Bagley and Lewis, 2008). Governments internationally and in the UK, both national and devolved, were reviewing Lean and other process improvement methodologies (Bhatia and Drew, 2006; Radnor et al., 2006; Hines et al., 2008, Rahbek et al., 2011) in order to determine the benefits they might bring to public services. In Denmark, Lean was being applied, after endorsement at Government level but also in response to budget and staffing constraints which had been identified

(Rahbek, et al., 2011). In the UK, this focus on improvement methodologies came at a time when public sector organisations were subsequently to be challenged in their operating environment over government policies and financial pressures (McQuade, 2008; Crump and Adil, 2009). Successes included Lean being used to generate process improvements in Housing Services including the identification of 80 percent waste in systems as a result of duplication, re-work and silo working and improvements in repairs from 129 to 7.7 days, end to end (McQuade, 2008). Lean has been used as a learning curve in housing services. Senior managers now have a systems view of the organisation with managers and staff being hands-on and concerned about flow and the focus on the end customer, rather than just the part they play individually in their silos (McQuade, 2008). This organisation is intent on sustaining these practices to be "*an exemplar in our sector*" (McQuade, 2008:60), though this is not the case with all Lean implementations in the public sector. The sense of achievement can fail to drive forward subsequent continuous improvement targets, unlike in the private sector where achievements are not celebrated but there is still an on-going drive towards continuous improvement (Hines et al., 2008).

Hines, et al. (2008) highlights key issues for Lean and its modification in the public sector. This includes the recognition that a 'critical' focus on the human dimensions of Lean (more so than in manufacturing) was required and there were issues over the flow of communication/information. The authors went on further identify complexity viewed in the lack of focus (and perhaps experience) of change, issues over the identification of the customer, as one group (solicitors) were deemed to be partners, suppliers and customers and the use of manufacturing language where terminology more related to the public sector is required (Hines et al., 2008). Rahbek et al., (2011) also recognised challenges in resistance of staff when the Lean implementation doesn't quite go to plan, the impact of managers as change agents and successes being 'quick hits' rather than longer term, complex projects. The authors also conclude that their research from Denmark showed that findings which became apparent were not specific 'Lean' issues but were similar to those viewed in general change management projects (Rahbek et al., 2011:416).

2.4.1.1 Her Majesty's Revenue and Customs

Her Majesty's Revenue and Customs (HMRC) has been the subject of several publications reviewing Lean in the public sector and explicitly in government organisations (Radnor and Bucci, 2007; Radnor 2010b; Carter et al., 2011; Carter et al.,

2013; Procter and Radnor, 2014). The original HMRC research conducted in 2007 focuses on multiple Lean implementations organisation wide, was set within a change programme known as 'Pacesetter' (Radnor and Bucci, 2007; Procter and Radnor, 2014). Familiar Lean tools which are used such as process mapping, standard work, 5S, line balancing and the 'pull' of work were applied in HMRC (Radnor, 2010b).

Challenges became apparent in the HMRC study where tools and techniques were not always used effectively or being overly focused on targets rather than improvements. There also was a need by HMRC to implement standard processes but this was problematic going forward. Staff involved in the process were not consulted, and this meant the processes were deemed "*not fit for purpose*" by those involved in them which led staff to abandon standardised working in these areas (Radnor, 2010b:420).

In other areas though, staff had been consulted by their line managers, and were positive about Lean's participative nature (Procter and Radnor, 2014). These inconsistency issues in implementation are contrary to Lean literature which focuses on the need for involvement of those involved in the process making changes for improvement so they can own their processes going forward (Womack and Jones, 1996; Liker and Meier, 2006).

Although Lean literature (Womack et al., 1990, Womack and Jones, 1996), focuses on the end customer, this is one aspect that was perceived to have failed during the Lean implementation at HMRC at the expense of the improvement in productivity and errors, along with the softer aspect of 'staff motivation' (Radnor, 2010b).

Further work on HMRC also argued that there was a failure in the focus on the end customer in that Lean was detrimental to the members of the public in how tax returns would be managed resulting in inequality which could have implications in complex cases (Carter et al., 2011). Carter et al., (2011) further dispute the impact of Lean in the public sector, continuing to use HMRC as an example discussing how Lean has detrimentally impacted staff with a focus on targets, doctored figures and has had a negative impact on self-worth in relation to the identity of a public servant and worker who takes pride in their work. Radnor (2010b) does however evaluate that Lean can have a significant impact in the public sector but not in a form which can be taken, if using the aforementioned noted Lean literature, in its purist form as there are differences in language and understanding of Lean.

2.4.1.2 Categorising Lean in the Public Sector

Lean in the public sector differs from manufacturing and accepting the need for differences in language and understanding is key (Hines et al., 2008; Radnor, 2010b). Lean also differs in that it has been categorised into three main activity areas: assessment, improvement, and performance monitoring. Assessment involves reviewing areas of waste, assessing process flow and process and value stream mapping. Improvement activities involve staff and are commonly conducted through the use of Kaizen or Rapid Improvement Events (RIEs) which bring in the use of problem solving tools or use of 5S (sorting, setting in order, sweeping, standardising and sustaining). Performance monitoring measures the improvements made, usually through the use of visual standards and visual management tools (Radnor et al., 2012). However, although Radnor, et al., (2011), highlight the tools used as part of Lean activity areas, there is a need to understand Lean in the public sector, as it is not just about the tools and techniques, but also about the human aspects (behaviour and culture) in organisations which are using/intending to use Lean (Radnor, 2010b).

2.4.1.3 Frameworks for Lean Implementation

Although Radnor (2012) classified the Lean tools used as part of Lean activity, prior to this, consideration was given to frameworks (also encompassing tools) which could be used to support Lean implementations in the public sector.

Many of the elements evident in the discussion of Lean in manufacturing (sections 2.2 and 2.3) and subsequently, in this section of Lean in the public sector, continue to argue for a balance of hard Lean (tools and techniques) and soft Lean (a focus on the social aspects such as behaviours and leadership). Frameworks are there to guide Lean implementations and often, visually illustrate the key elements which should be considered as part of the implementation process so to ensure sustainability. Åhlström (2004) discusses the challenges in designing and using frameworks as; *"Weick's (1976) characterisation of social theories has been kept in mind. It is impossible for a framework to simultaneously be general, accurate and simple. The three dimensions are always in conflict with each other" (Åhlström, 2004:549).*

One framework which has been used to show the implementation of Lean is the Iceberg Model from Hines et al., (2008) which is shown in Figure 2-2. In the Iceberg Model, two main elements are presented: above the water for visibility are the technology, tools and

techniques of Lean and the processes they support. Below or underwater are the enabling elements for Lean such as strategy and alignment, but also the social aspects of Lean such as supporting leadership, behaviours and engagement. All of these are also evident in the work of Monden (1983), Ohno (1998) and Schonberger (1992). What is crucial, are that all elements are required not just those above or below the waterline (Hines et al., 2008).
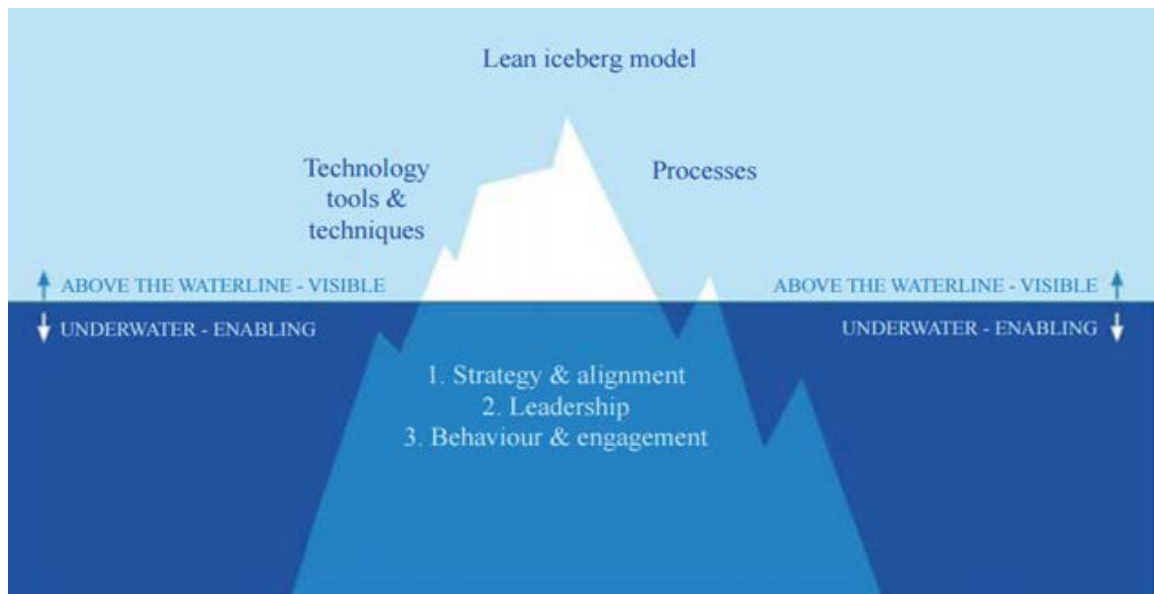
Figure 2-2 The Iceberg Model (Hines et al., 2008)

Radnor (2010) considers the Iceberg Model in reviewing the implementation of Lean in HMRC and its applicability but builds upon this to present the 'The House of Lean' for public services Lean implementation (see Figure 2-3). The House of Lean places a focus on the service nature of the delivery that public services are tasked with. She highlights managing demand and capacity as this has been challenging when reviewing public sector organisations (Radnor et al., 2006). As with the Iceberg Model, the alignment of strategy is also evident but there is also clarity over the tools which can be applied (such as 5S, process mapping and audit) and also the role of staff in the implementation process. The social aspects are considered within the role of staff, as there is discussion of development of staff as facilitators and the role of staff in visual management. Crucially, training and development of staff are the foundations of the implementation process which are also evident in the work Monden (1983) and Ohno (1998).
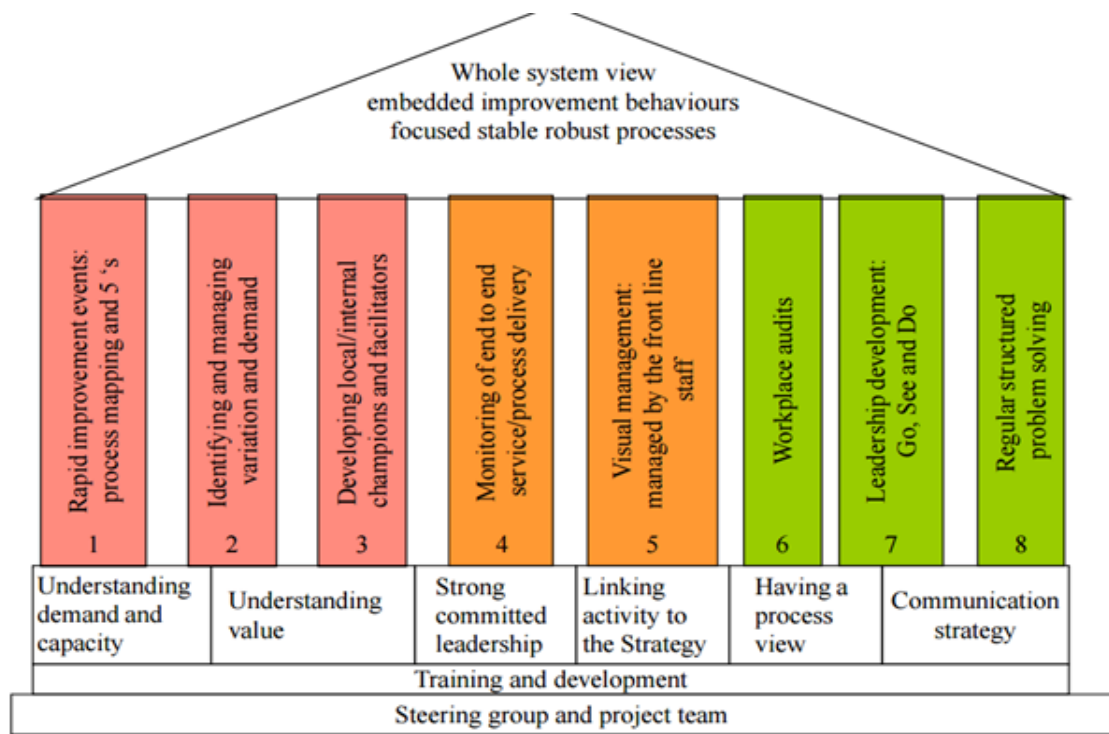
Figure 2-3 The House of Lean (Radnor, 2010)

2.4.1.4 Potential challenges for Lean in the Public Sector

Even with the use of frameworks to support the implementation process, care must be taken transferring methodologies such as Lean into the public sector as the characteristics of services will not lend themselves to complete transferability of these manufacturing applications (Åhlström, 2004). Hines and Lethbridge (2008) discuss the application of Lean in universities but illustrate the existing challenges of affecting change in academic institutions after noting that staff themselves do not feel empowered to affect change or staff not being comfortable with discussing 'customers' of which there are multiple levels. Scorsone (2008) discusses issues over customer identification, lack of a single goal in government and public administration, the various actors involved and the implications of process change within legal contexts which can be challenged.

Both Åhlström (2004) and Bowen and Youngdahl (1998) admit more work is required in the area of transferring manufacturing technologies into different areas, but there is a recognition that Lean and service can be linked and are proven as working in the areas they have identified in their case studies. Recently, Malmbrant and Åhlström (2013) still discuss the applicability of Lean in services, though Hadid and Mansouri (2014) discuss how an effective evaluation of the impact on performance from the application of Lean in services has been lacking.

Lean although it had been endorsed for use in the public sector, has been criticised as Lean is deemed to find the variability of customer demand problematic, the silo nature of working, contingency planning is lacking and there is a lack of linkage to strategy (Radnor and Walley, 2006, Radnor and Walley, 2008). Carter et al., (2013) criticise the target-driven nature and work intensification of clerical staff involved in Lean by linking to Lean negatively impacting quality and worker ill-health. By 2010, the transferability of Lean in the public sector was recognised as feasible and supported, but it is about adaption, rather than adoption and that very few organisations have fully committed to implementing the full Lean philosophy (Radnor, 2010a). Latterly, Radnor and Osborne (2013) were assessing Lean in the public sector as being defective due to a focus on tools in the implementation process, a lack of contextual understanding which included public sector culture, the impact of professional and managerial roles in Lean implementations and a lack of understanding of service management.

2.5 Exploring the application of Lean in healthcare

Literature has explored the adoption of Lean for the public sector (Radnor, et al., 2006; Radnor and Walley, 2006; Bagley and Lewis, 2008; Radnor, 2010a). There have been various articles published on the adoption of Lean in healthcare across the globe but many of these articles are concentrating on the process and operational benefits that Lean derives, and may concentrate on certain departments such as the Emergency department (Ben-Tovim et al., 2007; Dickson et al., 2009; Meyer, 2010; Holden, 2011). Many case studies on Lean are reporting the early stages of implementation and as such do not offer a longitudinal view of Lean in healthcare but they will be used to paint a picture of how Lean is adopted in the healthcare environment. In the United Kingdom (UK), The National Health Service (NHS) had commissioned work through its NHS Confederation to determine if Lean would be suitable for use in healthcare and from the initial results, through the utilisation of Lean at Bolton Royal Hospitals Trust, the report concluded;

"The Lean message is 100 per cent positive. Lean can improve safety and quality, improve staff morale and reduce costs – all at the same time. By freeing human potential it can add value to patient care and improve quality, and create a virtuous circle rather than perpetuating vicious ones" (Jones et al., 2006:23).

An early example of Lean being applied in healthcare was provided by Bowen and Youngdahl (1998) in their focus on Shouldice hospital in North America. Shouldice

Hospital is held up by Bowen and Youngdahl (1998) as an example of Lean 'service delivery' and the use of a 'production line approach' as it deals with the management of hernia repairs. The example of Shouldice shows the Lean approach. Patients are very active in the process which involves continuous flow and patient pull, knowledge sharing between patients, which in turn provides psychological benefits in the recovery process and frees up nursing staff to focus on areas where care is required (Bowen and Youngdahl, 1998). Senior clinical staff were also adopting Lean principles through standardised working by surgeons who use the 'Shouldice Method', and the set-up of the operating theatres. This way of working has resulted in this one procedure generating lower costs and improved recovery rates due to less complications (Bowen and Youngdahl, 1998).

2.5.1 Lean in healthcare

A selection of publications which deal with Lean in healthcare are shown in Table 2-3 below. One thing to note about this table is that many of the case studies are from hospitals in the USA, showing there is a need for literature which deals with Lean implementations in the UK and specifically in Scotland where the NHS differs (see section 1.3). The table presents the articles in date order, showing the progression of Lean from 2013, back to 2007.

Table 2-3 also highlights the focus on process and operational improvements in healthcare, and how there are areas of conflict in Lean in relation to people involvement but a lack of detail on how Lean affects those involved. Early discussions of Lean from 2007 onwards provide details of outcomes achieved (Ben-Tovim et al., 2007; Fillingham, 2007; Graban, 2009; Dickson et al., 2009) but articles from 2010 onwards begin to link to the challenges faced in Lean implementations (Grove et al., 2010; Waring and Bishop, 2010; Radnor et al., 2012).

Limitations of current publications are identified, citing the early nature of reports of Lean successes in healthcare and the need for not only longitudinal research but also research that focuses on people (Holden, 2011). This echoes calls discussed previously (section 2.3.1) that a focus of people within Lean has been lacking (Stone, 2012; Taylor et al., 2013).

This table is not intended to be a full review of all articles published on Lean in Healthcare, but a selection of some of the most cited articles[1]. As some of the literature encompasses multiple case studies which have been discussed elsewhere (Dickson et al., 2009; Graban, 2009; Holden, 2011), it is felt that further replication of this detail beyond Table 2-3 would add no value.

The original articles for example detailing Lean in healthcare from early adopters such as Flinders (Ben-Tovim et al., 2007), Royal Bolton (Fillingham, 2007; 2008) and Virginia Mason (Furman and Caplan, 2007) and Thedacare (Toussaint 2009a; 2009b) have been provided, rather than the examples from compilations or reviews of Lean in healthcare (Holden, 2011) and are referred to as the four main case studies. The articles in Table 2-3 however, encompass Lean implementations in healthcare in acute hospital settings in the UK, Australia and USA (Ben-Tovim et al., 2007; Fillingham, 2008; Graban, 2009; Meyer, 2010; Papadopoulos et al., 2011; Radnor et al., 2012), in mental health (LaGanga, 2011), and in community healthcare (Grove et al., 2010). A review into the extent of Lean in healthcare in the English NHS context is also provided which showed progression in the application of Lean but also variation in approaches (Burgess and Radnor, 2013).

Some of these individual cases are further discussed in the literature review so that key findings and correlations between case studies can be noted and potentially used within the research project to investigate how Lean is used in the NHS in Scotland through the example of the case study organisation of NHS Lothian.

Table 2-3 Lean in healthcare literature (2007-2013)

Article	Description of study	Key Findings/Issues
Burgess and Radnor (2013) 'Evaluating Lean in healthcare'	Classification through content analysis of Lean approaches in the English NHS trusts	- 2007-2008, 53% of trusts are discussing Lean implementation in their annual reports and by 2009-2010, this has risen to 78% - Variations in how Lean is applied from a few projects to full improvement programmes. - Move from few projects to a more systemic approach by 2009-2010. - Some Lean implementations appear to suffer from sustainability issues with Lean being reported in 2007-

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[1] Citations checked on Google Scholar, the last time being 9th June 2015, with Holden (2011) being the most cited of these articles with 170 citations, followed by Radnor, Waring and Holweg (2012) with 160 citations and Fillingham (2007) with 154 citations.

Article	Description of study	Key Findings/Issues
		2008 but no discussion by 2009-2010.
Radnor, Holweg and Waring (2012) 'Lean in healthcare: The unfilled promise?'	4 case studies in the English NHS	- Disjointed application with small scale activities taking place but a lack of a systems view. - Tools based approach with a narrow range of tools applied and an over reliance on RIEs. - Lack of knowledge about what Lean actually is. - Lack of sustained improvements.
Papadopoulos, Radnor and Merali (2011) 'The role of actor associations in understanding the implementation of Lean thinking in healthcare'	Study of a Pathology unit of an NHS Trust, where Lean was being implemented through the use of Actor Network Theory (ANT) (UK)	- Those involved in the implementation (the actors) took on roles which would affect the dynamics of the Lean implementation. - No single actor had influence. - The actors determined the trajectory and outcome of Lean. - Process of "negotiations, articulations and conflicts" (p.184).
LaGanga (2011) 'Lean service operations: reflections and new directions for capacity expansion in outpatient clinics'	Capacity problems in mental health services – challenges in capacity, overbooking and no shows (did not attend) in Denver USA	- Quantitative data analysed of 1726 appointments that took place pre and post Lean project. - 27% increase in capacity for new patients. - 12% reduction of did not attend due to improved processes. - Development of further Lean improvements into the organisations strategic plan.
Holden (2011) 'Lean Thinking in Emergency Departments: A Critical Review'	Review of 18 Lean implementations in 15 Emergency Departments (EDs) in Australia, Canada and the United States	- Lean appears to offer significant improvements in Emergency Department (ED) such as; process flow, standardised procedures/forms and improved communication. - Process change is a key component of Lean in the ED. - Need for longitudinal research. - Lack of detail on effects (directly and indirectly) of Lean on employees.
Waring and Bishop (2010) 'Lean healthcare: Rhetoric, Ritual and Resistance'	Study of a Lean implementation in an NHS operating dept. (UK).	- Lean acts as a challenge to power within healthcare. - Lean can contribute to evidence based work, new forms of clinical leadership and the re-determination of occupational boundaries.

Article	Description of study	Key Findings/Issues
		- Rhetoric – showed use of language in selling Lean to health care workers. - Ritual – "accepted patterns of routines, customs and order emerged" (p.1336) - Efficiency gains and improved work flow emerged. - Resistance: issues not limited to one single group, cynicism over methods and aims.
Meyer (2010) 'Life in the 'Lean' Lane: Performance Improvement at Denver Health'	Lean – performance improvement (US)	- Cost savings and revenue gains worth $54 million from Lean. - Improvements in ED waiting times for patients. - Issues in Lean – employee relations. - Lean is process and operationally based but other non-Lean aspects are required for addressing attitudes of clinicians who block changes.
Grove, et al. (2010) 'UK health visiting: challenges faced during lean implementation'	Health visiting in a UK primary care trust	- Many of the current studies are within hospitals. - Poor understanding of Lean by the project team. - Issues over communication and leadership as working in the 'community' causes issues and results in limited achievement and sustainability of Lean goals. - No strategic planning for Lean. - Challenges over customer focus on Lean – who is the customer in healthcare as so many stakeholders (33 identified)?
Dickson, et al. (2009) 'Use of Lean in the Emergency Department: A Case Series of 4 hospitals'	Effects of Lean on four emergency departments in the US	- Length of stay reduced. - Greater results where employees actively engaged with Lean. - Lean outcomes affected by leadership commitment to Lean. - Closer Lean is to the original Toyota ideal, the better Lean works initially.
Graban (2009) 'Lean Healthcare'	Lean healthcare 'success' examples from US healthcare	- Turnaround time for a laboratory improved by 60% with same level of resources. - Reduced deaths by 95% in relation to central line infections. - Orthopaedic surgery waiting time reduced from 14 weeks to 31 hours.

Article	Description of study	Key Findings/Issues
		- Savings of $7.5 million from Lean rapid improvement events in 2004 and savings reinvested into patient care.
Toussaint (2009a) Writing the New Playbook for US Health Care: Lessons from Wisconsin	How Lean is being applied in Thedacare (Wisconsin, USA)	- 3 years of using the TPS to reduce waste and medical errors has resulted in 5% of annual revenue saving. - Around five Kaizen projects a week being conducted. - Positive impact on mortality rates in Coronary Bypass: in 2002, 4% morality rate. Down to 1.4% by 2008 and for six months of 2009, there was a 0% mortality rate. - Need for change in healthcare performance in the US. - Has to involve culture and behaviour change towards continuous improvement, and a move away from command and control.
Toussaint (2009b) Why are we still underperforming?	Challenges in US healthcare and how Lean is meeting these challenges in Thedacare	- Thedacare Improvement System is based on the TPS and is their methodology for improvement. - All staff have to be involved in making changes otherwise, these will be temporary solutions from Lean.
Ben-Tovim, et al. (2007) 'Lean thinking across a hospital: redesigning care at Flinders Medical Centre'	Lean implementation (Australia)	- Reduction in 'did not wait' patients, from 7% to 3%. - Reduction in waiting times in ED. - Improvement in bed management processes. - Challenge in moving away from 'command and control' management to facilitating problem solving in Lean.

Article	Description of study	Key Findings/Issues
Ben-Tovim et al., (2008) 'Redesigning Care at the Flinders Medical Centre: Clinical Process Redesign using 'Lean Thinking'	Discussion of Flinders Lean implementation	- Started 2003 in ED and has progressed through hospital. - Safer care provided even with increased demand. - Saved 15,000 bed days to date of reporting.
Ballé and Régnier (2007) 'Lean as a learning system in a hospital ward'	Lean and learning in healthcare (France)	- Lean outside of the automotive industry is a challenge and a system which must be constructed by ward managers, matrons and nurses. - Need for basic stability in the working environment – which has shown to be problematic. Took around a year to embed standardising practices. - Issues over maintaining basic 'Lean' environment before moving on to specific tasks involving patients. - Results though were good once stability achieved – reduction of probability of a patient having an accident by 45%
Furman and Caplan (2007) 'Applying the Toyota Production System: Using a Patient Safety Alert System to Reduce Error'	Implementing the TPS for Patient Safety (Virginia Mason Medical Centre (VMMC), USA)	- Inappropriate physician behaviour was deemed to be a Patient Safety Alert (PSA). - Nurses quick to adopt the system and report PSAs. - Initial barriers to adoption: traditional healthcare hierarchies (clinicians in the hierarchy), discretionary working. - Tough stance taken for 'inappropriate behaviour' of 44 employees with suspensions (60%) and 30% terminated. - Strong Executive Leadership required.
Fillingham (2007) 'Can Lean save lives?'	Lean implementation in NHS Trust (UK)	- Experience that Lean 'can save lives'. - Better multi-disciplinary team working. - Total length of stay reduced by 33%. - Mortality reduced by 36%. - 42% reduction in paperwork.

Source: Created by the author

2.5.2 Early adopters – commonalities within cases

The four main case studies as early adopters of Lean are shown in Table 2-3, and all have commonalities when reviewed together. These are summarised in Table 2-4 below. Each of these articles were selected for comparison as the author has been involved in the implementation of Lean in their organisation. Social issues within Lean implementations are mentioned and specifically professionalism and hierarchy in healthcare, but often they are not discussed in detail as to the explicit impact they may have had on the progress, timescales and sustainability of Lean projects in the hospital environment.

This is evident in the case of Fillingham (2007) as this is only expanded upon briefly in his 2008 book on Lean in Healthcare. Fillingham describes hospitals as 'curious institutions' and recalling a conversation about hospitals being made up of 'feudal baronies' as "*these were the various medical specialities each headed by a powerful group of senior (often older!) Clinician's. These baronies are organised vertically and hierarchically, but patient journeys flow laterally across the hospital. There is therefore a need for these baronial fiefdoms to collaborate and synchronise their activities*" (Fillingham, 2008:43).

Furman and Caplan (2007) discuss applying Lean to the reporting of safety issues (patient safety alerts or PSAs) and evaluate the behavioural impact on healthcare, leading to hierarchies. Inappropriate physician behaviour was deemed to be a PSA and non-conforming staff would be taken off line or terminated (see Table 2-3). The article does not state if a particular group (nurses, doctors, pharmacists or other healthcare workers) were predominantly in the group of those taken off line in the first place or terminated after the failure of remedial plans (Furman and Caplan, 2007).

VMMC is the only case organisation in this group who did not make explicit reference to a crisis point prior to the introduction of Lean (Furman and Caplan, 2007), unlike Bolton who needed Lean to survive (Fillingham, 2007) or Flinders where safety of care was being compromised (Ben-Tovim et al., 2007). However, although all hospitals discuss Lean, a focus on quality and safety and the improvements which were generated as a measure of Lean success. The included improved patient throughput against higher demand (Ben-Tovim, et al., 2007 and 2008; Fillingham, 2007), improvement in reporting safety incidents (Furman and Caplan, 2007) and an improvement on savings (Toussaint, 2009a;

2009b). All cases discuss their organisational ownership of Lean programmes through own branding and the training offered to staff within Lean.

Table 2-4 Early healthcare adopters of Lean (commonalities within studies)

Commonality	VMMC Furman & Caplan (2007)	Thedacare Toussaint (2009a & 2009b)	Flinders Ben-Tovim, et al. (2007 & 2008)	Bolton Fillingham (2007 & 2008)
Crisis Point	Not explicit	✓	✓	✓
Organisational Ownership	✓	✓	✓	✓
Focus: quality and safety	✓	✓	✓	✓
Measured improvement	✓	✓	✓	✓
People Issues	✓	✓	✓	✓
Professionalism/hierarchy	✓	✓	✓	✓

Source: Created by the author

2.5.3 Working towards a successful Lean state

Table 2.4 in all four case studies highlights organisational ownership. The organisational ownership of Lean programmes is viewed as important to help embed Lean within the organisation by creating a shared language, shared ways of working, as well as providing training and education on the methodology (Ben-Tovim et al., 2007; Fillingham, 2007; Furman and Caplan, 2007; Toussaint, 2009a). This places the focus on Lean as a learning activity as in order to improve processes, the people behind these processes have to improve on what they themselves do (Ballè and Règnier, 2007; Furman and Caplan, 2007; Ben-Tovim et al., 2008; Toussaint, 2009a). This moves beyond the traditional focus on the Lean tool set and improvements, which the aforementioned case studies have concentrated on, into looking at Lean which must be constructed by the social actors

involved in healthcare provision who will better understand and improve their own practices (Ballè and Règnier, 2007). This focus on developing Lean in the healthcare environment is not about rushing straight into projects involving patients but by achieving 'basic stability', empowerment of staff and maintenance of the working environment, which may appear straight-forward, but in one case study, took one year to achieve (Ballè and Règnier, 2007).

It is the social elements of Lean which are most important in the healthcare environment, given that care is delivered by people for people. Mann (2009) suggests 20 percent of Lean implementation effort is tool based but 80 percent of effort is in dealing with social issues. It is this 80 percent of effort in managing the social issues in Lean which, depending on whether the organisation takes a tools-based or social focus, will impact the potential for the sustainability of Lean in the organisation (Mann, 2009).

The limited focus on the social aspects of Lean, including where Lean has to be adapted and negotiated by various groups, has been noted in literature (Joosten et al., 2009; Pettersen, 2009; Papadopoulos et al., 2011; Stone, 2012). However, more recent work is at least starting to acknowledge this lack of focus and highlights some key issues facing Lean in healthcare. Some of these later studies review Lean from beyond the operations management discipline (Waring and Bishop, 2010), making the case for a multi-disciplinary approach (Taylor and Taylor, 2009) or using theories out-with the operations discipline to understand Lean in process improvement (Papadopoulos and Merali, 2008; Papadopoulos et al., 2011).

Papadopoulos et al., (2011) review Lean implementations in healthcare through the lens of Actor Network Theory (ANT). In their case, they review Lean through the action and events of the actors and the networks which includes reviewing both human and non-human aspects (Papadopoulos et al., 2011). Through the use of ANT, the authors argue they were able to reveal the turbulent nature of change, showing how networks viewed as 'incompatible' were able to come together. However, there was no single actor who held enough influence for other actors to join networks (Papadopoulos et al., 2011).

2.5.4   Issues in Lean healthcare

Even though the research discussed in Table 2-3 was conducted within the healthcare environment, there is a lack of discussion in the literature over functional and professional silos and the impact this has on the Lean implementation which is recognised as a barrier

to Lean healthcare (Radnor et al., 2006; Brandão de Souza and Pidd, 2011). There has also been a lack of discussion over dual managerial and clinical authority in healthcare (Young and McClean, 2008).

Advice over the adoption or adaption of Lean is contradictory for organisations considering embarking on a Lean journey. Bolton hospitals' Lean implementation is one of those recognised in literature as a success (Holden, 2011; Radnor et al., 2012). Bolton began their Lean journey with the aid of an external management consultancy company who advised Bolton to customise and adapt Lean for themselves (Fillingham, 2007). However it has also been advocated that the closer Lean is to the original TPS, implementation outcomes will be improved (Dickson et al., 2009).

Training in Lean is important with Table 2-4 demonstrating organisational ownership, usually through their own 'Lean Teams' who provide project support and training and development but where training has been mentioned in other cases (Holden, 2011), it has been referred to as '*a brief orientation*' which may be problematic going forward.

Often many of the managers who will be responsible for implementing/managing Lean will require training in the methodology as they themselves have had little formal training in quality methodologies and improvement tools and techniques (Fillingham, 2008). Even when these tools and techniques are taught, Lean in healthcare is said to involve a narrow tool-based approach which is usually focused at pre-existing operational tensions at service level in the hope of quick gains and problem resolution (Radnor et al., 2012).

The nature of healthcare and the suggestion that Lean may not be as easy to implement in healthcare is explored tentatively beyond the operations management domain by Waring and Bishop (2010) as it takes into accounts the 'rituals' associated with healthcare. These rituals include status, roles and group membership and how converts to the Lean methodology, such as clinicians, bought into Lean though practices, language and philosophy (Waring and Bishop, 2010:1337). This was not the case for all clinicians and subversion with superficial support was also observed. The notions of power and resistance also became apparent and came into conflict with Lean, with the belief that quantity of work was taking priority over the quality of work, previous ways of working were less time consuming than new checks and the identification with professionalism. This professional identity was apparent where staff who were higher in the medical

hierarchy (Anaesthetist), were reluctant to take on roles previously conducted by lower grade staff (nurses) (Waring and Bishop, 2010).

Latterly Drotz and Poksinska (2014), recognise challenges for Lean practices of teamwork and decentralisation of power, where traditionally power and professional cultures are dominant in healthcare. The silo nature of public services and in particular in healthcare, where processes are organised by functional or professional disciplines also pose challenges or act as a barrier to Lean (Radnor et al., 2006; Brandao de Sousa and Pidd, 2011), especially where a lack of wider thinking across the whole process pathway impacts progress and performance (Radnor et al., 2012).

This idea of professional identity and professional roles within silos in healthcare structures requires further exploration given the impact it can have on Lean implementations (Stanton et al., 2014). It is already recognised that where Lean can generate real process and operational benefits, the role of professional groups such as clinicians and their attitudes towards Lean (and within quality improvement, generally) is somewhat neglected in literature and must be further explored (Øvretveit, 2005; Meyer, 2010).

2.5.5   Lean Criticism - Healthcare

The original, widely accepted 'Lean' literature (Womack et al., 1990, Womack and Jones, 1996) focuses more on the process improvement in organisations and the wider supply chain, than the human relationships and dynamics involved in Lean implementations which will have a greater impact in the public sector (Hines et al., 2008). Hines, et al., (2004:998) note that one criticism of Lean is "*the lack of consideration of human aspects*" and the consideration and 'respect-for-humans' aspects already discussed (Monden, 1983) in section 2.3 are essential in aiming for sustainability of any Lean programme as Lean is more than about tools and techniques (Liker, 2004, Mann, 2005).

Later Lean healthcare literature discussed in Table 2-3 (Meyer, 2010; Holden, 2011) again provides accounts of Lean performance and process improvements but neglects the '*social factors'* of Lean, and acknowledges this is an area where more work is required.

Waring and Bishop (2010) warn that Lean may not survive the transition to healthcare 'fully intact' and argue that there is a lack of research that explores the implementation process and clinical practice. Radnor et al., (2012) critique less the methodology of Lean

but the implementation of it in healthcare and distinguish that Lean is in its infancy in healthcare despite the increased focus. However healthcare applications of Lean are over reliant on a tools based, localised approach where a philosophical and system wide approach is required to fully realise the benefits Lean can bring.

The work of Lindsay et al., (2014) demonstrates both positive and negative aspects of implementing new technology as part of working Lean such as the negative impact of staffing models and their 'leanness' and some employees feeling isolated using the technology as they were removed from the patients and other colleagues. Positive aspects were based on team working and rotation between teams to develop new skills and experiences and improving services for patient benefit (Lindsay et al., 2014).

In reviewing change through the use of 5S projects in the NHS, reference is made to the adoption of the command and control mode for managing the change process (Esain et al., 2008). However it is endorsed by those leading Lean implementations that there is a need to move away from command and control in healthcare (Furman and Caplan, 2007; Toussaint, 2009a and 2009b). It may well be that this association with command and control in management and change could lead to the association of dealing with Lean and associated tools and techniques as Theory X (Pettersen, 2009) as discussed in section 2.3.3. Lean success is associated with its participative nature (Proudlove et al., 2008) which would be aligned with the view provided by Liker and Meier (2006) and which is at odds with the theoretical underpinning of McGregor's Theory X (McGregor, 1960). Reviewing the early Lean literature (section 2.3) which places a focus on the social aspects of Lean and how workers have the ability to solve and remove problems in the workplace, it may well be that the focus on outcomes (improvements, efficiency and cost reduction) has removed the focus from the involvement of those who have contributed to these outcomes and their experiences in the workplace. It is clear to this point, that the 'social' (human behaviour) aspects of Lean come secondary to the focus on process focused literature (Joosten et al., 2009).

2.6 Summary of Lean literature

As was discussed in this literature review from sections 2.1 through to 2.5.5, Lean has evolved from its initial origins in car manufacturing as the Toyota Production system and has been implemented in public sector organisations and healthcare for the improvement of quality. A key pillar of the Lean methodology is focus on respect for people (Monden,

1983; Ohno, 1988; Liker and Meier, 2004) which was also a focus in scientific management (Gilbreth, 1914; Gilbreth, 1917). However, these social aspects of Lean have been neglected at the expense of reports of outcomes from Lean (Hines et al., 2004; Stone, 2012; Taylor et al., 2013) and this requires a greater focus in the public sector and healthcare (Øvretveit, 2005; Hines et al., 2008).

The focus on the implementation of Lean in healthcare had not been attempted as a whole before 2005, and by 2005, only three hospitals, two of which were in the USA (Virginia Mason, Seattle and Thedacare in Wisconsin), and one in Australia (Flinders in Adelaide) were embarking on the Lean journey (Ben-Tovim et al., 2007; Fillingham, 2007). Shortly afterwards they were joined by the Bolton Hospitals NHS Trust in the UK who expect to be on a 10-20 year Lean journey (Fillingham, 2007). There is very little published literature on full Lean deployment as the cases noted above commonly report the early stages of implementation and full detail on the process of implementation is lacking in healthcare. It is questionable as to whether healthcare organisations who claim to be Lean, are indeed truly Lean (Radnor et al., 2009; Burgess and Radnor, 2013) as Lean 'longevity' in healthcare is yet to be viewed (Mazzocato et al.,2014). The use of Lean in healthcare is supported in the National Health Service (NHS) due to the social and inclusive focus but this requires a focus on the implementation process, rather than on techniques (Proudlove et al., 2008).

The studies discussed greater in detail in section 2.5.2 focus on the process and operational improvements from Lean, at the expense of providing real and in-depth detail of the social relationships and impact of the Lean implementation. Section 2.5.4 links to issues faced in Lean implementations which have received limited reporting in literature to date and discussion links to the dynamics of the healthcare environment. This consequently highlights a need for a greater focus of the healthcare environment to illustrate where those issues are that can affect Lean implementations.

However, despite the experience of other methodologies being used prior to Lean in healthcare, it has been noted that Lean appears to be following the trajectory of previous methodologies with inconsistent adoption as "*practice may be pragmatic rather than pure*" (Young and McClean, 2008:385). Waring and Bishop (2010) also warn that Lean may not survive the transition to healthcare 'intact'.

Consequently, after the discussion in this section of the literature review, the following areas have emerged for further consideration:

- How is Lean applied in healthcare? Is the focus on the implementation process rather than just the tools and techniques applied?
- What is the impact of Lean in organisations beyond the initial 2-3 years of implementation?

As this literature review has assessed, although there is obvious support and possibility for the use of Lean in the NHS (sections 2.5 to 2.5.5), there are limitations in existing literature, as yet unexplored through the lens of Lean. These unexplored avenues could affect the widespread adoption of the Lean methodology, in Scotland, the UK, and also for those healthcare organisations internationally. The following sections of this literature review will discuss other improvement initiatives which have been implemented in the NHS, as these aspects may have further implications for the implementation of Lean in healthcare.

2.7 Focusing on the healthcare environment

The need for a focus on quality and efficiency in the provision in healthcare are not new calls, and have been consistently made throughout the life span of the NHS (Ham, 2004; Klein, 2010). These calls for a greater focus on quality and safety have increased with governments and health advisors supporting this as is the case with Lean (Scottish Government, 2010). However these calls have also come at a time when budgets are under threat (Crump and Adil, 2009; Klein, 2010). The following sections will examine the relationship between quality in healthcare and those who are tasked with providing this quality as this may uncover further challenges for Lean in the healthcare environment.

2.7.1 Quality, safety and the NHS

During the 2000s, multiple publications and campaigns have been released from government and health departments focusing on the need for quality and safety improvement in healthcare provision (NPSA, 2004; NAO, 2005; DoH, 2008; NHSIQ, 2015). Although devolution in 1999 means all four nations may have differing approaches to NHS initiatives, the NHS in England has participated in a greater amount of initiatives and as such, this is reflected in the focus of many of the academic articles which have been published (Davies, et al., 2007). Many of those initiatives originating in the NHS in

England can be found to have their Scottish equivalents or are adopted such as the Productive Series (also known in Scotland as Releasing Time to Care from the Productive Ward programme [2]) which originated from the NHS Institute for Innovation and Improvement. In Scotland, calls to focus on quality and safety in healthcare in the UK have manifested itself in the Scottish Patient Safety Programme (SPSP). SPSP is centrally organised and supported by NHS Scotland and the Scottish Government but is also a network of clinical professionals driving and undertaking improvements in the provision of care. SPSP is described by Don Berwick, former Chief Executive Officer and President of Institute of Healthcare Improvement (IHI) as "*The Scottish Patient Safety Programme is, without doubt, one of the most ambitious patient safety initiatives in the world – national in scale, bold in aims, and disciplined in science. It harnesses the energies and wisdom of Scotland's healthcare leaders – all aligned toward a common vision, making Scotland the safest nation on earth from the viewpoint of healthcare*" (Healthcare Improvement Scotland, 2015).

So, what is quality improvement (QI) in healthcare? The subjective nature of what quality actually is and how it is perceived means definitions will vary, but for simplicity the definition from Esain, et al., (2012:565) is utilised here as "*QI is a service improvement that satisfies patient demand, clinical needs and patient and carer wants*."

For several years now, the NHS in both England and Scotland has looked to the manufacturing sector for improvement methodologies to combat the growing problems in tackling not only demand and capacity, service provision, but these aforementioned issues around quality and safety in the NHS. This growing interest in the application of quality methodologies in healthcare for quality improvement is discussed in terms of what healthcare can learn from industry (Komashie et al., 2007; Crump and Adil, 2009; Marshall, 2009).

However, the application of these quality methodologies is considered to have been undertaken in 'a piecemeal fashion' (Proudlove et al., 2008). Total Quality Management (TQM) with its inclusivity and focus on education and training to improve quality, (Øvretveit, 2000; Jackson, 2001) and Six Sigma are two methodologies. There are notes of lessons that can be learned from both TQM and Six Sigma implementations. With

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[2] The Productive Series is designed to support NHS staff in the redesign of processes, utilising improvement techniques adopted from manufacturing industries and applying them to healthcare to improve care and reduce costs. The programme encompasses seven components including the Productive Ward (PW) and The Productive Operating Theatre (TPOT) (www.institute.nhs.uk, 2013).

TQM, failures are attributed to senior leaders who are not committed to the methodology or who maintain control of work processes and physicians who are not as involved as they should be (Böhmer, 2009). Lessons that can be learned from Six Sigma in Lean implementations include ensuring clear linkages between projects and strategy and avoiding the Six Sigma weakness of a lack of focus on people (Proudlove et al., 2008).

The need for the development of a culture of quality in healthcare (which includes measurement) is noted in order to contribute to continuous improvement sustainability (Stahr, 2001). However, challenges are discussed in access to data in the healthcare field with data availability polarised as '*information overload*' or '*information poverty*' (MacDonald et al., 2010) which may have implications where data are used for engagement and sustainability (Al-Balushi et al., 2014).

The calls to increase healthcare quality continue throughout the 2000s with recognition that although there are lots of quality initiatives implemented, little is documented on the effectiveness of these efforts (Ruiz and Simon, 2004). Authors concentrate on the specific problems within the NHS such as improvements in mortality rates through the use of quality methodologies and techniques (Gilligan and Walters, 2008) and again are focusing on the ideas of quality and the benefits of quality improvements in hospital flow, though there is no link to the specifics of healthcare culture here.

Bate et al., (2008) attempt to address this by a collection of case studies about leading hospitals in Europe and the United States which include two cases from the NHS in England. These cases link to the softer aspects in quality improvement and discuss culture, identity and empowerment (Robert and Bate, 2008; Robert et al., 2008). The case of Exeter NHS Trust was triggered by a crisis involving the scandal of misreporting radiology scans where patients later died of cancer (Robert and Bate, 2008). This Trust had a reputation for clinical excellence but specialist services in some areas had medical staff with a history of being difficult. Local ownership of quality improvement was taken on and supported by the existence of strong relationships between clinical and managerial staff. There was recognition in this case that organisational and professional identity could determine the success of quality initiatives. The outcomes were favourable with continuation and engagement in staff in quality initiatives but the authors note "*such efforts often require overcoming not only a great deal of ambivalence among clinicians, but in many cases cynicism*" (Robert and Bate, 2008:51).

Robert et al., (2008) discuss the case of Peterborough and Stamford NHS Trust focusing on empowerment within quality in linkage to the organisational strategy, top leadership support and employees trusted to enact improvement. Again it is noted that a 'sceptical' clinical audience was present who not only needed to be convinced, but were also needed to take ownership of improvements. By 2008, the focus on quality improvement is moving towards Lean, with language of flow and pull of patients being used (Gilligan and Waters, 2008). Proudlove et al., (2008) recognise the move towards Lean when they report the use of Six Sigma in the NHS and lessons Lean can learn around structured methodology, project teams, staff engagement and customer identification. This focus on patients continues, with the need to have more user centred designed services (Mugglestone et al., 2008), a call which has been reiterated in 2015 (Robert et al., 2015).

There appears to be little evidence of healthcare recipients making demands for quality within healthcare (Komashie et al., 2007) and it seems the idea of quality within healthcare has come from within the NHS and government and was certainly recognised by the Scottish Executive (Scottish Executive, 2000). However, although this demand for quality in healthcare has originated from the NHS and the government, it has been somewhat more elusive to attain and still healthcare professionals and politicians are highlighting this as an area for concern.

This in part could be influenced by those involved in healthcare provision. Both Clark and Armit (2008) and Fillingham (2008) deduce that health care professionals, as well as managers, have received little training and education in quality improvement methodologies and tools, or basic problem-solving abilities. If skills are lacking in this area, it will be more complex to work within formal systems known for making quality improvements such as Lean. However, this can prove difficult when there is already ambivalence, scepticism and cynicism (Robert and Bate, 2008; Robert et al., 2008). This is further argued by Davies et al., (2007) who discuss healthcare professionals as being reluctant to engage in quality improvement. Four years on, Wilkinson et al., (2011) evaluate there being little evidence on the same group engaging in 'systematic' improvement initiatives focusing on quality.

2.8 Complexity in the NHS – ownership of quality

Mazzocato et al., (2014) concluded that Lean is being complicated by complexity and must be adapted to this complexity within care processes which would be organisationally

dependent. For healthcare improvement, it is not as simplistic as improving quality by teaching new methods and introducing new tools due to the staffing and structure of healthcare organisations. The nature of change in healthcare and how the introduction of quality methodologies such as Lean involves new ways of working and is fundamentally organisational change (Mann, 2009) presents challenges in healthcare organisations. This need for change of cultures and behaviours (Fillingham, 2008; Toussaint, 2009b) and new ways of working means that in the context of change in healthcare, change has been observed as being driven by clinical directorates and operational management (McBride and Mustchin, 2013). This is a key aspect when reviewing quality and those working within the NHS and the potential impact this can have on Lean due to the need to focus on the social aspects (Hines et al., 2008) and especially the role of the professional in delivering quality improvement (Øvretveit, 2005; Stanton et al., 2014). There are already well-documented hierarchical professional structures in the NHS and the complexities this results in due to the professional autonomy held by doctors and their ensuing problems with bureaucracy (Davies, 2007). Indeed, determining who is actually responsible for quality or involved in quality initiatives can bring aspects of quality and professionalism on a collision course (Davies et al., 2007; Wilkinson, 2011). Quality can be viewed as providing management with increased knowledge and influence over the previous autonomous workings of the professional groups, resulting in less professional discretionary judgements and more explicit standardised working, as determined by management (Harrison and Pollitt, 1994; Wilkinson, et al., 2011).

The politics of this autonomy and its impact on power, control and status in the hospital has been explored in literature (Currie et al., 2009; Klein, 2010; Currie et al., 2012). It is an historical issue in healthcare in the UK, that there are pre-existing relationship issues between clinical staff and managers, failing as a consequence of the changing NHS structure, political influence and managerial attempts at command and control (Harrison and Pollitt, 1994; Marshall, 2009; Klein, 2010). However, despite inconsistent policy making and the rise of the NHS manager, it is still medical staff that hold power and this has been recognised in changing roles (Currie and Suhomlinova, 2006; Martin et al., 2009; Currie et al., 2012; Currie and White, 2012).

2.8.1 Doctors and NHS Management – dual roles

Doctors were encouraged to move into management and General Management positions with responsibilities for budgets after the recommendations of the Griffiths Review

(1983) threatened their power in hospital decision-making (Webster, 1998, Ham, 2004; Klein, 2010). The medical profession were also quick to offer their views that doctors had to be more involved than management than they had been before and this would have to involve the management of hospital budgets and services (Ham, 2004). Though the reforming of roles and professional boundaries is usually complex and requires support of the relevant professional body (Hyde et al., 2005), in the case of doctors, this was endorsed by associations such as the British Medical Association (BMA), as the driver for moving into management was to gain greater control (Webster, 1998).

Doctors moving into management is not a phenomenon restricted to the NHS and can be viewed in other countries (Degeling et al., 2006). This move into management brings its own set of complexities as many doctors struggle to balance the attitudes and beliefs of their profession with their management roles (Degeling and Carr, 2004). This role conflict is discussed as bringing with it contradictions and ambiguity, rather than clarity (Iedema, et al., 2004). The doctor as holder of both identities as a doctor and a manager is known as a hybrid manager and has been the subject of recent research (Ham, et al., 2011; McGivern et al., 2015; Spyridonidis, et al., 2014) in how they identify with and adapt to their dual roles. Croft et al., (2014) argue that medical staff as hybrids are able to adapt and manage their dual identities as manager and medical professional far better than other professional hybrids such as nurses. This may be facilitated by credibility gained from medical colleagues and still practicing as a medical professional, though those who move higher in management, such as to Chief Executive level may switch identities and rather identify as doctor first, manager second, the manager may come first (Ham et al., 2011).

However, Ham et al., (2011) still evaluate the hybrid role as being fragile and support previous research which identified the lack of a 'coherent work identity' of hybrids (Ham, et al., 2011, citing Fitzgerald, et al., 2006). In reviewing the work of Collaborations for Leadership in Applied Health Research and Care or CLAHRC[3] , the identities of these hybrids were evaluated with those who engaged (innovators), the sceptics who modified their work to suit their own objectives or those who varied their engagement based on their own assessment of the impact of this work on their professional (medical) identity (Spyridonidis et al., 2015). It was also illustrated by the same authors how quality improvement was viewed by some of these CLAHRC professionals to impact

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[3] CLAHRC – NHS England arrangement for the facilitation of knowledge into practice involving academic involved in health services research, NHS managers and hybrid doctor-managers to improve quality and outcomes in healthcare (www.clahrcpp.co.uk, 2015).

(negatively) on their discretion and autonomy as a professional in these changing organisational structures (Spyridonidis et al., 2015).

2.8.2   Management and Leadership Skills for Doctors

As the focus in the NHS is increasingly moving towards effectiveness and efficiency, new roles and the need for new skills are becomingly increasingly important in the NHS (Hyde et al., 2005; Spyridonidis, et al., 2015). Doctors are doctors and have been trained as such, not trained as managers (Clark and Armit, 2010). As in the previous discussion, the balancing of these identities can have differentiated outcomes and can impact on quality improvement. The role of doctor-manager or clinical leader is complicated by their desire to act as a clinician with balancing the bureaucracy that comes with a management role (Iedema et al., 2004; Ham et al., 2011). This identity challenge is further affected by the skills of this group in management and leadership of diverse groups of stakeholders. There is a skills deficiency when it comes to competencies in management and leadership which has been exacerbated by discretionary rather than mandatory training (Clark and Armit, 2008). Doctors have been identified as lacking the training and skills associated with traditional management such as leadership and teamwork which are not acquired when they receive clinical training and development (Iedema et al., 2004; Olsen and Neale, 2005) never mind the requirement for new skills to improve healthcare (Clark and Armit, 2008). Where this training has been provided, it has been somewhat haphazard or has not met the expectations of the participants (Edmonstone, 2009; Edmonstone, 2011). When providing clinical leadership, doctors have to embrace the idea of working with inter-disciplinary teams, but issues over poor communication and traditional hierarchies can undermine effective working and leadership (Irvine, 1997; Olsen and Neale, 2005; Currie et al., 2012). These hierarchies and issues in team working by clinical leaders are picked up by junior doctors, who also not having access to traditional management training, copy senior staff, resulting in traditional hierarchies prevailing, where there is no place for it in the modern NHS (Olsen and Neale, 2005; BMA, 2013). Recent work has illustrated younger medical staff attempts to maintain this medical professional identity through a lack of communication and non-conformance (Spyridonidis et al., 2015) thus they are still contributing to maintaining these hierarchies.

2.8.3 Nurses

Nurses are a key stakeholder in the delivery of quality as frontline staff. Initiatives in the NHS in Scotland and England have proposed a greater role for nursing staff in leading and driving quality improvement (Wilkinson, et al., 2011). Nurses in NHS England accounted for 52% of all staff (nhsconfed.org, 2015). In the NHS in Scotland, they accounted for 42.3% of all NHS Scotland staff (ISD, 2015). This is a huge figure and the profile of this group would be expected to be significant in the implementation of quality improvement initiatives such as Lean in healthcare.

2.8.4 The Modern Matron and Quality

The idea of quality and the NHS arose in the 1980s (Klein, 2010) when new posts were created for Quality Assurance Directors, mostly held by former nurses (Harrison and Pollitt, 1994). This move of nurses into management roles continued into the 1990s with nurses represented in senior management but through management, not nursing routes (Bolton, 2005). Despite dedicated roles for quality, the NHS had still struggled with this area, with calls for a return to the 'golden age' of the matron, where wards were clean and matron ruled though this proved to be less than successful. It is nursing staff in various roles who have contributed to quality in healthcare and been tasked with its improvements and cultural change (Bolton, 2005). The introduction of the 'modern matron' in the NHS in England, tasked with quality improvement in order to drive out hospital infections (Savage and Scott, 2004; Currie et al., 2009) was not without its issues. Even prior to their introduction, questions were being asked as to where matrons would fit in the new NHS order. From the modernisation of the NHS, it appeared there was a need to revisit the past, and bow to public pressure after some spectacular service failures which had dented public confidence in a much loved institution (Currie et al., 2009).

Hewison (2001) raised several areas of concern prior to the introduction of the modern matron. These areas of concern included fears about the power of matron to bring about change, the issues of where matron would stand in the new nursing structure due to the re-grading of staff, and not least the issues of defining quality in healthcare where there were so many competing views that the view held by nurses was one of the less dominant views in the professional structure (Hewison, 2001). This prophetic view prior to the introduction of the modern matron was to be echoed in writing after their introduction. The role of the matrons was described as "*expressly charged with quality improvement*

and implicitly required to balance the often competing views of quality held by clinicians and general managers" (Savage and Scott, 2004:419). These matrons were essentially brought in to add a voice to nurses who appeared to lack authority, but were not to threaten the authority of nurses who held higher nursing level posts such as that of ward sister (Savage and Scott, 2004). In essence, these modern matrons were restricted as to what they could achieve in the modern ward. Traditional matrons had their powers through their subordinate position to doctors, but an elevated position above regular nursing staff. The modern matron was charged with quality improvement, but only by not interfering with the work of other groups (Currie et al., 2009). The role of the modern matron was subject to variation, which is surely at odds with the focus on quality which they were tasked with. This lack of standardisation of the role was to impact on its effectiveness. The focus should have been on quality improvements and improvements in patient care delivery, but many modern matrons spent time dealing with administration and human resource issues which are typically the duties of middle managers in nursing, the groups' matrons were not to interfere with. This led to the potential benefits of the matrons remaining unrealised (Savage and Scott, 2004). This is a view echoed by Currie, et al. (2009), who blamed inconsistent policy, barriers in professional hierarchies, and an awkward middle management position for their lack of impact.

2.8.4.1 Nurses - the semi profession?

As the figures in section 2.8.3 have shown, one key professional group in the NHS is that of nurses. Often this group has the most contact with patient care and therefore, by association the ideas of quality, in patient care. As previously mentioned, this is the group who held quality assurance posts in the 1980s (Harrison and Pollitt, 1994) and then matrons, as part of this wider group, were charged with quality improvement in the drive to combat hospital infections (Currie et al., 2009). The role of nurses has changed and this is recognised in literature. From being regarded as 'handmaidens' to doctors (Harrison and Pollitt, 1994; Radcliffe, 2007), now nurses hold diverse roles from what is perceived as traditional nursing, to training in specialisms and taking on roles formerly carried out by doctors (Radcliffe, 2007; Currie et al., 2009; Currie et al., 2010). Currie et al., (2012) discuss this specialisation where nurses trained as genetics specialists and were encouraged to work more autonomously as genetics experts but were faced with opposing views apparent from some medical staff who were endorsing a nurse led approach, to others viewing the nurses as taking on the 'donkey work' then handing back to medical staff 'specialists'. These changing roles can be referred to as the growing professionalism

of nursing (Currie et al., 2009), in a profession which is increasingly attempting to become a graduate-only profession (Currie et al., 2010). Nursing in the NHS exists in a service which is dominated by professions, though nurses, unlike doctors, have lost the right to be exclusively managed by their own profession (Harrison and Pollitt, 1994; Klein, 2010).

