Modelling the Shift in the Balance of Care in the NHS

By

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A thesis submitted to the Stirling Management School in fulfilment of the requirement for the degree of
DOCTOR OF PHILOSOPHY.

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for Howard

Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning.

Albert Einstein

Declaration

This thesis is submitted in fulfilment of requirements for the degree of Doctor of Philosophy at Stirling Management School at the University of Stirling, Scotland, United Kingdom. I declare that this thesis is based on my own original work and that where appropriate, I have made acknowledgement of the work of others and have referred to work carried out in collaboration with other persons. I also declare that this thesis has not been previously submitted, either in whole or in part, for any other qualification at the University of Stirling or other institutions. I am responsible for any errors and omissions present in this thesis.

Signed

Declaration of Author's Rights

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Acknowledgement is also given to my parents; Chris and Hugh Conway. At family meals or times of celebration, I see 'empty chairs' where they once sat. As one of six, those empty chairs remind me of gatherings, full of chat sometimes laughter, sometimes anger depending on who had the floor and the viewpoint articulated at the time but always encouraged and where 'Education, Education, Education' was a hot topic of my Dad's, ignored at your peril!

And last but never least, thank you to my three gorgeous boys: To Jamie and Calum who drive me nuts some of the time but who make me laugh most of the time, and to Howard, my husband and best friend, who kept me sane and without whose support this thesis would never have been completed.

Abstract

The concept of Shifting the Balance of Care was first introduced to NHS Scotland in 2005 through the Kerr Report. The key messages from the report were to: ensure sustainable and safe local services, which are supported by the right skills, change the emphasis of care into the community, provide preventative reactive care, and fully integrate the system to tackle the changes, use technology more effectively, and involve the public in finding solutions to change. Following the report, a framework was developed which highlighted and prioritised eight areas of improvement. These areas for improvement are the focus by which this research examines if Operational Research (OR), specifically OR models, can have a positive impact in Shifting the Balance of Care. The research utilises underlying OR methodologies and methods and provides evidence from the literature of the ability of nine selected models to facilitate the Shift in the Balance of Care. A contributing factor to the research is the barriers to implementation of OR models into the NHS. With reference to the literature, the common barriers to implementation of OR models are categorised and used to provide direction to modellers where implementation barriers are more prevalent in some models than in others. The research also provides empirical evidence of three selected models' (the Lean Methodology, Process Mapping and Simulation, developed over two Case Studies) ability to address and influence the prioritised Improvement Areas, with the addition of a newly developed model: SoApt. The development of SoApt follows the Principles of Model Development derived as a guide to modellers who wish to develop a new model. SoApt is also empirically explored in a Case Study and provides some evidence of the models ability to aid Decision-makers, faced

with limited budgets, to choose between options which will Shift the Balance of Care. OR methods and methodologies are examined to ascertain the Roles of Models for each model explored in the Case Studies. Examination of the Roles of Models against the Improvement Areas provided evidence of a models' ability to address more than one of the priority areas and that models can be used together or sequentially. In addition, with reference to OR methods and methodologies, a theoretical Evaluation Framework is proposed which suggests the User and User Satisfaction is key to the evaluation of a model's success; positive experiences of the User and Use of the model may help to eliminate some of the barriers to implementation.

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Chapter One

Introduction

1. Introduction

This chapter introduces the basis of the research. The first section describes the background of the research topic, followed by a brief description of the background to the thesis. These two sections are followed by the aims and scope of the research, then the research question along with the objectives of the research is stated. The final section describes the structure of the thesis and gives a brief description of each chapter.

1.1.Background

The NHS was officially formed in 1948 after World War II; however, unlike the rest of the UK, approximately half of Scotland was already covered by a state funded health system. Indeed, the template for the NHS reflected the existing Highlands and Islands Medical Service. Nevertheless, during the first year of the newly formed NHS, many Scots received free dentures, spectacles, and wages of health workers improved as they were aligned with the rest of the UK. Further reform over the years has seen the introduction of Health Authorities responsible for their own geographical areas in Scotland and the devolvement of Health and Social Care to the Scottish Government.

The NHS in Scotland is a highly complex, highly bureaucratic organisation which employs over 160 000 people[22]. The organisation is managed through five tiers of hierarchy with the Scottish Government at the top. Responsibilities at the two lower tiers are apportioned based on geographical location. There are many divisions within the NHS: Community Health Partnerships; acute and community services; primary, secondary, and tertiary care and eleven

recognised workforce groups. Within the workforce groups there are many job types, these job types also create further divisions. The outcome of these various divisions is one where groups work independently of one another: geographical; care level; professional and functional silos are apparent and embedded in the culture of the NHS.

The concept of Shifting the Balance of Care was first introduced to Scotland in 2005[1] [2]., although many of the themes of Shifting the Balance of Care were recognised and sought by various Government papers prior to 2005. Shifting the Balance of Care (SBC) is a strategic objective of the Scottish Government, NHS Scotland, and Local Authorities[3]. The change in demographics of the population; a reflection of the Baby Boom in the 1960's and that older people are living longer, often with complex and long-term conditions, mean that current service delivery is no longer sustainable. The objectives of SBC is to improve the health and well-being outcomes of people across Scotland by reducing inequality of care, encouraging independence of care and providing services that are preventative and closer to home. SBC provides the opportunity for the full involvement of patients, users, carers, and staff to ensure that services are fit for purpose. SBC also proposes better use of people, facilities, and technology and information systems. The Balance of Care is shifted through three key areas: shifting the focus of care, shifting the location of care, and shifting the responsibility of care[4]. Eight priority Improvement Areas have been identified as having the largest impact on Shifting the Balance of Care and it is the Improvement Areas that are the focus of this research.

Operational research applies scientific methods to management problems by providing a rational basis for decision-making through understanding and structuring complex situations. Operational researchers solve management problems by building mathematical models to predict system behaviour[5]. The application of Operational research modelling has been applied to many problem situations in healthcare since the 1950's[6]. The exploration of nine current OR models examine the ability of these models to impact the eight priority Improvement Areas. In addition, Case Studies are employed to explore in detail the ability of four models, including the development of a new model, to address the Improvement Areas.

1.2.Thesis Subject Matter

This thesis is in completion of a PhD examining the use of modelling in Shifting the Balance of Care in the NHS. The author and members of the Redesign Team at NHS Fife mutually agreed the subject. This study employs Operational Research (OR) modelling as a possible means of bringing clarity to the debate about the benefits and costs to patients, services and the NHS organisation of Shifting the Balance of Care.

1.3.Aims and Scope of the Research

The aims of this research are to reflect on OR modelling and if OR modelling can contribute to Shifting the Balance of Care in Scotland. The priorities of Shifting the Balance of Care in the NHS will be discussed and various modelling techniques will be examined with a view to their potential impact on meeting these priorities. Case Studies will then be employed to investigate if modelling can facilitate the delivery of Shifting the Balance of Care's objectives.

In addition, the development and implementation of a new model: SoApt will be discussed. The SoApt model is an aid to Decision-makers in prioritising new or re-designed services but which also acts as a standardisation and outcomes tool for proposers of new or re-designed services.

The geographic scope of the research will concentrate within NHS Fife area but will also include comparison of NHS practice elsewhere. The research is set within a limited timeframe and as such will reflect the priorities within Fife at this time. The academic scope of the research draws on research methods, operational research and to a lesser extent health economics.

1.4.Research Question

To what extent can Operational Research (OR) Modelling contribute to Shifting the Balance of Care in the NHS?

1.5.Objectives

The Research aims to address the following questions:

1) What are the priorities of Shifting the Balance of Care?
2) What is the Role of Modelling in the NHS and in Shifting the Balance of Care?
3) Which models have the potential to impact positively the Shift in the Balance of Care?
4) What are the barriers to implementation of models in the NHS?
5) What constitutes a successful model? How are they evaluated?

1.6.Structure of the Thesis

To address these questions and to demonstrate a clear understanding of the findings, the research will take the following path:

Chapters Two and Three review the literature in relation to the NHS in Scotland generally and Shifting the Balance of Care in the NHS specifically. These two chapters contextualise the thesis concerning historical and current significance.

> *Chapter 2* describes the historical and current situation within the NHS.
>
> *Chapter 3* examines the background and introduction of the premise of Shifting the Balance of Care in Scotland, the areas of concern and the areas given priority.

Chapter Four presents the methodology of the thesis.

> *Chapter 4* discusses methodological theory and the subsequent methodologies and methods adopted to investigate the research questions.

Chapter Five integrates Shifting the Balance of Care literatures with Operational Research.

> *Chapter 5* introduces Operational Research (OR) and examines nine OR models' potential to make an impact on the priorities of Shifting the Balance of Care. This chapter also discusses the barriers associated with the implementation of models in healthcare, a framework to improve implementation and a framework to evaluate successful models.

Chapters Six through to Eight present three separate Case Studies, where modelling techniques have been applied and are examined as to their potential to Shift the Balance of Care. These Case Studies are presented individually, therefore, as well as providing findings from empirical work; they also contextualise the cases according to the literature.

> *Chapter 6* presents a Case Study where the Lean Methodology is examined. This chapter discusses the implementation of the Lean Methodology into a project within the musculoskeletal service within NHS Fife. The chapter also follows and reports on the progress of the adoption of Lean and evaluates its impact on the project.

Chapter 7 presents a Case Study where Process Mapping and Simulation are examined. This chapter discusses the impact Process Mapping, Scenario Generator and Simul8 can have on the introduction of caring for people in their own homes.

Chapter 8 presents a Case Study introducing and describing the development of a new model: SoApt: An option assessor tool. The chapter describes the features of the tool as well as its implementation into NHS Fife and its subsequent adoption by NHS Scotland.

Chapters Nine and Ten combine the literature and the findings from the Case Studies to present an overview of OR modelling in the NHS specifically to Shifting the Balance of Care.

Chapter 9 defines the roles of OR modelling in healthcare, with reference to the experiences and potential of the models explored in the Case Studies and examines the roles of these models to influence the Shifting the Balance of Care.

Chapter 10 concludes the findings, the limitations, and the recommendations of the research and discusses future work.

Chapter Two

The National Health Service

2. Introduction

This chapter provides a brief historical overview of the establishment of the National Health Service (NHS) and its formation in Scotland. The chapter then provides statistical data and discussion, which relates to the modern NHS in Scotland. Finally, the chapter illustrates the current structures within NHS Fife.

2.1. A brief history of the NHS

> *"The right course, I am sure, is to nationalise the hospital services entirely and to take them out of the field of local government altogether. The future hospital situation is quite a new one. For the first time we shall be promising the whole population a full service - every kind of hospital and specialist care planned over the entire country. We shall (if my first proposal is accepted) be amalgamating the two present hospital services into one single new service, and we have got to achieve as nearly as possible a uniform standard of service for all - when all pay their contributions to a national insurance scheme. This is important. Under any local government system - even if modified by joint boards or otherwise - there will tend to be a better service in the richer areas, a worse service in the poorer. Yet all the population will be paying the same national rates of insurance contribution and will expect the State to see that an equally good service is available everywhere. Every attempt we might make to fit this new conception to a local government pattern which was never designed for it and to areas or even combinations of areas whose boundaries do not suit it, would simply mean hampering the sensible planning and running of the new service. This seems to me strongly to be a case of starting again with a clean slate."*
> Nye Bevan[7]

The NHS Act was founded and presented by the Labour Party's Minister of Health, Aneurin (Nye) Bevan in 1948; the Act presented the new National Health Service, which promised to provide free healthcare to all: rich or poor. The formation of the NHS at this time combated emerging views such as: healthcare was a right for all in a civilised society, the existing services were disorganised and not well managed and the voluntary hospitals were struggling to raise charitable donations. The destructive and life changing effects of World

War II made it possible to initiate full scale change in the existing health care systems; the creation of emergency medical services as part of the war effort provided evidence of how effective and efficient one UK managed service could be[8]. In addition, the 1942 report of William Beveridge highlighted the need for free healthcare when he identified five evils: want; ignorance; disease; squalor and idleness and recommended a compulsory system of state insurance to pay for and eliminate the five evils[9].

The implementers of the NHS did not start with a clean sheet of paper, the systems already in place included:

General Practitioners

Access to a GP was free to workers on low pay. Other people who could not afford to pay the fee occasionally received care through a GP charity but were not entitled to it.

Hospital Care

Nearly a quarter of hospital beds were provided in voluntary hospitals. These varied from small hospitals sustained by public subscription, to internationally famous teaching hospitals with investment income. Special hospitals concentrated on particular diseases or types of patients, children, or women. Each voluntary hospital was a law unto itself, raising funds and deciding its admission policies and many hospitals were near bankruptcy.

Local Authority Services

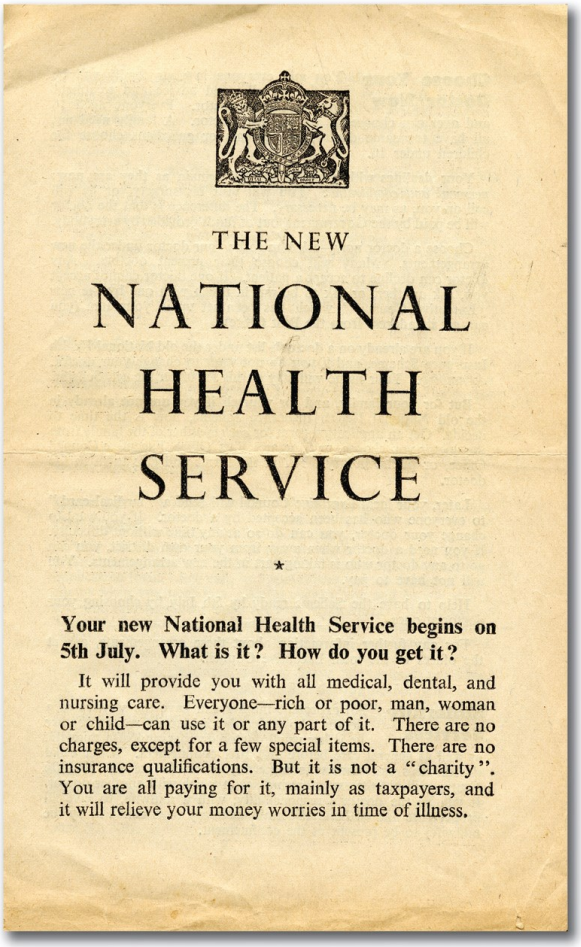
As a service to their ratepayers most beds were provided in municipal hospitals. Local authorities provided maternity hospitals, hospitals for infectious diseases, as well as those for the elderly, mentally ill and mentally handicapped and a variety of community services. The standard varied widely, depending upon the attitude of the Council.

Mentally Ill People

Mentally ill and mentally handicapped people were generally sent away to large institutions, admission was often for life.

Older People

Many older people, who had no other means of support, ended their lives in the Public Assistance Institutions: workhouses [8].



THE NEW

NATIONAL HEALTH SERVICE

★

Your new National Health Service begins on 5th July. What is it? How do you get it?

It will provide you with all medical, dental, and nursing care. Everyone—rich or poor, man, woman or child—can use it or any part of it. There are no charges, except for a few special items. There are no insurance qualifications. But it is not a "charity". You are all paying for it, mainly as taxpayers, and it will relieve your money worries in time of illness.

Source: Department of Health[10]

2.2.NHS Scotland

The NHS Act was introduced in Scotland at the same time as the rest of the United Kingdom however, 50% of Scotland's landmass was already covered by a state-funded health system serving the whole community and directly run from Edinburgh. The Highlands and Islands Medical Service[11] transformed care for more than 300,000 people. Unlike other local medical schemes, it was directly funded by the state and administered centrally by the Scottish Office in Edinburgh working with local committees and it was established 35 years before the NHS Act. Scotland also had its own distinctive medical tradition based on a scientific curriculum and learning from international practice. As a

result Scotland provided prototypes for the NHS and the UK wide service repaid it through delivering several advantages: National Health Service staff had common salary scales which gave a relative advantage to Scottish health workers whose wages were generally lower than elsewhere; The first year of the NHS provided the biggest single improvement in the everyday health and well-being of the people of Scotland; Half a million Scots were able to have free spectacles within four months of the announcement of the Act and half a million Scots received free dentures in the first year.

2.2.1. Modern NHS Scotland

Since the 1948 Act there have been a few key changes made to NHS Scotland: In 1972 an Act was published which reorganised NHS Scotland into health boards to improve organisation and integration of services; The Scotland Act in 1998[12] devolved several matters from UK Government to the Scottish Government including health and social services; In 2004 a reform Act abolished Trusts and absorbed them into the health boards; as a result the structure of NHS Scotland[13] is different from its UK counterparts and is illustrated in Figure 2-1.

Seven Special NHS Boards and one public health body support the regional NHS Boards by providing a range of specialist and national services.

Figure 2-1 Structure of the NHS in Scotland

The Special Health Boards consist of:

NHS Health Scotland: Promoting ways to improve the health of the population and reduce health inequalities.

NHS National Waiting Times Centre: Ensuring prompt access to first-class treatment.

NHS24: Providing health advice and information.

Scottish Ambulance Service: Responding to almost 600,000 accident and emergency calls and taking 1.6 million patients to and from hospital each year.

The State Hospitals Board for Scotland: Providing assessment, treatment and care in conditions of special security for individuals with a mental disorder

whom because of their dangerous, violent, or criminal propensities, cannot be cared for in any other setting.

NHS National Services Scotland: Supplying essential services including health protection, blood transfusion, and information.

Public Health Body

Healthcare Improvement Scotland: Delivering high quality, evidence-based, safe, effective, and person-centred care, and scrutinising services to provide public assurance about the quality and safety of healthcare.

The regional NHS Boards are responsible for the protection and the improvement of their population's health and for the delivery of frontline healthcare services. The number and geography of the regional health boards can be seen in Figure 2-2.

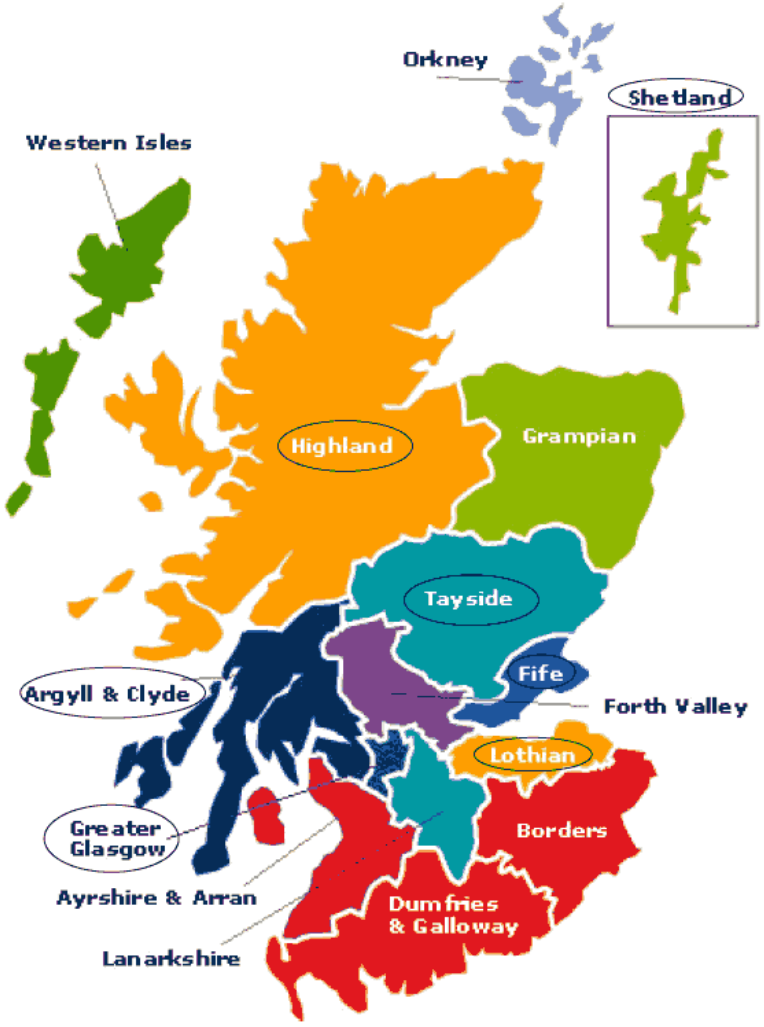


Figure 2-2 Regional Health Boards in Scotland[14]

The regional health boards support Community Health Partnerships (CHP's). There are 36 CHP's in Scotland and they are concerned with delivering local health improvements aligned to the responsibilities of their own local circumstances and populations. A map of the CHP's is illustrated in Figure 2-3. The concept of partnership working and the subsequent development of CHPs were set out in the papers 'Partnership for Care'[15] and 'Delivering for Health'[16]. CHPs are now central to the agenda of Shifting the Balance of Care and are expected to continually shift the balance of care by improving access, managing demand, reducing unnecessary referrals and providing better community care services as specified in 'Better Health, Better Care: Action

Plan'[17]. CHPs are partnerships made up of health, local authority, voluntary sector organisations, and members of the public to support local joint working on health improvement[18], address health inequalities, enhance anticipatory and preventative care, shift resources to community settings, and provide a wider variety of services at local level[19]. Profiles produced at a local level can highlight health and social inequalities, show trends and support priority setting and targeting of resources, which in turn aid service providers, planners, and policy makers improve the understanding of local health issues and the positioning of local issues in a national context.

CHPs were set up with the intention of facilitating integration between staff and services, with the aim of providing stakeholders and providers the opportunity to participate in local decision-making and service delivery. However, according to the BMA there is little evidence of genuine engagement with clinicians in primary or secondary services[20]. A recent survey has indicated that 63% of GPs do not feel engaged in their local CHP, with 55% believing that they have no influence over its priority setting[20]. CHPs were developed with the purpose of giving front line staff the resources and freedom to innovate and implement new and improved ways of delivering care for patients. The BMA believe that this has not been achieved, with the majority of CHPs operating in an environment of 'top-down directives and bureaucracy' [20].

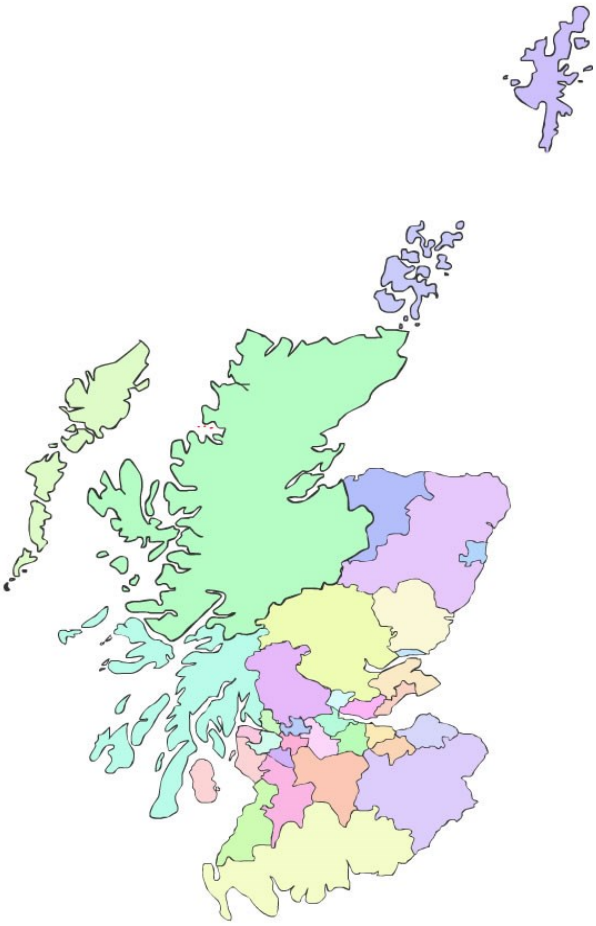


Figure 2-3 NHS Scotland CHPs[21]

In addition to the hierarchical decision levels within the NHS, stakeholders also have an input depending on their status: a comprehensive list of stakeholders) and their decision-making levels: Policy; Strategy and Operations, within the UK National Health Service was compiled by Brailsford et al. [250] (see Table 2-1).

As illustrated in Table 2-1, almost the entire population has a say in the running of the NHS at some level. The implications on the input into decision-making, given the structures and complexities described above, is that consensus will not be reached easily or quickly and final decisions will take time to be made.

In 2012 the NHS employed 162234 members of staff (including General Practitioners (GPs))[22], the breakdown of which can be seen in Figure 2-4.

		Policy	Strategy	Operations
Parliament	Policy Committee			
Government	Health Minister			
	Department of Trade and Industry			
	Treasury			
Civil Service	Social Care			
	Agencies			
	Strategic Health Authorities			
Public Providers	CEO's of NHS Authorities			
	Health Authorities			
Private Providers	Independent Treatment Centers			
	Private Hospitals			
	Insurance Companies			
Professional Groups	British Medical Association			
	Royal College of Nursing			
	Allied Health Physicians			
	Royal Colleges			
	NHS Confederation			
	Educational Institutes			
	Healthcare Commission			
	Allied Healthcare Professionals			
Professionals	General Practitioners			
	Physicians			
	Nurses			
	Surgeons			
Users	Patient Interest Groups			
	Patients			
	Families and Informal Carers			
Public	Taxpayers			

Table 2-1 Variety of Stakeholders in the NHS [250]

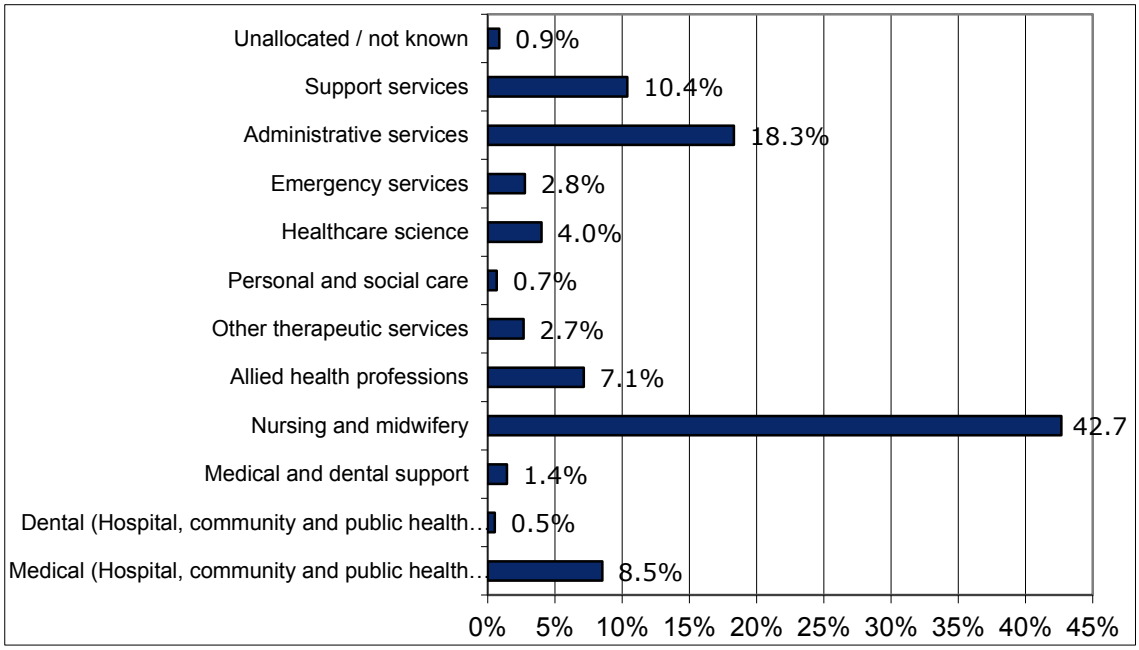


Figure 2-4 NHS Scotland Staff breakdown

Three hundred and nine hospitals[23] contain 16503 staffed beds[24] and in 2010,[25] there were 4,044,271 outpatient attendances. In 2010/2011, the government spent nearly 18%; approximately £11000 million of its total expenditure on healthcare (see Figure 2-5). This was made up of 57% costs for hospitals, 24% costs on Community Care and 16% of costs on Family Care (see Figure 2-6).

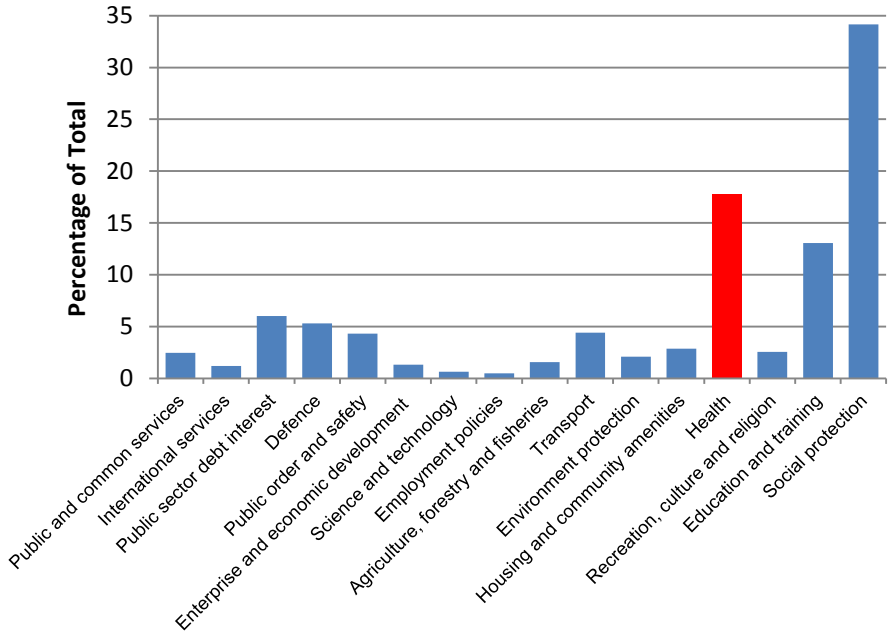


Figure 2-5 Scottish Government Expenditure 2011-2012[26]

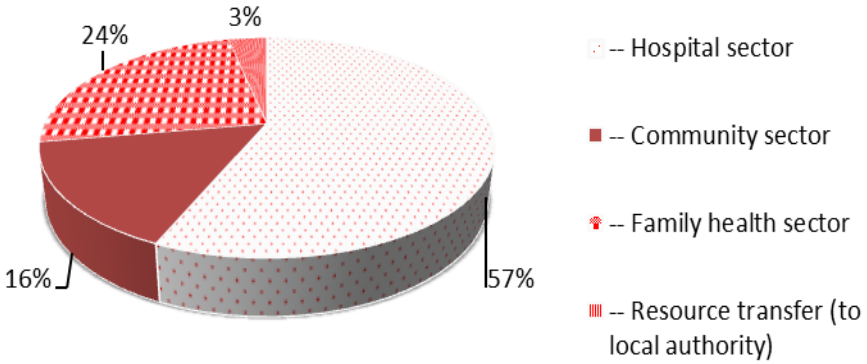


Figure 2-6 Scottish Health Services Costs (2011)[27]

2.3.NHS Fife

The Kingdom of Fife lies on the East Coast of Scotland, is a mixture of rural and inner city areas, and has a population of approximately 365000 people. Currently as depicted in Figure 2-7, Fife has a lower percentage of working population (65.7%:64.6%) and a higher percentage of pensioners compared to the national statistics (16.8%:17.6%)[28]. In addition, (see Figure 2-8) population predictions for 2035 estimate Scotland's population will increase by 10%, Fife's population will also increase by 10% and although there is predicted to be a 7% increase in Scotland's working population, Fife's working population will increase by 5%. In addition, the change in pensionable age of the population of Fife is 10% higher than that of Scotland With the demise of industries in the past such as fishing and mining experiences of people are very unequal, with opportunities and quality of life varying considerably across areas and amongst different groups. According to the Scottish Index of Multiple Deprivation 2012[29], Fife local authority has seen an increase in concentrations of deprivation within the 15% most deprived areas as well as an increase within the 20% most deprived areas and, as a result, is ranked third in the country for both.