2.8.4.2 Nurses and hybridity

Davies (2007) reviews nursing history from a sociological standpoint, commenting on authors working in the field of nursing history. Nurses have been referred to as a 'semi profession' by American sociologists but Davies disagrees with this, though admitting nurses do not have the same autonomy as doctors (Davies, 2007). Davies writes that there have been changes in how nurses worked, and were now breaking into the hierarchy through management, in order to have influence through control of their education and work (Davies, 2007). This view is echoed by other authors when reviewing nurses who are reluctant middle managers or may struggle but who have moved into these management positions in order to provide a greater contribution to their workplace in these roles (Currie, 2006; Burgess and Currie, 2013; Croft et al., 2014). These nurses who have entered management to influence strategy through ward management, modern matrons or senior nurse managers are known as hybrid Middle Level Managers or MLMs who contribute through knowledge brokering and are able to do so through recognition of their 'professional legitimacy' (Burgess and Currie, 2013). However, Croft et al., (2014) question the impact and role of these nurse hybrids, describing them as ineffective and discuss the need to better align the demands of management and professional leadership to mitigate identity conflict. If adopting Davies' (2007) discussion of nursing as a semi profession, this would be aligned to Currie's description of these nurses as middle managers holding a 'semiautonomous' position (Currie, 2006), so in essence, the semi profession has gained semi autonomy. However, Burgess and Currie (2013), conclude those MLMs who hold lower statuses in the professional hierarchy are still able to contribute due to their proximity to practice. Currie et al. (2010), continue to review nursing as part of the sociology of professions where nurses are taking on roles other than managerial, which include tasks formally the domain of doctors. However the nurse is still subservient to doctors and will gain support if the role supports the doctor's interests (Currie et al, 2012). The approval of professional bodies is required in order to support and enable change otherwise this development of traditional roles will be problematic (Currie et al., 2010; Stanton et al., 2014).

The description of a semi profession may seem derogatory but in comparison to their doctor counterparts it appears accurate, given their subservience to doctors (Hewison, 2001; Currie and Suhomlinova, 2006; Currie et al., 2010) as a professional group within the healthcare structure. Past references were made to nurses and nursing occupying a 'secondary position' when compared to other professions in healthcare (DHSS, 1966 cited in Hewison, 2001) or described as obeying orders from doctors in traditional viewpoints (Fagin and Garelick, 2004).

In reviewing literature on clinical staff and quality improvement, this secondary status or view of nurses being dependent on medical staff is also discussed by Wilkinson et al., (2011). The authors go on to conclude in their discussions of nurses and quality that "*nurses are somewhat left behind despite being a larger workforce and may find it difficult to reconcile this with the desire and requirement of managers to focus on medical engagement and leadership*" (Wilkinson et al., 2011:44). This position of nurses can have implications for Lean as in the case study of Thedacare, nurses were the lead in the process and were often to be found giving instructions to doctors which was recognised as being contrary to the accepted order (Toussaint, 2009a). However, once new roles were accepted then improvements could be attempted and firefighting and the hierarchy was negated in this process (Toussaint, 2009a).

Nurses lack complete autonomy, knowledge control and are described as a 'managed occupation' (Currie et al., 2009). A doctor-nurse relationship is identified and although nurses have progressed from traditional roles and are taking on more clinical and management-related roles, nurses are unsure who they are accountable to – doctors, managers or their own hierarchy (Fagin and Garelick, 2004).

The socialisation of certain nurses in their roles has been shown in one study as interviews highlight the nurses as being dependent on a higher clinical authority for decision-making and are unused to the amount of autonomy they have in new roles (Currie et al., 2008a) which would have implications for them taking the lead in Lean implementations. By adapting their roles over time, nurses have failed to dominate the medical profession, unlike doctors, who have gained autonomy through policy formations and their strength as a profession (Klein, 2010). Policy formation and changes to NHS structure, have seen nurses lose the right to be managed exclusively by their own profession, be affected by fragmented pay structures, and be subject to increasing general management control (Harrison and Pollitt, 1994).

Changes have worked positively, such as increased education and training which has facilitated development of new nursing roles, and the assistance of healthcare assistants to take on more basic care, but this has come at an expense. Growing levels of critique are evident that this growing professionalism and a move away from the emotional delivery of care, is damaging the core values of the practice of nursing (Currie et al., 2009).

2.8.5   Management in the NHS

As a large group, it appears from the literature that nursing staff can only achieve what is allowed by the highly professionalised and dominant group that is the doctors within the NHS, even though both groups have also progressed to management. Another group of influential stakeholders are those NHS managers who will also be involved in quality improvement initiatives and who will be discussed in this section.

From 2008, there was a clear drive to focus on quality as a clear principle of the NHS which was to be professionally led (Martin and Learmonth, 2012) but this focus on quality and patient safety can be perceived as managerialist (Davies et al., 2007). Lean thinking is one such methodology which is being explored by hospitals in Scotland (Scottish Government, 2012) and the wider NHS (Burgess and Radnor, 2013), but despite implementations on-going since the early 2000s, Lean has had limited effectiveness and the reasons for this are yet to be firmly established despite support for its applicability and utilisation in healthcare (Jones et al., 2006; Radnor et al., 2006; Fillingham, 2007).

Areas of risk management, patient safety and service quality are areas Lean is associated with, and have been discussed without mention of Lean in healthcare and NHS organisational literature, but are potentially relevant given the recurrent focus on quality and safety in the healthcare context (section 2.7). Currie et al. discuss patient safety incidents within their study, but even the reporting of these incidents is problematic due to variations in professional opinions, of what constitutes a patient safety incident (Currie et al., 2008b). These same professional opinion differences of the doctor-nurse views of clinical risk can also be viewed in VMMC and their implementation of the TPS for patient safety (Furman and Caplan, 2007).

In discussion of patient safety incidents in the UK, doctors were suspicious of what was reported, in case information would be used in the wrong way as it was managers who investigated any incidents, leading Currie, et al. to comment *"rather than an open climate*

for sharing knowledge, a fear of blame remained, with an underlying mistrust of managers and their motives by the doctors in particular. This had consequences for the reporting of incidents" (Currie et al., 2008b:376). Currie, et al. then discuss political behaviours in meetings between doctors and managers, where doctors used their medical knowledge to subvert control from the management, attempting to determine cause in a safety incident, back into the clinical fold. Further subversion and reversion into their professional role was observed with doctors using their own systems and terminology for reporting risks and safety incidents instead of the systems in place through clinical governance, and meeting as a group in '*corridor committees'* to discuss areas of concern at the exclusion of others (Currie et al., 2008b:378).

2.8.6   The NHS Manager – managerial and clinical relationships

These suspicions of professionals in their dealing with managers are impacted by the historical role of the manager (Preston and Loan-Clarke, 2000). Managers are often viewed in the NHS as being brought in to constrain clinical dominance (Harrison and Pollitt, 1994; MacIntosh et al., 2012) with a mandate for focus to be on improvements and accountability (Degeling and Carr, 2004). However, efficiency programmes translated as cuts to NHS medical staff (Harrison and Carr, 2004) and the battle ground was set (Atun, 2003). Changes in management structures have reinforced this negative relationship (Davies and Harrison, 2003). Connotations of leadership were associated with coerciveness and surveillance (Martin and Learmonth, 2012) and professionals looking back at these events 'demonised' those managers introduced during Margaret Thatcher's leadership as 'Maggie's Children' (McGivern et al., 2015:11).

Friction between doctors and managers is recognised, particularly during change processes. Relationships are not described as bitter, but there is a sense of tolerance as the doctor-manager relationship is viewed as being more about the "*containment of opposing forces than it has with promoting harmonious relationships*" (Bruce and Hill, 1994:52).

However the structure of the NHS and inconsistences in policy implementations have cemented the power of professionals, despite attempts by various governments to dilute and control this power by employing NHS managers (Currie and Suhomlinova, 2006). Managers in clinical settings cannot be viewed in the same light as managers in other areas due to the differences in culture, values and rules present in healthcare (Degeling et al., 1998; Hendy and Barlow, 2012).

The impact of professional power in the NHS is ever present as one study details an NHS manager discussing how she feels 'subservient' to the power of hospital doctors as she has no clinical background and acts in an administrative role towards these doctors, rather than a management role (Currie and Suhomlinova, 2006:18). Harrison and Pollitt (1994) describe the NHS manager as a 'diplomat' and place NHS managers in four areas. The first area is these managers are not the most influential in the structure in comparison to traditional management areas which has also been discussed by Øvretveit (2005). It is medical practitioners who decide on treatment and how long patients stay, not managers.

Managers are also defined as being reactive to problems, not proactive and these problems in turn come from internal rather than external factors, such as conflicts with other stakeholders in the NHS. Problems have also stemmed from change in the NHS but this change is incremental, rather than rapid (Harrison and Pollitt, 1994:35). This is further expanded by Harrison and Lim (2003) who also note the NHS 'diplomat' manager as being reluctant to challenge existing operating practices or to propose improvement in services for fear of coming into conflict with medical practitioners. This may go some way to explain why Davies et al, (2007) and Wilkinson et al., (2011) (section 2.7.1) found little evidence of professionals as having engaged in quality improvement if their managers may be reluctant to propose improvement in the first place. Managers also failed to view the patient as the customer, instead viewing the provision of services and customers as for physicians (Harrison and Lim, 2003:14). This reactiveness to problems, attempts at command and control and the failure to focus on the customer (patient) is symptomatic of the culture of healthcare (Fillingham, 2008; Toussaint, 2009b) and behavioural and cultural change is required for implementing Lean (Mann, 2005; Fillingham, 2008; Mann, 2009; Radnor, 2010b).

The differences between managers and doctors are further compounded in their different working styles, with managers utilising formal rules and the monitoring of work through government set targets (Macintosh et al., 2012) and clinicians preferring give and take and clinical autonomy (Spyridonidis et al., 2015). In ways of working, without the aspects of threat to power, there are already barriers between how these groups work (Degeling et al., 2001), with managers desiring more control and monitoring of clinicians work than what clinicians would like.

However, when it comes to reforms and improvements in the NHS, these are often based on targets to be complied with and specifications (Webster, 1998; Klein, 2010). These are

viewed as management generated command and control methods, rather than utilising the abilities of those involved in the system to generate positive change (Plesk and Wilson, 2001). This reliance on targets and attempts at measurement of clinical performance does impact the doctor-manager relationship with some targets or initiatives linked to targets, at times described as nonsense (Macintosh, et al., 2012). Although it is clear 'new' attempts at accountability in performance have been attempted in the past, the impact has been limited due to 'crude' performance indicators and the challenge to the authority of managers on which to judge clinical performance and decision making when they do not have clinical expertise (Bruce and Hill, 1994; MacIntosh et al., 2012). This reluctance and resistance towards performance monitoring may have explained the failure to embed previous quality initiatives (section 2.7.1). This has implications for Lean improvement activities as performance monitoring of the current and future state is required to ascertain the effectiveness of the Lean intervention (Liker and Meier, 2004; Radnor et al., 2012) and to engage staff in sustaining improvements (Al-Balushi et al., 2014).

These managers however, face the brunt of blame for failures in service provision and reforms due to the volume of reforms and targets on the NHS, driven by Governments in successive policies (Preston and Loan-Clarke, 2000; Bradshaw, 2002). This is an easy group to blame, for issues at hospital level, as opposed to unrealistic and unworkable government policies, measured by inadequate indictors of performance and variations in how performance is measured (Bradshaw, 2002). Managers are in the sights of those looking to apportion blame, due to their lack of public popularity (Preston and Loan-Clarke, 2000; Bradshaw, 2002) and their lack of popularity with clinicians (Harrison and Pollitt, 1994, Harrison and Lim, 2003; MacIntosh et al., 2012) which results in isolation from, and distrusted by, the two distinct groups they should be working for and with. This has implications for Lean as strong and consistent management and leadership is recognised as being important in service improvement and especially within healthcare improvement (Fillingham, 2008). It appears though it is managers who carry the blame, especially those at senior level as the life span of an English NHS Chief Executive (CEO) is under two years (Fillingham, 2008). Further evaluation on the subject in the British Medical Journal (BMJ) cited that the culture of blaming managers prevails due to improvements viewed as being CEO sackings and humiliation, rather than what would be considered to be quality improvement (Dyer, 2011).

2.9 Summary

This literature review on quality initiatives in the NHS and key staff groups of the NHS has highlighted key issues facing the NHS and those which could potentially impact the implementation of Lean. The NHS has faced many challenges in its operation over the last 67 years and many of these issues are still prevalent in the form of budgets, political influence and professional roles (Klein, 2010). The focus on quality and improvement has also been long held but this has also proven to be problematic with initiatives which have been introduced and have failed (Stahr, 2001; Davies et al., 2007; Proudlove et al., 2008; Böhmer, 2009; Currie et al., 2009; Wilkinson et al., 2011). The staff of the NHS has also been reviewed including doctors, nurses and managers as these members of staff would be expected to actively engage in, and work with Lean, to generate process and quality improvements in healthcare. This review has highlighted problems; previous reviews of quality improvement in healthcare have shown limited engagement from staff groups who are expected to be involved in quality improvement (Davies et al., 2007; Robert and Bate, 2008; Robert et al., 2008; Wilkinson et al., 2011). This may have been compounded as medical staff and managers have been identified as having different ways of working (Macintosh et al., 2012; Spyridonidis et al., 2015) which could have implications for formal improvement mechanisms such as Lean.

Key themes emerging from this section of the literature review are:

•   Demands for quality and efficiency are ongoing in healthcare and in the NHS

•   Non-Lean and quality and safety initiatives have already been challenged by professional groups which may have wider implications for Lean

Therefore, this part of the chapter has identified a gap in order to determine what roles staff hold in the Lean implementation.

2.10   Conclusion to this chapter

This chapter has reviewed literature both on Lean and studies on the NHS and its staff. The review has moved from the origins of Lean and its progression into service and healthcare. It has highlighted key case studies which offer successful examples of Lean in healthcare and the factors which contributed to this success such as senior management support, ownership of their Lean programmes and training and education of the methodology. This literature review has also shown there is support for the transferral of

manufacturing methodologies into healthcare but care must be taken to focus on the adaption, rather than the adoption of these methodologies. Endorsement is provided for this in focusing on behavioural and cultural change, the language used, leadership, time and education which are all required to embed these methodologies properly (Ben-Tovim et al., 2007; Fillingham, 2007; Furman and Caplan, 2007; Toussaint, 2009a and 2009b).

Although literature has been predominately positive on the benefits of Lean in healthcare in delivering quality and safety improvements, it is acknowledged that further work is required on the social aspects of Lean and how it will work in the healthcare environment, given the multiple challenges faced there over professional groups, knowledge-sharing and the healthcare hierarchy (Waring and Bishop, 2010; Radnor et al., 2012). There are multiple opportunities for research within Lean, within healthcare and within Scotland and the wider UK, but by specifically using the findings of the literature, then the focus for this project has narrowed.

Despite early literature (Monden, 1983) showing the Toyota Production System's focus on people and respect for humanity, later literature (Womack et al., 1990, Womack and Jones, 1996) focuses more on the process and operational aspects of Lean. This has been replicated in the focus on process and operational improvements of Lean in healthcare and the outcomes this derives (Ben-Tovim et al., 2007; Dickson et al., 2009; Holden, 2011). Many of these studies are from the US, rather than the UK. Focus is lacking on the specific roles of staff in Lean implementations. Where work has started to review this, research on Lean case studies have shown issues over conflicts, team working, resistance and attitudes of clinicians (Bishop and Waring, 2010; Meyer, 2010; Papadopoulos et al., 2011). However, this is yet to be explicitly explored in depth. This section of the literature review has discussed conflict between staff groups in their ways of working (Klein, 2010; Macintosh et al., 2012) and the context of the healthcare environment (Degeling et al., 1998; Ham, 2004; Klein, 2010; Hendy and Barlow, 2012). The transition of Lean from manufacturing to healthcare is still primarily within its first couple of decades. As the focus has been on the process and operational improvements, the roles of staff, their engagement and their views in a highly professionalised environment such as healthcare have yet to be adequately explored.

2.11   Research Questions

As articulated in section one of this thesis, the aim of this research is to evaluate Lean implementation in NHS Scotland through a case study of NHS Lothian.

In combining the emergent areas required for further focus from sections 2.6 and 2.10 the limitations of existing literature has been present. Consequently, the implications of contributing to existing research on Lean in healthcare have led to the following research questions being derived from this literature review to become the focus of this research:

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

RQ3. What roles do healthcare staff, including medical professionals involved in the implementation process, hold in terms of the effective implementation of Lean?

3.0 Research Philosophy and Research Methodology

3.1 Chapter Introduction

This chapter will detail the Research Philosophy and the methods deployed in this research project as this links to how the research questions provided at the end of the Literature Review (Chapter 2) and reiterated below, will be answered.

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

RQ3. What roles do healthcare staff including medical professionals, involved in the implementation process, hold in terms of the effective implementation of Lean?

These questions will be answered utilising a qualitative approach to research which is influenced by a social constructionist paradigm. Utilising a qualitative approach through content analysis in order to evaluate Lean in NHSL and providing different perspectives of Lean through those involved in projects derived from case study data, this section will not only demonstrate the benefits of triangulation of knowledge but also how this knowledge will be used to answer these questions.

This chapter will firstly discuss knowledge in terms of the research paradigm which underpins this research and this impact on the research through the researcher's own worldview. The link between theory and philosophy can be shown and understood through key paradigms which underpin researchers' understanding of the social world in which they are researching (Burrell and Morgan, 1982). Cunliffe (2011:651) makes explicit this relationship as "*our metatheoretical assumptions have very practical consequences for the way we do research in terms of our topic, focus of study, what we see as "data," how we collect and analyse that data, how we theorize, and how we write up our research accounts.*"

As a result, the first part of this chapter considers the challenges for researchers in navigating the confusing terminology and its applicability to research (section 3.2), before introducing the research paradigm under-pinning this research (see section 3.4.3). The second part of this chapter will consider what methods have been applied in data collection, how analysis has taken place and how the research has been written up (section 3.5 to 3.12). Within the sections discussing research philosophy and research design,

alternative paradigms and methods will also be considered to demonstrate why the paradigm and methods chosen were those most suited to the researcher's world view and the research context under study.

3.2 Challenges in defining Research Paradigms

The word 'paradigm' comes from the ancient Greek paradeigma (Clark and Clegg, 2000). Multiple authors define paradigms but essentially paradigms link to how knowledge is used and informs research. A paradigm is defined as *"a framework that guides how research should be conducted, based on people's philosophies and their assumptions about the world and the nature of knowledge"* (Collis and Hussey, 2009:55). Gummesson (2000:18) discusses a paradigm as "*representing people's value judgements, norms, standards, frames of reference, perspectives, ideologies, myths, theories, and approved procedures that govern their thinking and action*."

For the purposes of this research, a combination of the definitions of Collis and Hussey (2009) and Gummesson (2000) is accepted and the following definition is applied to this research "*a paradigm is a framework used to underpin research which is based upon value judgements, standards, knowledge and perspectives which impact thought and action.*" This definition of the paradigm underpinning the research here guides how research is to be conducted (see sections 3.2 to 3.4.3.2) but is also related to perspectives and nature of knowledge when there is a focus on people, such as in this research which focuses on the staff members involved in Lean.

Burrell and Morgan (1982) link the assumptions within paradigms as having three consequences:

- Philosophically – linked to knowledge and beliefs
- Socially – guidelines for research in reviewing human life and experiences
- Technical – methods, techniques and analysis applied in research.

Much of the discussion around research paradigms links to the area of philosophy in dealing with knowledge and beliefs, which in philosophical terms is ontology and epistemology. Ontology is described as being "*the branch of philosophy that attempts to answer questions regarding the existence of things and their nature*" (Epstein, 2012:10). Burrell and Morgan (1982:1) discuss the nature of a basic ontological question "*whether*

the 'reality' to be investigated is external to the individual?" So, this means determining if reality is objective in the world or subjective as it is created in individual minds (Burrell and Morgan, 1982). Epistemology is described as *"the philosophy of knowledge…it explores the possibility of knowing, the generation and evolution of knowledge, and its validity"* (Epstein, 2012:9). Burrell and Morgan (1982:1) discuss epistemology about being linked to assumptions over understanding and the communication of knowledge (see section 3.4). The understanding and awareness of the research ontology and epistemology can enhance the research leading to increased quality and creativity (Easterby-Smith, et al., 2012).

In order to focus on the research to be undertaken for this thesis, it was important to frame correctly the knowledge and beliefs of the researcher and how this would impact the conduct of the research. However, this was challenging in evaluating the appropriateness of the philosophy and alignment of the methodology and how this would be applied. Easterby-Smith, et al., (2012) discuss how even researchers in the area do not agree that the relationship between philosophy and methodology is shown consistently with terms being used interchangeably by different authors. A common reference is ontology, followed by epistemology (Bryman and Bell, 2011; Collis and Hussey, 2009; Easterby-Smith, et al., 2012) but Crotty (2010:4) amends this to show epistemology, moving into theoretical perspective (ontology), then into methodology and then methods. The methodology, methods and techniques utilised in this research will be defined and discussed later in the chapter (see section 3.5 onwards), but this section will go on to detail the main ontologies and epistemologies, including the ones applicable for this research.

Even in discussing ontology, this is not straight-forward as multiple authors all discuss this in different ways. As Crotty (2010:1) explains; *"There is much talk of philosophical underpinnings, but how the methodologies and methods relate to more theoretical elements is often left unclear. To add to the confusion, the terminology is far from consistent in research literature and social science texts. One frequently finds the same term used in a number of different, sometimes even contradictory, ways."*

Discussion in texts concentrate on epistemology, rather than ontology and allow only the briefest discussion of ontology which may lead to confusion as the terminology is not consistent (Bryman and Bell, 2011; Collis and Hussey, 2009; Easterby-Smith, et al., 2012). Collis and Hussey (2009:57) refer to 'two main paradigms,' those being Positivism

and Interpretivism. They show this as being a 'continuum' with Positivism and Interpretivism being at opposite ends of an arrow. Although the use of arrows is accepted, Crotty (2010) warns against this overreliance as the epistemological impact could subvert this viewpoint and methodologically, methods can be applied across multiple ontologies and epistemologies. Easterby-Smith, et al., (2012) discuss four ontologies with these being Realism, Internal Realism, Relativism and Nominalism. Again, these are discussed as being on a continuum. Lincoln, Lynham and Guba (2011) discuss Naïve Realism, Critical Realism, Critical Theory and Constructivism. Bryman and Bell (2011) discuss objectivism and constructionism, so again, even reviewing the work of different authors, the terminology varies dependant on the discussants. Crotty (2010) does use the term ontology, but prefers to discuss this as a 'theoretical perspective.' This is due to the confusion and interchanging use of terms between ontology and epistemology as ontological and epistemological issues 'emerge together.' This is demonstrated as Bryman and Bell (2011:16) describe Interpretivism as being an epistemology. Both Crotty (2010) and Collis and Hussey (2009) use the same terminology of Positivism and Interpretivism in ontological terms and it is these terms which will be further expanded upon.

3.2.1   Positivism

Operations Management as a discipline is deemed to be positivistic in nature (Croom, 2009:64) and the positivist paradigm commonly influences work in the Operations domain. Easterby-Smith et al. (2012) describe positivism as viewing the social world as external and the research subject can be measured objectively through deductive scientific methods in searching for causality and generalization. Collis and Hussey (2009:59) discuss how there is one reality which is objective and is separate to the researcher state. Even defining positivism is complex as Crotty (2010) references twelve varieties. Positivism is commonly associated with research in sciences which results in the view of certainty and accuracy (Crotty, 2010:27). Easterby-Smith, et al., (2012) also go on to explain that positivism is about identifying causal explanations and that research can be undertaken through hypotheses and deduction. The data that is emergent are commonly taken from large sample sizes and the positivist research allows for generalization about the wider population. This is reflected in the methods employed in research. Experiments and structured surveys can be used to collect data and mathematical and statistical tools are more commonly used in the analysis of data. Consequently, results are discussed in

terms of their validity, with the authors discussing levels of confidence related to statistical significance so that research can be replicated (Croom, 2009).

Positivism and its objective claims have been criticised. Strongly linked to scientific study, Crotty (2010) cites the criticisms Feyerabend (1987 and 1993) has made. Scientific findings are described as 'beliefs.' Researchers can never be totally value-free and at least have to acknowledge 'epistemological prejudices' and the historical impact of previous work which may be influenced by cultural and political assumptions.

3.2.2 Interpretivism

In employing the continuum often referred to by other authors (Bryman and Bell, 2011; Easterby-Smith et al., 2012), Interpretivism is often shown to sit at the opposite side of the arrow from positivism. Phenomenology is also used in place of Interpretivism and also discussed separately (Bryman and Bell, 2011) but to minimise the number of key terms and to avoid the aforementioned confusion (section 3.2), then only Interpretivism will be discussed. Burrell and Morgan (1982:28) describe the interpretivist paradigm as being "*informed by a concern to understand the world as it is, to understand the fundamental nature of the social world at the level of subjective experience. It seeks explanation within the realm of individual consciousness and subjectivity, within the frame of reference of the participant as opposed to the observer of action.*" Collis and Hussey (2009:57) cite Smith (1983) and Creswell (1994) as references for how in Interpretivism, "*the researcher interacts with what is being researched because it is impossible to separate what exists in the social world from what is in the researcher's mind...therefore the act of investigating social reality has an effect on it.*" Both link to understanding of the social world but also how the researcher is not divorced from the research process.

Table 3-1 shows that the two main paradigms have contrasting features which has an impact on the full research process as it impacts sample size, researcher involvement and also where the research takes place. Positivist research can be remote from the subject of study, such as when surveys are issued and completed electronically or experiments are conducted in laboratories. In Interpretivist research, sample sizes are smaller and the observer (the researcher) is involved in the research as they are interpreting the social world under study. This is facilitated by the location of the research as the researcher is in the environment being researched.

Table 3-1 Contrasting features of Positivism and Interpretivism

Contrasting features of Positivism and Interpretivism		
	Positivism	*Interpretivism*
The observer	Independent	Interprets the social world
Sample Size	Large sample sizes	Smaller sample sizes
Location	Remote from study	In environment being researched
Causality	Looking for causal explanations	Looking for understanding
Data Collection to	Test hypothesis/theory	Create theory
Data Analysis	Objective, quantitative data	Rich data – qualitative, based on research subjects views so is subjective
Analysis Process	Deductive	Inductive
Reliability and Validity	High reliability, low validity	Low reliability, high validity
Generalisability	Generalise results to population	Generalise results to settings
Associated methods	Experiments, survey, simulation	Interviews, observations, ethnography

Source: Adapted from Collis and Hussey (2009); Croom, (2009); Crotty (2010)

3.3 Axiological and Rhetorical Assumptions

Before moving on to consideration of epistemology, axiological assumptions and rhetorical assumptions will be briefly discussed. Axiological assumptions deal with the role of values. In positivist research the process of research is value-free so the researcher is detached and has no influence on the research process. Interpretivists consider themselves to be involved in the research and may even make their values explicit (Collis and Hussey, 2009). The rhetorical assumptions relate to language used in the research process. Often it is assumed interpretivists will use the first person voice to describe their research and positivists the third person (Collis and Hussey, 2009) however, this is not always the case.

3.4 Epistemology

As epistemology is linked to assumptions over the understanding, communication and validity of knowledge (section 3.2), then as with the previous discussion on ontology, the

two main epistemologies will be explained, these being objectivism and social constructionism. The epistemology applicable for this research will also be discussed.

3.4.1 Objectivism

When reviewing epistemology, the same complexity in providing consistent definitions arises. Easterby-Smith, et al., (2012) discuss epistemologies as being strong positivism, positivism, construction and strong constructionism. As Crotty (2010) and Collis and Hussey (2009) have described positivism as an ontology (or theoretical perspective), then the epistemologies of strong positivism and positivism are not considered in this discussion of epistemology. Indeed, Collis and Hussey (2009) explain positivism and Interpretivism in the context of being 'main' paradigms and do not take epistemological discussion any further. Instead Crotty (2010) discusses objectivism as an epistemology, linked to the positivist theoretical perspective. Popper (1972) also links epistemology to knowledge in the discussion of knowledge in 'objectivist' terms. What emerges is that both positivism and objectivism are considered as both ontologies and epistemologies in different literatures (Paley, 2008). Crotty (2010:8) defines the objectivist epistemology as holding "*that meaning, and therefore meaningful reality, exists as such apart from the operation of any consciousness. That tree in the forest is a tree, regardless of whether anyone is aware of its existence or not.*" Cunliffe (2011) describes objectivism as allowing the study of phenomena and objects which can be studied out of context and knowledge of this phenomenon can be generalised. Knowledge can then be theorised through causal linkages, variables, rules and laws.

3.4.2 Social Constructionism

Social constructionism is certainly on the other side of the arrow from objectivism and focuses on subjective meanings. A now common epistemology (Crotty, 2010), it is commonly used in qualitative research by researchers from different disciplines; from sociology (Berger and Luckmann, 1969), psychology (Burr, 2003) and management research (Turnbull, 2002). The seminal work on social construction is acknowledged to be that of Berger and Luckmann (1969) who discuss the sociology of knowledge as being focused on the social construction of reality. This is due to; "*the sociology of knowledge must first concern itself with what people 'know' as 'reality' in their everyday, non- or pre-theoretical lives. In other words, common-sense 'knowledge' rather than 'ideas' must be the central focus for the sociology of knowledge. It is precisely this 'knowledge' that*

constitutes the fabric of meanings without which no society could exist" (Berger and Luckmann, 1969:27). Berger and Luckmann (1969) go on to assess that knowledge and its distribution can be affected by social structures and interpreted and accepted in different ways within these structures. Reality is also taken not to be fixed but to consist of different forms where movement and interaction are required for existence. Crotty (2010) suggests social constructionism has a critical spirit given the impact culture has on us, shaping our worlds and allowing us freedom. This is supported by Burr (2003:2-3) who links social constructionism to a critique of our own understanding of the world and ourselves, as *"it invites us to be critical of the idea that our observations of the world unproblematically yield its nature to us, to challenge the view that conventional knowledge is based upon objective, unbiased observation of the world…Social constructionism cautions us to be ever suspicious of our assumptions about how the world appears to be."*

A common association with social constructionists is that researchers influenced by this paradigm explore how language is used by research participants in understanding social realities and relationships within it (Burr, 2003; Cunliffe, 2011). Discussion over the constructionist position commonly associates discourse analysis with the paradigm (Cromby and Nightingale, 1999; Burr, 2003). Discourse analysis is not exclusive to social constructionism and is not mandatory in analysis of social constructionist work as social constructionism allows a focus on people. Cunliffe (2011:663) discusses the researcher interest in multiple interpretations and reflections and as such, accounts are written which focuses on people and their perspectives. Cunliffe (2011) goes on to describe these accounts as being stories which include feelings and reactions impacted by contextual meanings. The focus on people, rather than language is important and links back to the view of how knowledge is socially constructed by people in their environment (reality) which impacts their acceptance and transmission of knowledge (Berger and Luckmann, 1969; Burr, 2003).

This focus on the social realities and how knowledge is understood and managed is very different to the objectivist focus of searching for causal relationships and creating laws and rules. Interview accounts and observations are common as social constructionists are interested in multiple reflections and viewpoints. However, some accounts may receive more attention as the power and influence of the respondents '*voice*' commands it (Burr, 2003). Although social constructionism has been criticised for its neglect of the debate related to power and knowledge (Burr, 2003), power is constructed by individuals who

construct a '*representation of themselves*' in their reality that can subsequently legitimise this position and maintain its construction in their reality (Burr, 2003:137). Although focus has been on the social construction of the world which individuals are part of, Burr (2003) identifies that people are agents who actively construct their social world but also that there is constraint, in that people are in environments which have been socially constructed by others in previous generations, through organisations and frameworks.

3.4.3   The Research Philosophy for this study

3.4.3.1 Ontology

The research undertaken for the study of an evaluation of Lean in NHS Lothian (NHSL) clearly falls into one section of the research continuum. The researcher's ontological position is that of an interpretivist as the full study and the methods applied, will be done so in a manner fitting this position and will be further discussed from section 3.5 onwards. Crotty (2010:67) discusses interpretivists' looking to explain and understand as an interpretivist is interested in interpretations of the social world which can be impacted by culture and history. The aim of this research is to evaluate Lean in NHS Lothian, but this is not for absolute knowledge or a reporting of a fixed reality, but to understand the social world of Lean through the subjective experience of participants (staff of NHSL) and the roles they hold in this process. This focus is important as this research on Lean in healthcare where the distinctiveness of healthcare provision, its culture and its staff, (sections 2.7 to 2.8.6) and these cultural and historical interpretations may have an impact on what is happening within Lean implementations (section 2.10). A positivist ontology is not applicable here as research is inductive. Findings from the analysis are interpreted and are generated from the data itself. There are no hypotheses or experiments or testing of pre-conceived theories driving the research. As Lean originated in operations management through Lean manufacturing (section 2.2), there is also support for the use of alternative research paradigms and lenses to explain phenomena, beyond a concentration on positivism in the operations and supply chain management domain (Mangan, et al., 2004; Taylor and Taylor, 2009). This is further endorsed by Meredith (1998) who discusses the need to cross disciplinary boundaries for qualitative understanding in building and accepting theories. Boyer and Swink (2008:339) link this to a focus on the social aspects as "*it is especially important that we uncover the often complex social and behavioural elements involved in OSCM (Operations and Supply Chain Management).*" This discussion is important in this research, as work on Lean and

Lean healthcare has been evaluated on multiple occasions to have a lack of focus on the social aspects of Lean. This has culminated in the research questions being formed (section 2.11) and as such informs the ontology and epistemology that underpins this research.

3.4.3.2 Epistemology

Consequently, a social constructionist epistemology is informing this research as this links into the focus on a socially constructed environment (NHS), but where power and hierarchy are legitimised and may pose challenges for Lean, as articulated in section 2.10. This links to the changing nature of reality and is particularly appropriate for the study of Lean given its continual evolution over time (Hines et al., 2004) and how it is reconstructed through adaption in different settings. This social constructionist research focus is on participants and their stories detailing their involvement in Lean through their interpretations and reflections (Cunliffe, 2011). The discussion by Burr (2003) on voice and the impact on power is also relevant given the historical professional dominance by key staff groups in the provision of healthcare (section 2.7.1). This dominance by certain groups may also impact Lean in this environment in their involvement, acceptance of Lean and transmission of knowledge (Burr, 2003). This professional dominance has been discussed within the discipline of sociology which is aligned to the research philosophy chosen for this project (Berger and Luckmann, 1969). With an endorsement from OM researchers for combining different paradigms and lenses to explain OM phenomena such as Lean, the use of sociology to begin to explain the socially constructed environment that Lean is being implemented in, means this research is being conducted in a cross-disciplinary nature and as such, the discussion on the philosophy and research design must be aligned to this.

3.5 Research Design

Before discussion over research design and its relationship to this project, some clarity will be provided over terminology which is used in terms of designing and conducting research. Research design and research methodology are often taken to have the same meaning but there are differences as with research methodology and research method. For the purposes of this chapter, research design is defined as a clear definition of the chosen topic and the methods to be employed to investigate the topic (Croom, 2009:60); research methodology will be defined as "*the theory of methods*" (Glaser, 1992:7) and

methods will be defined as "*techniques and procedures for gathering and analysing data*" (Corbin and Strauss, 2008:1). This chapter will discuss the relationship of research design to research philosophy, then will go on to discuss the approach used in this research, and then analysis which has been undertaken. Validity, Reliability and Generalisability will be discussed but in terms applicable to the research philosophy for this project (section 3.11). As the importance of ethical issues cannot be ignored, consideration of ethics and its effect on the research will also be discussed (section 3.11.1).

Research strategies are linked to the distinction between qualitative research and quantitative research and are also linked to research philosophy because of ontological and epistemological considerations (Bryman and Bell, 2011).

A qualitative strategy has been applied in this research because of the research philosophy considerations discussed in sections 3.4.3.1 and 3.4.3.2, but a brief discussion of quantitative and mixed methods research will be provided to further demonstrate why the qualitative strategy applied is suitable for this research.

3.5.1   Quantitative Research

Quantitative research is commonly associated with positivism (Bryman and Bell, 2011) due to the common use of mathematical and statistical tools in the research process. Creswell discusses testing of objective theories in search of relationships and the use of statistics (Creswell, 2009:4). A clear link here is made with ontology and epistemology as theories are described as 'objective', and methods associated with this type of research include experiments, simulation and structured survey research which can be analysed using statistical methods (Easterby-Smith, et al., 2012).

3.5.2   Mixed Methods Research

The conduct of mixed methods research shows an attempt to move away from the traditional viewpoint of using methods which are deemed to be consistent with epistemological paradigms (Johnson and Onwuegbuzie, 2004). The researcher 'worldview' is still considered important in using this methodology (Creswell, 2009) and pragmatism is considered appropriate for mixed methods studies (Johnson and Onwuegbuzie, 2004; Creswell, 2009). Mixed methods are described as research which involves both quantitative and qualitative techniques of data collection, analysis and synthesis (Leech and Onwuegbuzie, 2009). Mixed methods research is believed to

enhance triangulation as a method which may be associated with one strategy and delivers a set of data, which then can be tested with a method from another strategy in order to provide confidence in the findings from this type of study (Bryman and Bell, 2011).

3.5.3 Qualitative Research

Qualitative research is often linked to the interpretivist paradigm although the linking of ontologies and epistemologies to methods is based on traditional associations and is not absolute (Bryman and Bell, 2011; Easterby-Smith, et al., 2012). A qualitative research strategy is designed to *"explore the human elements of a given topic, where specific methods are used to examine how individuals see and experience the world"* (Given, 2008: xxix), though complexity in defining the strategy is noted as qualitative research transcends typical disciplinary boundaries (Denzin and Lincoln, 2013a). This view of individuals and how they experience the world (Given, 2008) is particularly relevant in this research as research question three related to how individuals are involved in the implementation of Lean in NHS Lothian.

The benefits of qualitative research are perceived to be numerous. The applied nature of qualitative research and its ability in cutting across disciplinary boundaries, from humanities, social sciences and into applied sciences has made it a popular strategy to be used by researchers (Flick, et al., 2004). Unlike other research strategies, qualitative research is perceived to be free from the constraints over the nature of the study in which it can be applied as any event can be the focus of a qualitative study (Yin, 2011a). This suitability of qualitative research is linked to the lack of formal research environment required (unlike experiments), the ability to provide research based on small sample sizes, and the lack of impact on set variables (Yin, 2011a). Even defining what qualitative research methods are is problematic due to the variety of methods which fall under the qualitative domain such as interviews, observations, focus groups, archival research, oral histories, and content analysis (Preissle, 2011) to name but a few. The methods and analysis used in qualitative research are not distinct to this research strategy as multiple methods and analysis can be employed, with not one method taking precedence over others. Even those analysis types commonly associated with the aforementioned quantitative research strategy (section 3.5.1) such as statistics, graphs and tables can be used in qualitative research (Denzin and Lincoln, 2013a). The research is commonly carried out within the participants setting and it is up to the researcher to interpret the meaning and highlight the complexity of the field under study (Creswell, 2009).

The perceived limitations of qualitative research appear to be enmeshed in debates over paradigms with positivist research (quantitative) generating truths and science and interpretivist (qualitative) research being associated with journalism, being unscientific and producing fiction without truth (Denzin and Lincoln, 2011). These views impact on how generalisability, reliability and validity are perceived in qualitative work in demonstrating the objectivity of the research, but reliability and validity concerns do vary over the myriad of methods employed in qualitative research. General concerns have been noted over generalisability because of the smaller sample sizes in comparison to large scale surveys, though this can lead to greater explanatory detail and reliability can be provided as data are being gathered for understanding, not absolute truth and this understanding can be triangulated with other data sources (Rothbauer, 2008). Validity suffers from the same complexity in qualitative research due to the myriad of methods available to researchers using this strategy and the link to the epistemological considerations of the researcher. However, these will broadly encompass validity ensured through the research being appropriately conducted through recognised method standards (Miller, 2008).

3.5.3.1 Application of a qualitative strategy

In this research, a full qualitative strategy will be applied but multiple methods are to be employed in the data collection to alleviate concerns over reliability and validity to enable triangulation of sources and allow for a fuller picture of the research problem to be presented (Rothbauer, 2008). Validity will also be ensured through further discussion of recognised standards (Miller, 2008). Despite the constraints that a qualitative strategy can place on the researcher, the guidance of established work in the design and conduct of qualitative studies was adopted (Eisenhardt, 1989; Yin, 2011a; Yin, 2011b; Charmaz, 2012). As a qualitative strategy will be adopted for this work, further discussion will now take place about how this strategy will be put in place in the research environment in section 3.6.

3.6 Case study Research

Meredith (1998:442) provides a definition of case study research which has been adapted from authors including Yin and Eisenhardt as "*a case study typically uses multiple methods and tools for data collection from a number of entities by a direct observer(s) in a single, natural setting that considers temporal and contextual aspects of the*

contemporary phenomenon under study, but without the experimental controls or manipulations." Case study research has many uses and its contribution is recognised in its appropriateness for exploring new areas in order to generate empirically valid theory (Eisenhardt, 1989:532). The enrichment of empirical research, understanding and developing of theory is discussed by Voss et al., (2002); highlighting that operational understanding of concepts such as Lean has emerged from case research. Taylor et al., (2013) discuss the need for case study based work in the area of Lean, especially in the social aspects as empirical work in this area has been lacking. The process of conducting a case study enriches both theoretical contributions, and also the researchers themselves, as researchers benefit by exposure to real problems and people at all levels of the organisation (Voss, et al., 2002).

Multiple methods can be employed within a case study and include interviews, observations, document analysis and questionnaires. Case studies can be exploratory, descriptive and explanatory, though this is commonly linked the research questions which are employed and the language used in them, such as what, who, where, how and why as detailed below in Table 3-2. This table further discusses the purpose, benefits and limitations of case study. Yin (2011b) warns that these types do not have fixed boundaries and there may be overlap between them and researchers must consider this when they are defining the methods they have applied to their own research. The discussion in Table 3.2 is then directly related to the case study research which is to be undertaken here.

Table 3-2 Types of cases and their application

Case Type	Exploratory	Descriptive	Explanatory
Language Used	What	What, Who, Where	How, Why
Purpose	Testing/definition	Investigating/Describing	Linkages/showing cause and effect
Best alternative method where relevant	Survey	Survey/archival data	History/Experiments
Benefits of case research	Managerial relevance, understanding, depth, flexibility, adaptability		
Limitations of case research	Access, times, triangulation (multiple methods), lack of control		

Source: Adapted from Collis and Hussey (2009); Croom, (2009); Crotty (2010)

This research has been conducted in an exploratory, descriptive and explanatory manner in order to determine; 'what' is the impact of Lean in NHS Lothian? (RQ2) and 'what' role healthcare staff have in Lean implementations? (RQ3), which links into the use of an exploratory study. An explanatory case study would generate understanding 'how' Lean is implemented (RQ1) as this is not known externally which then will enable the researcher to understand 'how' and 'why' staff may have issues in Lean implementations, and how this will impact Lean in the organisation going forward. Although Yin (2011b) has discussed that surveys can be used to answer exploratory research questions, the case study organisation had already discussed their issues over poor survey response rates and generating reliable data for their own reporting. This was perceived by the researcher that it would be restrictive for an outsider with no affiliation to the organisation (beyond this research project) to try to gather survey data and a qualitative perspective would allow for the uncovering of new insights which may then inform future operational practice. Further support for the use of case studies for this research was that these Lean implementations are contemporary events (Yin, 2011b) affected by temporal and contextual factors (Meredith, 1998) and impact staff and their involvement which is to be

studied as Lean work was on-going on clinical sites. This enables the researcher to move beyond purely focusing on historical events as observations and interviews were to form the data sources for the research where the benefits of a case study is the management of this variety of evidence (Yin, 2011b). After observations and interviews commenced, the researcher was given access to a third source of data, the Lean in Lothian Annual Reports where details of projects completed and their outcomes were published and available to interested stakeholders (see section 3.10). This third source of data offered additional triangulation to further enhance the reliability and validity of the research and was further utilised to answer research question two. This also added a descriptive element of case study in determining; what the focus of the Lean implementation was, who were involved and where the events took place in evaluating these reports. Content analysis was applied to these reports and the approach for this is further discussed in section 3.7, with the findings reported in Chapter 4.

In Table 3-2 two types of case study such as the single case and the multiple case study are discussed and their differences and applicability are highlighted. Single case studies involve one case only, whereas multiple case studies apply to two or more cases. Single case attributes and types are explicitly detailed, though in the discussion over multiple cases, only the type of comparative case has been discussed as the types discussed also are applicable to multiple cases (Flyvbjerg, 2011). Table 3-2 provides the features of these cases such as in discussing the robustness of cases through multiple points of evidence and the replication aspects of searching for duplication to further add to the robustness of the research (Yin, 2011b). It is important to know, as well as case types and features, cases can include more than one unit of analysis. These multiple units of analysis can include a case study at organisational level, with sub units of analysis including groups in the organisation, and a further sub unit including individual analysis. An embedded case design can involve sub units of analysis and a holistic case design is where no sub units are identified (Yin, 2011b).

| Single Case Study Types | • Critical - for theory testing/logical deductions
• Extreme/unique - rarity so must be documented
• Representative - circumstances/conditions of a common situation
• Revelatory - observation/analysis of a previously inaccessible phenomenon
• Longitudinal - same case under study at different points in time |
| Multiple Case Study Features | • As above, but also;
• Comparative - cases are compared
• Replication - multiple points of evidence across multiple cases |

Figure 3-1 Case Study types and features

Source: Adapted from Flyvbjerg (2011) and Yin (2011b)

3.6.1   Application of a single case study

This case study has been deployed as a single organisational case study but as an embedded case design involving multiple sub units of analysis comprising of within and cross case analysis (Eisenhardt, 1989; Yin, 2011b). As a single case, it would be classed as a revelatory case, encompassing exploratory, descriptive and explanatory in how the research questions for this thesis will be answered (section 3.6). There was multiple units of analysis within a single case study including evaluation of projects and staff. The explanatory work includes sub units of groups (including senior medical staff, nurses, managers and administrators) because of their roles and involvement in Lean. The case seeks to observe and analyse a phenomenon which has received little attention to date such as the roles of staff in Lean healthcare implementations, through a Lean lens.

3.6.2   The Case Study Framework

The Eisenhardt (1989), case study framework has been adapted for this research. This framework allows for credibility, dependability and confirmability through the utilisation of multiple sources of data for triangulation which can then allow for discussion of consistency (Miller, 2008). Table 3-3 discusses the Eisenhardt (1989) adaptation, detailing the steps and activities taking place (which includes the discussion on single cases and analysis units from section 3.6.1) and then in the third column, how this was

approached to answer the aim and research questions in this research. This framework includes interpretivist research Table 3-1 and 3.9) where the 'go see' nature of the research has led to the development of the case selection and when entering the field, how data collection and analysis has overlapped.

Table 3-3 Theory Building from Case Studies

Step	Activity	Approach
Getting Started	Formulating research aims and objectives	Focuses research – choice of topic (Lean) and identification of case study organisation
Selecting Cases	No theory or hypothesis	Initial sampling – people, places, projects to enable theoretical flexibility (start with Lean team, moving towards senior medical staff) for theoretical sampling (snowball sampling works well with theoretical sampling).
Crafting Instruments and Protocols	Multiple data collection methods (unstructured observations, semi-structured interviews, field notes, company documents)	Triangulation of evidence. Multiple accounts of the same event (Lean implementation), observations in the research site(s) and company 'Lean' report analysis to remove respondent and researcher bias.
Entering the field	Overlap data collection and analysis Flexible and opportunistic data collection	Speeds analysis. Take advantage of 'new' themes emerging and further exploration can provide added depth to the study.
Analysing Data	Within and Cross Case Analysis (single case but across multiple groups with varying hierarchical positions enabling interpretivist analysis)	Familiarity of data – can see evidence from multiple viewpoints/perspectives (Lean team, Service Operational Management, Administrative and Clinical Staff).
Enfolding Literature	Comparison with similar and conflicting literature	Raises theoretical level, improves construct definitions and sharpens generalizability.
Reaching Closure	Theoretical Saturation	Marginal improvement is minimal

Source: Adapted from Eisenhardt (1989)

3.6.2.1 Sampling approach

In Table 3-3 sampling is discussed in the selection of cases. In case study research, there is a divergence of author opinions. Yin (2011b) endorses the use of replication, rather than sampling logic. In sampling, Charmaz (2012) discusses the use of initial sampling as a starting point which can involve people, places and projects before moving onto theoretical sampling (Charmaz, 2012). Theoretical sampling impacts the study throughout, not just at the start as the analysis of data throughout the data gathering process, directly inform further sampling activity (Locke, 2001). This impacts the study as Yin (2011b:60) specifically endorses replication as "*the cases should serve in a manner similar to multiple experiments, with similar results (a literal replication) or contrasting results (a theoretical replication) predicted explicitly at the outset of the investigation.*" This is contrary in an interpretivist study as researchers may enter the field to develop the research as they are being responsive to the data, therefore informing further sampling that develops theoretical categories (Braun and Clarke, 2006), rather than the predetermining that Yin (2011b) advocates. This responsiveness will end when data generates no new concepts and repetition or consistency in data may be seen (Charmaz, 2012) and is discussed as 'reaching closure' in Table 3-3.

In the case of this research, theoretical sampling which combined well with initial sampling was applied. On initially entering the field, initial sampling was used which involved 'people, places and projects' and in this case the people were those in the dedicated 'Lean team' in NHS Lothian, the places were clinical settings and the projects were the Lean improvement projects which included past and present projects. The pilot study (see sections 3.7 and 3.7.1) and access to the clinical settings, led the researcher to theoretically sample the senior medical staff group as that is where the data gained from other groups (managerial, administrative and clinical) led to the focus of this research (Charmaz, 2012). As the researcher, as was previously stated, was not attached as an employee to the organisation, other members of staff were able to clarify who senior medical staff were and how they would be accessed by theoretically driven sampling.

3.6.2.2 Addressing criticism of case study research

Although the benefits of case studies have been discussed in how they apply to this research and recognised are in operations management research, case studies do have their critics. Case research is often misunderstood and compared as being inferior to

rationalist research methods where testing and reliability is deemed a key measurement of strength (Meredith, 1998). Flyvbjerg (2011) also notes issues over generalisability, reliability and validity in case studies. Flyvbjerg (2011:302) lists five common misunderstandings and these are subsequently addressed in Table 3-4. It is important to note that because this study is an interpretivist case study, it has not strictly adopted the protocols advised by Yin (2011b) but is adapting Eisenhardt's (1989) framework. These concerns will be addressed from an interpretivist perspective which is aligned to the discussion previously presented in the Eisenhardt (1989) framework for case study research (Table 3-3).

Table 3-4 Addressing Misconceptions over Case Study Research

Addressing Misconceptions over Case Study Research from a inductive, interpretivist approach
Misunderstanding 1 – General, theoretical knowledge is more valuable than concrete case knowledge.
Case studies can contribute to the building of new theories. Starting off with neither theory nor hypotheses to influence study results in data and analysis of the data as being inductive and emergent theory which is not forced or subject to preconceived ideas (see section 3.6).
Misunderstanding 2 – cannot generalise on the basis of an individual case, therefore the case cannot contribute to scientific development.
Sample is not restricted by size or amount but that data offers depth and understanding about a phenomenon (see section 3.11).
Misunderstanding 3 – the case study is useful for generating hypotheses; e.g. so the first stage of research but other methods are more suitable for hypotheses testing and theory building.
Hypotheses can be formed after data analysis to confirm, extend or sharpen theory but they are not essential.   *(Table 3.3).*
Misunderstanding 4 – the study contains a bias towards verification, that is, a tendency to confirm the researchers pre-conceived notions.
The reflective work in interpretivist research through diagramming and memo writing the researcher's own pre-conceived notions are removed through the subsequent layers of coding so this is not reflected in the interpreting of the data (Figure 5.1 through to Figure 5.6).
Misunderstanding 5 – It is often difficult to summarise and develop general propositions and theories on the basis of specific case studies.
Multiple sources offer triangulation and inductive research offers – new conditions, subjects and perspectives on the same problem which can be studied in a new area (see sections 3.6.1, 3.8.1, 3.8.2, 3.10).

Source: Adapted from Eisenhardt, 1989; Flyvbjerg, 2011; Charmaz, 2012.

3.7 Pilot Study – first observational analysis

For researchers conducting a research project, the importance of a pilot study becomes apparent. Whether the research is based on questionnaires or interviews, this process helps the researcher understand any issues which may need to be ironed out before the full study is launched (Bryman and Bell, 2011). This can relate to whether participants are comfortable with the wording of questions which are set for comprehension or even the comfort of the respondent. The comfort of the respondent is of key importance, and links to ethics where the researcher is to do no harm to participants. Some respondents may not wish to discuss certain matters but the pilot also enables the researcher to understand where new questions may be answered or existing questions may be moved to in order to gain flow in the process answer the research questions (Bryman and Bell, 2011).

As this research was conducted as an interpretivist case study, a pilot study was required in order to help determine the focus for the main research study. NHS Lothian were known to be implementing Lean and as the second biggest health board in Scotland, this was an opportunity to see how far Lean was being utilised in an organisation, that had moved beyond the initial 2-3 years of implementation. When the researcher first contacted NHS Lothian for access, they had been implementing Lean for almost five years.

After access to the Lean team was granted, the researcher joined a Lean team lead to shadow them on a project involving drug prescribing in the prison service as this was the first opportunity to do so. Observations were utilised to see how a Lean project was started, why this project would be undertaken and how staff were involved in the process. As this was a secure site (prison), no recording or IT equipment was permitted so notes were handwritten as work was observed. These observations covered around 20 hours and allowed the researcher to see the preparatory work conducted by the Lean lead, the discussions with staff, the initial Lean event and a meeting of senior managers, off site, regarding prescribing in the region. Staff accepted the presence of the researcher (whose role was fully explained) and a Lean event which prison nurses and prison officers participated in was also observed. These observations are further discussed in Chapter 5 (section 5.3.3). The use of observation as a method for gathering research data is discussed in section 3.8.1.

3.7.1 Second Pilot Study – interviews with sub-sample of staff

As there were no further opportunities to conduct in-depth research with staff here due to the nature of the secure site, the pilot study interviews were conducted on clinical sites with four staff involving one of the following; Lean team, Operations Manager, Administrator and a Consultant (senior physician), all with involvement in Lean projects. Two initial Elite conversations were also conducted with authors of highly cited case studies and the themes discussed were how staff engaged with Lean and their own experiences of leading Lean implementations in healthcare. These conversations were not planned as part of the data collection process but this was an opportunistic exploration of their experiences of Lean which took place at a workshop the researcher was attending. The responses of these Elite interviewees confirmed that the initial themes to be discussed in the interviews were valid as these conversations uncovered previous unpublished insights from their experiences of Lean that were relevant when discussing staff roles in Lean and the healthcare environment.

The pilot study offered an opportunity to test the questions for relevance with the target group, including staff in NHS Lothian. Questions were built around key themes such as their role in the healthcare environment (including some background information on their career), involvement in Lean (how they were involved, roles held and whether this involved single or multiple projects), their views of Lean and what outcomes had been evident from the Lean project. Staff used the term Lean project rather than Lean implementation so this terminology was adopted for the context under study. The interpretivist aspect of the study allowed for emergent themes to be taken on from group to group and for the continual development of new knowledge to be built into the questioning of respondents. The pilot study also confirmed that staff in the NHS would be happy to be interviewed so there was no need to change method as an outcome of the pilot.

3.8 Methods applied in this research

A detailed exploration of the methods employed in this research such as semi-structured interviews and observations is given below and these are methods which are applicable for deployment within a qualitative case study (Yin, 2011a).

3.8.1   Non-Participant Observations

Due to the nature of researching on a secure site in the first pilot study, non-participant observations were used initially when scoping the study and also have been used to support participants' discussions of improvements. Observations are commonly and often described in relation to Ethnography (Sánchez-Jankowski, 2002) which is not the case here as these observations have formed part of the research work and have instead been utilised within a qualitative case study (Yin, 2011a). Observations are endorsed in the OM field after many years of research moving from observed practices to simulation and modelling (Craighead and Meredith, 2008). Sociology has long used observations as a way to document the everyday activities of societies and it is through the work of the researcher as observer, that these societies were explained and represented (Sánchez-Jankowski, 2002). In this research, the society is healthcare staff and their groupings. Observations in qualitative research are described as *"those in which the researcher takes field notes on the behaviour and activities of individuals at the research site. In these field notes, the researcher records in an unstructured or semistructured way (using some prior questions that the inquirer wants to know), activities at the research site"* (Creswell, 2009).

Observations commonly take place in the field under study such as clinics or laboratories and in naturalistic or non-participant observation, the aim is for the researcher not to interfere with people or process which are under study. In participant observations researchers are immersed in the area under study (Angrosino, 2008). The process of conducting observations involves acceptance in the field of where the studies are to take place and the context under which behaviours and actions are taking place, must be understood as there will be actions and behaviours not observed when the researcher is not present (Angrosino and Rosenberg, 2011).

Key challenges are noted within observations and these relate to the role of the researcher, access and acceptance in the field under study and ethical constraints in relation to research and its funding for this methodology (Angrosino and Rosenberg, 2011). The researcher was aware of these limitations as observations were noted strictly on the basis of what was observed, e.g. the discussions, actions and behaviours which were noted at the point and time (and context) of what was being observed. The use of observations allowed for the researcher to see for herself how Lean leads worked on projects. In the clinical setting, the improvements which had been discussed by respondents in interviews

gained the importance of 'one source' (seeing it first-hand) which aided triangulation of evidence to ensure the facts under discussion were correct (Meredith, 1998).

3.8.2   Interviews

Interviewing is one of the most commonly noted qualitative methods. Interviews are described as social situations which allow researchers to gather empirical data, based on how the interviewee sees their world which produces understanding and knowledge which is reported by the researcher (Holstein and Gubrium, 1997). The researcher is very much involved in the process of gathering data as the questions asked in the interview will determine the data gathered, as it is the interviewee who is an active participant whose responses may determine the process of the interview (King, 2006).

In OM, interviews are used within case research, longitudinal studies and action research (Karlsson, 2009). Although surveys have been noted as being more popular in OM, interviews are popular within research investigating social phenomena (Hopf, 2004).

Interviews are noted as being commonly used in qualitative research as *"the qualitative research interview is a construction site of knowledge. An interview is literally an inter view, an inter change of views between two persons conversing about a theme of mutual interest"* (Kvale, 1996:2). Kvale (1996:1) explains, *"the qualitative research interview attempts to understand the world from subjects' points of view, to unfold the meaning of peoples' experiences, to uncover their lived world prior to scientific explanations."* The skills of the interviewer are important in this method because of the interaction in the exchange of views between interviewer and interviewee. The key skills involved are numerous but include listening which in turn will aid flexibility in picking up on points raised and exploring this in an opportunistic manner (Kvale, 1996; Yin, 2011a). Mitigation of bias and neutrality are also key skills as this links to being non-directive and maintaining a neutral demeanour (Kvale, 1996; Yin, 2011a).