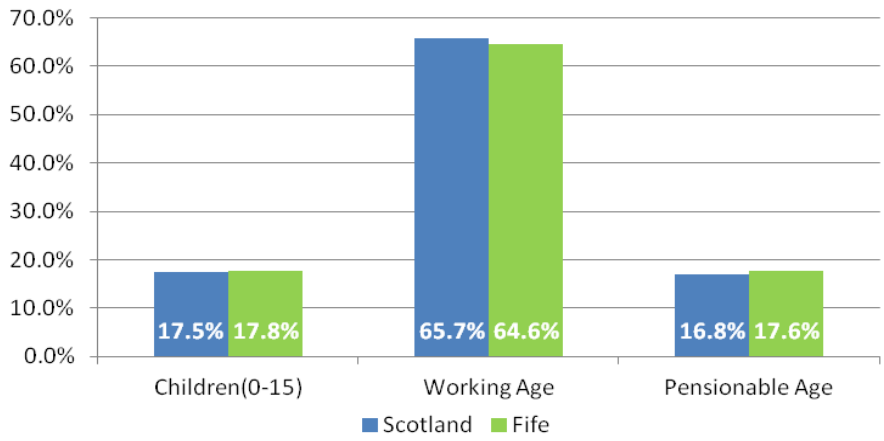


Figure 2-7 Percentage Breakdown of Population in Fife compared to Scotland

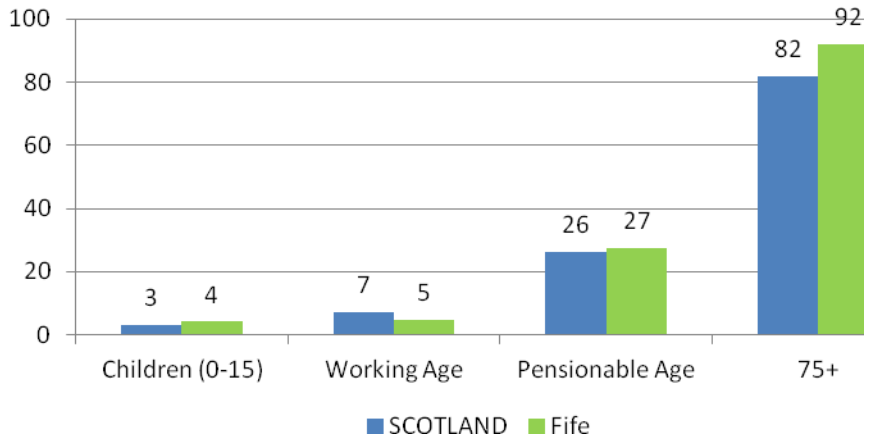


Figure 2-8 Projected Percentage Change in Population for 2035 Fife compared to Scotland.

Fife NHS also has the additional problem of high obesity rates: a report in 2005/2006 showed that Fife's children have the highest levels of obesity in Scotland[30]. It is acknowledged that obesity[31] and deprivation[32] are key determinants of health and with the addition of a higher aging population than National levels; Fife NHS has additional strains on already tight resources.

2.3.1.Fife's Community Health Partnerships

NHS Fife is divided into three Community Health Partnerships (CHPs): Kirkcaldy and Levenmouth, Glenrothes and North East Fife and Dunfermline and West Fife. There is also the Operational Division, which is responsible for the strategic planning and implementation of Fife's development plans.

The three CHP areas are served by three acute hospitals: Queen Margaret Hospital, Dunfermline, Victoria Hospital, Kirkcaldy and Forth Park Maternity Hospital, Kirkcaldy. Fife's Operational Division manages the acute hospitals.

Each CHP also has two Local Management Units (LMUs). LMUs represent a working partnership between NHS Fife and Fife Council and are responsible for delivering and managing integrated care services within their localities (see Table 2-2).

CHP	Kirkcaldy and Levenmouth	Glenrothes and N.E. Fife	Dunfermline and West Fife
LMU	Kirkcaldy	Glenrothes	Dunfermline
LMU	Levenmouth	N.E. Fife	West Fife

Table 2-2 Local Management Units within CHPs

2.3.1.1.Kirkcaldy and Levenmouth CHP

Kirkcaldy and Levenmouth CHP serve a population of approximately 96000[33], which as can be viewed in Figure 2-9 and Figure 2-10, has the smallest percentage of the total population and the smallest geographical area. The population density, however, for this CHP is higher than the average for Fife with Kirkcaldy and Levenmouth averaging 1299 per square mile compared to 704 for Fife. The percentage of the population who are income deprived is also significantly different in Kirkcaldy and Levenmouth compared to Fife with 17.1% in Kirkcaldy and 12.6% in Fife[34] .

2.3.1.2.Glenrothes and North East Fife CHP

Glenrothes and North East Fife CHP serve a population of approximately 124000[35] , which is the largest geographical area as can be viewed in Figure 2-9 and Figure 2-10. The population density for this CHP is 403.2 people per square mile, which is well below the average for Fife and reflects rural areas. The income deprivation percentages are also below the Fife average, with 9.8% against 13.9% for Fife[36].

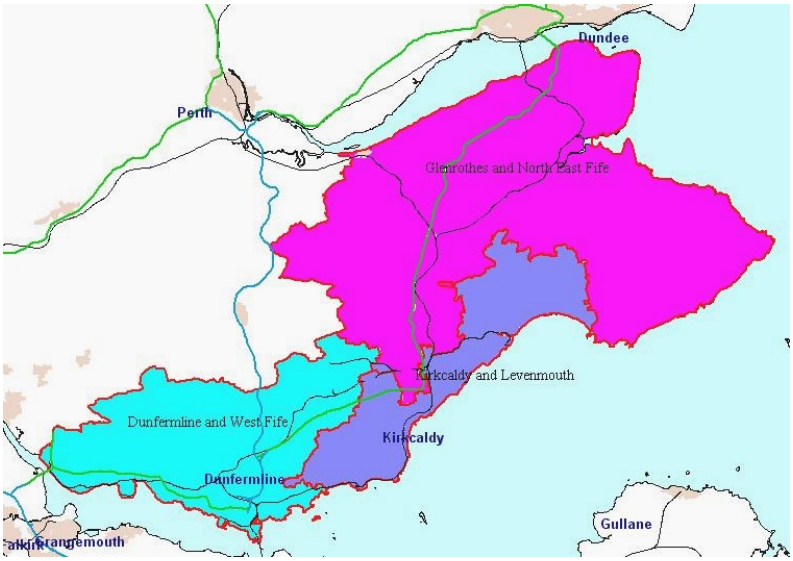


Figure 2-9 Fife's three CHPs

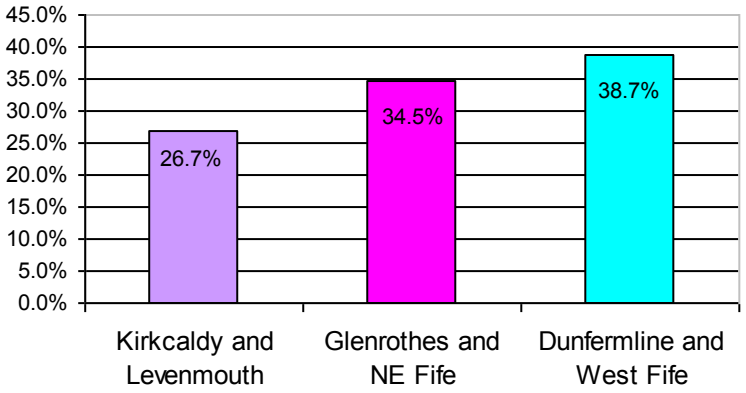


Figure 2-10 Percentage of Total Population served by each CHP

2.3.1.3.Dunfermline and West Fife CHP

Dunfermline and West Fife CHP serve a population of approximately 139000[37] , which has the highest percentage of total population for Fife as can be seen in Figure 2-10. The population density for this CHP is above the Fife average of 704 people per square mile at 1077. Income deprivation levels are approximately equal to the average for Fife[38] .

2.4.Discussion and Conclusion

Since the formation of the NHS, healthcare has come a long way: from the lone community doctor, to the network of expert consultants; from voluntary, often specialist, hospitals, to today's hospital, populated by staff, divided into hundreds of job categories, overseen by many stakeholders to run a highly complex and interactive system[39]. The size and complexity has made it impossible for any single individual to control and guide the operation, and no single profession can claim to be able to guarantee high quality care[40]. As a result, with the autonomy of and responsibility given to CHP's, health authorities and sub-divisions thereof, work independently of one another whilst also following Government targets, they prescribe to targets/policies to meet the needs of the patients within their geographical area. Healthcare has, under recent sustained pressure of efficiency savings, come to understand if care is to be of higher quality and lower cost the key to improvement lies in better organisational structures and processes and evidence based mechanisms to effectively and efficiently manage uncertain demands and outcomes [244]. However, the breaking down of the structures to make the NHS organisation more manageable can lead to silos, which can then lead to non-standardisation and inefficiency, and would not meet with the approval of Nye Bevan's vision of 'a uniform standard for all'[7]. Therein rests the motivation for the premise of Shifting the Balance of Care: the necessity to reduce costs but deliver a quality service, which is efficient, equitable, and accessible to all. The concept of Shifting the Balance of Care will be discussed in the following chapter.

Chapter Three

Shifting the Balance of Care

"Shifting the Balance of Care describes changes at different levels across health and care systems-all of which are intended to bring about better health outcomes for people, provide services which reduce health inequalities; promote independence and are quicker, more personal and closer to home."

Sylvia Wyatt (2009)[41]

3. Introduction

This chapter reviews the relevant Government papers, which precede the introduction of Shifting the Balance of Care, and continues by reviewing the papers that first introduce the concept of Shifting the Balance of Care. The chapter then discusses the influences and connections to Shifting the Balance of Care and finally debates the progress of the Shift in the Balance of Care in NHS Scotland by reviewing a report from Audit Scotland, the National Performance Framework, the **H**ealth Improvement, **E**fficiency, **A**ccess to Services and **T**reatment (HEAT) targets, and the Change Fund.

3.1.Background

The White Paper *'Designed to Care'* [42] sought to bring the NHS into the 21st century. It was the first policy from the then Scottish Office that highlighted the potential benefits to health improvement by making the patient the heart of healthcare and by involving the community. This Government department recognised that patients required a more responsive healthcare service and to achieve this aim, the paper proposes an increase in responsibility for primary care staff at local level to best assess the needs of service users. The Scottish Office's vision was to provide an integrated service where health authorities and Social Care are no longer in competition with one another but work in partnership to deliver a service of excellent quality.

> *"It will be an NHS designed to co-operate not compete; designed to deliver not delay; and, above all, designed to care. It will be modern, dependable and responsive."*
> Right Hon Donald Dewar MP, Secretary of State for Scotland, 09/12/1997[43]

In addition, the paper included a Clinical Governance framework to link clinical effectiveness to other quality systems and structures such as risk management, complaints and continuing professional development. This gave health professionals an opportunity to manage quality improvement and become more engaged in their area of work[44]. This policy was followed by a number of national policies that recognised the value of patients, carers, community members and the wider public have in shaping and implementing services related to health and wellbeing.

3.2.Healthcare and the Devolved Scottish Government

In 1999, the Scottish Parliament was reformed and was known as the Scottish Office until 2007. The Scottish Government has responsibility for devolved matters such as health, education, justice, rural affairs, and transport. With the devolved responsibility for Health came the necessity to shape healthcare in Scotland to meet the needs of the people of Scotland. The Government papers: *'Towards a Healthier Scotland'*[45]; *'Our National Health: A plan for action, a plan for change'*[46]; and *'Partnership for Care: Scotland's Health White Paper'*[47] address Scotland's ill health and inequalities of care.

Towards a Healthier Scotland (1999)[45]

This paper calls for a commitment from the Scottish people to work with the Government to prevent the 'killer diseases' of cancer and coronary heart disease by maintaining healthier life styles. It also promises to tackle the root-causes of ill health such as poor quality housing and to address the health inequalities between deprived and wealthy areas.

Our National Health: A plan for action, a plan for change (2000)[46]

This paper sets out several plans to:

Improve health by reducing inequalities in health and by encouraging a national effort;

Rebuild the NHS by integrating planning and delivering standards locally;

Improve the patient's journey by improving access and flexibility and by reducing waiting times;

Involve people by listening to patients and communities;

Provide a lifetime of care prioritising children and older people;

Meet specific needs by prioritising coronary heart disease, cancer, and mental health;

Work in partnership with staff by encouraging innovation and creativity.

Partnership for Care: Scotland's Health White Paper (2003)[47]

This paper proposes a major programme of service redesign and supports several policies for improving healthcare in Scotland:

Health Improvement: reduce health inequalities and tackle damaging lifestyles;

Listening To Patients: treat patients as partners and improve information with the Patient Information Initiative and NHS 24;

Quality, National Standards and Inspection: introduced NHS Quality Improvement Scotland and waiting time targets

Partnership, Integration and Redesign: create new Community Health Partnerships matched better with Social Work services and with stronger roots in the community through redesign of services;

Empowering and Equipping Staff: strengthen partnership with the workforce;

Organising For Reform: abolish NHS Trusts and devolve authority from Health Boards.

Fair to All, Personal to Each (2004)[48]

This paper sets targets to be met by the NHS in Scotland. Although the paper acknowledges progress made to date of improvements in the delivery of

healthcare, it also introduces Health Improvement, Efficiency, Access to Services and Treatment (HEAT) targets and sets the first targets for the end of 2007:

Patients will not wait more than 18 weeks from GP referral to an outpatient appointment;

Patients will not wait more than 18 weeks from a decision to undertake treatment to the start of that treatment (down from the previous 9 month maximum wait guarantee);

Patients will be able to rely on shorter maximum waits for specific conditions:

18 weeks from referral to completion of treatment for cataract surgery;

4 hours from arrival to discharge or transfer for accident and emergency treatment;

24 hours from admission to a specialist unit for hip surgery following fracture;

16 weeks from GP referral through a rapid access chest pain clinic or equivalent, to cardiac intervention.

3.3.Establishing the Shift in the Balance of Care

The concept of Shifting the Balance of Care was introduced to Scotland in recommendations set out in the Kerr report: *Building a Health Service Fit for the Future: A National Framework for Service Change in the NHS in Scotland: Volume 1 and Volume 2*[1] [2]. A follow up report by the Scottish Executive; '*Delivering for Health*'[16], states the main actions that will be implemented to meet the recommendations of the National Framework for Service Change[1] [2].

In order to plan for the next twenty years, the Kerr report [1 2] sets out detailed recommendations for change in the NHS. The need for change is galvanised by three main issues:

The ageing population: Older people are more likely to have a long-term illness, more likely to have a combination of such illnesses, more likely to be admitted to hospital and more likely to stay there following admission;

Increased incidence of long-term conditions: patients with long-term conditions are twice as likely to be admitted to hospital.

The rise in emergency hospital admissions: The mismatch between the needs of the population for proactive, integrated and preventive care for chronic conditions and a healthcare system where the balance of resources is aimed at specialised, episodic care for acute conditions.

The report stresses changes which should be made to the delivery of healthcare and which are listed in Table 3-1.

Current Delivery of Care	Changing Model of Care
Geared towards acute conditions	Geared towards long-term conditions
Hospital centred	Embedded in communities
Doctor dependent	Team based
Episodic care	Continuous care
Disjointed care	Integrated care
Reactive care	Preventative care
Patient as passive recipient	Patient as partner
Self-care infrequent	Self-care encouraged and facilitated
Carers undervalued	Carers supported as partners
Low tech	High tech

Table 3-1 A New Way of Delivering Care [1]

The key messages summarized in the report and in Table 3-1 are to ensure sustainable and safe local services which are supported by the right skills, change the emphasis of care into the community, provide preventative reactive care, fully integrate the system to tackle the changes, use technology more effectively and involve the public in finding solutions to change.

The framework takes guidance from the previous papers *Designed to Care*[42] and *Partnership for Care* [47] but also from consultation held with members of the public and NHS staff where the direction on healthcare delivery was emphasised as supplying core services closer to home. Addressing the three main issues, the report recommends:

Care of Older People: a change of focus from episodic to sustained co-ordinated care; a proactive and supportive approach to care of frailer older people, based on 'whole-system' redesign of health and Social Care but this will need a substantial shift in resources.

Long Term Conditions: models of care that are: patient centred; integrated and co-ordinated by Community Health Partnerships; systematic.

Care in Local Settings: supporting people at home; preventing avoidable hospital admission; identifying opportunities for more local diagnosis and treatment; enabling appropriate discharge and rehabilitation.

The report also recommends that Community Health Partnerships (CHPs)(see 2.2.1) should be the vehicle to develop and action change and that they should prioritise supporting patients at home; preventing avoidable hospital admissions, identify opportunities for more local diagnosis and treatment, and enable appropriate discharge and rehabilitation.

The response of the Government to the recommended framework was positive, the paper *Delivering for Health* [16] sets out a programme of action for the NHS, and endorsed and utilised the term "Shifting the Balance of Care". The Government state their priorities are: reducing the reliance on acute hospital services, supporting self-care and reducing the inequalities gap that exists between the more affluent and deprived areas and urban and rural areas. In order to reduce the reliance on acute care in hospitals the Government required more emphasis to be placed on preventative medicine, self-care and anticipatory care. To address the issue of inequality the Government sought to increase the levels of care provision at a local level including rural communities. In the paper, the Government encourages the public to take more responsibility for their own health but also responds to the wishes of the public by promising a greater say in how the NHS is run and a more responsive NHS. The Government also promised a seam-less journey of care, which will be brought about by integration of multi-disciplinary teams working across boundaries. The newly formed Community Health Partnerships (CHPs) (see 2.2.1) would be the mediums for developing a system of care in local settings prioritising their work into: supporting people at home, preventing avoidable hospital admission, identifying opportunities for more local diagnosis and treatment, enabling appropriate discharge and rehabilitation. The changes patients would see in the health services are articulated in Box 3-1.

THE CHANGES PATIENTS WILL SEE

Healthcare will be provided locally in GP practices, in community pharmacies or, increasingly, in Community Health Centres, with greater use of day case treatment.

In deprived areas, local primary care teams will have dedicated resources to reach out and help people with higher risks of ill health.

People with long-term conditions will find help and support available so they can play an increasing role in managing the condition themselves.

People who are older, frail or liable to frequent hospital admission will get co-ordinated care provided locally.

Carers will be treated as partners in the provision of care.

Patients will have access to their own Electronic Health Record and so will all the clinical staff that treats them.

Patients who need specialist treatment in hospital will get access to a good, safe service provided by the right person, even if that means they have to travel.

Patients who need to go to hospital will have quicker access; more tests will be done locally, and their length of stay will be planned and shorter.

If patients require care urgently, they will be able to see the right person, with the right skills, at the right time.

Patients will experience fewer cancelled appointments or procedures because of an emergency or because tests are not available.

People, who stay in remote and rural areas, will be provided with a core set of services in Rural General Hospitals.

Box 3-1 The changes in the NHS [16]

The vision of the paper was to make care more accessible to service users by providing community hospitals and local facilities, moving away from large centralised hospitals, better access to GP's and keeping people better informed enabling them to take more control of their own care. However, it is recognised that this shift is not one of just geography but of other factors such as a change in attitude and mind set of both users and practitioners alike. Shifting the Balance of Care into the community is, according to consultation[16], what people want; however, hospital services account for over half of NHS spending (see

Figure 2-5), and with the availability of acute beds decreasing, it is even more important to find solutions to treating people away from acute hospital activity.

As a result, the Scottish Government published a strategy[49] aimed at NHS Boards and their associated CHPs. This emphasises the role community hospitals will play in Shifting the Balance of Care through delivering and developing services in conjunction with primary care and that community hospitals have a role in both rural and urban settings. NHS Boards are encouraged to include community hospitals in their overall health strategy by ensuring they have skilled staff and, given the historical origins of some community hospitals, are fit for purpose. In addition, given the origins of some community hospitals such as war memorials and fever hospitals, NHS Boards are advised to be aware of the symbolic, sometimes romantic connections community hospitals have in the local community. Acknowledgement of these relationships would help toward involving the community in extending the scope of the community hospital but Boards should also be aware that negative reactions might occur if the plan is to rebuild or totally redevelop a community hospital.

In 2006 the Shifting the Balance of Care (SBC) Delivery Group[50] was formed to focus on the key commitments of 'Delivering for Health' and to take a leadership role in the Shifting in the Balance of Care by careful planning and development involving all partners: health, social, the 3rd sector and voluntary care.

3.3.1.The Current Scottish Government and Shifting the Balance of Care

In 2007, the Scottish National Party (SNP) won the most seats in the election and governed a minority administration. In the 2011 election, SNP again won the election to form the first majority Government since the reformation of Parliament. Consequently the new Government outlined their own response to the Kerr report [2] in a series of three papers: '*Better Health, Better Care: A Discussion Document*'[51], '*Better Health, Better Care: Action Plan*'[17] and '*Better Health, Better Care: Action Plan, What it Means for You*'[52]. These papers also endorse Shifting the Balance of Care and delivering care in the new way as described in Table 3-1. The discussion paper invites contribution from the public to engage with the Government to meet the objectives suggested in the paper, whilst both Action papers state the actions, which will be taken as a result.

Better Health, Better Care advocates: A mutual NHS in partnership with the public which continues to Shift the Balance of Care into the community through CHP's, where performance will be measured through annually set **H**ealth Improvement, **E**fficiency, **A**ccess to Services and **T**reatment (HEAT) targets (see 3.4.1.3) ; Improving Scotland's health by informing and enabling people to take better care of themselves and by addressing the life expectancy gap between deprived and well-off areas; By putting people at the centre of health decision-making and by improving the quality of health by adopting the six criteria of the Quality Strategy[256].

3.3.1.1.The Healthcare Quality Strategy for NHS Scotland

The Quality Strategy was published for commentary in draft form in 2009 [307] and formally adopted in 2010 [256]. To measure quality in NHS Scotland the strategy has adopted the six internationally recognised dimensions[53] :

Person-centred: providing care that is responsive to individual personal preferences, needs, and values and assuring that patient values guide all clinical decisions;

Safe: avoiding injuries to patients from healthcare that is intended to help them;

Effective: providing services based on scientific knowledge;

Efficient: avoiding waste, including waste of equipment, supplies, ideas, and energy;

Equitable: providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location or socio-economic status; and

Timely: reducing waits and sometimes harmful delays for both those who receive care and those who give care.

The ambitions of the Quality Strategy are illustrated in Box 3-2 and are driven by the dimensions of: Person–centred, Safe and Effective.

Building on the foundations of *Better Health, Better Care*[17], and the Quality Strategy document advocates: putting people at the heart of the NHS; making life easier for people who work within and for the NHS and making measurable differences to the quality of care delivered. The Quality Strategy supports the Shift in the Balance of Care by providing the standard by which care should be

shifted and delivered. Specifically, the dimension Effective drives the quality standard for enhancing prevention and anticipatory approaches and has the potential to make services more efficient and sustainable by avoiding the development of disease and unnecessary hospital admissions, reducing avoidable days in hospital and improving the patient experience[256].

The Quality Ambitions

Mutually beneficial partnerships between patients, their families and those delivering healthcare services which respect individual needs and values and which demonstrate compassion, continuity, clear communication and shared decision-making.

There will be no avoidable injury or harm to people from healthcare they receive, and an appropriate, clean, and safe environment will be provided for the delivery of healthcare services at all times.

The most appropriate treatments, interventions, support and services will be provided at the right time to everyone who will benefit, and wasteful or harmful variation will be eradicated.

Source: The Healthcare Quality Strategy for Scotland[54]

Box 3-2 The Quality Ambitions

3.3.1.2.Review of the Shift in the Balance of Care

In 2008, the Government commissioned a review of the evidence relating to Shifting the Balance of Care[55]. The aims of the review were to: provide an overview of the range of evidence available; point out agreement and disagreement of effective change; highlight significant areas to learn from; identify gaps in the evidence and identify the impact and related costs and benefits of Shifting the Balance of Care to service-users. The authors of the review acknowledge this is an international review of the knowledge base,

which may contribute to the debate as well report on developments pertaining to Shifting the Balance of Care. Contained in the report the authors identify four sub-levels within the policy of Shifting the Balance of Care: Focus, Location, Roles and Responsibility.

Focus - The focus of care is defined as shifting care from acute services to preventative care and care in the community and stresses the importance of continuous, integrated care rather than disconnected episodic care.

Location – The location of care is defined as shifting care and services into the community improving access to treatment, diagnostics and specialist services managed by CHP's.

Responsibility – The responsibility of care is shifted towards a partnership with the public to enable people to manage their own care.

Professional Roles – The roles of care are shifted away from individuals to integrated teams of skilled professionals delivering care across pathways.

The review found evidence to suggest the following areas could contribute to Shifting the Balance of Care:

Shifting the focus of care through:

- Assessment of older people;
- Multi- disciplinary working;
- Integrated care for older people, people with LTC, Alzheimer's and people with HIV/ AIDS;
- Disease management;
- Early supported discharge with community-based rehabilitation for stroke and other patients;
- Rehabilitation in the community for a range of conditions.

Shifting the location of care through:

- Housing adaptations and equipment
- Supported discharge for older people and for people after a stroke
- Early supported discharge for older people and people after a stroke
- Care at home and hospital at home interventions
- Community hospitals
- Day hospitals

Shifting the roles of care through:

- Substitution of roles;
- Respite and day care services to support unpaid carers.

Shifting responsibilities of care through:

- Telephone support services
- Telephone consultation
- Self-care support
- Self-monitoring of long term conditions

The review found more evidence relating to the focus and location of care but fewer incidences relating to roles and responsibilities of care. The review also revealed gaps in the evidence in relation to particular groups including ethnic minorities, people with alcohol problems and people from rural areas, however, there was evidence pertaining to older people in all four sub-levels above.

In two later documents, [56] [3] Shifting the Balance of Care is sub-divided across health and Social Care into three categories as: Shifting the focus of care into prevention; Shifting who delivers care and Shifting the location of care.

Also in 2008, the SBC Delivery Group commissioned a project: an Integrated Resource Framework (IRF), to focus on resources; one of the main barriers to

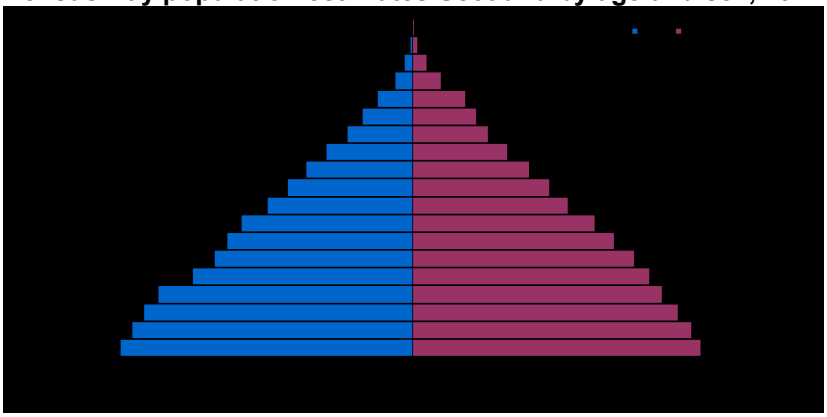
Shifting the Balance of Care. The Scottish Government, NHS Scotland and the Convention of Scottish Local Authorities (COSLA) to work across health and Social Care developed the IRF jointly. The objectives of the IRF are to provide information of activities across the sector to partners to help them plan strategically and financially to redesign and realign services whilst understanding the implications of their decisions to health and Social Care as a whole. Four sites have been selected in Scotland to test the IRF and then to inform other authorities: NHS Highland with Argyll & Bute Council and Highland Council; NHS Tayside with Angus Council, Dundee City Council and Perth and Kinross Council; NHS Ayrshire and Arran with East Ayrshire Council, North Ayrshire Council and South Ayrshire Council; NHS Lothian with City of Edinburgh Council, East Lothian Council, Midlothian Council and West Lothian Council.

3.3.1.3. Shifting the Balance of Care for the Elderly

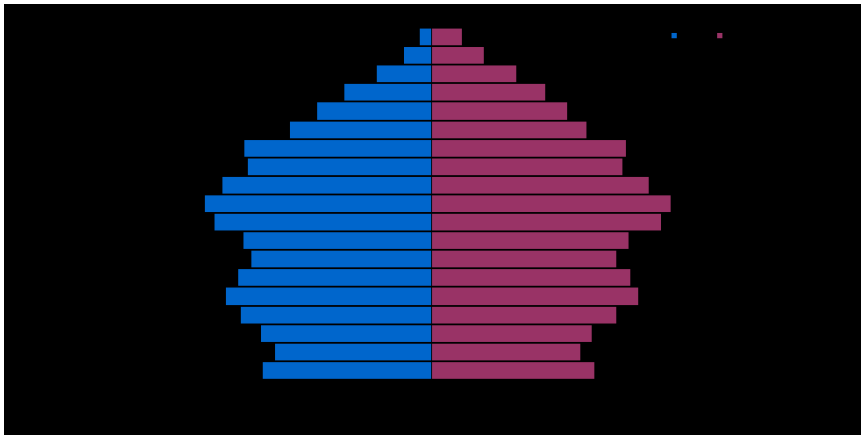
As recognised in the Kerr report [1 2] supported by the current Government and the Shifting the Balance of Care Review [4], the aging population is a significant motivation for Shifting the Balance of Care. The change in demographics of the population in Scotland[1] (see Figure 3-1) and the change in the number of dependents in Scotland (see Figure 3-2) indicate that, along with the current economic climate, current resources are being squeezed[57].

[1] All statistics relate to Scotland unless otherwise stated.

Census Day population estimates Scotland by age and sex, 1911



Census Day population estimates Scotland by age and sex, 2011



Projected population of Scotland (2006-based), by age and sex 2031

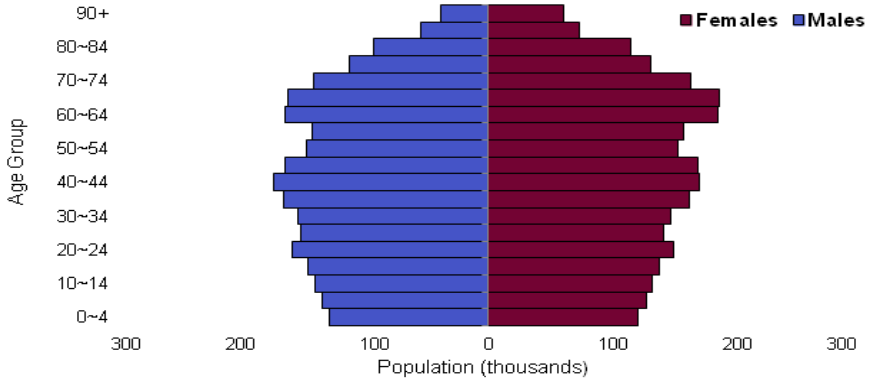


Figure 3-1 The changing shape of the population from 1911 to 2031.[58] [59]

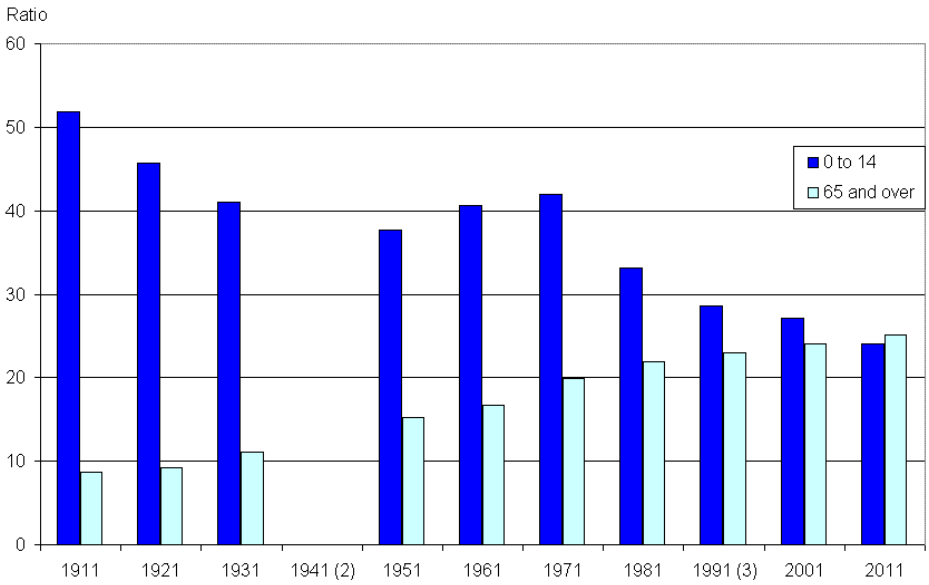
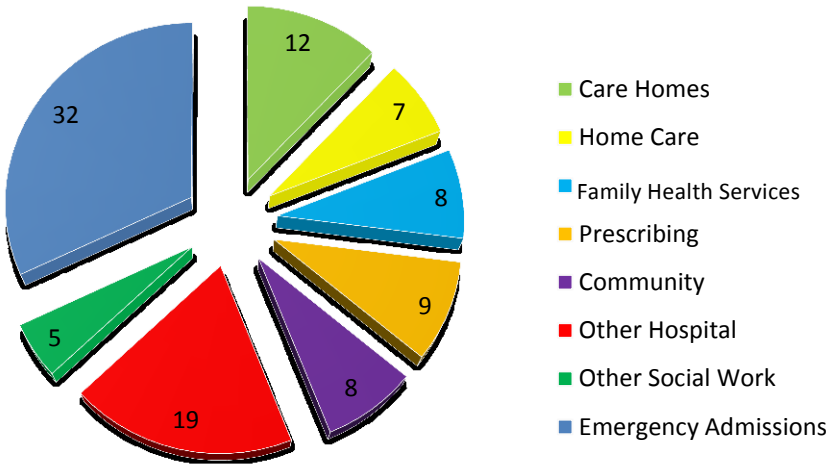


Figure 3-2 Dependency Ratios 1911-2011[60]

Of the £4.5 billion spent on Health and Social Care in 2007/2008 for over 65's, 32% was spent on emergency medical admissions (see Figure 3-3); in 2007, this equated to nearly 8000 emergency beds, and is projected to reach 14000 beds by 2031.



(Scottish population aged 65+ (Total=£4.5bn)

Figure 3-3 Heath and Adult Social Care Percentage Expenditure 2007/08[61]

Figure 3-4 Emergency Admissions 75+ years[62]

The Emergency Admission rates for 75 year olds and over, despite a slight decrease in 2009/10, is predicted to continue to rise (see Figure 3-4) and the average length of stay (LOS) after Emergency Admission is much longer for older patients (see Figure 3-5).

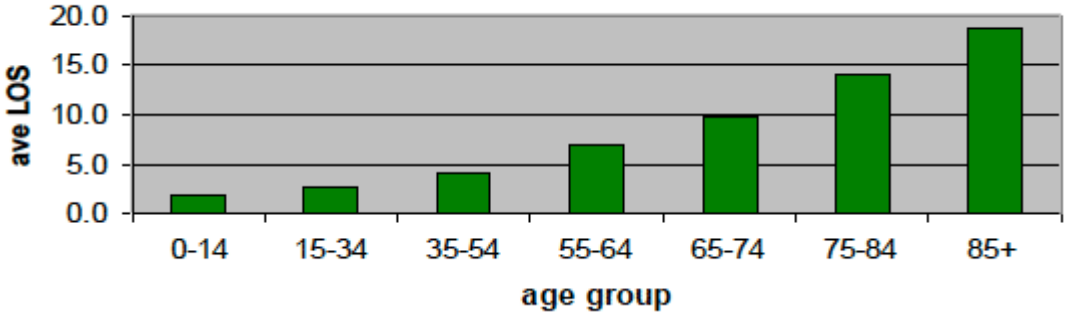


Figure 3-5 Average LOS (days) per Emergency Admission by Age 2007-2008 [61]

As evidenced by the above data the current level of spend is not sustainable [61]. The predicted change in demographics of the population suggests an increase in annual expenditure of £1.1 billion by 2016 and of £3.5 billion by 2031 [61].

3.3.1.3.1.Reshaping Care for Older People

In keeping with the ethos of Shifting the Balance of Care and to generate interest and input into unsustainable spending on healthcare, the Scottish

Government undertook an engagement programme from May 2010 to September 2010 in order to give people a voice in how care for older people should be reshaped. The programme took the form of 15 public events, a leaflet, a booklet and a questionnaire[63]. The on-line questionnaire received 519 responses and 512 responses were received via a paper-based version of the questionnaire distributed at the public events. The majority of respondents were female and fell into the 45-54 year age bracket. The key responses to the questionnaire were:

- 62% of respondents did not believe older people's care needs were currently being met;
- 70% of respondents preferred to receive support in their own homes;
- 74% of respondents believed the support should be provided by a combination of state help and family;
- 16% of respondents were confident that their care needs would be met in the future;
- 50% of respondents believed care should be paid for by a combination of general taxation and personal contribution.

As a result of the need for change and the views of those who contributed to the public events and questionnaire, COSLA, the Scottish Government and NHS Scotland combined forces and produced the document "A Programme for Change 2011-2021"[57] . The document lists several commitments to reshape the care of older people over ten years. These commitments include doubling the current spend for care at home with equivalent reductions made elsewhere, reducing the number of emergency bed days used by the over 75's, offering all over 75's the use of a Telecare package, ensuring older people are not

discharged to care homes after a stay in an acute hospital, increasing the capacity of third sector partners and reducing waste with regards to emergency admissions and bed days [57].

3.3.1.4.Change Fund

Also included in these commitments is an undertaking to make available a Change Fund [57] of £300 million over the period 2011-2015. The Change Fund was initiated as transitional monies to aid in Shifting the Balance of Care to care at home and the community and away from acute provision. Interested partners were invited to apply for a proportion of the £70 million budget made available for 2011/2012 through a Change Plan. All 32 possible partners; made-up of health, Social Care, housing, the Third sector, and Independents applied and were granted an allocation from the Change Fund initiative.

3.3.1.5. The Change Fund and Fife Partnership

The Fife Partnership is made up of Fife Council, NHS Fife, Council for Voluntary Services (CVS) Fife and Scottish Care (Fife Branch). The Fife Partnership applied for an initial central allocation of £4,899,000 from the Change Fund[57]. Fife's Change Plan stated these monies would be allocated as follows:

Preventative / anticipatory care	5%
Telehealthcare	6%
Equipment and Adaptations	4%
Carers	4%
Volunteering & Community Capacity	4%
Reablement / rehabilitation / intermediate care	75%
Support to implement the Delivery Plan	2%

These monies would support the following work streams:

Preventive/anticipatory care;
Services for people with dementia;
Telehealthcare;
Very Sheltered & Amenity Housing;
Reablement/rehabilitation/Intermediate care;
Rapid response;
Equipment and adaptations;
Carers;
Volunteering;
Community Capacity.

Interested parties within Fife were invited to tender for the monies available with a business plan of how the monies would be used. In 2011/2012, the £4.89million available was allocated to the following five projects with the vast majority of the money being awarded to the first two:

ICASS Integrated Community Assessment Support Service- a specialised team providing a service to look after a patient within their own home over a short period, thus reducing emergency admissions and bed days.

Reablement- a service that provides a 6 week home assessment to ensure older people can live safely and independently at home.

Telecare- continued investment in technology, which monitors the health and well-being of the user allowing them to live safely at home

Local Area Coordination-refocus of services to actively support people to feel safe and independent while living at home and to ensure quality of life is maintained through coordinated interaction with others.

Community Equipment- is an investment in software, which will provide a faster and more efficient service to those requiring alteration, and equipment in their homes.

3.4.Progress of Shifting the Balance of Care

In 2010, the Government commissioned a report on the condition of public services in Scotland, the Christie Report[64]. The report was published in 2011 with, arguably, damming evidence of public services in Scotland, the report states:

> *"The public service system is often fragmented, complex and opaque, hampering the joint working between organisations which we consider to be essential. As a whole, the system can be 'top down' and unresponsive to the needs of individuals and communities. It lacks accountability and is often characterised by a short-termism that makes it difficult to prioritise preventative approaches."* [65]

The report specifies several recommendations for immediate reform across all public service provision based on the following key messages:

Services should not be delivered 'top down' but designed with and for people and their communities;

Maximise resources from all sectors to make better use of scarce resources;

Better understand the need of individuals and the community to support self-reliance;

Deliver results from integrated services;

Identify the causes of inequalities and prioritise preventative measures;

Improve data gathering and accountability and introduce performance comparators;

Drive reform across all public services based on outcomes, improved performance and cost reduction;

Implement long-term strategic planning, with greater transparency around major budget decisions.

The Christie commission reported across all public services but all of the key messages noted above are relevant to Health and Social Care.

In response to the report and to reform public services[66] the Government prioritised 'four pillars': prevention, partnership working, workforce development, and performance management.

Towards prevention: In its response the Government recognised that investment in prevention delivers results and cited the Change Fund as an example of success;

Towards locally integrated service delivery: The Government noted that effective, locally integrated service provision working within the community is fundamental to the achievement of outcomes;

To invest in workforce development: The Government accepted listening to the public servants who work on the front line would enhance improvements;

To improve the transparency of service delivery performance and outcomes: the Government also recognised that outcomes and targets must be transparent and undertook to use Scotland Performs[2] more effectively.

The Association for Public Sector Excellence (APSE) welcomed the prioritising of preventative programmes response from the Government but questioned how much change would occur if the Government only invests 1% of its budget over a three year period [67].

The source with the most potential for progressing and reporting on the actions pertaining to Shifting the Balance of Care is the Shifting the Balance of Care website[68], however, after accessing this site in January 2013 it is evident the site has not been updated: the latest publication is dated 2010. However, the

[2] Scotland Performs was established in 2007, measures, and reports on progress of government in Scotland. Progress is tracked by 7 Purpose Targets and it is supported by 16 National Outcomes and 50 National Indicators, covering key areas of health, justice, environment, economy, and education.

ethos of Shifting the Balance of Care is prominent in the Performance Framework, the HEAT targets and The Joint Improvement Team (JIT). The JIT have responsibility for continuing the Shift in the Balance of Care[69]. The JIT was established in 2004 to work directly with local health and Social Care partnerships across Scotland and is co-sponsored by the Scottish Government, the Convention of Scottish Local Authorities (COSLA), and NHS Scotland. The JIT aim to make sustainable improvements that suit local needs: to find practical solutions that translate into positive outcomes for patients, users and carers [82]. The action areas prioritised by the JIT are:

- Care at Home
- Commissioning
- Delayed Discharge
- Equipment and Adaptations
- Governance and Management
- Housing
- Intermediate Care
- Performance Improvement
- Reshaping Care for Older People
- Talking Points: User and Carer Involvement
- Telecare

3.4.1.Reviewing the Progress of Shifting the Balance of Care

In order to ascertain the progress of Shifting the Balance of Care the performance measures introduced by the Government along with other relevant reports are reviewed.

3.4.1.1.Audit Scotland

CHPs were set up in 2004 (see 2.2.1) to bridge the gap between primary and secondary healthcare, and between health and Social Care. However, a report by Audit Scotland reviewing CHPs[70] stated:

"There has been no large-scale shift in the balance of care despite this being a key priority since 2000"

The report also commented on the following areas of responsibility:

3.4.1.1.1.Emergency Admissions Over 65's

Although some CHPs reported a decrease in emergency admissions, Figure 3-6 and Figure 3-7 illustrate an increase in activity overall for people aged 65 and over. For those CHPs who did succeed in reducing emergency admissions funding was not released from Acute divisions; the report found an overall lack of analysis and understanding of the overall effect on costs as a result of service change.

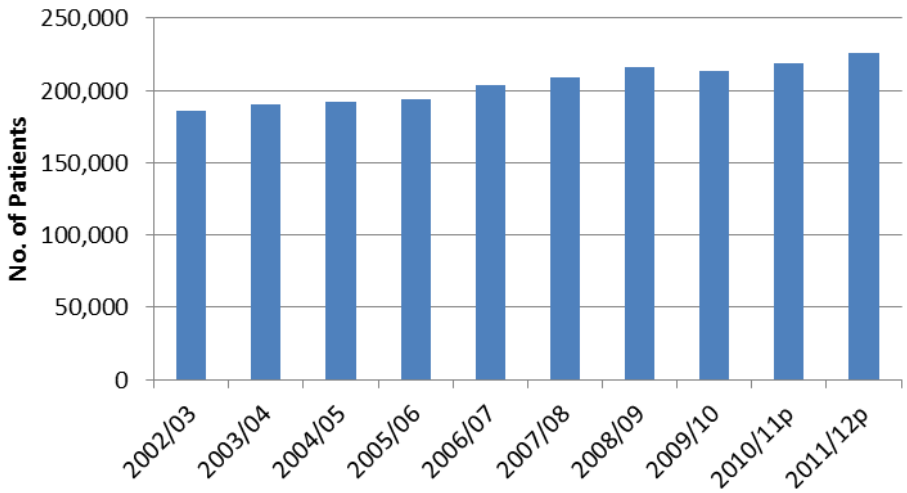


Figure 3-6 Patients Aged 65+ Emergency Admissions[71]

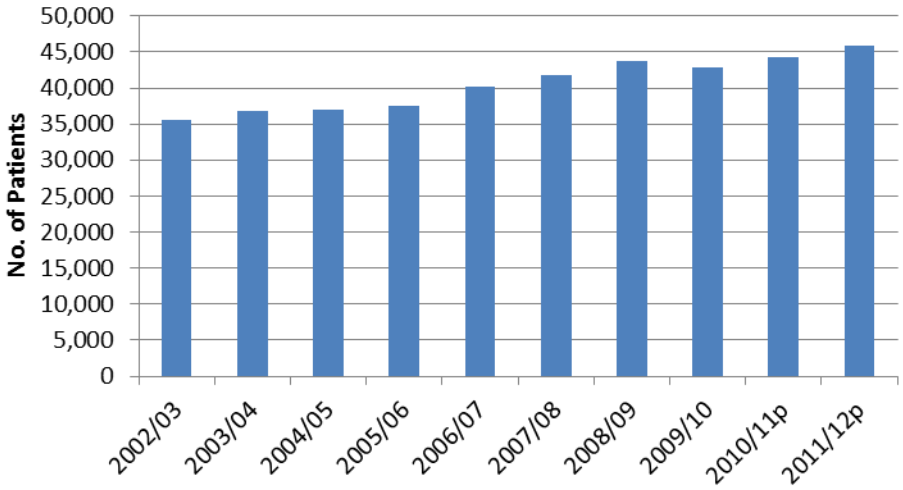


Figure 3-7 Patients aged 65 yrs., with 2+ Emergency Admissions[72]

3.4.1.1.2. Delayed Discharge

Although there has been a substantial decrease in delayed discharge since 2002 [77], the evidence suggests numbers are starting to increase again. The 2007/2008 target was to reduce delayed discharge of more than 6 weeks to zero patients. As illustrated in Figure 3-8 the delayed discharge levels have fluctuated over the last four years, although there is an element of seasonality, which is more evident in Figure 3-9. However, in October 2011, the Scottish Government announced two new targets. These stated that by April 2013, no patient should wait more than 4 weeks from when they are clinically ready for discharge and subsequently by April 2015, no patient should wait more than 2 weeks until discharge [73].

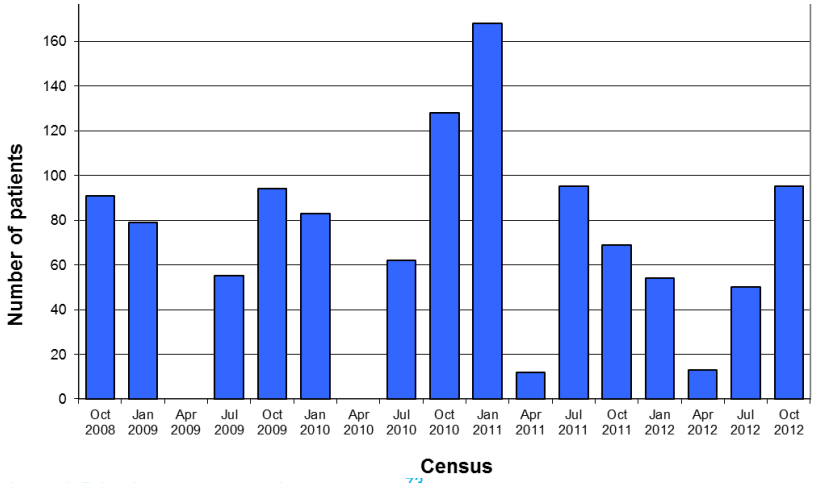


Figure 3-8 Delayed Discharge 6 weeks or more[73]

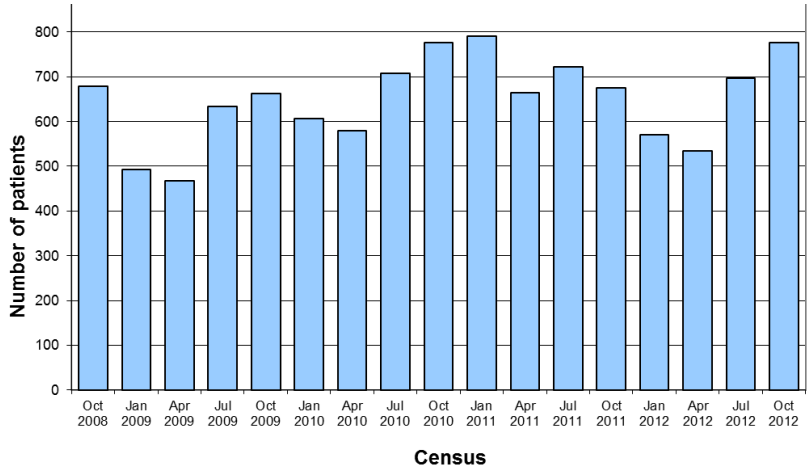


Figure 3-9 Total Delayed Discharges[74]

3.4.1.1.3.Health Inequalities

There is mixed evidence in reducing the gap of healthcare between well-off and deprived areas: there is evidence to suggest fewer pregnant women smoke, and that there are fewer low-birth weight babies. However, admission to hospital due to drug problems has increased in the majority of CHPs and the health gap for coronary heart disease is widening. Overall, as depicted in Figure 3-10, the death rate gap between most and least deprived has changed very little[75].

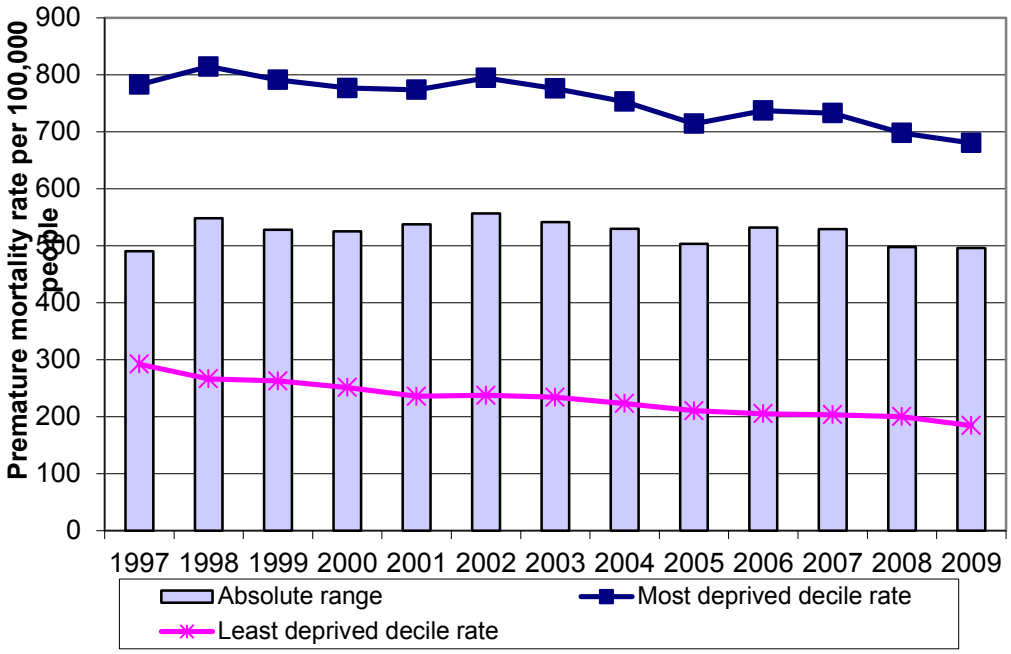


Figure 3-10 Under 75 death rates[75]

3.4.1.1.4.Telecare

There is evidence that Telecare[3] services are reducing the number of unplanned admissions to hospital and that the Telecare programme has saved approximately £48.4 million in saved bed-days. However, the statistics available for the years 2011 and 2012 show that the number of Social Care clients receiving Telecare is static at approximately 56%.

3.4.1.2.The National Performance Framework

The National Performance Framework[76] was originally initiated in 2007 and revised in 2011. The framework consists of four parts to measure success:

Purpose and Targets: Economic Growth; Productivity; Participation; Population; Solidarity; Cohesion and Sustainability.

[3] The Telecare programme allows older people to stay at home by providing alerts through telecommunication connections case of i.e. falls.

Strategic Objectives: Wealthier and Fairer; Safer and Stronger; Smarter; Greener and Healthier.

National Outcomes: Business; Crime; Employment Opportunities; Sustainable Places; Research and Innovation; Communities; Young People; Environment; Children; National Identity; Healthier Lives; Environmental Impact; Inequalities, Independent Living; Public Services and Children, Young People and Families.

50 National Indicators: Of the 50 National Indicators, 17 have been selected by the author as representing Health and Social Care as illustrated in Table 3-2. As indicated by the arrows in Table 3-2, seven indicators show improved performance however, improvement in the healthcare experience has only increased by 0.6% and alcohol related hospital admissions is still 20% higher than the 1997/1998 figure. In addition, eight of the indicators have not improved and two have reduced performance.

↑	Reduce premature mortality	Premature mortality decreased by 2% in 2011
↑	Improve the quality of healthcare experience	The healthcare experience score is 78.7% for 2011/2012 an increase of 0.6% on the previous year.
↑	Reduce the percentage of adults who smoke	Adult smoking has reduced by 2.1% since 2006.
↑	Reduce alcohol related hospital admissions	Alcohol related hospital admissions have decreased by 2.1% in 2010/2011 compared to 2009/2010 figures but represents an increase of 20.6% since 1997/1998.
↑	Improve the responsiveness of public services	The number of people agreeing that they can influence decisions affecting their local area increased to 22.5% in 2011 compared to 21.3% in 2010.
↑	Reduce the proportion of individuals living in poverty	In 2010/11, 15.2% of the population was in relative poverty. This is a fall from 17.1% in 2009/10.
↑	Improve children's dental health	67.0% of Scottish children in Primary 1 in 2010/2011 have no obvious dental decay, compared with 64% in 2009/10.
↔	Increase physical activity	No change in physical activity since baseline.
↔	Improve self-assessed general health	78% of people rate their general health as good or very good.
↔	Improve mental wellbeing	The well-being score (maximum 70) has remained at 49.9.
↔	Improve end of life care	90.7% of people spent the last six months of life at home or in a community setting.
↔	Improve support for people with care needs	60.4% of people receiving care at home for 2011-12 is a slight decrease when compared to 60.6%
↔	Reduce children's deprivation	In 2010/11, the percentage of children who were in combined material deprivation was 13.0%. This compares with 14.7% in 2009/10.
↔	Increase the proportion of babies with a healthy birth weight	90% of babies have maintained a healthy birth weight.
↔	Increase the proportion of healthy weight children	The proportion of children with a healthy weight is (65.6%) which represents a small decrease on the previous year's figure (67.5%)
↓	Reduce emergency admissions to hospital	In 2011-12 10,070 per 100,000 population emergency admissions indicate that there has been an increase in the rate over the last two years.
↓	Reduce the number of individuals with problem drug use	People, aged 15 to 64 years old, with drug use problems in 2009/10 was 59,600 compared with an estimate of 55,300 in 2006. This represents an estimated increase of 4,300 people.

Key to arrows: ↑ Performance Improving ↔ Performance Maintaining ↓ Performance Worsening

Table 3-2 Health Indicators[77]

3.4.1.3.HEAT Targets

The HEAT targets are internal NHS performance management measures that support the National Performance Framework (see 3.4.1.2). Each year the Scottish Government agrees and publishes a group of national NHS performance targets depending on priorities and attainment of previous year's targets. HEAT targets were first published in 2006[78]: A list of HEAT targets and resultant performance from 2007 can be viewed in Appendix 1.

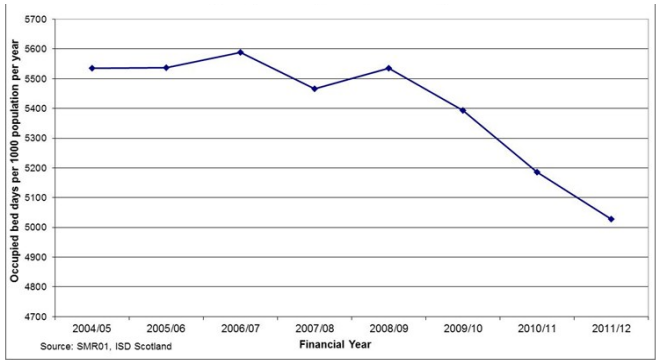


Figure 3-11 Emergency Bed Days for People 75+ Years[79]

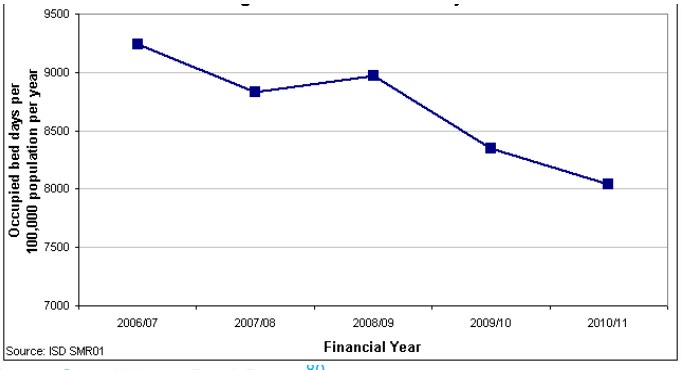


Figure 3-12 Long-Term Conditions Bed Days[80]

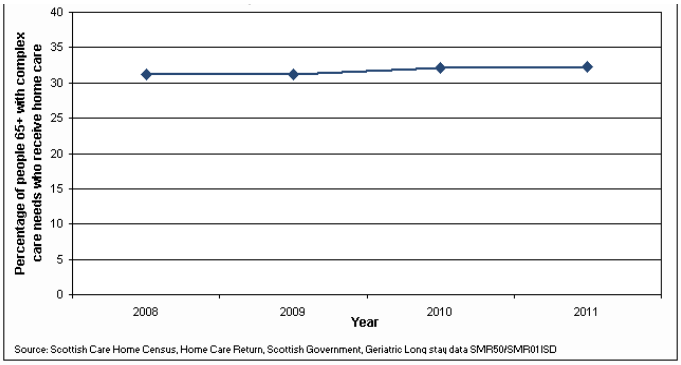


Figure 3-13 Complex Care Needs Delivered at Home[81]

HEAT TARGETS >March 2013	Target	Outcome
T: Accident and Emergency (A&E) Attendances	2095 2013/2014	2183
T: Delayed Discharge (14 days)	April 2015	220 (28 days)
T: Emergency Bed Days for 75+ Reduce the rate of emergency inpatient bed days for people aged 75 and over per 1,000 population	2014/2015	12% reduction
HEAT TARGETS 2012/13	**Target**	**Outcome**
H: Inequalities Targeted Cardiovascular Health Checks Achieve agreed number of inequalities targeted cardiovascular Health Checks	26,682	47,776
E: Cash Efficiencies NHS Boards to deliver a 3% efficiency saving to reinvest in frontline services	3%	3.6%
A: Waiting Times (18 weeks referral to treatment)Deliver 18 weeks referral to treatment	90%	92.%
H: Exclusively Breastfed Increase the proportion of new-born children exclusively breastfed at six to eight weeks from 26.6% in 2006/07 to 33.3% in 2010/11.	33.4%	26.5%
HEAT TARGETS 2011/2012	**Target**	**Outcome**
H: Inequalities Targeted Health Checks Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2010/11.	23,597	41,107
E: Same Day Surgery The target is to achieve 80% of British Association of Day Surgery (BADS) surgical procedures performed in a day case or outpatient setting by March 2011	80%	80.7%
E: Emergency Inpatients Average Length of Stay The target is to achieve a reduction of the average length of stay per hospital episode (for acute inpatients discharged following an urgent, emergency or other non-routine, unplanned admission) to 3.9 days by 2010/11	3.9 Days	3.3 days
HEAT TARGETS 2011/2012	**Target**	**Outcome**
T: Long Term Conditions Bed Days To achieve agreed reductions in the rate of hospital admissions and bed days of patients with primary diagnosis of chronic obstructive pulmonary disease, asthma, diabetes or coronary heart disease from 2006/07 to 2010/11	Reduce to 8,511 Bed Days per 100,000 Pop	8,041
T: Complex Care Needs: Care at Home Increase the level of older people with complex care needs receiving care at home.	33.5%	32.3%
T: Dementia Each NHS Board will achieve agreed improvement in the early diagnosis and management of patients with dementia by March 2011	39,578 Dementia diagnoses on QOF	40,195 Dementia diagnoses on QOF

Table 3-3 HEAT Targets Relevant to Shifting the Balance of Care

2011/2012 Change Plan			
JIT Recommended Percentage Allocation of Investment			
19%	**27%**	**24%**	**23%**
Preventative and Anticipatory Care	**Proactive Care and Support at Home**	**Effective Care at Times of Transition**	**Hospital and Care Homes**
Build social networks and opportunities for participation.	Responsive and flexible home care.	Urgent triage to identify frail older people.	Reablement & Rehabilitation.
Early diagnosis of dementia.	Integrated Case/Care Management.	Early assessment and rehab in the appropriate specialist unit.	Specialist clinical advice for community teams.
Prevention of Falls and Fractures.	Carer Support and Respite.	Prevention and treatment of delirium.	NHS24, SAS and Out of Hours access ACPs.
Information & Support for Self-Management & Self Directed Support.	Rapid access to equipment.	Effective and timely discharge home or transfer to intermediate care.	Range of Intermediate Care alternatives to emergency admission.
Prediction of risk of recurrent admissions.	Timely adaptations, including housing adaptations, and equipment.	Medicine reconciliation and reviews.	Responsive and flexible palliative care.
Anticipatory Care Planning.		Carers as equal partners.	Support for carers.
Support for carers.		Specialist clinical support for care homes.	Medicines Management.
Suitable, and varied, housing, build support and housing support.	Telehealthcare		Access to range of housing options.
7% **Enablers** i.e. Outcomes-focussed assessment, Co-production, Technology/eHealth/Data Sharing, Workforce Development/Skill Mix/Integrated Working, OD and Improvement Support, Information and Evaluation, Commissioning and Integrated Resource Framework.			