Interviews have varying structures in comparison to quantitative methods as the direction of the interview can be determined by the respondent and not the interviewer, depending on the style used in the research process. This can impact the ordering, addition and wording of questions as the interview progresses. As is discussed with research ethics which follows later in this chapter, the interview should 'do no harm' and the interview should be a positive and even enriching experience for all of those involved, with the

focus being on the interviewee and their responses, rather than the interviewer (Kvale, 1996; Yin, 2011a).

Questions were set initially to cover respondent's roles in the service and their typical duties. The interview was designed to obtain details of specific experiences, in this case, the Lean events or staff experiences working within projects (see Appendix 3). However, flexibility was key as it was imperative to capture potentially unconsidered areas for discussion and then to build on this and so a few key questions were identified but other emergent areas would also be explored. Avoiding bias and focusing on neutrality was important in the research as although professionalism was highlighted in other literature studies of healthcare as impacting the improvement process, this would be an emergent theme in the data collection generated from the participants' discussion and not from the researcher. This can lead to non-directive interviewing as it is the respondents discussing areas in their own way, using their own language which develops the conversation (Kvale, 1996).

3.8.2.1 Different types of interview

There are three main types of interview, one which is predominately associated with quantitative research and the other two which can be used in qualitative research but the terminology for these interviews varies between authors (Kvale, 1996; Bryman and Bell, 2011). For simplification and description purposes, they will be referred to as structured, semi-structured and unstructured interviews. In structured interviews, the interview process will be highly structured and standardized across all participants and can be recognised in gathering quantitative data as these interviews are commonly regarded as survey interviews (Holstein and Gubrium, 1997). In semi-structured interviews, the interviewer will have questions to be answered but there will be the flexibility to pick up on emerging themes and for gathering contextual data in order to understand the subject and the context of their world and situations they face (Yin, 2011a). Unstructured interviews may require the interviewer to use prompts or even ask a single question to commence the interview but follow-up questions are likely to be based on following up on responses and the unstructured interview can resemble a conversation (Easterby-Smith, et al., 2012).

The benefits of qualitative interviews are recognised as the interviewer is gaining an insight into the respondents' world, it is a way to transmit knowledge and to reconstruct events, and they enables the gathering of empirical data as a result (Holstein and Gubrium, 1997). Criticisms of interviews are linked to bias and the role of the interviewer in driving the direction of the interviewee and the insignificance of interviews in providing new knowledge (also described as atheoretical) in comparison to the more scientific methods of gathering research data (Kvale, 1996; Easterby-Smith, et al., 2012). The overlapping data collection and analysis and the development of themes as generated from the data, means the grounding of the data aids the elimination of bias which mitigates some of the criticisms levelled at interviewing (Locke, 2001; Charmaz, 2012).

Semi-structured interviews were adopted for this research as this would enable key areas to be discussed and allow for flexibility where respondents would discuss their own experiences which could allow for unconsidered insights to emerge. Although there were key areas to be discussed, a protocol was designed around these areas as shown in Figure 3.2. This protocol was adapted as the interviews progressed in order to take advantage of emergent themes (Eisenhardt, 1989) and the data analysis which was being conducted throughout (Eisenhardt, 1989; Charmaz, 2012). Protocols were configured to cover key areas but emergent themes were also followed up. The interview protocol was checked for relevance and applicability as the research progressed (see Figure 3.2 for details of these themes and see Appendix 3 for one of the interview protocols). Each interviewee signed a consent sheet and was also provided with an information sheet about the research (Appendix 1). A separate briefing sheet was developed for the Executive interviews as an information sheet on the key themes expected to be discussed was required to be submitted before the interview approval was given (see Appendix 2). It is important to note, this was a thematic protocol and emergent themes were introduced and discussed in the interview.

43 NHS Lothian staff were interviewed in total for this research. Including the two elite interviews the total is 45. Four members of staff participated in the pilot study and these are incorporated into the 43 interviews. Two of these pilot interviews were semi-structured but also conversational style as they took place during the pilot study and in gaining access before these members of staff were formally interviewed (and recorded) at a later date. The 43 interviewees all worked for NHS Lothian in positions including

'front line', middle and senior management. Respondent's positions included administration, management, senior management, clinical work, human resources and quality improvement work across four sites. The breakdown of the amount of each group interviewed is contained within Figure 3.2. Staff have been shown in groups rather than listed individually for a key reason. Some staff, by the nature of their job title and role, may be at risk of being identified and to ensure confidentiality and anonymity, then demographics by grouping has been presented. Administrative staff includes all administrative staff at all levels, nursing staff includes all levels of nursing grades and management and the medical consultant group includes clinical directors.

It is important to note that many of the respondents worked across multiple sites due to the pan-Lothian focus that NHS Lothian healthcare provided at the time the research was being conducted. Only three senior management interviews were conducted as the focus was to be on the front line staff groups. Data were collected through a digital recording of the interview which was then transcribed verbatim. Non-participant observations supported data as well as company documents on Lean projects which were given to the researcher by the organisation (see section 3.10).

One area which did emerge was one senior respondent discussed not using the term 'Lean', so the interviewing of staff in his services (and also other services in case this was the same elsewhere) took this into account and broached the subject based on 'quality improvement initiatives' respondents had been involved in and this was adopted in the themes and topics for interviews if respondents were unfamiliar with the term 'Lean'.

This enabled the researcher to understand what respondents' experiences were in improvement and to also potentially unpick where staff had been involved in improvements in dealing with waste and patient flow, but not necessarily branding it, or associating it, as being Lean. Although interview themes were adapted as the interviews progressed, so did the demographic the research covered. Quality Improvement staff, administrators and managers had all highlighted having issues with clinical staff, and in particular with senior medical staff (consultants). For this reason, a greater focus was placed on this group so to understand their perceptions about Lean and also about the roles they had within Lean implementations in regards to engaging in the process, involvement in Kaizen events or even taking on training.

THEMES AND TOPICS FOR INTERVIEW

DEMOGRAPHIC
- TITLE
- POSITION
- EXPERIENCE

HEALTHCARE ENVIRONMENT
- PRESSURES FACED
- CHALLENGES
- CURRENT STATE

INVOLVEMENT IN QUALITY IMPROVEMENT
- QUALITY IMPROVEMENT EXPERIENCE
- KNOWLEDGE
- LEAN

LEAN
- EXPERIENCE
- PROJECT INVOLVEMENT
- KAIZEN/ TRAINING
- PERCEPTION

Demographic – Groups by roles
- Exec – 2
- Elite - 2

- Quality Improvement Team - 8

- Operations – 5
- Admin – 6
- HR - 3

- Consultant – 13
- Nurse (all) - 6

Figure 3-2 Interview themes and interviewee demographics

3.8.2.2 Limitations of approach

A case study strategy was employed which was comprised of an initial phase of observations, followed up by interviews and document analysis. There are challenges involved in conducting a qualitative study, especially one involving multiple methods. The main issues, after initial organisational approval was granted, were access, time and resources. Access was a challenge as the researcher was not attached to the organisation beyond the data collection phases. Therefore identifying and gaining access, even once top level access was granted to the appropriate respondents was difficult due to work-loads and schedules which affect the amount of time available for interviews. The average length of interview was 30 minutes. Time and resources were issues as the collection, management and analysis of large amounts of qualitative data had to be considered and training was undertaken in order to enhance existing skills in this area. Table 3-5 shows the data collection undertaken in NHS Lothian (NHSL) including interviews and observations. Each location/department is numbered for anonymity so to avoid potential identification of research participants.

Table 3-5 Access to NHS Lothian for data collection

Date	Nature of visit	Observations	Time spent on site (approximately)	Site (anonymised)
Nov 2011	Informal meeting – introduction to PhD project	Workspace, evidence of Lean projects	4 hours	Site 1
Feb. 2012	Discuss shadowing Lean Team		2 hours	Site 1
Feb. 2012	Shadowing Lean Lead	Discussions, initial process mapping, Lean 'taster' event	20 hours	Site 2 and off site meeting
March 2012	Interviews x 5		6 hours	Site 1
March 2012	Interviews x 3		5 hours	Site 1
March 2012	Informal meeting to discuss participation in PhD project		2 hours	Site 3
March 2012	Interviews x 2		2 hours	Site 3
April 2012	Interviews x 2		2 hours	Site 4
May 2012	Interviews x 3	1 hour clinic observation	4 hours	Site 5
June 2012	Interview x 1		1 hour	Site 5
June 2012	Interview x 4	1 hour clinic and office observation	5 hours	Site 5
June 2012	Interview x 1		1 hour	Site 3
July 2012	Interview x 4	1 hour clinic observation	5 hours	Site 5
July 2012	Interview x 3		3 hours	Site 5
August 2012*	Interview x 1		2 hours	Off-site location
Jan 2013**	Informal meeting		1 hour	Off-site location
Feb 2013	Interview x 2		1 hour	Site 3
Mar 2013	Interview x 2		1 hour 30 mins	Site 6
April 2013	Interview x 2		2 hours	Site 3
April 2013	Interview x 1		1 hour	Site 3
April 2013	Interview x 1		1 hour	Site 6
May 2013	Interview x 2	1 hour 30 mins	3 hours	Site 6
May 2013	Interview x 1		1 hour	Site 3
May 2013	Interview x 1		1 hour	Site 1
May 2013	Interview x 2		1 hour 30 mins	Site 1

*Interviews in 2012 conducted until August due to challenges faced in NHSL (section 5.8) and change of staff roles due to reviewing of competencies. Requests for interviews after August remained unacknowledged. Decision was taken to withdraw until things were more settled.

**Informal meeting. Advised as to potential research participants and update on Lean activity so decision taken to start interviewing again and to follow up on emergent themes.

3.9 Interpretivist Inductive Analysis

Section 3.2.2 discussed the philosophical underpinnings of this research and this is aligned to the analysis process which was undertaken, where the interpretivist researcher seeks understanding rather than absolute knowledge. Interpretivist thematic analysis was undertaken where themes/patterns were identified, analysed and reported (Braun and Clarke, 2006). Quantifiable measures are not necessary to show important themes but their importance will be determined or interpreted in their relation to answering the research questions set (Braun and Clarke, 2006). The inductive nature of the research is that the researcher is guided by the themes which are emergent from the research and not by preconceived theories (Bryman and Bell, 2011). This inductive and interpretivist approach is consistent with the nature of how the research project has been conducted as this has been detailed in sections in the case study framework and then the sampling approach (3.6.2 and 3.6.2.1). Thematic analysis has been argued as a method in its own right, but also as a process which is performed within grounded theory (Braun and Clarke, 2006).

All interviews conducted were transcribed verbatim and then uploaded to NVivo 10. NVivo 10 assists in undertaking data analysis and is intended to increase the efficiency and effectiveness of managing data (Bazeley and Jackson, 2013). All data within NVivo 10 was manually coded thematically, and line by line coding was used in the first round to reflect respondent-derived codes or 'in vivo codes' (Charmaz, 2012). Three rounds of coding were applied to the data in this project. The first round involved line by line coding and involved naming and providing a common name for the data concepts. Comparing data is also undertaken here as the researcher searches for similarities and differences. As in vivo respondent codes were applied to data, this was to be refined in round two where categories are integrated and relationships between categories are becoming apparent (Locke, 2001; Charmaz, 2012). In round three, further refinement of properties and dimensions of the data, now results in saturation where no new data has provided new insights (Charmaz, 2012). This refinement has now set the focus of the research (Locke, 2001). These three rounds are labelled to provide first, second and aggregate order concepts. The illustration of the coding is shown in Chapter 5 which presents the data analysis.

3.10   Additional Data Sources

Once access had been granted to NHSL and interviews were progressing, the researcher was granted access to the annual reports generated by the Lean in Lothian team which report on projects undertaken each year. These reports allowed for another data source to be used in the research project which could support or 'fill in the blanks' from data gathered from the interviews and observations. Qualitative content analysis was undertaken on these reports. These reports were also to contribute to answering the following research questions:

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

3.10.1 Content Analysis

The aim of content analysis is "*to provide knowledge and understanding of the phenomenon under study*" (Downe-Wamboldt, 1992:314, cited in Hsieh and Shannon, 2005). Content analysis is commonly used in healthcare research (Elo and Kyngäs, 2008) and is suitable for qualitative text data analysis.

Although there can be confusion that content analysis is a quantitative methodology, Krippendorff (2004) describes reading as a qualitative process and when codes are used to describe elements of the text under study, there is interpretation of the results. This is further elaborated, as using numbers or counting is described as convenient, but "*it is not a requirement for obtaining valid answers to a research question*" (Krippendorff, 2004:87). Throughout Krippendorff's text, he is explicit that content analysis is a qualitative method in discussion of interpretation, context sensitivity and sense-making of the contents of the text (Krippendorff, 2004). Krippendorff (2004) is also critical of those who define content analysis as being quantitative and cites Berelson (1952) in doing so. Qualitative content analysis can demonstrate reliability and validity as long as the method of analysis and interpretation is explicit (Elo and Kyngäs, 2008; Krippendorff, 2004). This coding applied is discussed in section 3.9 and the coding tables are shown in Appendix 4, with the discussion of this data in Chapter 4.

The benefits of content analysis are that large volumes of qualitative data can be analysed when qualitative research often deals with smaller sized samples (Krippendorff, 2004). Findings from content analysis can be used in areas where knowledge is still developing

or is perceived as fragmented (Elo and Kyngäs, 2008) which is relevant for Lean in healthcare. The limitations of the method are linked to missing or incomplete data (Krippendorff, 2004), or in failing to understand the context under which the data are gathered (Hsieh and Shannon, 2005).

3.10.1.1 Coding

Following the receipt of these documents, their content was reviewed across all versions and coded so to organise the data into relevant sections (Elo and Kyngäs, 2007). The document format and their presentation varied over time and so a consistent format would need to be constructed and then used within the analysis process. As the interview and analysis process had commenced by the time these documents had been received, the interviews had already been coded in the interpretivist methodology (see section 3.9 for further details). These codes for projects had been created through the interview analysis but were relevant for coding the documents received as both interviewees and the documents discussed projects and their outcomes. Dey (1993) and Elo and Kyngäs (2007) ask researchers to consider five key areas in qualitative data analysis when they are making sense of the data and this is aligned to the research being undertaken here and is shown in Table 3-6.

When categorising data through coding, the researcher is interpreting under which category the data belongs until reduction of the data led to five key categories (Project, Drivers for Project, Project Type, Outcomes and Sustainability) which are further illustrated and discussed in Chapter Four. These five key areas were considered and utilising the language of the organisational stakeholders from the interviews, codes were developed for analysis. Context is now Project – context and where Lean is being implemented. Intentions are now determining insights about the Drivers for Project (Lean) – why is Lean being implemented here? Process is now Project Type and Outcomes – How is Lean implemented here in terms of its project type? What are the outcomes from the Lean implementation? Connections inferred are now just one code of Sustainability – is there a relationship or connection between the Lean implementation and the maintenance of the outcomes – has there been sustainability of Lean?

Table 3-6 Key analysis areas (Content Analysis)

Key areas	Areas applied to Content Analysis
What is the context under study?	Context – the application of Lean since 2006 in healthcare provision for a large regional healthcare provider and how this application is reported.
What are the intentions?	Intentions – uncover new insights about an improvement phenomenon which had grown in recent years (Lean) but was not yet fully understood or as widespread (in healthcare) as in other industries (manufacturing) and what might be impacting this?
What is the process (action/outcomes)?	Process – How and why was Lean being implemented? What outcomes were generated?
How is the data categorised?	Categorising – Coding – e.g. Context of application, intentions from Lean, process of implementation and outcomes and connections as a result of this (inferred).
Can connections be inferred?	Connections inferred – What impact did Lean have in terms of sustainability?

Source: Adapted from Dey (1993) and Elo and Kyngäs (2007).

3.11 Reliability, Validity and Generalisability in Interpretivist-Social Constructionism Research

When Positivism and Interpretivism were contrasted in Table 3-1, reliability, generalisability and validity were considered. Interpretivist-social constructionist research has been criticised as lacking in reliability, generalisability and validity due to the subjective nature of the research (Easterby-Smith, et al., 2012). Interpretivist research is judged on positivist terms including against the criteria of validity, reliability and objectivity (Denzin, 2011). Social constructionist implications of these terms of measurement will be briefly discussed and how they apply to this research as the terms are commonly associated with Positivist-Objectivist research, rather than Interpretivist-Social Constructionist research.

Validity cannot be understood in the same way as it would in objectivist research as the researcher and the research participants are involved in interpreting meaning to accounts of the social world (Denzin, 2011). These meanings are based on understanding, not absolute truth or a set reality (Turnbull, 2002). Generalisation is not the aim of constructionist research and is conditional to the situation under study, so instead the researcher is aiming for interpretive understanding of the phenomenon under study which includes highlighting differences and variation (Charmaz, 2012). Reliability is not discussed to the same extent in interpretivist research and instead terms such as credibility, e.g. having confidence in the findings, dependability in the consistency of findings, confirmability in how respondents and not the researcher are shaping the findings are applicable (Lincoln et al., 2011). This has been discussed in this chapter where consistency is applied and related to the thoroughness of the methods of data collection and the analysis of data (Miller, 2008).

The interviewing of staff of NHSL, the observations of the researcher and the content analysis of the reports are interpreted by the researcher but the validity or credibility of these multiple accounts is supported by the use of the Eisenhardt (1989) framework, which is a known and credible framework for conducting case study research. The application of multiple methods within this research allow for confirmability of data. As discussed in section 2.6, the case studies on Lean commonly report on the early stages of implementation and these accounts are reflective of healthcare systems beyond Scotland so there is limited work on how Lean is applied in the Scottish context. Consequently, this research is evaluating the situation under study at a certain point in time. This situation is informed by the social actors involved in the Lean implementation which may lead to differences and variation between studies. Dependability is demonstrated by the explicit nature of the work which has been undertaken which supports the consistency in approach, as a coding framework has been designed and illustrated and applied to interviews, observations and document analysis.

3.11.1 Ethics in this research

The researcher had no previous affiliation to the healthcare organisation under study here. Ethical approval was granted by the academic institution and approval for access was granted by the case study organisation. Formal ethical approval was not required from NHS Lothian as contact would be with staff members who could consent or refuse to participate in the study if they so desired to, and so access would be granted through the

Modernisation Directorate. Apart from access, other ethical issues were based on interviewing, observations and access to company documents. Written permission was granted and the researcher has liaised with the Modernisation Department of NHS Lothian for initial access to sites within the organisation, but otherwise had free access to contact and consent participants as required. Before data collection commenced, all interviewees were given the opportunity to read (and keep a copy of) the 'Participant Information Sheet', which provided details of the study, contact details of the researcher, and details of approval at NHS level. A consent form was created, guided by fellow researchers working in the NHS and Bryman and Bell (2011). Consent was granted for all interview activities by individuals, prior to the data collection commencing, regarding anonymity, confidentiality, access to data and consent that findings (anonymous comments, quotations) can be publishable in academic sources. A copy of the participant information form is shown in Appendix 1.

3.12   Summary to chapter

Chapter 3 has discussed the research paradigm, research strategy and design employed in this research project. In order to evaluate how Lean is implemented in NHS Lothian, an interpretivist-social constructionist research paradigm is held by the researcher which has informed the strategy and design of the research. A qualitative research strategy has been employed in this project as this research is focusing on the social elements of Lean implementations (Given, 2008). As the chosen topic is the evaluation of Lean, then the methods employed were supported by the application of Eisenhardt's (1989) framework for conducting research through the application of an interpretivist case study. Within this case study, multiple methods were employed which included observations, interviews and content analysis.

These multiple methods allowed for greater access to data and to allow for rich and detailed findings to be grounded in the data in supporting the answering of the research questions which have been reiterated below. Research question one was answered by observations, interviews and content analysis. Research question two was answered by interviews and content analysis and research question three was answered by interviews.

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

RQ3. What roles do healthcare staff including medical professionals, involved in the implementation process, hold in terms of the effective implementation of Lean?

Credibility and dependability is demonstrated in this research in the application of a known research frameworks, which is further supported by confirmability through the utilisation of multiple sources of data which can then allow for discussion of consistency (Miller, 2008). The process of analysis and generation of categories has been demonstrated in section 3.9 and has been guided by the work of established researchers (Eisenhardt, 1989; Locke, 2001; Charmaz, 2012). Appendix 4 of the thesis provides the content analysis of the Lean reports which are reported in Chapter 4.

4.0 Content Analysis of Lean in Lothian Reports

4.1 Chapter Introduction

This chapter presents the data analysis from the Lean in Lothian team annual reports, using the analysis and coding methodology described in Chapter 3.

The document analysis data presents discussion of how Lean was implemented in NHS Lothian and the projects conducted in the period of 2006-2012. The discussion is based on data which have been reported in the Lean in Lothian reports which are produced on an annual basis and provide summaries of projects under taken by the Lean team each year. These reports provide an overview of the project, drivers for Lean, the approach used (which includes any details of tools and techniques applied) in implementing Lean; outcomes generated from Lean and also sustainability considerations. Some of these project reports present a 'snapshot in time' as the project may only have launched weeks prior to the reporting being presented in these documents. Where citations are used to illustrate discussion, the author will be provided where known, otherwise, the phase will be given, e.g. Phase 2) as this is not consistent across all documents. For alignment of data, the coding of the documents is aligned to the coding frame applied to the qualitative data which has been discussed in Chapter 3, section 3.6. The data are recorded from these projects in Appendix 4. These reports focus on one Health Board (NHS Lothian) but refer to projects across multiple sites within the health board's geographical area. A list of abbreviations used in the reports is provided at the start of this thesis as these abbreviations were often provided in the reports with no explanation. The projects are referred to according to their phase, in line with the original format of the reports and this corresponds to the annual reports as noted in Table 4-1.

The findings identify the progression of the application in NHS Lothian as being driven by the Lean in Lothian team and initially GE Healthcare. The chapter uses content analysis to analyse this progression and how this progression is monitored in annual reporting. This analysis allows the progress of Lean in Lothian to be tracked in the time period of 2006-2012 and also allows trends to be identified in the drivers for the application of Lean and the type of projects undertaken by the Lean in Lothian team.

Table 4-1 Phases of Lean in Lothian projects

Phase No	Annual Report
1	2006-2007
2	2007-2008
3	2008-2009
4	2009-2010
5	2010-2011
6	2011-2012

It must be noted that the Lean in Lothian reports do vary in format and approach as the reporting of the projects is by individual Lean Improvement Lead but configured into an annual report; hence a consistent coding structure linked to the qualitative data was applied so the data could be presented in a uniform way (see section 3.10.1.1).

4.1.1 Chapter structure

This chapter will be presented as follows: an overview for the general drivers behind the application of Lean will be provided as per the reporting in the Lean in Lothian reports. The analysis tables for the projects reported through the Lean in Lothian annual reports can be found in Appendix 4 of this thesis as this chapter will provide an overview of the projects conducted, not detail each project individually. In sections 4.2 through to 4.7, the six phases of Lean projects will be discussed respectively considering;

Drivers for Lean

Implementation of Lean

Outcomes from Lean

Sustainability of Lean

Section 4.8 will follow on with the discussion of the progression of the reporting of Lean. Consideration of the impact of the utilisation of these reports in the research, as well as discussion of any limitations associated with content analysis will also be evident.

4.1.2 Drivers for Lean Implementation in NHS Lothian

By 2005, there was recognition by NHS Lothian that there was a need to enhance capacity and capability in order to drive widespread service redesign, accompanied by culture change in order to foster an environment where change would be embraced. After a full tendering process, GE Healthcare was selected to be NHS Lothian's partner in its service improvement programme (Tait, 2007). The approach is described as a programme, linking the aims and objectives of Lean in NHS Lothian to strategy and also trying to create change which will give the organisation internal capability, through its staff to drive this culture change.

A full investment of £500,000 was provided, and £100,000 of this investment was provided by a third partner, NHS Education Scotland (NES), who wanted to use this project to identify learning's for NHS Scotland (Tait, 2007).

Lean as a methodology is not explicitly mentioned in the first paragraph of the Executive Summary however, in detailing GE's methodology, Lean is discussed as part of the 'GE Toolkit', alongside 'Work-out', Change Acceleration Process (CAP) and Six Sigma, although the method of deriving the outcomes reported is through 'Kaizen' in Phase 1. Training was provided in all the areas of the GE Toolkit. The table below discusses how Work-out, CAP, Six Sigma and Lean are defined within the context of the GE toolkit as discussed by NHS Lothian.

Table 4-2 GE Toolkit

Term	Definition
Lean	Streamlines processes and eliminates unnecessary steps
Work-out	Problem solving, develop solution and action plan
Change Acceleration Process (CAP)	Change Management framework to mobilise teams and make change last
Six-Sigma	Statistical approach to reducing variation and defects

Source: Tait (2007:1)

Although the programme was initially driven by GE Healthcare, GE consultants were working alongside NHS Lothian staff to support learning and embed skills transfer in the organisation through training 30 key managers and senior partnership representatives. A further 200 staff in the first phase participated in training and events linked to specific redesign projects (Tait, 2007).

Initially two main streams of work were identified as they provided current challenges for NHS Lothian in terms of waiting times and length of stay are further discussed in section 4.2.2 and were perceived as gaining benefit from process improvement: Cancer Waits and Delayed Discharges. Six projects (three from each stream) evolved from this:

Cancer Waits	**Delayed Discharges**
CT Scanning	Medicine of the Elderly length of stay
Urgent Colorectal Referrals	Bed Management
New Patient Breast Clinic	Alternatives to Acute Admission

4.2 Phase 1 - Introduction

In the Executive Summary in the phase one report, it is noted that that the pilot projects have delivered the objectives that have been set which have included potential resource releases identified of circa £1 million. The programme is to be continued into phase two. This continuation will be supported by GE Healthcare who will mentor and develop staff,

which includes having trained NHS Lothian Improvement Leads to deliver projects. The Lean projects are already described as being part of a programme approach to service redesign and process improvement.

4.2.1 Phase 1 (P1) - Drivers for Lean

Phase one drivers were predominately based on tackling challenges related to waiting times and targets and the impact this had on patient care.

These initial projects were conducted by GE Leads who were also supported by two NHS Lothian managers, including one from the Modernisation Team.

4.2.1.1 Cancer targets

The challenges were particularly urgent when those pathways related to the 62 day cancer targets where patients must be treated within the 62 day target from receipt of referral to start of treatment. In CT Scanning, waiting times were noted as being as high as 21 weeks, so in breach of the nine week referral to treatment time guarantee, although it was discussed that treatment times were varied across Lothian. In the New Patient Breast Clinic, although this included waiting times of around six weeks, the service had yet to breach the 62 day target but multiple referrals and appointments may have been required before the patient had received a diagnosis.

4.2.1.2 Medicine for the Elderly (MoE)

The second stream of work was related to delayed discharges and particularly around Medicine of the Elderly (MoE). Drivers for the MoE stream were related to Lothian's failure to meet National targets on Delayed Discharges. In August 2006, Lothian's delayed discharges were 66 percent higher than the target for April 2007. The challenges in meeting this target are further compounded by issues in accessing post-acute care such as care packages and nursing/residential home beds. There are also issues in the visibility of beds within the pan-Lothian area and their utilisation.

4.2.2 Implementation of Lean

The approach for all projects was through Kaizen events. The adoption of 5S is discussed for the colorectal project (in relation to cancer waits) for administration processes. Techniques applied at Kaizens have not been detailed explicitly but process maps and

value stream maps (VSM) have been included in the reports to illustrate the before and after status of the projects on patient pathways

4.2.3 Outcomes from Lean

4.2.3.1 Cancer Stream

All objectives were perceived to have been met in the cancer stream. Gains in CT Scanning included pooled slots to reduce variation in patient waiting times, with waiting times down to four weeks and 5S applied to improve administration processes and support faster processing of reports. In the new patient breast clinic project, the project was reported in its early stages but a one stop clinic for diagnosis and reporting was operational with improved General Practitioner (GP) advice and triage service for referrals.

4.2.3.2 MoE

Outcomes generated from MoE projects were directly related to the challenges previously identified; extra occupational therapy slots were identified to facilitate the earlier transfer of MoE patients to downstream facilities. A Single Bed Management system was utilised to provide a pan-Lothian visibility of acute and downstream beds for MoE patients to ensure the right patient was in the right bed, through the utilisation of pull. This also positively impacts on staff time as it releases significant time to care, instead of staff travelling to bed meetings.

4.3 Phase 2 (P2) - Introduction

Phase two saw the continuation of the implementation of Lean in NHS Lothian. In P2, the report discusses the programme of improvement as being 'the Lean in Lothian Programme.' Projects were conducted by both GE Leads and Modernisation Leads. Although the Phase 2 report discusses the conduct of 14 projects (seven each from GE and NHS Lothian Leads), 13 projects were in fact conducted – some by GE Leads and others by Modernisation Leads, although the reporting does not report who the main leads were. The 14th project, based on Research and Development Administration of research applications is noted as *"this project was commissioned outside of the main Lean in Lothian programme"* (Tait, 2008:32) and hence has been noted in the document analysis as it is still reported in the P2 documents.

Phase two saw an increase in projects being conducted, with 14 projects being conducted in comparison to Phase 1's six projects (See P2 tables in Appendix 4 for details of all projects conducted). Some of these projects progressed on from earlier work focusing on cancer pathways, such as Colorectal and the Breast patients long term follow up projects. Other projects however, moved beyond the focus on acute services and saw multi-agency involvement in projects such as Repeat Prescribing Waste, Substance Misuse (patient focused booking) and Child Protection.

4.3.1 Phase 2 - Drivers for Lean (Targets)

The main drivers identified from P2 projects are related to targets as 10 out of 14 projects were struggling or completely failing to meet referral to treatment time targets across services. Targets as a main driver were further impacted by challenges within the patient pathways over demand and capacity management (Colorectal cancer project), referral processes (Cardiology), inadequate reporting, information flows and administration processes (Breast clinic follow up, Child Protection and Outpatients 4/1 at Royal Infirmary Edinburgh (RIE)). An impact of poor processes in the management of patients on service pathways also resulted in issues with high patient 'did not attend' (DNA) rates (Outpatients 4/1 and Substance Misuse) which further impacted on demand and capacity management due to wasted appointments and further pressurised services in trying to meet targets.

4.3.2 Implementation of Lean

Tools and techniques associated with Lean are inconsistently noted in the reporting (P2). Kaizen events were held for seven of the 14 projects, with five workouts being held (short, usually one day events involving problem solving, solution and actions plans devised), and two projects of 'unknown' approach. Value Stream Mapping was applied in eight out of 14 projects and 5S was applied to two projects (Royal Hospital for Sick Children (RHSC) and Hospital Sterilisation and Decontamination Unit (HSDU)).

4.3.3 Outcomes from Lean

Outcomes were related to meeting targets through improved processes such as aligning clinical rotas to meet service needs (Breast patient long term follow up), performance measures and the application of 5S to improve the physical area and remove defects in order to improve quality (HSDU). As in P1, substantial reductions in meeting waiting times guarantees from referral to treatment were achieved such as Cardiology where waiting times reducing from 24 weeks to 13 weeks and in Substance Misuse appointments for drugs treatments services were reducing from four months to two months.

Wastes within Lean projects were also tackled, where the Pathology laboratories were struggling with delays impacting the service ability to contribute towards meeting the 62 day cancer targets. Centralisation of the service had resulted in work being batched as service demands and transport of samples from sites was not aligned resulting in defects and repetition of work. Improved flow and optimisation of resources such as staff, time and equipment, has resulted in the service achieving significant reductions in processing times, such as the processing of large specimens reducing from 36 days to nine days.

4.3.3.1 Relationships

Although it is not mentioned in Phase 1, Phase 2 sees the first discussion of 'relationships' being identified as impacting on services with discussion over staff morale and communications issues previously having an impact in multi-agency work or through poor processes and their management. Work in Outpatients 4/1 specifically notes *"some breakdown in confidence between Admin and clinical team placing a strain in relationships"* and outcomes in this project are noted as *"staff satisfaction"* and *"improved working relationships"* (Tait, 2008:11).

4.3.4 Phase 1 projects revisited in Phase 2 - Sustainability

P2 reporting saw the projects of P1 revisited and reported in the P2 report. The report confirms there has been sustained improvement with no loss of momentum. Although sustainability is noted in the Lean and Lothian reports, this is often related to work that may be taken forward in the future, with process owners taking on responsibility for managing changes through meetings or monitoring of performance measures.

4.3.4.1 Cancer Stream

In the reporting of P1 projects, some projects had been noted as meeting targets set such as colorectal targets achieving nine weeks for routine patients and two weeks for urgent patients being met. Reductions in CT Scanning have also been noted, from a maximum of up to 21 weeks, to between 4-6 weeks in 2007-2008 from referral to treatment.

4.3.4.2 MOE

The Delayed Discharges projects which included a focus on Medicine of the Elderly in reducing length of stay, single system bed management and alternatives to acute admission saw mixed results. Reduction in length of stay and single system bed management repeated the reporting of outcomes previously stated in P1 but success was achieved in the alternatives to acute admission project where 64 patients avoided admission to acute sites, equal to the release of 448 bed days and a cost avoidance of £260,000 per annum in P2.

4.4 Phase 3 (P3) - Introduction

Phase 3 report Executive Summary for 2008-2009 links the Lean in Lothian programme to the strategic aims of NHS Lothian as *"the programme was established in 2006 with the support of GE Healthcare to allow NHS Lothian to develop capacity and capability to deliver the significant service improvements needed to be at the level of Scotland's best, and among the world's top 25 healthcare systems"* (Tait, 2009:5). This is the first time in the reporting that an explicit statement such as this relation to strategy has been reported. 12 projects were conducted and 10 of these projects have now been led by four improvement leads from NHS Lothian. Over the three years, there has been a focus in gaining self-sufficiency and in the third year of the programme, it is now fully owned by NHS Lothian in the delivery of training and service improvement projects (Tait, 2009). In P3, a new format for reporting has been adopted and the project is reported with the names of the Improvement Lead, Process Owner (service manager, clinical manager or equivalent) and Executive Sponsor (senior executive).

4.4.1 Drivers for Lean

The drivers for this next phase of Lean projects are again linked to pressures over targets, including the inability to meet referral to treatment times guarantees. This was a factor in the commissioning of projects in the Plastic Surgery hands service where waits of up to 73 weeks were noted from the clinical appointment to receipt of results for nerve conduction tests and up to 99 weeks in the overall carpal tunnel pathway in P3. Magnetic Resonance Imaging (MRI) scanning was also facing increased demand which had impacted the services' ability to meet 18 weeks referral to treatment times guarantees, as capacity of scanning and demand was not aligned.

Dermatology, in this phase received a high focus, also due to the failure in meeting targets impacted by challenges over capacity and demand. It was reported that 7.3 percent of all outpatients in NHS Lothian are Dermatology patients. The service was struggling to meet 18 week referral to treatment time (RTT) guarantees (soon to move to maximum 12 week outpatient appointment wait guarantee) as four pathways had been shown as not achieving 18 week RTT, and had been running additional evening and weekend clinics in a bid to manage this. In Scotland, increased referrals (20 percent) for Dermatology, public awareness of skin conditions (including the 'Tommy Burns' effect related to the Celtic Football Club Manager who died of skin cancer) and General Practitioners (GPs) supporting less minor surgery due to changes in the GP contract, so more minor referrals were also being received, were all impacting on the NHS Lothian Dermatology services. Variation was observed in Dermatology pathways across three sites (St John's, Lauriston and Roodlands) raising concerns over patient equity of access to services across Lothian (P3).

4.4.2 Implementation of Lean

The introduction of a new format for reporting has resulted in a lack of information provided about the type of event or the tools used within the Lean project as this is provided inconsistently in the reporting in P3. Stakeholder interviews are noted as being used. Value stream and process maps are used to illustrate some projects or references are made to tracking outcomes through visual management, but again, this is not consistent across all reporting. GE are still involved in one project which is the building

of the new Royal Hospital for Sick Children (RHSC) and details of the analysis tools are provided (Tait, 2009:34).

4.4.3   Outcomes from Lean

Outcomes as have been observed in P1 and P2 were also similar in P3 as they were related to the achievement of targets and minimising waiting times aligned to the 18 weeks RTT guarantees. This was evident in the Plastic Surgery project where nerve conduction waiting times reduced from 48 weeks to 18 weeks and in Dermatology, Cryotherapy was now conducted the same day instead of within 84 days. Colorectal was achieving 98 percent of its 62 days cancer target.

P3 also started to see a focus on administration processes as there was a strong focus on administration in some of the major projects conducted (including Dermatology, Future Models of Psychiatry for Older People and Outpatients Department Two (OPD2) in General Medicine). These processes were to be improved in order to focus on improved patient experience through minimising cancellations and DNA rates (OPD2 General Medicine). Medical accessories were also tackled such as the project on Wheelchairs and Seating Pathways in order to more effectively manage inventories with 80 percent of adults getting a wheel chair post-Kaizen the same day as clinic attendance, instead of a 52 days wait as experienced previously.

4.4.3.1 Relationships

Relationships linked to communication and morale were also noted as issues within projects as three out of ten projects had mentioned this in the P3 reporting and this follows on from being highlighted in P2. These issues were managed through the Lean project and are listed as an outcome such as improved working and communication in multi-agency projects (Social work referral, assessment and allocation processes project and the Scottish Ambulance Service/RIE turnaround times project) as well as work within acute services (Colorectal information flow within OPD4) (Phase 3, in Appendix 4).

4.4.3.2 Consistency in focus - administration

How patient referrals are triaged has been a consistent focus in administration process and has been increasing as the phases of Lean in Lothian have progressed (see Phase 1, Phase 2 and Phase 3 within Appendix 4 for more details) due to the impact that efficient

and effective triaging has on the ability of services to meet referral to treatment times, either through the 18 weeks RTT targets or though meeting 62 days cancer targets.

4.4.4   Phase 2 projects revisited in Phase 3 - Sustainability

As from P2 onwards, P3 reporting also revisits projects conducted in P2. Again, as with P2, the P3 notes that all P2 project outcomes continued to be sustained. P2 sustained projects include Cardiology consistently attaining targets across all sites from 24 weeks in P2 to 18 weeks by November 2007 and then a maximum 12 week wait by March 2009. In the Substance Misuse patient focused booking project, the drugs DNA rate was 40 percent and has reduced to 21 percent, with a 28 percent increase in new patient appointments. In Psychology, the service faced waiting times pressures of up to 150 weeks and now, appointments for psychology plastic surgery appointments have reduced from 36 weeks to 20 weeks.

4.5 Phase 4 (P4) - Introduction

Phase 4 reporting notes that the Lean in Lothian Programme is now in its 5th year, though this report discusses year four projects and notes that there was an initial two year partnership with GE Healthcare (Tait and Howie, 2010). Again, following on from P3, the strategic use of Lean is reiterated as *"the programme continues to offer a key set of skills and tools to achieve service transformation improving quality while managing costs in pursuit of NHS Lothian's aspiration to be among the top 25 healthcare systems"* (Tait and Howie, 2010:3). P4 saw 12 projects being conducted with the focus being on those service requesting projects which were scored against '*patient benefit and suitability of Lean criteria'* (Tait and Howie, 2010). Some projects were following on from earlier success – a focus on West Lothian substance misuse was now being conducted as part of Lean, resulting in a multi-agency project. Work on Community Day Hospitals was also following on from earlier projects based on Alternatives to Admission for MoE patients and improving length of stay metrics (P1 and revised in P2). Although the P4 data shows nine projects being conducted, the day hospital work covers four sites and is reported as one project in P4 reporting by Lean in Lothian. As with P3, the Improvement Lead, Process Owner and Executive Sponsor for all projects has identified in the reporting.

4.5.1 Drivers for Lean

Drivers for projects were linked to targets in four out of 12 reports. Targets were noted as a driver in projects about Substance Misuse where the longest wait was 24 weeks wait was in breach of the 18 weeks RTT, which was also due to reduce down to 3 weeks RTT by 2011. Challenges noted as affecting the target were lack of centralisation and a need for standardisation in assessment criteria. Front door patient flow work at A&E and acute admission at the Western General Hospital also linked to targets in order to prevent breach of the four hour target and ensure the right patient was admitted to the right speciality. Paediatric Gastroenterology were currently meeting their six week target on paediatric endoscopies but only through the use of emergency theatres which was unsustainable and the service would be under further pressure when the target reduced to four weeks. P4 also continued to focus on administration projects, following on from P3, in order to improve services and processes. Administration was also a factor in the Lean project for Paediatric Gastroenterology. Complaints handling also received a focus here due to the complex management of complaints handling as centralisation and standardisation was required due to variation and performance issues (P4). Community Mental Health Teams (CMHT) in East Lothian were also affected by administration processes which were affecting clinical time to care for patients as standardisation and improved GP referrals triaging were required.

4.5.2 Implementation of Lean

Although in Phases 1 to 3, the most common approach to Lean projects in NHS Lothian was by Kaizen event, by P4 this had changed. Three Kaizens had been held but seven other projects were conducted by 'workout', which included four workouts for the Community Day Hospitals projects. There were two projects where the approach was not made explicit so these are listed as 'unknown'. No justification for the choice of approach is given or inferred in the reporting of the Lean in Lothian programme.

4.5.3 Outcomes from Lean

Outcomes linked to these Lean projects included management of the issues identified with improved administration processes such as in Paediatric Gastroenterology where a four years backlog of dictation was eliminated and the typing backlog reduced from a maximum of 9.5 weeks, but commonly four weeks and by June 2010, had reduced to 0.5 weeks. Complaints handling was moved from multiple points to a single point of contact,

with new policies devised for its management and complaints processed daily, without batching. Administration processes were also improved at East Lothian CMHT and the new processes implemented have resulted in a cost avoidance of £7684 in nursing time being released back to patient care. Appropriate management of referrals have seen a drop in inappropriate referrals from 17 percent to less than 1 percent. Areas facing pressures of targets also saw outcomes from Lean projects. In the front door patient flow project, 663 patients were diverted from A&E after pre-assessment from a senior clinician. Plastic surgery was revisited, following on from P3 but this time the work was carried out in the Skin Lesions pathway which straddles Dermatology (P3) and Pathology (P2) too. As skin lesions are impacted by the 62 days cancer target then redesign work on the pathway was required. The service was facing a loss of capacity, just when the 62 days target would be impacted by the 31 days target where patients will start treatment within 31 days of the decision being made to treat the condition diagnosed. Consultant job plans were reviewed and a nurse specialist was able to deliver an extra 220 cases per annum.

4.5.3.1 Systemic Improvement

By P4, it can be seen that there are projects being delivered consistently and consecutively in services so initial work is being followed up or extended into other pathways for systemic service improvement. The reporting of this work does link to other outcomes or notes where work is following on from previous projects, where it is being reported in the early stages.

4.5.4 Phase 3 projects revised in Phase 4 - Sustainability

From P2 reporting onwards, projects which had been conducted in the previous phase were revisited and this has continued in P4. Some projects had work which was still going on such as Repeat Prescribing Waste which has been impacted by pharmacy recruitment and work on the General Practice Administration System for Scotland (GPASS) system. Colorectal Information Flow is also on-going as the GE Lead has left and work has been taken on by a service redesign manager with the plan to implement learning into other projects in cancer services. Dermatology is reported with successful project outcomes as triaging of referrals are now conducted daily in a centralised location (Lauriston), an email advice system for GPs is being conducted by one consultant, and patient focused booking has been expanded. Changes to job plans have resulted in extra sessions being offered (see P3 outcomes in Appendix 4 as this is reiterated) but also training an extra

nurse in cryotherapy has provided an extra 600 slots and has contributed to the reduction of waiting times. The parallel clinic which was offered by both Dermatology and Plastic Surgery proved to be successful and at the time of reporting, the aim was for it to be sustained. Towards the end of the report reference is made to the financial contribution of Lean in Lothian as "*the Lean in Lothian programme supported achievement of over £6 million in increased productivity/cost avoidance/cost savings*" (Tait and Howie, 2010:41).

4.6 Phase 5 (P5) - Introduction

The annual report for the 2010-2011 (P5) Lean in Lothian programme is referred to as 'Continuous Improvement' and was produced as the programme was entering its sixth year. The executive summary is reduced to one page and is not explicit about the number of projects conducted in this year. The Phase 5 work streams based on four patient pathways are noted: Medicine for the Elderly (MoE), Stroke services, Orthopaedic rehabilitation and Dementia and Delirium. These are all pathways which have been involved in previous phases of the Lean in Lothian programme. Work has been ongoing in MoE from P1 and the work conducted here is listed as linked specifically to the MoE pathways. Orthopaedics' has also previously received focus in P3 as did Dementia through the Future Models of Psychiatry for Older People project. There were seven main projects conducted through these pathways in P5; two projects each within Medicine of the Elderly, Stroke and Orthopaedics and one project in Dementia and Delirium. Lean in Lothian were also noted as contributing to a further five projects in the areas of Paediatric Diabetes, Mental Health, Hospital at Night, Transplant Administrative Processes and School Nursing.

4.6.1   Drivers for Lean

In the seven main projects conducted under the MoE pathway work, targets were the main drivers for the work as this was impacting on diagnosis in Dementia and Delirium, access to beds and the flow of MoE patients. The issues of access to beds and flow were recurrent in the Stroke pathways as access to diagnostics and treatment for Stroke patients critically impacts clinical outcomes. At the time of the pathway work, NHS Lothian had only met two out of seven standards for stroke clinical standards. This included flow of patients admitted to a ward with only 65 percent (between January and October 2010) of stroke patients being admitted to a ward within a day of having a stroke when the target was to

be 90 percent by March 2013. Diagnostics such as swallow screens had only 59 percent compliance instead of 100% of patients receiving a swallow screen. 71 percent of patients received a CT scan when the target was 80 percent. Stroke received an additional focus when focus was applied to the management of stroke patients in terms of their length of stay, access to therapy and reasons for delayed discharge. The lengths of stay for stroke patients varied between 2-127 days, with the mean being 29 days and median 14 days. However, there were known limitations in access to therapy sessions which impacted on length of stay, as well as the impact of Multi-Disciplinary Team (MDT) meetings delaying discharge. Further focus was applied to Orthopaedics but this time linking into the Geriatric Orthopaedic Rehabilitation Unit (GORU) due to pressures over patient flow where 240 bed days per month are lost waiting for a GORU bed.

4.6.2 Implementation of Lean

P5 reporting differs from previous reporting in so far as throughout the phases, the format of the report has changed with information being added or subtracted in different sections. The format in each report is consistent (drivers and outcomes) but there are variations throughout the phases and this is also evident in P5. Now the reports include the methodology of the projects which includes the tools used as a separate listing within each reporting of the project. Consistently within the projects, value stream mapping and stakeholder interviews to ascertain the current state are used to inform the initial project work. The use of Kaizen events to introduce Lean to services has continued to decline. In 2009-2010 four Kaizens were held in comparison to five workout events and three unknown events (potentially workouts).

4.6.3 Outcomes from Lean

The drivers linked to challenges in processes and patient pathways flow did inform outcomes from the Lean projects provided. In the Stroke project, huge gains were made with a potential of 440 extra occupational therapy (OT) slots being realised. 220 were identified with an extra 220 slots being identified if an 8am pre-breakfast slot was included, as well as 176 extra OT slots for 8am washing and dressing. At the Royal Victoria Hospital (ward 9), length of stay reduced from 56 days in 2009/2010 to 52 days by March 2011. In the Inpatient flow project, similar gains were made in Occupational Therapy (OT) and Physiotherapy (PT) appointments. This was due to changes in ward routines, as an extra 60 sessions per week were gained, resulting in 2340 PT and 780 OT

sessions which is expected to be positively reflected in length of stay reductions. For the meeting of stroke targets, work appears to be in its early stages as it is reported that staff will be trained on swallow screens. There was variation in meeting of the Scottish Government set HEAT (HEAT = **H**ealth improvement, **E**fficiency and governance improvements, **A**ccess to services, **T**reatment Appropriate to Individuals) stroke target (80 percent) with successes at the Western General Hospital and the Royal Infirmary Edinburgh, but a reduction down to 65 percent at St John's in January 2011. As well as targets proving to be drivers for Lean projects, issues emerge over capacity and the provision of services. The evaluation of these services and their management, including the organisation of work routines, has resulted in gains to improve capacity within services and also contribute to the improved management of targets.

4.6.4   Phase 4 projects revisited in Phase 5 – Sustainability

The report continues to report projects which started in the previous phase in order to ensure outcomes have been maintained. The report generally notes that the benefits which have been reported previously have been maintained and developed. For the project on Substance Misuse in West Lothian, successes noted are that the HEAT target is being exceeded currently and there is a clear pathway identified for the provision of safe and effective care. The reporting notes that there are challenges over IT support and costs, so it has not been possible to achieve the status of being 'paper free', although other financial targets have been achieved in the periods 2010/11 and 2011/12. The Complaints project has also been maintained with a single point of contact for phone or written complaints, a single policy approved and one team working with one complaints process. Full details of the projects revisited and their outcomes are provided in the supporting documents (Appendix 4).

4.6.4.1 Reporting of service run projects

P5 notes projects which have been conducted by services and which have received support and guidance from the Lean in Lothian team. The P5 report provides an overview of the projects taking place and as some minimum details have been provided, then these have been listed in the P5 section of the content analysis. Paediatric Diabetes was one such project which was challenged by increasing demand within existing capacity. NHS Lothian was also challenged as patients had higher blood glucose levels than other similar centres. Improved processes and improved management of children on glucose pumps

have meant the number of children on insulin pumps went from eight in December 2009 to 28 in December 2010. The Lean in Lothian team also assisted on work conducted on Hospital at Night handovers which was to improve consistencies in approach across all sites, in supporting junior doctors, improving decision making and to improving the safety of handover. Outcomes included handover sheets, induction booklet, protocol for escalation and consultant involvement.

4.7 Phase 6 (P6) - Introduction

Phase 6 saw the 6th year of the Lean in Lothian programme annual report where the Executive Summary reports 19 projects have been conducted by the Lean in Lothian team, and 19 project summaries have been included in the annual report (See P6 for details). The annual report states that 75 projects have been delivered since 2006. The summary also notes that one Modernisation Manager post has been lost, though two other members of staff funded from Quality and Efficiency Improvement resources have been gained. The summary also notes the impact of Lean projects in financial terms as cash release, cost avoidance and increased productivity for the year is estimated at £1,125,000. The strategic link to Lean is also reinforced here as the Lean in Lothian programme is linked to the 'emerging clinical strategy' and will also be contributing towards 'service redesign priorities' in the period 2012/13.

4.7.1   Drivers for Lean

As can be noted from the summary and also P6 data, projects link into previous project areas and themes, so continuing the systemic approach identified in P3. Substance Misuse services provided across Lothian receives a focus after projects were conducted in P2 and P4. Centralised services such as Orthotics also received a focus and this is in line with projects seeking to have outcomes such as improved integration of services across acute and community health partnerships. Again there was a focus on administrative procedures which are impacting pathways and flow.

4.7.1.1 Targets and pathways

Out of the 19 projects provided in the P6 summary, seven of these projects were explicitly linked to challenges in meeting targets. These challenges were further compounded by demand and capacity issues such as in Orthotics where budgets were overspent and private contractors were utilised due to resources not being used effectively. One key

issue as a challenge to meeting targets is that in some services which are centralised services, there are unclear pathways for access, which creates duplication and inefficiencies, especially where services have been provided across multiple access points to pathways. This has been noted in seven of the current reported projects; Management of neck lumps, Sexual Health, Substance Misuse (two projects in this period), Respiratory, Chronic Pain and Continence services.

The Substance Misuse projects in both South-East (SE) Edinburgh and East and Midlothian, were facing challenges over targets and unclear pathways. Although drug services in SE Edinburgh had met RTT targets, alcohol patient's face up to a 22 week wait, when the target for March 2013 is to be three weeks RTT. East and Midlothian were also challenged as they were unable to meet the 3 weeks RTT, and were further affected by high DNA rates of up to 70 percent which directly impacts the target with wasted appointments which could have been utilised elsewhere. The unclear pathway further complicates waiting times and DNAs as access at multiple points means patients accessing the service may be undergoing multiple assessments. These challenges were also noted in previous Substance Misuse projects.

Although Dermatology last featured in P3, Lean in Lothian have conducted a further project in this service as Dermatology are still facing variation in how triaging is conducted which impacts the patient pathway, as do inappropriate GP referrals. The report does note that there has been improvement since the previous Lean project.

4.7.2   Implementation of Lean

Out of 19 projects conducted, 13 workouts took place and four Kaizens, with two projects starting with an unknown approach, though they describe a workshop, rather than a workout or Kaizen. As the Lean programme has continued in the organisation, from all projects in P1 being started through Kaizen events, to Kaizen being the predominant approach from the periods 2006/2007 – 2008/2009, there is a sharp decline in Kaizen events in the periods 2009/2010 – 2011/2012. It is not clear from the reports what the rationale is for the varying approaches, whether it is due to time or the preferred approach from the Lead from Lean in Lothian. These reports do not provide details of the Improvement Lead, Process Owner or Executive Sponsor but have continued on from P5 in listing the tools and techniques applied in the projects as this is reported within each project summary.

4.7.3 Outcomes from Lean

In the projects which can demonstrate outcomes, both Substance Misuse projects provided demonstrable outcomes from Lean projects. South-East Edinburgh groups agreed to co-location and were up and running by January 2012 with an estimated saving of 500 hours through mitigated wasted appointments, with standardised processes across alcohol and drugs services. In the Substance Misuse clinics for East and Midlothian, Gateway recovery clinics were created (six across the geographical area) providing 21 hours of open access, joint training and procedures agreed, standardisation of processes and shared rotas which have mitigated the issue over DNAs. Further clinics for different client needs are in scope for development (e.g. anger management).

The project which received the most focus in the reporting of the Lean projects (four pages of the report) was The Productive Operating Theatre or TPOT. TPOT was responsible for delivering £536,000 of the £1,125,000 financial impact of the Lean projects obtained from cash release, cost avoidance and increased productivity. TPOT is linked to the NHS Productive series which is underpinned by Lean in order to help healthcare teams work more effectively in order to improve quality, safety, patient outcomes and patient experience. TPOT was launched in NHS Lothian over three acute sites – main theatres at Western General Hospital (WGH), Theatres 3, 5, 7 at St John's Hospital (SJH) and orthopaedic theatres at Royal Infirmary Edinburgh (RIE).

At the time of reporting, 21 events have been held across the pilot sites, and the programme focus is all aspects of the patient journey within theatre pathways. Outcomes include the application of Lean visual management, single point of contact to improve communication and flow, removing waste (activities and motion) to prevent duplication in order to improve flow within theatre pathways. 5S was applied in the equipment stores of WGH and SJH, where overstocks, out of date equipment and clinical supplies were identified. Equipment was able to be moved to other theatres resulting in £27,000 cost avoidance and it was estimated that the time released for care is around 28 hours per annum.

4.7.3.1 Relationships within Projects

As with Phases 2, 3 and now Phase 6, relationships in services in terms of communication, staff morale and impact to Lean projects has been included in the reporting, although not consistently. It is discussed in three of the 19 projects reported in P6. In the

Administration Processes Gynaecology project, there were issues over back-logs of work, poor dictation performers and a lack of communication and feedback over these key issues which was recognised as needing to be improved going forward. In Orthotics, improved collaboration across specialties and a move towards a single service is discussed. In TPOT, again there were issues over communication affecting processes and patient journeys through waste and flow. Although there is no explicit discussion over engagement related to relationships, it is noted in P6, as cited from the original report that *"the programme has been limited on occasions due to staff attendance and lack of orthopaedic surgeon attendance"* (Unknown, 2012:28). It has been inserted into the Phase Six reporting under sustainability as it can be inferred from the highlighting of this in the report that this may have implications for sustainability.

4.7.3.2 Limitations in reporting

This Executive Summary does not state unlike in other phases, that all objectives were met. However, outcomes have been noted against key projects. It should be highlighted that out of 19 projects reported to have been conducted, seven of these projects are in their early stages (such as Community Health, Chronic Pain, Management of neck lumps, Continence service, Administration in Gynaecology, Pharmacy Stores and Laboratories for Blood Sciences) so the outcomes and sustainability information is based on what is expected/needs to support the project, rather than demonstrable outcomes per se.

4.7.3.3 Reporting of service run events

Phase Five saw the initial reporting of projects which were supported by the Lean in Lothian team but were being conducted by former trainees of the Lean training in NHS Lothian. The project summaries in Phase Six are shorter than those in Phase Five – some are just a paragraph and report work in its initial stages and detail only issues currently faced rather than reporting outcomes and sustainability. There were seven projects listed as conducted by the former trainees and only three of these projects provided evidence of outcomes derived from these projects.

4.7.4 Reporting the sustainability of previous projects

Unlike reporting in Phase Two to Phase Five, there are no summaries provided of previous projects in phase six reporting where the team have revisited projects conducted to review the outcomes and sustainability through Lean. Only a brief paragraph is

provided in the Executive Summary about Phase Five (2010-11) in that *"of 31 wards in-scope for the Older People's Pathways Programme, 23 have demonstrated a continued reduction in average ward stay between April 2010 and March 2012"* (Unknown, 2012:32). In the Phase Six report, there is a brief summary of work which will be conducted in Phase Seven (2012-13) as 'future plans'. Some of these projects include areas already visited such as pharmacy prescribing which had projects undertaken in Phase Two (2007-08) and Phase Three (2009-09). This time the prescribing pathways within Prison Healthcare will be reviewed which includes those at Edinburgh and Addiewell prisons. Complaints will also be revisited in Phase Seven, following on from work conducted in Phase Four (2009-10). HSDU, was an award winning project in Phase Two (2007-08), but is being revisited in Phase Seven for process improvement.

4.8 Summary - Reporting of the Lean in Lothian Programme – 2006-2012

From its inception, the application of the Lean in Lothian Programme and its outcomes has been reported through annual reports published by the Lean Leads who are responsible for the Lean in Lothian Programme. The documents have varied in their content and approach to reporting over the six reports which have been analysed here, so the creation of a standardised format for analysis enabled the projects to be analysed for patterns in the approaches and progress to be tracked. This standardised format was maintained across all six phases of work which has been content analysed and is shown in the tables contained in Appendix 4.

It should be noted that although in Phase 6, it is reported there have been a total of 75 Lean in Lothian projects, only 70 projects have been reported in the annual reports for P1 – P6. These project figures do not include the projects conducted by the services themselves via former trainees of the Lean in Lothian training programme as this includes a further 12 projects which have been reported (five projects in P5 and seven projects in P6). There is no discussion over the lack of inclusion of any projects at any period in the reporting so it is unclear why there is inconsistency in the figures provided in the reporting. Chapter five may shed light on why this is the case.

These 70 projects reported on within the Lean in Lothian reports have been mapped by project type in Table 4-3 below. Over 70 percent of projects were on pathway work as pathways received a focus in 50 out of the 70 projects conducted. Laboratory or reviewing

of a specific process was only evident in five projects and administration received a focus on its own or as part of wider pathway work.

Table 4-3 Type of Lean in Lothian project by phase

Year	Phase	Pathway	Laboratory or Process	Administration	Combined pathway and administration projects	Total
2006-07	1	6	0	0	0	6
2007-08	2	8	2	0	4	14
2008-09	3	10	0	1	1	12
2009-10	4	8	0	2	2	12
2010-11	5	6	0	0	1	7
2011-12	6	12	3	4	0	19
Total amount of projects by type	=50	=5	=7	=8	= 70

4.8.1   Drivers for Lean

The Lean in Lothian programme was linked to strategy initially as the programme was linked to NHS Lothian's need, by late 2005, to have capability and capacity "*to take forward significant service redesign*" (Tait, 2006:1) (see section 4.1.2). GE Healthcare consultancy was employed to take this forward in conjunction with NHS Lothian, and also NES Scotland who were interested in learnings for the wider NHS in Scotland. The link to NHS Lothian's strategy was explicitly iterated in Phases 3 (2008-09) and 4 (2009-2010) where Lean was linked to the strategy of supporting NHS Lothian being "*at the level of Scotland's best, and among the world's top 25 healthcare systems*" (Tait, 2009:5). This link to strategy was aligned to the projects which were being reported on.

4.8.1.1 Targets

The predominant driver for the projects which can be inferred from the document analysis is targets. 36 out of 70 reported projects are specifically linked to external targets which are set. Table 4-4 shows the Lean project by their phase and how many of the projects conducted are related to targets. The focus on targets varied across the reporting period

where targets drove the majority of work in Phases one and two and were 50 percent of the Lean projects in phases three and four. These targets include Scottish Government determined HEAT targets where specific specialities are focused on each year (Scotland.gov, 2014). Referral to Treatment times guarantee's (RTTs) are set but vary depending on the speciality from 18 weeks in P3 for MRI (section 4.4.1) and in P4, challenges to meet a new three weeks RTT for Substance Misuse (section 4.5.1).

Table 4-4 Lean projects related to targets

Year	Phase	Amount of Projects	Projects related to targets
2006-07	1	6	4
2007-08	2	14	9
2008-09	3	12	6
2009-10	4	12	6
2010-11	5	7	3
2011-12	6	9	8
		= 70	= 36

4.8.2 Implementation of Lean

The approach to embedding the Lean programme in NHS Lothian has varied as the phases have shown and has been discussed in this chapter. Equal application of Kaizen events and workouts have been discussed but there is uncertainty over how Lean was implemented in nine of the projects reported with one project being attributed as involving both Kaizen and workout events. The prevalence of Kaizen events in the early Lean projects had reduced dramatically by the time the report was produced for P6, where work-outs were favoured for the majority of projects. The reports are limited as there is no justification as to why Kaizens or work-outs may be preferred and the circumstances under how they are applied. It cannot be analysed as to if this is due to individual Lean lead preference as by P6, there are no details provided as to who has led the project,

although details of the tools applied are provided in the reporting. In P2, there are also no details about the Lean lead, thus a lack of consistency in reporting data across the reports.

There has been consistency in approach across the Lean in Lothian programme which can be inferred from the documents analysed in the use of the Lean toolkit. The same key basic tools (value stream mapping, stakeholder interviews, process mapping and 5S) appear throughout the phases to be applied, and this is also inferred through the analysis. Where no approach is listed visual illustrations have been provided. This is then taken to be part of the approach. There is not always transparency in the approaches undertaken, even within the same phase of reporting, and how the tools are applied. This transparency only appears in later phases such as in P5 and P6 where the tools and techniques applied are listed within the project summaries of the report.

4.8.2.1 Systemic Approach

Lean in Lothian has consistently been discussed as a 'programme' but systemic improvement can be observed across multiple phases and pathways. This is also supported by Table 4-3 as this highlights that over 70 percent of projects had a pathway focus throughout the phases reported here. It can be inferred through the analysis that there is consistency applied to the types of projects undertaken. Linked projects are apparent throughout all phases such as work on Medicine for the Elderly which were multi-site, multi-pathway projects and received focus in all six phases. Substance Misuse projects across the Lothian region have also progressed from earlier projects and have included multi-agency projects which move beyond traditional acute healthcare boundaries. These projects started in P2 and were continued into P4 and P6. Projects have been documented as following on from previous work within these services and pathways such as work in cancer pathways (Breast, Pathology and Colorectal) in P1, P2, P3, P4 and P6. Cancer work also cut across pathways of Dermatology and Plastic Surgery and linked into work conducted in P3, P4 and P6 with cross-service projects delivered.

4.8.2.2 Outcomes from Lean

From P1 to P6, outcomes from projects have been reported with some projects providing substantial gains in cost avoidance (TPOT in P6), additional capacity through changes to ward routines, especially in the areas of Occupational Therapy and Physiotherapy as reported in multiple projects (Stroke, GORU and Inpatient Flow in P5 in section 4.6.3 and MoE reduction of length of stay in P1, in section 4.2.3.2), or cohesive structuring for

multi-agency service provision in Substance Misuse (P2, P4 and P6). However, some projects in the Lean in Lothian reporting are in their early stages and there is little to be discussed in terms of outcomes and sustainability, such as in the Repeat Prescribing Waste project (P2) which was carried forward in P3. In this project, outcomes could be inferred as being minimal as when the project was revisited in P4, there were still issues in using the GPASS system and in pharmacy recruitment. Repeat Prescribing was still a focus when the researcher was observing in the pilot study see section 3.7).

4.8.2.3 Relationships

An outcome from the data analysis that was less measureable was that qualitative outcomes were also generated from Lean projects. Although data analysis and process improvement interventions could generate demonstrable outcomes such as reduction in length of stay and reductions in waiting times for meeting HEAT targets and RTTs, discussion over improved communication, morale and relationships also factored within reporting outcomes. Improved communication and working practices were provided in outcomes in projects in P2 (Outpatients 4/1, see section 4.3.3) and P3 (Scottish Ambulance Service and Social Work Referral, see section 4.4.3.1). A move away from silo working with improved collaboration between services was noted as outcomes in P6 in the Orthotics project (section 4.7.3.1).

4.8.3   Revisiting projects - sustainability

With respect to sustainability reporting of the projects, this is contained in the initial reports. The wording changes in in later documents, forgoing mention of sustainability and instead discussing *'future plans'* (P6) and *'insights'* (P5), with the term *'sustainability'* last being used in P4. The analysis also shows that there is a 'drop off' in what is described under sustainability from P4 onwards, where there is a lack of discussion in some projects under what could be considered as 'sustainability' or additional outcomes achieved since the project was last reported on. In P6, the project report for TPOT warns of a lack of engagement from staff which may be advance warning of concerns about future sustainability (section 4.7.3.1). P6, for example, also differs from previous phase reporting in that there are no summaries from the revisiting of projects from P5, especially where previous phase reports how benefits previously given have been maintained and developed. Instead a brief section on the P7 work plan is given and some of this work is discussed as already being underway (Unknown, 2012:35). This

P7 work links to past projects in HSDU process improvement (4.3.3) and Complaints response time (revisited as sustained in section 4.6.4) but does not discuss if this new work is an extension of the previous projects or is in fact related to a lack of sustainability of the outcomes initially derived from Lean.

4.9 Limitations of Document Analysis

The document analysis provided is restricted to the data which has been reported in P1 to P6, through the Lean in Lothian reports which are produced on an annual basis and report projects conducted over the previous year. Missing or incomplete data is a limitation of content analysis (Krippendorff, 2004) and this has been explored in the earlier discussion. As it has been noted previously, these reports have not been provided in a consistent format with information and depth being both added and subtracted from the reports as the Lean in Lothian programme has progressed. For this reason, as detailed in section 4.1, a coding frame generated from the qualitative case research has been applied to these documents for consistency. The terminology does not differ vastly as terms such as 'outcomes' and 'sustainability' were generated in the case data and then applied here as these were also commonly applied terms within the reports. Although as the reporting progressed and the term 'sustainability' was not used after P4, for consistency and alignment of the research, the term 'sustainability' was maintained throughout the period from both the content analysis and also the qualitative analysis of the case study data.

It can be inferred from the reporting of the projects that there is missing project data. Only 70 projects, plus the 12 mini projects supported by the Lean in Lothian team are noted in the reporting, despite P6 stating in the Executive Summary that 75 projects to date had been conducted. These 75 projects could be linked to P7 projects which had commenced at the time of reporting, but which are not covered within this analysis. This is unclear however, and cannot be said with any certainty. Generally, all the projects report positive outcomes with demonstrable improvement, although some were conducted over longer timescales than others. Data from revisiting P5 projects is also not available within P6 so there are limitations in judging the sustainability of P5 projects, beyond the statement made about the MOE work conducted which took place in the period 2010-2012, see section 4.7.4.

This missing data impacts the analysis as only inferences can be made without any other evidence and this is one of the key limitations with content analysis of documents.

4.10   Conclusion to Chapter 4

To summarise, this chapter has discussed the reporting of the implementation of Lean in NHS Lothian through content analysis of the Lean in Lothian report documents provided to the researcher when research had commenced. These were used as an additional data source to further verify how Lean was being implemented and the impact of this in the organisation. Table 4-5 illustrates the research questions in order to uncover how Lean is implemented in NHS Lothian (RQ1) and what the impact of Lean in NHS Lothian is (RQ2). The table shows how this content analysis contributes to answering RQ1 and RQ2. The analysis here will be enhanced by the forthcoming discussion in Chapter 5.

Table 4-5 Answering Research Questions from Content Analysis

RQ1 – How is Lean implemented in NHS Lothian?	RQ2 – What is the impact of Lean in NHS Lothian?
Started with GE Healthcare consultancy support but developed a dedicated Lean team who fully owned the Lean implementation since 2008-2009 (P3).	The implementation process for Lean has been ongoing from 2006. At the time of the reporting (2012), this was continuing.
Systemic focus on key and strategic areas – reiteration in the reporting of how Lean links to the strategy of NHS Lothian.	Real measureable benefits such as reduction in length of stay, financial savings or cost avoidances, and capacity and demand alignment. Projects are target driven predominantly, rather than an explicit focus on quality and safety.
Training for staff led by Lean team and staff reported as delivering their own Lean projects.	Softer and qualitative impacts also noted in discussions of improved relationships.

4.11   Emergent Research Questions

However, the analysis of the Lean in Lothian reports has highlighted some key areas which were previously unconsidered when the initial research questions were formed. Relationships emerged as one of the outcomes from Lean in terms of reported improvement (section 4.8.2.3). Clinical staff were discussed in terms of improved relationships between services as one of the outcomes from Lean. In Dermatology (Phase 3, Table 28-1), staff scepticism is discussed but also how continuous improvement was

embraced with many changes emerging after the initial Kaizen work. In section 4.7.3.1 however, a lack of medical and surgical staff engagement was evident in TPOT and so was reported in the Lean in Lothian P6 report (see Table 70-1). Therefore as a result of this, a fourth research question is generated here:

RQ4: How do medical professionals and professionalism impact Lean implementations?

This question will enable consideration of the medical professional but also the impact of professionalism and how this impacts the identity of the medical professional to be explored.

Another area to consider which has been emergent from the content analysis is that of sustainability. Sustainability of projects was reported but in later phases, this is not discussed and the reasons for this are unknown. The reports help to answer research questions one and two as shown in Table 4-5 but as it has been discussed earlier (sections 4.8.3 and 4.9), variations in the reporting mean that there is a lack of clarity in some phases as to whether all projects have been sustained and progressed as per the Lean in Lothian reports. Therefore a fifth research question has emerged:

RQ5: How is sustainability of Lean evident in NHSL?

This question will enable consideration of sustainability. The reports analysed here discusses sustainability of Lean in services but in the phase six report, this discussion is not evident and the reasons for this not being discussed are uncertain. It is hoped the case study data will provide clarity on whether projects are sustained or whether there have been sustainability issues in Lean projects in NHSL.

Chapter 5 provides the case study data which will illustrate in more depth the context in which these projects were conducted, those involved (including the medical professionals), the project outcomes, and sustainability. Chapter 5 will further contribute to the answering of these first two research questions, and also in answering research questions three, four and five for this study.

5.0 Case Study Analysis

5.1 Chapter Introduction

This chapter presents the case study research findings. The case study links to three key areas in the research questions; how Lean is implemented in NHS Lothian (RQ1), the impact of Lean in NHS Lothian (RQ2) and the roles of healthcare staff, including medical professionals, in the implementation process (RQ3).

These questions are answered through the case study as the qualitative data being reported within this case study allows for rich data to emerge about the experiences of healthcare staff which includes both clinical and non-clinical staff in NHSL. This use of rich data will contribute towards theory building (Eisenhardt, 1989) and the case study will allow for validation or otherwise of the content analysis findings through the discussion of the approach and outcomes from projects previously conducted. The use of multiple sources of data, in this case qualitative data, observations and document analysis, as discussed previously, will aid triangulation of evidence (Meredith, 1998).

The case study will be presented in the following format: the first section presents the over view of the case study. The second section will focus on the strategic application of Lean, for example, what were the drivers for Lean implementation in NHSL? The third section will discuss the operationalisation of Lean, e.g. how Lean is implemented in the organisation and the factors impacting on this. The fourth section will discuss outcomes from Lean, specifically in terms of gains and improvements from Lean which will link into the third section to see if the approach taken had garnered the expected gains from Lean. The fifth section will discuss Lean in terms of the roles staff hold which directly links to research question three as this discussion and the subsequent discussion of complexity, may be able to explain factors discovered in the third and fourth sections.

The two additional research questions were emergent from Chapter 4 (section 4.11) such as research question four in determining how do medical professionals and their professionalism impact Lean implementation. This will be discussed in conjunction with research question three in the roles staff hold which is discussed in the fifth section. Although the fourth section discusses outcomes from Lean, this will also link to research question five in order to determine how the sustainability of Lean is evident in NHSL.

The coding of the data gathered in the interviews is shown below in Figures 5.1 to 5.6. This is also explained in section 3.9 as is the coding process which involved three rounds of coding through the use of NVivo 10 software. NVivo 10 is not shown as only limited coding would be illustrated in the transcript therefore, the data concepts and their refinement to the aggregate codes of the focus of the research to demonstrate the coding process have been illustrated as shown in Figure 5-1 through to Figure 5-6.

Each section of discussion is accompanied by tables which relate to the aggregate codes which were generated in each section and which map to the Figures 5.1 through to 5.6. This will be explained in each section with the provision of the code and frequency of reference.
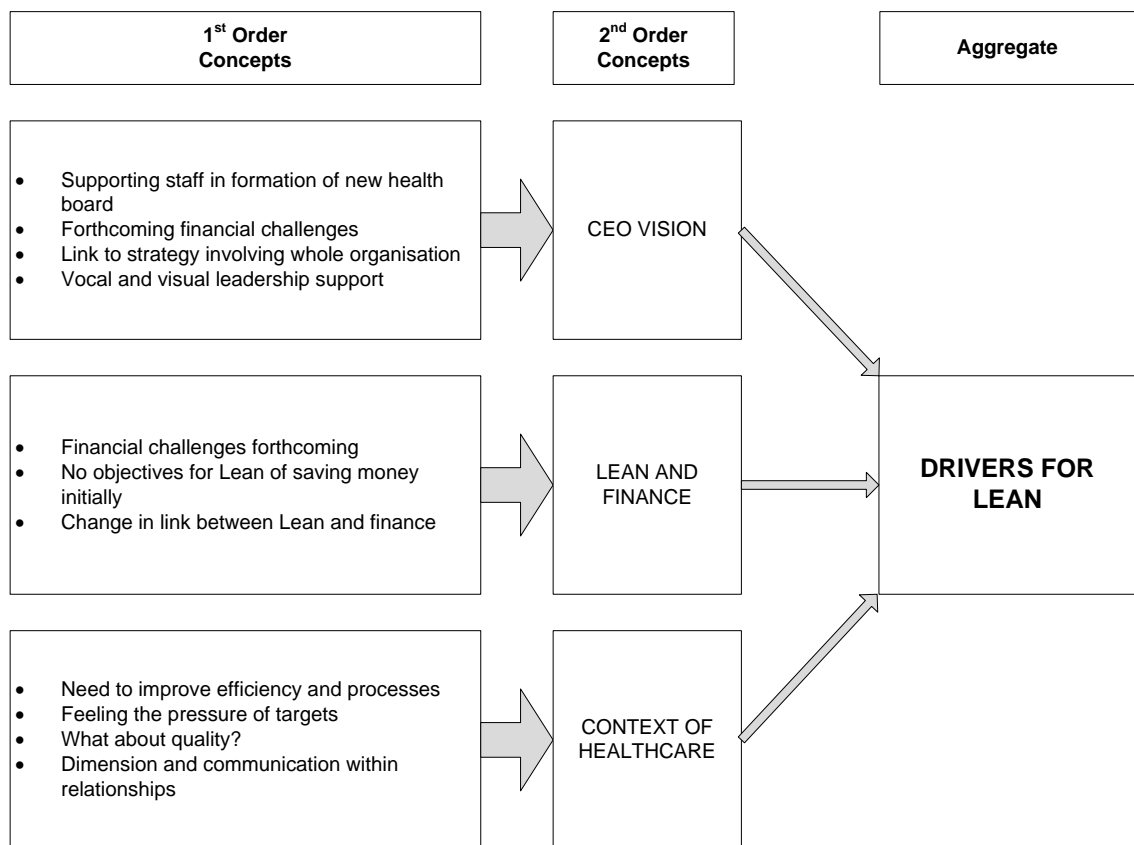
Figure 5-1 Coding – Drivers for Lean
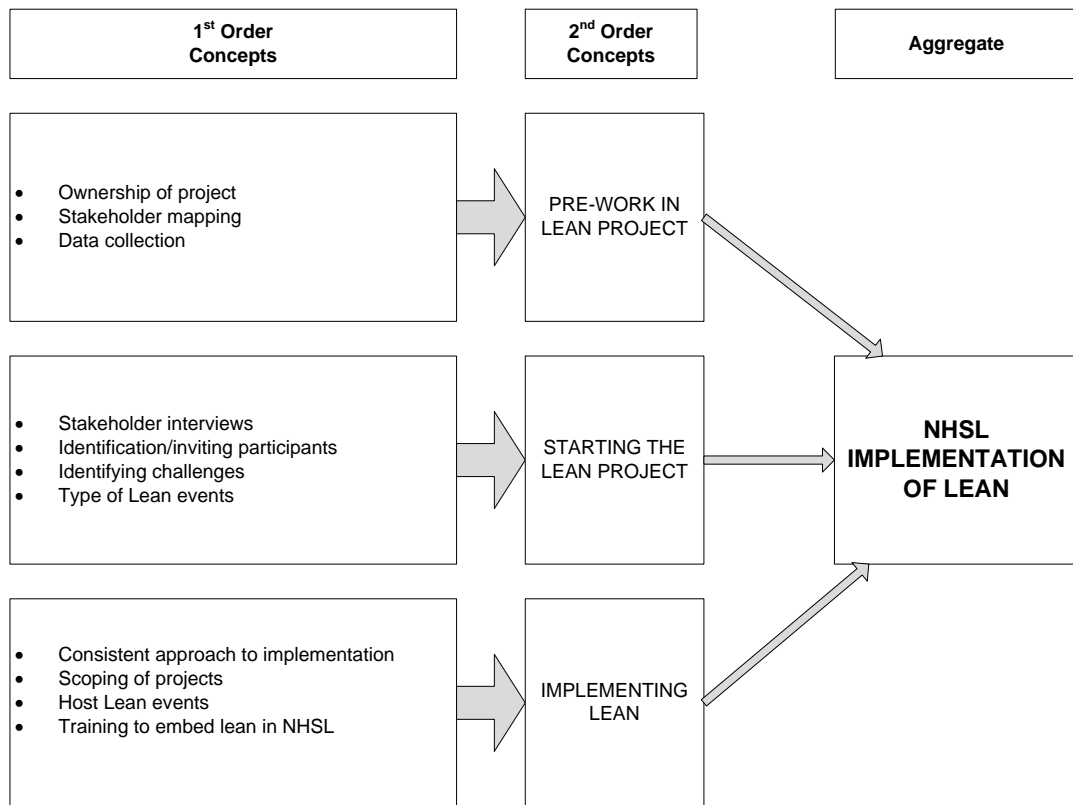
Figure 5-2 Coding – NHSL Implementation of Lean
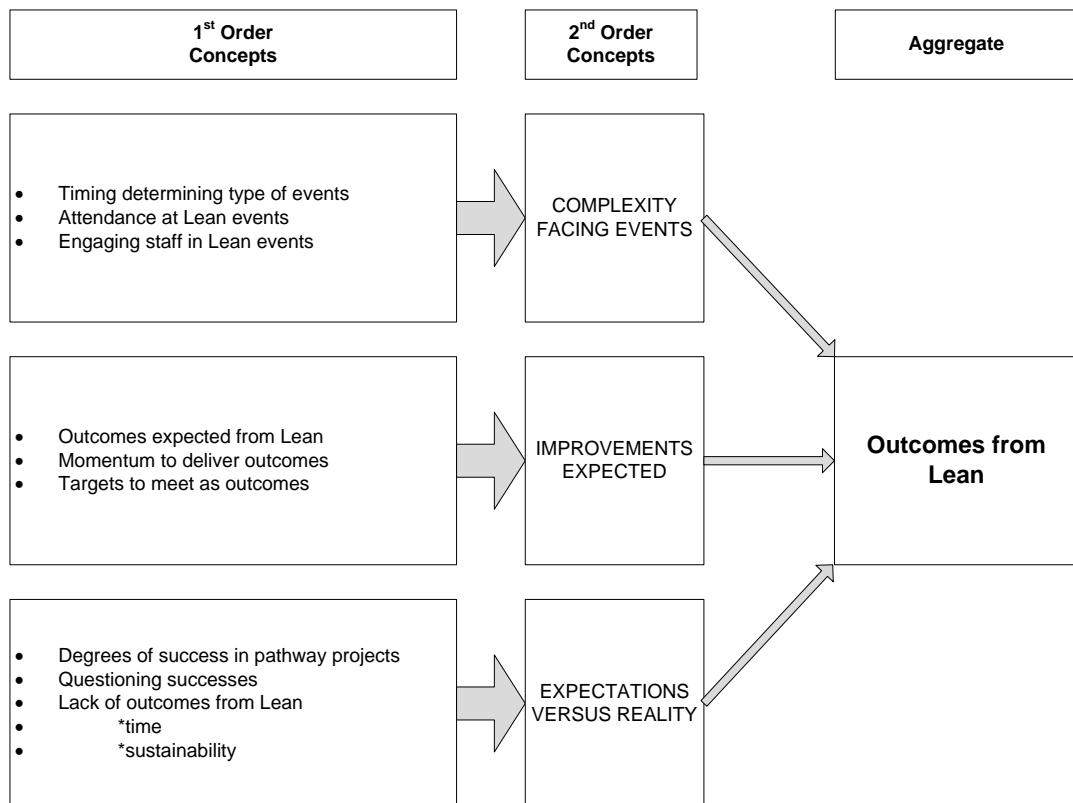
Figure 5-3 Coding – Outcomes from Lean

1st Order Concepts	2nd Order Concepts	Aggregate
• Lean team driving projects • Lean team providing all training • Skill base of Lean team	EMBEDDING LEAN	
• Small Lean team • Seconded friends in Lean team • Expectations of staff of Lean team	USE OF LEAN TEAM	Lean Team in NHSL
• Developing staff capability in Lean • Using (or not) Lean training • Confidence and facilitation in Lean	TRAINING IN LEAN	

Figure 5-4 Coding – The Lean Team in NHSL

1st Order Concepts	2nd Order Concepts	Aggregate
• Autonomy and power • Got own agendas • Special • Appeasement is easier	IDENTITY AS CONSULTANT	
• Arrogance and problems in managing • Obstructive to change • Difficult behaviours advertised • Non-compliant	MANAGING CONSULTANTS	Professionalism Impact
• Hierarchy and silos • Historical dominance • Diplomat managers	ACCOUNTABILITY	

Figure 5-5 Coding – Professionalism Impact

1st Order Concepts	2nd Order Concepts	Aggregate

- Scepticism and cynicism
- Impact of lack of communication
- 'Jumped up' nurses
- Lack of management as a process

VIEW OF MANAGEMENT

- Things passed top down – dictat
- 5th floor syndrome
- 'The Lothian Way'
- NHSL Scandal

VIEW OF SENIOR MANAGEMENT

Clinical and managerial relationships

- Team dynamics
- Disconnect in relationships
- Dysfunctional relationships
- Personality problems

INTRA-PROFESSIONAL CHALLENGES

Figure 5-6 Coding – Clinical and Managerial Relationships

5.1.1 Overview of the case study

As a single organisation case study was chosen, this allowed for in-depth analysis on the application of Lean in healthcare through the experiences of NHSL.

Initially the aim was solely to collect qualitative data through the use of semi-structured interviews but on gaining access to the organisation and interviewing staff, the Lean in Lothian documentation was provided to the researcher, so allowing for an additional data source (see Section 3.7 for further details). This was further enhanced by the opportunity to shadow a Lean lead to observe how projects were scoped out and the processes involved in implementing Lean. Access to several sites allowed 43 interviews to be conducted and data collection stopped when no new insights were uncovered through theoretical sampling (Charmaz, 2012). Each interview was audio recorded and transcribed, and analysis was conducted by the use of NVivo 10 software. Chapter three provides full details of the research approach employed in this project.

5.1.2 Selection of Case Study

NHSL was selected as an exemplar case study as they were also known to have implemented Lean and been 'early adopters' of the methodology in Scotland. This health board provides health services for the second largest population area in Scotland at 800,000 people, and is classed as the second largest health authority in the UK with 21 hospitals and 24,000 employees (NHS Lothian, 2015). By 2010, NHSL had been implementing Lean for four years, 11 health boards had commenced full Lean implementation programmes (timescales not provided), two boards were drafting documents to commence Lean projects and there was uncertainty over one health board (Scottish Government, 2010).

5.1.3 Data Collection: Interviews

43 interviews were conducted across NHSL sites between March 2012 and May 2013, involving a cross section of staff from all levels and members of the Executive which included the former Chief Executive. The respondents interviewed by role type are noted in Table 5.1. Due to the individualistic job titles held by some staff, these have been generalised to protect anonymity e.g. Nurse, whether this is nurse manager or senior and specialist nurse is provided without further details. The researcher was also able to observe the pre-work stages and an improvement event based on improving prescribing within the prison healthcare system. The observations here were able to be used and compared to interview data in order to determine if there was consistency in processes in how Lean was implemented in NHSL projects

One of the largest projects which had taken place and which had continued to develop Lean through subsequent projects was in the Dermatology service. 14 respondents out of 43 interviewed came from this service, and the document analysis provided in the Chapter 4 (section 4.4.1) discusses this project. For anonymity, these staff are not separately identified beyond the classifications provided here. The classifications of staff by role are provided below in Table 5-1. Table 5-2 provides the interview codes which are attributed to the relevant staff role and which will be used in the reporting of data in this chapter. It is important to note that medical staff who hold the role of clinical director, have a dual role where they have management responsibilities in their service but are also still practicing medicine and therefore have been listed in Table 5-2 under senior medical staff (consultant grade).

Table 5-1 Respondents by Role

Job Title	Number of respondents interviewed
Modernisation Manager (Lean in Lothian Programme team, now Lean Lead)	3
Modernisation Assistant (Lean in Lothian Programme team, now Lean Lead)	5
Administration Staff (based in clinical services)	6
Operational Service Manager (includes senior level)	5
Medical Consultants	11
Clinical Director	2
Executive - CEO	1
Executive - other	1
Nurse (Senior and specialist)	2
Nurse (Manager)	1
Nurse (various grades)	3
Human Resources managers (senior and service level)	3

Table 5-2 Interview codes attributed to interviewee

Interviews Conducted by Staff Role									Role	Total
No	1	2	3	4	5	6	7		Role	Total
Role	QI	QI	QI	QI	QI	QI	QI		QI	8
									OM	5
No	8	1	1	2	1	1&2	2		AD	6
Role	QI	OM	AD	AD	CT	EXEC A&B	CT		CT	13
									EXEC	2
No	1	3	2	3	4	4	5		N	6
Role	N	CT	N	AD	CT	AD	AD		HR	3
No	5	6	6	3	7	8	2		TOTAL	43
Role	CT	AD	CT	N	CT	CT	OM			
No	3	9	10	11	12	4	4			
Role	OM	CT	CT	CT	CT	N	OM			
No	13	5	5	6	1&2	3				
Role	CT	OM	N	N	HR	HR				

Codes: QI = Lean Lead; AD = Administrator; OM = Service Operations Managers; CT = Senior Medical Staff (Consultant Grade); Exec A&B = Executive (Board); N = Nursing Staff; HR = Human Resources Managers

5.1.4   NHS Lothian – Background and Overview of Lean implementation

The NHS in Scotland differs from that of the other home nations (England, Northern Ireland and Wales). Scotland by 2004 had dissolved 23 hospital Trusts, and healthcare was subsequently provided by 15, now 14 (after the board of Argyll and Clyde was subsumed into Greater Glasgow and Clyde) regional health boards and this is the structure that exists today. This reorganisation of the NHS to remove duplication and competition in Scotland was expected to minimise the "*gap between national policy and local practice*" (Scottish Executive, 2000:23). This flatter structure of the NHS in Scotland allowed for decentralisation as frontline staff acquired greater influence, Chief Executives were to remain accountable for strategic leadership and governance, and Divisional Chief Executives were to maintain control of budgets and performance. Standards of care prior to re-organisation were variable as the focus had moved away from quality and service improvement so this new structure was viewed as '*rebuilding our NHS*' (Scottish Executive, 2000). The links with many institutions working with the NHS in England such as NICE (National Institute for Clinical Excellence who advise and approve drugs and technologies for use in the NHS) maintained. Many other NHS initiatives have variants in operation in the NHS in Scotland which also runs alongside those programmes set up by NHS Scotland. The Productive Series (see section 2.7.1) from the NHS Institute for Improvement has been adopted within NHSL and is being rolled out. The Scottish variant of The Productive Ward is known as Releasing Time to Care. The Productive Community is also in use, and the Productive Operating Theatre was being piloted in three sites at the time of conducting the research.

The CEO of the newly configured NHSL in late 2005 recognised they needed to be able to take forward significant service redesign and within that be an organisation with the ability to embrace change. The organisation was not facing a crisis point, but wanted to embed a culture of embracing change after the reorganisation process and challenges of previous healthcare structures which had preceded the new health board structure.

> "*I think what we recognised was that we needed to do something quickly that showed that the new organisation, that the new NHS Lothian was going to do it differently from the way it had been done previously. The board in the past as one of the four organisations had been passive, reactive, had seen its role as holding the ring. The*

trusts had been in conflict with one another, in conflicts with the boards so having brought these things together, we wanted something that said to the frontline troops, all 28,000 of them, most of them, that this was different, that was urgent but it wasn't a crisis" (Exec A).

5.1.5   Use of Consultancy in Lean

An independent consulting company, GE Healthcare was selected to aid NHSL in implementing Lean after a competitive tendering process. The Lean approach already supported in GE Healthcare was also recognised by the then Chief Executive (Exec A). An initial investment of £500,000 was required to support the project which was also supported by NHS Education Scotland (NES) who provided £100,000 and were keen to see how the learning from this project could be shared throughout NHS Scotland.

GE continued to work with NHSL until 2008 when the organisation fully adopted the Lean programme through their branded 'Lean in Lothian Programme' which sat within the Modernisation Service in the health board. NHSL had in 2006, selected five Leads (listed in Table 5.2 as QI) from the areas of Organisational Development and Modernisation to be fully trained by GE's Improvement Leads. These NHSL new 'Lean leads' had previous experience of leading and facilitating change programmes. The NHSL Lean leads would work with GE, firstly completing training courses and working in three phases. The first phase was having NHSL Lean leads shadow the GE leads on projects. In the second phase, they would actively work on a project with the GE improvement lead and thirdly, lead their own project with support provided by the GE lead where required. Training for all staff, with regards to Lean, was initially delivered from GE Healthcare, but training and development of the NHSL Lean leads was to enhance the organisation's ability to grow Lean so NHSL Lean leads could eventually provide the training and development for all staff taking on Lean projects. The initial five Lean leads by the time of interviewing had reduced to three leads that were joined by 'seconded friends' who also led Lean projects and delivered training.

The Chief Executive for NHSL at the time of the Lean implementation had spent over five years as Chief Executive and was responsible for driving the implementation of Lean in NHSL. Section 5.2 will go on to further discuss the Lean implementation drivers at NHSL.

5.2 Driving Lean Implementation at NHSL

Section 5.2 discusses the drivers for Lean Implementation in NHSL and the main drivers such as the CEO Vision and the context of healthcare are shown in Table 5-3 below. This table includes the data from the NVivo analysis which provides the amount of respondents discussing the relevant areas with the amount of references on this topic made. This links to Figure 5-1. With some themes, key areas are only discussed by certain respondents, e.g. less than 10 interviewees. For example, when discussing the formation of the health board, this was primarily discussed by staff that were employed and actively involved in the re-organisation at this time such as the Executive and senior management and some of the Human Resources Managers.

Table 5-3 Drivers for Lean - NVivo codes and sources

Code	Frequency of Reference
Formation of health board	21
CEO Vision	17
Lean and Finance	15
Context of healthcare:	191

5.2.1   Formation of Health Board – a cultural intervention

As discussed in section 5.1 and shown in Figure 5-1 the reorganisation and dissolution of the previous Hospital Trust network into the formation of the health boards was a driver for commencing the Lean implementation in NHSL. The CEO stated there was no crisis point or *"burning platform"* and Lean instead was based on supporting staff and in looking forward in developing the strategy for NHSL. The financial challenges facing public services was also a factor in implementation, but the link is made between NHSL and Lean involving whole cultural change and staff ability to work within these confines across the organisation was discussed at the time of interviewing by the CEO.

"I think it was probably 5 years ago…and at that time, at that time there were two things we needed. One was we needed an overall cultural organisational intervention that would essentially bind together the whole of NHS Lothian. If you

look at your organisational history, you'll see that all the health boards in Scotland were probably created from 3 or 4 different, disparate, separate organisations. We'd just got through all of that and we'd come out through the other side of the admin managerial stuff and we wanted something culturally that everybody would get. Related to that we wanted stuff that front line staff would get – if you're set in the kind of ivory towers that _ (Exec B) and I inhabit, you can get dangerously divorced from that so we wanted stuff the people who looked after sick people could relate to. And then, I think the second thing is we could see without being unbelievably far sighted, we could see that there was going to be a downturn in funding, we knew that the levels of growth were unsustainable and therefore we wanted to get our people to the point where they could see that there were solutions to the kinds of problems they faced and give them high quality services which were not solely or exclusively about more people, more money or more stuff. So two things: one, a cultural glue and secondly empowering front line people to understand that they were able to fix things without necessarily recourse to money, given that money was going to become tighter" (Exec A).

5.2.1.1 CEO Vision

The role of the CEO in bringing Lean to NHSL is recognised by members of the Lean team and Executive B. The implementation of Lean predated Executive B's arrival at NHSL. Executive B emphasises how in NHSL at this stage, post formation of the health board structure, this desire for change in the NHSL structure was indeed the CEO's vision in making this happen.

"There is actually few health boards in Scotland that would have done this I think. What it required is vision that it was the right thing to do. That vision without action is fruitless. Action without thought is meaningless. If you put vision and action together you get something very powerful and that's what happened here. You had someone who had the vision to do it and you had people who had the courage to then go and make it happen. Add in to that, as the second largest health authority in the UK, perhaps we had the critical mass which would allow a conversation between us and the world's biggest private sector organisation, not to be one of complete, total imbalance but the fundamental bit of it for me was that it was driven for the right reasons which was a desire to improve the quality of care which was

provided to patients within the resources that parliament allocated to us so it was done absolutely for the right reasons, in the right way, at the right time because the right people were here to see that and make it happen" (Exec B).

Other staff members describe Lean as being driven by the CEO as it is *'his baby'* who is noted as *'bringing Lean to NHS Lothian.'* The *'buy-in'* of senior management is recognised and particularly the CEO as he is said to remind everyone *'this is what we do'*. This support is recognised as being both vocal and visual support as all Lean projects have an Executive Sponsor who may be in attendance at events. Staff have noted that senior supporters often attend events at the opening and closing of the event, rather than stay for the full Kaizen or full workout event. Full attendance could be considered counter-productive in terms of staff feeling whether they have the freedom to voice their own opinions. This was particularly noted at early events as the importance of Lean to senior management was emphasised in terms of their engagement in the process.

"I mean at the beginning you couldn't have a Lean project that wasn't opened by the Chief Operating Officer and they really made time. It was very, you know, they emphasised it. Many people met the Chief Exec for the first time you know at some of these Lean events – they might have known the name but they would have never known the face and it did help them to see a bit and to get out there and meet people and see what people were doing it and to become aware of what was happening in the extremities of the organisation" (QI6).

5.2.1.2 Lean and Finance

Although Lean was clearly driven from the Executive and initially focused on 'cultural intervention' and a realisation of forthcoming financially straightened times, interviewees focused on improvements to services in how they affect patients. Early conversations with the Lean team (QI) emphasised that financial benefits were not initially directly linked to the rationale for Lean. The focus on Lean and how it linked to strategic service improvement and patient focused services was considered to be how staff engaged with Lean. Though, in improving processes, a financial link to Lean was made.

"As a by-product of that process improvement, 9 times out of 10 we will make savings or cost avoidances so there is no objective...we have never went into any project with any objectives of saving money, yet" (Q13).

Lean team members confirmed that initially this was the case but later interviewees admitted the climate in NHSL was changing and there would be an enhanced financial focus going forward. This financial focus may impact engagement of staff who had previously been engaged by the patient focus and service improvement in how Lean was applied. This change of approach was considered to be potentially providing a challenge going forward and was discussed by different groups of staff.

"It is interesting as our Lean programmes up to pre 11-12 never had or were never aligned to LRP (Local Reinvestment Target) or productivity but now they are starting to come in to the efficiency/productivity part of it so people might see it now as a way of trying to reduce costs or whatever else as there has never been that focus on it until recently" (OM1).

"I think we are at a time now where we are being asked more and more to do projects to save money which is fine if that is the upfront goal but it's hard looking under and seeing staff, if the staff know it's an underlying goal and us not being totally truthful. If it's out there then staff do warm to projects which are purely focused on patients and improvements for patients are improvements for them, and whenever we mention to save money then they switch off" (QI4).

This clarity over what Lean aimed to do was often provided to staff at the start of projects. Some administration and nursing staff prior to the introduction of Lean admitted they did fear Lean to be based on finance and the consequences of this, but once involved, or having sought clarity about Lean, later understood Lean to be used for process improvement.

"There will still be huge pockets of people who believe it is all about cost cutting. And the lady who told me that, she met me with four of her colleagues as she was so concerned and we met over coffee. And then she came and realised that I wasn't scary and the process wasn't scary and they all kind of dropped off and having said

'I have 20 minutes with you and I'm not sparing anymore time', it went on for an hour and a half because she wasn't worried anymore" (QI2).

5.2.1.3 Context of Healthcare

The context of healthcare in discussions of quality, process improvement and the pressures of targets are discussed by different staff groups.

I. Quality and efficiency

Quality of service is mentioned by the CEO above but only one operational manager discusses quality and Lean, in linking staff being developed through Lean so to provide quality of patient care. Quality does not feature in discussions with staff about drivers for Lean and instead they discuss Lean in terms of service improvement regards efficiency, driven by targets and pressures facing their service.

"…[It's] how we might improve the efficiency and processes within Dermatology because I think the thing that probably initiated that was that we have a huge workload and huge demand on our service and obviously we have waiting times that we have to meet. I think it was to see if we could optimise how we were organising ourselves in Dermatology…" (CT5).

II. Pressure of targets

It became clear that staff felt the pressure of targets on a regular basis, from the Lean team acknowledging the pressure operational managers were under, to Consultant Medical staff discussing competing targets and the impact on staff and patients in trying to meet demand. These targets were time related targets in terms of patient treatment times, rather than quality of service targets.

"Because there are so many targets to meet now and there is real pressure to meet those targets and you know, issues if you don't, so it seems like the operational teams are firefighting all of the time, so it's difficult for them to see the wood for the trees, you know" (QI6).

"I think as an organisation we sometimes get a wee bit bogged down in quantitative aspects of it and we don't look at the qualitative aspects of targets. So I mean as well as someone sitting on a trolley for 8 hours, what harm has that done to the person?" (OM1).

III.   Improving relationships

Although Lean was discussed by the CEO as a driver for culture change, contributing to quality and being used to meet service challenges, another dimension quickly emerged, that of Lean being used to bring staff together. The Lean events provided a forum for discussion and communication where there were issues over relationships and communication in the department. Having managers present at Lean events has facilitated groups coming together to generate outcomes. These benefits and challenges for Lean were noted by one improvement lead working on projects.

"my first one which was the diabetes events, the director of Operations who was a sponsor for it, actually attended all of it and on the second day it was actually very useful and as a result of that, they actually have far better relations between that management team and the clinical team which is quite good because they saw her in a different light I suppose and realised she was there to help and not point the finger all of the time" (QI4).

The use of Lean to facilitate bringing staff together was discussed by respondents in the Dermatology Service in particular.

"There were some personality problems in the department and it was thought there may be good reason to have a collaborative meeting and get some issues decided and that sort of process. I don't know if that was the primary reason for it but that was a secondary reason and I think primarily it was to see if they could get or to do things better in the department in general" (CT2).

"This department was having quite a few issues with waiting times and things like that and communication was not great. Communication was just atrocious, things weren't getting discussed you know or if somebody knew something and somebody knew nothing then things were really quite bad...I was desperate to get it, really

desperate cause I thought that we need to get everyone in there and everyone talking, you know" (AD2).

Administration staff from Dermatology positively discussed improved relationships they had noted through the Lean events taking place. Not all administrators interviewed were present at Lean events but were impacted by changes made to administrative processes, such as in patient-focused booking. This positivity in relationships was related to an increased team-working atmosphere and senior medical staff (with only a couple of exceptions) who were more approachable through the relationships which had been built.

"...now this whole Kaizen has come, there have been more relationships built and we know where everyone stands now if you know what I mean, but yes, I think that has definitely come out of Lean" (AD4).

"We seemed to come together more closely as a department instead of just admin, nurses and doctors. We were all involved in the process together so not one main decision – everything was discussed in the open at the meeting from what I can gather and everybody's views got portrayed across as being useful in changes and things" (AD6).

5.2.2   Summary: Drivers for Lean

Section 5.2 has discussed the drivers for Lean and these have been coded in Figure 5-1 and shown in Table 5-3. These have included the vision of the CEO, the impact of finance on Lean and also the context of healthcare. The section that follows will explore the NHSL implementation of Lean in more detail as this relates to the 'how' Lean is implemented in NHS Lothian and therefore contributes to the answering of research question one.

5.3 Implementing Lean

Background information on implementing Lean and the role of the 'Lean Team' is provided here initially to support discussion on how Lean is implemented in NHSL. Extended discussion is provided in section 5.5 which discusses staff roles. As with section 5.2, Table 5.4 presents the NVivo code data and much of this discussion here is related to the interviews conducted with the Lean Leads, though this was further expanded upon in later interviews with staff that had experienced Lean in their

services. These Lean leads discussed how Lean was meant to be implemented in the organisation, the profile of Lean in NHSL, access to data and also the work undertaken in both the pre-work stages and in the actual Lean events.

Table 5-4 NHSL Implementation of Lean: NVivo codes and sources

Code	Frequency of reference
Pre-work in Lean	95
Starting the Lean Project	96
Implementing Lean	66

As discussed in section 5.1.4, there were at the time of research, three managers as original Lean leads and who were joined by five Modernisation Assistants; one who worked full-time with the team and a further four who were seconded to work on the Lean in Lothian programme to deliver Lean projects and training as Lean leads. Lean in Lothian is consistently referred to as a programme.

Interviews (designation QI) and observations confirmed that a consistent approach was taken by all members of the Lean in Lothian programme team in how Lean was being implemented in the organisation and this was subsequently mapped out in Figure 5-7. The original Modernisation Managers who deliver projects as part of the Lean in Lothian programme were trained by GE and worked with GE leads on projects. Their project experience with GE was to be *'see one, help with one, and do one'*. This was consistent with the original team who discussed this approach, but as seconded Modernisation Assistants have joined the team, this is then viewed as a limitation of their own experience as they have not gained experience of delivering Lean in the same way as the original Modernisation Managers.

During the interviews with those working as members of the Lean team; another element of how Lean was to be implemented and embedded in the organisation emerged. The original intention was for GE to train a group of managers who would be the original Lean team. This group would deliver projects under GE's guidance as per the '*see one, help with one and do one'* model. Once they had sufficient experience of running Lean

projects and delivering training, then they would move into operational management within services in order to solidify this commitment to Lean within the organisation.

"Now the model that GE Healthcare came in, sold to us and they did sell it to us for a lot of money, was that you were a Lean Improvement Lead for 2-3 years, you were running projects and getting experience, and then you should have been put in an operational role to start embedding the methodology in the organisation, so you are managing in a Lean way, rather than running individual Lean projects. As you move into operational land then you move other people into the Lean leader role, which you've been succession planning for anyway. And if you kept doing that, feeding it and feeding it, you don't need loads of improvement leads but then you embed the Lean methodology in the organisation" (QI3).

The original members of the Lean team were those managers who commenced their training with GE in 2006 and were still in the same role at the time this research was conducted. This failure to progress was viewed by newer members of the team to have impacted on these managers and also the limitations facing Lean being embedded in the organisation.

"I think some of my colleagues who have been in the team longer than me…they would like to spread their wings a wee bit. I'd like to see more fluidity with working arrangements…one of my colleague's talks about how ideally you should be rotating managers at our level. You know, Lean trained, back into the operational side of things and then another manager comes in and does this work, so that eventually, you have this organisation who are expert in Lean and think 'efficiency, efficiency, efficiency'…" (QI7).

5.3.1   Pre-work in Lean Projects

Lean in Lothian projects are commonly projects with a strategic focus and this can include problem areas and those areas which are struggling to meet HEAT targets (see section 4.6.3 for definition and explanation). These projects can come from senior management or from services that put themselves forward 'to be leaned'. The motivations of services however are not always understood by the team as there have been issues in having services take ownership for Lean, despite this earlier enthusiasm. Figure 5.7 shows the process of how Lean projects are implemented in NHS Lothian and this figure illustrates the steps in how amendments have been made to the earlier

process of implementing Lean. Where Chapter 4 details the projects undertaken in the period 2006-2012, the early GE projects were indeed linked to strategic targets and especially those linked to Government HEAT targets but since then, services were able to nominate themselves for projects.

Initially the Lean team will define and scope the project – what the service is trying to achieve and whether it is suitable for a Lean approach, as opposed to a manager who wants a project managed in their service. This includes determining sponsors and project owners so that a project charter can be drawn up. This charter will define goals and ownership. Specific metrics may not be clear at the outset, but boundaries for the project can be defined as well as milestones as the Lean team work on each project for three months before handing over to the services. By 2011, a project charter was introduced to manage previously noted issues of ownership. This was included for both services who were defined by senior management as being 'strategic projects' and also by those services who had volunteered for Lean. Part of the role of the project charter is for setting out service responsibilities in the Lean project and also to manage expectations. This managing of expectations has become important so that services realise what they are undertaking:

> *"People hear good reports about Lean and then they just want it all sorted for them and we have to stress that this will come from you and your team and there's a lot of hard work, it's not just going to be fixed in a day. So it's managing those expectations as well that's quite important"* (QI1).

Even during the scoping of Lean projects, there is a difference viewed by the Modernisation Assistants in comparison to the original Lean team who hold the role of Modernisation Manager. This is noted in the comment about asking senior people to sign papers but also continues on in discussions over Lean team projects. There is a barrier viewed in the grading of the Modernisation Assistants who perceive themselves to have less authority due to their grade in the organisation which they feel can inhibit their ability to drive change in projects.

> *"We've tried to mitigate that recently by almost trying to sign a contract with the officers and the owners saying clearly, 'this is your role in this, you are responsible for…' but again asking quite senior people to sign papers is quite challenging so it is really about trying to get a message across when you first meet them, to set out*

what the project is going to look like, where they fit in at each step and the most important bit at the end, so especially about the action plans and making sure they collect the data to make sure they back up any improvements" (QI4).

The 'Lean brand' as in Lean in Lothian though is perceived to assist in driving change due to the profile it has in the organisation and the support from senior management. As it has been discussed, the strong association with the CE has helped the team in terms of recognition and profile.

"…In all honesty, saying 'part of the Lean in Lothian team' has a bit more organisational clout than just saying we were the Modernisation Team" (QI2).

5.3.1.1 Stakeholder Mapping

The Modernisation Assistants as seconded 'friends' also confirmed they followed the process mapped out in Figure 5-7 and also admitted that the pre-work stage of meeting staff and conducting stakeholder interviews allowed them to gain an insight to services. This importance of stakeholder interviews is emphasised as it allows the Lean Lead insight which then impacts how they will take forward the Lean project.

"if you are running your own project, you do all the pre-work, you have the picture in your head as you are going to be running it…because there is something about face-to-face and speaking to somebody…" (QI6).
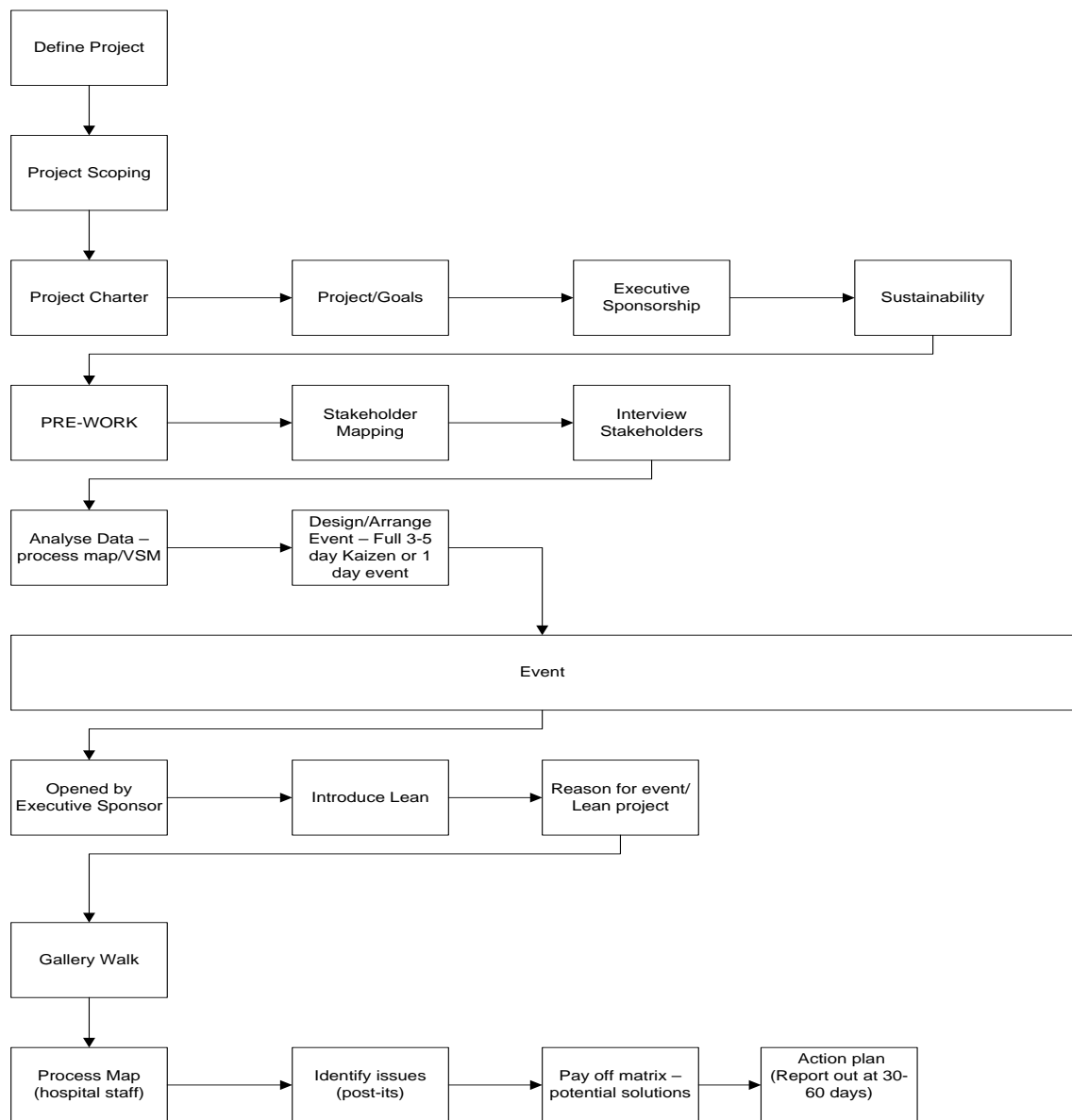
Figure 5-7 Process of Initiating Lean Projects in NHS Lothian

Source: Lindsay and Kumar (2015:335)

This focus on pre-work is important as it allows the staff to understand the service and personalities who will potentially be involved in the Lean project through stakeholder mapping and stakeholder interviews. This also helps to identify supporters and troublemakers.

> *"I suppose part of what we have to do, right at the start, when we are doing all our interviews is to meet everybody, all the stakeholders and also to gauge 'are you an enabler, are you…' I can't remember all the names of all these models that you get,*

but you know 'are you going to obstruct, be obstructive, will you be somebody who is going to be a leader?' You usually can tell right at the start, just by interviewing someone, their body language, if they are behaving, what they are saying, their motivation and what is their motivation behind it all?" (QI7).

"I had some very honest discussions with the service management about who the potential trouble makers were or could be and it's kind of been proved right" (QI4).

The interviews confirmed there was consistency in process in how Lean projects are scoped out whether it is by the Modernisation Team or NHSL staff that have been trained in Lean and then go to run their own projects.

"…anyone who was involved in the process was included into the workshop and also through stakeholder interviews as well to capture them" (OM1).

The value of the work that is undertaken in the pre-work stages by the Improvement Leads is acknowledged by one senior clinician who was leading a Lean project in his own service.

"I do appreciate actually and that's the other thing that is worth mentioning is the preparation that goes into the Lean events because X and all the other people, Y, do a lot of work, preparatory work, interviewing all the stakeholders, bringing that together for the day as it were and I think that is a very good way of working…I know they do the non-believers as well, some of them, and I think sometimes they have difficulty actually meeting the non-believers so I think that is a really worthwhile part of the Lean process" (CT10).

5.3.1.2 Analysis of Data

In order to measure improvement through Lean, process data from the current state is required. The benefits of data to Lean are to demonstrate clear improvements and having evidence of this. The Lean team use data to demonstrate improvement as this is required for the project charter and for reporting both to Executive sponsors but also for reporting on their own projects through the reports discussed in section four. The Lean team also use the data they have generated to win over those who are wary of how the Lean methodology is being deployed. This helps to support the team as they have initially been

working with staff within their services during the pre-work stage in order to gauge the current state and issues faced.

> *"You are backing it up with your data and your (VS) map and you've been to gemba and you've seen it. You can say 'this is how it is' and there is no blame and I think staff like that and they like having that voice. They feel great and it's such a nice thing to see them get all excited when something works so they can improve something"* (QI1).

Although the benefits of having this data are recognised, it is also a key challenge to the Lean Team and all members made references to these challenges during the interviews which were conducted. Consensus was reached as all agreed there was no substitute for '*getting in there*' to gather data however, limitations of healthcare systems were quickly recognised as discussions on the subject moved on to the challenges of getting access to data. The Lean leads consistently note, '*we get the data eventually but it is not particularly accessible*' or when data are received, it can be top level data. The data are not specific enough that it would allow further insight to clinical pathway issues. These data challenges are not just faced by the Lean team themselves but by staff who often struggle to get access to data in order to review their service performance.

> *"…data is obviously integral to the whole thing because if you don't have baseline data, you can never track where you have got to and you can't provide that actually this change has worked or hasn't worked or whatever and trying to get data is like pulling teeth. Even people within the service don't seem to be able to get data and sometimes, like the work I had last week, I had data, down to individual consultant clinics that they had never seen, that they had been asking for, for some time and they couldn't get it and I think, I just think that's basic, so that's an issue. I think that's probably being addressed but it can be a real issue trying to get data and it seems almost impossible to get clinic capacity. You think that would be a basic thing as well but it's hard to get stuff like that"* (QI5).

The challenges over data access were regularly discussed, not only by the Lean team but by service staff too. Even then where data are perceived to be missing or wrong, this is a further challenge as in trying to engage staff (medical staff in particular were noted as providing this challenge) who state '*show me the data*' (CT12) thinking this will prevent any further discussions on the topic taking place. Comments will then be fed back that

even though there are data, it is wrong because the wrong information has been recorded or the information is incomplete.

> *"Nearly at every workshop, not so much now, but they'll say the data is wrong but they are putting the data in, they are putting the times in so…"* (QI6).

Sometimes, the data are genuinely incomplete so to ascertain how a service is performing and using measurements to do so is problematic. This has been noted by one nurse in particular.

> *"we are measuring things which haven't been filled in, that's the trouble and having someone take the time and the knowledge to do it, because whilst you can have somebody you can put on to it that might not have had the knowledge and the training to successfully evaluate something but it is also that what they are evaluating is incomplete data"* (N4).

This nurse is trying to address this challenge by allocating a specific resource to gathering data, but ensuring there is '*backfill*' so this can be achieved creates further challenges as previously in the interview, there had been discussion over strained resources and stress on staff. Recently, a staff member had been allocated to ensuring process data gathered was complete and accurate and the aim was to continue this for a month, so further data could be used for a future improvement project.

> *"it is only day 3 so we'll see (laughs) but the first 2 days have been fabulous and so much easier and that's because someone has taken over and is process mapping as they go along, of what they are doing and what is happening in the unit and they are taking stats as they go along, so hopefully at the end of the four weeks we'll get a really good overall picture"* (N4).

5.3.2 Starting the Lean Project

Although data are crucial in ascertaining a 'before' state to understand how a process is currently performing, all staff working on driving Lean projects continually returned to people as a theme and maintained that there needed to be a focus on people within Lean.

5.3.2.1 Stakeholder Interviews

This focus on people and their expectations also follows through the process when the team enter the pre-work stage after the project charter has been defined. Key stakeholders are defined. The team meet these stakeholders for informal 'interviews' in order to discuss their roles in the processes and future involvement in the Lean project. These stakeholders are not defined in terms of their power and influence but are defined in terms of how they interact with the process under review – what is their role in the hand-offs and what is their opinion on the process, such as what can be improved? This then enables the team to identify potential participants to the Lean event.

This focus on the qualitative aspects is viewed as being crucial to the success of any potential Lean project within a service. It helps the Lean team as outsiders understand the staff and service pressures which may have an impact on any Lean project initiated.