Table 3-4 Reshaping Care Pathway

3.4.1.4.Change Fund (see 3.3.1.4)

As part of the Reshaping Care for Older People strategy[82], a Pathway has been developed by the JIT to illustrate four priorities for investing Change Fund monies and the recommended apportionment of investment (see Table 3-4)[82].

The mid-term report of Reshaping Care for Older People [82] analyses Change Fund awardees self-reports of five achievements of planning, developing and implementing their Change Fund monies, the results of which are illustrated in Figure 3-14 and Figure 3-15. Awardee's report achievements in partnership development and improvements to intermediate care delivery, however, the report groups' responses into System Redesign and Service Delivery, therefore, it is difficult to compare the detail of awardee's achievements with the detail given in the Pathway and to compare their proportion of spending with the recommended allocation.

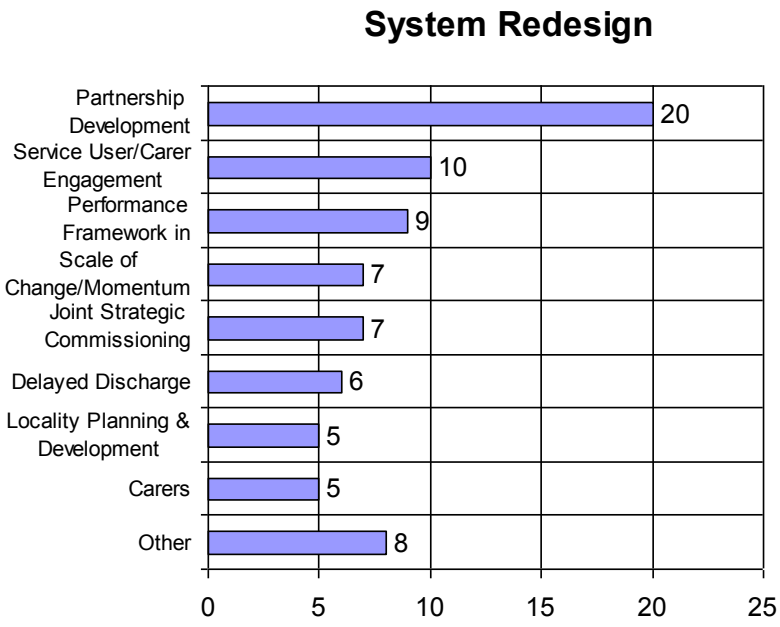


Figure 3-14 Awardee's Top 5 Change Fund Achievements[82]

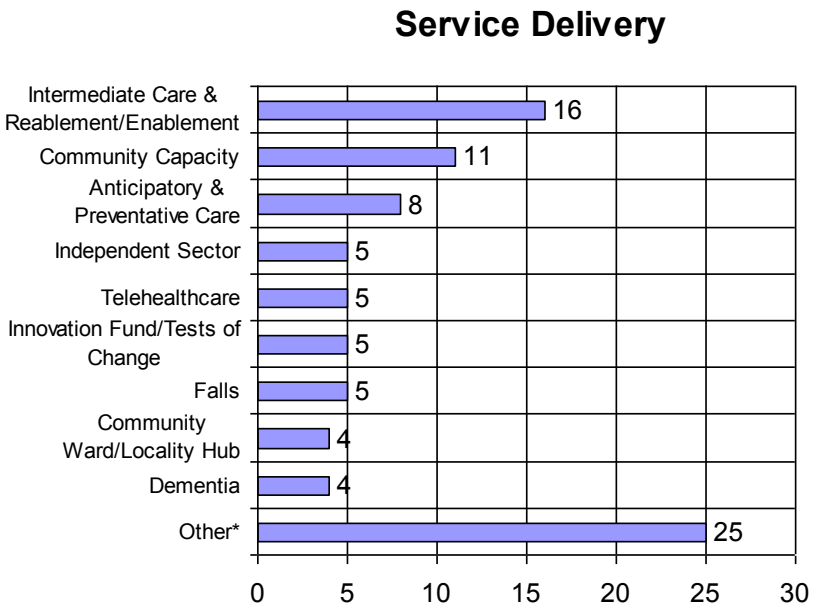


Figure 3-15 Awardees Top 5 Change Fund Achievements[82]

The awardee's also identified challenges they face whilst attempting to initiate change as listed in Figure 3-16: the pace of change, engagement of partners and recruitment issues are all reported by more than 50% of awardee's as being particularly challenging.

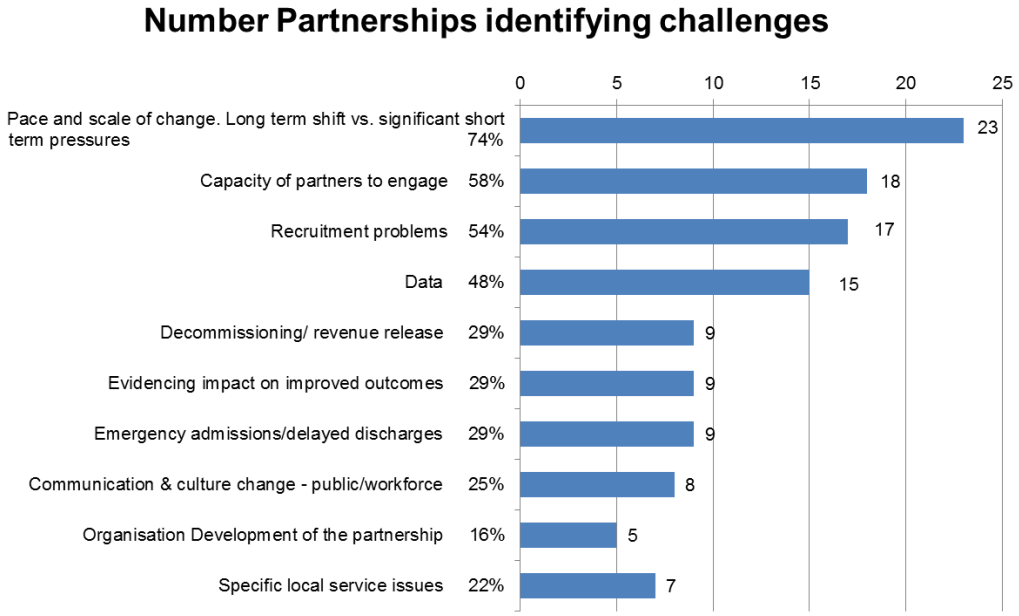


Figure 3-16 Challenges of Initiating Change[82]

3.4.2.Integration of Adult Health and Social Care

In 2012 the Government launched the consultation document Integration of Adult Health and Social Care in Scotland[83]. The proposal to integrate health and Social Care is based on the following principles:

- Health and Social Care services should be integrated around the needs of individuals, their carers and other family members;
- There should be strong and consistent clinical and care leadership in the planning and provision of services;
- The providers of services should be held to account jointly for delivering improved outcomes; and
- Services should be supported by flexible, sustainable financial procedures that give priority to the needs of the people they serve.

The principles of the document, according to the Government, will be met by the following proposals:

- Community Health Partnerships will be replaced by Health and Social Care Partnerships, which will be the joint and equal responsibility of Health Boards and Local Authorities.
- Nationally agreed outcomes will apply across adult health and Social Care. Health and Social Care Partnerships will be jointly accountable.
- Health and Social Care Partnerships will be required to integrate budgets for joint strategic commissioning and delivery of services to support the national outcomes for adult health and Social Care.
- A jointly appointed, senior Jointly Accountable Officer in each Health and Social Care Partnership will ensure that partners' joint objectives, including nationally agreed outcomes, are delivered within the integrated budget by the Partnership.
- The role of clinicians, Social Care professionals and the third and independent sectors in the strategic commissioning of services for adults will be strengthened.

- Proportionally, fewer resources - money and staff - will be directed in future towards institutional care, and more resources will be directed towards community provision and capacity building.

The final bill is due to be delivered during the summer of 2013[4].

3.5.Discussion and Conclusion

The Government papers [42] [45] [46] [47] [48] reviewed above, despite several administrative changes, have common themes regarding healthcare reform which suggests 'modernising' the NHS is a slow process. Tackling health inequality gaps, reducing wait times, forming partnerships with patients and shifting care into the community are constant themes, which successive government administrations have tried to address (see 3.2). The change in demographics of the population (see 3.3.1.3.1) has galvanised the proposed changes. The ratio of over 65's is higher than ever before resulting in the current level of spending and the current delivery of care for older people is no longer sustainable[61]. CHPs have the responsibility of Shifting the Balance of Care that aims to reform healthcare by addressing many of these common themes and by addressing the care of an aging population (see 3.3.1.3).

The National Performance Framework (see Appendix 2) measures the attainment of many sectors, including health, across Scotland. The HEAT targets (see 3.4.1.3) set by government, contribute to the Health sector of the Performance Framework. Many of the HEAT targets agreed support and

[4] Public Bodies (Joint Working) (Scotland) Bill introduced to Parliament May 28th 2013 [318]

measure the Shift in the Balance of Care (see Table 3-3). However, compiling the paper in Appendix 1 concerning HEAT target performance was a time consuming task accessing then retrieving the information from the relevant documents. In addition, the HEAT targets are produced each year and are therefore posted for the year of release; however, each targeted performance also has an associated target date. Therefore, although the Government reports when a target has been achieved it does not necessarily report if the target has been achieved within the specified time frame. For instance, the HEAT standard: 90% of planned / elective patients to commence treatment within 18 weeks of referral was achieved in 2011[84], this target was due to be delivered in 2007[48].

The Change Fund (see 3.4.1.4) also reflects and supports the Shift in the Balance of Care by providing some monies to health authorities to invest towards reshaping care for older people and preventative care as recommended in the Kerr report [2] .

The Performance Framework, HEAT targets, the CHP report [70] and Change Fund report [82] contributed to the assessment of the progress of Shifting the Balance of Care. There is evidence of progress, particularly regarding the 18 week referral to treatment target and a reduction in alcohol related hospital admissions. However, many of the health performance indicators have remained static, there is little change in the health inequalities gap and delayed discharge and emergency admissions and bed days have not yet reached targets set. Evidence relating to changes made through the investment of

Change Fund monies does indicate change but the evidence is self-reported and fragmented and therefore does not give an overall view of change across Scotland. Indeed, the lack of evidence of the Balance of Care shifting resulted in the report by Audit Scotland stating there has been little change in the Shift in the Balance of Care despite the priority it possesses in healthcare reform.

At its conception, Shifting the Balance of Care was introduced to prioritise reform in the delivery of healthcare in Scotland; it is now embedded in NHS policies as reflected in the National Performance Indicators, the HEAT targets, the work of the JIT and the IRF (see 3.4). Shifting the Balance of Care, as previously stated, reflects common themes identified by prior Government papers for healthcare redesign. As well as introducing the concept of Shifting the Balance of Care, the Kerr report [1 2] provided a label, a term, by which these common themes could be identified and expressed. Therefore, Shifting the Balance of Care brings these individual themes under one umbrella, which encompasses the focus of care onto prevention of ill-health, who delivers care and where care will be delivered (see 3.3.1.2). Unlike previous healthcare redesign, such as the themes common to Government bills, Shifting the Balance of Care's approach to healthcare reform is holistic. This then requires the integration of healthcare, including primary, secondary, community and acute care, as well as Social Care, the third sector, the patient and the patient's carer. Consequently, the delivery of the Shift in the Balance of Care is particularly challenging as evidenced by the amount of progress that has been made to date despite being a priority of health reform since 2005.

The integration of adult health and Social Care (see 3.4.2) may help to address some of the current issues regarding Shifting the Balance of Care particularly where there is difficulty with sharing resources, crossing boundaries and moving care into a community setting. However, tools and techniques such as models are required to operationalize the Shift in the Balance of Care. Chapter Four will discuss methodologies of research generally and the specific methodology employed to address the objectives of this research. Chapter Four also introduces the methodological assumptions behind ten selected models, a framework to help categorise models and a schematic to assert the role of models. The literature review continues in Chapter Five when these tools are incorporated to examine evidence of the potential of OR models to facilitate change in the NHS.

Chapter Four

Methodology:

The Theory and Practice of the Research

4. Introduction

The challenges faced by the researcher are described by Gummesson[85] as 'Preunderstanding' and 'Understanding'. Preunderstanding is the knowledge the researcher brings to the project before beginning. Understanding is the knowledge gained during the project, which can then lead to preunderstanding for future tasks. Gummesson [85] warns that a lack of preunderstanding before embarking on a project can be time consuming as the researcher has to acquaint him/herself with the organisation beforehand and that lack of preunderstanding can lead to shortcomings in the analysis: misunderstanding information passed on by intermediaries for example. However, it is also acknowledged that preunderstanding could also result in bias and lack of objectivity. Nonetheless, Figure 4-1 demonstrates how preunderstanding is achieved.

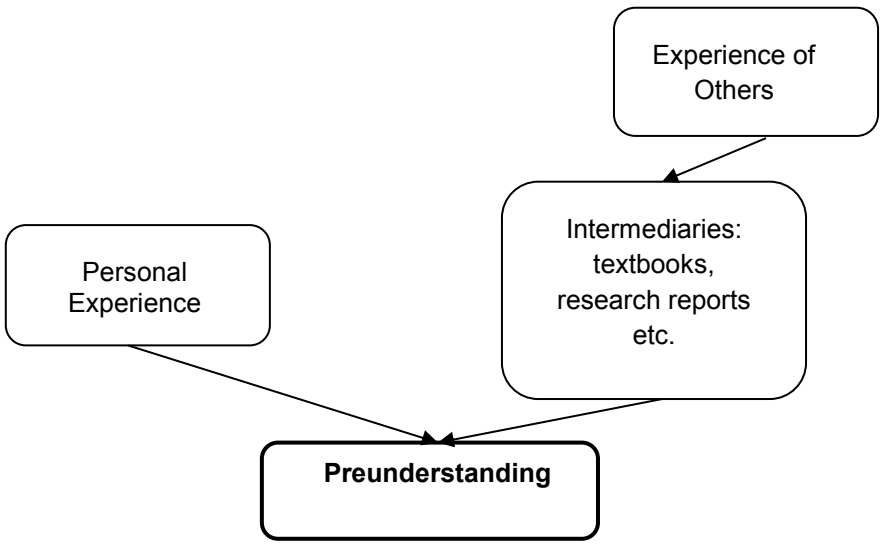


Figure 4-1 Sources for Preunderstanding[85]

On this basis, the first part of this chapter discusses the philosophies, methodologies and methods available to the researcher and is organised following the layout shown in Figure 4-2. The remainder of the chapter discusses the philosophies, methodologies and methods employed in this research from the basis of an operational research (OR) researcher.

4.1.Research Theory

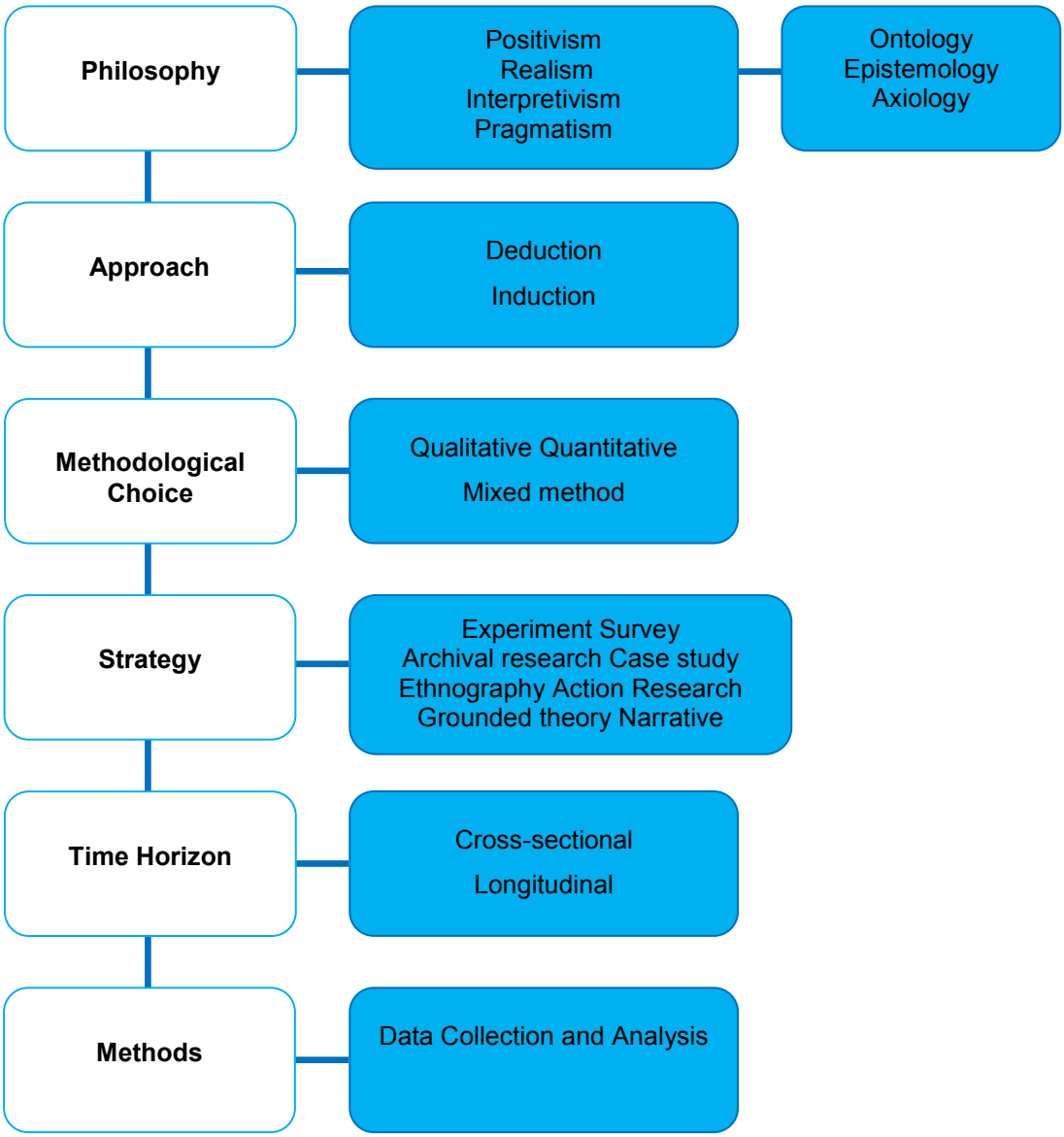


Figure 4-2 Hierarchy of Research Theory Adapted from Saunders et al [92]

Sections 4.1.1 to 4.1.4 follow the theory of research as depicted in Figure 4-2.

4.1.1. Research Philosophies and Approaches.

The research philosophy indicates the assumptions made by and the way in which the researcher views the world and therefore underpins the approach to the research. Two main branches of research philosophy are Epistemology and Ontology: Ontology is about the nature of reality; what exists, what it looks like, what entities it is made up of and how these entities interact with one another, more specifically, it can be an objective reality that really exists, or only a subjective reality, created in our minds. Epistemology considers views about the most appropriate ways of enquiring into the nature of the world[86], Blaikie[87] describes epistemology as a set of assumptions about the ways in which it is possible to gain knowledge of reality, how what exists may be known, what can be known, and what criteria must be satisfied in order to be described as knowledge. Within these philosophies, four paradigms, which are relevant to business and management research, exist:

Positivism

- Positivists believe the social world exists externally and can be measured objectively

Realism

- Realists believe entities exist whether we have knowledge of them or not

Pragmatism

- Pragmatists believe it is possible to work within different philosophies to answer a research question

Interpretivism

- Interpretivists take the opposite view to Positivists, they believe scientific methods are inappropriate for the study of society since human beings think and reflect and human beings can change their behaviour if they know they are being observed. Therefore Interpretivists argue if we want to understand social action, we have to delve into the reasons and meanings of the action

However, it is possible, and often desirable, to combine paradigms in order to answer the research question [92]. It is also important to understand the theoretical approach to answering the research question. One approach is when theory guides and influences the collection and analysis of data, but an alternative approach views theory as something that arises after the collection and analysis of the data is complete. Specifically then, in a deductive approach theorising comes before research, the research then produces the empirical evidence in order to test the theories, in an inductive approach research comes before theory and the researcher looks to discover a theoretical proposition depending on the outcomes of the research. While these descriptions of deductive and inductive research is of pure forms, in practice the distinction between them and the steps to perform them are often more blurred: There are elements of induction in the deductive approach and elements of deduction in the inductive approach[88].

4.1.2.Methodological Choice

A methodology is a structured set of guidelines or activities. Generally, a methodology will develop within a particular paradigm and will embody the philosophical assumptions and principles of the paradigm. However, there is often more than one methodology within a paradigm. Mingers and Brocklesby [106] suggest several reasons why multi-methodology should be used:

- Real-world problems are highly complex and multi-dimensional. To deal with the complexity distinct paradigms can attend to different aspects of the situation;
- Combining methodologies can address the problems posed by the different problems that arise during the different phases of a project.
- Combining methodologies in practice within research is more and more common.

Methodologies may be developed implicitly like soft systems methodology or explicitly like the traditional OR methodology of model building[89].

4.1.3.Strategy and Time Horizon

4.1.3.1.Research Strategies

The research strategy is the plan of how the research will be undertaken and is the link between the philosophy and the methods of data collection. Saunders et al [92] catalogue an incomplete list of research strategies as:

Experimental;

Survey;

Archival Research;

Case Study;

Ethnography;

Action Research;

Grounded Theory;

Narrative Enquiry.

Experimental and Survey research strategies are generally linked with quantitative research design [92]. The Survey strategy mainly uses questionnaires but also structured interviews and structured observation to collect data. Survey research tends to be exploratory and uses quantitative data to describe, infer and provide causality.

Archival research and the Case Study are generally linked with both quantitative and qualitative research design [92] [90]. The Case Study analyses a single case, which can be an organisation, location, person or event. It allows an in-depth understanding of the processes and context of the research by employing several data collection techniques[91] . The Case Study, however, is criticised for lack of external validity: the findings cannot be generalised to the population however multiple cases: the study of several similar cases, eliminate criticisms. Nevertheless, advocates of the single Case Study design suggest Case Studies allow for exploration and contesting of existing theory and produce a rich picture of the phenomenon being researched[92]. A Case Study is

distinguished from other research designs because of its ability to explain unique features of a case [91] however; Saunders et al [92] also advocate a single case can be selected because it is typical of others. Yin [90] also identifies two approaches to Case Studies: single case/multiple cases and holistic case/embedded case. The holistic Case Study considers the organisation as a whole whereas the embedded case considers i.e. departments within the organisation.

Ethnography, Grounded Theory, Narrative Enquiry and Action Research are generally linked with qualitative research design. According to Julienne Meyer[93] Action Research is often written up as a Case Study. Action Research[94] is an approach to research rather than a design, where the researcher embeds him/herself within an organisation and works with members of the organisation to identify and provide solutions to a problem. Action Research differs from other approaches because it endeavours to change practices as part of the process. The process is iterative which means the focus of the research could change as it develops. Action Researchers can already be part of the organisation in question or can be completely independent [93], although the pre-understanding that Gummesson[95] believes researchers bring to a study should be suppressed according to Eden and Huxham[96] to elicit new ideas. Meyer [93] alludes to potential limitations of Action Research: Validity and reliability in Action Research should be addressed using triangulation of the data and feeding back results to informants to negate researcher bias. Generalisation of the findings is also of concern in Action Research as well as the potential exploitation of participants: the participant may feel obliged to participate in the

research due to the perceived authority or permission given to the researcher. In addition, Action Research implies a level of relationship between the researcher and the staff, however, this relationship exists within the period of the study, the researcher can walk away at the end of the research whether the problem has been resolved or not, the staff do not have that choice.

4.1.3.2.Research Time Horizons

The time horizon of research is dependent on the type of research that is being undertaken. Most empirical academic research for the purpose of qualifications is cross-sectional; it represents a record of a project at a particular period in time and it does not need to be performed over a long period. Longitudinal studies are also possible but this type of research is normally performed over a number of years where the researcher is able to record a project at a particular period in time but can also revisit that record for comparison purposes. Cross-sectional studies relate to the limited time of the chosen research design [92] and correspond well with Case Studies. Cross-sectional studies collect data from several cases at one point in time over several variables in order to find relationships within the variables. They can normally be replicated due to the structure of the design. Conversely, longitudinal studies involve revisiting participants over a longer period of time to examine change and development. Unfortunately, by their very nature, longitudinal studies are time consuming and expensive the number of original participants in the study can be depleted due to changes in circumstance [92]. It is, however, possible for the researcher to revisit previous research or to consider secondary data in a longitudinal design to negate costs and time constraints.

4.1.4.Research Methods

A method is a specific activity that has a clear and well-defined purpose within the context of a methodology. Complementary methods work together within a methodology whereas substitute methods are used instead of another method within a methodology. The relationship between methodology and method is that between a *what* and a *how*: The methodology specifies the type of activity that should be undertaken whereas the techniques are how these activities should be performed. Generally, each *what* has a number of possible *hows*. Also on this basis, the paradigm is the *why:* why the methodology generates this type of activity. In order to perform particular methods tools are used to collect data.

4.1.4.1.Data

Data can be either quantitative or qualitative and their distinctions are highlighted in Table 4-1. Quantitative research is normally associated with positivism and the investigator generally has a deductive approach. The researcher uses numerical data to test theories and test hypotheses. A researcher isolates variables and causally relates them to determine the magnitude and frequency of relationships. Alternatively, qualitative research is normally associated with Interpretivism and the researcher has an inductive approach. The interpretive researcher works in a natural setting, is subjective and has to make sense and interpret the social constructs and meanings that make up the data [92 97]. In qualitative research, the study is framed and the data is collected from those immersed in everyday life. Data analysis is based on the values that these participants perceive for their world.

Quantitative Data	Qualitative Data
Based on meanings derived from numbers	Based on meanings expressed through words
Collection results in numerical and standardised data	Collection results in non-standardised data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualisation

Source: Saunders et al[98]

Table 4-1 Qualitative and Quantitative Data

Both approaches have strengths and weaknesses, but by combining the two the researcher is able to draw on the inherent strengths of each. The mixed methods approach allows the researcher to extend the depth of the project and reduces the weaknesses of one particular paradigm[99]. When used in combination, quantitative and qualitative methods complement each other and allow for analysis that is more complete[100]. Saunders et al [92] list several reasons why a mixed methods approach is used: initiation, facilitation, complementary, interpretation, generalizability, diversity, problem solving, focus, triangulation and confidence. In a mixed methods approach, the researchers build the knowledge on pragmatic grounds [101:] They choose approaches, as well as data for analysis, which are most appropriate for finding an answer to their research question[100]. A major principle of pragmatism is that quantitative and qualitative methods are compatible. Thus, both numerical and text data, collected sequentially or concurrently, can help better understand the research problem. While designing a mixed methods study, three issues need consideration: priority, implementation, and integration[101] Priority refers to which method, either quantitative or qualitative, is given more emphasis in the study. Implementation refers to whether the quantitative and qualitative data collection and analysis comes in sequence or in chronological stages, one following another, or in

parallel or concurrently. Integration refers to the phase in the research process where the mixing or connecting of quantitative and qualitative data occurs.

4.1.4.2.Data Collection

There are several methods of data collection; Kumar[102] identifies various methods as shown in Figure 4-3. The method of data collection chosen is dependent on many factors such as: time, resources, skill of the researcher, and education of the respondent and the context of the research. The two main approaches to gathering data are secondary and primary sources: Secondary sources are data that are collected originally for another purpose but can be further analysed for another project and primary data are data collected first–hand for a specific project [98].

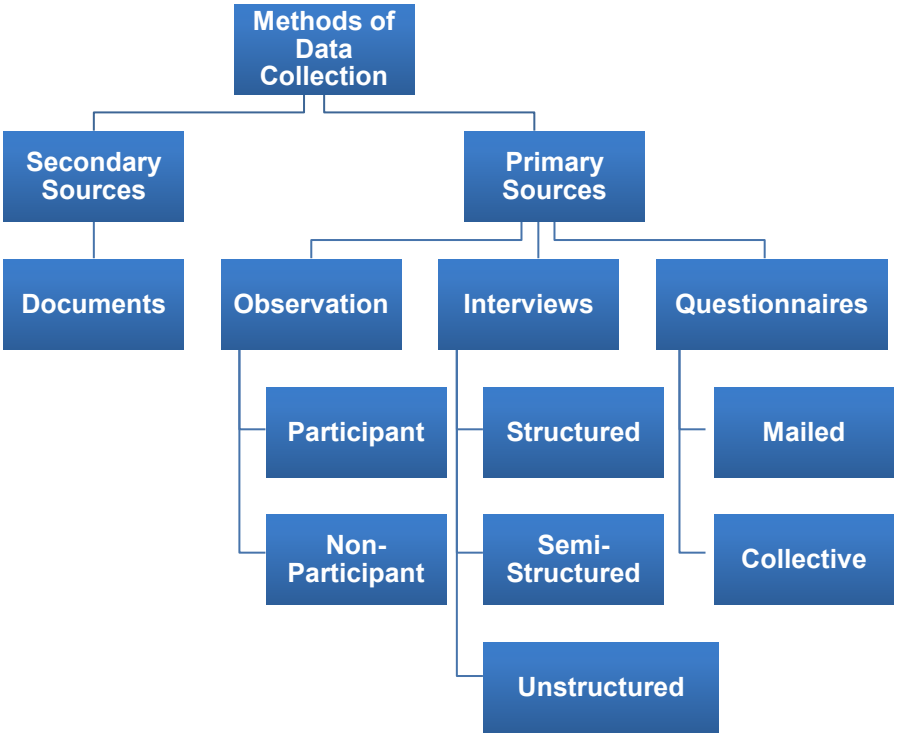


Figure 4-3 Methods of Data Collection. Adapted from Kumar[102]

Kumar[102] describes three methods of collecting data from Primary sources: Observation, interviews and questionnaires.