> *"The stakeholder interviews tell you two things: one, they give you detail about the process, and they also tell you about people which is really, really important. Because Lean, although it looks very theoretical and very textbook, I would say in figures, my view is 70% people, if not more. And with the best process in the world if people aren't willing to follow or buy into then you have a problem. So it tells you two things. One is the objective parts but also the other parts, where the tensions are, where there maybe subjective influences going on which may be having an influence on how their process is performing now, what we might need to address in order for them to get better in the future"* (QI2).

This use of the stakeholder interview to determine 'subjective' influences highlights the need to uncover issues affecting service which may not necessarily be operationally driven in terms of targets and issues over demand and capacity, but the need to focus on people. As discussed in section 5.2.1.3 (iii), relationships fall into this 'subjective' influence and Lean was viewed as a bridge to opening up channels of communication in staff members who had simply stopped communicating. This lack of communication had further contributed to other pressing problems in the department. Through these stakeholder interviews, Lean was viewed as a channel for bringing all staff together in order to provide a forum for communication and problem solving.

All team members from the Lean in Lothian team confirmed the value of these stakeholder interviews, as it enables the team *'to win hearts and minds'* (QI3) where there were potentially issues over how Lean was viewed. Although QI1 describes how *'people hear good reports about Lean'* this initially is not always the case.

Although stakeholder interviews can reassure those afraid of what Lean might be, their use also lets the Lean team start to build up process maps and value stream maps prior to any Lean event being held. The interviews allow the team to ascertain how many people are involved in the process, what happens in their role in the process and what the interviewee views as good processes or processes which need improvement. The interviewee is also asked how they feel the process can be improved. This information which is combined with service data enables the team to plan the Lean event where all stakeholders will be brought together and the drive towards implementing Lean in the service starts.

5.3.3   Observation of Lean Pre-work and Taster Event

This focus on data and stakeholder identification links to the work undertaken in the pre-work stages. The researcher shadowed a Lean team lead in the pre-work stages of a project, linked to strategic development of prescribing services across the health board. This project had Executive support and was one of a series of projects in this area. The specific project observed was on prison prescribing and so the researcher attended multiple visits to a prison. At the time of the observation, the prison held around 800 inmates roughly comprising of 700 male and around 100 female prisoners, many of whom were receiving medication for long-term medical conditions. The data gathering was observed as problematic with missing data and uncertainty, with inaccurate and out of date information often being provided on 'Kardexs' which recorded inmates medication requirements. Trying to determine how much waste was being generated as a result of inaccurate information was impossible as no records on this were available. Process Mapping and stakeholder interviews were used but also a 'Lean Taster Event' was also held as staff resources were stretched and the service had a high turnover of nursing staff. At the Lean event, the event timings had to be reduced to coincide with shift changes in order to allow staff to attend – from a half day, this was then reduced down to 90 minutes. The senior manager responsible for nursing staff on site, although supportive of the Lean project in allowing access to staff, did not attend the event. No prison doctors were in attendance.

Nursing staff recognised the problems they faced in prison prescribing with out of date Kardex information, duplicate prescriptions being received or prescriptions not received at all. This was further compounded by the processes for managing prescription deliveries when pharmacy staff were off shift. However, the high turnover of staff did affect the event. Ten nurses and two of the Prison Officers attended the event. Out of 10 nurses, half of these had been in their role for four weeks or less and one senior nurse dominated the mood and engagement in the event. Initially nursing staff were introduced to what Lean was, including the seven types of waste, value for customers (inmates) and flow, with healthcare success stories highlighting its application in NHS Lothian. A mini simulation was played to allow staff to see the impact of this, so to better embed what Lean meant for healthcare staff. Some staff had admitted having heard of the term 'Lean' but had little comprehension about what it involved.

The senior nurse who had been in a prison nursing role the longest, was the most resistant and initially stayed quiet but when she spoke out against Lean, the mood of the nurses changed. She can only be described as reacting in a 'forceful' manner against Lean and then subsequently dismissed the idea that Lean will aid process improvement as they (nurses) have had to *"pick up the pieces of Lean before"* (when implemented as part of receiving ward work) despite the project she was referring to being deemed as successful and sustained by the Lean team. Immediately, the mood of the other nurses changed and a 'switch off' was observed by both the researcher and the Lean Lead. The Prison Officers did engage in the session. Further data collection and analysis was facilitated, which included Voice of Customer (VoC) interviews being conducted with the customers (e.g. prisoners) about the process of ordering medication and their current views. The project remained beset with problems, including a separate project on prescribing out-with the Lean project, and an anonymous source later described the project as *'an unmitigated disaster.'*

5.3.4   Type of Lean Events

This taster event which was observed was a variation on typical Lean events held in NHSL. The Lean in Lothian team, use two types of events for Lean projects. These events are Kaizen (also known as RIE events) or 'one day workout' events. It was also noted previously in Chapter 4 (section 4.7.2) that the deployment of these events has changed over the period 2006-2012. Kaizen was the common approach to 'kick start' Lean projects, but this has evolved into a predominance of 'one-day workout' events being

used in projects. The rationale for the type of approach used was not provided in the documents reporting the outcomes from Lean. However, this has been discussed in the interviews by respondents involved in Lean events. The Lean team themselves describe the timing as a '*balancing act'* as the type of event may be determined by what can be provided by the service in terms of staff time and commitment. It is noted (QI2) "*that there isn't any doubt that the longer they can give, the more they get back out of it*".

As discussed in section 5.2.1.3 (ii), targets are a common pressure and have been discussed as a driver for Lean and yet it is this target pressure which is perceived to be impacting Lean events and engagement in Lean projects for driving outcomes.

> "*I think it is getting more and more difficult to get people released for that length of time. So for all its good to get people away from their environment and away to concentrate on these things for a day or two days or three days or whatever, it is becoming more and more difficult because of a lack of resources or waiting times targets to get pulled away for this*" (QI5).

Kaizen is a term staff are familiar with and associate it with Lean events. This familiarity over the term 'Kaizen' is noted by one Operational Manager.

> "*For most people Lean will translate into Kaizen here and therefore if you are an individual clinician, your experience of Lean will be determined by the quality of a Kaizen experience or the outcome of that*" (OM3).

Consistency of approach was visible whether it was a Kaizen event or workout, hence being mapped out from the interview data. When there are larger pathway projects, this consistency in process allows different members of the Lean team to work together to deliver projects as a standardised methodology is followed. This follows through from the stakeholder interviews, process mapping, to finally the event itself, though the merits of this are challenged.

> "*As a team, we all use the same method of eliciting what are the issues in a process. We use a gallery walk to begin with. There are other tools we can use but we've kind of got into being a wee bit lazy but we all know what we are doing as if we are supporting each other in our different events then we know what works for us. It*

could be standardisation or it could be lack of imagination (laughs), I'm not sure" (QI2).

5.3.4.1 Time

Time is noted as a predominant driver for determining the events length as this is related to time pressures for the services which then impacts the scale of work which can be undertaken. The team have even created a hybrid two-day event to provide more time than the one day workout for '*trickier*' or '*Lothian wide*' processes but which isn't as long as the Kaizen/RIE which is commonly held for between three to five days. This then starts to explain why in later reporting there is a preference for workout as opposed to Kaizen events.

> *"We can have anything from a one day workout to a five day Kaizen. We used to do more of the longer Kaizens than we do now. The service is under a lot of pressure and they feel it difficult to realise people for that length of time"* (QI2).

The reduction of time was commented on by staff, some of whom welcomed the reduced timing events, noting that having attended events for four to five days previously, "*it was a lot of Lean. It wasn't 'lean' Lean*" (CT2). Other staff also questioned the need for the length of these events given challenging conditions and waiting time pressures that services were facing. Others being more cynical about the organisation and its way of working stated it was typical to reduce timings down. One operations manager confirmed experiencing a shorter event as the initial plans were believed to be for a Kaizen event but this turned out not to be the case.

> *"It (the Kaizen) was watered down, much like 'oh no we need to get these people off the shop floor, I know, we'll compress it all into kind of five hours' which is quite a Lothian thing to do, so do all the 'this is what we'd like, this is what the pressures are, lets kind of muddle through with some kind of thing which is a watered down version because we are so time pressured'. So yes, it was kind of a five hour session and then something like a 3 hour afternoon meeting after that and then the follow ups"* (OM2).

5.3.5　Summary to NHSL Implementation of Lean

Section 5.3 has discussed the NHSL Implementation of Lean as shown in Figure 5-7 and this has taken into account the pre-work which is conducted, how the Lean project is started and also the process of implementing Lean which is mapped out. This section also contributes in answering research question one in how Lean is implemented in NHS Lothian and in doing so, attention can now turn to answering RQ2, in order to understand and ascertain the impact of Lean in NHS Lothian which is further discussed in the next section.

5.4 Outcomes from Lean

In this section, the outcomes from Lean will be discussed. This section is a smaller section as projects and outcomes have been discussed in Chapter 4 and are also shown in Appendix 4. Staff however did discuss projects they had participated in so this section will give an overview of projects discussed. Some of the challenges in gaining outcomes from Lean will be illustrated as in discussing these outcomes; interviewees also evaluated areas of complexity that affected Lean events. These areas of complexity therefore affected the outcomes under discussion, as they link to the discussion in section 5.3.4. Table 5-5 below shows the NVivo code data in relation to the topics discussed in this section.

Table 5-5 Outcomes from Lean, NVivo codes and sources

Code	Frequency of reference
Complexity facing events	136
Improvements Expected	192
Expectations vs Reality	214

5.4.1　Outcomes from Lean

The action plans generated from the Kaizen or workout events are in place to help achieve outcomes from Lean. Although Chapter 4 discussed this in the content analysis of the

NHSL Lean reports which report the outcomes from Lean projects conducted, respondents also discussed their experiences of the outcomes generated from Lean projects. As discussed in section 5.3., government set targets such as HEAT targets are often a driver for Lean projects where services are unable to meet the targets set. Therefore a Lean intervention is viewed as being able to change that status.

Many staff were positive in their comments about Lean, about the outcomes they gained. Projects discussed in Chapter 4 such as HSDU in Phase 2 (section 4.2.3) and Dermatology in Phase 3 (section 4.4.4 where the project was revisited) were award-winning as they won the Lean in Lothian award for their respective projects.

One of the Lean leads discusses outcomes generated and maintained as part of a successful Lean project in substance misuse. This was an area where waiting times were far in excess of set targets and the project was to include multi-agency input. This was a successful project which was later replicated in other areas.

"I worked with West Lothian substance misuse in 2009 and that would be just over 3 years ago, and that for me was the first time I had brought together social work, voluntary and health and it was quite daunting. And at the time I think their waiting times were 22 weeks, which was the longest wait and we were looking to get that to 18 weeks very quickly which was the government target which was then dropping to 8 weeks for substance misuse. And actually post-Kaizen we got it down to 8 weeks so we were way ahead of the game and they ended up working in a very multi-disciplinary way so with hind-sight that was a really successful project. We dropped DNA rates – they actually became leading in Lothian and I think in Scotland to hit targets" (QI1).

Many projects have not been 'stand-alone' projects and the systemic approach was discussed by interviewees as well as section 4.7.2.1. Medicine for the Elderly (MOE) has been the focus of multiple projects in terms of managing length of stay, day beds and physiotherapy sessions, see section 4.7.2.1 as this work is across six phases of Lean in Lothian reports reviewed. Some projects such as reviewing physiotherapy access to patients in order to determine the impact to delayed discharges which has had a considerable effect on both patients and staff. The auditing and mapping conducted as part of Lean highlighted areas for improvement.

"Another one we had more recently in stroke rehabilitation was with AHP's (Allied Health Professionals – physios, occupational therapists and speech therapists) and we were looking at what was preventing stroke rehabilitation patients from being discharged and we had to get into areas about how much therapy that the patients actually were getting and we audited 50 of the patients in their stays to find out how much therapy were they actually getting which proved to show, not a lot. And when we looked, they were very small resources, you could see there was a mismatch between the therapists day and the availability of the patient for the therapist which meant there was quite a bit of time where they did not have access to patients or time they were there but it was early morning and it wasn't a reasonable time necessarily to see patients" (QI2).

This project generated notable outcomes as part of Lean: 2000-2500 extra therapy sessions were generated as a result of changes to ward routines, showing that Lean can be applied and aid improvement through using current resources, rather than adding in additional capacity through employing more staff.

5.4.2   Attendance at Lean events

Time has been noted as a pressure in trying to attract staff to attend Lean events as ideally a mixture of staff from all grades and all areas across the process under study should be in attendance in order to generate outcomes. This section will go on to identify the stakeholders who are in attendance at Lean events as these attendees will be responsible for delivering outcomes for the Lean project

5.4.2.1 Sponsor

As per the project charter and Figure 5-7 each project is allocated an Executive Sponsor and the Executive Sponsor role involves support for the project and being present, at least, at the opening of the event as this demonstrates senior support for Lean to lower graded staff. This visible support certainly was present in the early days of Lean but this has waned a little in recent times.

"We have executive sponsors for every project - normally the executive management team or one level below so really they should be there at every project, ready to kick things off and at the very end, occasionally we get the CEO very

occasionally turning up to the events he wants to see or has an interest in or wants to go to. In the early day, that was more formal, but now it is more established, the sponsors for the events can be management, lower management rather than executives and it kind of ticks on like that" (QI4).

5.4.2.2 Process Owner

This Executive or CEO support was recognised as being beneficial for the Lean project as this sent a very visible message to employees that Lean was being supported from the very top. For sustainability (noted in Figure 5.7), each project has a Process Owner who manages that area and who is involved in 'signing' the Project Charter. The Project Charter, at the time of interviewing was a recent addition as there had been issues over ownership which then affected sustainability of projects. In signing the Project Charter, the Process Owner demonstrates commitment to the project in agreeing to accept responsibility, protecting time and also setting the scope for the project. This is not a formal signing process but is a documented record about responsibility and scope of the project. These managers as Process Owners are generally agreed to be 'responsive' or they do listen to the Lean leads. However, there have been issues with process owners who assume the Lean leads will do all the work or they do not follow through to ensure sustainability of the project.

> *"It depends on the area, each area as the success of the project depends on the role or how active the process owners are, the management team is as there have been experiences where the management team have wanted us to do a project where we have to see the whole thing through and make sure the whole thing is done and dusted for them and to take it off their hands. However, in reality, these things work best when there is strong leadership and they take any actions forward themselves and make sure all the action plans are completed"* (QI4).

5.4.2.3 Managerial attendance at events

Managers should be in attendance at events to show support for the Lean project, though it was noted in section 5.3.3 in the observations of a Lean event, that this is not always the case. Lean leads have noted the importance of senior managers in attendance in early events as this is perceived to have sent a strong message to staff over the importance of Lean to the organisation.

"At the very beginning, there was no doubt people thought that the Chief Exec had taken the time to, or the Chief Operating Officer, to come and be in this room with us; 'They know about the work we are doing, they'll come back in 3 days' time and see what we did' and that had a real impact I think" (QI6).

When discussing involvement in Lean and how a service came to be involved in Lean, one particular service was 'volunteered' due to waiting times pressures. This attendance by senior management was perceived to add some pressure to staff as for them, as it added to the need to deliver outcomes, through an unfamiliar methodology and with senior staff involved.

"There was a bit of pressure around it because we were told not only we would be doing this event but because the Chief Operating Officer had invested so much time and money in it then we were expected also to deliver results and the consequences of that. And this was a process, none of us knew anything about so that was an interesting thought that we were about to launch into something over a short period of time and then make a presentation to the Chief at the end of it, explaining what we'd achieved, when actually none of us knew what we were letting ourselves in for" (CT2).

Although the positives aspects were discussed and concerns noted about management being involved, staff also noted the impact of a lack of managerial involvement. This creates limitations for the progression in making changes as agreed at the Lean event. The hierarchical nature of healthcare and staff waiting for approval means momentum for change can be lost if delay and authorisation to make changes is limited by the lack of management 'sign-off'. Staff also related this back to medical staff not engaging, because as well as challenging data; they will also challenge the lack of management attendance as this will impact in taking improvement forward.

"So I think the management side of it up there who want this done, need to be taking part as well. I have to say, the manager was there most of the time which was good but there was an issue one day that the person who came along, (the manager didn't come along), didn't have the authority to do things and they just...and I think you are just loading the gun for people who don't want it to happen by them turning round and saying 'what's the point because there is nobody here who can sign this off?'" (AD2).

5.4.2.4 Staff groups at events

Staff note in the interviews that by the nature of healthcare and demand on services, that it is not feasible to have all staff from services attend all events. A cross-section from relevant staff groups are expected to attend in order to drive forward changes and improvements and also to report back to their colleagues. The Lean leads prefer if attendance is consistent, e.g. the same people from groups attend every day of the Lean event, rather than someone different attending every day. This continued attendance aids consistency and development of discussions. A wide range of staff from all parts of the process being involved is beneficial for Lean as otherwise the event may be considered '*biased*'. This mix of staff is viewed as positive for taking Lean forward and having everyone involved.

> "*I thought it was really good because in my group there was a mixture. There was management, there was me as admin/clerical, there were doctors and nurses, well nurse specialists and there was also higher management as well*" (AD4).

5.4.2.5 Hierarchical nature of healthcare

Discussion on demographics of staff in attendance at this type of event led to discussions on hierarchy. Some initial perceptions around involvement in Lean were that Lean was perceived to be for '*higher graded*' staff only. The hierarchical nature of healthcare was introduced by respondents in this discussion on attendance and those who were involved in Lean events. Attendance at events by lower graded staff is viewed as a positive as this was phrased in terms lower graded staff having a '*voice*' and being allowed '*their say'* when this is not the norm.

> "*there was the opportunity for everybody's views to be gathered, you know because in medicine there are hierarchies and so it was a good opportunity to flatten those hierarchies and bring people at the grass roots/ coal face, get them to come in and they could be heard in an environment where they knew they were going to be heard and not squidged by the bossy senior consultants*" (CT5).

Those staff members who were in attendance and are considered to be 'lower graded' staff also highlighted the positives in how they were allowed to contribute to discussions.

"It's the first time that has happened in all the years that I've worked to be able to stand up and voice my opinion and for people to…not that I've not done it before and people have disregarded you but for someone to actually listen to the person that is actually doing the job and that is the whole core, the whole issue, is that it is actually someone who is doing the job and them listening to the person who is doing the job and incorporating what they are saying and with that, to me it was the biggest satisfaction of the whole thing. They actually listened to what someone who was at the bottom of the food chain was saying, rather than someone at the top of the chain" (AD4).

The staff member quoted above was one who was involved in a large service wide project which was focusing on clinical and administration improvements in the service. This project was deemed to be very successful but during the interviews, staff across this service noted the impact of these lower graded staff having a '*voice*'. This is bringing together of staff was attributed to how relationships in the service were improved as a result of the Lean project. Staff of all grades coming together started to break down the hierarchy that had previously existed. This in turn is discussed as facilitating improvement.

"I prefer it now because it is nice to have doctors and consultants that you can actually approach and just ask the question about 'this lady is in your clinic and can she be brought forward?' and things like that, whereas before you would be a bit reluctant to go and ask them. You would have to go via the secretary or via another doctor whereas we feel that we can just approach them, ourselves obviously being a lot lower grade than them, and their secretaries are higher than us as well so it's a bit like 'you are down there, why should you ask us to do THAT?' but they are fine with it now" (AD6).

This focus on lower graded staff in being able to contribute to improvements is viewed as important. This is linked to being able to gain improvements which will add value to those who are responsible for delivering services as they have direct patient contact. Although the importance of leadership and management presence has been discussed in making change happen and being supportive of this, there has to be a good tranche of staff from those lower grades available to identify the real issues which can be tackled in service improvement.

"I would actually almost top load it from the lower grades, so from the people who are actually delivering the care, rather than the leaders. You need a leader there to be able to enact the change, and to help facilitate the change, but you need the ideas and the answers from people who are doing the job" (N1).

This fits with the Lean leads own idea of how Lean events should work. The team aim through the pre-work and initial event to ascertain the current state and what the current service challenges are before getting attendees to consider how they would start to meet these challenges to gain improvements. The attendees will then consider through a pay-off matrix, of what potential solutions there are to these challenges and will also be evaluating how easy or hard this will be to achieve and what the potential pay-off will be. The discussion will be facilitated by the Lean leads but the aim is for those who are doing the jobs to provide the answers. The team however can assist with providing information on systems usage and capabilities which may facilitate improvement.

Challenges however were noted in engaging medical staff, especially consultant staff. These staff members are essential for the delivery of services and yet there have been instances where they are disruptive or have failed to engage in Lean projects aimed at improving the patient pathway.

"Senior clinical staff...they might arrive late and have an opinion on everything...they come in and it's like 'it's ok everybody, I'm here now' and talk about this when we've already spoken about that, 'oh it just is'. But other times they don't come at all and unfortunately it can be incomplete as you haven't got that info so it's difficult" (QI6).

"There are certain specialties where they don't even participate, because 'they are perfect' and they are renowned for it and my colleagues have had the same thing in different projects. You know, how do you get them engaged? Sometimes you can't, can't make them" (QI7).

The Lean leads have been working on projects where this engagement is an issue and they have to try and work around this to deliver some form of outcomes, despite these limitations. Service staff are also aware of these limitations. News of consultants divided and their discussions gets back to staff involved in services that have not necessarily been involved in the Lean events but will be involved in new ways of working as a result of outcomes.

"I think it was…from what we got told in the meetings…they were very, very divided and some people did want to do it and others wouldn't and they were picking at how things wouldn't work and how things do work" (AD5).

The project under discussion (Dermatology) had a successful outcome but one of the Orthopaedic projects in theatres was viewed as limited in being able to achieve what was expected due to a lack of surgical engagement. This lack of engagement was discussed by a consultant illustrating why medical staff are important in driving projects forward and why it is detrimental if this engagement is lacking.

"Whether again that comes back to the critical mass group…it is really important that you have the people who can change things in the room…In Orthopaedics' Lean, there were no Ortho pods there, no orthopaedic surgeons, not that I ever saw. They had the charge nurse and the clinical nurse manager but that engagement or lack of it as such, yes, how do you get round that?" (CT10).

5.4.3 Improvements Expected

Section 5.4.3 discusses the expectation of outcomes which are expected as part of the Lean project and where in past projects these have been reported to senior management. Once payoff solutions have been evaluated, those which are considered viable are noted as actions and attendees and Process Owners are responsible for delivering the 'action plan'. The action plan is aligned to milestones of 30 days and 60 days for delivery of these actioned improvements. After 60 days, the Lean team hand the project over to Process Owners who as discussed in section 5.3.4, have responsibility for the sustainability of the Lean project. Whilst the project is still the Lean leads' responsibility, it has been noted there are issues of having to '*chase*' people up and there are commonly also fortnightly or even weekly meetings to ensure the action plan is being delivered. Support from the

Process Owners (section 5.4.2.2) in delivering Lean and allowing staff time is viewed as a success factor in the improvements which are expected to be delivered.

> *"In the projects we've seen the most success, they are the ones where the management have taken someone out for a day a week, come up with an action plan and made sure it's implemented"* (QI3).

5.4.3.1 Momentum

The action plans and regular meetings will help to maintain '*momentum*' although timescales can slip due to key stakeholders being on holiday or ill which impacts timescales. The large Dermatology event, resulted in 140 actions which took almost two years to deliver, but was delivered due to a "*very, very diligent local, junior manager*" (QI2). In some services however, getting actions delivered or the data collected to support improvements is challenging. Leadership in ensuring actions being delivered is an importance factor as is protecting the time of those doing this. This protection of time was certainly a noted as a factor in successful projects, such as the Dermatology project.

In some services, actions which have been agreed have not been taken forward so the same issues which had plagued services before are still an issue post-Lean project and this has affected momentum. Consistently, Lean leads refer to 'nagging' services to ensure there is momentum in actions being a focus and keeping Lean at the top of the agenda. Staff realise that the Lean event provides enthusiasm for improvement and change, but this momentum can be lost when staff return to their '*day jobs*'. In other services though this momentum has been lost and it has been the Lean lead who has gathered the data and worked on the action plan, even when there have been no data challenges in being able to evidence improvement.

> *"We had an action plan of who was going to do them, how often they were going to do them, and did they do them? No. Did anyone do them apart from me? No. And, because they've got lots on, they've got their day jobs to do and in saying that these measurements, well most of them should be in the system anyway, so I ended up doing them but I suppose we do have protected time to do such things anyway"* (QI7).

This tracking of actions and '*nagging*' staff to keep the momentum going forward is why the Lean Lead will work to deliver a successful project with the associated evidence to support improvement. This is challenging however, as the hierarchical elements affecting service staff are also felt by the Lean leads when they are working on projects. This impact of hierarchy which was introduced in section 5.4.2.5 is again related to medical staff in how Lean leads are viewed.

"We don't carry the same authority and they wouldn't take it from us. The project that I have now, the project that I am trying to complete, the consultants aren't...they probably aren't as receptive to me as they would be to the modernisation manager but I just keep going. It has to be done, it's my project, it's their project as obviously they've brought it to the Lean team but as far as I'm concerned it's my success or failure to, well not success or failure but I need to deliver it. That's what I've got to do so it is different, you know we are different because we are different grades so we don't get the same...they do know we are from the Lean team and I think that helps" (QI6).

5.4.4   Expectations versus reality

Staff often discussed how they perceived a gap to exist between what was expected and the reality that was evident in NHS Lothian. This was viewed as impacting the Lean in Lothian implementation as staff questioned successes from Lean and also questioned the support from Lean given the time pressures they faced.

5.4.4.1 Questioning successes

Certain staff members however have been ambivalent about Lean successes, even in high profile projects such as Dermatology which is regarded as successful and resulted in the department winning the Lean in Lothian award for best project.

"It doesn't really strike me as a sensible way to improve clinical services because its seems to be 'we'll come in and do this, this and this, and then go in and out' and looking at the summaries, it really didn't seem...the summary documents didn't really seem to match what I thought what was said, there seemed to be an element of 'this came out of the Lean process' when some of those changes were on-going anyway" (CT3).

One consultant who was heavily involved in this and other Lean projects in his service was cynical, stating; *"There were lots of wee minor things but I don't think anything major happened except for a good psychological exercise"* (CT2).

Another consultant who initially claimed to be supportive of Lean found it difficult to describe what the outcomes from Lean were and referred to tangibles as '*new theatre lights'* and getting '*new stamps'* for the clinic. However, non-tangible outcomes such as improved relationships and team working were also identified.

> *"We achieved what we wanted to achieve, I felt the non-tangibles were that we had an opportunity to work as a team and that there were certain things in relation to that system that could be ironed out in the forum quite quickly"* (N1).

Nursing and administration staff commonly commented on their discussions with patients who felt new patient focused booking systems, clinic organisation and departmental guides were helpful which has in turn demonstrated measurable outcomes in reductions of DNA rates. This positive feedback from patients was also noted by the researcher during observations in the Dermatology clinics.

> *"Afterwards with Lean, I think the thing that has been most affected has been the DNA rate and how they've managed to change with the PFB's (patient focused bookings) that we do which has decreased the DNA rate by a good percentage which is good for us as well"* (AD3).

5.4.4.2 Lack of outcomes from Lean

Some projects are very high profile, meaning they have strong executive support and are linked to strategic aims of the organisation. Single Point of Contact was one such project as it was focusing on front door or Accident and Emergency (A&E) attendances which were considered inappropriate as these can be due to issues that can be dealt with by GPs. Single point of contact has been a project which has received a huge focus over the years, with strong executive support from operational and medical directors as well as multi-agency input but is regarded as being less than successful in comparison to other events.

> *"There was also another big one for 'single point of contact' for NHS Lothian which was looking at reducing, trying to reduce the number of inappropriate admissions from primary care and attendances at front door because obviously that*

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is a big issue but that was another difficult thing. Things happened in the background and we did…I guess there is a minor success there in we've now got a directory of services which can direct people from secondary care to primary care and direct people to the most appropriate route, rather than them pitching up at the front door" (QI5).

Staff discussed this lack of outcome in other projects saying:

"I think…the other thing I have experienced from Lean events that's made me slightly negative about them is lack of outcome,' So we've been doing this, we're doing that, we're going to do that' and then it doesn't happen" (CT13).

"There's been lots of events in the past where there has been lots of good work there being done and then you hear nothing else about it and it is a shame you know that the people who are actually saying this aren't taking it…you know there is maybe stuff not being taken forward and it's not all vast…its small pieces of work that sometimes can have a major impact" (OM4).

CT13 goes on to reference an example for lack of outcome that he has experienced in Lean events as; *"I suppose the biggest example of that and it's interesting – have you heard of single point of contact?..."*

"…it was all around trying to improve how we work and I was single point of contact and I had never been to one of these events in my life and I was really enthusiastic with one of the senior directors of operations was there and she was sort of the main sponsor for our group and there was a medical director for medicine, the director of op's for medicine was there and some GP's and myself and actually some social care people and we came up with some really good ideas and I thought, 'do you know, this could really work'. Now this was probably 2008 and I was really enthusiastic and I said, 'yes, I'll be happy to join in and do everything I need to' and we waited for a year and nothing happened because it wasn't high on the priority list for people…It was probably that there were 30-40 people there, it was a lot of people and nothing as a result of that was taken forward, with lots of good ideas and nothing taken forward…I went along to a series of meetings about single point of contact, I went to a meeting every month for 12 months and at the end of it we had lovely minutes and lovely documents and nothing

was moved forward and at that point I lost all enthusiasm. They are still talking about single point of contact; today in 2013 (said pointedly) as being the way forward" (CT13).

The lack of outcomes from Lean is also related to time dedicated for Lean. Staff discussed protected time, or the perceived lack of it for staff working on Lean.

I.   Time – Reality and Expectation

Time to engage staff and releasing them from the 'day job' was a consistent theme in interviews whether it is discussing the type of events (5.3.4) or in later discussions of momentum (5.4.3.1) or developing Lean capability (5.4.3). The notion of protected time was discussed in terms of expectation of what should happen and the reality of what does actually happen.

In driving a Lean project, the Lean leads are struggling to engage people to do the necessary work to produce outcomes due to time constraints cause by pressures of work.

"…it can be quite difficult to convince people to find time to do Lean projects. The project that I'm doing at the moment, people are saying things to me like 'how will I be able to do this when I'm struggling to do my day job? – do I just forget about my work?'" (QI8).

Time is discussed as a constraint and the concept of protected time and additional resources to support staff in Lean is needed.

"It's an area where if we want to do the redesign that we want to do then I think there has to be additional resources put into that to allow people to do it. And also to allow operational management to have that opportunity to take forward these sort of changes as well that we'd like to do" (OM1).

This, however, was also noted as a source of complexity facing Lean as moving staff around is perceived to be affected by budgets and resource constraints.

"I think there are a lot of barriers there which we have probably created with the way that our budgets work and the way that our organisation is structured that stops us from going into other areas so people see what resource am I getting back from them" (OM1).

This concept of protected time which emerged from staff interviews was followed up with the Executive members at the time of interviewing where the question was directly asked if staff had protected time for Lean.

"We have got protected time; yes...this is not something you do on the cheap. We had to pony up the money to start with in order to make this happen and that included recognising the fact that if you meant it and were serious about the problem then you had to give people the time and space to fix it and very often people would say we always knew of the problem but we never got round to doing it but the process compelled them to get round to doing it" (Exec A).

Exec B went on to add that services know their Lean trained staff will go elsewhere to work on projects, where they are needed and this is understood across the organisation.

"The deal is not the right word but the agreement that we had was that individual heads of departments could absolutely see the benefit that they would get as a head of department having somebody in their team Lean trained and doing stuff in their own thing. The quid pro-quo was that we train one of your people to that high standard and somebody else somewhere in the organisation, can get some benefit out of that, then you have to be relaxed that there are going to be times where that person is going to be over there doing something else as the organisation need it. And there was a pretty mature and remains a mature attitude to it" (Exec B).

Exec A then added*;*

"And since, and we don't now and at the time we didn't much, that if people were still arguing about the rules about 'what is the company policy and somebody being released to do a Lean project?', we would be sat here going 'ahhh, this is not the kind of thing we thought we had built here'. If that's going on, it doesn't filter its way up to where I live and I suspect it really doesn't filter its way up to where I live as it really isn't happening for the reasons said because people will have seen 'they've put money in the bank in order that they can take stuff out'" (Exec A).

5.4.4.3 Sustainability of outcomes and projects

The Lean leads' revisit every project six to twelve months after their involvement ends to check to see if projects have been maintained or have 'slipped'. This slippage could be due to a manager or key staff members leaving. The expectation of staff fixing this slippage is there but often it is the Lean team who are asked to go back and do some work so there are still some issues with ownership as discussed in section 5.3.1.

Projects noted as successful were discussed in terms of their sustainability. Substance Misuse, Dermatology, MoE pathway work and work in Transport in conjunction with the Ambulance Service and also NHSL owned transport were all viewed as good projects which had been sustained and taken forward since their initial Lean work.

Some areas have been noted as working better because of their setting as it is a contained, almost factory type process. In other areas staff have had a 'taste' for Lean and then it has been sustained and led to other projects by service staff, rather than the Lean leads.

> *"The projects which have worked best have been in that factory type, industry type setting, for example, HSDU and the wheelchairs"* (QI4).

> *"There are a couple of operation managers who have taken things forward themselves who had initial, for example mental health where they had a project in mental health a couple of years ago where they were successful and they started doing their own Kaizens and things which has been quite useful and that's the way it's should be as staff should get a taste for it and then want to do it themselves so that builds internal capacity…"* (QI4).

Although HSDU was recognised as a successful 'award-winning' project and has been discussed as a type of project which has worked best, the researcher was anonymously informed that due to a changes in staffing, the HSDU project had been '*systematically picked apart*' and was in scope for being revisited in future project work.

5.4.5 Summary to Outcomes from Lean

Section 5.4 has discussed the outcomes from Lean as shown in Figure 5-3 and Table 5-5 and has discussed areas of complexity affecting how outcomes from Lean are achieved, how improvements are expected but also how expectations and reality are not aligned, especially in terms staff having protected time to do improvement work and also in sustainability of improvements. Section 5.4 is related to answering the impact of Lean in NHS Lothian (research question two). Section 5.5 will now follow on and investigate the roles of healthcare staff in the Lean implementation process.

5.5 Staff Roles in Lean implementations

This section will go on to discuss the roles that staff hold in Lean implementations in NHSL. The focus initially will be on the role of the Lean team in NHSL, but will then discuss the roles and experiences of staff who are involved in Lean activities such as projects, including their experiences in running their own projects, and training. Attendees at Lean events have been discussed in section 5.4.2 but further evaluation of how training is used and areas of complexity in relation to staff groups will be further discussed here. The discussion follows through to a focus on the medical staff as other staff groups discussed the expected and actual role of this group in Lean implementations. This discussion relates to the coding shown in Figure 5-4 through to Figure 5-6. Table 5-6 shows the main codes generated in this section as this encompasses discussion of the Lean team in NHSL but also the impact of professionalism which was generated from respondent discussions about the senior medical consultants. Some of the smaller codes (e.g. managing consultants) were generated from smaller proportions of the interviews, e.g. directly related to medical consultant, Lean team and operational management interviews. Discussion in this section also evaluates clinical and managerial relationships as this was coded from interview data.

Table 5-6 Coding for Staff roles in Lean – NVivo codes and sources

Code	Frequency of reference
Embedding Lean	58
Use of Lean team	92
Training in Lean	144
Identity as Consultant	45
Managing Consultants	22
Accountability	123
View of Management	47
View of Senior Management	47
Intra-professional challenges	56

5.5.1 Lean Team in NHSL

As discussed in section 5.3, the Lean in Lothian leads takes a consistent approach in how Lean is implemented in the organisation. The Lean leads are not only responsible for project work but also training staff. Once GE left NHSL, the Lean leads took over the facilitation of all Lean projects and the training of all staff across and beyond the organisation. In order to embed Lean in the organisation, a core team would conduct projects but would also train staff to build capability within the organisation for growing and embedding Lean throughout services. Staff, post training would then run their own project(s) to continue the development and sustainability of Lean in NHSL. This however, has not come to fruition in the way that was originally intended. By November 2011, 395 people had been trained in Lean, although 40 of these were classed as 'no longer available'. In 2013, the researcher had been told (informally), training had been

suspended due to the problems in getting staff to attend and follow on with using it, but this would restart at a later date.

5.5.2 Embedding Lean

The Lean team of NHS Lothian are viewed as valuable in the view of the staff that have interacted with the team. Their knowledge and skill base is recognised with several of the team being praised in interviews by other healthcare staff. However, a difference in skills is recognised by staff in their interactions with the original members of the team and newer members of the team.

> *"I'd like to see a Lean team being sustained particularly because I think they are a really valuable resource. I think obviously there is a variation in the skills of any team and there are those who I think are very good, are very good and it is therefore something that that team has to work on to ensure its offering is as good as can be. Perhaps need to refresh it and up skill it because their formal training, I'm not quite sure what they've had in recent years, since GE were no longer on the pitch and what was good a few years ago might not be the only way to do it"* (OM3).

5.5.3 Use of Lean Team

The team's role in facilitating projects is recognised (section 5.5.3) but is also questioned as to whether their presence is a barrier as it could have impacted the training being used by service staff.

> *"Do we still need the Lean team? What value do they add to the organisation? – I don't know if this is fair but I don't know. Again, compared to the people who were trained, if we had given them the knowledge to become 'train the trainers' then they are constantly thinking about Lean and how it works, rather than relying on this wee team of people who are experts because they are doing it all the time and that is what I think when projects come up. It's always that team where people apply to have Lean systems and it's these people who are leading it if you like and yet you've got literally hundreds of people who have been through the training who are not really used enough. So the question would be do we now need the Lean team and then that's them out of a job but could we have not used these other people better that we've trained? Is their (Lean team) job not done?"* (OM2).

5.5.4   Training in Lean

Although multiple staff have been trained, getting staff to then take ownership and run their own Lean projects has been difficult. Although the role and use of the Lean team was questioned in section 5.5.3, other staff have been happy to have the support of the team in initiating projects. The team have discussed the challenges they face and in issuing surveys about the use of training in order to evaluate the reasons that staff may have for participating in, but then not using Lean training. Some staff have also noted the 'flaw in the plan' for using training to embed Lean but how this has not quite paid off for several reasons.

> *"That (training) doesn't appear to have delivered a major return in terms of a strategy in terms of 'we are going to train x number of Lean agents who are then going to go forth and undertake Lean activity' because I think that was part of the initial plan. The flaw in that would probably be the, in either the belief that its meaningful to release them, a willingness of the individuals to be released or managerial willingness to release them or the ability to release, all of that" (OM3).*

5.5.4.1 Not Using Lean Training

The team have been unsure if there is one specific reason for this lack of use of training or whether there are various reasons such as time, the demands of the 'day job' and confidence have all been mooted as potential challenges to the use of training. Where projects from service staff have been reported, these were discussed in Chapter 4 in sections 4.6.4.1 and 4.7.3.3.

> *"I think for them (managers) to identify individuals who might want to take it forward themselves and that's happened with varying degrees of success where staff have almost used our experience in a project and used us as a Lean mentor and done the training at the same time and then tried to take things forward themselves but more often than not, get stuck back in the day job and don't really have time to think about it themselves" (QI3).*

One service manager notes the challenges they face in the 'day job'.

> *"You are on a hamster wheel, all the time; you are on the hamster wheel. The operational service managers, a lot of senior managers in the NHS work really ridiculous hours, I mean in excess of 50 hours a week, contracted for 37 ½ and you*

are at the very...and I don't know if this is just NHS Lothian, if this is just as a whole, but there is a very knee jerk reaction and we don't have the opportunity to plan ahead and that's not particularly good. And that's why we get ourselves into the messes that we get ourselves into sometimes" (OM2).

The aforementioned time challenges and how this links to 'the day job,' again are discussed and are noted by the Lean team who discuss observing pressures on staff and how these staff members are *'firefighting'* constantly. This has impacted the sustainability of projects and also has not, as discussed in section 5.3, been able to support the revolving door policy that had been endorsed as part of the GE project model.

5.5.4.2 Using Lean Training

One service operations manager did participate in Lean training and found it 'useful' as it was a chance to step back and look at processes in a way that was not really feasible due to the demands of healthcare operational management.

> *"I found it really simple (laughs) actually because I think sometimes we and I don't know if this is human nature or within the NHS culture, we think a problem is bigger than it is or we make life more difficult than it is and Lean makes you step back and just unpick things and look at it in quite a simplistic manner and that for me was quite interesting"* (OM2).

However the same manager did use her training in another project, but she feels that the skills she gained as part of her own professional and personal development were not taken forward in the way it should have been. She endorsed that staff of all grades were able to go on training and this included Administration Assistants who she supported going on training for their own development and future progression. Medical staff are also encouraged to take on Lean training, but staff interviewed did not know of any medical staff who had participated in their training sessions, and the researcher only met one medic (during the pilot study) who had (for career progression). OM2 had participated in one project post-training and has tried to apply Lean methods back in her own service in reviewing processes and 5S application but notes that the training for Lean in NHSL has "*not been used to our best advantage.*" This is echoed by another Lean trained service operational manager as "*If you look at our experience in the past, potentially we've sent people forward onto courses, and what we get out of that is not much*" (OM1).

I. Engaging staff at service run events

Staff referenced both positive and negative attempts at engaging staff when they are delivering their own Lean projects after participating in Lean training. This service manager is actively using Lean in delivering projects at service level but admits the time constraints and challenges of service management, does impact trying to work on Lean projects.

"I think at times there was….it was difficult in respect of your day to day work and you didn't have the dedicated time to do all your stakeholder analysis and your data analysis and it was a bit of a struggle and everything else and I think if we had been better...if we had planned a bit better, then it would have been a bit easier, but generally the day went well" (OM1).

The project being discussed above has actions and further meetings being planned. The same manager references how the organisation are embedding Lean into the organisation and as such, people are becoming familiar with the language of Lean and processes of Lean. The language is perceived here not to be a barrier as *"we are in an industry that is very jargon orientated."* The discussion over how Lean is applied by this manager (OM1) also confirms that trainees are applying Lean in the same manner that those conducting the training are, as this also is supported by other interviewees and the observations.

"We are embedding Lean into the organisation so people are starting to pick up on the language of Lean and we tend to use it more frequently and there is processes within Lean that we've been able to adapt and use within certain meeting forums, etc. to try and get it more participative and maybe do a bit of gallery walking and process mapping. People are becoming more in touch with it, rather than just looking at a Kaizen or a workout or something like that. So, there is in that respect that people are becoming more ok with it even with the terminology which is the industry one which has managed to move into healthcare" (OM1).

Unfortunately, the fear of what Lean 'is' however is not far away and this can impact engagement in people attending service driven Lean events. The diversity of representation expected is just not present at these events.

One Lean trained nurse discussed her experiences of training and being involved in running events. Like many of the nurses interviewed, she is keen to make a contribution to improvement, due to the specialisation of her practice, but is aware she needs medical staff support to do so. She noted that people who do not know what Lean is can be reluctant to get involved due to the '*money saving*' perception. She admits to working hard to get colleagues on board with her own project but there are many colleagues who are '*negative*' and this is challenging.

These challenges have been further compounded by the Lean project that she has been involved in has just not progressed. The follow up meetings have not taken place and the actions have not been completed. This is perceived to validate the opinions of those staff members who were reluctant to get involved and were cynical about the ability of Lean to make changes.

> *"I just felt embarrassed personally as I had been promoting this as a good thing, saying we'll get something done about it and then people who were involved, there was no follow up so it just makes them think, 'what was the point then?' and its very demoralising I think when you've put a lot of work into something and then it doesn't get followed up like it should do"* (N2).

Several reasons were put forward for this lack of action such as competing projects where this project was viewed as 'less important' to comparative work elsewhere in the service. Service management issues where meetings are cancelled, the service being short staffed, lack of senior medical staff (consultant) buy-in and changing of roles were all discussed as affecting this project. At the time of interviewing, this particular nurse stated that she was unsure if this project had a future at this point in time. There was also uncertainty over participation in future Lean events due to the embarrassment felt in regards to the lack of progression on this project.

5.5.4.3 Confidence and facilitation in Lean events

When members of the Lean team discussed training not being taken forward by service staff, they acknowledged service pressures could be a contributory factor but also noted that confidence in facilitating an event or the fear of presenting may also be to blame. The Lean team see themselves as facilitating improvement, not leading it, but being present to teach staff about Lean and for the staff to then drive improvement.

"So our role as facilitators, for not actually leading, is to get action and to try and get people to get over this initial thing about 'that's not how things are done', 'we don't do it now' to 'yes you can do it now' and usually by the end of the Kaizen, people have really gotten into it and they now, they now think 'this is how we should solve problems all of the time'" (QI2).

One administrator who was Lean trained and delivering projects in her service admits having confidence in presentations and facilitation is challenging but the more this is undertaken, the easier it is.

"The biggest challenge in events...to speak up in front of people I think! Doing presentations and thinking about your workout in front of people – it's very nerve wracking! It builds up my confidence by doing it..." (AD1).

However, the team recognise that there may indeed be issues over staff having the confidence to speak up or to facilitate improvements at Lean events. Staff spoke at length of their own struggles during the facilitation of events. Many noted not just the hierarchy impact but having to manage bad behaviours and how this impacts the flow and outcomes from events. The team recognise that for trainees to see this first-hand, this may impact their desire to facilitate and work on their own Lean projects. Even newer members of the Lean team have noted their own issues with confidence and dealing with disruptive people during facilitation and link this to healthcare hierarchy.

"I don't like falling out with people, I don't like confrontation...I wouldn't be good at just saying 'if you don't like it then just go then' whereas other people are more, well they are more senior. We're service improvement managers; we're two grades lower than the modernisation managers" (QI6).

This viewpoint of hierarchy which had previously emerged in section 5.4.2.5 may also be evident to staff members who may not be used to breaking down hierarchical barriers in facilitating projects. It can be difficult to go back and then try to confidently run Lean projects in their own service if they are aware of hierarchy or have witnessed bad behaviours.

"I have a certain amount of sympathy for people on the training, who've not done any facilitation before and who may or may not be confident in standing up and particularly in front of their own service colleagues. They might think 'oh no I can't do that' and they might actually be better doing it in front of strangers, rather than the people they work with" (QI5).

5.5.4.4 Lean Agents

Several staff during interviews expressed a desire to participate in more Lean projects or even be an agent for Lean. One medical consultant (CT7) recognised the potential for having a medic who can be '*an agent who can represent Lean'* as they could not recognise existing Lean agents in their service. The Lean leads recognised that a lack of Lean 'agents' within services has prevented the GE model from being fully implemented. Consequently, their own careers have remained with the Lean in Lothian programme, rather than moving into service management as per the GE model.

The expertise of the Lean team has been discussed by respondents and their contribution is perceived to be valued due to their 'expert' status as this is their full time role rather than someone who is service based. Even for medical staff such as consultants who recognise their power and influence in their services, they query whether an internal Lean agent, even if it was to be a fellow clinician, will have the same effect in facilitating improvement.

"When you've got someone from outside you have no reason to doubt them in a way if you see what I mean, their expertise. You don't need to believe their ethos but at least you might believe they might be expert in their field and whether you can achieve that same quality of person internally then I don't know. You probably can but I don't think you can do it overnight, let's put it that way" (CT2).

5.5.5   Professionalism Impact

An emergent theme throughout the research was that of the historical structures of medicine and the role of a medical professional with knowledge and power within the healthcare system. These were staff who had a key role to play in implementing Lean but it became apparent that regardless of the service structure, the medical professional, who was often designated as being a consultant, wielded incredible power in the services and

could have a major impact on the progression and spread of Lean. This discussion was initiated by staff that were working within the Lean team but was also initiated by nurses, managers, and administration staff. Even the medical staff themselves discussed medical professionalism as having an impact in their services and as such, a greater focus was placed on this group through theoretical sampling.

5.5.5.1 Identity as a Consultant

Those staff who were part of the original Lean team had mentioned challenges with medical staff, but the newer members of the team discussed issues they faced in greater detail. This was linked to having projects which need consultant support, yet if this group did not support the project, then nothing could change this.

> *"People have got their own agendas and consultants who dig their heels in and nobody seems to have the wherewithal to make them change. If they don't want to do it, then they just won't do it and that's a real problem I think. In effect, if a group of consultants get together and say, 'we are not doing that' then it won't happen"* (QI5).

This was echoed by consultant medical staff who also recognised these traits in colleagues and associated this with consultants and their identity as a professional.

> *"I think that sometimes people are…they are professionals and perhaps they regard professionalism as 'being able to do what you want'"* (CT10).

This identity as a consultant may impact their delivery of care as autonomy is linked to how individual consultants will conduct their work. One Operational Manager, discussing Lean projects and improving processes, gave an example reviewing how ward rounds were conducted and then uncovering disparity in the time taken by medical consultants to do ward rounds. This disparity which impacts other staff groups who have to work with and around these ward rounds, may further impact the delivery of care and is an issue when trying to generate improvements when staff are working in different ways.

> *"…if you have two consultants in medicine, one will do a ward round completely differently to the other. Why? Because one thinks that their system of doing a ward*

round is better than the other system. Well I don't know which one is best, but can we not do the ward rounds the same? But that's that cultural thing, the autonomy that the medical staff have, 'well I'm going to do my ward round my way' but you may get one consultant do ward rounds and take an hour and a half and you may get the other one who will do it and it takes 3 hours. So which one is the best? Why is one different to the other? And then you've got to tease that out of the medical staff without offending them and then actually having an open debate about what's best and there is a middle ground" (OM5).

5.5.6 Managing Consultants

Challenges were noted in terms of actually managing consultants. This was fuelled by discussion of the Lean team in how they tried to engage consultant staff in Lean but had no managerial authority over them. Managers themselves also discussed challenges with this group as did some of the consulting staff who noted their peers' difficult behaviours.

5.5.6.1 Difficult Behaviours

One member of the Lean team was explicit about the behaviours of this group which had been viewed in a project which was on-going at the time of interviewing. Another team member had also referenced this and other incidents in discussions in discussing projects, demonstrating a consistent theme in this staff group. In a project to introduce speech recognition software to aid dictation, there had been challenges where staff had been resistant to the project. When asked about areas of complexity in projects, the following was discussed;

"Probably…at the moment with the Gynae team and the consultants because…no, not all the consultants because a few of them are very keen and a few of them are dead against it. Dead against Lean itself and dead against the technology they use in the speech recognition software which they are having trouble with the automatic, vision and its awful and all they need is more staff. So it's been very difficult to engage and see them and its really one of the senior consultants who is leading the charge at this, at this kind of view and its…he's brought a few of them with him" (QI4).

When asked how the team try to engage staff in situations like this, then difficult behaviours were noted in dealing with opinion leaders.

> *"Getting a hold of them is difficult enough. I try to knock on the doors when I've been there but they've not been there unfortunately and they've not really responded to emails. When they do respond to emails they respond to everyone, so their negative comments are not only directed at me but directed at everyone else which brings along…which advertises that kind of behaviour is almost acceptable and some other more junior staff might kind of follow their lead I think"* (QI4).

All operational service managers also noted these behaviours when discussing medical staff engagement in Lean and this is attributed to resistance to changing practice. There is a balance between keeping these staff members engaged but not excluding them completely as negative behaviours and reactions can spread across teams.

> *"what I'm saying, is that if you exclude them, that the negative-ness will spread throughout their influential team and that could be a small medical team, it could be a small sub department or sub specialism so that's why it is important to keep them hooked in and if nothing else, contain their opinions to themselves without letting it spread and that's very hard…but you will get pockets of blistering (emphasised) negative-ness from the impact of this person around who they can influence. Maybe it is just where they sit in the staff room and the people that sit with them…"* (OM5).

5.5.7   Accountability

These behaviours, advertised to other staff members who may be influenced and imitate these are attributed to their role as a professional, this historical nature of professionalism and how this is embedded in the healthcare structure. This impact is felt not just by the Lean team in trying to deliver service improvement but also by those who are managing services as they recognise issues with this group of staff in their accountability.

> *"my personal view is, until we break down that (professionalism) silo and we have people managing the service, including the medical staff, we will always run into cultural problems and professional problems in terms of how we deliver a service"* (OM5).

"Again, in my view but I think you'll find that some medical staff enjoy the freedom that they feel they've got and would not like to see that diluted in any way" (HR3).

Even those responsible for managing medical staff such a Medical Directors are viewed as ineffective in having medical staff accountable in the change process.

"No-one seems to be able to say to them 'you will change' or someone must have the authority because we have Medical Directors but they don't seem to weld it or maybe they can't do it either, I don't know" (QI5).

Trying to manage this separation of doctors and services and doctors who wish to hold onto their power presents difficulties for managers who are accountable for performance of services and Lean projects. For Lean leads who are involved in launching Lean implementations, this impacts their own role in working with services to deliver projects, even when there is a clear lack of engagement and accountability from medical staff in delivery. QI6 discusses the TPOT project which, in the content analysis (section 4.7.3.1) had reported concerns over non-engagement in the project which proved to impact the delivery of the project from the Orthopaedic team. This had previously been discussed by one of the consultant staff involved in section 5.4.2.5;

"…since we have been in the Royal, the Orthopaedic surgeons have not come to anything and Orthopaedics is one of the pilot sites. You know, I said right at the start, if we don't have surgical engagement then there is absolutely no point, so I was very keen to end that part of the programme but theatre management wanted me to continue with it, so I did" (QI6).

"We've closed off some actions because they've gone nowhere and there is no point in asking 'how's this going, how's this going?' because they are not going to do it, they are not interested in it, it's not going to make a big difference, it was a good idea at the time, just close it off" (QI6).

The dominance of the professional in these services is evident as are the historical links. As difficult relationships have previously been discussed, which included the impact on departments and Lean events, there is a reluctance to risk good working relationships.

"They are not shy in coming forward, they are not shrinking violets and they will tell you what they think and they are not fussy who hears it with a lot of them and

there is still very much…they are still very much 'the old boys network' and they are still a profession in that most rules that would apply to you or I, you know do not apply to them. Or if you do want to challenge them over something or if there is a major issue that is going to involve HR and unions and stuff then it is very difficult place to go with them, a very difficult place to go so that relationship to me is really, really important because they are our most expensive workforce and they are invaluable and we need them and you do whatever you can to work with them" (OM2).

5.5.7.1 Diplomat Managers

The same manager admitted to working with colleagues who are '*diplomat managers'* who would be unwilling to challenge certain staff members as she recalled colleagues saying '*you know what he's like, I'm not going to go there.*' This manager, even though she admitted to doing whatever you could to work with them, admits to testing the water on multiple occasions even with those who have a reputation for being '*difficult*' whereas other colleagues wouldn't with those who enjoy their notoriety. This diplomacy will have an impact on how improvement can or will be delivered. This also links into the expectations of managers as facilitators of Lean in their services, as these managers tasked with delivering improvement, may not want to 'go there' with difficult staff members.

> "*…a lot of them are quite proud of their reputations, so they enjoy the notoriety. Yep, honestly they do, they are a funny bunch*" (OM2).

> "*Maybe that's where we fail sometimes. Maybe we assume that a manager will be able to be a facilitator of change because of their title and not necessarily realising that they've got the right skills to implement the (Lean) change and make it robust so it's choosing your people carefully in terms of what their roles will be*" (OM5).

5.5.7.2 History and hierarchy

History and hierarchy in particular discussed by operational managers who were directly involved in managing services who faced the impact of working with and trying to manage medical consultants within their services

> "*We have that set up that goes across the United Kingdom and it's a historical set*

up in terms of doctors will be managed by doctors and they have their own hierarchy, they have their own structure and they have their own training programme" (OM5).

This history and hierarchy was recognised by operational managers in driving Lean improvements in their services where it was discussed how medical staff did not like changing their practice and could be obstructive if this was attempted. OM2 did discuss how this was not just older members of staff but also younger members of staff.

"as long it (Lean) doesn't involve them changing their practice because they are not good at changing their practice, a lot of clinicians are not good at it, that's not to say them all, but it does involve a lot of TLC and coercion and 'there, there now.' We get there in the end but a lot of them can be obstructive and it's not just the older one's but the younger ones can be too" (OM2).

Additional support for this discussion was provided by nurses who developed their practice to take on new roles such as Nurse Practitioner where they are doing tasks formally practiced by medical staff and who have actively been involved in Lean. In discussing resistance to Lean, they linked back to their experiences of resistance from medical staff who feared 'dilution of the system' but how this had to be accepted as a new way of working and is now generally accepted.

"You come across resistance from people who just think you are taking their jobs away from them and I'm good but I'm not that good that I'll take a registrars job way from them, do you know what I mean?! But they see it as a dilution of the system and a dilution of the medical staff but I think with being a nurse practitioner it is about what you're comfortable with and we all are trained to a certain level...there has been on and off resistance from some of the medical staff but generally it is just so accepted now, the advance nurse practitioners and the senior nurse practitioners, are the way forward to plug the medical gaps (laughs) that they have to be on board but still you get the odd wittering that we are taking their jobs and we are really not" (N6).

The difficulties in winning over this group are viewed as being tied to professionalism but it was noted by another operational manager and also the Lean team that even though

this group is recognised as being difficult, then once on board, they can be a positive force.

"I think the consultants are the hardest to win over as a general rule and I think that is just because of how the NHS works and always has worked as they are accountable to themselves rather than and just because of the way it was set up originally as it is like GPs not being part of the organisation and having their own little empires as you like but they are the hardest people to convince but if you can convince them and they see something working then they could also be your greatest advocates for change but initially getting them on board is the most difficult thing" (QI7).

5.6 Clinical and Managerial Relationships

Staff commented often that the way to achieve outcomes was linked to having good relationships between services. This however has been discussed as a challenge for Lean where clinical and managerial relationships are poor.

5.6.1 View of Management

Lean leads consistently illustrated challenges over poor relationships in their discussions of working with different services. These poor relationships were also discussed by all groups of staff members as these relationship challenges were attributed to the view of management held by the medical staff.

"…a lot of the consultants are very sceptical and wary of their own management teams so it's quite difficult for them to be 'in'" (QI4).

Consultant staff often raised the issues of poor relationships with managers when they were discussing challenges in their services and views on improvement. One consultant succinctly summed up his view of clinical-managerial relationships;

"I think as clinicians we feel that management don't listen to what we want" (CT6).

This was not always the case as the consultant cited above discussed his regret that having previously experienced working with a 'fantastic' service manager, whom, now was no longer with the service. This impact of not listening and not having a happy department was pondered on by a second colleague who also noted the unhappiness in the department.

This colleague linked this unhappiness to impact on productivity which is important in a department which had faced pressures of waiting list delays.

> "*I wonder at our productivity per person in the department. The department here has not been a happy one and don't pull together but without poor leadership, it would be more efficient if happier*" (CT8).

5.6.2   Jumped up nurses

Consultant staff discussed good and poor clinical-managerial relationships and also expressed sympathy for managers, in noting the difficulties in managing medical staff and the hierarchical nature of healthcare. The expression in discussing managers as '*jumped-up nurses'* or '*nurses with clipboards'* was used several times in discussing medical staff attitudes to managers.

> "*I think managing doctors is bloody hard because they can always stick their nose in the air and say 'where is your medical degree? You are just some jumped-up nurse, you know' which is a terrible thing to say as you are all doing the same thing but there is an arrogant, there can be an arrogance amongst doctors that makes them very difficult to manage*" (CT8).

5.7 Intra-professional challenges

The challenges of relationships however were viewed by consultants across sites consistently and this was not swept up as a natural event but something which was continuing to provide greater challenges in services. Human Resources (HR) staff discussed an increasing amount of their involvement with services being related to these intra-professional challenges as these were impacting on performance aspects of the jobs undertaken by medical staff, including senior consultants.

Nurses admitted that their relationships were good and they perceived themselves to work well across all groups. No other staff groups highlighted nurses as being an issue when involved in Lean implementations.

5.7.1.1 Team Dynamics

The discussion of relationships and the challenges they present was also framed within the discussion of team dynamics and how these are increasingly affecting teams and intervention that is required to resolve this. This was reinforced by a senior human resources manager involved with medical staff who admitted this is now being brought up as an issue impacting staff ability to work within teams.

"Definitely team dynamics is becoming more of an issue...It is becoming more apparent I think. I think it has always been an issue but it is only now that people are coming round to actually getting used to bringing the issues up and realise that things will be done about these issues and therefore more things are actually coming forward" (HR2).

A senior nurse also discussed tensions in relationships but put this down to a more natural state of people not getting on and this not being a permanent state.

"...some areas are quite large, team dynamics and relationships can be great one day, next day you have a different change of team, that dynamic won't work so well...You will always have conflict in every area. There is not an area that will not have conflict at some point and there will always be, out of 10 areas, 8 will be running smoothly and 2 will be in conflict. It's the nature of the beast" (N4).

5.7.1.2 Personality problems

These viewpoints then add complexity to getting the right mix of people in attendance at Lean events. It has been noted that although clinical-managerial relationships are challenging, both groups are needed to enact improvements from Lean. However, it is getting the right members of each group in attendance which presents these challenges.

"They might be a team, they might be a group of people who all do the same thing but they might not see themselves as a team so they might not be happy for doctor A&B to represent them and to then come back and say 'right we've done this event and this is what was decided' and it doesn't matter of this was a good or bad idea, it's just that they won't be told what to do by A&B" (QI6).

In the Dermatology event, one of the positively viewed outcomes was that of improved relationships between clinical and managerial staff but also between clinical staff (see section 5.2.1.3, III). This however, was not viewed as the case by all members of staff, especially by one member, who noting personality problems as discussed below, wryly suggested the solution might be a gun rather than Lean.

"There are problems in the department, especially personality problems, it doesn't matter how much Lean experience you get, it won't make a difference there" (CT2).

These challenges in relationships were noted by one manager (OM3) who discussed how another Health Board in Scotland (Bridge) use Lean in conjunction with organisational development assessment. This means there is recognition of dysfunctional relationships but work is conducted on this in conjunction with Lean. Although these dysfunctional relationships in services are widely discussed by staff, organisational development assessment is not the approach taken in NHSL. Human resources (HR) staff confirmed their limited interaction with the Lean team and any interaction was, at the time of research, mainly restricted to notifying the HR team of any potential overlapping activity.

5.8 Scandal

Staff had discussed benefits and challenges of relationships, not only between peer groups but also between managers and medical staff. However, a further dimension to these relationships became apparent in March 2012, when news broke about NHSL manipulating waiting time lists and how patients on these lists were managed in terms of treatment delivery (PWC, 2012). Further to this news, after an audit by Price Waterhouse Coopers (PWC, 2012), the Health Board management culture was also scrutinised and the resulting Bowles report (Bowles and Associates Ltd, 2012) was released. The report supported PWC's earlier assertions linked to the mismanagement of waiting time's lists and targets about unacceptable management cultures apparent in NHSL (Bowles and Associates Ltd, 2012).

The news of this scandal broke as the researcher was working in NHSL on this research and this was discussed by some respondents in the interviews which were conducted. The interviews in 2012 were conducted until August 2012, until the point where it became increasingly difficult to get staff to commit to interviews, or those who did, spoke at length of the allegations which had emerged, at the expense of discussing Lean.

Interviews commenced again in early 2013 but during this period, changes in management and the review of competencies were being undertaken as a result of the scandal.

5.8.1 View of Senior Management

As staff interviewed discussed the scandal, then it is staff views which are presented as this links to discussion about Lean and its role in healthcare. Words such as 'pressure' and 'difficult' were used by staff who introduced the scandal that was engulfing NHS Lothian at the time of interviewing. Medical consultants, who were discussing senior managerial and medical staff relationships, also acknowledged where some of the issues stemmed from and related this to senior management dictating what should happen at service level.

> *"I think it's a nightmare of a job for them (managers) because they are subject to removal from their jobs due to various political issues and I think the phrase is 'the big lie'"* (CT4).

> *"I think this department needs great leadership and stuff has slightly been handed down by dictat ex cathedra, from on high, with no encouragement in the past and I think that this is the problem that this department has had is that people have been disenfranchised... I think management has a difficult role. Management are being asked to do really difficult things and I have great sympathy for them because they are being asked...they are having pressure applied on them"* (CT8).

Service managers discussed the problems they faced in relation to trying to embed Lean and how this was affected by the challenges of 'competing priorities' and 'time.' In doing so, they also referred to issues which were publicised in the reports about the management culture and disconnected views about what was really happening in NHSL.

> *"I think our previous Chief Exec was very demanding in an unrealistic way and it was a case of, you'd get a phone call for something that needed to be with someone within an hour and if you are going to do something properly then that is not always going to be realistic and you need time to do stuff so there is always competing priorities. There are always competing priorities in every role but everyone seemed*

to be 'if you don't do it, you'll get a kick up the backside' and that's difficult" (OM2).

"Recent media coverage is impacting on us. I think it depends what area you work in, in the organisation, as there is part where we are all aware of it and we all have some part to play in it but some areas have more of an issue around the waiting times issues and suspensions than others and within the areas that we manage, we're...we don't have an issue. There is a part that you have to be seen...well not be seen but want to support your colleagues and also it does impact on everybody else in the organisation as it does put a dark cloud over us just now" (OM1).

Although the organisation was being discussed in terms of 'scandal', other colleagues made reference to how the challenges faced in the organisation were also apparent in other NHS scandals being reported.

"I think frontline staff would think there is a disconnect between what was going on in the ground and what the management are saying should be happening and I think that's probably been evidenced by all the bullying stuff and interestingly enough has a lot of resonance with the whole Mid-Staffs thing and nationally[4], so it's not just a Lothian issue that the middle managers are saying what they think they need to say to the senior managers to keep them happy and really the senior managers have no idea about what is going on at individual patient level or at individual staff level" (CT9).

There was also the association of Lean which had been linked to strategy but was strongly associated with the senior management team and the negative impacts of this in light of the publications of the PWC and Bowles reports.

"So the Lean thing seemed to me a sort of, you know it's like Lothian's top 25 healthcare thing, I think the external report said, 'Lothian want to be one of the top 25 in the world' and the external report pointed out, that was almost laughable and

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[4] Mid Staffordshire NHS Foundation Trust where serious failures in patient care, a negative organisational culture and a lack of managerial responsibility triggered an investigation in 2010, with the subsequent Francis Report published in 2013 (telegraph.co.uk, 2013).

it seemed to be an excuse to not been able to actually take responsibility or to actually run the place well" (CT4).

The focus on the reports and the outcomes which would have to be generated which included a need for changing the culture at some levels in the organisation, reviewing competencies of managers and emergency work on waiting times targets had potentially been other competing priorities which had removed the focus on Lean.

"Another thing in the organisation is we've had the culture issue with the loss of the Chief Executive and the Chief Operating Officer changing and the structure change is another iteration of that and the whole waiting times recovery which has largely been about an urgency of churning through numbers, again without necessarily a huge focus on 'what service improvement (Lean) gets out of that'" (OM3).

"*I think we probably had a duty to (reviewing competencies) considering with some of the stuff they had been talking about with the dignity at work stuff which was coming out and maybe managers were managing in a way that was not correct, you know… I mean you have external people looking at things, certain things that come out of the report certainly from my point of view, you recognise some of the behaviours*" (HR3).

5.9 Summary of Case Study Findings

Chapter 5 has presented the data from the case study on NHSL in order to contribute to the evaluation in how Lean is implemented.

The key discussion points presented were:

Drivers for Lean

- A cultural intervention triggered by the formation of a new Health Board related to the CEO Vision
- Lean being applied within the context of healthcare where existing challenges relating to efficiency, targets and improving relationships are present

NHSL implementation of Lean

- The process undertaken by NHSL was mapped and highlight's a key focus on people, especially in the pre-work stages
- The type of events used with the rationale for this explained
- Training to embed Lean in the organisation and staff experiences of leading their own Lean projects

Outcomes from Lean

- Success stories recognised by staff
- Improvements expected but not realised and an exploration of the complexity impacting this
- Expectations versus reality in views from different staff groups about Lean and Lean projects

Sustainability of Lean

- Evidence of sustainability of Lean in services and ongoing improvement
- Sustainability has also been challenged due to a lack of engagement by key actors

Roles of staff within Lean

- The Lean Team in NHSL, how they are used and the training provided
- The role of management in service delivery
- View of senior management held by staff

Medical Professionals and professionalism

- Exploration of the healthcare hierarchy and the medical professional role in this.
- The impact of professionalism related to medical consultants and their management

The case study findings allow for greater detail to be provided where limitations had been discussed in reporting of the content analysis of the Lean in Lothian reports (section 4.8). This allows for a greater depth of analysis in the case study reporting. The next chapter, Chapter 6, will present the discussion of the findings which have been presented in Chapter 4 and Chapter 5 and will focus on how the research questions (shown below) for this study have been answered.

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

RQ3. What roles do healthcare staff including medical professionals involved in the implementation process, hold in terms of the effective implementation of Lean?

RQ4. How do medical professionals and professionalism impact Lean implementations?

RQ5. How is sustainability of Lean evident in NHSL?

6.0 Discussion

6.1 Introduction

This chapter aims to combine the findings from the two previous qualitative analysis chapters (Chapter 4 and Chapter 5). Emergent themes and findings will be discussed in how these relate to the literature review in Chapter 2. Initially three research questions were derived from the literature review and these are:

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in Lothian?

RQ3. What roles do healthcare staff including medical professionals, hold in terms of the effective implementation of Lean?

However, Chapter 4 saw two previously unconsidered research questions emerge and these are:

RQ4. How do medical professionals and professionalism impact Lean implementations?

RQ5. How is sustainability of Lean evident in NHS Lothian?

As a result of these emergent research questions and for discussion of all research questions, an additional literature review will be initially presented which covers the emergent themes of the medical professional and professionalism. This will allow for the enfolding of literature (see the Eisenhardt (1989) framework in Table 3-3 which underpins this research, as discussed in section 3.6.2).

This chapter is structured as follows:

Section 6.2 provides an additional literature review on the medical profession and professionalism. The addition of this literature will ensure that this chapter discussion will draw upon the disciplines of operations management (sections 2.1 through to 2.3.3) and the sociology of professions in order to evaluate Lean improvement in healthcare through the theoretical lens of professionalism.

The discussion will be structured around the five research questions within the sections that follow.

Section 6.3 considers research question one: How is Lean implemented in NHS Lothian? Data combined from the content analysis undertaken in Chapter 4 and the case study analysis in Chapter 5 maps the approach undertaken by NHS Lothian in implementing Lean.

Section 6.4 continues on to consider research question two: What is the impact of Lean in NHS Lothian? Research question two again utilises content analysis data and also case study data. Chapter 4 provides evidence of outcomes generated, linked to improved performance. This discussion is then linked to the case study data in Chapter 5 for more detailed discussion of this impact through staff involved in and experiencing Lean in the healthcare environment. This section will also encompass discussion of the emergent research question five to see if the outcomes generated have been sustained, e.g. how is sustainability of Lean evident in NHS Lothian?

Section 6.5 considers the third research question of the roles held by healthcare staff, including medical professionals, in the implementation process. This discussion is supported from the case study data to ascertain the involvement of different staff groups in Lean. This is also linked to uncovering areas of complexity which may affect determining the impact, outcomes and sustainability of Lean in NHS Lothian. Therefore this evidence and discussion is linked to the emergent fourth research question: How do medical professionals and professionalism impact Lean implementations?

6.2 NHS – professional groups and the link to quality

The initial literature review on the NHS and staff groups (section 2.7 through to section 2.9) discussed how the complex groups of stakeholders within the NHS are varied who often have competing interests. This additional section of the literature review will discuss medical professionals and the impact of professionalism. This review is designed to highlight areas which can be compared to the data from Chapter 4 and Chapter 5 as to how this identity as a professional has the potential to impact Lean implementations. In the world of healthcare and specifically within the NHS, professional groups dominate the provision of services, with their own professional bodies that sanction their education and training (Harrison and Pollitt, 1994; Clark and Armit, 2008; Clark and Armit, 2010). The review of the medical staff as a professional group as NHS stakeholders, has to be

conducted for this research to determine if the roles held within the greater confines of professionalism, impact on running and attempted quality improvement of the NHS through the use of Lean.

6.2.1   Defining the professions – the sociological view

Professionalism has been studied as part of the sociological discipline (Freidson, 1972; Johnson, 1972), but it is linked to the research being conducted here on the social aspects of Lean and how inter-relationships will impact any Lean implementation in the healthcare environment. Indeed, it is identified by Taylor and Taylor (2009:1325-1326) that there is recognition of the benefits of exploring operations practice (which would include Lean) through alternative lenses in order to enrich or to challenge existing assumptions.

Professionalism is strongly linked to the medical profession (Freidson, 1972; Johnson, 1972). It is associated with the adoption of formal codes, the belonging to professional associations as well as those who contribute to education, and the distinct language and jargon which aids autonomy and acts as a barrier to outsiders and even those 'subordinate' within the professional group (Johnson, 1972). Freidson (1972) defines medicine as a profession having *"something of a monopoly over the exercise of its work"* which has been supported by the state who have maintained this exalted status (Freidson, 1972:21-23).

Doctors are widely recognised as a professional group, and as a group holding power in the provision of healthcare. The image of the doctor within the medical services is steeped in history but is also a 'socially constructed' image (Esland and Salaman, 1980:216) which has changed little over time and has contributed to the enduring vision of the doctor as the expert (Freidson, 1972). Within this professional group, the hierarchies have changed. From the image of the surgeon as a butcher being viewed as lower in the hierarchy than the physician, in part due to history, but also due to the professionalism bestowed on the physicians as their own professional body was formed in 1518 (Esland and Salaman, 1980), far earlier than that of other medical professionals. The surgeon is now a specialist, in comparison to the more generalist physicians. The position of doctors as a professional group has been cemented within the history of the NHS and it is due to this history, that doctors in hospital medicine have the prominence and power they have (Larkin, 1988; Currie and Suhomlinova, 2006; Klein, 2010). To gain support for the NHS

at its inception, Aneurin Bevan (then Minister for Health), conceded to the British Medical Association (BMA) and as such, concession to the prominence and power of this group has consolidated their position in the NHS (Gorsky, 2008). Successive policy changes and government initiatives have seen the gain and removal of certain powers, but nothing so damaging that it affected the professional hierarchy's dominance in the NHS (Larkin, 1988; Klein, 2010).

An updated definition can be expanded on the subject of professionalism and related to doctors but the monopoly over the exercise of its work is still present. Currie et al. (2009) defines professional groups as "*characterized by their possession of, and claim to autonomy. They have high degrees of discretion in their work and freedom from external supervision. In essence, professions have autonomy in both the social organization of work, for example, within the division of labour, and also in the technical substance of work, premised on the exclusive control of knowledge*" (Currie et al., 2009:296).

6.2.2   Challenges of managing 'the professional'

In referring back to the definition of professional groups, then this surely impacts the NHS and its management and also has an impact on Lean, especially where respect for people elements are applied as discussed in sections 2.3 through to 2.3.2.

Harrison and Pollitt (1994) determined that more than one half of the NHS workforce considered themselves to be professionals which would be expected to be problematic for management given the association of professionalism and autonomy. This is compounded by Harrison and Pollitt's own definition of professionalism and the role of a manager which is about the professional acting autonomously, whereas the manager often delegates to get others to carry out tasks required (Harrison and Pollitt, 1994:2). This then results in a further clash over the direction and control of work (Currie et al., 2009). In the case of professionalism and the NHS, these professionals are members of professional bodies, and the professional is only judged by their peers, not by others outside the profession (Johnson, 1972). These professionals demonstrate protectionism over their areas of specialty, at the exclusion of others (Johnson, 1972). This protectionist viewpoint is still used to represent and protect the identity of medical professionals and to maintain professionalism (McGivern et al., 2015).

Doctors in the NHS are regarded as the dominant professional group, despite nurses being the largest stakeholder group in the NHS actively delivering care (Harrison and Pollitt,

1994). In Scotland, nurses make up 42.3 percent of the total staff of 160,746 with doctors only accounting for 8.16 percent (ISD, 2015). However, as they appear to dominate as a group, doctors will be important in their support in the delivery of quality within services. Their power, influence and knowledge as a professional group, will impact on the sustainability of any initiatives/attempts at improvement through Lean, especially as there appears to be little evidence of their engagement previously in systematic continuous improvement as discussed in section 2.7.1.

Doctors pose a problem for NHS management with professionalism and their identity as a professional, linked to autonomy (Pate, et al., 2010; Wilkinson, et al., 2011) and their identity and status as a profession set within distinct social structures (Tasselli, 2015). As the most influential of the NHS stakeholders claiming to be an unmanaged occupation as opposed to nurses managed occupation (section 2.8.4.1), they only accept management by their own profession. This provides complexity in the role of the professional NHS manager who are trying to manage a profession which will not accept their management (Harrison and Pollitt, 1994). This will create problems where coordination between employees and managers is expected in Lean (Monden, 1983; Toussaint, 2009a).

6.2.2.1 Professional hierarchies

The sub hierarchies of professional groups are documented within literature and also highlight areas of concern. The NHS has continued to revise the roles and grading of staff (Jasper, 2002; Savage and Scott, 2004; Currie at al., 2009) and this has also affected doctors and the hierarchy within this professional group. Professional groups appear as 'cliques' and this can inhibit and control knowledge between categories of professionals, even those considered 'doctors' (Tasselli, 2014). General Practitioners (GPs) have also taken on new roles and in some cases, worked in areas which were traditionally the domain of hospital medicine (Martin et al., 2009; Currie et al., 2012). The threat to the established order was seen when there was a proposition for an autonomous GP clinic in the genetics speciality and the professional boundaries started to close in to ensure the specialists retained their dominant position. In this study, the GPs were subordinate to the specialists, deferring to them, and looking to them for approval (Martin et al., 2009; Currie et al., 2012). This led Martin et al. (2009) to conclude that the strategies used to protect the boundaries of specialities within the wider confines of the professional group, can impact on wider healthcare policy, determining its success and failure and this has to be considered going forward (Martin et al., 2009; Currie et al., 2012). Similar strategies

to protect boundaries are also evident in quality improvement initiatives by medical staff. They are viewed as withholding knowledge to circumvent management processes in managing patient safety and process improvement or controlling the flow and access to knowledge, in order to subsume medical control over management initiatives (Waring and Currie, 2009).

6.2.3 Professions and knowledge

However, the prominence of the doctors in the NHS is not solely derived from being part of a professional group but through professional bodies who sanction this education and knowledge in the development of the professional groups. Knowledge and the perceived power of this knowledge is a factor in this dominance as noted by Harrison and Pollitt (1994:4) *"medical knowledge is all encompassing of health services, other professions being logically subordinate."* This is echoed by Currie et al. as *"Power is not derived solely from position or hierarchy, but from professional knowledge. This jurisdiction over this knowledge domain is guarded assiduously. Commonly one's ability to practice requires a qualification or credential controlled by the relevant profession"* (Currie et al., 2008a:543). This professional identity is developed through initial training (Pate et al., 2010) and relates to the Currie et al., (2008) quotation about doctors in the NHS as their education and qualifications are controlled by their professional body. As has previously been discussed, this is a professional body which wields power and influence over its members. These professional bodies have been crucial in the formation of policy and procedures as has been demonstrated in the history of the NHS (Harrison and Lim, 2003; Ham, 2004; Gorsky, 2008; Klein, 2010).

6.2.4 Implications for Lean

This review of organisational behaviour literature pertaining to healthcare and noted sociological texts has shown up another key aspect. In Lean, knowledge sharing (between groups and from managers to subordinates) is part of the philosophy (Monden, 1983; Liker, 2004; Liker and Meier, 2006). However, in reviewing the professions, there are issues over this, such as maintaining the exclusive control of knowledge (Freidson, 1972; Currie et al., 2009) as this knowledge and power is linked to professional dominance (Freidson, 1972; Johnson, 1972; Currie et al., 2008a, Currie et al., 2012) and can face challenges in spreading out beyond professional networks (Tasselli, 2014). The idea of professionals and hierarchy is briefly mentioned in Lean case studies (Furman and

Caplan, 2007; Fillingham, 2008). These were identified in the earlier literature review (section 2.5.2) and the discussion hints at issues over professionalism but fails to go into any real detail, amongst the positivity and discussion over the benefits of Lean.

Given that more than half of the NHS' one million staff view themselves as a professional and professionals can be described as 'autonomous' and having control of their work (Currie et al., 2009; McGivern, et al., 2015), then these professionals can be problematic for NHS managers to manage (Harrison and Pollitt, 1994; MacIntosh et al., 2012). There have been accounts of issues over multi-disciplinary team working, communication, knowledge sharing, identity and managerial relationships (Currie and Suhomlinova, 2006, Currie et al., 2008a, Davies et al., 2007, Martin et al., 2009; Spyridonidis et al., 2015; Tasselli, 2015). Even incidences where professionals have instigated implementation of their own systems, this has taken three to four years to embed due to reinforcing functional boundaries and the need for repeated education (Aitken et al., 1997).

Given these themes which have emerged from literature on the medical profession and professionalism, it is clear that these issues have been somewhat neglected when assessing the implementation of Lean in healthcare. Therefore following on from this additional literature review, attention will now turn to discussion of the five research questions and how these have been answered.

6.3 How is Lean implemented in NHS Lothian?

In order to determine how Lean is implemented in NHS Lothian in order to answer research question one, the physical process of how Lean was implemented was mapped out from case study data and content analysis data was used to clarify and verify approaches staff discussed in interviews.

6.3.1 Implementing Lean – a dedicated team

The implementation of Lean is framed as change management and there is a need for change agents to support this change. Change agents are those who innovate, participate and will manage change in their organisation (Doyle, 2011). Organisational ownership of Lean has been one factor identified for successful Lean implementations (Ben-Tovim, et al., 2007; Furman and Caplan, 2007; Toussaint, 2007b) and within this, change agents for Lean are facilitators for this organisational ownership and success (Fillingham, 2008).

This is also evident in NHSL with ownership through a branded Lean in Lothian programme and a dedicated Lean team which is confirmed by both data sources of content analysis and case study data (sections 4.1.2 and 5.3). The Lean team view their role as facilitation as it is for the service clinical staff and managers to construct Lean in the healthcare environment (Ballé and Régnier, 2007), though this is a new way of working. The role of the Lean team often is discussed in terms of the implementation process or outcomes generated (Bateman, 2005; Radnor, 2011) and is also considered in this manner here in the role they hold in Lean implementations in NHSL. However, the role of teams generally in improvement is considered to be under-researched (Hartley et al., 1997; Arumugam et al., 2012; Easton and Rosenzweig, 2015).

Although NHSL brought in an external consultancy (GE) to aid them in their implementation of Lean, the aim of this was to use the consultancy to train and develop NHSL staff in order to build internal capability and capacity to take over the delivery of Lean across the organisation. When GE left, the Lean project work and training was delivered by the NHSL Lean team but the progression of the Lean team and trained staff did not proceed as planned as discussed in section 5.3. This is in contrast to the progression of Lean trained staff in Royal Bolton Hospital (Fillingham, 2008). The team available is a small team – from five members, it was down to three full-time leads who were supported by an administration assistant and four other staff who had been 'seconded to join them' (see Table 5-1). The team describe themselves as "*a small but well used resource*" as they deliver projects and training across the organisation. Project successes are discussed but the already noted over-reliance on this team is viewed as impacting the progress of Lean through service-led implementation (section 5.5.3). Although this Lean team profile aids them in the organisation and other members of staff have recognised the value of their experience and input, this also presents challenges from those who expect the team to manage and drive projects without taking over service ownership of Lean. This has been evident elsewhere where there can be over-reliance on local Lean experts rather than staff having ownership of the improvements (Radnor, 2011). The case study data discussed the Lean team (sections 5.3 and 5.5.1,) which makes reference to the failure to progress the GE model of succession and embedding Lean in the organisation through operational managers. This skills transfer from external consultants (in this case GE) and employees (of NHSL) is needed for sustainability of Lean in an organisation (Radnor et al., 2006). The GE model of the creation of Lean experts who then move to other roles to facilitate improvement is aligned to the origins

of Lean as once a Lean implementation has been successful, staff can be deployed in other areas to facilitate continuous improvement (Schonberger, 1986; Ohno, 1988; Womack et al., 1990; Womack and Jones, 1996; Marksberry et al., 2010). This then negates the issue over job losses (Karlsson and Åhlström, 1996; Bhasin and Burcher, 2006). However, as the team has developed, there has been variation in skills noted by staff members involved in Lean projects. In determining successes in Lean projects, one of the areas highlighted is that variation in the abilities or skills of Lean change agents can also impact outcomes (Doyle, 2001; Herron and Hicks, 2008).

The Lean team are also responsible for delivering Lean training and staff throughout the organisation have been trained to become Lean change agents. By November 2011, around 355 people should have been available to deliver projects (section 5.5.1). The project summaries of Phase 6 detail seven projects delivered by trainees and the Phase 5 reports five projects '*led or supported*' by the Lean in Lothian team, though it is not clear which projects were 'led' by Lean or Lothian or 'supported by' Lean in Lothian (sections 4.6.4.1 and 4.7.3.3). Those projects that were supported by Lean in Lothian would infer these projects are delivered by staff who have undertaken Lean training previously. This is a limitation as 355 people are designated as 'available' to deliver projects, but there are at the most, 12 projects reported which have been driven by Lean trained staff. This would support service operational managers (OM3 and OM4) assertions (sections 5.5.3 and 5.5.4) that the return expected from training has not been delivered.

6.3.1.1 Lean Agent

Lean in the organisation is clearly being driven by the Lean team but ownership by services has been variable. The Lean team seek to maintain momentum or energy for change and improvement as per the role of the change agent (Massey and Williams, 2006) but this had a variable level of success when staff return to the day job (section 5.4.3.1). The concept of a 'Lean Agent' who would act as a change agent in their service and thus continue this momentum for change, was discussed in 5.5.4.4 with several respondents keen to take on this role. These respondents could not recognise anyone currently within their service who was in this position. One medical consultant (CT7) perceived there to be benefits in a member of the medical staff selling Lean to other medical staff through their professional credibility (Ham et al., 2011) and thus operate in a hybrid role and manage dual identities (Croft et al., 2014). However, this was questioned by another medical consultant (CT2) as to how effective this would be. There was evidence of staff

who had been driving forward improvements through Lean and being recognised in their department for it, but were cynical about the outcomes from Lean (section 5.4.4.1). This may show medical staff working to suit their own objectives in the knowledge of the strategic and senior management links to Lean (Spyridonidis et al., 2015) but still maintaining their place in a distinct social structure (Tasselli, 2015) which would then subvert the desired impact of a Lean agent. As a result of this discussion on the Lean team and change agents in determining how Lean is implemented, the following proposition is generated:

Proposition 1: The Lean team who facilitate improvement must be succession planned for embedding and sustaining Lean in the organisation.

6.3.2   Approach to implementation

Figure 5-7 provides an illustration of the approach taken by the Lean team in implementing Lean in NHS Lothian. This illustration shows the work that is under taken by the Lean leads, especially in the pre-work stages where a qualitative focus is placed on engaging staff in Lean and taking time in stakeholder interviews to deal with their concerns and discuss what is really happening in their service. This focus on the qualitative aspects, rather than just taking a tools approach is viewed by the Lean leads as crucial to success and was also discussed by Holden (2011). In section 5.3.1, this crucial aspect is described as Lean is endorsed as being about people, at least 70 percent, if not more. This need to focus on people in Lean is already recognised by Mann (2009) and Liker and Meier (2004), and was noted by Hines et al., (2008) as what would separate Lean from manufacturing and its transferability into areas such as healthcare. This focus on people is noted as being limited in existing studies of Lean (Hines et al., 2004; Pettersen, 2009; Stone, 2012), even though 'respect for people' is a key goal of the TPS and endorsed as such in original Lean works (Monden, 1983; Ohno, 1988).

This focus on people is not exclusively about staff in healthcare organisations but also patients or clients of the system under study in the pre-work stages. Staff may undertake patient surveys or even conduct Voice of Customer (VoC) interviews to determine the patient experience in current pathways (section 5.3.3 and table detail in Appendix 4) so these data can be incorporated and ensure improvements proposed are underpinned by a focus on quality and safety from a patient perspective. This focus on the 'customer' is aligned to Womack and Jones' 1996 definition of Lean (section 2.2.1). These initiatives

were discussed as informing work in Dermatology, Prison Prescribing and Theatre work as part of TPOT. Staff were clear about the customer as being the patient and therefore the focus of the Lean intervention so there were no issues in the identification of customers as has been discussed elsewhere (Scorsone, 2008; Grove et al., 2010; Radnor et al., 2012). However, some Lean leads propose that this can be taken further and more can be done to engage patients' views in Lean projects which also echoes literature discussion (Mugglestone, et al., 2008; Robert et al., 2015).

6.3.2.1 Kaizen vs. Workouts

The approach when mapped (Figure 5-7), also clearly illustrates that Lean is commonly approached or 'kick-started' through the use of Kaizen events or one day workouts. The chapter 4 content analysis discusses the predominance of the use of Kaizen events in the early years of Lean implementation. This is supported by the Lean leads and healthcare staff who commonly discuss the use of Kaizen events in the case study analysis. The content analysis showed that although there was an equal application of Kaizen events (30/70) and one day workout events (30/70) in Lean implementations, the use of Kaizen declines in the later reports as one day workouts are favoured. It was not reported what the other event types were (section 4.8.2). It was not clear in the content analysis why one approach may be favoured over another. The case study analysis however, illustrates that time pressures resulted in '*watered down*' versions of events where it is a struggle to get staff released (Section 5.3.4.1). This was also evident in the event the researcher observed as the timings were reduced to ensure staff could attend after negotiation of how long the event would be (section 5.3.3). Kaizen or RIEs as longer events over three to five days are evaluated by Radnor et al., (2012) as being a common approach to 'kick-starting improvement', though Dickson et al., (2009) discusses Kaizen events being applied in healthcare in the USA over one to five days but does not make a distinction as to why some Kaizens are longer than others.

6.3.2.2 Use of tools

The discussion of the tools applied in the implementation process was inconsistent in the content analysis with some reports clearly discussing what tools were applied in the project and others not. Transparency was only gained in P5 and P6 as this detail was included in project summaries (section 4.8.2). Illustrations shown within the reports contained process and value stream maps and further discussion was included to show

that stakeholder interviews and 5S were regularly applied and this was supported by the case study data. The application of these tools is also evident in other studies of Lean in healthcare (Fillingham, 2008; Dickson et al., 2009; Holden, 2011; Radnor et al., 2012). The tools were applied by the Lean team and interviewee respondents, though medical staff did not discuss tool application beyond their Kaizen experiences. Visual standards and visual management tools for monitoring performance were observed by the researcher in areas which had been subject to Lean projects. The Lean leads note the consistency of their approaches in so far as they recognise a wide variety of tools can be used but they rely on the same tools (section 5.3.4). The application of a narrow range of tools is also aligned to the findings of Radnor et al., (2012) where the three phases of assessment, improvement and performance monitoring are evident in NHSL's approach to implementation.

6.3.2.3 Consistency in approach

Mapping the approach to Lean by NHSL in Figure 5-7 showed at least there was consistency in approach when the Lean team and employees implementing their own Lean projects discussed how this was undertaken. This consistency extended to service staff led projects where staff illustrated their own processes for conducting Lean projects (section 5.5.4.2, sub section I) which is advocated for generating successes in literature focusing on TPS implementation (Marksberry et al., 2010). The focus on the qualitative aspects of Lean implementation, over a tools-based approach which was previously proposed (Hines et al., 2008; Proudlove et al., 2008) was evident in NHSL from discussions of the identification of stakeholders and stakeholder interviews being conducted (sections 5.3.1.1 and 5.3.2.1). Staff involved in projects, were keen that the focus of the improvement was by those involved in delivering the relevant service so that improvements were owned by staff (section 5.3.1).

6.3.2.4 Programme Theory

The mapping of the approach taken by NHSL (Figure 5-7) and the case study analysis makes a potentially important contribution to programme theory. Programme theory is a theory of change applied in healthcare. This programme change occurs due to the articulation of processes and inputs required, so to derive the outcomes expected as you are clearly specifying the conditions necessary for effectiveness at the outset (Weiss, 1995, cited in Davidoff et al., 2015). Goicolea et al., (2015) explain that programme

theory can be designed based on theory or experience and then tested empirically in terms of what is being undertaken, why this is and how this will be done so to generate outcomes. The theory can also be refined (Goicolea et al., 2015). This was evident in NHS Lothian as the Lean Team were trained by GE initially and have continued to consistently work and train in this approach to Lean implementation, but have further refined this by the introduction of the project charter to mitigate against poor outcomes.

The importance of programme theory is argued as failures can be due to poor implementation, inconsistency in approach, retention of participants and incomplete follow up (Lipsey and Cordray, 2000). Programme theory provides clarity over intentions, tools applied in terms of data collection and measurement and the standards which will be used (Davidoff et al., 2015). These are evident in NHSL in Figure 5-7, where the mapping shows the process for implementation of Lean in scoping and defining the project, the mechanisms for ownership (project charter, executive sponsorship, stakeholders), the tools used (stakeholder interviews, value stream, maps, process maps), the mechanisms for generating outcomes (pay off matrix then action plan) and then the timescales of improvement (report out within 30 or 60 days).

Limited mapping of a full approach to implementation is available as a guide to organisations planning to implement Lean, especially in the healthcare environment. Radnor (2010b) maps out the approach taken by HMRC, although this is a public sector body not a healthcare organisation. Literature commonly discussing the implementation of Lean in healthcare and the success stories (Ben-Tovim et al., 2007; Furman and Caplan, 2007; Fillingham, 2008), do not fully map the details of their approach. As a result, the following proposition is generated:

Proposition 2: A clearly mapped process articulating intentions, approach and expected outcomes which is applied by those responsible for Lean improvement, provides consistency of approach in the implementation of Lean.

6.3.3   Lean in Lothian as a Strategic Programme

From Chapter Four, the multiple phases of the Annual Reports refer to Lean in Lothian as being a programme, usually in the introduction or Executive Summary. This 'programme of work' links the aims and objectives of Lean to NHSL's strategy. The articulation of the application of Lean to strategy was reinforced in the Lean in Lothian

Annual Reports which were content analysed in Chapter 4, in Phase 1 and in Phase 3 (section 4.1.2 and 4.4), this link to strategy was clearly articulated:

"…the programme was established in 2006, with the support of GE Healthcare to allow NHS Lothian to develop capacity and capability to deliver the significant service improvements needed to be at the level of Scotland's best, and among the world's top 25 healthcare system (Tait and Howie, 2009:5).

This articulation of a strategy of outcomes in so far as seeking improved organisational performance and an aim to be 'best in class' (section 4.4) was also matched in this strategy encompassing a focus on people in order to drive cultural change through Lean.

Lean leads also linked Lean to strategy in the delivery of their projects in defining the types of projects they undertake as "*a strategic goal the organisation wants to achieve*" (QI2). Interviews did confirm that Lean was not implemented from a crisis point unlike other healthcare studies discussed in Table 2-3 but was directly considered as an approach to enable the organisation to meet its external and internal strategic aims as was viewed as being best practice for those organisations looking to implement Lean (Hines et al., 2004; Radnor and Walley, 2006 and Bagley and Lewis, 2008; Hines et al., 2008).

This explicit linkage and the approach of Lean being used 'in strategic projects' shows there is a clear focus on linking Lean to strategic intent, rather than overly focusing on tools based improvement (Radnor and Osborne, 2013). The discussion about Lean involving cultural change within the organisation has been discussed previously (Monden, 1983; Ohno, 1988; Liker and Meier, 2004; Mann, 2009) and was also discussed in the annual reports for Lean. In Phase One (section 4.2) Lean was specified as providing the mechanism to create change through the achievement of building the organisations' internal capability in staff in order to drive cultural change.

This discussion is supported from the case study data as the executive interviews clearly articulated a link to strategy through Lean in supporting staff and empowering them (Mann, 2009). This was discussed in terms of the formation of a new health board. This was driven by the need for culture change and in supporting and empowering staff. The link to strategic objectives with Lean was strongly linked to staff in this healthcare environment (section 5.2.1);

"...it was in line with an over-arching strategy which was how do we support the people who treat the sick people, rather than getting in the way of them?" (Exec A).

6.3.3.1 CEO Vision impact

This desire for Lean to be linked to organisational strategy is attributed to the vision of the CEO who led the organisation through the formation of the health board which went from various regional wide disparate organisations, into one health board. At the time of the research, NHSL was almost six years into the implementation of Lean without a change in CEO. The continuation of Lean in the organisation and this consistency in executive leadership (which also impacts the consistency of the Lean team as this too can be observed), is one of the key success factors identified in successful Lean implementations (Furman and Caplan, 2007; Fillingham, 2008; Dickson, et al., 2009). Section 5.2.1.1 also discusses how staff recognised this support from the CEO and other senior members of staff as they would be in attendance at events. It is endorsed that leaders should personally be involved in Lean improvement (Mann, 2009). Where this is not evident, there have been challenges in sustaining Lean beyond the initial two to three year period (Dickson et al., 2009). NHS Lothian have moved beyond this initial period and this support from senior leadership and clear articulation to strategy which has been recognised has potentially been one contributing factor as to how Lean has continued in NHSL. Therefore from this discussion, supported through the evidence in the content analysis in section 4.1.2 and the case study data in section 5.2.1, the following proposition is provided:

Proposition 3: A clear alignment between organisational strategic objectives and consistency in leadership support for Lean is required for Lean to be sustainable in the longer term.

6.4 What is the impact of Lean in NHS Lothian?

This section will now consider research question two: What is the impact of Lean in NHS Lothian? In assessing the impact of Lean within the organisation, a focus will be placed on the outcomes generated from Lean as these are discussed in both Chapters Four and Five.

In order to ascertain the impact of Lean in NHSL, this research question is discussed by primarily utilising data from the content analysis chapter. Where limitations of this has been discussed previously (section 4.9), then the case study analysis allows for further explanatory detail to be used to support evaluation of the impact. Six phases of project reports were analysed for Chapter 4 (and see also Appendix 4 for a breakdown of projects by phase) and this breakdown of projects is shown in Table 6-1.

Table 6-1 Amount of Projects Conducted by NHSL per Phase

Year	Phase	Amount of Projects
2006-07	1	6
2007-08	2	14
2008-09	3	12
2009-10	4	12
2010-11	5	7 (+5)
2011-12	6	19 (+7)

In Phase 6 (section 4.7), it was reported that 75 projects had taken place within the Lean in Lothian programme, but 70 reports of projects were evident across all reporting. In Phase 3, there is reporting of nine projects but this involved one project in three areas, hence counted as 12 projects. In Phase 5 (section 4.6.4.1), there is also reporting of additional projects (five projects) which were 'supported by' or led by Lean in Lothian. It is not clear if they were full Lean projects, e.g. how many of these additional projects were led by the Lean leads as the same detailed reporting summaries were not provided. It is known by the researcher than at least one of these projects listed was led by a staff member who had previously participated in Lean training.

Phase 6 details 19 projects and then an additional seven that were delivered by trainees who had participated in Lean training and the reporting makes this clear that these are trainee delivered projects. However, these are 'supported' by the Lean in Lothian leads

who still support trainees in providing assistance in designing events or helping to facilitate where this is required (section 4.7.3.3).

The Lean in Lothian report format has changed as the programme of work has continued throughout the phases. There is, however, evidence of consistency in reporting the drivers for the projects and the outcomes.

6.4.1 Types of projects and outcomes

Table 4-3 shows the types of projects undertaken by Lean leads. These projects are taken from the Lean in Lothian reports from Phase One to Six and therefore will encompass work conducted by GE consultancy support as this work was undertaken under the Lean in Lothian programme banner.

Out of 70 projects, 50 projects have been based across multiple pathways. Contained processes such as laboratories for blood work and pathology and the laundry have featured the least. From Phase 2 onwards administration featured in combined projects involving pathway work (section 4.3) and was the sole focus of some projects from Phase 3 onwards (section 4.4.3.2).

6.4.1.1 Pathway Projects

As discussed in section 6.3.3, Lean is linked to strategy and this has informed the work that has been undertaken through Lean. The reports provide the impression of Lean implementation at NHSL being successful with demonstrative outcomes such as increased capacity and reduction in waiting times, and DNA rate in Substance Misuse in Phase 2 (section 4.4.3), Phase 4 (section 4.5.3) and Phase 6 (section 4.7.3). Substance Misuse (section 4.3, 4.5.1 and 4.6.4) was a full pathway project as initially the work was focused on one regional area. This work was then spread across the region and saw multi-agency involvement with participants from social care and third sector agencies coming together to implement improvements in access to treatment pathways and equity of service. MoE work was also deemed successful and features across the pathway in all six phases of reporting and included bed management systems, release of additional Physiotherapy and Occupational Therapy slots and improved access to day hospital beds for assessment which was verified by the case study data in section 5.4.1. Both Substance Misuse and MoE projects have involved work beyond the acute settings and into cross-regional healthcare provisions which has received limited reporting to date (Radnor and

Osborne, 2013). These are outcomes which were sustained and additional improvements followed the initial work undertaken (Section 5.4.1).

6.4.1.2 Administration projects

Pathway projects were a focus but from P3 onwards the Lean in Lothian team started to look at administration and how it affected the processes of patient treatment. Full pathway projects were still in operation but work on complaints, transplant administration, Estates and managing invoices were all undertaken with the Lean team. By the end of Phase 6, the outcomes had been provided in previous projects but sustainability was not clear and in complaints, this was a project which was to be revisited in Phase 7.

6.4.1.3 Combined projects: Dermatology

Dermatology was a large project which encompassed full pathway work and also improvement in administrative processes in Phase 3 (section 4.4.1). Dermatology were struggling to meet waiting times targets of 12 weeks and had implemented additional capacity through evening and weekend clinics. In administration processes, Dermatology was managed across three sites but there was variation in triaging across each site affecting equity of treatment of patients.

Dermatology was viewed as a successful project and was awarded the Lean in Lothian award for best project (section 5.4.4.1). Triaging of referrals were conducted at two sites and patient focused booking was implemented which positively impacted on DNA rates (section 5.4.4.1). Consultants also offered an email advice service to GPs to tackle inappropriate referrals. Consultant job plans were reviewed and altered to create additional patient appointment slots (section 4.5.4). The altering of job plans to be better aligned to service requirements in managing demand and capacity, has received limited discussion in literature as an outcome from Lean (Radnor and Osborne, 2013).

6.4.1.4 Laboratory and Contained Projects

Pathology also was reviewed for its impact on waiting times to enable the service to meet its targets in Phase 2. Phase 4 (section 4.5.3) saw further work between Dermatology and Plastic Surgery take place. This spread of work and linkage to other services, continues to demonstrate a pathway approach to improvement, rather than small, disjointed projects. Projects such as HSDU (P2, section 4.3.2), Pathology (Phase 2 and Phase 4, sections 4.3.3 and 4.5.3) are described as a '*contained projects*' by Lean leads as they have recognisable

processes, with a designated Process Owner so they are not as '*messy*' as the pathway work with cuts across multiple services (section 5.4.4.3).

Laboratory work is viewed as one part of the pathway and has received previous focus due to the recognisable processes and clear outputs (Graban, 2009; Papadopoulos and Merali, 2008). In literature, a common focus for research has been how Lean has been applied in Emergency Departments with multiple publications focusing on this area (Ben-Tovim et al., 2009; Dickson et al., 2009; Holden, 2011; Meyer, 2010). The Accident and Emergency Department (A&E) only started to receive focus in NHSL from Phase 4 onwards (section 4.5.1) with one project and linked into associated pathway work in other projects but included similar metrics to those previously reported including patient flow, waiting times and improved processes for managing patients and information.

6.4.2 Challenging a small project focus

Lean in healthcare is commonly criticised due to the focus on small projects which often provide quick gains (Brandão de Sousa, 2009), but does not include linking Lean to organisational strategy (Young and McClean, 2008; Ballé and Régnier, 2007; Radnor and Walley, 2008; Radnor et al., 2011) but this is not the case in NHSL. This variation in approach compared to what has been commonly witnessed in earlier publications may be attributed to a systemic approach to continuous improvement through Lean that involves system wide change. The approach to improvement by NHSL is discussed as the aim of Lean was to be aligned to strategy, involving cultural change, Lean training and is described as 'this is what we do' (section 5.2.1.1). This fits with Burgess and Radnor's (2013) classification of a systemic approach to Lean (discussed for NHSL in section 4.5.3.1). The content analysis within Chapter 4 discussed the nature of this systemic improvement, across whole pathways, in projects which have been built upon in successive phases of Lean, such as in Medicine for the Elderly (MoE), first discussed in Phase 1 (section 4.2.1.2) and received a focus in all six phases of projects analysed. Cancer pathways received a focus on five phases and included cross service, multi-disciplinary pathway work (section 4.5.3). This is not just linked to specific areas of the pathways in managing targets such as laboratory work or waiting lists but across multiple aspects which has received limited reporting to date (Papadopoulos et al., 2011). A focus across pathways has also been on equity of access to services as demonstrated in the Dermatology and Substance Misuse projects which has also been lacking to date (Radnor and Osborne, 2013). The use of Lean across whole pathways in order to tackle variation,

demand and capacity, and flexibility is endorsed (Bhatia and Drew, 2006) and demonstrated in the NHSL. The organisation has faced challenges which were further elaborated on within the case study data (sections 5.5.4 and 5.8) which may have started to impact this systemic approach going forward and as such, Lean in Lothian is referred to as a programmatic approach at this time. However, the pathway work undertaken as part of Lean in Lothian and its reporting adds value as this is contrary to projects which just focus on waste. This provides an additional perspective to work undertaken through Lean in comparison to previous reporting of Lean projects (Radnor et al., 2012).

6.4.3   Outcomes from Lean

Various measureable outcomes were discussed as attributed to Lean. Content analysis of the Lean in Lothian annual reports shows substantial gains being attributed to specific Lean projects. Full details of the outcomes by project are contained within appendix three but in Phase 1 of Lean in Lothian the MoE project released staff time to care in bed management systems. Cost avoidance of £260,000 per annum was reported in managing patients appropriately so they would not be admitted to acute sites in the MoE project (section 4.3.4.2). Plastic surgery was discussed in nerve conduction waiting lists in section 4.4.3 where waiting times reduced from 48 to 18 weeks post-Lean project.

6.4.3.1 Focus on Targets

Many outcomes from Lean have been linked to waiting times initiatives as 36 out of 70 projects were related to waiting lists and targets the services had to meet (see Table 4-4). The focus on targets includes those targets set by the Scottish Government within healthcare as is evident in the Phase 5 project for stroke services (section 4.6.1). The link to Lean with targets influencing projects is not surprising due to the recognisable impact of political influence in healthcare provision (Rivett, 1998; Webster, 1998; Ham, 2004; Gorsky, 2008; Klein, 2010). From the inception of the NHS, this focus on increased productivity and efficiency against a background of rising demand and funding restrictions has engulfed NHS provision of healthcare (Ham, 2004; Klein, 2010). This was evident at NHSL where executive interviews cite the realisation of future funding restrictions for public services and the need to focus on efficiency and quality of services as a driver for Lean implementation (section 5.2.1.3).

6.4.3.2 Positive focus on outcomes?

Dickson et al., (2009) note that literature on Lean appears to be biased towards an overly positive focus on Lean and associated outcomes, believing their work to be one of the first and potentially in that period, the only one to present discussion of failures. A positive focus in reporting outcomes and sustainability is certainly evident in the earlier phases of the Lean in Lothian reports, as it is in literature published before 2010 (see Table 2-3). Post-2010, some reports of problematic Lean implementations emerge (Grove et al., 2010; Waring and Bishop 2010) with others beginning to question the impact and sustainability of Lean (Radnor et al., 2012; Radnor and Osborne, 2013). In the A&E project, conducted in later phases (P4 – P6) outcomes are explicit such as minimisation of wastes (movement) and having equipment in the right place at the right time where 5S was applied.

Although not a warning about sustainability, initial wariness over Lean is not always discussed in Lean project reports. Scepticism appears as a common theme experienced by the Lean leads and one publishes it in the reporting in Phase 3.

The Dermatology report in Phase 3 notes "*Although like many departments, the project was met with initial scepticism, the staff have fully embraced the notion of continuous improvement as many of the changes were conceived well after the kaizen week. Morale has improved and staff feel they are providing the best possible service for patients*" (Table 28-1).

I.   Scepticism

However, there were others, who were the medical staff (consultant grade) and were sceptical about the improvements made, and appeared to be 'playing the game' (Waring and Bishop, 2010), as they had been recognised by other staff members as being responsible for some of the initiatives that were on-going. These were initiatives which had been developed from the initial Lean Kaizen. Section 5.4.4.1 questions the perceived success of the Dermatology event from the participants' perspective who were viewed by others as supporting Lean and this scepticism even relates to the contents of the summary documents or annual reports.

"...the summary documents didn't seem to match what I thought was said, there seemed to be an element of 'this came out of the Lean process when some of those changes were on-going anyway" (CT2).

II. Challenging medical hierarchies through Lean

Although measureable outcomes from Lean were discussed, softer, qualitative outcomes were also attributed as Lean successes. Although within the healthcare environment challenges of working across silos and professional disciplines is recognised within quality improvement of services such as through Lean (Radnor et al., 2006; Brandão de Sousa and Pidd, 2011), this has received limited attention in literature (Øvretveit, 2005; Waring and Bishop, 2010). The case study however presents parallel views with administration staff enjoying the opportunity to have '*a voice*' and make improvements which affect them (section 5.4.2.5). Some medical consultants were encouraging that Lean allows this voice to be heard resulting in challenges to traditional hierarchies and power bases that exist (Waring and Bishop, 2010). The staff here were participating in projects which have spanned further Lean work, owned by service staff and where original Lean projects have been sustained. Section 6.3.2 discusses the emphasis on a qualitative focus within Lean. This is evident as medical staff recognised where lower grade staff such as administrative staff working within these traditional hierarchies felt safe in speaking up during Lean activities as in section 5.4.2.5;

"...they could be heard in an environment where they knew they were going to be heard and not squidged by bossy senior consultants" (CT5).

III. Continued Improvement

Staff in Dermatology noted that improved relationships were evident post-Kaizen. This outcome links to the drivers for Lean which appeared not solely around the service improvements required in terms of equity of access and treatment times but also the qualitative aspects of team working, improving relationships and communication (section 5.2.1.3, III) which had been discussed elsewhere (Lindsay et al., 2014; Procter and Radnor, 2014). This qualitative improvement then facilitated continued improvement in services. Dermatology has undertaken several other Lean projects; a larger Plastic Surgery event and also smaller projects which were on-going in the service at the time of interviews. Nurses who were active in the Dermatology event confirmed they were commencing their own project in converting a room to be used to offer nurse-led

treatments to offer more capacity in the service without additional staff. This at least confirms that although there was scepticism over Lean, improvements have been sustained and additional Lean initiatives are being taken forward by staff (section 5.4.4.3). This shows a move away from previous reports of fragmented Lean implementations (Proudlove et al., 2008; Young and McClean, 2008). Time for Lean was also identified as facilitating and generating improvements with impact and was discussed in sections 5.3.4.1, 5.4.4.2, subsection I and 5.4.4.3.

This appears to provide evidence that Lean leads worked hard to provide an environment where participants who may not normally have *'a voice'* (AD4 and AD6 in section 5.4.2.5) and be listened to, felt psychologically safe in doing so without fear of negative consequences (Kahn, 1990). Edmondson (2004) relates this to how individuals will assess the potential consequences of feedback, highlighting errors and asking questions or offering suggestions and notes that perceived organisational support is an enabler of psychological safety and in this case, this support has been from the Lean leads. Commonly, those of a professional status are viewed as psychologically safe in comparison to other groups where there is more variation (Nembhard and Edmondson, 2006) and this is evident in QI4's discussion of consultant behaviours (section 5.5.5.2, ii).

This also links back to the respect for people pillar within Lean (sections 2.3 and 2.3.1) in empowering staff of all levels to use their skills to solve problems (Ohno, 1988; Dahlgaard and Dahlgaard-Park, 2006), which can also be traced back to the work of Gilbreth (1914) and Gilbreth and Gilbreth (1917). This focus on people in allowing voices to be heard in hierarchical environments (section 5.4.2.5) and providing time for improvement (section 5.4.3) has shown to be important within Lean in NHSL in generating real and sustained outcomes as discussed in 6.3. This has resulted in the generation of the following proposition:

Proposition 4: Creating psychologically safe spaces and protecting time for staff to engage in Lean facilitates the breakdown of traditional healthcare hierarchies.

6.4.4   Warning of problems

Despite the benefits identified with the breaking down of traditional hierarchies and ongoing improvement work, certain projects highlighted problems. The reporting of Dermatology reports scepticism and TPOT warns of a lack of engagement. However, the data to support discussion of why projects may fail to be sustained is limited in the annual

reports. The reporting of TPOT in Phase 6 warns of the lack of engagement by staff before the project is even completed (section 4.7.3.1). Although Phase 6 reporting of TPOT was the first to warn of non-engagement, as the content analysis of the documents ended at Phase 6, then there is no further data in how this was to play out. However the case study data, supports that this was a valid warning as the project in Orthopaedics has been beset with problems of non-engagement and accountability for projects from Orthopaedic surgeons. A Lean lead discussed this project as it was ongoing and admitted there were some good outcomes from the project but also things that were abandoned as staff were not interested (section 5.5.7). The Orthopaedic work continued but in discussing hierarchy in healthcare and engagement by medical staff, this project was directly discussed in terms of limited outcomes (section 5.4.2.5).

This lack of engagement has impacted Lean and the ability to further garner outcomes from the full potential of Lean as it is not the manager or Lean leads job to improve processes, but the role of the professionals who are working within these processes (Joosten et al., 2009). In order to further evaluate the impact of Lean, the case study data will continue to aid insight to these projects from staff perspective experiences where this can *'fill in the gaps'* from missing data.

6.4.5   Missing data inferences

It has been discussed that 70 projects were reported in the annual reports but P6 reporting discusses 75 reports meaning there are five reports for which there are no summaries provided as it is unclear how many additional projects are actually full Lean in Lothian led projects. The positive nature of the reports would allude to successful outcomes but this appears not to be the case and the missing five reports may be linked to projects which have failed to have any impact in the organisation. Section 5.4.4.2 of the case study chapter discusses a lack of outcomes from Lean from both the Lean lead perspective and also staff involved in the project. Single Point of Contact was discussed as receiving Executive support and a huge focus over the previous few years but it is a project which does not appear in the project summaries and staff have evaluated how there has been minor or little success in this project (section 5.4.4.2). This would support that where projects have been less than successful, there may well be some editing about what is submitted as part of the Lean annual reports, especially if these projects received a focus across multiple phases, thus explaining the disparity between the number of projects attributed to Lean, versus the number of projects reported.

6.4.6   Evidence of sustainability of Lean

Although the impact of Lean (RQ2) is considered in terms of the projects and their outcomes, an additional research question was emergent as information on the sustainability of the projects was inconsistently reported in the Lean in Lothian annual reports. This research question seeks to ascertain how sustainability is evident in NHSL. Sustainability is reported in early annual reports but this is inconsistent in later reporting (sections 4.7.4 and 4.8.3). However, staff were able to confirm if projects were sustained such as through the award winning Dermatology project and the ongoing work in substance misuse.

The Programme theory approach to Lean should be clear about the mechanisms for improvement and the outcomes expected. This is something the Lean team have worked on now with the inclusion of a project charter which is used to have services commit to the delivery of the Lean project, outcomes and also to ensure sustainability (see section 6.3.2.4 and Figure 5-7).

The project charter was a recent addition and therefore was not evident in earlier projects. Phase 6 summaries note that work in Phase 7 will be undertaken in HSDU. In the content analysis, it was not clear why HSDU was being revisited (the initial project for HSDU was undertaken in P2) but the case study data (section 5.4.4.3) discusses how the improvements were evaluated as being '*systematically picked apart*'. This confirms that at least in some areas of NHSL, there have been sustainability issues in Lean projects as evidenced elsewhere (Grove at al., 2010; Radnor et al., 2012; Burgess and Radnor, 2013). Sustainability of Lean has been discussed in terms of inhibitors which include lack of motivation, lack of commitment demonstrated by managers and lack of involvement by all employees (Bateman, 2005). This lack of involvement by senior medical staff was discussed in the Orthopaedic work which impacted the outcomes expected from Lean. The Iceberg Model from Hines et al., (2008) and the House of Lean (Radnor, 2010) both discuss guidance for the implementation and sustainability of Lean (see section 2.4.1.3). Enabling elements in the Iceberg Model include alignment to strategy and leadership which are evident in NHSL, certainly in terms of the strategic linkages and leadership support as these are discussed in sections 6.3.3. However, behaviours and engagement have been challenging and it is these areas which have impacted on Lean. Radnor's (2010) House of Lean was designed for public sector Lean implementations and again highlights key areas where the implementation process should be supported. These areas include

training and development, the steering group and project team and the development of local or internal facilitators. There were elements evident in Bolton's implementation where levels of training in Lean were offered to facilitate ongoing development and the sustainability of Lean (Fillingham, 2008). In NHSL training had been available but the ongoing nature of supporting staff development through Lean is not clear. However, a dedicated Lean team is available and each project has clear executive support. There have been issues in training staff where training has not been used which has impacted on the development of internal facilitators for Lean (sections 5.5.4 and 6.3.1).

Where employees have engaged and clear leadership support is evident within Lean, e.g. Dermatology projects, the results are much improved and has led to positive outcomes (Dickson, et al., 2009). However, there are clearly issues in the training and development and also in the engagement of staff in how they are used to facilitate Lean improvement which impacts on sustainability of Lean projects (section I). Therefore there is evidence to support sustainability of Lean in some services as discussed in the content analysis and case study data due to the continued and ongoing work, post the initial Lean intervention, but this is not consistent across all projects.

Proposition 5: An increased focus on training and development of all staff is required for driving sustainability of Lean.