4.1.4.2.1.Observation

Participant Observation: the researcher involves him/herself in the activities of the organisation and observes the group with or without the member's knowledge.

Non-participant Observation: the researcher observes the group passively without becoming involved with its activities.

4.1.4.2.2.Questionnaires

A Questionnaire is a written list of questions, the answers to which are recorded by the respondent or the researcher. Figure 4-4 depicts the different types of questionnaires.

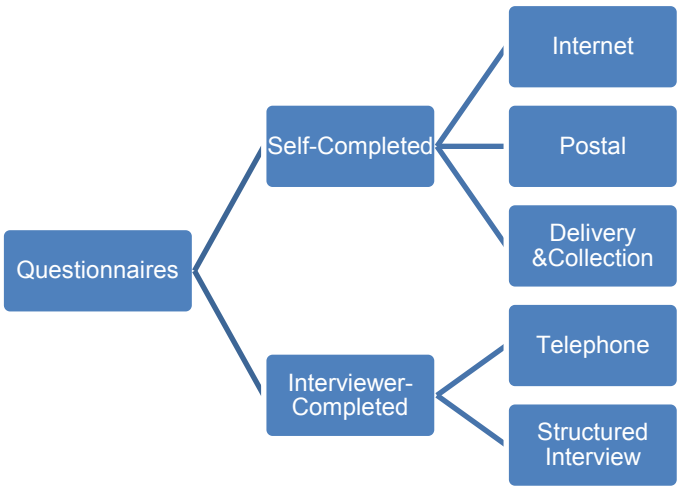


Figure 4-4 Questionnaires[103]

4.1.4.2.3.Interviews

Interviews are purposeful discussions between two or more people[104] and are categorised as:

1. Structured
2. Semi-Structured
3. Unstructured

Structured Interviews are predetermined on an interview schedule using standardised questions administered to the respondent, the respondents answers are reported on a standardised schedule.

Semi-Structured Interviews can vary from interview to interview depending on the occupation of the respondent or on the organisation. The researcher approaches the interview with set themes and questions but can explore other avenues dependent on the respondent's answers.

Unstructured Interviews have no predetermined lists of questions but the researcher does have a theme, which he/she wishes to explore. The respondent is allowed to talk freely on the given topic. The various types of interviews are illustrated in Figure 4-5.

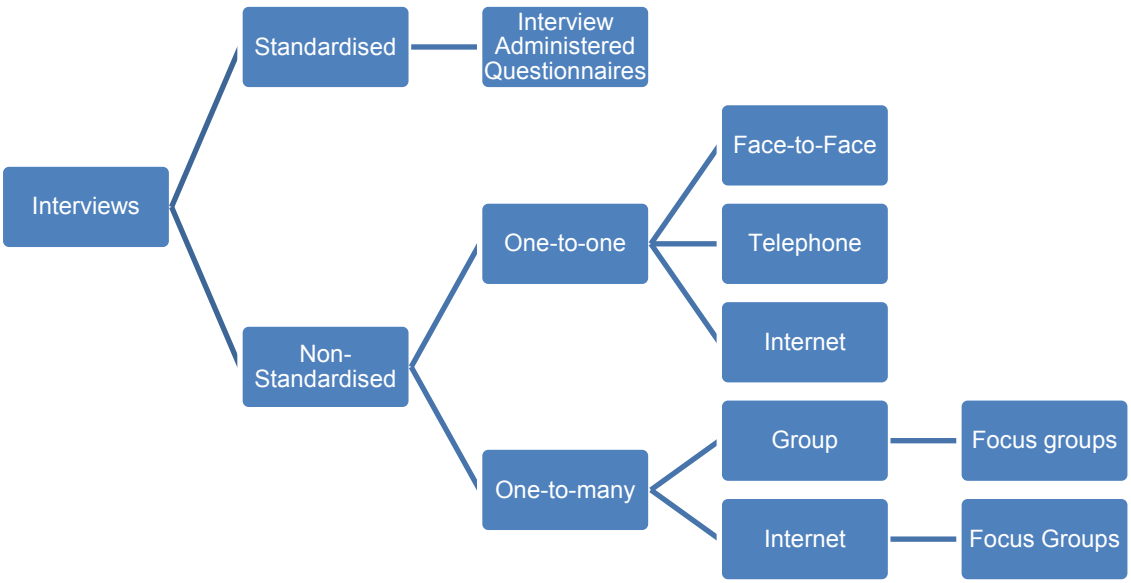


Figure 4-5 Types of Interviews [105]

4.2.The Research in Practice

4.2.1.Preunderstanding of the Research

Figure 4-6 [85] illustrates experiences in Fife, of OR model experience and academic qualifications: these attributes contribute to the author's preunderstanding of the research.

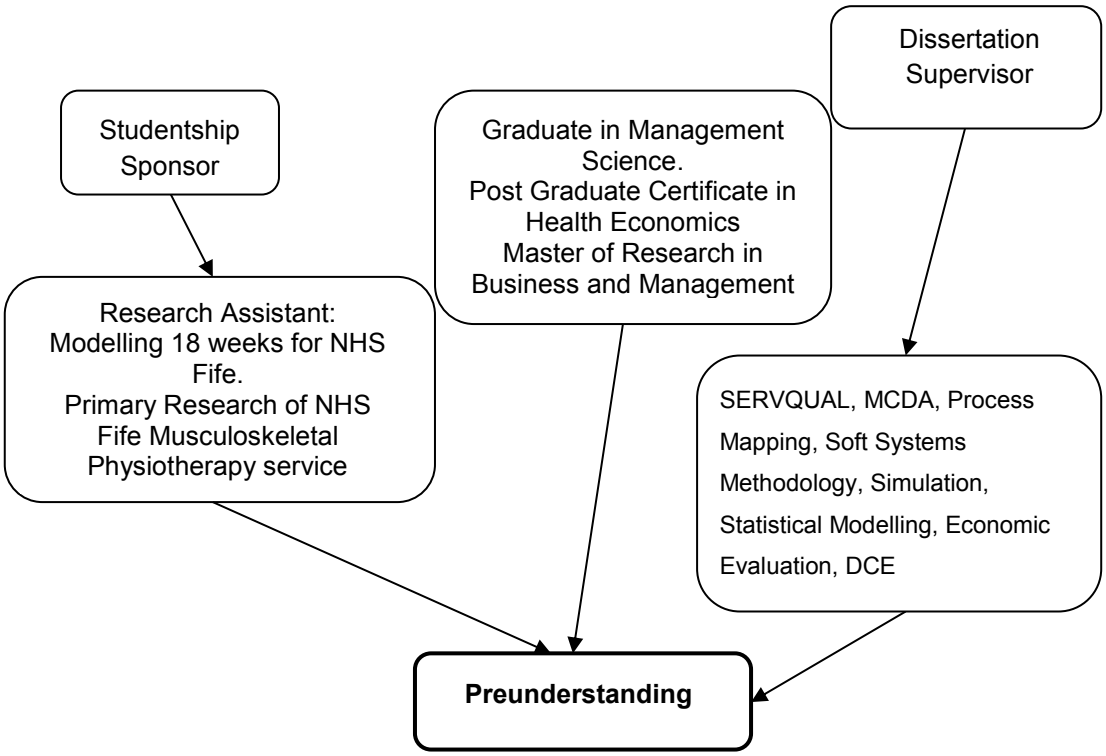


Figure 4-6 Preunderstanding

Experiences in Fife include time spent on previous projects and data collection carried out, these activities allowed the author to observe processes within particular departments and resulted in relationships being formed with members of staff and management.

4.2.2.Philosophies, Paradigms and Approach to the Research

As a discipline Operational research (OR) has adopted and developed many methods, techniques and methodologies. The various choices, all with their

own characteristics originating from different paradigms based on differing philosophical assumptions, continue to grow. However, it is not always possible to follow the pure definition of the theory behind the philosophy. For example, as human beings, researchers bring their own preconceived ideas to the research, whether consciously or sub-consciously and therefore it is difficult to be completely objective particularly if measuring behaviours and interactions of other human beings. As a Management Scientist, or indeed any positivist researcher, it is important to remain as objective as possible and to be aware of any preconceived ideas or pre-understanding[91] he/she may have of the research or areas within the research. With this in mind, whilst following the rules of a Management Scientist, this research follows a pragmatic philosophy in order to answer the research question (see 4.1.1). This paradigm integrates the philosophies of Positivism and Interpretivism to help collect and interpret data. It follows then that the approach to the research is mainly inductive but also combines deductive approaches (see 4.1.1).

4.2.3.Methodologies of Operational Research

Mingers[106] identified three general characteristics that he believed all operational research methodologies have in common. An operational research methodology:

1. Provides users with procedures that they can perform in response to how they might change some properties of a situation, process or system. The overall approach is one that

aims to amalgamate the objectivity of the analyst with the commitment of the client[107] .

2. Commonly develop *models* of properties of a situation, process or system, but differ in terms of what it is that they form models *of,* hence there are many different types of models.
3. Generates implicit or explicit philosophical assumptions about:
    - *Ontology*; what kinds of things the method will build models of.
    - *Epistemology*; where the model comes from and the nature of its representation.
    - *Axiology*; what the purposes or uses of the model are, and who develops and uses the model (see Figure 4-2).

From these commonalities, Mingers [106] produced a root definition based on Checkland and Scholes 'do X by Y in order to achieve Z'[108] for a generic operational research methodology:

> " A system to **do** the process specified, **by** developing models of that assumed to exist, in the specified form of representation, based on necessary information, gained from particular sources, **in order to** assist users achieve specified purposes."[109]

From the root definition, he devised a framework for characterising the underlying philosophical assumptions of operational research methodologies (see Figure 4-7).

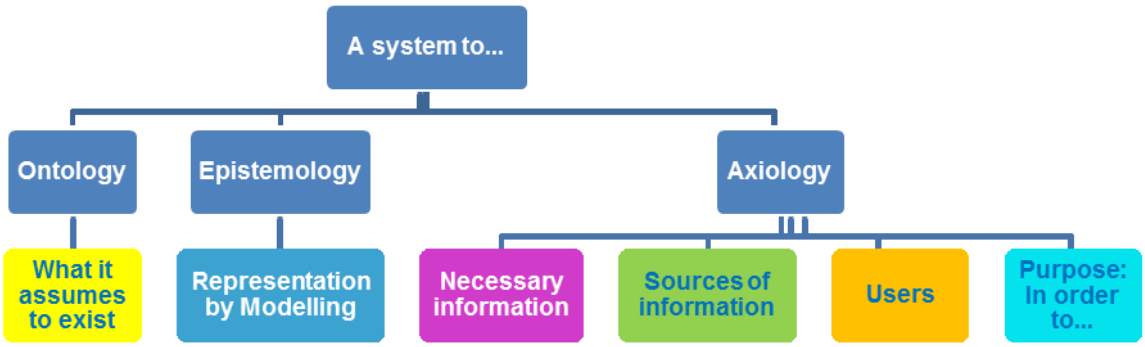


Figure 4-7 Framework characterising the underlying assumptions of Operational Research

4.2.3.1.NHS Fife as a Case Study

The Case Study strategy (see 4.1.3.1) was selected as the design to carry out this study and links the afore-mentioned philosophies with the upcoming methods. Case Studies allow the researcher to utilise multiple methods and models associated with them to investigate the quality and delivery of services, the effectiveness of the services offered and the possibility of identifying improvements, which could be made to the services delivered whilst attempting to Shift the Balance of Care. The comprehensive characteristic of a Case Study is its deep concentration on a single phenomenon within its real-life context. The definition of a Case Study includes its holistic approach to a case or unit and therefore the potential to research sub-units within the case. This is particularly relevant to this research: NHS Fife provides the real-life context of the Case Study, modelling the Shift in the Balance of Care is the phenomenon being examined. The Case Study is not associated with any one type of data collection and is capable of exploring a variety of variables within the context of

the research, unlike Experimental designs, which control the context and Survey designs whose control of context is limited. The Case Study strategy has the flexibility to cope with uncertainty and complexity found in healthcare organisations (see 2.4) and the inevitable changes that will occur over time[110].

4.2.3.2.NHS Fife as Action Research

As stated previously Action Research and Case Study research can be combined (see 4.1.3.1) therefore in theory this research could also be classified as Action Research. Saunders et al [103] identify five themes of Action Research: Purpose, Process, Participation, Knowledge and Implications. Meyer[111] also identifies Participation as an important aspect of Action Research. Researchers participating in this type of research are aware of the need for change and want to play an active part in facilitating that change. Also, the differentiation commonly found in other types of research between participant and researcher in Action Research is less obvious as researcher and participant need to work together to bring about change [111]. Certainly, over the course of the research, the author became a customary visitor to hospitals and offices in NHS Fife, and considers certain members of the Fife community as colleagues rather than respondents. The process associated with Action Research is iterative: (see Figure 4-8).

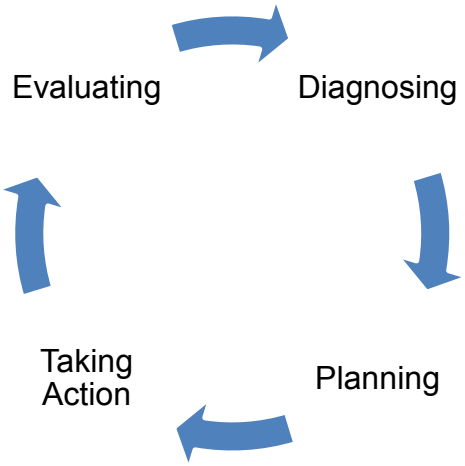


Figure 4-8 Action Research Process Cycle

This cycle is repeated until solutions are found and change is made [98]. Although the research conducted in NHS Fife's purpose is to identify problems or improvements and to find solutions it is difficult to perceive that these solutions will be implemented and facilitate change. Meyer [111] however advocates that success should not be judged on the amount of change nor on immediate implementation but on the experiences gained when performing the work. Implementing/executing change is a theme revisited throughout this thesis.

4.2.4.OR Methods

4.2.4.1.OR Model selection and their underlying assumptions

To examine if OR models facilitate Shifting the Balance of Care, models require to be selected. There are many modelling techniques available to the OR researcher[89] and therefore cannot all be examined here. Consequently, the models selected to answer the research question have been chosen based on: the researcher preunderstanding, the researcher's experience, the researcher's access to various models, models familiar to NHS Fife and models adopted in

NHS Fife at the time of the research. The models selected for initial review of the literature are listed in Table 4-2.

The underlying philosophical assumptions from Mingers[106] Framework (see Figure 4-7) have been applied to each model and are also illustrated in Table 4-2. Four of these models are selected for deeper analysis in later chapters.

Three philosophies: Ontology, Epistemology and Axiology (see Table 4-2) are used by Mingers[106] to illustrate the criteria of a model i.e. what the model assumes to exist, illustrated by and the information necessary to support the model; the source of the information; who will use the model and for what purpose. The Framework provides a detailed, useful and easily read illustration of models and the assumptions behind them.

In Mingers[106] Framework the purpose of the models are generic to all industries, whereas in Table 4-2 the purpose of the models has been directly related to healthcare. For instance, to apply the Lean Methodology to a problem situation it is assumed inefficient flows across technologies, assets, and departments resulting in waste exist, the information necessary to improve the problem is hard and soft information and stakeholder's views about processes and systems and will be provided by stakeholder experience and observations, and data collection using Lean tools. The model will be operationalized using Lean tools including Value Stream Mapping and the User of the model will be facilitators and participants in order to improve patient flow through the eradication of waste.

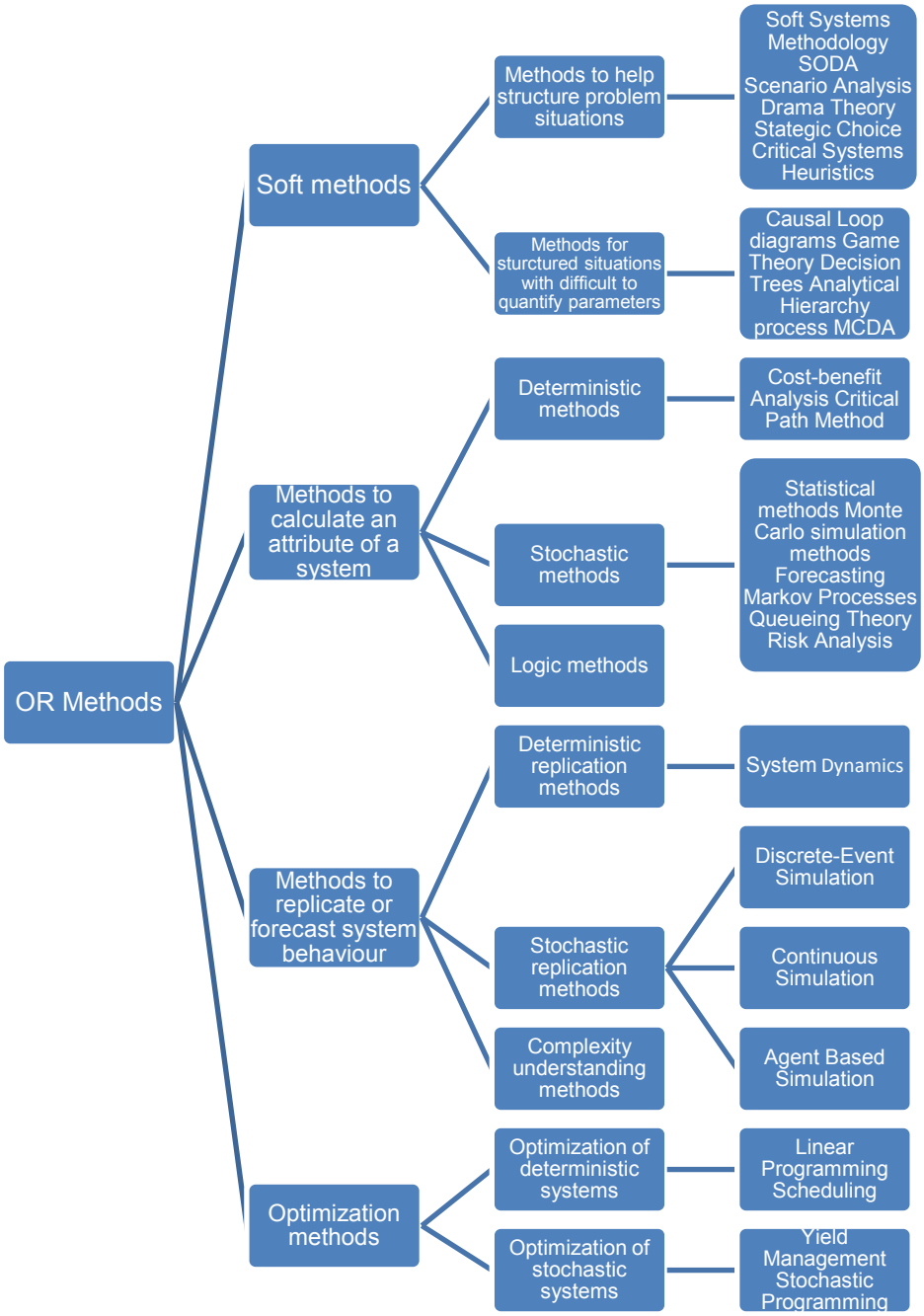
Methodology/ Technique	*What it does: A system to...*	*Ontology*	*Epistemology*	*Axiology*			
		What it assumes to exist	***Representation by modelling...***	***Necessary information***	***Source of information***	***Users***	***Purpose in order to...***
Process Mapping	Illustrate throughput providing a clearer understanding of a process or series of parallel processes and peoples places within that process.	Interdependent entities and activities which transform inputs into outputs	Flow diagrams, visual interactive software	Entities, their interactions, and behavioural patterns	Participation and experiences of stakeholders in the mapping process	Analyst Facilitator Participants	Record existing processes, examine them thoroughly and develop improvements by: Eliminating unnecessary tasks; Clarifying roles within the process; Reducing delays and duplication
Lean Methodology	Improve efficiency by reducing waste	Inefficient flows across technologies, assets and departments resulting in waste	Lean tools including Value Stream Mapping	Hard and soft information and stakeholders views about processes and systems	Stakeholder experience and observation, data collection using Lean tools	Facilitator Participants	Improve patient flow through the eradication of waste
***Soft Systems Methodology**	Explore different worldviews relevant to a real-world situation and contrast them in a process of debate	Real-world problem situation; conceptual human activity systems; worldviews	Systems concepts; rich pictures, analyses	Hard and soft information concerning structure, process, climate, and relevant worldviews	Concepts, language, logic, and participation by concerned actors	Analyst Facilitator Participants	Learn about and improve a problematic situation by gaining agreement on feasible and desirable changes
Experience Based Design	Record patient and their carers experiences of their healthcare journey	Stakeholders willing to share experiences of care	Audio/Video recordings of viewpoints	Stakeholders view points	Workshops, interviews to elicit Stakeholders views	Facilitator Participants	Put patients first by listening to their views
Multi-criteria Decision Analysis	Support decision-makers faced with complex decisions whilst taking into account multiple, and often conflicting, criteria	Key issues with constraints and uncertainties and with alternative goals	MCDA software or equivalent	Details of available options	Options under consideration, decision-maker	Analyst Facilitator Participants	Aid in the process of difficult decision-making
Discrete Choice Experiments	Determine patient preferences and the trade-offs they would make to achieve those preferences	Patients with choices	Hypothetical choice sets, analysed using statistical packages	Unambiguous choice sets	Observation of real world to inform choice sets, Patients views	Analyst	Determine patients preferences
Statistical Modelling	Understand quantitative data to calculate attributes of a system	Available, accurate measurable data	Statistical software packages	Data relating to the system/entity to be analysed	Observation and measurement of real world processes	Analyst	To find relationships, differences and independence between variables
SERVQUAL	Calculate the gap between patents perceptions and expectations of the quality of the service they receive	Patients with views on healthcare delivery	Questionnaire Analysis	Perception and Expectation Questionnaire	Participants views	Analyst	Determine gaps between users expectations and perception of the quality of health services
Economic Evaluation	Evaluate a healthcare system by calculating the costs and benefits	Cost and Benefits data with monetary values, or convertible to monetary values or a standard unit	Relationships between the calculated costs, the opportunity costs and benefits of a system	Costs and benefits of a system as monetary values or measurable units	Systems manager, IS team	Analyst	Choose a system which optimises benefits whilst minimising the opportunity costs
***Discrete-event simulation**	Simulate the behaviour of particular entities and the activities they undergo in a visual interactive form	Entities and activities with stable patterns of statistical behaviour that form inter-linked processes	Activity-cycle diagrams, entity life cycles, visual, interactive software	Entities, their interactions, and the behavioural patterns	Observation and measurement of real-world entities and procedures	Analyst	Explore the operation of complex interactions in health between discrete entities to aid understanding and control

Table 4-2 Mingers Framework Applied to Selected OR Models

4.2.4.2.Categorisation of OR Methods

Williams[112] focused on the purpose of methods but in a more pragmatic way than Mingers[109]. Williams categorises OR methods and into four basic groups, as can be viewed in Figure 4-9, in order to form a basis for model selection. Each method is sub-categorised to give a more precise definition. In addition, he has chosen models based on popularity to represent examples of each category:

- Soft methods are utilised to structure ill-structured problems and help with problems whose parameters are difficult to quantify. Examples include Soft Systems Methodology and Multi-criteria Decision Analysis (MCDA);
- Methods to calculate the attribute of a system assume the problem has been structured and utilises mathematical methods to solve the problem, these methods are further sub-divided into deterministic e.g. Cost Benefit Analysis and stochastic e.g. Statistical methods.
- Methods to forecast or replicate system behaviour are utilised to show how a system behaves or might behave. Examples include Discrete-event simulation and Forecasting.
- Optimisation methods assume the problem is already well structured so that the optimum solution can be found. Examples include Linear Programming and Yield Management.



Adapted from Williams[112]
Figure 4-9 OR Methods

4.2.4.2.1.Selected models applied to the categorisation of OR Methods

Adapting Figure 4-9, Figure 4-10 displays the models selected in Table 4-2 and relates them to the categorisation of methods suggested by Williams [112]. The majority of models selected are categorised as soft methods with three models

categorised as methods to calculate an attribute of a system. Arguably, missing from the latter category but included in Williams [112] category is Queuing theory.

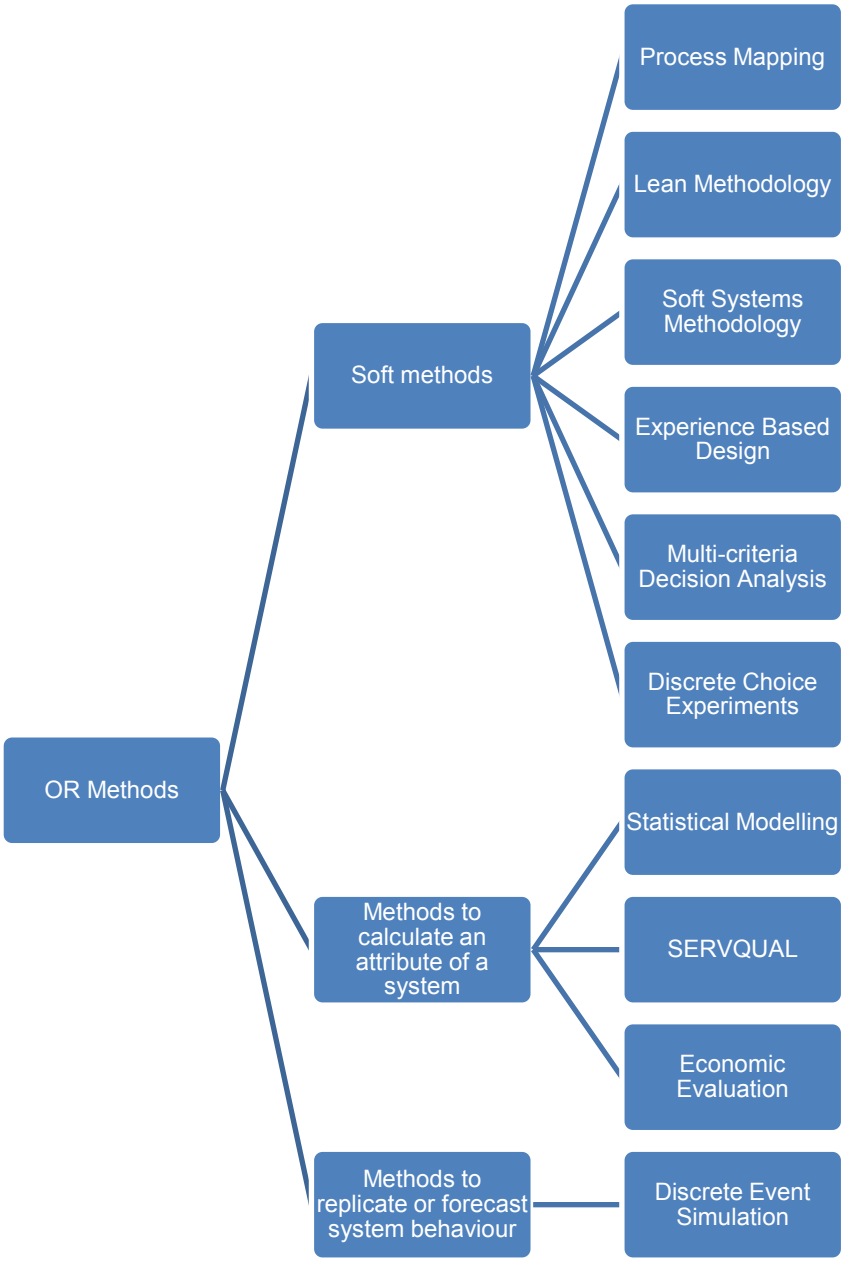


Figure 4-10 OR Methods and their related models

Queuing theory has been shown to be useful in healthcare particularly regarding bed allocation and waiting times[113]. However, it is also recognised that Queuing theory is only useful for less complex problems[113] whereas simulation modelling can also cope with situations that are more complex.

Simulation, specifically Discrete-event simulation, was chosen as the simulation type to examine in this thesis. Other simulation models could have been selected but Discrete-event simulation using Simul8 was currently being explored in Fife at the time of the research. There are no models examined in the thesis, which meet the category of Optimisation methods. However, it could be argued that tools used as part of the Lean methodology, are used to optimise a process (see 6.3).

4.2.4.3.Case Study Model Selection applied to categorisation of OR Methods

Of the ten models listed in Table 4-2, four were selected for further study. The strategy adopted to investigate these models was individual Case Studies (see 4.2.3.1.) The models: the Lean Methodology, Process Mapping and Discrete-event simulation were selected based on the work taking place within NHS Fife at the time of the research. In addition, a new model, SoApt, is also examined as a Case Study and was developed at the request of the Redesign Team at NHS Fife, to produce a method to aid decision-makers with investment decisions when faced with a limited budget. With reference to Figure 4-10, the models selected for further analysis represent three of the categories identified by Williams[112], (see Table 4-3) although the categorization of the new model will be confirmed after development and testing.

Categorisation	Model
Soft Methods	**Lean Methodology** **Process Mapping**
Methods to calculate an attribute of a system	**SoApt**
Methods to replicate or forecast system behaviour	**Discrete-event Simulation**

Table 4-3 Case Study Model Selection Categorisation

4.2.5.Data and Data Collection

The type of data and the method of data collection of the research are discussed in the following paragraphs.

4.2.5.1.Data and Data Collection for the Selected Models

The ten selected models are examined qualitatively by studying evidence from the literature along with each model's underlying assumptions (see Table 4-2) and categorization (see Figure 4-10) on their potential to deliver a Shift in the Balance of Care (see 5.4.).

4.2.5.2. Data and Data Collection for Case Studies

4.2.5.2.1.The Lean Methodology

To explore fully the Case Study of the Lean Methodology the author observed as a participant. Observation allows the researcher first-hand experience of how an event works in practice. According to Kumar[114] there are some disadvantages to observation as a tool for collecting data. Those prevalent to this research include observer bias and incomplete observation due to observing and taking notes at the same time. These disadvantages were combated by firstly being aware of them and secondly by only taking notes when not involved in any participating activity. Questionnaires and interviews were also performed to derive further information based on the initial observations. The questionnaire was an inexpensive tool to access the relevant people and to provide an overall view of opinions. Interviews were then utilised to follow-up on information gained from the questionnaire. The disadvantages of interviewing as a data collection tool, which are relevant to this study, are: the quality of responses received may vary significantly and they can be time

consuming and expensive[114]. The author welcomed the variation in responses as it was thought useful to gain different perspectives. Semi-structured interviews were used as these would yield the best response from interview; the semi-structure of the interview allows for flexibility if the interviewee wants to impart information, which is common to them. Interviews were conducted at a time and place convenient to the respondent but also allowed for more than one interview to take place in a day to reduce travel time, the timing of the interviews depended on the interaction between the author and interviewee. All of the interviews began with an explanation of the reason for the interview and the purpose of the research.