6.5 Introduction

Sections 6.3 and 6.4 have considered how Lean is implemented, the impact of Lean and the evidence of sustainability in NHSL. Now attention will turn to identifying the roles of staff and the impact of the medical professional and their professionalism on Lean implementations. As Lean outcomes should be derived from those tasked with working within the process (Joosten et al., 2009), then this section will discuss the roles held by those involved. Limited focus has been placed on the role of people within Lean implementations (Joosten, et al., 2009; Pettersen, 2009; Papadopoulos et al., 2011; Stone, 2012), although some attempts have been made to re-address this (Papadopoulos, et al., 2011; Waring and Bishop, 2010; Drotz and Poksinska, 2014). This question will be answered with the aid of the case study data from Chapter 5.

6.5.1 Managers

Section 5.4.2 discusses attendance at Lean events and the roles held by those involved. The role of senior and executive management support in Lean healthcare implementations is recognised (Furman and Caplan, 2007; Fillingham, 2008; Toussaint, 2009b). The role of management across all grades was viewed as crucial for demonstrating not only visible and vocal support to the Lean project but also committing to the sustainability of Lean through the project charter which is signed by process owners (section 5.3.1). Challenges in holding a management role in healthcare were recognised with respect to not having the opportunity to make full use of the Lean training that had been received (section 5.5.4.1) due to the firefighting culture in healthcare invoked by reactiveness and failure to plan ahead (Fillingham, 2008; Toussaint, 2009b).

Initiatives in healthcare such as improvement in clinical settings are viewed as being under the ownership of operational managers and clinical staff (McBride and Mustchin, 2013). Managers are viewed as being able to make things happen when staff propose changes as they have the authority to allow this but when they do not attend, then staff can disengage (section 5.4.2.3). The senior management or executive support was viewed to demonstrate real commitment to Lean in NHSL as this had been a programme that had been invested in (sections 4.1.2 and 5.4.2.3) and this was illustrated in their attendance at events where staff had to report on outcomes (section 5.4.2.3).

As was discussed in section 6.3.3, Lean in Lothian was linked to the strategy of NHSL which service operations management would be tasked with delivering at a local level through improvements to services. The linkage of Lean to strategy was viewed to have been aligned to the training of staff (section 5.5.4) but challenges were evident in the amount of staff who were perceived not to be using their Lean training and issues were linked to the ability of having staff released as commented by OM3 in section 5.5.4. This links to discussion as impacting the lack of improvements through Lean in section 5.5.4.2, subsection I, as the reality over time available to do this versus the expectations was not viewed as aligned. This is evident in the data as the views of senior management versus service operation management were disparate with the executive not viewing there to be an issue when staff in services, and in particular operations managers discussed these issues. The Lean leads further recognised the issues of staff having a lack of 'protected time' for facilitating improvement or taking training forward (section 5.4.4.1). It was evident from staff in this study that managers had to be engaged and seen to be engaged

in improvement, or else things would not progress (section 5.4.2.3). The role of the manager and the skills required for change facilitation had also been discussed as a lack of impact from managers as change agents has been recognised elsewhere (Rahbek et al., 2011).

Five service operational managers (OM) were interviewed as part of this research, as well as three Human Resources Managers (HR) and are detailed in Table 5-1. All five service operational managers had participated in Lean events and two of these managers discussed their experiences of Lean training. Their discussions of issues with medical staff were echoed by Lean leads which showed consistency in the issues identified.

The management of medical staff has been widely reported in literature (section 2.8.5 to section 2.9) and many of the issues identified there have been evident in this study in discussions with managers and their interactions with this group. All five operational managers discussed problematic managerial and clinical relationships about how changing practice is an issue with clinicians and in the manifestation of difficult behaviours in medical staff (section 5.5.6.1) which is also evident in Currie et al., (2008b) which is further discussed in section 6.5.5. One manager spoke in detail about clinical and managerial relationships and discussed how colleagues acted as 'diplomat managers' who were unwilling to challenge accountability from medical colleagues and this has been discussed by Harrison and Lim (2003). OM5 discussed from a service management perspective about not being able to manage the medical staff in a way that meets the needs of the service (section 5.5.7) which compromises the management role which is echoed in Currie and Suhomlinova (2006). However this same clinician (CT8) also recognised that views of management may be related to a perceived lack of clinical expertise which also impacts authority (Bruce and Hill, 1994; MacIntosh et al., 2012). This lack of authority and ability to manage will have consequences for Lean. The Lean team discussed behaviours when trying to monitor Lean progress (section 5.5.6) but monitoring is required to ascertain the status of the Lean implementation (Radnor et al., 2012) and this monitoring behaviour, although associated with managers (MacIntosh et al., 2012; Martin and Learmonth, 2012) is at odds with 'give and take' and clinical autonomy (Spyridonidis et al., 2015).

6.5.2 Service Staff delivery of projects

As well as the support required from management, the Lean team have already discussed their role as facilitating improvement (section 5.5.3) and as such, staff from services which includes managers, doctors, nurses and administration staff should be working together to deliver improvement. Multi-disciplinary teams are viewed as being the key to successful implementations of Lean (Ballé, 2007; Fillingham, 2008; Joosten et al., 2009) and concerns have already been discussed where this was not evident (TPOT Orthopaedics, section 6.4.4). Staff discussed their role in driving their own projects with mixed success as so this has had limited impact in the organisation (section 5.5.4.2 and subsection I).

6.5.3 Nurses

Six nurses were interviewed in this research (see Table 5-1 and Table 5-2) and those interviewed confirmed they were involved in Lean projects. Initiatives in NHS Scotland and England have recognised the role nurses hold in leading and driving quality improvement in healthcare (Savage and Scott, 2004; Bolton, 2005; Currie et al., 2009; Wilkinson et al., 2011) and this was evident in NHSL where nurses had undertaken Lean training and were using that in service based projects. Some nurses had faced challenges in this (section 5.5.4.2, I) and others were planning their own initiatives to improve capacity in using existing resources for creation of additional nurse led treatments where they are taking on roles formerly conducted by medical staff due to changing roles (Radcliffe, 2007; Currie et al., 2009). These changing roles, taken on for professional development and to make a contribution to the workplace (Currie et al., 2010) had to be balanced with resistance from the medical staff as was illustrated in section 5.5.7.2 as it related to the role medical professionals have held historically within a hierarchy. Many of the nurses interviewed were at senior levels (management) or within specialised roles and perceived their roles as enabling them to make a greater contribution to improvement (Currie, 2006; Burgess and Currie, 2013; Croft et al., 2014) but this had to be supported by medical staff (Currie et al., 2012).

Service Operational Managers, the Lean leads or Administrators did not make any comments on the non-engagement of nurses in Lean projects, as only the medical staff were highlighted as proving problematic due to historical hierarchies and their identity as a professional. This is further expanded upon in section 6.5.5.

6.5.4 Administrators

Administrators were interviewed as part of determining the roles held by staff in Lean implementations. Where work has reviewed the role of healthcare staff in improvement, this predominately has focused on healthcare clinical staff such as doctors and nurses (Davies et al., 2007; Wilkinson et al., 2011) and not lower graded staff such as administrators. These administrators were involved in clinical services and had been interviewed as they had been involved in services where multiple Lean projects had been taking place. The administrator, who was interviewed as part of the pilot study group (section 3.8.1) was the only one who had full Lean training and was running Lean projects within her service (AD1 in section 5.5.4.3). There were five other administrators interviewed (see Table 5-2). The administrators interviewed had been positive about the Lean projects in their department. In Dermatology which received a focus in Phase 3 (see section 4.4.3) this focus included review of administrative projects to help improve equitable access to treatment which is further discussed in section 6.4.1.3. Improved relationships were discussed in section 4.4.3.1 and this was further expanded upon in section 5.2.1.3, subsection III, where administration staff discussed not only improved relationships but participation as a department.

The participative nature of Lean was also recognised and how this allowed these lower graded staff to have a voice and have their say in a safe environment in order to contribute to making improvements through Lean. The administrator in section 5.4.2.5 recognised that as someone doing the job, she was pleased that others were taking the time to listen to her which was also evident in the study of HMRC (Procter and Radnor, 2014). Administration staff were positive about the improvements which had taken place as they perceived a better working environment with improved morale (Jones et al., 2006) as hierarchical barriers were being broken down. As discussed in section (section 6.4.3.2 subsection I), cynicism from clinical staff over the methods, aims and outcomes from Lean in section 5.4.4.1 and non-engagement from *'non believers'* (section 5.3.1.1) has been evident in other quality improvement initiatives (Robert and Bate, 2008; Robert et al., 2008; Böhmer, 2009). This cynicism provides a challenge for Lean in breaking down hierarchical barriers and power in healthcare (Waring and Bishop, 2010; Drotz and Poksinska, 2014), although there is evidence of this being successful in NHSL.

The desired impact of Lean in Dermatology, as discussed in section 4.4.1 was to meet current challenges in demand, capacity and equity of access and these outcomes were

discussed in 4.4.3 and 4.5.4. Staff discussed the impact of patient focused booking and how this was expanded following on from the initial Lean project. This meant that staff were able to verify data reported in the case study, that these challenges were met and taken forward which included improving equity of access to services, not compromising it as has been argued in other studies (Carter et al., 2011; Carter et al., 2013).

6.5.5 Medical Staff

Limited attention had been paid to the role of the medical professional in process improvement, such as through Lean implementations (Øvretveit, 2005; Meyer, 2010; Stanton et al., 2014). The role of the medical staff and in this case, those referred to as 'consultants' was an emergent theme in the data collection when interviewees of all demographics were discussing their experiences of Lean. This emergent discussion affected the research questions as a further research question was added in order to determine 'how do medical professionals and professionalism impact Lean implementations?'

An additional literature review was added in this chapter, to support the emergent nature of this research (section 6.2 onwards). The discussion on the medical staff was related to the impact of professionalism (section 5.5.5). This emergent theme was respondent driven and was discussed in relation to Lean such as in attendance at Lean events (section 5.4.2), which then later led to discussions of traditional hierarchies within healthcare (section 5.4.2.5). Discussion of the hierarchical nature of healthcare (section 5.4.2.5) was introduced by interviewees in all staff groups. All groups recognised the hierarchies in healthcare which is aligned to literature where the professions (medical staff) and their position as expert has been cemented in healthcare (Freidson, 1972; Esland and Salaman, 1980) and in the NHS (Larkin, 1988; Davies, 2007; Currie et al., 2009; Martin et al., 2009; Klein, 2010; Currie et al., 2012). This recognition of hierarchies and the role of professionalism provide support for the evaluation of the role of this group in the research.

6.5.5.1 Professionalism and identity

Staff recognised the professional groups as mirroring the definition by Currie et al., (2009) in section 6.2.1 where high degrees of discretion, and autonomy in how work is organised based on specialised knowledge, are characteristics. This recognition and the use and control of specialised knowledge is valued and is what sets apart those with

'expertise' which is recognised by consultants discussing Lean agents in section 5.5.4.4 and affects professional groups and dynamics (Tasselli, 2014).

Professionalism was linked to the holding of an identity as a consultant where autonomous working, resistance to change and own ways of working were discussed by respondents (5.5.5.1). This is aligned to challenges identified in managing the professions within distinct social structures (Pate et al., 2010; Wilkinson et al., 2011; Tasselli, 2015). This impact of the identity of the consultant as a professional and the challenges of managing them was discussed with staff in section 5.5.6.1 who highlighted issues they had with this group and their 'difficult behaviours' with poor communication or resistance to multi-disciplinary work.

6.5.5.2 Behaviours and hierarchy

These difficult behaviours are impacting on Lean and improvement projects where communication and knowledge flows, as well as multi-disciplinary work is expected of medical staff who are expected to demonstrate clinical leadership skills roles in their service (Irvine, 1997; Olsen and Neale, 2005; Currie et al., 2012). This leadership would include driving Lean improvement as engagement and supportive behaviours are areas required for enabling of improvement through Lean (Hines et al., 2008). This demonstration of clinical leadership and engagement was discussed as affecting Lean (sections 5.4.2 and 5.4.3) and impacting momentum (section 5.4.3.1). This maintenance of hierarchies and lack of clinical leadership in accountability which was evident in certain projects, such as Gynaecology in section 5.5.6.1, and TPOT discussed in section 5.5.7, clearly demonstrates the medical staff ability to maintain professionalism and protect their speciality (Johnson, 1972; McGivern et al., 2015) at the expense of Lean. This hierarchy and associated obstructive attitudes towards change were observed in section 5.5.7.2, where behaviours are demonstrated by not just older staff, but younger staff too so this further contributes to the maintenance and protectionism of professionalism (Olsen and Neale, 2005; Spyridonidis et al., 2015).

6.5.5.3 Clinical and Managerial Relationships

Section 5.6 incorporated discussion where staff had commented that where Lean was successful, it was due to good relationships being present in and across services. This included relationships between clinical staff and managers which was expanded upon in section 5.6.1 as poor relationships between these groups were discussed by Lean leads

and medical staff. Medical staff were discussed as being *'very sceptical and wary'* which was evident in literature discussing these relationships in healthcare (Bruce and Hill, 1994; Harrison and Pollitt, 1994; Currie et al., 2008b). This wariness can be directly linked to discussion that followed in section 5.6.2, where 'jumped-up nurses' and 'nurses with clipboards' had been used by medical staff interviewees in discussing medical staff attitudes to managers. This can be directly linked to literature where nurses were encouraged to move into management in the 1980s through quality posts (Harrison and Pollitt, 1994; Klein, 2010; McGivern et al., 2015). This focus on management in the 1980s was viewed as being able to help to constrain clinical dominance (Davies and Harrison, 2003; Degeling and Carr, 2004; MacIntosh et al., 2012) and was associated with command and control and surveillance (Plsek and Wilson, 2001; Martin and Learmonth, 2012). Even though a focus on professionally led quality improvement was expected from 2008 onwards (Martin and Learmonth, 2012; BMA, 2013), these historical divisions have impacted medical staff, contributing to their wariness and as such, continue to have implications for the implementation of Lean where clinical leadership and good relationships are expected (section 6.5.5.2).

6.5.5.4 Intra-professional dynamics

Although clinical (medical) staff and managerial relationships were evaluated in how they impacted Lean by staff in services, intra-professional relationships and their dynamics were also proposed as affecting Lean implementations in various services. The use of Lean in improving relationships had been identified in section 5.2.1.3, subsection III as respondents linked to how Lean was used to facilitate bringing staff together and this was particularly discussed by Dermatology staff. This was also evident in the content analysis data (sections 4.3.3.1, 4.4.3.1 and 4.7.3.1) but staff including the Lean leads, HR, nurses and service operational managers highlighted issues. Medical staff have been referred to by others as having 'personality problems' where representation at Lean events and communication is impacting Lean initiatives (section 5.7.1.2). Warnings in literature of intra-professional cliques (Currie and Suhomlinova, 2006; Martin et al., 2009; Tasselli, 2014) and the existence of traditional work roles and demarcation boundaries between medical staff (Stanton et al., 2014) were evident in Dermatology and TPOT, thus providing a further challenge to Lean.

6.5.5.5 Impact of staff roles and professionalism

Section 6.3 considered how Lean is implemented in NHSL and the role of the Lean team and the expectations of the Lean trained change agents were discussed here. Sections 6.5 through to 6.5.4 have considered the roles of Administrators, Managers and Nursing staff in Lean implementations. Sections 6.5 through to 6.5.5.4 evaluated the impact of medical profesisonals and their professionalism and how this has had an impact on Lean to the extent that desired outcomes have not been feasible due to their lack of engagement. In considering these different groups of staff, this has uncovered areas of complexity which is impacting on Lean. Therefore, the following two propositions have been generated from the evidence from the case study data discussed here:

Proposition 6: Cross-functional and multi-disciplinary teams are a key enabler for Lean success.

Proposition 7: Medical professionals and their professionalism appear to negatively impact Lean implementations and further focus on medical professionals is required to foster Lean success.

6.5.6   Senior management

Poor relationships between clinicians and managers have been discussed in section 6.5.5.3 and this impacts the roles held by staff in Lean implementations. Section 6.5.1 also discussed managers but this was compared to the medical staff they manage as these managers cannot be comparable to mangers in non-clinical settings due to the distinctiveness of healthcare (Degeling et al., 1998; Hendy and Barlow, 2012). At the time of the Lean implementations commencing in NHSL, the CEO had been in post for six years (section 5.1.5) and continued until 2012. This would be considered unusual in comparison to Fillingham (2008) citing the short lifespan of a CEO in the NHS in England as being less than two years which is supported by Dyer (2011) discussing sackings of CEOs which impacts the sustainability of initiatives such as healthcare improvement through Lean. The role of the CEO in supporting Lean was discussed in section 5.2.1.1. The executive senior management were positively discussed in section 5.4.2.3 in their attendance and support for Lean as this included not just verbal support but attendance at Lean events which was described '*buy-in*' (section 5.2.1.1). There has been a change in CEO at NHS Lothian since 2012, after the previous CEO retired, but Lean has continued after the appointment of the current CEO.

6.5.6.1 Senior Management and Scandal

Medical staff introduced discussion on senior management into the interviews. This was also consistent with interviews which were subsequently conducted with operational and HR managers. The context of this is discussed in section 5.8, when NHS Lothian was engulfed in a scandal over waiting time's lists and the management of patients. Two reports were subsequently published on this topic discussing waiting times and the management culture of NHSL (Bowles and Associates Ltd, 2012; PWC, 2012) and in interviews, staff including operations managers, medical staff and HR managers inevitably referred to these events. The cynicism and wariness over management which was discussed in section 5.6.1 and 6.5.5 would be further compounded by these events. Parallel views were provided by staff (section 5.8.1) with operations managers discussing the management culture and pressures they were under. There was also recognition by medical staff about management '*being asked to do difficult things*'. However, others discussed the disconnect between what is being said and what is reality which was also evident in earlier discussions of Lean (section 5.4.4) and the role of managers in facilitating this is potentially also viewed in earlier discussions of diplomat managers (5.5.7.1). The strategic application of Lean was discussed (sections 4.1.2, 4.4, and 5.2.1) but cynicism over Lean and the strategy articulated related to these events and their reporting. This 'scandal' was also considered as potentially another competing priority which would affect time available for Lean and outcomes that could be generated (section 5.4.4.2, subsection I) due to structure change and in the reviewing of competencies which were discussed in section 5.8.1 by OM3 and HR3. The challenges that this scandal has brought and impacted the view of senior management from staff will create challenges for Lean, and may affect the creation of an environment for staff engagement with Lean (proposition four in section 6.4.3.2 subsection III). Mazzocato et al., (2014) highlight that there is limited discussion when Lean is faced with, and how it works during interaction with different contexts and this is certainly evident here. One study published latterly was that of Gossamer Hospital where initial Lean successes, which included a whole organisational approach to Lean, were detailed (Burgess et al., 2015). However, sustainability was uncertain when the organisation faced its own crisis when it ran into financial difficulties, failed to meet targets and the Chief Executive took early retirement, to be replaced by new management (Burgess, et al., 2015). The challenges in Gossamer facing targets and new senior management were also evident in NHSL (section 5.8). At

the end of research period in NHSL in the aftermath of the crisis, Lean was continuing, but how much the scandal would have impacted Lean is at this time uncertain.

6.6 Summary and Implications for Research

This chapter has evaluated the implementation of Lean in NHS Lothian and the evidence for this is provided within the content analysis of the Lean in Lothian reports in Chapter 4 and the case study data reported in Chapter 5. In the utilisation of multiple methods of data collection, this thesis has provided an in-depth study of the approach to Lean by NHSL. The use of interviews within the case study reporting has provided an in-depth insight into the implementation of Lean through those who have been involved in generating those outcomes or have been impacted by the Lean improvements made. This has contributed to potential new insights being generated in order to understand Lean implementations in healthcare.

Section 6.3 is related to the answering of research question one in determining how Lean is implemented in NHS Lothian. The identification of a dedicated Lean team who had adopted a consistent approach to Lean allowed for the mapping of the process. The programme approach to the implementation of Lean was discussed and this adds insight currently lacking in existing literature. This detail would be applicable to other healthcare organisations seeking to commence Lean implementations. Within the mapping of the approach to Lean, it was demonstrated how the implementation process placed a focus on staff prior to commencing Lean events.

Section 6.4 identified the impact and outcomes from Lean in NHS Lothian. The content analysis in Chapter 4 provided details of what outcomes were generated through Lean and the impact these were to have on the organisation, through an exploration of the types of projects conducted. Where limitations were identified in the content analysis, the case study provided a greater level of detail and was able to support discussion on the impact of Lean. A variable impact was evident with some projects providing greater impact than others and the reasons for this were explored. Measureable outcomes and other more qualitative or intangible outcomes were discussed in Chapter 4 and Chapter 5. Thus this thesis presents evidence that as well as impacting the healthcare environment and generating measureable benefits that impact patients, Lean can also positively impact staff of all grades. This then enables the staff to generate improvements which as a process is closer to the Toyota model which endorses respect for people and involves people of

all levels owning improvement (Monden, 1983; Ohno, 1998). Although outcomes garnering measureable benefits were evident, NHSL were facing issues in the sustainability of projects. This meant that one of the emergent research questions (RQ5) could also be answered here as there is evidence of sustainability of Lean in some services, but this is not consistent across all areas where Lean implementations have taken place. What also became clear and was further explored in section 6.5, was how the sustainability of Lean in NHS Lothian was impacted by staff engagement and this was further explored when reviewing staff roles in Lean and the impact of medical professionals and professionalism.

Section 6.5 discussed the roles of healthcare staff hold in the implementation process. This investigation of roles of staff, contributed to adding insight into the roles of medical staff in the Lean implementation as this exploration had received limited reporting to date (section 2.10). The exploration through the case study analysis highlighted complexities as discussed by case study respondents. These complexities uncovered enablers and barriers to Lean with the same factors being identified by respondents as both an enabler for and a barrier to Lean. An enabler for Lean was the use of Lean to breakdown established hierarchies but the attempt by some medical staff groups to maintain these hierarchies through non-engagement and bad behaviours was also identified as a barrier to Lean. This meant another emergent research question was answered here in how medical professionals and professionalism impact Lean implementations. The identity of a medical professional which is enshrined within professionalism with autonomy and control of knowledge (Johnson, 1972; Currie et al., 2009, Tasselli, 2015), had a clear impact on Lean, to the extent of key medical consultants not engaging in Lean which impacted outcomes, timescales and raised concerns of sustainability of projects. This impact of professionalism had been explored through the sociology of the professions

Throughout the discussion contained in this chapter, a series of propositions were generated as a result of evaluating the implementation of Lean in NHS Lothian:

Proposition 1: The Lean team who facilitate improvement must be succession planned for embedding and sustaining Lean in the organisation.

Proposition 2: A clearly mapped process articulating intentions, approach and expected outcomes which is applied by those responsible for Lean improvement, provides consistency in approach in the implementation of Lean.

Proposition 3: A clear alignment between organisational strategic objectives and consistency in leadership support for Lean is required for Lean to be sustainable in the longer term.

Proposition 4: Creating psychologically safe spaces and protecting time for staff to engage in Lean, facilitates the breakdown of traditional healthcare hierarchies.

Proposition 5: An increased focus on training and development of all staff is required for driving sustainability of Lean.

Proposition 6: Cross-functional and multi-disciplinary teams are a key enabler for Lean success.

Proposition 7: Medical professionals and their professionalism appear to negatively impact Lean implementations and further focus on medical professionals is required to foster Lean success.

7.0 Conclusion

7.1 Introduction

The conclusion to this research study is presented in this chapter. The aim of this chapter is to provide a summary on the approach taken in this thesis in order to evaluate Lean in NHS Lothian. The contribution to knowledge from this thesis will be articulated. The limitations of the research will be considered and recommendations for future research will be presented.

7.2 Thesis aim and research questions

As articulated in section 7.1, the overarching aim of this research was to critically evaluate the implementation of Lean in NHS Lothian. Objectives to achieve this aim were provided in Chapter One and included how Lean was implemented in healthcare which was detailed in the literature review in Chapter Two. The second objective was also to review the longer term impact of Lean, e.g. move beyond the initial two to three year period of implementation which also aided the answering of the aim due to the selection of NHS Lothian, a health board which had been implementing Lean for six years at the time of research. Evidence to support the sustainability of Lean was assessed. A lack of focus on the social aspects of Lean where the focus had previously been on outcomes achieved meant the third objective was to understand staff roles in Lean. These objectives were further refined to research questions which were derived from the literature review. Subsequently three research questions were identified in order to address this aim and expand on the aforementioned objectives. These three questions were then supplemented by a further two research questions which were emergent from the study as it progressed. Research methods including content analysis, observations and interviews as part of an interpretivist case study strategy were applied to answer these research questions which are provided below:

RQ1. How is Lean implemented in NHS Lothian?

RQ2. What is the impact of Lean in NHS Lothian?

RQ3. What roles do healthcare staff including medical professionals, involved in the implementation process, hold in terms of the effective implementation of Lean?

RQ4. How do medical professionals and professionalism impact Lean implementations?

RQ5. How is sustainability of Lean evident in NHSL?

The methods applied were aligned to an interpretivist-constructionist paradigm, as discussed in Chapter Three. Within a social constructionist paradigm some accounts may receive more attention as the power and influence of the respondent '*voice*' commands it (Burr, 2003). This was evident in the research, especially in the areas of identifying the roles of staff within Lean and also in the impact of medical staff and professionalism on Lean implementations in answering research questions three and four.

7.2.1 Answering the research questions

The following sections will discuss the key findings of the thesis in relating how the research questions set have been answered.

7.2.1.1 Answering Research Question One

In response to the findings of Chapter Two (sections 2.6 and 2.10) the majority of literature sources fail to provide clear detail about how Lean is actually implemented in healthcare. The HMRC approach was mapped by Radnor (2010) but this is a public sector body and is not specifically a healthcare institution. Fillingham (2008) provides illustration on the use of the Lean team at Bolton and the development available for staff in building Lean capability internally. Mann (2005) emphasises that the implementation process must include a strong focus on people, more so than tools.

As such the first research question sought to understand how Lean was implemented in an organisation that was known to have been implementing Lean for six years at the time of research. Utilising case study data and content analysis, the question of how Lean was implemented could be answered and the key findings are:

- A dedicated team facilitates the implementation of Lean but the approach used to date has been limited in developing change agents beyond this team to support Lean.
- Figure 5-7 provides a mapping of the process for initiating and implementing Lean projects in healthcare.
- The case study data provided further evidence on the approach to Lean in healthcare in recognising the need for cultural change and embedding Lean with

strategy, supported by senior management. This was then aligned within the initiation and implementation process to focus on people, rather than tools, which contributed to Lean successes.

7.2.1.2 Answering Research Question Two

The second research question sought knowledge in order to determine what is the impact of Lean in NHS Lothian? This question was answered by content analysis of Lean in Lothian project reports from the periods 2006 through to 2012. Six phases of reporting were analysed in Chapter 4, with the analysis tables contained within Appendix 4. The drivers, outcomes and sustainability of projects were assessed from the documents provided. Case study data also supported discussion of these projects as this information was provided by those responsible for or were participating in Lean. Literature has focused on outcomes from Lean (Ben-Tovim et al., 2007; Fillingham, 2007) but the focus tends to be on localised and disjointed Lean projects (Radnor et al., 2012) which are commonly reported in their early stages (Mazzocato et al., 2014). Lean in Lothian had moved away from work solely on the Emergency Department (Dickson et al., 2009; Holden, 2011) or a focus on pathology or other laboratories (Papadopoulos et al., 2011). As such, this was the opportunity to view the impact of Lean in an organisation which had been implementing Lean for six years. The content analysis data supported by the case study data, was able to illustrate that the NHS Lothian approach to Lean had moved beyond a small and fragmented project approach. Although Lean in Lothian was described as a programme of work, a systemic approach to implementation (Burgess and Radnor, 2013) was evident in some areas with staff taking ownership of projects and in cases such as Dermatology, initiating their own projects to further develop Lean in the service. The projects undertaken by Lean in Lothian also included cross-disciplinary and multi-agency projects which had moved beyond the acute setting and little evidence of this has existed to date (Radnor and Osborne, 2013; Lindsay and Kumar, 2015). Utilising the content analysis, the question of what is the impact of Lean in NHS Lothian could be answered and the key findings are:

- A variable impact from Lean was evident with some projects generating successful outcomes with others facing challenges in sustainability. This however, was not always explicit in the content analysis and instead was explained through the case study data.

- Lean had a qualitative and perceived intangible impact in improved team and multi-disciplinary working. Staff perceived Lean as improving service and multi-agency relationships where there had been pre-existing tensions.

7.2.1.3 Answering Research Question Three

The third research question sought to understand what roles do healthcare staff including medical professionals involved in the implementation process, hold in terms of the effective implementation of Lean? In order to answer this question, the case study data was gathered and used to determine the involvement of different staff groups and the roles they held. In doing so, this data would be used to explain areas of complexity that had been identified when answering research questions one and two.

A dedicated Lean team were identified as facilitating Lean implementations, delivering training for Lean and supporting staff undertaking their own Lean projects. This was also evident in the study of Bolton hospitals (Fillingham, 2008). Other service staff such as; service operational managers, medical staff, nurses and administrators were all expected to be involved in generating and maintaining improvements (Furman and Caplan, 2007; Joosten et al., 2009). This expectation was evident in NHSL too. The case study data support instances where this had happened and also provide an illustration of challenges. Senior management were recognised as supporting Lean in the organisation (Radnor and Walley, 2008; Radnor, 2010). HR Managers had no involvement in Lean.

As a result of identifying what roles do healthcare staff including medical professionals involved in the implementation process, hold in terms of the effective implementation of Lean, the following key findings are presented:

- Lean can be most effective when there is cross-disciplinary engagement but where this is lacking, challenges to success and sustainability of projects is evident.
- Staff at all levels were encouraged to participate in Lean and Lean training.
- Lean is enabled by hierarchies breaking down but also affected by barriers in attempts at maintaining traditional healthcare hierarchies.

7.2.1.4 Answering Research Question Four

The fourth research question sought to ascertain how do medical professionals and their professionalism impact Lean implementations? This was an emergent research question as the content analysis of the Lean in Lothian reports had alluded to issues with medical

staff in the progress of Lean projects. In order to answer this question, the case study data was gathered and used to determine how medical professionals and professionalism impacted Lean. In doing so, this data would be used to explain areas of complexity that had been identified when answering research questions one and two. An additional literature review was added to Chapter 6 which discussed medical professionals and how their professionalism had impacted previous initiatives in the healthcare domain (Currie et al., 2009; Currie et al., 2012; McGivern et al., 2015; Spyridonidis et al., 2015). Medical staff in their clinical leadership roles were expected to be involved in driving Lean improvements in their services. However, the Lean team, service operational managers, nurses, administrators and medical staff recognised challenges from medical staff who had been expected to deliver clinical leadership in contributing to improvement, but in some cases, this was not evident and impacted the progress of and outcomes from projects. This impact on Lean was attributed to the role of the medical professional in the healthcare hierarchy and their professionalism which meant they could only be managed by their peers and they had autonomy which was not challenged by service managers or in some cases, their peers.

As a result of evaluating how medical professionals and professionalism impacts Lean implementations, the key findings are presented:

- Historical healthcare hierarchies supporting professionalism are still in evidence.
- Professionalism presents a challenge to Lean and can subvert desired outcomes.
- Where projects are driven by service management and there are pre-existing relationship tensions with medical staff, this will present further challenges in engagement with Lean improvements.

7.2.1.5 Answering Research Question Five

The fifth research question sought to identify 'how is sustainability of Lean evident in NHSL?' As with research question four, this was an emergent research question from the content analysis of the Lean in Lothian reports. Sustainability of improvement initiatives have been found to be challenging (Bateman, 2005; Burgess and Radnor, 2013; Mazzocato et al., 2014; Burgess et al., 2015). Training and development of staff contributes to sustainability (Hines et al., 2008; Radnor, 2010) but this was impacting Lean in NHS Lothian were training was not being used properly. The Lean in Lothian reports had reported the sustainability of Lean projects from Phases Two through to Five

but from Phase Six, there were no reports of how previous projects had been sustained. It was not clear from the annual reports why this would be an omission and so this question was answered with the support of the case study data. This emergent research question is also linked to research question two as Lean has had an impact in the organisation and delivered clear outcomes and improved service provision which has been maintained in areas, but this has happened inconsistently.

Staff were able to illustrate their experiences providing discussion on projects which had been sustained and taken forward and also those projects which had not been sustained. As a result of identifying how sustainability of Lean is evident in NHSL, the following findings are presented:

- There is evidence of sustainability of Lean in NHSL but this is not consistent across all Lean implementations in the organisation.
- The sustainability of Lean is impacted by the non-engagement of key groups of staff.
- Continued training and development for staff in Lean will support sustainability in the organisation but this has been limited to date.

7.3 Contributions to knowledge

As the aim and research questions for this study have been discussed, this section will now discuss the contributions to knowledge from this thesis.

This thesis offers three contributions to knowledge:

1. Mapping the approach to Lean and providing extended discussion of the process of Lean implementation is a contribution to Programme Theory. The Programme Theory application for driving change provides a structured mechanism for the approach, processes to support change and outcomes required for effectiveness (Davidoff et al., 2015; Goicolea et al., 2015). This was evident in NHS Lothian in how Lean was applied.

2. Qualitative evidence that Lean faces barriers in the form of the existing hierarchy and professionalism such as that which is evident in healthcare (Waring and Bishop, 2010; Stanton et al., 2014). This further contributes to the knowledge base of Lean from an Operations Management perspective but offers a contribution as Lean engagement by

medical staff is evaluated through the theoretical lens of the sociology of professions (Johnson, 1972; Friedman, 1972, Currie et al., 2009).

3. A set of seven propositions which provides a framework for the implementation of Lean in healthcare. These propositions are derived from the data provided in this study.

7.3.1 A series of propositions as a framework for Lean

A series of propositions are generated from the research in this thesis to be used as a framework for the implementation of Lean in healthcare. Although this framework for Lean was derived from healthcare research, this may also be applicable in other professional environments seeking to undertake Lean implementations, where hierarchies related to professional practice exist.

The evaluation of Lean in NHS Lothian presented evidence of clear organisational ownership with a focus on targets. This resulted in measured improvement but faced challenges in people and professionalism and hierarchy issues which was evident in other studies (Ben-Tovim, et al., 2007; Fillingham, 2007; Furman and Caplan, 2007; Ben-Tovim et al, 2008; Fillingham, 2008; Toussaint, 2009a; Toussaint, 2009b). However, Lean was implemented to focus on staff and aligned to culture (Mann, 2009) and not from a crisis point in comparison to Bolton, Flinders and Thedacare (Ben-Tovim, et al., 2007; Fillingham, 2007; Toussaint, 2009a; Toussaint, 2009b). NHS Lothian did acknowledge that in line with other state providers of healthcare, they faced challenges over budgets and resources (section 5.2.1.3).

As a focus on staff in Lean had been lacking and especially a focus on professions within Lean (Stanton et al., 2014) then this further identified and illustrated the challenges Lean faced in hierarchical environments and which could impact the overall implementation of Lean. In managing these challenges this would facilitate an implementation which is close to original Lean (Monden, 1983; Ohno, 1988; Dickson et al., 2009) to include the 'respect for people pillar'. The need for Lean being adaptive to the healthcare environment is encompassed and in doing so, would begin a move away from a tools-based approach which has been common in literature to date (Radnor et al., 2012). The impact of hierarchy and professionalism found in this study was also evident in other studies (Bishop and Waring, 2010; Papadopoulos et al., 2011) and highlights the impact that these distinct groups have in Lean. This would be something else to manage in the implementation process.

In grounding the research in the data, the following propositions as a framework are presented:

Proposition 1: The Lean Team who facilitate improvement must be succession planned for embedding and sustaining Lean in the organisation.

Proposition 2: A clearly mapped process articulating intentions, approach and expected outcomes which is applied by those responsible for Lean improvement, provides consistency in approach in the implementation of Lean.

Proposition 3: A clear alignment between organisational strategic objectives and consistency in leadership support for Lean, is required for Lean to be sustainable in the longer term.

Proposition 4: Creating psychologically safe spaces and protecting time for staff to engage in Lean, facilitates the breakdown of traditional healthcare hierarchies.

Proposition 5: An increased focus on training and development of all staff is required for driving sustainability of Lean.

Proposition 6: Cross-functional and multi-disciplinary teams are a key enabler for Lean success.

Proposition 7: Medical professionals and their professionalism appear to negatively impact Lean implementations and further focus on medical professionals is required to foster Lean success.

7.3.1.1 Limitations of Research

The discussion will now turn to the limitations of the research as discussion has been provided as to how the research questions from this study have been answered. The research is underpinned by two main sources of data: the data from the content analysis of the Lean in Lothian reports and the case study data. Limitations of the content analysis were acknowledged in section 3.10.1 as six years of reports were subject to content analysis. Further iterations of content analysis may uncover additional insights into the sustainability of Lean in NHS Lothian. However, case study data provided confirmability of impact and outcomes and also for understanding the roles of staff in Lean implementations. Transparency of the research processes employed in this thesis has been discussed and illustrated in Chapter 3.

The data provided here provides a snap-shot in time of the Lean implementation in NHS Lothian which was, at the time of interviewing, being potentially impacted by contextual factors as discussed in section 5.8. This may have wider, longer-term ramifications for Lean in this organisation but these are yet to be explored and are beyond the scope of this thesis.

7.3.1.2 Implications for Research

Although the limitations of this research have been acknowledged in section 7.3.1.1 above, the research presented in this thesis is important for other researchers as a reference for future studies. The thesis provides an evaluation into the implementation of Lean from a Scottish perspective and does so using the second largest health board in Scotland. This case study focused on one organisation, but as the status regarding the implementation of Lean in other NHS Health Boards in Scotland at the time of research was unclear, there is further scope potentially to identify the progression of Lean across Health Boards in Scotland and take a comparative approach.

7.3.1.3 Implications for Practice and Policy

A mapping of the implementation process as a programme approach is provided and this may help/inform practice for other healthcare institutions that are unsure how to commence Lean implementation.

The implementation of Lean in NHSL has shown the positive impact that Lean can have in improving service provision and ensuring equity of access for patients. However, there is not consistency in delivering and sustaining outcomes from Lean.

The identification of complexities experienced within the healthcare environment which included behaviours and intra-professional challenges may further inform practice. Lean has been endorsed by the Scottish Government (section 1.2) but this in-depth exploration of one of the first Scottish Health Boards to commence Lean implementation evaluates there are clear issues in the implementation and sustainability of Lean when it encounters professional resistance. Further implications must be considered in aligning Government policy after engagement of relevant stakeholders and this includes external stakeholder such as Professional Bodies and patient groups. In practice, aligning policy initiatives with the Professional Bodies in training and education to support strategic initiatives such

as the application of Lean in healthcare would help to support sustainability in the longer term.

7.3.2   Further Research

The propositions generated have emerged from the research in this thesis but further research and testing would determine their robustness in other settings, whether this is in healthcare or in other contexts. These other contexts may also include other professional and hierarchical environments such as the legal sector. A clear focus must be on the professional groups when commencing the Lean implementation process. This focus on this group could lead to further development of the mapping of the implementation process in Figure 5-7 to inform practice of utilising Lean alongside organisational development tools. This would allow organisations to achieve 'basic stability' prior to commencing a full and systemic Lean implementation (Ballé and Régnier, 2007). Combining Lean and Organisational Development may mitigate some of the issues identified within NHS Lothian regarding clinical-managerial relationships. This may also provide a role for HR Mangers in the development and implementation of Lean as this was lacking in this study.

Several elements were emergent from the research that was undertaken here. Some staff discussed the concept of 'Lean Agents' (introduced in section 5.5.4.4) and further research on this topic in relation to medical staff in this role could be undertaken by applying agency theory to research within the professions of Lean. The implementation process was mapped out in Figure 5-7 where a focus on people was evident. This could be further evaluated in terms of the concept of psychological safety where an environment is created so staff feel safe in speaking out and proposing improvements. Respondents in this study recognised the value of a focus on people but also that they were in an environment where their voice could be heard and their contributions valued which was unusual. Therefore this could be further developed and evaluated by applying a focus to psychological safety within Lean. This would also answer previous calls for the development of operations management in researching in areas such as Lean but adding cross-disciplinary insights (Taylor and Taylor, 2009).

7.4 Research Conclusions

The ultimate aim of this thesis was to evaluate the implementation of Lean in NHS Lothian and this was undertaken through the lens of Lean and the sociology of

professions. This research has achieved this by considering how Lean is implemented (research question one), determining what is the impact of Lean in NHS Lothian (research question two) and uncovering what roles do healthcare staff, including medical professionals involved in the implementation process, hold in terms of the effective implementation of Lean (research question three). Further consideration was applied to how medical professionals and professionalism impact Lean implementations (research question four) and how is sustainability of Lean evident in NHSL (research question five). As discussed in section 7.3, this research has contributed to an understanding in how Lean is implemented in healthcare. Implications for practice from this research are also considered here. It is hoped that this research can be used as a platform for further contributing to the knowledge of Lean in environments beyond manufacturing by focusing on the social aspects of Lean and the development of new theoretical lenses.

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9.0 Appendix 1

Participant information sheet

Thank you very much for agreeing to participate in this study. This information sheet provides details of the study and how I would like you to take part in it.

The purpose of this study is to research how Lean is implemented in NHS Lothian through ascertaining the views and experiences of this who have been/or still to be involved in Lean implementations. By ascertaining views about experiences of Lean, this could help healthcare organisations in improving the following areas in moving forward with Lean implementations:

- Perceptions of Lean, both by those who have been involved in leading and implementing projects and those who have not and have still to be engaged in the improvement process through projects and/or training;

- Highlight areas of good practice and potential areas for development in NHS Lothian;

- Engagement with training and Lean knowledge – enabling those trained to take on and drive current and future improvement projects;

- Identification of enablers and barriers which have impacted the Lean implementation/improvement project and potential areas for learning.

In order to elicit your views, Claire Lindsay of Edinburgh Napier University will conduct an interview. If you agree to this, the interview will be audio recorded and will last no longer than 1 hour.

The information provided in this interview, will be used for research purposes. It will not be used to identify any individuals. This study has been granted ethical approval at Edinburgh Napier University and has been granted NHS Lothian approval by Melanie Hornett, Nurse Director, NHS Lothian.

Once again, I would like to thank you for agreeing to take part in this study. If you have any questions about this research at any time, please do not hesitate to contact me.

Contact: Claire Lindsay, Edinburgh Napier University, Craiglockhart Campus, Edinburgh, EH14 1DJ. Email/Telephone: c.lindsay2@napier.ac.uk / 0131 455 4323

Appendix 2

Briefing Note

This research project investigates implementation of Lean Thinking in healthcare through ascertaining the roles of key stakeholders at strategic and operational levels in the organisation.

This project is a qualitative study based on the views of NHS staff in NHS Lothian. The role of senior leadership is a critical success factor in driving Lean in healthcare. For this reason, I have requested to speak to ████████████ and ████████.

Some key areas which I would like to discuss are:

- Key drivers for implementing Lean in NHS Lothian

- Choice and role of GE Healthcare in the Lean in Lothian Programme

- Lean and NHS Lothian's strategy

- Progression of Lean in Lothian

I would like to request your permission to digitally record this interview. Only the researcher (Claire Lindsay) would have access to these recordings which would be destroyed after this research project has been completed.

For any further information which may be required, my contact details are as follows:

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Appendix 3:

Interview Protocol

Role and knowledge of Lean

What do you know about Lean?

Have you been involved in Lean?

Describe the role you had in Lean improvement?

Process of how Lean is implemented

Describe the Lean event you were involved in?

What challenges do you perceive Lean to face?

Impact

What benefits have been evident from Lean?

What has been the impact of Lean in your service?

(This may be discussed in terms of tangible and intangible benefits and impact)

Has this been sustained?

How has Lean progressed in your service?

Appendix 4: Content Analysis Tables

Table 1-1 Phase 1, CT Scanning

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revisited in Phase 2
Project	CT Scanning	Kaizen event, 5S, VSM, culture change linked to continuous improvement	Pooling of CT slots to improve productivity and removing variation in waiting times across sites	CT times monitored to ensure maintenance. Process owners monitoring cycle times. Change of staff culture as further improvement activities identified (7). 5S being applied to workplace to support faster processing of admin and reports.	CT waiting times have reduced - in 2007 CT waits remained at a maximum of 4 weeks though there has been an increase to 6 weeks in April 2008. Hot reporting secretary is still available to facilitate faster processing of admin and reports. Reports are available on average 1.8 days after the exam has been carried out with 70% of reports available the same or next day.
Drivers for Project	Waiting time from referral to treatment was up to 21 weeks., so in breach of 9 week target		Cost avoidance of £75k per annum in buying in scans to meet targets. Dramatic reduction in waiting times - now down to 4 weeks, from target of 6 weeks. Maximum time for CT report dispatch now 24hrs instead of 3 weeks.		
	CT waits across Lothian varied and reporting times also varied				

Table 2-1, Phase 1, New Patient Breast Clinic

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revisited in Phase 2
Project	New Patient Breast Clinic	Kaizen, VSM	One stop clinic for diagnosis and reporting. Improved GP triaging and advice service for GP's.	Trial week is only just commencing so early days as yet. Weekly meetings expected as well as financial and executive support.	One stop clinic is operational - pilot first then introduced from January 2008. Clinics now provide same day diagnosis rather than patients being required to attend for 2-3 clinics and 97% of patients have indicated they prefer the one stop approach. Clinic approaches are consistent (including clinic sizes to manage workload). Hot reporting (same day) to minimise lost reports.
Drivers for Project	Patients waiting up to 6 weeks for breast clinic appt. - danger of breach of 62 day cancer target. Patients may also have required multiple appointments for diagnosis.		Improved clinic rota for staff to maximise appointments and patient experience. Standard Operating Procedures/guidelines for different medical issues and their management in the clinic		

Table 3-1, Phase 1, Colorectal Referrals

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revisited in Phase 2
Project	Colorectal Referrals	Kaizen event, 5S, VSM, SOP's	Waiting time reduced to 18 weeks and on track to reduce further to 9wks. Increase of capacity to eliminate backlog.	Increased capacity to eliminate backlog. Increased monitoring to ensure wait times are not deviating. New SOP's applied to appointments.	9 week target for colorectal diagnostics was reached by September 2007 and waiting times for routine colonoscopies by the end of April 2008 is 9 weeks and 2 weeks for urgent patients. Capacity has been increased to eliminate a backlog of referrals and waiting times are being tracked weekly to ensure progress is being maintained.
Drivers for Project	Routine patients waiting up to 29 weeks for diagnosis via colonoscopy - breach of 62 day cancer target. Delays in receiving and triaging outpatient referrals, DNA's.		24 extra clinical nurse specialist slots identified. 20 additional colonoscopy slots identified across Lothian per wk. resulting in cost avoidance of £160k. Daily triaging so rapid turnaround of appt. 5S applied to admin so improved processing.		

Table 4-1, Phase 1, Single System Bed Management

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revisited in Phase 2
Project	Single System Bed Management	Kaizen	Potentially 80+ hours per week savings of nurse time in travel time and meetings, released for patient care. Equivalent to £50k per annum of resource.	Daily reviews by bed managers who are using the bed system. The system also notes if the bed states is updated on time or not (to be updated 4 times per day) so to create pull and also acts as an added check for full adoption and roll out by all sites.	Same outcomes are repeated here such as the potential release of 80+ hours per week being saved due to reductions in travel times and meetings for nursing staff. Again notes the use of the bed management system, daily reviews and system noting of updates on time or not.
Drivers for Project	Availability of beds in downstream hospitals which were not tracked by managers in acute sites. Aim to provide bed managers with constant visibility with a centralised system to prevent wasted time through meetings and managing problems.		MoE beds are available for the right patients which results in pull at the front door and impacts positively on meeting 4 hour front door targets. Prototype IT system developed and implemented in 2 weeks. Co-location of bed managers and discharge facilitators for improved communication.		

Table 5-1, Phase 1, MoE Length of Stay

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revised in Phase 2
Project	Medicine of the Elderly (Reduce Length of Stay in MOE)	Kaizen	72 OT slots per month released to support new patient assessments. Earlier transfer of patients to appropriate downstream care released 2400 bed days per annum, with a cost differential of £300 per day. This transfer also impacts, reducing pressure on the front door which is impacted by the 4 hour target. Social work criteria poster is visible for staff in making accurate and timely decisions about patients.	The Head of Service for Occupational Therapy will continue to monitor the release of additional sessions. This MoE project is linked to another kaizen based on the Single Bed Management System which provides complete visibility across Lothian of available beds.	Earlier outcomes noted previously such as the release of 72 OT slots and the bed management system are noted. Length of stay reductions have been achieved with average length of stay in January 2007 being 50 days compared to 45 days in January 2008. The release of additional OT capacity is still being monitored by the Head of Service.
Drivers for Project	Need to have patients in the beds appropriate to their needs and increase the utilisation of downstream beds. Also aimed to improve communication between hospital and social work staff.		The MoE project is also supported by the Single Bed Management system which facilitates utilisation of beds in acute sites (RIE) as well as utilisation of downstream beds.		

Source: Lindsay and Kumar (2015)

Table 6-1, Phase 1, Alternatives to Acute Admissions

Date	P1 2006-2007	Project Type	Outcomes	Sustainability	Revisited in Phase 2
Project	Alternatives to Acute Admission	Kaizen	Identification of 6 additional assessment slots at Roodlands Day Hospital. Potential for the saving of 300 acute bed days per annum.	Four week pilot to have redesigned assessment slots at Roodlands acting as an alternative to admission. Work also to commence on pre-planning and scheduling tools and 'flexing' patient transportation. Also work being done on single point of contact for MoE assessments, same day lab results and on-site diagnostic service Monday to Friday.	Pilot conducted - 10 patients who would normally have been assessed and sent to A&E at the RIE or ARU at the WGH, 8 patients avoided admission which released an estimated 56 days in acute beds. The project was funded (£65,000) for 5 months and 64 patients avoided admission, releasing an estimated 448 acute bed days, which is a cost avoidance of £260,000 per annum. 86% of the patients though they were receiving the right care in the right place with 2% thinking they should have been admitted. Full roll out of the project across Lothian's 4 other day hospitals currently being considered.
Drivers for Project	Better outcomes if early people can be managed close to home so admission to acute care should only happen when specialist diagnostics and treatment is required. An alternative MoE pathway will reduce admission and contribute to length of stay, helping front door pressures.				

Table 7-1, Phase 2, Colorectal Cancer Pathway

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Colorectal Cancer Pathway	Kaizen, VSM.	Move from 58.7% to 90.7% achievement of 62day cancer target, improved use of TRAK (IT) and improved scheduling of colonoscopy (80 per week) to match capacity and demand. Improved visibility of flow - patients and information in pathway.	Use of TRAK for visual monitoring and further integration is planned. Case management has cut breaches and will continue to be monitored.	Consistent attainment of 62 day cancer target. Case management - cancer tracker covering from outpatients to theatre.
Drivers for Project	Breaches in 62 day cancer target pathway, poor information flow and variation in colonoscopies performed per week.				

Table 8-1, Phase 2, Outpatients Ward 4/1

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Outpatients 4/1 @ RIE	Kaizen, VSM, Protocols (SOP's)	Reduced DNA's and appt. management bringing down waiting lists. Staff training in processing and customer service with protocols written with letters used which are appropriate for the service. 3 referral routes for appointments, focus on 62 day cancer target, same day triage for 2/3's of specialities and booking time 26 days max from up to 90 days	Service Manager responsibility for process being maintained. Metrics dashboard developed and sample audits periodically will ensure service weaknesses are identified.	New referrals triaged daily by general surgery and 3 times per week by vascular surgeons so 95% full process done daily. Improved triage form to capture patients on 62 day cancer target. Referrals for endoscopies processed daily and urgent booking happening within 26 days.
Drivers for Project	Delays in receipt, referral and processing appointment (appt.) impacted by batching. High DNAs, confusion over procedures and strained admin and clinical relationships.				

Table 9-1, Phase 2, Cardiology

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Cardiology		Single point of referral and triage to be a pilot at RIE & WGH - if successful then rolled out across NHSL. Capacity utilised at all sites, single point of referral and triage. Triage from up to 21 days to up to 3 days, maximum wait previously 24 weeks, now 13weeks. Additional slots of ECG's (24hrs) identified.	Early stages - trial to be conducted. Dashboard for reporting has been configured to report on patient activity and will continue to be developed.	Consistent new outpatient waits across all sites - waits from 18 weeks in Nov 07 to 12 weeks maximum in March 09. New referrals triaged daily at RIE OPD3. TRAK available on all 5 sites so easier access to appointments.
Drivers for Project	Patients waiting up to 24 weeks for cardiology OP appointment - breach and variable wait times across Lothian with no consistency of service (ECG testing 24hrs), 5 different referral points and processes.	Workout, VSM, VOC			

Table 10-1, Phase 2, Discharge Process

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Discharge Process	Kaizen, SOPs, VSM, VOC	HEAT target exceeded with 100% coding within 2 weeks in ward 207. Increased capacity and coordination for admission and discharges to better meet 4 hour front-door targets. Transport savings estimated at £60k per annum through efficient ordering of transport at ward level. SOP's rolled out for ward processes and use of 'best in class' where project rolled out.	SOP guidelines and associated documentation. Ownership for processes and metrics in use for monitoring as well as visual feedback to improve processes such as visibility of dictation and improved production of discharge letters.	OT staff are completing eAccess for care packages up to 14 hours across all areas and Boarders noted being returned within 2 days. Expected roll out to other wards. Staff using e-booking for patient transport.
Drivers for Project	Breach of HEAT target - target is 95% within 6 weeks and is not being met. Patient information for Primary Care not being disseminated efficiently enough. Profile of discharges and admissions not aligned. Lack of standardisation in discharge processes across NHSL.				

Source: Lindsay and Kumar (2015)

Table 11-1, Phase 2, Pathology Processes

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Pathology Processes	Kaizen, VSM	Reduction by up to 40% in some processing and maximum turnaround times for diagnostics reduced from up to 24 days to 7 days and for large specimens from 36 days to 9 days, with resources (equipment, time and staff) being used more effectively.	Continue to maintain 7 days for diagnostics and 9 days for large specimens in turnaround times. Improved transport service for reduction in delays. Standard reporting metrics for turnaround times agreed and to be monitored by the Clinical Manager. Process Improvement to be taken forward at bi-monthly meeting.	100% of histology reports are typed up within one working day, compared to 2.5 day pre-Kaizen. GI endoscopy samples have remained at post kaizen turnaround times at 4.6 working days even though they are impacted by 11.5% increase in workload. Respiratory sample turnarounds down to 2.5 days from 2.9 days which includes a 4% increase in workload.
Drivers for Project	Delays impacting 62 days cancer target. Centralisation impacting turnaround times and transport and service demand is not aligned. Batching was common and defects included repetition of work. Required improved layout for flow and capacity constraints due to staff scheduling				

Table 12-1, Phase 2, Child Protection

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Child Protection	Workout, VSM - multi-agency	Reduction of waste - up to 30 hours a week in time and information flow related to contact, forms and records and insufficient data stored online. Common form for multi-agency use now in place and improved response rates.	VSM to inform future processes and productivity (e.g. where a consultant or specialist needs to be involved in the referral process. Common language has still to be agreed as this is not consistent and strong leadership is also required - project in early stages.	Problems to date with electronic system for IRDs and business case being developed to share IRDs Lothian wide. Performance measures agreed and monitored.
Drivers for Project	Execution of Initial Referral Discussions (IRDs) where partner agencies consider referring children at risk. Increase of IRDs so child protection is overwhelmed and has insufficient capacity.				

Table 13-1, Phase 2, Substance Misuse

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Substance Misuse - patient focused booking	Workout - multi-agency, VSM, VOC	Reduced DNA rate and reduction in waiting times and improved patient triaging. In pilots drugs have reduced times from 4 months to 2 months and DNA rates have reduced 25% in first two weeks. Alcohol has reduced from 6 weeks to 0-4 weeks and DNA's have reduced from 65% to 7%. Improved process mapping to show clear process and how patients are managed.	Early stages - sustainability is dependent on capacity of service and further inclusion of other partners (GP's, etc.) may be required.	Standardised appointment scheduling and patient focused booking but 534 clinic hours saved in the alcohol problem service. Drugs trialled the new system and 28% patients increase attendance at new appointment and DNA rate reduced to 21%
Drivers for Project	Waiting times pressures up to 4 months for drugs services and 6 weeks for alcohol services. Drugs DNA rate 40% and inconsistent processes.				

Source: Lindsay and Kumar (2015)

Table 14-1, Phase 2, HSDU

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Hospital Sterilisation and Decontamination Unit (HSDU)	Kaizen, 5S	615 lost instruments returned. 58 non-conforming trays amended with 59% reduction in quarantined trays. 500 pieces of redundant equipment removed. 83% reduction in trays identified as non-conforming, 72% reduction in complaints and reduction of around 10.5hrs of turnaround time (about 30%).	Dashboard developed and weekly reviews to maintain this. Continuous improvement in service is planned. 5S and reorganisation of instrument store to ease replacement of instruments.	Six sigma status attained and sustained (99.9997%), 98% reduction in missing instrument complaints, 96% reduction y-o-y in number of contaminated devices.
Drivers for Project	100 Non-conforming surgical trays, 32 trays in quarantine, 103 complaints about missing instruments, inconsistency in quality, finding replacement instruments.				

Table 15-1, Phase 2, Acute Mental Health

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Acute Mental Health	Kaizen, Visual management, VOC	Ward improvements to positively affect patients and staff through therapeutic and psychology based treatments. Options of home treatment team could reduce admissions by 20% and a length of stay by 10%.	Home care teams in place with funding. Psychology training is also funded. Review of roles is planned and upgrading of facilities on wards for 2008-2009.	Home treatment teams in operation. Hospital improvements – £200k investment across hospital for furniture, equipment and painting/floor covering. Life Skills Centre created. Patient documentation standardised across all wards.
Drivers for Project	Admission only is an issue, disjoined admission, therapeutic time is an issue and nurses losing time due to non-nursing duties and the environment poor.				

Table 16-1, Phase 2, Breast Patients

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Breast Patients - long term follow up	Kaizen, VSM, VOC	2000 clinic attendances released, processes defined clearly and rotas developed to meet needs of service. Standardisation of letters through TRAK and patients managed better through follow up. Results letters issued within 10 days, max wait of 14 days for pathology result and CT discussion. Improved appointment booking.	Review of Breast Cancer Nurse role. Dashboard of metrics in place and processes to be further developed to ensure alignment with general clinical system.	TRAK not able to provide long term review waiting lists so appointment still being issued up to a year in advance. Recall mammography patients telephoned and offered appointment within one week and mammogram only letter despatched within 4 working days.
Drivers for Project	Delays in issuing clinic results (up to 69 days), 42 days for appointment for results, inconsistent processes, 31% cancellation rates				

Table 17-1, Phase 2, Administration Project (RHSC)

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Admin Project RHSC	Workout, 5's, process mapping	Link to junior doctors to educate them on dictation techniques. 5S applied to improve H&S issues. GPs to manage patient expectations as waiting times are currently 12 weeks and patient families disrupting secretaries from dictation as wanting to know about appointment - this can be managed by SCI Gateway, the GP referral portal via a notice.	Profile of project is high and is supported by staff - so much so that further specialities (3) are adopting 5S for their areas. Intension to apply throughout RHSC.	5S outcomes sustained in wards 6 and 7 so no more notes lying around and this has been adopted by members of staff in other areas. Induction booklet devised to aid with ward processes.
Drivers for Project	New CTs hired but no increase in medical secretary resource resulting in backlogs of dictation, H&S issues of notes on floors. Staff morale impact.				