4.2.5.2.2.Process Mapping and Simulation

Meetings with clients, semi-structured interviews and applying secondary data provided by NHS Fife were the main data collection techniques used in this Case Study research. In the case of Hospital at Home Action Research is also evident: although the change: introducing Hospital at Home to reduce admissions to acute beds had already been agreed within NHS Fife. The purpose of Process Mapping and Simulating Hospital at Home was to manage the change and to provide decision-makers with “what if” scenarios so that they could adopt the most efficient and effective use of the Hospital at Home concept, therefore influencing the type of change.

4.2.5.2.3.The SoApt Model

The data collection techniques engaged to develop SoApt was mainly unstructured interviews with clients to ensure free and frank discussion of the model requirements. The outcome of the adoption of SoApt will effect change and can therefore be considered as Action Research: implementation of the

model will change how decision-makers allocate investment and how proposers' present initial proposals and how they report on progress and outcomes of successful proposals.

4.2.6.The Roles of Models

Operational Research or Management Science strives to help individuals or organisations solve problems typically by building and using models. Models are defined by Pidd[115] as:

> *"an external and explicit representation of part of reality as seen by the people who wish to use that model to understand, to change to manage and to control that part of reality"*

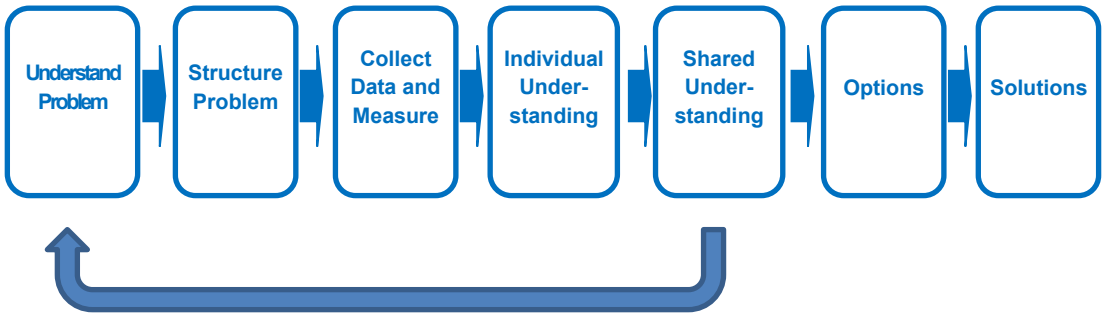


Figure 4-11 The Generic Role of Models

Figure 4-11 illustrates the generic role that most models in OR have. The schematic was produced based around Mingers[106] 'Purpose: In order to…' (see Figure 4-7), Williams[112] (see Figure 4-9) and Bowers et al[242]. The purpose of modelling is to understand a problem, share the understanding as a repetitive practice towards discovering options and subsequently finding a solution. The *user* of the model as defined by Mingers[106] (see 4.2.4.1) is dependent on the use of the model and the problem situation under discussion. With reference to the generic role of models schematic, a schematic will be drawn and explanation given of the roles of each of the models listed above in the following chapters.

4.3.Conclusion

This chapter has discussed the underlying philosophies and related methodologies available to the researcher and stated the methodology and methods that will be incorporated into this research. The logic behind the model selection; to explore the aims and objectives of the research, were stated, and the underlying methodological assumptions[109] of these models have been examined. Williams[112] categorisations of the purpose of models have been applied to each of the ten models selected and each model categorised accordingly. The underlying methodological assumptions and the categorisation of models are employed in Chapter Five to examine the literature for evidence of their application in Shifting the Balance of Care. A schematic of the generic roles of models, has been developed, which reflects Mingers[106] , Williams[112] and Bowers [242] and will be applied to three Case Studies (see Chapters 6, 7 and 8), which examine empirical evidence of four models' capability of meeting the research question's objectives.

Chapter Five

The Potential for Modelling the Shift in the Balance of Care

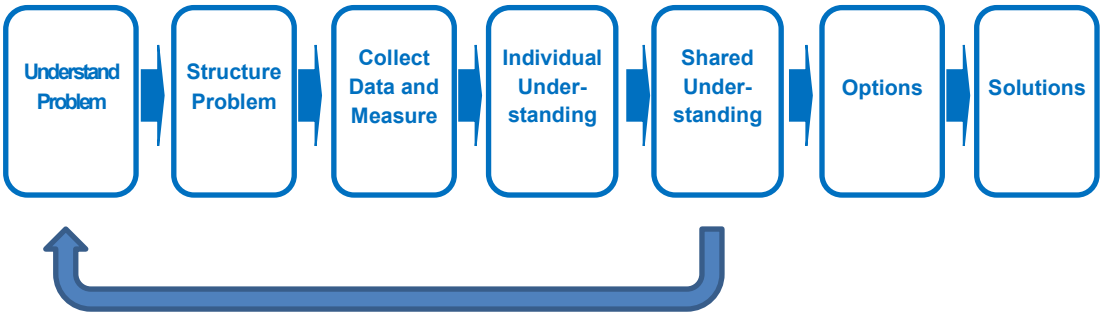


Figure 4-11 Generic Role of Models

5. Introduction

This chapter examines further the concept of Shifting the Balance of Care by introducing the eight priority Improvement Areas identified to Shift the Balance of Care. After a brief introduction to Operational Research (OR) and modelling, this chapter synthesises the eight priority Improvement Areas with OR modelling by, with reference to the Roles of Models (Figure 4-11), examining each selected model (see 4.2.4.1) and its potential to address the main Improvement Areas. The Roles of Models (Figure 4-11) are generic in any organisational setting, but within this thesis, they are specifically applied to healthcare and the NHS. This chapter also examines the barriers to the implementation of models in healthcare reported in the literature and, after examination of other evaluation frameworks, proposes an Evaluation Framework with the potential to reduce at least some of the barriers to implementation of models. The Evaluation Framework may also have the potential to provide unambiguous evidence of the success of an applied OR model.

5.1.Operational Research

Operational research (or Management Science as it is also known) is the application of scientific methods to management problems. It aims to provide a rational basis for decision-making by understanding and structuring complex situations. Improvement to a process is made by (often) building mathematical models to predict system behaviour[5].

5.1.1.A Brief History

The roots of Operational Research (OR) have been traced back to the profession of gambling in the 1600s when mathematics were applied to the calculation of risk[116]. The methodology known as Operational Research in the United Kingdom and Operations Research in the United States is more traditionally known to have developed during World War II to evaluate the scope of intercepting enemy aircraft with state of the art radar equipment. Scientists from various disciplines were brought together to run tests, evaluate field operation testing and make strategic recommendations. The successful formation of this group resulted in others being established to investigate military problems throughout the duration of the war[117]. The contributions made by OR groups were recognised for their achievements and the British and US governments continued to employ these group types after the war had ended. *The golden age* of Operational Research then followed from 1945 until the mid-1970's the new methodologies expanded rapidly into industry, government and business.

In the United Kingdom and United States, professional societies were organized, OR consultants became popular and OR programs were introduced into academia. One such professional society, the Operational Research Club, was established in 1947. The OR Club, (the precursor to the OR Society) was the world's first organisation set up to facilitate the Operational Research profession. Operational Research today has proved to be of great value to management, business, and industry and is recognised worldwide as a modern, decision-aiding science[118 5].

Operational research applied to UK healthcare services is first noted in the 1950's and there has been continuous involvement since that time. A dominant aspect of OR in healthcare is centred on the topic of waiting: every decade since the 1950's has publications dedicated to waiting in outpatient departments. OR in healthcare covers a wide range of applications including policy and strategy; implementation and delivery and monitoring and evaluation. However, recognition of the potential applications of OR in healthcare is not always evident and issues regarding implementation problems continue6.

5.1.2.Operational Research Modelling

The operational researcher's approach to investigation is to recognise and define a problem, to structure the problem normally in the form of a model and then to gather the data which will inform the model as a "real world" situation.

There are many different modelling techniques available to the researcher and practitioner (over 200 listed in 2001[119]) but all require the researcher to be objective, systematic and transparent in their approach. Models represent a simplified version of a real problem and allow for trying different ideas. The modelling process, however, can only ever be as good as the data, which informs it. Methods of data collection include interviews, questionnaires, observation and secondary data. It is important when collecting data to remain objective, to ensure the data is reliable and will measure what it is supposed to [112] .

Modelling has the potential to:

- Be objective and traceable in decision making, effectively providing an audit trail for stakeholders;
- Facilitate effective participation of all stakeholders, providing opportunities for divisions, departments and individuals to come together;
- Understand patient preferences and the variety of stakeholder priorities, by understanding the complex structures that exist;
- Provide the structure that helps assimilate all relevant data, in a systematic and transparent way;
- Analyse current practice and compare options; Assess options thereby selecting the most appropriate, based on objective practices;
- Offer a vision of the new system for reference during implementation, to keep stakeholders informed and engaged;
- Establish a basis for evaluation and feedback for future redesign exercises, by maintaining metrics before and after implementation.

It is important, however, to select the model, which best fits the problem, whilst also recognising that individual models need not be used in isolation of one another, models can be used sequentially. In addition, the model selected also depends on the experience of the researcher or practitioner, as Gummesson[85] indicated, a certain amount of preunderstanding will aid the researcher/practitioner in his/her selection. The methods of models are categorised by Williams[112] to aid in the model(s) selection process (see Figure 4-9).

5.2.Health Economics and Modelling

Economics and Operational Research are connected by their tools and history[120], and many operational researchers[112 120 121] include traditional economic tools in the Operational Research portfolio e.g. cost benefit analysis[112] Economics is the study of scarcity and choice: resources are scarce and consumers consider the opportunity cost of choosing one item over another to maximise their utility or satisfaction. Health economics, as a sub-division of economics, endeavours to inform decision-makers on how to maximise health benefits for the population by improving the distribution of healthcare but with limited resources. However, the principles of economics are based on a free market whereas in health and healthcare it is recognised that market failure exists in healthcare markets and that governments intervene to meet societal objectives of efficiency and equity[122]. Governments intervene in other markets too but within healthcare asymmetry of information and supplier-induced demand also exists which makes healthcare a unique market, which has resulted in the study of health economics. In healthcare resources are scarce; decision-makers must decide which resources to invest in to maximise health benefits to society and to minimise opportunity costs of healthcare.

5.3.Modelling and Shifting the Balance of Care

5.3.1.Shifting the Balance of Care Improvement Framework

Shifting the Balance of Care (SBC) Improvement Framework was established by the SBC Delivery Group[123] to help Health Boards and Local Authorities identify and act upon SBC priorities: SBC crosses the boundaries of acute,

primary and tertiary care as well as health and Social Care, therefore, a whole system approach is necessary for its success [123].

The SBC Delivery Group developed eight Improvement Areas based on current policy and stakeholder consultation. The Improvement Areas are listed in Table 5-1:

1.	**Maximise flexible and responsive care at home with support for carers**
2.	**Integrate health and Social Care and support for people in need and at risk**
3.	**Reduce avoidable unscheduled attendances and admissions to hospital**
4.	**Improve capacity and flow management for scheduled care**
5.	**Extend scope of services provided by non-medical practitioners outside acute hospital**
6.	**Improve access to care for remote and rural populations**
7.	**Improve palliative and end of life care**
8.	**Improve joint use of resources (revenue and capital)**

Source: Scottish Government1
Table 5-1 SBC Improvement Areas

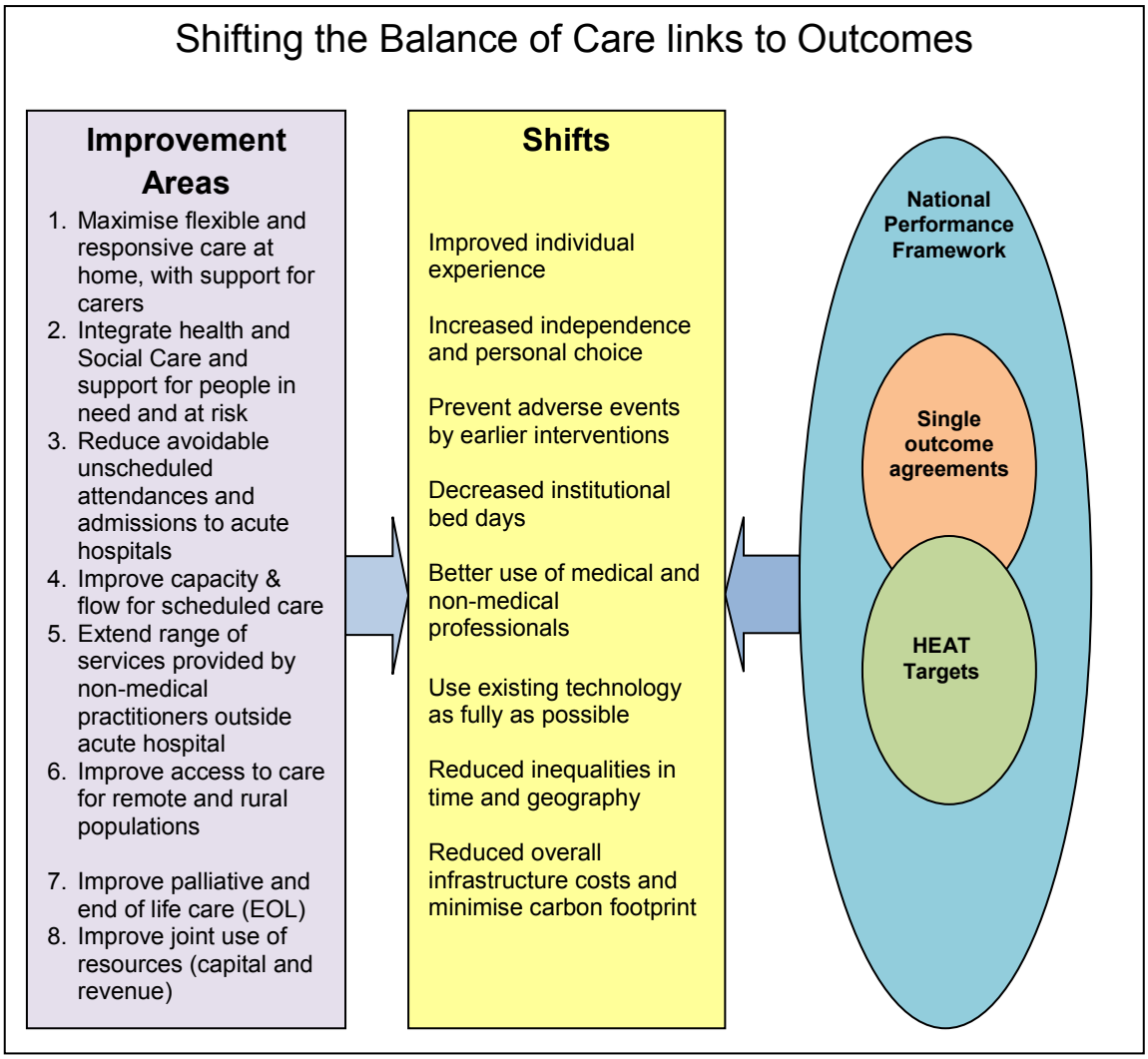
Figure 5-1 identifies 48 areas of change suggested by the Government to facilitate Shifting the Balance of Care at local level. However, the high impact change areas (shown in dark blue) have been prioritized based on: their ability to have an impact on more than one Improvement Area, their scalability- how quickly change could happen, the amount of existing published evidence of improvement and the number of people who would be affected by the change. Appendix 3 illustrates the range of these 20 prioritized changes against the eight Improvement Areas.

Enhance informal carer capacity	Rehabilitation and reablement	Community urgent response systems	Voluntary sector organisations	Better pharmaceutical care	Self referral	Obligate networks
Existing housing, equipment & adaptations	Anticipatory care and crisis prevention	Near patient testing	electronic record and shared information	Referral management	Extending non-med professional roles	Improved EOL and palliative care for all
Extra care houses	Case manager - Personalised care	Community transport	Clinical & Social Networks	Understand and reduce variation	Psycho-social support	Plan EOL care with family and carers
Redesign home care	Extended community teams	Integrated equipment & adaptation service	Mentoring & peer support dependent people	Redesign care pathways	Single point of access in care pathway	Local care centres / hubs
Telecare 24/7 risk management	Single 24/7 point of contact	Self-held personal care plans		Reduce peri-operative beddays	One stop shop	Integrated budgets
Tele-medicine & tele-health	Overnight response for people in need	User participation in care planning	Co location	Quality & standardisation of routine care	Innovative prescribing & access to medication	Generic workers
Self directed support	Intermediate level alternatives	Resources aligned to care pathways	Better management of transitions	Non medical prescribing	Mobile services	Aligned financial incentives

Source: Sylvia Wyatt, Scottish Government, 2009

Figure 5-1 Areas of Change with Highest Impact

illustrates the eight Improvement Areas along with potential shifts across all areas; the diagram also depicts the direct links of the Improvement Framework to the support and delivery of the National Performance Framework (see Appendix 2), Single Outcome Agreements (local authorities' reports to the Government about performance relating to the national Indicators) and the HEAT targets (see 3.4.1.3).



Source: Adapted from Improvement Framework[31]

Figure 5-2 Improvement Areas with Potential links to Impact on Shifting the Balance of Care

Examination of the twenty high impact change areas, illustrated in Figure 5-1, and demonstrated on the Shifting the Balance of Care website[68], reveal only eight (of the twenty) have been allocated to the eight Improvement Areas (see Appendix 3). As illustrated in Table 5-2, there appears to be no logical or systematic linkage from the matrix depicted in Figure 5-1 to the eight Improvement Areas (see Figure 5-2). In addition, from this table it would appear that 'Reducing acute bed days' is somewhat of a priority and would imply an emphasis on cost saving.

High Impact Change	Shifts	Improvement Area
Enhance informal carer capacity	Reduce acute bed days	3
Existing housing, equipment & adaptations	Reduce acute bed days Improve patient experience Increase independence and choice	3 1 2
Anticipatory care and crisis prevention	Reduce acute bed days	3
Extended community teams	Reduce readmissions Improve patient experience	3 1
Redesign care pathways	Reduce acute bed days	3
Telecare 24/7 risk management	Reduce acute bed days Reduce adverse events Increase the use of non- medical practitioners	3 3 5
Tele-medicine & Tele-health	Reduce acute bed days Reduce adverse events Increase the use of non-medical practitioners Increase independence and personal choice Reduce carbon footprint through less travelling Reduce use of NHS facilities	3 3 5 2 8 8
Intermediate level alternatives	Reduce acute bed days	3

Table 5-2 Links from High Impact Matrix to Eight Improvement Areas

In summary, Shifting the Balance of Care concentrates on eight Improvement Areas (see Figure 5-1), the improvements will be made by considering forty-eight changes but particularly twenty prioritised changes (see Figure 5-1), these changes will deliver eight main impacts or shifts (see Figure 5-2) but others are also listed against each priority area (see Appendix 4).

5.4.Models and their Potential to Deliver Improvement

To measure impacts and outcomes reliable systems of measurement need to be in place. The Scottish Government and the SBC Delivery Group have commented that the Health Boards reporting on impact and outcomes is not consistent and do not directly link to improvements [123]. Nevertheless, it may be

possible to deliver a more focused; transparent and systematic approach of impact and outcomes to the eight SBC Improvement Areas with various modelling techniques and frameworks. Exploring the application of relevant models to the Improvement Areas may help to ensure the anticipated changes and the resulting Shifts in the Balance of Care are met.

Each Improvement Area in Table 5-1 was carefully considered with reference to the detailed descriptions given in the Shifting the Balance of Care Summary Report [123] (see Appendix 34) and to Table 4-2 and Figure 4-10. Table 5-3 is derived from these considerations. Each modelling technique was measured by the author with significance given to its ability to assess an Improvement Area's impact on Shifting the Balance of Care, its ability to inform decision-makers when re-designing services and consideration given to other suitable models and allocated a rating: three stars potentially high ability. (A full list of justifications for selection of the models listed in Table 5-3 can be viewed in Appendix 5).

The following paragraphs examine each model in turn from Table 5-3. The models with the highest star rating will be discussed further, providing brief background information from the literature of the model, and evidence from the literature of the model's use in healthcare is provided in Box 5-1-Box 5-10, the specific contributions the model may make to Shifting the Balance of Care is also analysed.

	Improvement Area							
OR Model	**1.** Flexible & responsive care at home	**2.** Integrate health & Social Care	**3.** Reduce attendances & admissions to hospital	**4.** Improve capacity and flow	**5.** Extend services provided by non-medical practitioners	**6.** Improve access to care	**7.** Improve end of life care	**8.** Improve joint use of resources
Process Mapping	***	***	***	***	*	***	*	***
Lean Methodology	***	***	**	***	**			***
SSM	**	***	*		**	**	***	
ebd	***	**					***	
MCDA			**		*			***
Discrete Choice Experiments		**	***					
Statistical Modelling	*		***	*				**
SERVQUAL		**				*		
Economic Evaluation					*	*		***
Discrete Event Simulation	***	***	***	***	***	**		**

Table 5-3 Models and their Potential to Address Improvement Areas

5.4.1.Process Mapping

The method of Process Mapping is identified by Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10), it is a simple representation of a patient's pathway through pictures or symbols and can use a variety of medium such as flip charts, post-it notes or software for illustration, Figure 5-3 is an example of a Process Map using visual language software[5]. Process Mapping can represent three main processes: the journey of the patient's treatment, a demonstration of best practice for a particular

[5] Courtesy of Ken Laurie and Mike Ghattas

diagnosis and a pathway depicting what and where the physical documentation is at each point of treatment[124].

Process Mapping the care pathway responds to the concerns of patient safety, variable healthcare quality, and increasing healthcare costs[125]. Process Mapping is a simple but powerful tool, which can improve the quality of care, standardise clinical practices and provides an integration mechanism, which improves the efficiency and effectiveness of the care process. The mapping process is a tool, which involves a systematic and disciplined approach to assimilate knowledge from all involved in the care process, which can be implemented to plan, integrate, and coordinate patient care and can be used as a strategic management tool that defines the essential steps of a complex process.

Mapping the current pathway and then implementing improvements is a continual process, redesigning a service with the intention of enhancing patient care[126]; as illustrated in Box 5-1. However, Bragato and Jacobs[124] warn that Process Mapping is not suitable for all settings; it will be more difficult to develop Process Maps for unpredictable trauma settings for instance.

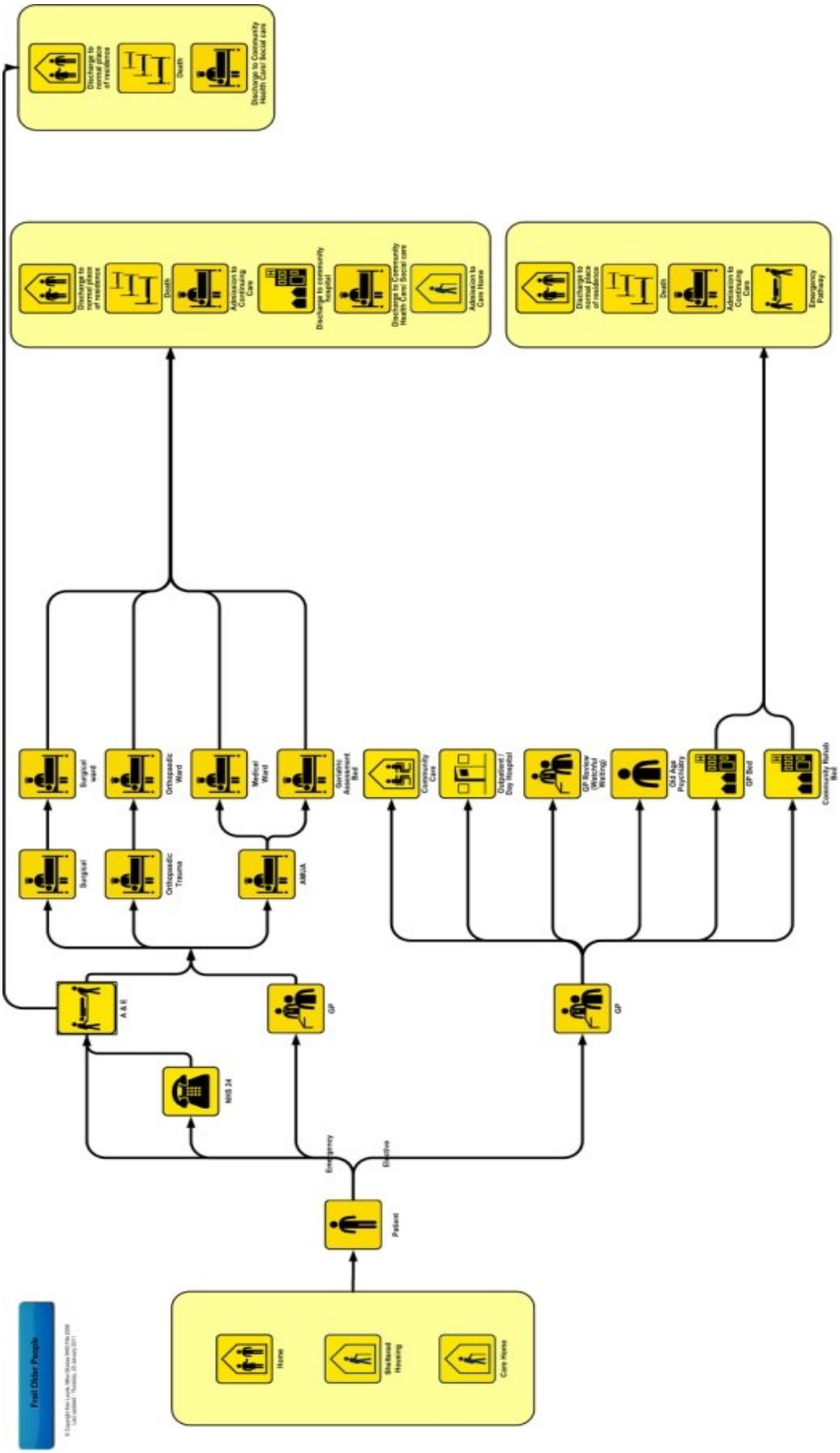


Figure 5-3 Example of a Process Map

A study contributing to the work of the Emergency Services Action Team utilises a qualitative approach of Process Mapping to answer the broader question of 'the wider patterns of patient management in acute hospitals, and patient blockages in the whole system'. A conceptual framework for the mapping was developed to ensure all participants and not just the creator of the map understood the terms and processes. The team firstly drew maps of the current situation, then conducted interviews with relevant staff then redrew the maps according to the discussion. As maps alone do not produce a rigorous approach to behavioural understanding, workshops were then conducted with 43 National Health Service members of staff. The workshops, along with the maps, generated ideas and improvements and helped the participants to see outside their own environments and specialties.

The outcomes, created from further maps and discussion at the workshops, found two main intervention themes; firstly, altering the current pathway enabled a faster flow of patients and secondly, including flexibility within the pathway ensured patients were processed in the part of the system that was more relevant to them. More specifically, the filtering of patients away from acute hospital activity included interventions such as GP's surgeries performing tests at an early stage, and early discharge from hospital wards was achieved by stepping down the aftercare of patients into the community.

Source: Lane and Huseman (2008) [127]

Box 5-1 Evidence of Use in Healthcare: Mapping Acute Patient Flows

5.4.1.1.Process Mapping's Potential Contribution to the SBC Improvement Areas

Improvement Area 1: *Maximise flexible and responsive care at home, with support for carers*

Process Mapping can inform decision-makers and carers of the current process whilst highlighting duplication, redundant activities, bottlenecks[124] and avoidable wait times for the service user, as well as finding alternative Pathways away from institutionalised care. The Pathway can also illustrate to each carer how their role fits within the whole process and allow an understanding of the work others perform within the process facilitating better co-ordination[128]. Discussions

around the Process Map facilitate the sharing of knowledge and experiences of carers providing an opportunity for carers to provide support one another. The Process Map can also illustrate the use of resources: housing adaptations, Telehealth and highlights the needs the service user as well as if each member of the team is effectively managing resources.

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

Care at home will invariably involve workers from both healthcare, Social Care and voluntary services, the mapping of the integration[129] of both services will be clearly defined on the pathway and highlight particularly duplication or redundant activities. The Pathway illustrates the multi-disciplinary approach to care, which enables staff to appreciate their co-dependency and strengthens team working.[130]

Improvement Area 3 *Reduce avoidable unscheduled attendances and admissions to acute hospitals*

Process Mapping can help to develop care pathways across health, Social Care, NHS 24 and the Scottish Ambulance Service, which could avoid unscheduled and unnecessary admission into hospital by assessing the need for hospital admission at the source.

Improvement Area 4 *Improve capacity and flow for scheduled care*

Process Mapping the patient pathway will identify duplication of process steps and duplication by staff; elimination of repetition will improve the effectiveness and efficiency of care given to the patient. As such, Mapping can improve patient flow and help to avoid unscheduled admissions by suggesting alternative paths and can standardise referral procedures. Duplication is also

highlighted in integrated pathways across health and Social Care; reducing or eliminating duplication will allow the opportunity to make the best use of the available capacity for both services [129 130] (see Box 5-1).

Improvement Area 6 *Improve access to care for remote and rural populations*

Comparative Process Mapping can highlight inequalities of access to care, best practice of access can be Mapped and duplicated for all areas.

Improvement Area 8 *Improve joint use of resources*

Pathways can be redesigned to improve better use of resources, improve communication across the public and voluntary sector and to maximise use of shared buildings and other resources[124 129 163].

5.4.2.The Lean Methodology

The method of Lean is identified in Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10). Although Lean was developed initially for manufacturing it appears to transfer well into the service sector and has been used effectively in healthcare[131] . Whilst attempting to unravel care or organisational problems the Lean methodology uses many tools and techniques to measure, understand and analyse the problem. A particular benefit of Lean is the attention given to the patient or service user: a Lean technique is to listen to the *voice of the customer*.

The Lean methodology follows five basic principles as an iterative process [132];

Value	specify what creates value from the customer's perspective.
The Value Stream	identify all the steps along the process chain.
Flow	flow is created by eliminating queues and stops, and improving process flexibility and reliability.
Pull	end customer pulls product/transaction through the value stream.
Perfection	strive for perfection by continually attempting to produce exactly what the customer wants.

Lean is a philosophy that seeks to eliminate waste in all aspects of activities: human relations, supplier relations, technology, and the management of materials and inventory. Mapping the value stream identifies value-added activity: any activity that changes the form, fit, or function of a product/transaction or something customers are willing to pay for, and non-value added activity: all unwanted actions and are considered waste (Muda). Targeting the non-value adding activities within a process can also reduce the value enabling activities (see Figure 5-4) which in turn allows more time to be spent on the value added activities.