Table 18-1, Phase 2, Psychology (West Lothian)

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Psychology - West Lothian	Workout	50% of A&C staff time, now freed up to let clinical staff focus on patients, improve waiting times and list management through TRAK so improve data management. Capacity and demand of service now apparent and processes standardised.	Early days for project - accountability rests with CHCP who are engaged, Clinical Lead to be appointed, maintain understanding of capacity and demand and access to data.	TRAK training completed and psychology appointment being transferred to TRAK for management. Waiting times reduction - plastic surgery psychology appointment wait from 36 to 20 weeks.
Drivers for Project	Waiting times pressures of up to 150 weeks, poor data availability, clinical staff time being used for admin (20-30%), notes unavailable and leadership missing as no Clinical Lead.				

Table 19-1, Phase 2, Repeat Prescribing Waste

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Repeat Prescribing Waste	Unknown	No outcomes detail but expected outcomes are; reducing wastes through repeat prescribing and improve communications and working between pharmacies and GPs and patients. Aim to minimise harm to patients as reducing risk of using outdated/unsuitable medication.	Early stages: Challenges - GP practices and community pharmacies outside of NHSL influence. Issues over patient confidentiality in extracting data.	Carried on into phase 3 see P3 for further details
Drivers for Project	12 months prescriptions = 9.5m costing £126M. Increase expected in primary care to manage chronic diseases but impacted by repeat prescription so results in waste.				

Table 20-1, Phase 2, Research and Development Administration

Date	P2 2007-2008	Project Type	Outcomes	Sustainability	Revisited in Phase 3
Project	Research and Development Administration	Unknown			
Drivers for Project	Lothian is perceived and receives criticism in managing the processes concerning research and development project. They are perceived to be slower than competitor organisations for granting approval and consequently, this may impact on the ability to attract grants and research talent to NHS Lothian.	Note "This project was commissioned outside of the main Lean in Lothian programme."	Rapid advice on incomplete or incorrect applications resulting in reduced processing of invalid applications. Turnaround time from receipt of application to approval letter, within 30 days, is expected to be achieved in 95% of applications. Within 30 days would make Lothian a world class administrator of R&D applications	R&D team have instigated a tracking process at stages which provides visibility of applications which are delayed in the system. Time measurements for R&D applications are also captured on the R&D database.	

Table 21-1, Phase 3, Future Models of Psychiatry

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Future Models of Psychiatry for Older People	Kaizen	Standardisation of processes - admissions, assessment and discharge. Process also to share information now as this was an issue. Policy now in place for provision of services to suit the needs of the users - flexible, responsive and utilised better. Improved physical environment and improved bed allocation and utilisation.	Alignment of consultants working with the new care models. Implementation of new models of care to be reviewed within audit.	Upgrades to wards have enhanced basic facilities and there is a day/home support service. Rehabilitation ward has assisted patient throughput and respite and bed occupancy have improved.
Drivers for Project	Predicted 30% increase in dementia sufferers and need to redesign and modernise the services. Physical environment is poor, day hospitals under used, processes varied and uncoordinated.				

Table 22-1, Phase 3, Out Patients Department 2

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	OPD2 General Medicine				
Drivers for Project	No data on clinical outcomes and not sure what the actual referral to treatment time was. Poor admin processes and issues in use of urgent Appt. 8% DNA rate, 24% cancellation rate (hospital cancels), 64% clinical utilisation rate, shortfall of on average 10 patients per week who could have used urgent slots if they had been monitored as being available.	Kaizen, visual management, load levelling	Cancellation rate reduced from 14.5% to 9.5%. Clinical outcomes templates agreed through TRAK, same day triaging of patients and processing time for clinic letters reduced from up to 7 days to up to 5 days. Load levelling so clinic capacity is effectively managed with urgent slots being available. Management of progress and milestones.	Change in service management - ensure implementation and roll out to other specialities in OPD2. Link to work to the 18 weeks team for recording clinical outcomes. Link to 'single point of contact' for urgent appointments.	Improved waiting areas for diabetic and general clinics. Work continuing on referral process, but GP referrals are now more appropriate. Altered clinic times improved availability and there are defined timescales for cancellation. Prescription pads have also been withdrawn for all but specialist drugs which has improved patient transit and decreased pharmacy costs. Urgent outpatient appointments have been established using primary assessment area (PAA) and the surgeon on duty for PAA now takes calls for urgent OP slots.

Table 23-1, Phase 3, Social Work Referral

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Social Work Referral, Assessment and Allocation Processes	Kaizen, VOC, Process Mapping	Reduction of patients waiting for assessment and allocation to social work but figures not available from social work. Improved use of Estimated Date of Discharge (EDD) up to 14 days before discharge to allow for referrals and for transfer/care packages to be in place so to minimise referrals. Visual management on ward 5 to show discharge process to facilitate improved communication between social work and ward staff.	Continuous monitoring of delayed discharges for meeting of national targets. Impact of plans to be monitored.	Liberton staff are screening referrals, log new clients and initiating new referrals as this allows the senior social worker to allocate cases effectively and focus on the patient pathway to ensure throughput. Time between referral and allocation has reduced - the longest wait is 7 working days, the shortest is one day and the average delay is 3.5 days. Capacity issues at Liberton in managing demand and they will not be able to be supported by ECC staff due to current climate.
Drivers for Project	Social work role in discharges but delays in system lead to medically fit patients in hospital beds. Workload is increasing - complexity and challenging and lots of forms/paperwork.				

Table 24-1, Phase 3, Scottish Ambulance Service

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Scottish Ambulance Service/RIE turnaround times	Workout, Process Mapping, VSM	Ambulance bay at A&E has been reorganised resulting in reduced delays and improved flow. Clarity of process has been provided for A&E for SAS for triage and the SAS patient report form contains improved information and will be moved to an electronic format. Observed turnaround times reduced from 24.46 mins in Sept 2008 to 22.26 Feb 2009.	Joint liaison group for SAS and NHSL to monitor turnaround times and joint issues. Weekly meetings implemented to resolve transport issues.	Improved working together to generate improvements. Signposting is improved, ambulance crews can replenish at RIE, the ambulance bay has been changed and the discharge lounge operates extended opening hours. RIE and SAS staff attend planning meetings and ad hoc meetings if required. Turnaround times have been improved from same point last year - from 29 to 27 mins.
Drivers for Project	Failure to meet target - 28 mins at RIE against Scottish av. 20 mins, though DoH guidelines of 15 mins. Improve response times for patients being collected as this is impacting on 4 hour A&E targets. Staff face delays when phoning to book transport and communication between SAS and RIE poor.				

Table 25-1, Phase 3, Wheelchairs and Seating Pathways

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Wheelchairs and Seating Pathways		Use of historical data to use as forecasts to predict demand. 5S of centre created space for 50 wheelchairs for the one stop clinic, stock levels reviewed to manage inventories and batching. Matching clinics to demand to reduce waiting times for equipment and one stop clinics introduced = 80% of adults from 52days waiting to same day and for 20% of children then 72 days to same day for provision of wheelchairs.	Project manager employed to manage project. Four members of staff will undertake Lean training in order to develop sustainability in Lean within the service.	Several improvements to the service. Referral form is now implemented electronically; Bioengineers have been employed so there are more clinical slots for Special Seating clinics. Predictive ordering is used so patients can get their wheelchair at the clinic, stores personnel check wheelchairs so clinicians don't have to and there is efficient and improved use of space and stock levels.
Drivers for Project	Formally 3 separate services were combined but they still continue to work in their historic ways. There is variation in pathways and missing information impacts on the ability to provide the equipment patients need without incurring delays.	Kaizen, VSM x 3 for the services, process mapping, 5S			

Table 26-1, Phase 3, Plastic Surgery: Hands Service

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Plastic Surgery Hands Service		Same day receipt, triage and actioning of all plastic surgery referrals (8334 per annum), 336 patients seen directly by specialist not generalists can reduce waits up by up to 13 weeks, nerve conduction waits have reduced from 48 to 18 weeks. New hand profiling kits have reduced surgery and improved outcomes - patients to theatre two days earlier, saving 8 bed days per week at £390 per day and +£4000 annual saving on antibiotics.	Linked to 18 weeks team with monitoring of impact. Further improvements identified into 2009-2010 such as using community facilities at Leith (1050 cases per annum), job plans amended, two extra consulting rooms at St John's and 2317 additional patients being seen by nursing and physio staff and business case presented for 2nd hand consultant to be employed.	Due to the scale of the work, including not just hands pathway but also plastic surgery, it has taken longer than expected to address some of the changes. Daily triaging now done at St John's meaning a 65 day reduction as it is now same day. A second nurse practitioner and new surgeon are both to start in Spring/summer 2010. Waiting times for nerve conduction studies are down from max 51 weeks to 3 weeks for physiologist led clinics and at 15 weeks for consultant clinic. Now some national work on carpal tunnel is commencing and this will be merged into the improvement plan.
Drivers for Project	Insufficient substantive capacity to meet demand for the plastics hand service at St John's. Waits of up to 73 weeks from clinical appointment to receive results of nerve study and overall carpal tunnel pathway including diagnostic procedure can take 99 weeks.	Kaizen			

Table 27-1, Phase 3, MRI Processes

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	MRI Processes	Kaizen, VSM	Moving request cards timings across sites cut from 8 days to 48 hours. Vetting and booking of requests within 24/48 hours and is being piloted. Demand and capacity analysis currently undertaken with support of 18 weeks team. Improved use of porters and supervisors to manage work and maximise scanner utilisation.	Process owners supported by 18 weeks team to drive key areas to meet targets. Monitoring as part of audit also.	Four week wait by March 2010 in place as this was the goal from the Kaizen. Daily vetting takes place and at DCN, the administrative staff do the booking of routine examinations to free up radiographer. Reports to consultants highlight unreported or unverified reporting. Average turnaround time at WGH reduced to 1.8 days by March 2010.
Drivers for Project	Reduction in MRI waiting times to meet 18 weeks targets as demand increased. Improve variation and utilisation of scanners as capacity and demand is not currently matched.				

Table 28-1, Phase 3, Dermatology Outpatients

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Dermatology Outpatients	Kaizen, VSM,	GP's to be able to have advice only referrals using SCI Gateway. Daily triaging at all three sites (St John's, Roodlands and Lauriston) as currently triaging can take up to 20 days. Proposed centralisation of referrals so 83% are triaged within 48hrs. Patient focused booking to be extended to sub-specialities (8000+ patients per year) so potential gain of 489 slots per year through reduced DNA's (8.1% currently). Review of consultant job plans to create 36 additional clinics and 228 new patient slots per year. Accommodation review so 5-13 additional patch	Early stages for project so many outcomes and sustainability statements have yet to be materialised. 18wks team working with Dermatology to meet 18wks RTT and plans monitored as part of audit. Multi-disciplinary meetings are planned to ensure progress is maintained and issues managed.	Fully centralised booking is nearly all in place and patient focused booking has been expanded to cover sub-specialities. Email advice from one consultant to GPs is available and triage is done daily at Lauriston and 4 times per week at St John's. Capacity has improved as changes to job plans have freed up = 228 general appointment slots, 126 phototherapy slots, 462 tumour slots. Tumour service reviews means all urgent melanoma patients are seen within 2 weeks, all tumours seen within 2-3 weeks and all lesions seen within 4 weeks. There has been a reduction in the waiting list initiatives and this is expected to be further reduced when the additional consultant is employed. Improvements in dermatology have also been worked on within pathology and implemented systems that have minimised patients breaching the 62 day guarantee - only two patients have breached. Parallel clinic with plastic has
Drivers for Project	Struggling with 12 week max wait for outpatients and managing currently by adding in evening and weekend clinics. Also impacts 62 day cancer target and increased referrals - seen nationally but also due to GP contract changes. 7.3% of all outpatients in NHSL are Dermatology patients. Variation in how Derm patients are referred and triaged across sites.				

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
	Dermatology Outpatients continued.		test patients seen per week. Cryotherapy treatment now same day so wait time reduction of 84 days.		reduced the need for secondary appointments and saves days in the skin cancer patient pathway. Notes that *"Although like many departments, the project was met with initial scepticism, the staff have fully embraced the notion of continuous improvement as many of the changes were conceived well after the kaizen week. Morale has improved and staff feel they are providing the best possible service for patients."*

Source: Lindsay and Kumar (2015)

Table 29-1, Phase 3, Orthopaedic Trauma Clinic

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Orthopaedic trauma clinic	Work Out, VSM, VOC	Referral protocols to be reviewed, clinic templates to be reviewed so to better match capacity with demand and reduce overbookings. Improve waiting area facilities with in and out reception desks and self-service to reduce bottlenecks. Skills of nurse practitioners to be reviewed to provide extra treatment scope.	Early stages for project. Dedicated staff member responsible for project and actions occurring from it and impacts will be monitored through audit.	90% of action plan implemented. 97% of orthopaedic patients are now admitted on the day of surgery and this includes major procedure patients. Daily triage has reduced triage process from average 32 days to 5 days and the need for extra clinics has also been reduced. A pilot enhanced recovery pilot was implemented April/May 2010 with initial results suggesting predicted savings of 1500 bed days per year in elective orthopaedics.
Drivers for Project	Long waits in clinic with patients on complex patient journeys. 85% did not know why they were delayed, high % of patients have one appointment only, 32% do not see the person they expected to see.				

Table 30-1, Phase 3, Colorectal Information Flow

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Colorectal information flow (GE)	Follow-up from previous two Kaizens in diagnostic and treatment of colorectal cancer.	Paper processes reviewed and improvement implemented in OPD4, then to be rolled out to St John's. TRAK implementation completed. Triage done in department, 62 day cancer referral in Jan 2007 was 57%, by the time the information flow project was implemented the rate was 97% against a Scottish national rate of 91.7%. Staff morale improved.	Review of physical layout to be conducted. Plan to fully embed into OPD4 and roll out in outpatients and endoscopy and trial usage of clinical information from TRAK at MDM with testing of electronic patient record facility in TRAK and then this can be implemented into other specialities after testing.	MDM facility in TRAK - benefits are being realised as cancer trackers can access MDM to see which patients are being discussed, see new patients not being tracked and see the management plan for them so future appointment (radiotherapy, chemo, outpatients and surgical) can be made. MDM is a single system so admin processes are more effective. Patients due to be discussed at MDM can be reviewed by clinical staff prior to meeting and their results are also accessible.
Drivers for Project	Variation in outpatient admin processes, usage of TRAK, timescales, and lack of case notes as MDMs.	VSM			

Table 31-1, Phase 3, RHSC Workflow Optimisation

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Lothian RHSC Facility Workflow Optimisation (GE)	Multiple working sessions, VOC, Spaghetti mapping, gemba walks, process mapping, time analysis, VSM	Pull of information rather than push, single source information, remove unnecessary motion, standardisation of documents, maximise use of existing functionality. Use of RFID for semi-automation of ward level medicines stock checking - save pharmacy technicians time.	Recommendations (110+) have been made to improve processes and some (20) have been incorporated already into the existing RHSC	Consideration of recommendations to be implemented in new hospital - 18 to be included in operational plans. This includes entrances for A&E, location of pharmacy dispensary and separation of pre and post op entrances to improve flow.
Drivers for Project	Planning and workflow optimisation for the new RHSC hospital. Result would be potential footprint reduction and standardisation and simplification of care.				

Table 32-1, Phase 3, Repeat Prescribing Waste

Date	P3 2008-2009	Project Type	Outcomes	Sustainability	Revisited in Phase 4
Project	Repeat Prescribing Waste			Two of the primary care pharmacists currently involved in the project will be leaving to take up posts in other health boards so this is flagged up as a risk. Aim is to roll out project across GP practices and community pharmacies across Lothian.	
Drivers for Project	Wasted medicines costs NHSL around £3 million per annum and more than 80% of these are repeat prescriptions. Cost of disposal is £880 per tonne and 55.69 tonnes were disposed between July 08-March 09.	Following on from previous project 2007-2008, Workout, process mapping, data analysis	Workout sessions conducted with GP practices and community pharmacists. Still issues in accessing data due to patient confidentiality. Use of GPASS for GP practices to monitor their repeat prescribing.		GPASS team is developing a visual tool to support monitoring of repeat prescribing at practices and track improvements. A change to the layout of the repeat prescription form is being proposed to separate out regular repeat medications from required. Pharmacy recruitment is also underway to support improvement plans.

Table 33-1, Phase 4, Substance Misuse

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Substance misuse services in West Lothian	Kaizen - multi-agency, 5S	Website to host West Lothian substance misuse services developed. 5S to improve work conditions. Interagency group to identify staff training needs. Centralised methadone titration clinic operational, new assessment capacity freed from staff time (40 hours). Pre kaizen 122 clients waiting, less than 40 by April 2010. Pre Kaizen, longest wait was 115 days, post Kaizen 60 days.	Further workouts planned with staff and accurate and measurable outcomes used across all agencies. Assessment criteria standardised and used across all agencies. Trying to deliver on appointments for meeting the 3 week RTT target. Potential to expand service structure across Lothian.	HEAT target met and currently being exceeded. Clear pathway established from referral, care and discharge processes. Safe and effective drug titration (Methadone and Buprenorphine) clinic at St John's now established.
Drivers for Project	RTT targets issue - longest wait was 24 weeks, 18 weeks target by Dec 2009 and 3 weeks target by 2011. Disconnect between services in West Lothian, no central point, 30% of nurses tasks spent on admin and 79% re-referral rate in drugs in 6 months.				

Source: Lindsay and Kumar (2015)

Table 34-1, Phase 4, Review of Day Hospitals

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Review of community day hospitals	4 x workouts	Not clear about effectiveness as it is about measures proposed: e.g. Measuring LOS in those supported by day hospital early support, use of standardised assessment and case review sheets for monitoring quality outcomes such as improvement in mobility and reduction in fails risk. Use of assessment for cognitive function for diagnoses of early dementia and its subsequent management. Use of core data set to review information about activity, demand and capacity and can be used for performance measurement in reduced admissions and early supported discharge.	Further work to be taken forward by Day Hospital Review Group and Modernisation Team re: capacity to treat more patients, ensure patients is assessed as per the appropriate medical condition and work with council agencies in partnership over day centres, crisis care and community resources. IT use and quality to be reviewed.	Data being collected to support future planning and use of the sites - being used to inform considerations of the use of day hospitals in light of policy shifts (national) in Reshaping Care for Older People.
Drivers for Project	Improve access to day hospitals which in turn can reduce admissions and LOS in acute sites and reduce attendance at A&E, CAA, ARAU. Rapid assessment and diagnostics for those over 65 is not always available so treatment and admission is not always appropriate. Also issues in medical cover at sites and issues in transport for patients.	(Scope: Templar Day Hospital, Royal Victoria Day Hospital, Liberton Day Hospital, OPPRA (Leith CTC) and Roodlands Day Hospitals).			

Table 35-1, Phase 4, Review of Administration Services

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Review of admin services in East Lothian CMHT	Workout, process mapping	Standardisation of letters and forms, improving the GP referral process. There are new admin processes in place so to provide equal service across the Mental Health Team resulting in a cost avoidance of around £4452 and a cost avoidance of nursing time resulting in extra clinical activity equal to £7684. Previously inappropriate referrals for alcohol service was 17%, now less than 1%.	Delay in reorganisation due to getting staff together for review meeting but measurements going forward will be based on reductions in clinical staff's time being spent on admin, reduction in patients waiting times, reduction in admin work including delays in filing.	Majority of GPs use standardised proforma to support accurate triage and allocation. Meetings booked electronically, notes delivered to meetings and team members present at meetings. Electronic system now generates appointment letters
Drivers for Project	Admin work is behind and clinical staff time is being taken up with admin duties. There are inequalities in access to admin staff for clinical staff and there are cross site working delays.				

Table 36-1, Phase 4, Front Door Patient Flow

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Front door patient flow - A&E, combined assessment, capacity team	Kaizen, VSM, 5S	Porter's use of radios has saved 12 hours of portering time over a 24hr timeframe. Equipment located and returned to A&E - £2855 of excess pharmacy, £2479 equipment recycled, £2000 p/a saved on replacement cables - equipment available at right time from right place. Policy in place for escalation of breach patients, greater decision making presence to facilitate discharges and unnecessary admissions. A pilot conducted has resulted in some initial gains - 663 new patients diverted from A&E in the first 4 weeks after being seen in PAA by a senior clinician.	Action plan has been given to process owners and the process owners will report on key performance measures identified.	Planned admission unit was re-established so to better improve flow so that patients would be diverted from A&E and would be seen in the right setting. Now a twice daily consultant sweep as well as ward rounds to facilitate discharges and prevent unnecessary admissions. 5S repeated to ensure correct equipment is available in CAA and A&E when required.
Drivers for Project	Reducing waiting times in A&E, prevent breaches of the 4 hour guarantee and improve patient care through improved processes on the admission of patients and them being admitted to the correct area or specialities.				

Table 37-1, Phase 4, Complaints Handling

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Complaints Handling	Unknown. Process mapping, wastes identified (8)	Single point of contact for complaints. No batching of letters for signing - now being done daily for CE and COO. New policy on complaint handling and procedures. New NHSL process timeline. Proposed new process for MP/MSP enquiries. Complaints hub to be centralised at Waverley Gate with funding identified for the software required to facilitate the single point of contact.	New NHSL Complaints Manager to be appointed. Manager responsible for the new policy introduction and delivering improvement of local and national targets. Policies will be impact assessed.	Single point of contact established for phone or written complaints. Single team working on one site doing the complaint processing. Final daily sign-off where feasible from lead executives and there is a single NHSL policy approved.
Drivers for Project	Patient complaints are dealt with by separate teams/areas but there have been performance issues/variation in management even as complaints are decreasing. The % acknowledged in 3 days is decreasing to 91.7% and response within 20 days is 76.7%.				

Table 38-1, Phase 4, Paediatric Gastroenterology

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Paediatric Gastroenterology		48 extra outpatients' slots per annum released due to duplicate appointment problem being identified and removed. Daily triage rota for all referrals - down from 28 days. Dec 09 - 87 days for clinical letter turnaround, Jun 10, up to 17 days, team aim, 7 days. 4 year extended backlog in dictation has been eliminated. Templates for forms/common use terms for new staff available to reduce errors. Typing back log of 4 weeks (and as high as 9.5 weeks in action plan phase), now 0.5 weeks by June 10.	Weekly meetings between service teams to monitor the project and weekly monitoring to establish baseline and impact of improvements. Aim to forecast demand to respond once backlog is eliminated. Another consultant is also to join the team so job plans to be reviewed for clinical care sessions.	All letters are triaged within 3 days, and there is a max 4 week wait for all endoscopies. Backlogs - dictation now max one week, typing now max 2.5 days and validation is now max 5 days.
Drivers for Project	Clinical admin process struggling – e.g. Dictation, typing, validation, issue and filing which impacts results processing and clinic letters. Routine work is being noted as urgent so it is available for follow up clinics. Paediatric endoscopies meet 6 week target currently but through use of emergency theatre (CEPOD) and needs to meet 4 week target without this resource.	Kaizen (doesn't say but VSM and process mapping apparent).			

Table 39-1, Phase 4, Plastic Surgery Skin Lesions

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Plastic surgery skin lesions	workout (process mapping?, VSM)	Linked to Dermatology Kaizen for mapping skin cancer model between Derm and Plastics, consultant job plans reviews re surgical retirement for SNLB. Nurse specialist delivering extra 220 cases per annum at SJH. Standardised template for bounce back letters for GP's re. breach of referral protocol.	To be taken forward by clinical management team/18 week teams who are also linking in with other kaizen events in the specialities' under discussion here.	Generic feedback letter used in Dermatology and Plastic Surgery for GP's. Dermatology staff now administering the clinic and are utilising TRAK for information sharing with plastics staff. Aesthetics referrals have been removed from Head & Neck waiting lists and are on the appropriate pathway.
Drivers for Project	Skin lesion pathway needs focus and redesign - multi-pathway affecting patients and impacting on 62 day target which is being reduced to 31 days from decision to treatment. Future loss of capacity (surgeon retiring) in conducting Sentinel Lymph node biopsies (SLNB).				

Table 40-1, Phase 4, Acute Medicine Patient Flow

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Acute Medicine patient flows at WGH	Workout, 5S	Porter based in ARAU with use of radio system to facilitate contact and flow of patients. Patients are to have a bed booked for them within 3 hours of admission and two hourly patient safety rounds have to be embedded. Two new DVT slots have been created for DVT patients in the afternoons, 1 additional ultrasound slot has been created, DVT paper work has reduced from 17 to 3 pages, APEX licences purchased to allow improved multiple access to lab results. AHP review to aid involvement in patient care plans to help potentially reduce LOS. Storage and space issues to be targeted by 5S.	Early stages. Work underway and Site Emergency Access Group is dealing with issues. ARAU will be monitored for compliance with national targets, follow up sessions are planned as well as audit for monitoring too.	Each area now has a coordinator to manage patient flow and work on achieving the 4hr standard. New processes in place to meet patient needs. Porter based communication involves radios and there is improved collaboration. Stores have improved and equipment storage has improved. New DVT slots becoming available and relationships are improving between areas which are having a positive impact on the patient journey.
Drivers for Project	Poor environment for patients whilst waiting at ARAU including issues over privacy and dignity. Existing processes to be reviewed so maximise patient flow and best use of the facility. Facility see's approx. 350 patients per week with peak days being Monday and Friday, and breaches increasing between 10am to 6pm with the main reasons being waiting for first assessment (36%) and waiting for bed (30%). Jan - Nov 09, 96% patients within 4hr target at ARAU, but lowest point has been January at 85% with 77% at the RIE.				

Table 41-1, Phase 4, Utilisation of Theatres at SJH

Date	P4 2009-2010	Project Type	Outcomes	Sustainability	Revisited in P5
Project	Utilisation of theatres at St. John's		Target set to staff - to achieve theatres benchmark of 4%, then ENT would need to reduce cancellations by 5% equalling 12 cancellations a month and Plastics by 6% which is also 12 cancellations a month. Criteria to be set to avoid patients being inappropriately listed for surgery with trial review of pre-assessment clinic with nurse, consultant and anaesthetist. Insufficient theatre capacity will be scoped by potential extended operating days with theatre lists start and finishing times being reviewed for appropriateness. Surgical cancellations will be managed by reviewing lists with locum surgeons weekly with the Patient Admission Service (formally waiting list office) and list scheduling will be reviewed by surgeons and PAS using time tariffs to enable improved accuracy in scheduling.	Early stages. New short stay elective centre is due to open at end of 2010 and the issues raised here will be addressed through the planning group for SSESC. Meetings currently taking place with process owners and improvement leads to support the implementation of the outcomes.	Criteria for listing procedures agreed with consultant teams including cases for pooled lists. Visual management about operational targets and achievements displayed in admission office, wards and theatres. Patients phoned two days before surgery to help manage reduction of patient DNA.
Drivers for Project	Reduce waiting times for operations through improved theatre utilisation at St John's. Utilisation of theatre time in ENT & Plastic surgery at St John's is 92% which is below the service target of 95%. High number of cancellations - ENT had 9% cancellations and Plastics 10%. Sept to Nov 09 - 166 cases cancelled - 25% ENT and 19% plastics - main reason is patient DNA. Nov 09 - Jan 10, ENT common reason was surgeon cancelling and in plastics patient DNA resulting in a total of 87 cases at a cost of £63,853 lost theatre time.	Unknown - possibly workout but not clear			

Table 42-1, Phase 5, Older People's Pathways

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Older People's Pathways Programme	Combined and multiple projects using Kaizens and workout, process mapping, VSM and visual management.	Development of performance monitoring - data and analysis was required to measure improvement and this is shared between all pathway teams. 29 wards and 735 beds across 6 sites in the older people's pathway and Lean has engaged with them directly and indirectly. 24 out of 29 wards have achieved reductions in LOS. This has been greater in acute sites where LOS has been cut by an average of 3.5. All 5 stroke wards have achieved a mean reduced length of stay from 2% at Liberton to 30% at RIE. Orthopaedic rehabilitation in acute orthopaedics has reduced by 0.5 days	Elderly Care Assessment Team set up and piloted in order to identify and transfer patients to the appropriate care facility for MoE patients at RIE and Team 65 works at the WGH. Boarding of elderly patients has resulted in longer LOS as it has been recognised that frail elderly patients are not to be boarded and they need to repatriate the patient to the relevant speciality to enhance patient care and minimise clinical risk. Redesign of discharge paperwork and discharge letters prepared in advance to facilitate discharge by 11am.
Drivers for Project	To implement improved patient pathways - medicine for the elderly, orthopaedic rehabilitation, stroke services and management of delirium and dementia patients. Linked to previous work in A&E and ARAU and CAA where problems at the front door were related to downstream sites so there was a need to have pull. Patients were waiting for discharge whilst medically fit waiting on care home or package of care (POC) - up to 6wks for POC set up.			

Table 43-1, Phase 5, Inpatient Flow's

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Inpatient flow: WGH, RVH and City of Edinburgh Health and Social Care	Kaizen (RIE), VSM, circle of work, try storms	Note that it is too early to identify evidence of improvements. However, due to changes in ward routines, 60 extra AHP sessions gained per week so 2340 PT and 780 OT contacts per year which is expected to contribute to reduction in LOS. Some reduction in stay has been notes - ward 50 at WGH March '10 = 24 days and by March '11 = 20 days and at ward 51 24 days at March '10 and 16 days by March '11. RVG 56 days LOS in March '10 and then 48 days in March '11. Hospital social workers are now better informed about patients' situation.	Learning from this event to be taken forward into other events as can inform work with NHSL and Edinburgh City Council joint working as the event was deemed useful in generating collaborative solutions.
Drivers for Project	Improve inpatient experience and access to ensure MoE patients are immediately transferred to the relevant speciality. Need to have streamlined pathways and processes for MoE patients to increase throughout of wards at RVH and WGH. Aim to reduce LOS to average 12 days and to reduce LOS of rehabilitation patients to average 30 days.			

Table 44-1, Phase 5, Stroke Services

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Stroke	Workout (2 days), process mapping (not stated) and look to best practice at Lanarkshire Health Board with the Lanarkshire Stroke Managed Clinical Network Manager in attendance.	Days when no multidisciplinary meeting a daily huddle from wards 55 and 9 focussed on discharges. Daily communication and information sharing about patients going home is accepted practice and considered to be a factor in trend of reduced mean and median length of stay. Additional PT slots identified - up to 220 slots identified and potential for a pre-breakfast slot at 8am could possibly create another 220 slots to facilitate earlier discharge. Now a regular washing and dressing 8am slot also adds up to 176 additional slots. OT vacancy will help facilitate implementation of additional slots to facilitate discharge. Piloting of new neurological assessment forms to prevent duplication of assessment by OT and PT staff - reduction in paperwork timings and staff time in conducting task identified. At RVH ward 9, LOS has reduced from 56 days in 2009/10 to 52 days at March 2011.	Some aspects to be taken forward once recruitment has been completed for extra OT/PT staff. Desire to increase access to make e-referrals to social work so IT and electrical quotes being sought and bid in place to shift stroke rehabilitation into community settings which would allow patients to be discharged 4 days earlier.
Drivers for Project	Improvement in stroke services processes in the hospital and how an average length of stay at 26 days for a completed stroke pathway could be achieved. Patients stays ranged from 2-127 days (mean 29, median 14 days). Limitations in access to therapy sessions identified, including impact of ward routines, as well as how weekly MDT meetings were delaying discharge. 10.5 beds out of 24 RVH occupied by patients waiting nursing home, residential place or POC.			

Table 45-1, Phase 5, Stroke QIS Standards

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	NHS Scotland Stroke QIS standards		Kaizen held Dec 2010, reporting for this report based on Jan to March data. New stroke checklist form for A&E and ARU staff to use to inform rapid and accurate clinical decision making and management to aid compliance with QIS targets. Desire to have a consistent procedure which is relevant on each site but there are some local differences and best ways to communicate scan results have to be implemented. Recruitment to facilitate clinics running 52 weeks of the year for having support of neuro-radiology and neurovascular radiology support and improve organisation of clinics. Process for potential stroke thrombolysis patients' management alert system to be developed.	Spot audits conducted wk. of 11 March 2011 with mixed results on use of stroke checklist form = WGH, 66% patients had new form in notes with 40% complete, SJH had 95% of patients with new form, 90% complete and RIE, 50% patients had new form with 31% complete. 100% completion target set for August 2011. HEAT target of 80% admission to stroke unit during 2011/12 and 90% by 2013 = Jan 2011, WGH achieved 100%, SJH 80%. Feb 2011, WGH 97%, RIE. 90% and SJH 65%. A sustainable stroke ward policy is to be developed for all sites. Staff are to be trained to conduct swallow screening on all 3 sites. Communication of brain scan results to be agreed and implemented as SOP by end June 2011. Recruitment for neuro-radiologist consultant post specialising in stroke interest to be taken forward instead of just advertising generically for a consultant radiologist.
Drivers for Project	NHSL was only meeting 2 out of 7 existing QIS clinical standards. From Jan to Oct 2010, NHSL had = 65% of patients diagnosed with a stroke being admitted to a stroke unit within one day (HEAT target to be 90% by Mar 2013). 59% of patients receiving a swallow screen on day of admission when target is 100%, 71% of patients receiving a brain scan on day of admission and the target is 80% and 78% of mini stroke patients were seen in Neurovascular clinics within 7 days and target is 80%.	Kaizen		

Table 46-1, Phase 5, GORU

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Geriatric Orthopaedic Rehabilitation Unit (GORU)	Kaizen, VSM, circle of work, try storms	Pilot of morning huddles to facilitate patient transfer to rehabilitation unit: fit patients (well enough to be transferred) pre-Kaizen, 10 days and post kaizen 8 days. Unfit patients (not well enough at listing to be transferred), pre-Kaizen 20 days and post-Kaizen 6 days. Earlier identification of patients to be referred from MOE to orthopaedics - appropriate referrals. Process for sign-off for orthotic equipment at RVH - from 3 weeks to 24 hours. Change to ward routines - lunch time amended so 3 PTs can see an av. extra of 4 patients per day. OT in month audit, extras were 4 transfer assessments, 16 transfer practices, 4 kitchen assessments and 3 kitchen practices, one extra initial assessment, 3 initial interviews.	Sustained practices noted were OT changes to ward routines and delivery of extra practices and assessments have been sustained. Clear referral criteria to ORS (Orthopaedic Rehabilitation Service, formally GORU) has been agreed and disseminated but staff are still referring to the service as GORU so this has still to be sustained.
Drivers for Project	Variation in length of stay in GORU wards across Lothian. Needs to be a streamlined pathway and processes from admission to discharge reduction in LOS and optimise care for patients. 240 bed days lost in waiting for a GORU bed per month, 119 bed days lost waiting on POC.			

Table 47-1, Phase 5, Orthopaedic Rehabilitation Service

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Orthopaedic Rehabilitation Service Phase 2			
Drivers for Project	Need for standardisation of documents as patients arriving with incomplete information when transferred or lack of unitary notes at Astley Ainsley. Fit and unfit patients being mixed up when transferred to rehab wards. Problems when transporting patients off site for investigations and transport availability when discharging patients.	Workout	Format of ORS list to ensure getting the right patient to the right receiving ward. Unitary notes to be implemented at ORS wards at Astley Ainsley. Review therapy timings to maximise therapy times and identify additional slots.	Early days to see if this will be implemented and maintained.

Table 48-1, Phase 5, Dementia and Delirium

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Dementia and Delirium	Unknown	Dementia training and awareness/training sessions attended by 950 staff and 130 staff have been fully trained. 4AT screening tool is being rolled out across all medicine. 64% increase in patients discharged from general hospitals with cognitive impairment (dementia and delirium) from 1.4% in Feb '09 to 2.3% in March '11, but figure should be 20-30% of patients. Audit results show before and after training and interventions: average length of stay previously 30 days, after 17 days; carer views on staff awareness of condition - before 41% and after 70%	Not discussed.
Drivers for Project	To improve the care of delirium and dementia patients - higher rates of formal diagnosis, appropriate referral pathways and development of 4AT, a simple screening tool for dementia and delirium			

Table 49-1, Phase 5, Paediatric Diabetes

	OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM			
Date	**P5 2010-2011**	**Project Type**	**Outcomes**	**Sustainability**
Project	Paediatric Diabetes	Workout x2	Inpatient service improvements for clearer contact details of diabetes team and named inpatient nurse for day/week. Workshops for ward staff and up to date information on diabetes management. Guidelines for foods and suggested snacks for ward use to educate children and parents on wards and also for children consuming the appropriate foods when ward based. Dec '09, 8 children on insulin pumps, Dec '10, 28 on insulin pumps. Outpatient improvements - revised format for child's first appointment, separate dietician sessions for patients with complex issues and administration staff book patients' follow up appointments. Procedure for insulin pump has been improved for clearer referral and selection based on NICE guidelines.	Aim to use a web based insulin pump system to allow children/parents the ability to add blood glucose and insulin information to the system so the diabetes team can view rather than phone calls for this information which mean added time inputting this to patient notes. Issues however over IT security guidance in NHSL.
Drivers for Project	Further demand for insulin pump therapy as well as increase demands on the service. NHSL patients have higher average blood glucose levels over time than other centres.			

Table 50-1, Phase 5, Mental Health Collaborative

	OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM			
Date	**P5 2010-2011**	**Project Type**	**Outcomes**	**Sustainability**
Project	Mental Health Collaborative	Unknown - listed as a three year programme of work, process mapping, VSM, data analysis tools	Access to psychological therapies in Midlothian and reduce waiting times from referral to first assessment. Opt in system and centralised bookings, DNA's have reduced from 20% to 13%. Redesign of weekly allocation meetings for clinical time so up to 300 hours per year for face to face contact with patients. Daily clinical meetings introduced to ensure rapid decision making and discharges facilitated. Redesign of community health pathways with the inclusion of standardised processes for referral, allocation, opt-in, assessment, review and discharge. Amalgamation of two day hospitals for provision of a single model of care for dementia and function illness.	Ongoing as programme dates from April 2008 to March 2011.
Drivers for Project	To improve across mental health services, develop improvement capacity and align to HEAT targets			

Tables 51-1 & 52-1 Phase 5, School Nursing and Transplant Administration

OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM

Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	School Nursing	Unknown event - possibly workout, time value analysis, VSM, data collection	Early stages- agreement of the need for the pathway for LAC and also for management of health records.	Not discussed.
Drivers for Project	Clear pathway for looked after children and standardisation of the process of handover of health records from health visitors to school nurses in West Lothian.			
Date	P5 2010-2011	Project Type	Outcomes	Sustainability
Project	Transplant Administrative Procedures	Workout, 5S	A review of filing (including what needs to be filed), workload rota for typing so equal distribution of work, staff training review and 5S of workspace to improve the office environment	Early stages.
Drivers for Project	Streamline administrative processes, improve clinical notes and manage rotas for cover sick and annual leave			

Table 53-1, Phase 5, Hospital at Night

	OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM			
Date	**P5 2010-2011**	**Project Type**	**Outcomes**	**Sustainability**
Project	Hospital at Night (HAN) handovers			
Drivers for Project	HAN handover is the largest handover in the hospital (large potential for error) but there are variable processes between the 3 hospitals, there are no standard documentations or protocols, no formal guidance or training, and minimal communication between ward staff and HAN team.	Half day workout	Induction booklet with handover guidance, which included examples and a standard operating policy and procedure which defined roles, responsibilities and guidance. Introduction of SBAR (situation, background, assessment and recommendations) handover sheet for wards requesting a HAN review for patients.	Intention for paper based systems to be integrated and documented in TRAK.

Table 54-1, Phase 6, Orthotics Services

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Orthotics services		Cast store 5S conducted. Staff management and structure has been centralised enabled capacity to be reviewed. By moving to 20 minute appointment slots instead of 30 min, 3036 extra clinical slots were created and 3 private contractor clinics can be brought in house due to identified capacity which utilises existing resources. Single point of referral to manage waiting lists so reduction of waiting times from 33 to 4 weeks. £25,000 has been released back into system through the reduction of return appointments and through outsourcing sole production, production costs have been reduced by £2125. Patient facilities - additional clinic room and movement of waiting room.	Staff have reported improved collaboration with RIE and other specialties. Duplication of tasks such as paperwork has been removed. Now there is consideration of single service orthotics across Lothian. A quality system is to be started and embedded into orthotics.
Drivers for Project	Budgets had substantial overspend and services relied heavily on private contractors. Staff spent large amounts of time travelling between multiple sites. Demand and capacity had to be established, outsourced clinics had to be reduced to impact on overspend. Poor facilities for patients. DNAs an issue and there was no single point of referral.	Kaizen, 5S, VSM, circle of work, time value analysis, VOC, stakeholder interviews, data collection and analysis		

Table 55-1, Phase 6, Respiratory Inpatient Pathway

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Respiratory inpatient pathway (RIE)		A&E, Assessment and Respiratory medicine staff will have advance access to information about patients in advance of their notes being supplied so patients could be supported and not admitted to a bed. Improved decision making and flow of patients to the respiratory wards. 90% staff trained in inhaler techniques and now 800-1000 inhaler assessments annually will be done by ward nursing staff so to give patients access to effective treatment. Reconfiguration of space gives more beds and access adjacent to the respiratory ward so patients get specialist support.	Pilot for 42 bronchiectasis patients to be treated at home (on eight weekly IV antibiotics to be given at home instead of in hospital) would release 2 beds per day in Ward 204 to potentially save £73,000 per year. Discharge huddle - 10 mins set time to include focus and clarity to reduce the lengthy discharge communication process currently in place and save 900 hours of staff time which can be redirected to patient care activities.
Drivers for Project	Variation in admission practices - some chronically ill patients experiencing very short stays and potentially not receiving the same standard of attention as those on specialist respiratory wards. 70% of patients prescribed with an inhaler were unable to use it properly - impact on admission which could potentially be avoided. Discharge planning - lengthy communication process.	Workout, VSM, circle of work, stakeholder interviews.		

Table 56-1, Phase 6, Substance Misuse South East

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Substance Misuse Services - South East Edinburgh		Agree to co-locate to a single premises - co-location took place in Dec 2011 and started operating in Jan 2012. Single point of access offered through a drop in service between 10-4am, Monday to Friday with home visits being offered in extenuating circumstances. Saving of wasted appointments through drop in estimated around 500 per hours per annum. Standardisation of process for assessment and triage across all alcohol and drug services (8 services). Staff rota to support drop in service to be staffed by staff across NHS, Council or third sector.	Steering group set up to monitor progress and drive action plan.
Drivers for Project	Drug and Alcohol services in Edinburgh operated by NHS, Council, Third Sector and Primary Care operate their own assessment and triage process which means clients who may access more than one service can receive multiple assessments. Drug services have met their national targets – 5 weeks from RTT but alcohol sees a 22 week wait when target by March 2013 is 3 weeks. RTT.	Kaizen (multi-agency), VSM, time value analysis, stakeholder interviews, data collection and analysis		

Table 57-1, Phase 6, Substance Misuse East and Midlothian

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Substance Misuse Services (SMS) - East and Midlothian			
Drivers for Project	Service have grown organically and lack strategic direction as they were dependent on making commissioning decisions based on when funds were available. Issues over meeting 3 week RTT target and high DNA rates - up to 70% in some services. Same as South East services, there were separate processes and could be affected by patients receiving multiple assessments.	Kaizen (multi-agency), VSM, time value, VOC, data collection and analysis and stakeholder interviews.	Creation of Gateway Recovery clinics, 6 of them, located across Mid and East Lothian with 21 hours of open access. Joint training and procedures agreed, standardisation of operating procedures, including triage and assessment. Staff rotas were agreed and shared and the implementation of drop in clinics has mitigated the issue of first appointment DNAs.	Treatment and Recovery Clinics (TARC) will be developed. There will be the development of information and services for anger management. An alcohol coping skills group is to be created. Training for use of a tool for screening for cognitive issues related to long term substance misuse.

Table 58-1, Phase 6, Sexual Health and Family Planning Services

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Chalmers Sexual Health and Family Planning Services			
Drivers for Project	Integration of services from genitourinary medicine and family planning in NHSL have integrated to become Chalmers Sexual Health Service but with different care models and pathways then this has presented challenges for patients trying to access the service. Challenges have included getting booked appointments and having the phone answered when they try to contact the service.	Workout, VSM, VOC, circle of work, data collection and analysis and stakeholder interviews.	Quick access appointment slots have been created. Attempt at reducing the number of unanswered calls but rate has remained at 30% as increase in calls has been at 35%. Visual management has improved the stocks of clinic rooms. The waiting environment is to be improved through enhanced sound proofing.	Working with GPs to maximise over all capacity and agree on services provided by primary care and Chalmers. More triage for potential patients and improved signposting to services for potential patients.

Table 59-1, Phase 6, Community Child Health

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Community child health - reducing DNA's			
Drivers for Project	The Community Child Health Service is spread across Lothian and some services have no permanent accommodation. Lack of clarity on appointment letters. New patient DNA rates at 20% in some areas and could be as high as 40% for review patients. Services lack standardised processes.	Workout	Redesign of appointment letter - provision of clear information to try to mitigate DNAs. Provision of a patient service leaflet. Agree to use one referral form so there is consistency across Lothian. Pilot of patient reminders at clinics where high DNA rates.	Early stages as event was March 2012

Table 60-1, Phase 6, Management of Chronic Pain

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Management of chronic pain	Workout, VSM, VOC, CTQ, data collection	Improved collaboration with other areas so patients can be seen where appropriate. Day before appointment telephone reminder introduced and DNA rate has dropped from 22% to 8%. Single triage process provides a consistent service and equity of access.	Expected to have pilot for GP/AHP electronic advice to reduce inappropriate referrals and to try and minimise waiting times. Also aim to identify a single management structure and budget.
Drivers for Project	Chronic pain service is fragmented so a clear patient pathway is to be identified. Issues over waiting times.			

Table 61-1, Phase 6, Ethics Committees Procedures

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Ethics Committees Procedures		Simple IT solutions implemented to reduce time spent on applications and also committee based email addresses were created so all coordinators could access them. 7 days have been knocked off the deadline and time has also been reduced off the time the paperwork is with the Chair due to IT improvements.	Research ethics to be integrated with R&D so that other Board Committee work conflicting with ethics processing will not be an issue.
Drivers for Project	Failure to meet the 30 day turnaround times targets for research applications as set by the Chief Scientist Office. Target is also expected to reduce to 25 days in 2012. Perceived lack of secretarial resource and also two members of secretarial staff (from 3) supporting the ethics committee were transferred to other duties in Sept 2011.	Workout, VSM, stakeholder interviews and data collection		

Table 62-1, Phase 6, The Laundry Service

Date	P6. 2011-2012	Project Type	Outcomes	Sustainability
Project	The Laundry Service		Clear condemnation and replacement procedure which has improved the quality f laundry items supplied to wards. New style gown to provide dignity to patients and 6000 additional pyjamas and nightdresses have been ordered to address shortages. Additional Friday lunchtime pick up of dirty laundry to improve flow to the laundry - potential saving of £102,000 per annum and this will facilitate PPM schedule. PPM schedule is being developed for laundry equipment. Looking for dry storage facilities at RIE which will reduce the weight of the bags so to improve conditions for staff handling these bags. Extra 44 linen bags purchased for theatre changing rooms so uniforms disposed of safely.	Some progress in action plan is delayed due to leave in the laundry so some items still to be addressed.
Drivers for Project	Regular instances of damaged laundry items being in clinical areas and no clear condemnation process. Patient gowns were detrimental to patient dignity. Rogue items in laundry also damaged laundry equipment and resulted in breakdowns. Variable flow of linen with extra capacity being added on Saturday, despite quiet periods on Thurs and Friday AM. This then impacts on PPM of laundry.	Kaizen, VSM, Process Map (audit of flow), observations, stakeholder interviews		

Table 63-1, Phase 6, Estates Purchase to Pay

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Estates Purchase to Pay		Process control improved over having new contracts in place prior to expiry of previous contract. Standardised process for emergency call outs. Revised terms and conditions for contractors and suppliers - includes rapid payment. Implementation of internal reporting to monitor outstanding invoicing.	Estates contracts steering group in place and also has sub groups covering relevant areas, chaired by the Acting Head of Estates and the Head of Financial Services.
Drivers for Project	Wasted time dealing with invoice queries and issues in meeting payment terms (within 30 days of invoice) - 72% of payments in operational estates teams and 52% payments in contracts team.	2 day workout, VSM, data collection and analysis, stakeholder interviews		

Table 64-1, Phase 6, Management of Neck Lumps

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Management of Neck Lumps	Workout, VSM and stakeholder interviews	Reduce cancer waiting times - just do it so as of 23rd Jan 2012, all referrals to Haematology team will go to ENT head and neck team so reductions of up to 14 days in patient pathway. One stop neck clinic - 73 patients, 48% discharged at clinics, 52% ultrasound scan without re-referral to WGH taking up to 3 weeks and then 2-3 week wait for results.	Final report out of project to be held in June 2012. Surgeons and radiologists discussing patients whilst in clinic which is cutting days off the patient journey.
Drivers for Project	Patient pathway for lumps in the neck is complex. They require urgent referral in case of potential malignancy but multiple pathways and GPs not sure where to refer to.			

Table 65-1, Phase 6, Continence Services

Date	P6.2011-2012	Project Type	Outcomes	Sustainability
Project	Continence services	Two day workout, VSM, stakeholder interviews, shadowing, data collection and analysis.	Patients referred to the appropriate service after referral criteria and process developed and this is supported by SCI Gateway. Triage criteria developed so patients triaged to the right professional.	Pilot clinic to be launched in northeast Edinburgh - staff training needs to be identified. Demand and capacity for the community clinic to determine what the clinic requirements are. Reviews are planned to determine progress at three and six months.
Drivers for Project	Initial continence assessments are varied and this can affect waiting times for patients further referred to Urology/ Uro-gynaecology for investigations.			

Table 66-1, Phase 6, Administrative Processes in Gynaecology

Date	P6.2011-2012	Project Type	Outcomes	Sustainability
Project	Administrative processes in Gynaecology at SJH		Refresher training for medical and secretarial staff on the use of the speech recognition system as its correct usage will enable system learning. Manually enhancing system to load up letters for each dictator. Dictators (medical staff) weren't aware of correction rates so these rates and feedback will be shared. Recognition of a need to improve team communication through regular meetings. Actual backlog is variable but at times between 750-1000 letters at its peak - if team transcribe 54 letters a day then this reduces by half and if 64 letters per day then backlog will be minimal.	Early stages in the implementation. A new secretary has recently started in the service and the process of listing patients for surgery is under review. Trial ideas about protecting quiet time for secretaries in order to facilitate transcribing.
Drivers for Project	Backlogs of typing are variable with up to 8 weeks delay in getting non-urgent letters sent to patients. Speech Recognition software is perceived to have slowed the process with persistent errors and secretarial team face numerous issues impacting the backlog of typing.	1/2 day workout and short sessions - identification of wastes in the process, process map, value stream map		

Table 67-1, Phase 6, Pharmacy Stores

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Pharmacy stores			
Drivers for Project	Progress had already been made in 2010-11 in rationalisation of procurement and distribution by the Stores Group. However, there are 7 pharmacy stores across NHSL, with 3 different pharmacy IT systems in use. Single system management is not feasible at this time but further opportunities for fewer procurement hubs and consistent procurement practices across sites.	Workout	Director of Pharmacy had agreed to establish working group to consider existing sites and service provision model. Link to e-health as the current Pharmiss system is not sustainable long term so this links to existing NHSL work and plans for a national pharmacy system.	Early stages as main outcomes still to be realised.

Table 68-1, Phase 6, ARAU

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Acute Receiving Admissions Unit (ARAU)	further half day workout post previous Lean event (workout) in 2009-2010 (P4)	Clear identification of ARAU coordinator for visiting doctors and improved communication to impact on patient flow. Job plan revision to ensure senior clinician provision and also FY2 in specialities can work in ARAU. Communication of patients admitted from trolleys to beds to be discussed with consultants.	Pilot a move of nursing resource for phlebotomy in the evenings to reduce pressure in the evening. Establish a multi-disciplinary room to improve communication and have a central location for notes.
Drivers for Project	Four hour target only achieved 4 times out of 10 between Jan-Oct 2011. 49% breaches were for time to first assessment and 26% breaches due to waiting for a bed.			

Table 69-1, Phase 6, Dermatology Outpatients

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Dermatology Outpatients			
Drivers for Project	Although there has been improvement since the last Lean project (2009), there is still variation in how referrals are received and how the process the service has for triage. These issues have the potential to add time to the patient pathway. There are also issues in inappropriate referrals from GPs.	Workout	Letters reminding GP's of the web-links for nationally developed Dermatology pathways to try to minimise inappropriate referrals. 5 key referral questions for GPs to be added to SCI gateway and will enable consultants to triage patients to the right pathway. Draft letter regards referrals for benign lesions to ensure consistency of approach and clarity for patients. Smaller rota of consultants triaging for consistency and equity when triaging.	*"Dermatology have truly embraced the concept of Lean which strives for continual improvement. The team plan further developments on a regular basis."* Dermatology is to be escalated onto the e-triage programme - initial work has been completed and further work will be taken forward from April 2012.

Table 70-1, Phase 6, The Productive Operating Theatre

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	The Productive Operating Theatre (TPOT)	Programme with 'visioning workshop', VSM, circle of work, time value analysis, voice of patients, data collection and analysis and stakeholder interviews, 5S.	5S of equipment store at WGH where redundant instruments were identified and some equipment was relocated to other theatres resulting in a cost avoidance of £27,000. This has resulted in 28hrs per annum of released time to care. 5S of anaesthetic room at SJH where out of date clinical supplies were identified as well as old anaesthetic equipment, drugs cupboards were overstocked and work surfaces were cluttered. WGH main theatres: one point of contact for each theatre to improve flow of patients and communication and has also improved staff morale with having improved visibility of the theatres co-ordinator and Lean visual management. Any changes last minute to theatre lists are agreed with the coordinator so equipment is available, late starts are reduced and risk is minimised. SJH main theatres - keys distributed at 08.30am so reduced time wasted looking for keys (estimated at 83.5hrs per annum), location of theatre co-ordinator so increased visibility, information exchange and increase in staff morale. RIE Orthopaedic theatres - briefing sessions for staff to increase accuracy of ORSOS data inputs and reporting. Designated rooms for orthopaedic patients so time not wasted looking for these patients. Clinical Supplies - all sites - new structure and contacts for the supply chain available to staff so to improve waste in phoning wrong areas and improve supply chain flow.	*"the programme has been limited on occasions due to staff attendance and lack of orthopaedic surgeon attendance."* Recovery staff are also reviewing the handover at all three sites so to improve patient safety and care, ensure accountability and reduce wasted movement searching for information
Drivers for Project	"The Productive Operating Theatre (TPOT) helps theatre teams to work more effectively together to improve the quality of patient experience, the safety and outcomes of surgical services, the effective use of theatre time and staff experience. This focus on quality and safety helps theatres run more productivity and efficiently, which can subsequently can lead to significant financial savings." Programme focus on all aspects of the patient journey within theatre pathways.			

Table 71-1, Phase 6, Older People's Pathways

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Older people's pathways: East Lothian	Workout, VSM, circle of work, time value analysis, VOC, data collection and analysis and stakeholder interviews	Facilitate bed information and improved patient flow through TRAK. Agree admission criteria on Friday afternoons for wards 1&3 - to be done with consultant at Roodlands, ECAT, Team 65 and site capacity teams. Briefing in Rootlands and CHP to have a shared understanding on issues and targets about delayed discharges - average monthly discharges has increased by 4 since the workout.	Teams from Medicine of the Elderly, Stroke and Orthopaedic teams on all sites have been working on action plans to reduce length of stay and to facilitate transfers from hospitals to community. From April 2010 to March 2012, 23 out of 31 wards have had a continued reduction in average ward stay.
Drivers for Project	Patients being delayed in acute hospitals whilst waiting for transfer to Roodlands or social work services offered by East Lothian Council.			

Table 72-1, Phase 6, Labs and Blood Sciences

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Labs - Blood Sciences Redesign			
Drivers for Project	4 year modernisation service in order to meet future challenges. Rationalisation of 'hot or urgent work and cold work.	1/2 day workshop supported by Lean in Lothian	A project manager has been identified to take forward work	Project not commenced so no real outcomes/ sustainability issues to report

Tables 73-1 & 74-1, Phase 6, Cancer Data Collection and Respiratory Outpatients

OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM				
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Removing the duplication of cancer data collection	Workout, stakeholder interviews, mapping data collection	Solutions being developed include maximising electronic systems and getting access to patient data and automatic downloads.	Not provided
Drivers for Project	Same data is being collected more than once and teams collect data from different databases - sharing data is problematic due to systems and process improvement is required.			
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Respiratory outpatients	Workout	Not provided	Not provided
Drivers for Project	Run in parallel with the respiratory inpatients work			

Tables 75-1 & 76-1, Medical Physics and Admission and Discharge at Astley Ainsley

	OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM			
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Medical physics	Workout	Not explicit as discussion is about how improved processes will benefits NHS Lothian. 5S planned.	Not provided
Drivers for Project	Poor turnaround times for repairs, lack of processes for urgent repairs and a poor working environment			
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Admission and discharge processes at Astley Ainsley Hospital	Workout	Enhanced collaboration with admitting wards, therapists able to see patients at short notice.	Not provided
Drivers for Project	Improving processes for admission and discharge at the Charles Bell Pavilion			

Tables 77-1 & 78-1, ENT Theatre Cancellations and Podiatry Service Documentation

OTHER PROJECTS SUPPORTED BY THE LEAN IN LOTHIAN TEAM				
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Reduction of same day cancellations in ENT theatres	Unknown	Not provided	Not provided
Drivers for Project	Linked to TPOT for new processes to reduce the patients affected by cancellations on the day of surgery and also to reduce patients who do not attend (DNA)			
Date	**P6 2011-2012**	**Project Type**	**Outcomes**	**Sustainability**
Project	Edinburgh, East and Midlothian Podiatry service documentation review	Unknown - Lean tools used to identify and eliminate waste	Aim to sustain improvements	Not provided
Drivers for Project	To ensure consistency across services and clinics for standard documentation to be available			

Table 79-1, Phase 6, Pregnancy Termination Services

Date	P6 2011-2012	Project Type	Outcomes	Sustainability
Project	Developing future plans for termination of pregnancy services			
Drivers for Project	Variation in services and access at RIE and SJH. RIE pressured as perceived lack of capacity. Aim to develop quality and same standard of service. Also want to increase the number of women who can have Early Medical Abortion (EMA).	Unknown	Not Provided	Not Provided