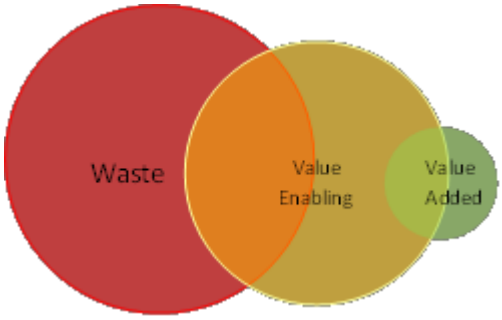


Figure 5-4 The interaction of activities within a process

5.4.2.1.The Lean Methodolology's Potential Contribution

Improvement Area 1: *Maximise flexible and responsive care at home, with support for carers*

Implementing the Lean Methodology can identify areas of waste, which may result in reduced length of stay and reduced delayed discharge. Value Stream Mapping the discharge procedure of patients will highlight delays and therefore the waste associated with the process, the team would then produce an action plan to eliminate the waste thereby reducing discharge time[133].

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

A Kaizen event, which includes all stakeholders including patient representatives, can facilitate discussion around a value stream map, which may lead to a fully integrated service.

Improvement Area 4 *Improve capacity and flow for scheduled care*

Value Stream Mapping the care process can highlight waste. Reducing or eliminating the waste will reduce the number of steps in the process reduce the number of unnecessary people in the process and therefore reduce the length of the pathway [133]. Value Stream Mapping the care process can identify areas of duplication and bottlenecks resulting in a more efficient pathway. In addition, Lean can also facilitate discussion around the correct referral procedures and identify the best referral pathway.

Improvement Area 8 *Improve joint use of resources*

The case illustrated in Box 5-2 is an example of how Lean can make better use of resources. Value Stream Mapping services, which involve integrated teams, will highlight waste and inefficiencies due to duplication and redundant steps.

This process will also highlight common resources: equipment and buildings, which could be shared.

The Lean methodology was applied to the pathology department at Hereford Hospital, the turnaround time for results was too slow delaying patient discharge and effecting overall efficiency and patient flow. The 40 members of the pathology department were given a one-hour training session on improving flow and eliminating waste and were asked to complete forms, which identified waste.

The objectives were identified as:

- Improving turnaround times for all specimens
- Improving morale and using staff more effectively
- Improving quality, reduce waste and lower costs
- Levelling the arrival of demand
- To use resources effectively and efficiently.

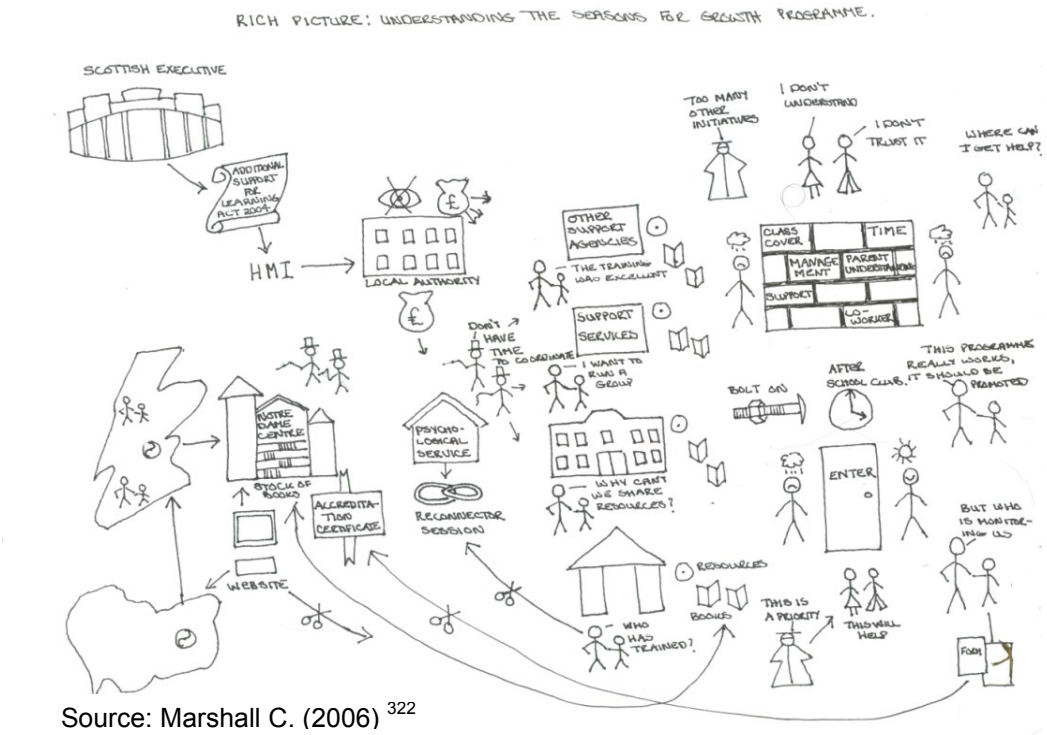
The whole system was observed, questioned, and included staff working with couriers to identify problems. After acting on their findings, staff in the pathology lab has reduced turnaround times by 40%, improved productivity by 252% at peak times and the majority of patients now receive their results within 45 minutes. Approximately £365,000 a year will be saved every year because inpatients can now be discharged quicker, shortening length of stay and creating extra capacity in the hospital.

Source: NHS Institute for Innovation and Improvement (2011)[133]

Box 5-2 Evidence of Use in Healthcare: Reducing turnaround times using Lean Thinking

5.4.3.Soft Systems Methodology (SSM)

The method of Soft Systems Methodology (SSM) is identified in Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10). SSM is a methodology, which applies a soft approach to identifying or solving a complex problem where human activity is concerned. SSM staged process relies on the members of the organisation to identify, agree and take action of a problem. The benefit of SSM is that the process involves key stakeholders and elicits their individual perceptions. This is particularly important when endeavouring to capture the patient's point of view.



Source: Marshall C. (2006) [322]

Figure 5-5 Rich picture depicting a children's bereavement programme

The seven-stage process [134]:

1.The problem situation unstructured

2.The problem situation expressed (Often in the form of a Rich Picture, see Figure 5-5)

3.Root definitions of relevant systems

4.Deriving conceptual models

5.Comparing conceptual with the real world

6.Defining feasible, desirable changes

7.Taking action

This methodology takes a holistic approach to problem solving but is often criticised for not advocating solutions[135]. SSM is particularly useful when the problem is "fuzzy". An example of SSM in practice is illustrated in Box 5-3.

The seven-stage SSM approach was incorporated into a study to improve communication between an acute inpatient unit and a rehabilitation service. Staff from the unit was dissatisfied with the service generally and felt there were unnecessary delays transferring patients who had been referred to the unit. Stage one of the process involved interviews of all available members of staff to firstly identify their perceived roles and secondly to gain their understanding of the communication process. In the second stage, a "rich picture" was drawn to help identify the key issues, which were highlighted as bed management, interaction, referral process, service development, and the service role. A root definition, description of the system, was then constructed for each service unit using the elements of the CATWOE analysis. A conceptual model for each root definition was then derived, which described the main activities of the two services. At stage five of the process the derived conceptual models were then compared with the rich pictures drawn in stage two and asked if the concepts expressed actually happen in reality. The comparison highlighted desirable changes some of which included; a representative from the referral unit attending the weekly bed management meetings, referees being visited within their own environment to discuss referral procedures and a more formal referral policy being put in place. The final stage of the process resulted in an action plan with time constraints to ensure the changes were implemented.

Source: Brenton V. (2007)[136]

Box 5-3 Evidence of Use in Healthcare: Using SSM to examine communication difficulties

5.4.3.1.Soft System Methodology's Potential Contribution

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

SSM brings together professionals from health and Social Care, patients and carers to consider the requirements of individuals in need and at risk in an effort to improve their individual experiences (see Box 5-3).

Improvement Area 7 *Improve palliative and end of life care*

The reluctance to discuss the reality of dying can lead to lack of planning and poor communication of experiencing a "good death". In addition, in modern society families live more independently and are separated from older members, as a result more deaths will occur outside the family home[137] . SSM is

concerned with human activity systems that include human intent. The soft approach of this model recognises that different things have different meanings to different people and, during the process, helps people to understand another's point of view. The SSM approach is also concerned with "why" questions, which during the stages of the model help participants, come to a common consensus[138]. The SSM approach would make it easier to communicate and plan end of life care.

5.4.4.Experience Based Design (ebd)

The method of Experience Based Design (ebd) is identified in Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10). The Healthcare Quality Strategy for NHS Scotland[256] lists person-centeredness as one of the six dimensions of achieving quality in the NHS, in addition, the government is aiming for a patient-led NHS. However, Experience Based Design says this is not enough and the redesign of the health service should be patient driven.[139] Experience Based Design is a method, which aims to redesign or improve services by listening to the experiences of the patient and their carers during the journey of their care.

The core principles of ebd are:

- A partnership between patients, carers and staff
- An emphasis on experience not attitude or opinion
- Narrative and storytelling approach to identify direct contact with healthcare staff and treatments
- An emphasis on the co-design of services.[140]

Although ebd is a soft, subjective approach to healthcare redesign, there is a structured method with clearly defined roles, actions, and timescales:

(1) Volunteer patients and their carers describe an account of their experience of the process of treatment or service, from referral to completion. This is captured through various media for example, interviews, storyboards, and film.

(2) Staff interviews help to discover those aspects of the service, which they believe, influence the experience of patients or staff for good or bad.

(3) The narratives are analysed and those points, which influence the experience, are listed. Particular attention is paid to “touch points” which have emotional impact on the patients.

(4) Staff and patients work in two separate groups initially to prioritise the points that have been noted. At this stage, the patients produced the film containing extracts of interviews, which had been recorded with their permission.

(5) Staff and patients then come together as a large “co-design” group to share experiences, including the film, and prioritise what needs changing or improving as a result.

(6) Smaller co-design teams of staff and patients are set up, each with responsibility for one part of the service: the ward, outpatients, information leaflets, etc. These groups have responsibility for making improvements, which reflect the priorities that have been identified.

(7) The whole process is facilitated by an advisory group, which includes patients and carers, senior medical and clinical staff.

Adapted from Pickles, Hide and Maher (2008)[141]

The Royal Bolton Hospital NHS Foundation Trust decided to introduce ebd to patients having elective joint replacements asking them to recount on film how they felt at each stage of their journey. Patients were simply invited to talk about what they remembered and how it made them feel. The films were then edited and shown to staff over four sessions. Staff reactions were also filmed. The sessions allowed the team to understand the impact of their interactions with patients. The staff and patients joined forces to come up with ideas that could improve experiences for patients. Suggestions varied from developing a Top 10 Tips for Patients Undergoing Joint Surgery through to improving pain control and setting up an informal patient support group. Such has been the success of the ebd work in Orthopaedics that it is now being rolled out across other departments. The ebd approach forms the basis of cultural change that aims to see staff and patients becoming everyday problem-solvers.

Source: NHS Institute for Innovation and Improvement (2011)[142]

Box 5-4 Evidence of Use in Healthcare: From Patient Centred to Patient Driven

Although the ebd approach appears robust, it also appears to be a very time-consuming process, which involves several members of staff, which would therefore presumably also be very expensive.

5.4.4.1.Experienced Based Design's Potential Contribution

Improvement Area 1: *Maximise flexible and responsive care at home, with support for carers*

The ebd approach is a powerful account of the service user's personal experience, assuming that staff and management act on the negative parts of that experience, as illustrated in Box 5-4 then the individual experience of the service user can improve.

Improvement Area 7 *Improve palliative and end of life care*

The experience sharing of people who have reached end of life could be fundamental to improving palliative care.

5.4.5.Multi-criteria Decision Analysis (MCDA)

The method of MCDA is identified by Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10). MDCA is a technique, which aids users in controlling large amounts of complex information in a consistent way by identifying preferred or acceptable options or by weighting or ranking options in an effort to aid decision making. The diagnosis of care or organisational problems can be complex in nature and needs to consider multiple stakeholders but MCDA was developed to unravel and answer complex problems in a transparent manner.

A key objective of MCDA is the intervention under consideration should be consistent with the decision-makers objectives; however, the decision-maker may have many objectives but may not necessarily be aware of the importance of one objective over another. The process of MCDA allows these objectives and their importance to the decision-maker to emerge in a transparent manner. The two-stage process consists of firstly deciding what the options and alternatives are and then deciding which criteria will be used to evaluate the options and alternatives. The second stage consists of building a model, which reflects the decision-makers objectives along with the weights, which will be applied to the decision-making criteria [30] (Figure 5-6).

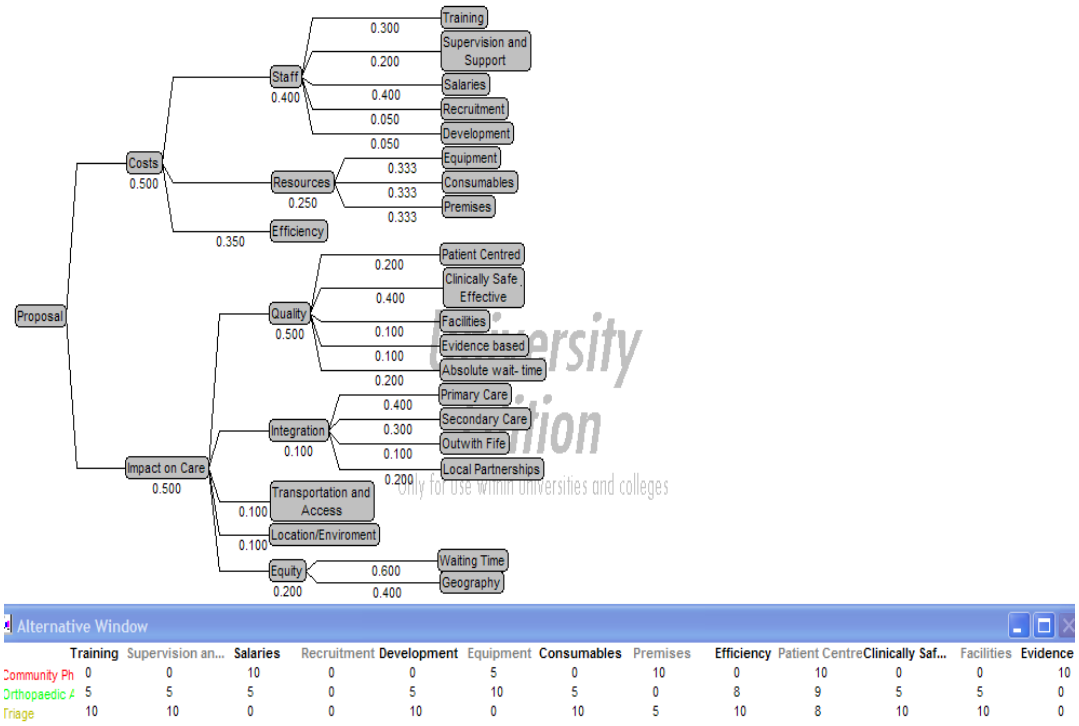


Figure 5-6 Example of MCDA scoring and weighting criteria

MCDA eliminates intuitive decision-making: the criteria are mutually exclusive and because they are weighted, it helps decision-makers to identify their policy-making preferences in a systematic and transparent process[143] (see Box 5-5). Importantly MCDA does not leave decisions to chance, opinion, or perceptions. The stages of the process are designed to encourage participants to consider the criteria carefully against other criteria.

5.4.5.1.Multi-criteria Decision Analysis' Potential Contribution

Improvement Area 8 *Improve joint use of resources*

Traditionally, each part of the public sector has tended to plan and manage its own resources independently of other sectors: Each sector has its own staff, its own buildings, and its own information systems. Multi-criteria decision analysis will consider the alternatives available for joint use of resources: facilities, buildings, technology etc. and assign a weighted score to each identified

criteria: cost, communication levels etc. in order to optimise choice [144] (see Box 5-5).

Primary Care Trusts (PCT) are responsible for the well-being of their populations working with a fixed budget they need to decide which of the available health and social services have priority over others. A study using multi-criteria decision analysis was constructed to aid in this decision-making process by producing a weighted benefit score (WBS) which when combined with cost resulted in a cost-value ratio. The lower the cost-value ratio the better value for money is the programme in contention. The details of the seven-stage framework and testing of the framework were the result of a series of workshops conducted with 20 members of the NHS. The benefit criteria were established as; Access and Equity, Effectiveness, Local and National Priorities, Need, Prevention, Process and Quality of Life. These criteria were then weighted resulting in the valuation framework. The workshops tested mock programmes by scoring each programme in contention against the above criteria between 0-10. The programme was then weighted by multiplying its weight by the criteria score and then adding up scores over all criteria to give a weighted benefit score for the entire programme. According to the author, in contrast to other similar methods, the net cost of the programme is then divided by the weighted benefit score to give a cost-value ratio. This then results in a ranked list of proposals for consideration of the PCT.

Source: Wilson, Rees and Fordham (2006)[144]

Box 5-5 Evidence of Use in Healthcare: Developing a framework in an English PCT.

5.4.6.Discrete Choice Experiments

The method of Discrete Choice Experiments (DCE) is identified by Williams[112] framework as a Soft Method- a method to structure unstructured problems (see Figure 4-10). DCE is an example of the *stated preferences* approach to valuing all benefits including non-health in monetary terms and was introduced to reflect patient experiences. DCE's ask individuals to choose their preference between two or more hypothetical choice sets (see Table 5-4). Within one choice set, the same attributes would be applied to each scenario but each

scenario has a different level; which can be in the form of monetary terms: This reflects willingness to pay (WTP). WTP originates from the *economic theory of demand,* which states the benefits to a consumer of a good, or service is measured by the maximum they are willing to pay for that good or service. DCE's force the participant to make a choice thereby trading off one attribute with another.

Choice	Which service would you choose?	
	Service A	Service B
Making contact	Single telephone call	In person
Where advised	At home, no travelling	Nearest NHS facility 15 miles
Waiting time between initial contact and advice	2.5 h	4.5 h
Informed of expected wait	No information	No information
Who advises you	Nurse, specially trained	Doctor
Quality of contact	Enough time, no interruptions	Not enough time, interruptions
(Tick one box only)	☐	☐

Source: Gerard K and Lattimer V (2005)[1]

Table 5-4 Example of Choice for a Discrete Choice Experiment

A DCE needs to be carefully planned however to ensure there is no ambiguity of the choices to be made by the participant. In addition, the hypothetical questions asked although realistic do not necessarily reflect the participant's responses if they were to be faced with the actual situation[145].

5.4.6.1.Discrete Choice Experiment's Potential Contribution

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

The culture of healthcare is moving to greater involvement with patients and their carers. A DCE can establish the preferences of patients who choose to

self-manage their own care, this can lead to more personalised integrated care for the patient and their family.

A study applied DCE to investigate patient preferences for emergency services during normal GP hours. Regression analysis was employed to estimate the importance of different attributes at differing levels for patients using GP services, Accident and Emergency, NHS Direct and a NHS Walk-in Centre. The results of the study showed that 'being kept informed of expected waiting time' was the most important attribute with participants willing to 'trade-off'>2 hours longer waiting to be given this information. Other important attributes to participants included making contact in person, the quality of consultation and receiving advice from a nurse or a doctor rather than a paramedic. The authors suggest that the use of DCE's will aid decision makers to reflect patient preferences when making proposals for change.

Source: Gerard K and Lattimer V (2005)[146]
Box 5-6 Evidence of Use in Healthcare: Preferences of patients: a discrete choice experiment.

Improvement Area 3 *Reduce avoidable unscheduled attendances and admissions to acute hospitals*

A well-planned Discrete Choice Experiment may help to explain why and under what circumstances people access emergency care rather than care which is available locally. DCE also establishes the trade-offs people are willing to make which would encourage them not to access emergency care (see Box 5-6).

5.4.7.Statistical Modelling

The method of Statistical Modelling is identified by Williams[112] framework as a method to calculate an attribute of a system (see Figure 4-10). A statistical model is a probability distribution constructed to enable inferences to be drawn or decisions made from data. There are many statistical modelling techniques available to the researcher, too many to mention here. However, the main purpose of statistical modelling is to find relationships between variables, find differences between groups or treatments, find independence between groups

or treatments and to use past data to forecast the future. Box 5-7 provides evidence of Statistical Modelling in healthcare.

As a prelude to this work, the author conducted research on data provided by General Practitioners concerning their pattern of referrals into the physiotherapy service. Data was collected to examine referral patterns into community physiotherapy versus the orthopaedic service and to examine referral patterns per patient condition. The data was used to test two hypotheses:
H_1: Referrals by Practice differ between community physiotherapy and orthopaedics
H_1: Referrals by medical condition differ into community physiotherapy and orthopaedics.
Both of the alternative hypotheses were upheld when chi squared testing had been performed on the data. The data revealed that certain GP practices had higher than average referral rates into orthopaedics and that certain conditions, particularly hand, knee, hip and foot had higher than average referrals into orthopaedics. The result of this analysis allowed the author to make recommendations which included identifying GP practices with higher than average referrals and then educating these practices on which was and was not an appropriate referral into orthopaedics and also educating GPs on the correct pathway to follow for certain conditions.

Box 5-7 Evidence of Use in Healthcare: GP Referral Data

5.4.7.1.Statistical Modelling's Potential Contribution to the SBC Improvement Areas

Improvement Area 3 *Reduce avoidable unscheduled attendances and admissions to acute hospitals*

The study illustrated in Box 5-7 is a good example of how to reduce avoidable attendances into acute care. GP's are said to be the gatekeepers of the NHS therefore educating GP's on appropriate referrals and providing them with agreed patient pathways would reduce unnecessary attendances and admissions. A simple model, which gathers referral data, highlights GPs whose referral patterns into acute services are higher than the norm.

Improvement Area 8 *Improve joint use of resources*

Statistical analysis of data collected for arrivals; planned and emergency, length of stay, case mixes can produce patterns and probabilities, which can be used to understand and therefore improve the use of hospital resources[147].

5.4.8.SERVQUAL

The method of SERVQUAL is identified by Williams[112] framework as a method to calculate an attribute of a system (see Figure 4-10). The SERVQUAL Instrument is extensively employed to measure quality in the service sector and has been widely used in healthcare[148]. More importantly service quality aids in the achievement of improved health outcomes for patients[149] by understanding and appreciating patient's needs and wants[150]. It is now recognised that patient's perspectives have a significant role to play in health service quality[151] . Patient satisfaction measures one aspect of service quality; patient dissatisfaction is found when the patients expectations are not met by the service received[152]. Developed to measure specifically service quality and to apply across a broad spectrum of services, SERVQUAL, using questionnaires, measures the gap between the perceived service level and the expected service level of the service-user[153]. Measurement of service quality is made over the five dimensions of Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Gaps found between the perceived service and the expected service can then be used to inform management of where improvements can be made (see Box 5-8) but also can be applied to inform models such as Process Mapping (see 5.4.1) to identify deficiencies in the current system.

To measure patients' satisfaction of service quality in NHS hospitals in the West Midlands, the SERVQUAL instrument was used to measure the expectations of 174 patients before admission and their perceptions after discharge from the hospital.
From the results, it was found that patients' perceptions failed to meet expectations in all dimensions, except in the case of 32% who found that the tangibles exceeded their expectations. Reliability and Assurance had the highest gap scores with Reliability also named as the most important dimension by the patient when asked to rank all five: Tangibles, Reliability, Responsiveness, Assurance and Empathy. The authors also reported that 25% of patients experienced a service quality problem, which was unresolved during the course of their treatment.
The service quality of the hospitals failed to meet the expectations of their patients to which the authors suggested improvements:

- institutionalizing quality throughout the NHS hospitals;
- developing the important role of management in quality improvement;
- recognition of service performance by measuring performance and introducing an effective reward system;
- sorting problems quickly, skilfully and tactfully when they arise.

Source: Youssef, Nel and Bovaird (1995)[154]
Box 5-8 Evidence of Use in Healthcare: Service Quality in NHS Hospitals

Zeithaml et al. [153] claim that the SERVQUAL Instrument is reliable and valid, a finding confirmed in a study by Babakus and Mangold[155] . However, criticisms of the SERVQUAL instrument include; there is little evidence to suggest customers assess service quality in terms of the perceptions/ expectations gap as described in the model, it does not afford enough attention to outcomes[155] and that the dimensions that make up the framework do not fully cover all that is required in a healthcare setting[156].

5.4.8.1.SERVQUAL's Potential Contribution to the SBC Improvement Areas

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

Adopting and administering the SERVQUAL questionnaire to those people identified as in need or at risk, would establish the perceptions and expectations of these service users. A gap analysis over the five dimensions

would then identify the areas where the service was failing to meet the expectations of the service-user. The integrated staff should then prioritise actions to close the gaps in the service as a first step to improving independence and personal choice [154]. Box 5-8 exemplifies the examination of the patient/client expectations and how these can be used to fill gaps in service provision.

5.4.9.Economic Evaluation

The method of Economic Evaluation is identified by Williams[112] framework as a method to calculate an attribute of a system (see Figure 4-10). Economic Evaluation compares two or more healthcare interventions and provides evidence of costs and benefits to decision-makers why one intervention should be invested in over others[157]. The purpose of any Economic Evaluation is to identify measure and value costs and benefits using scarce resources: to maximise benefits whilst minimising the opportunity cost, optimisation is reached when marginal costs are equal to marginal benefits[158]. There are four main types of Economic Evaluation currently in use by economists [122] (see Table 5-5), the type of evaluation utilised is firstly dependent on the type of question being asked: one of technical efficiency or allocative efficiency. Technical efficiency is reached when the optimum benefit is achieved for the least cost e.g. the most efficient way to deliver surgery for tonsillectomy whereas in allocative efficiency services compete with one another for scarce resources e.g. surgery for tonsillectomy versus outpatient clinics for asthmatic patients [157] .

	Allocative Efficiency	Technical Efficiency
Cost-effectiveness analysis		X
Cost-minimisation analysis		X
Cost-utility analysis	X	X
Cost-benefit analysis	X	

Table 5-5 Type of efficiency addressed by Economic Evaluation

The four common evaluation techniques used by health economists are Cost-effectiveness analysis, Cost-minimisation analysis, Cost-utility analysis and Cost-benefit analysis, Cost-effectiveness analysis (CEA) is the most commonly used evaluation technique. CEA is regularly used to determine the least expensive way of achieving a target within a programme. Cost-minimisation analysis (CMA) is a type of cost-effectiveness analysis, CMA assumes the benefits of the different options for intervention are equal and therefore considers only costs. Cost-utility analysis measures outcomes in terms of both quality and quantity of life thereby addressing both technical and allocative efficiency questions. Cost-benefit analysis considers costs and benefits in monetary terms thereby allowing comparison of allocative efficiency both within and beyond the health sector.

Modelling is a commonly used tool in Economic Evaluation[159] and is now a requirement of the National Institute for Health and Care Excellence (NICE) when evaluating new technologies[164]. Key parameters to inform models are costs and utilities: Costs include direct medical, non-medical, and indirect costs such as drug costs, homecare and loss of working days respectively, whilst benefits include health-gains, non-health related effects, and production gains.[160]

The key strength of Economic Evaluation in health economics is the consideration of costs and benefits and the comparison of at least two treatments or services incorporating both the costs and benefits as measures. All of these techniques incorporate modelling and tools to deliver an assessment such as Markov Modelling or Decision Tree Analysis[161] (see 5.2) and although Cost-effectiveness analysis is the most widely used in healthcare (see Box 5-9),

Cost-utility analysis is the only technique, which can assess both allocative and technical efficiency[157]. In all Economic Evaluation, difficulties arise when valuing the benefit to the patient. Cost-utility analysis commonly uses quality-adjusted life years (QALY's) as the unit of measurement for evaluating benefit. The QALY combines many possible outcomes allowing for, in theory, the comparison of different options. Although there are various techniques available to calculate the QALY, the most frequently used is the EQ-5D which is a self-completed questionnaire which incorporates five health state dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The EQ-5D allows a tariff to be calculated which when divided by the cost of the service allows a cost/quality adjusted life year to be reported [160].

5.4.9.1. Economic Evaluation's Potential Contribution to the SBC Improvement Areas

Improvement Area 8 *Improve joint use of resources*

Economic Evaluation of the costs and benefits of integration between services may identify where the most cost-effective use of resources: people, buildings,

information, and technology can occur. Box 5-9 is an example of effective use of resources in the community.

A study performed a cost-effectiveness analysis of subacromial corticosteroid injection combined with exercise compared with exercise alone in patients with moderate to severe shoulder pain. An incremental cost-effectiveness analysis was conducted, to determine the difference in costs and outcomes between exercise and advice plus injection versus exercise and advice alone. The unit of outcome was the incremental cost per QALY gained. Mean per patient NHS costs and overall health care costs were lower in the injection plus exercise arm, but this difference was not statistically significant. Total QALYs gained were very similar in the two trial arms although slightly higher in the injection plus exercise arm, indicating that injection plus exercise may be the dominant treatment option. At a willingness to pay of £20,000 per additional QALY gained, there was a 61% probability that injection plus exercise was the most cost-effective option. The authors concluded Injection plus exercise delivered by therapists might be a cost-effective use of resources compared with exercise alone and lead to lower health care costs and less time off work.

Source: Jowett et al[162]

Box 5-9 Evidence of Use in Healthcare: CEA of shoulder pain treatment

5.4.10.Discrete-event Simulation

The method of Discrete-event simulation (DES) is identified by Williams[112] framework as a method to replicate or forecast system behaviour (see Figure 4-10) Simulation provides detailed, virtual outcomes of changes made to a business process. Simulation within healthcare is used extensively, particularly in the areas of patient flow and resource allocation[163]. A simulation model can aid decision-makers measuring the efficient use of resources and when considering the impact a re-designed service will have on key measures. It allows practitioners to consider “what if” scenarios. Process Mapping (see 5.4.1) can be used as a first step to simulation, by quantifying flows and constraints and by reflecting stochastic behaviour. The time and subsequent cost of building a simulation model has been criticised but this is normally due to the experience of the model builder and the complexity of the process the

model typifies. Discrete event simulation provides a powerful analysis of the process and is capable of calculating outcomes for individual patients who experience varying times during an event in the process, and therefore can calculate costs for each event[164].

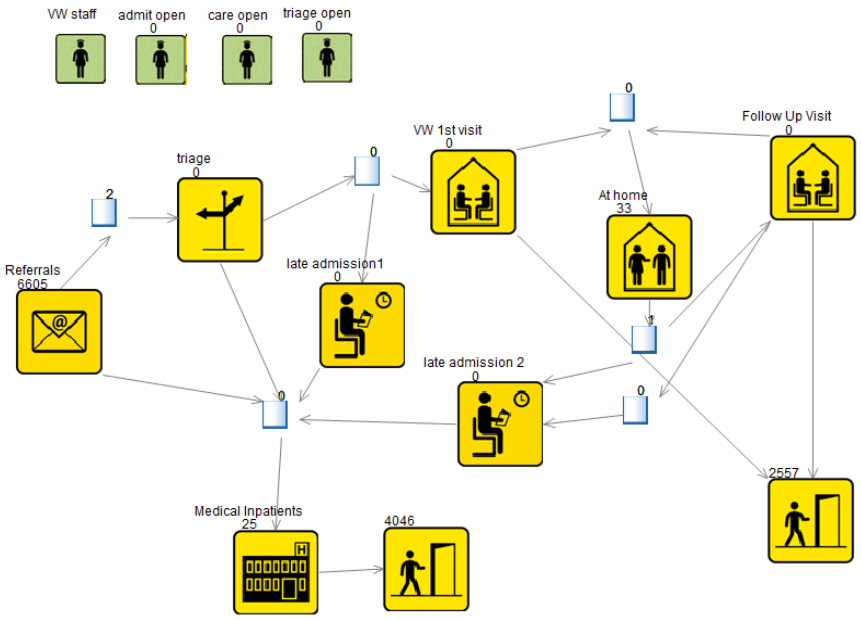


Figure 5-7 Example of Discrete Event Simulation Graphic

5.4.10.1.Discrete-event Simulation's Potential Contribution

Improvement Area 1: *Maximise flexible and responsive care at home, with support for carers*

DES can simulate the flow of patients away from institutionalised care onto alternative pathways thereby also diverting resources into care at home giving decision-makers more flexibility.

Improvement Area 2 *Integrate health and Social Care and support for people in need and at risk*

DES can evaluate options posed by decision-makers, integrating health, social and voluntary care thereby identifying the most effective and efficient options for service delivery.

Improvement Area 3 *Reduce avoidable unscheduled attendances and admissions to acute hospitals*

Simulating various intermediate care responses may help to identify the most effective scenario in reducing unscheduled attendance and subsequent admittance to hospital.

Improvement Area 4 *Improve capacity and flow for scheduled care*

Box 5-10 illustrates the way in which simulation can improve capacity and flow of scheduled care.

Improvement Area 5 *Extend range of services provided by non-medical practitioners outside acute hospitals*

Initially, agreement among stakeholders as to the broad range of services, which could feasibly be provided, by non-medical professionals and the key measures of these services would need to be reached. Simulating these services, by manipulating the key measures, would allow stakeholders to compare the current situation with alternative scenarios with a view to costs, staff, and other resources, wait times etc. The stakeholders could then select the services, which could utilise non-practitioners thereby improving effectiveness and efficiency [164].

Discrete-event simulation uses quantitative data to predict outcomes when changes are made to a process. A large surgical centre in Brazil used Discrete event simulation to improve performance in terms of both number of surgeries and the reduction in elective surgery queues.
Due to cultural tradition, the hospital used a scheduling system, which assigned a specific operating room to each speciality (General, Paediatric, Traumatology and Urology, Neurosurgery, Vascular, Plastic, Thoracic and Proctology, Gynaecology and Ophthalmology) on the assumption that this would be better for ancillary activities. The simulation model classified groups based on surgical times rather than specialities thereby, by association, also identifying complex surgeries; three groups were identified the third being the most complex. The model then used these classifications to schedule surgery.
This study was able to demonstrate via computer simulation that by adopting flexible scheduling the hospital would improve its productivity by 51%.

Source: Ferreira, Coelli, Pereira and Almeida (2008)[165]
Box 5-10 Evidence of Use in Healthcare: Optimizing patient flow by means of DES models.

Improvement Area 6 *Improve access to care for remote and rural populations*

Agreement by key members of staff of the current pathway for the care of people from rural and remote areas will aid in the appreciation of the present situation of the patient group and will involve the "clients" at an early stage within the process[166]. Simulation will allow stakeholders to appreciate the current situation, for instance with reference to waiting time and then can adjust resources to reflect the particular characteristics of the area e.g. staff to provide services, which will reduce waiting time or make waiting time more equitable across regions. Simulation can also include Tele-medicine and Tele-care within a scenario with a view to providing equitable and accessible care.

5.5.Model Categorisation and Selection

With reference to Figure 4-10 model categorisation and Table 4-2 models' underlying assumptions; it is important to distinguish the types of models, which can best deliver assessment, and measurement of outcomes necessary to achieve each of the desired improvements. Figure 5-8 develops the Improvement Framework Model (see Figure 5-2) further. The Improvement lists Area column lists the eight priorities, the Shifts column lists the desired shifts which can be met in theory with attention to any of the Improvement Areas (but see Table 5-2), the Model Categorisation column lists the type of model as deliberated and categorised by the author against each Improvement Area as well as indicating Williams[112] categories and the final column, Potential Models the potential of the models evaluated in paragraphs 5.4.1-5.4.10, to deliver the desired shifts for each Improvement Area. For example, in Figure 5-8 the categorisation Understanding Patient Views is the main requirement of models to meet the shifts desired by Improvement Area 1, from Williams[112] categorisation of methods, these would mainly be Soft Methods, such as ebd and Process Mapping. However, DES, which is not usually considered a Soft Method, has also been included here as a means to simulate the patients' views and to suggest and calculate the costs of options. In addition, Understanding Current Systems is the model classification given to Improvement Area 2 and is categorised as Soft Methods. However, to address the improvements within this area DES is also included as well as SERVQUAL, which is categorised as a System Attribute Method. Both of these examples typify the importance of model selection. Different models will address the different aspects of achieving improvement in a specific area, but also the

sequential nature of models can sometimes mean one model will inform another model i.e. Process Mapping and Discrete Event Simulation.

Coloured text indicates model categorization and their associated models

Figure 5-8 Improvement Areas and their Potential Models

Shifts	Improvement Areas	Model Categorisation	Potential Models
Improved individual experience	1. Maximise flexible and responsive care at home, with support for carers	1. Understanding Patient Views Soft Methods	1. Process Mapping, Lean, ebd, DES
Increased independence and personal choice	2. Integrate health and Social Care and support for people in need and at risk	2. Understanding Current Systems Soft Methods	2. Process Mapping, Lean, SSM, DCE, SERVQUAL, DES
Prevent adverse events by earlier interventions	3. Reduce avoidable unscheduled attendances and admissions to acute hospitals	3. Diagnosing current care problems Soft Methods	3. Process Mapping, DCE, DES
Decreased institutional bed-days	4. Improve capacity & flow for scheduled care	4. Diagnosing current organisational problems Soft Methods	4. Process Mapping, Lean, DES
Better use of medical and non-medical professionals	5. Extend range of services provided by non-medical practitioners outside acute hospital	5. Logistical Assessment of Options System Behaviour	5. DES
Use existing technology as fully as possible	6. Improve access to care for remote and rural populations	6. Logistical Assessment of Problems System Behaviour	6. Process Mapping, DES
Reduced inequalities in time and geography	7. Improve palliative and end of life care (EOL)	7. Quality assessment of options Soft Methods	7. SSM, ebd
Reduced overall infrastructure costs and minimise carbon footprint	8. Improve joint use of resources (capital and revenue)	8. Economic assessment of options System Attributes	8. Process Mapping, Lean, MCDA, Statistical Modelling, Economic Evaluation

The Generic Roles of Models (see Figure 4-11) is a useful start to establishing the role a specific model may contribute to Shifting the Balance of Care. The generic schematic will be utilised in Chapters 6, 7 and 8 to examine the specific role selected models may make.

5.6.Model Implementation and Barriers to Implementation

Despite successful implementation and use of modelling in other manufacturing and service industries the evidence of modelling applications in a healthcare setting are sporadic at best[167]. Following a review of the use of modelling in public health Fone et al[168] concluded:

> "*Despite the increasing numbers of quality papers published in medical or health services research journals we were unable to reach any conclusion on the value of modelling in healthcare because the evidence of implementation was so scant."*[169]

However, since this conclusion is based on a literature review, it may reflect the journal publication process rather than the actual degree of implementation.

Healthcare is intrinsically different from other industries and it is these differences, which create barriers to implementation and create challenges for modellers. The common barriers to implementation of models are derived from the literature: the barriers found in specific types of modelling work and in general OR work have been categorised into common themes and are listed in Table 5-6. The intrinsic differences in a healthcare setting pertinent to the implementation barriers are explored in the following paragraphs:

Implementation Barriers Common to OR Models
Culture [173 170 171 172]
Data [173 170 172 171 163]
Conflict [167 172 171 163]
Experience [171 172 170 173]
Support [167 170]
Silos [172 173]
Cost [173 167 163]
Organisational Momentum [171 170 167]

Table 5-6 Implementation Barriers

Culture

Healthcare appears to be in a state of constant change[173] with social, economic and political influences change can come in the form of demographics, behavioural and social, organisational, political, strategic, technological and clinical which all add to the complexity of the organisation [172]. Added to this are Government imposed targets of prioritisation[173]. Health workers are, unsurprisingly, resistant, sceptical and suspicious[173] of yet more change that any new model may suggest[173 171] particularly regarding models that originate in the manufacturing industry [173] . Change also does not act in isolation; a change at political level will result in changes at strategic and organisational levels. Therefore, it is important to recognise that a model for change may influence other unexpected areas of the organisation[242].

Data

The perception of the quality of data in healthcare is inherently poor and it is common for different departments or localities to collect different data at different times using different methods[171]. An abundance of data collected [172 163],

inaccuracy of data collected[172] and incompatible computer systems [173] all add to mistrust of the data and the need to clean data before modelling can even begin [173]. If models are to be trusted and thereby implemented then it is essential that the applied data is verified and accurate [170] particularly since not only does the data inform the model but is also used to measure the performance of the model before and after implementation [171].

Conflict

Models can be misused if objectives of managers and staff conflict with one another[172]; models can be used to either *enable* or *police* [172] a change in healthcare delivery, a reduction in resources due to efficiencies gained from model use will not incentivise staff to embrace the other non-financial benefits gained[172]. In addition, conflicting objectives occur between clients and academics[167] [173]; academics are concerned with being published in academic journals[167] and have little interest in completing the project through to the point of contributing to healthcare delivery[167]. In addition, academics need to show evidence of adding to the knowledge base, this can lead to models which are too complex for the end-user[173] [167] [163] .

Experience

The unfamiliarity of OR models[172], the lack of trained analysts[170] and the lack of in-house expertise[173] add to barriers to implementation. Managers in healthcare are often promoted from powerful clinical roles[171], have a fire fighting approach[171], have little quantitative skills[171] and manage from the top down[171]. This lack of experience of modelling and the approach to OR modelling makes modelling difficult to implement: OR modelling needs to be informed from the front line, with accurate data and is a process which takes time and is therefore

not about quick fixes. Expectations of a model built to solve a particular problem can often be unrealistic.

Support

Sustained and reliable support from managers and/or leaders is crucial to model implementation[167 170]. Lack of knowledge and understanding of models and the model building process can result in managers not supporting key elements of the process when it is needed [167 170].

Silos

Healthcare organisations whilst adhering to government directives, plan and manage at a local level, this can lead to the development of models, which are not generic to healthcare as a whole and are more specific to one locality[172]. Bespoke models are extremely costly and therefore unlikely to be implemented[173] . Added to this is the 'Not Invented Here' syndrome[173] where healthcare organisations will not adopt models created elsewhere because their organisation is 'different'.

Cost

The cost of modelling can be expensive. In the manufacturing industry training in modelling techniques is much more the norm than it is in healthcare, therefore without in-house expertise specialists need to be bought-in[173 170]. In addition, due to the 'not invented here' syndrome, models tend to be bespoke for a particular health board or department[167], which, of course, adds to the cost. Unfortunately, those Boards, having made the initial investment, are unlikely to share the model with other 'outside' health organisations [173]. As well as the cost of modelling, cost can also be in the form of time taken to development the model: there must be a balance between time and cost, if a model takes too

long to develop because of lack of resources the model could become obsolete[163].

Organisational Momentum

The implementation of modelling is not quick: it requires effort and participation to bed-in the process and deal with glitches until organisational momentum[171] is reached through the standardisation of procedures[171]. Any interruption to the bedding in process will result in the momentum being lost and the project most likely failing[171]. The implementation of a model requires time and capacity[170] of those who will use it. The successful implementation of a model also needs to be promoted and shared; however, often in healthcare time is not put aside to report on the success of a model[167].

5.6.1.A Proposed Framework for Implementation

In an effort to address the barriers to implementation, a framework for successful implementation is proposed:

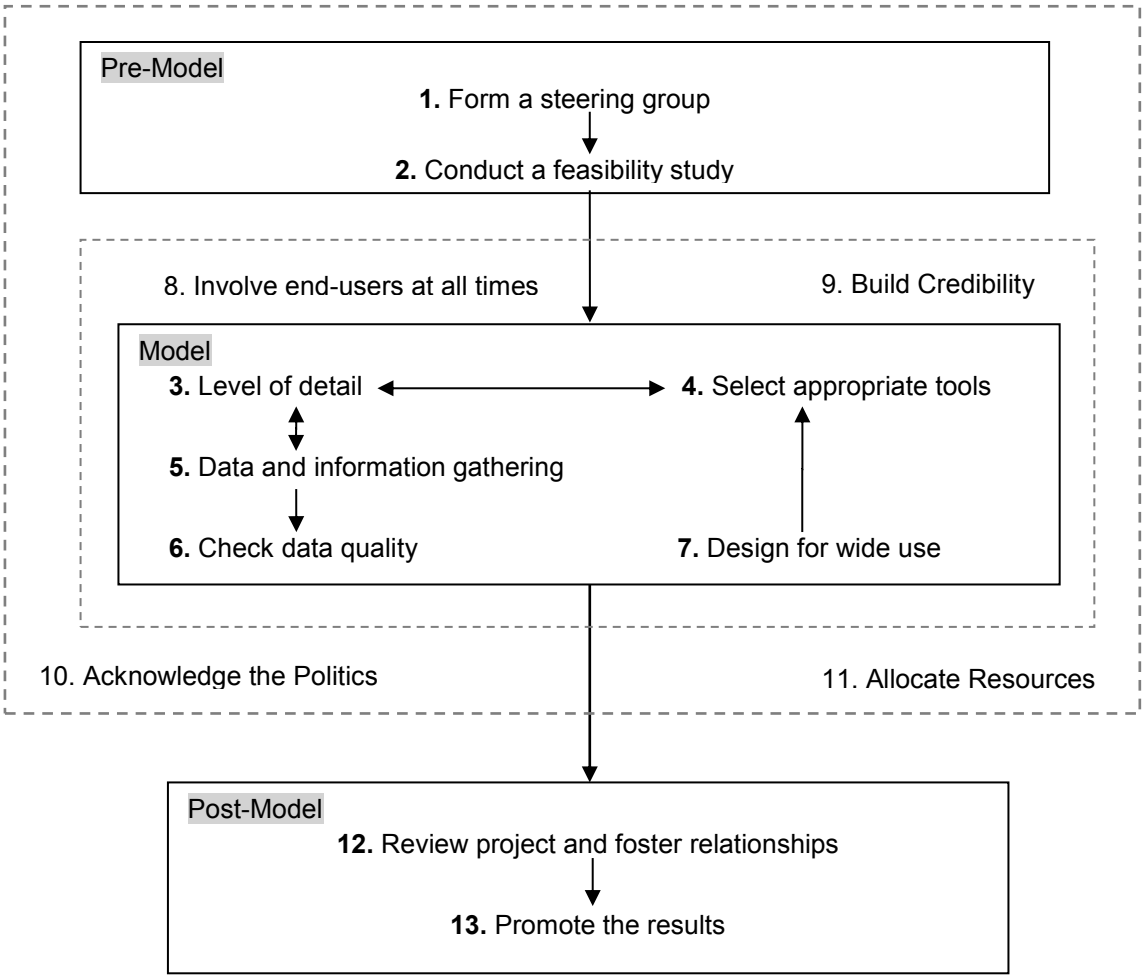
The following compares the steps within the framework proposed in Figure 5-9 against the main implementation barriers listed in Table 5-6 to assess, if by following these steps, implementation barriers are reduced:

1.Form a steering group

A steering group made up of a mix of management, front-line staff representing relevant departments could resolve conflict between management, and staff at an early stage (see Conflict). In addition, a manager, who is part of the steering group, is more likely to be supportive of the project (see Support). In addition, steering group will ensure the organisational momentum of the project is not interrupted giving it time to bed in properly (see Organisational Momentum).

2.Conduct a feasibility study

A feasibility study will define the project including the time frame and the key outputs. Agreeing on these areas at the outset will negate any unrealistic expectations of the capability of the model (see Experience and Expertise).



Source: Harper and Pitt (2004)[172]

Figure 5-9 A proposed project life cycle for successful implementation of healthcare models

3.Level of detail

The framework emphasises the importance of the amount of detail: finding the balance between simplicity and enough detail to generate results. This step, however, should emphasise finding the balance between the amounts of detail required generating results for the project and the amount and complexity of detail included to satisfy academic requirements (see Conflict).

4.Select appropriate tools

5.Data and information gathering

6.Check data quality

Checking the data quality by verifying its accuracy should help to eliminate mistrust and cynicism when the inputs are right first time. However, this could be time consuming and will not eliminate the additional costs of checking and data cleaning nor will it eliminate the difficulty caused when retrieving data from incompatible computer systems (see Data).

7.Design for wide use

Designing the model for wide use by including flexible parameters will ensure the model is more generic. However, designing the model for more generic use does not ensure that it will be used in this way: the ‘not invented here’ attitude and the reluctance to share with others will still exist (see Culture and Silos).

8.Involve end-users at all times

Involving the end-user at all times will ensure the model is fit for purpose and may help to reduce scepticism and mistrust of the model itself and the reasoning behind the need for the model in the first place (see Culture).

9.Build credibility

Building credibility by talking to key personnel about the model and valuing their input to prototypes should also help to reduce scepticism and mistrust of the model (see Culture).

10.Acknowledge the politics

Acknowledging the politics at national and local level will improve the understanding of the modeller of the conditions in which the model is being implemented. However, in addition to politics the modeller needs also to be

aware of the possible impact of the model on other areas within the organisation (see Organisational Momentum).

11.Allocate resources

12.Review project and foster relationships

Relationships with management and staff will be enhanced if, on completion, the model and the approach to the project are reviewed on both positive and negative aspects (see Culture).

13.Promote the Results

Promoting successful results will reduce suspicions as the modelling technique applied will become more familiar to healthcare staff and they will be encouraged by the improvements because of the modelling process (see Organisational Momentum).

This framework addresses some of the main barriers to implementation and will go some way to improving outcomes, the author's state that the framework has been successfully adopted for a number of projects in healthcare and, although difficult and complex, the barriers to implementation can be overcome[172]. However, as this framework was proposed in 2004 it is questionable how effective it is given the continued reference to implementation barriers [131 171 173 170 213 218 171 220].

The promotion of healthcare modelling in the NHS needs to increase, publicising the benefits of models in a real world setting through actual Case Studies will increase awareness and reduce some of the barriers to implementation. Pitt et al. [167] suggest the UK Network for Modelling and Simulation in Healthcare (MASHnet) is a good opportunity for inter-organisational exchange. Unfortunately, although MASHnet had a link on the

NHS Networks web page[174] , a visit to the MASHnet site in August 2013 revealed only 16 Case Studies as evidence of real and successful modelling in healthcare, in addition the site has not been updated since September 2012[175].

5.7.Evaluating Modelling Success

The randomised control trial (RCT) is generally accepted as the most appropriate method to provide evidence of the cause and effect of a healthcare intervention[176] and therefore, presumably, the model which supports the healthcare intervention. When the intervention only considers one component e.g. drug trials, the ability to control and standardise factors is, relatively, easily achieved. However, rarely do healthcare interventions and models, which support them, only consider one factor. Healthcare interventions are complex. Many are concerned with changing behaviour, such as used in the Lean methodology (see 6.3); components to be considered here are practitioner behaviour, frequency, and timing of behaviour and delivery of behaviours[178]. It has been argued[177], nonetheless, that randomised control trials are possible in healthcare if, rather than standardising components in an intervention, the function and processes of the intervention are standardised. For example: rather than all sites delivering the same training materials in the same way over the same set time, materials and resources are provided which the sites use to tailor the training which suits their schedules, venues and learning styles. However, it is unlikely that standardising functions of interventions in an RCT will capture the interaction between context and implementation that is required when reviewing interventions in a 'social world'[178].

Healthcare organisations have particularly challenging characteristics (see Box 5-11) which have the potential to distort or interfere with any attempt to evaluate healthcare intervention models. However, there is still a need to evaluate models, which are aimed at improving or redesigning healthcare interventions or healthcare delivery.

Characteristics of healthcare organisations

- Complexity of care processes
- Multiple existing standards, guidelines and protocols which are often poorly integrated
- Multiple stakeholders (e.g. patients, communities, staff, media, politicians)
- Strong inter- and intra-professional boundaries and the continued dominance of the medical profession
- Reluctance of many health professionals to engage in quality improvement activities
- Limitations on the ability of managers to direct or control health professionals;
- Varying standards of data and infrastructure support for data collection and analysis
- Contest and negotiation around what counts as 'quality' in healthcare and around the nature of 'evidence'
- Traditional patterns of education and socialisation that have focused on individual expertise and have not encouraged a team or system-wide approach
- The ongoing impact (on staff, on structures, and on processes) of successive NHS reorganisations together with a history of top-down change approaches.

Source: Powell, Rushmer and Davies (2009) [179]

Box 5-11 Characteristics of Healthcare Organisations

5.7.1.Theory Driven Evaluation

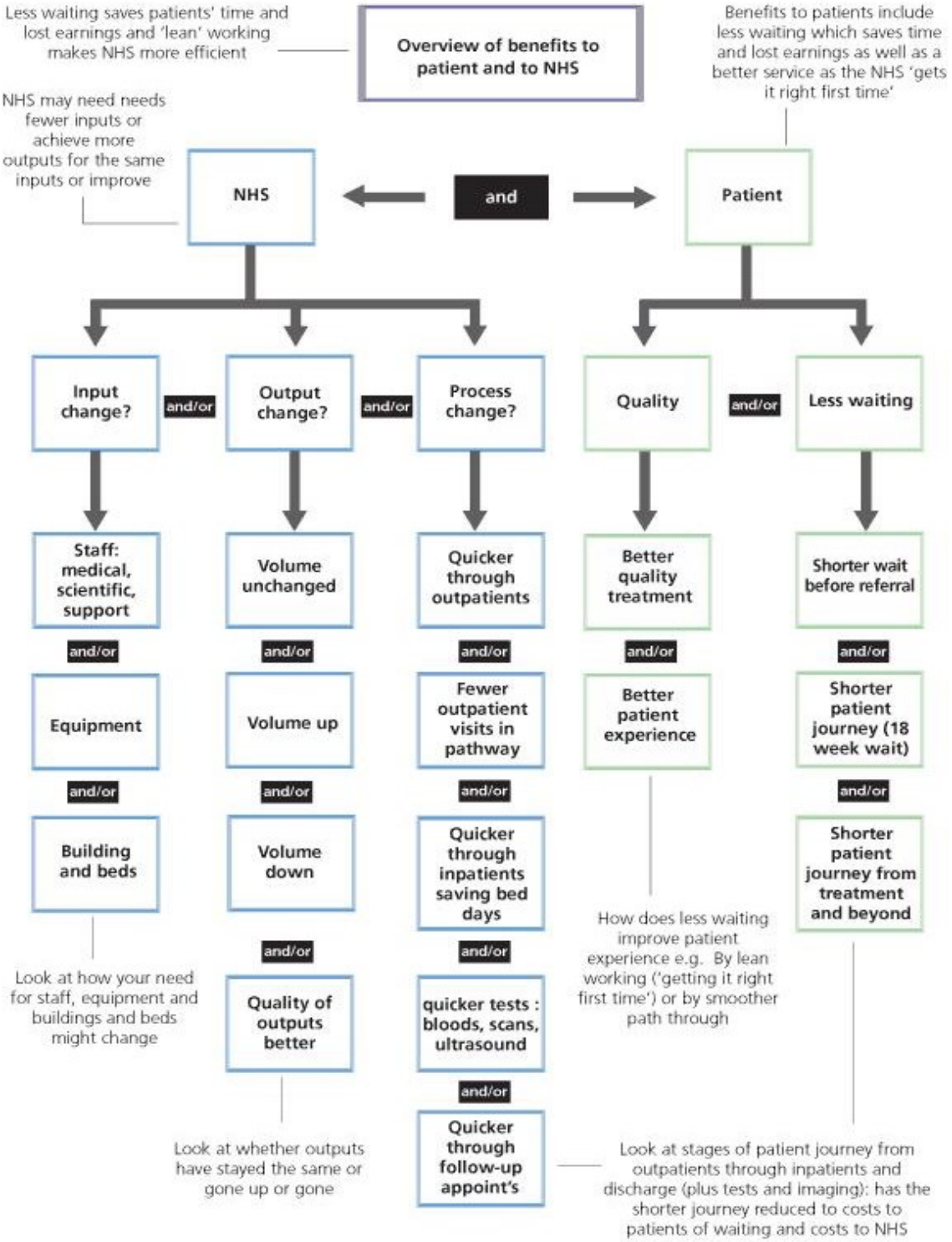
All of the models cited in 5.4.1-5.4.10 have evidence attached to them of success in their use in various organisations: all of the users report an impact or change. This appears to answer the question: 'Does the model work?' but on

discussing quality improvement interventions Walshe[180] advocates that this is not enough; the purpose of evaluation is to also establish how, why and when the intervention works by considering context, content and application[180]. Furthermore, Walshe[180] also encourages, for quality improvement models at least to include "auto-evaluation" in that the processes within the model revisits and therefore generates information about its own effectiveness. Walshe[180] and others[181] [182] [183] support the use of theory-driven evaluation (realist reviews) in an effort to unravel the affiliation between context, content, application and outcomes thereby providing a greater understanding of the effectiveness of healthcare interventions. The purpose of a realist review is to produce a model of how, when and why an intervention works which can then be used to guide change or improvements. The key steps in a realist review are: clarifying the scope of the review, articulating the relevant underlying theories, searching for evidence and appraising and synthesising the evidence (a full explanation of these steps can be seen in Appendix 6). However, the success of this type of evaluation appears to depend on the quality and quantity of evidence available: in a study to guide the development of on-line medical courses [182], the authors were able to offer a set of questions to aid development. However, in a study of district nurses role in palliative care provision[183] the authors were unable to give advice that would guide practice because of the lack of explicit evidence on outcomes of care. In addition, a literature review on lean thinking found reported study designs and outcomes did not give enough clarity[184].

5.7.2.Benefits Realisation

The NHS Institute for Innovation and Improvement [185] endorse the use of Benefits Realisation as a tool to assess if a healthcare improvement project is delivering what it is supposed to be delivering and to provide evidence to others that the project delivers the benefits expected and therefore can make the case for reform. Benefits Realisation considers the patient and the NHS in two streams.

The flowchart illustrated in Figure 5-10 is used as a guide, along with a questionnaire, to track and assess the benefits realised from a project. Benefits realisation allows the project to be critically assessed on an on-going basis; it keeps benefits to the forefront of the project and helps to fill the gaps between expectations and perceptions of users and developers[186]. On a purely visual level of the flowchart, greater emphasis appears to be given to the organisation than the patient. In addition, quality is only defined as better quality treatment; given the six dimensions of the Quality Strategy [256] perhaps further detail of the definition of the quality of the patient experience is required.



Source: National Institute for Innovation and Improvement (2013)[185]

Figure 5-10 Methodology Flow Chart

5.7.3.Case Studies

Case Studies are also used as an evaluation tool in healthcare, they utilise assorted social science methods (e.g. observation, interviews, surveys), which enable some explanatory analysis: *"discerning what works for whom, in what circumstances, in what respects and how"*[187]. Two studies[131 179], which evaluated the Lean Methodology using Case Studies, are discussed here:

A review of quality improvement models in healthcare[179] focused on five models adopted in healthcare settings: Total Quality Management (TQM)/ Continuous Quality Improvement (CQI); Business Process Reengineering (BPR); The Institute for Healthcare Improvement (IHI)'s rapid cycle change; Lean thinking; Six Sigma. The review examines evidence of success of the models and lessons learned during their implementation. Of these models, the review of the Lean methodology is pertinent to this thesis; therefore, Table 5-7 details the methodologies, methods, and reported outcomes from the Lean Case Studies examined in the review. All of the studies reported positive outcomes, however, only one of the studies[218] , fully implemented the Lean methodology, others applied tools and techniques from the Lean Methodology.

A review evaluating the application of Lean in the public sector [146] listed the methods adopted as literature review, eight Case Studies, a survey, and an evaluation of the Lean methodology in three pilot sites. Of the eight Case Studies, two were health related. The methods adopted within the Case Studies included, interviews, observation, and secondary data, such as management documents and annual accounts. The review reports positive outcomes from the application of Lean tools and techniques, which it lists as both tangible i.e.

improving patient wait times and intangible i.e. focus on customer requirements and joined-up working.

Study	Methodology	Methods	Outcomes
Stakeholder Network Dynamics and Emergent Trajectories of Lean Implementation Projects: A study in the UK National Health Service[188]	Case Study	Interviews, discussions, observation- meetings, shadowing, research diary, triangulated with documentation.	Significant reduction in waiting times
Combining Planned and Emergent Change in a Healthcare Lean Transformation[189]	Longitudinal Case Study	Change agents, interviews, reflective questionnaire, observations –workshops and review meetings	New change model developed
Implementing change: the perspective of NHS change agents[190]	Case Study	Change agents, reflective questionnaire, observation- workshops, and feedback sessions.	CANDO is an appropriate tool for developing change agents and creating change in healthcare.
Designing the accident and emergency system: lessons from manufacturing[191]	Case Study	Observation and secondary data (activity).	Removal of queues, identified waiting in A&E caused by capacity imbalance not shortage.
Can lean save lives?[218]	Case Study	Implementation of the 5S technique.	Improved metrics including mortality rates, length of stay, time to surgery and amount of paperwork.
New development: using Lean techniques to reduce radiology waiting times[192]	Case Study	Observation, interviews, and documentary reviews.	Radiology waiting times reduced.

Table 5-7 Evaluating the Lean Methodology

It is evident from both studies that social science methods have been applied to provide evidence of success. However, both studies also comment on the weakness of these studies because of the apparent lack of information about costs, either by failing to allocate costs for the study or by failing to include the change in costs of the intervention. This despite many of the studies including

improved efficiency as an objective. It is acknowledged, however, that measuring and analysing costs and savings does cause difficult challenges[179].

In addition, due to the complexities noted above (see Box 5-11), the difficulty of measuring the success of an intervention in healthcare is providing evidence that improvement is entirely as a result of the intervention and not another factor that the researchers are not aware of. Indeed, the authors of one report[179] admit that there would be no evidence of success if RCTs had been used in their review.

5.7.4.DeLone and McLean IS Success Model

Unfortunately, apart from the application of social science methods, none of these studies suggests a framework for evaluating the success of modelling techniques in a healthcare intervention. In contrast, measurement of information systems (IS) success using a framework has been on-going for some time[193]. Like healthcare, IS is multidimensional and complex which involves a variety of technologies and stakeholders with both internal and external interventions taking place at any one time and rarely in isolation which results in numerous effects. A framework developed by DeLone and McLean in 1992[193] recognised the importance of providing measures by which the value and effectiveness of IS management actions and IS investment could be gauged. The model was updated in 2003 to reflect changing technologies and experiences of the models' use by other researchers[194]. The framework (see Figure 5-11) is a causal model: although dimensions can be measured independently, the authors advocate that some dimensions are associated with

other dimensions and should be measured accordingly. For instance: Information Quality, System Quality, and Service Quality will all impact User Satisfaction.

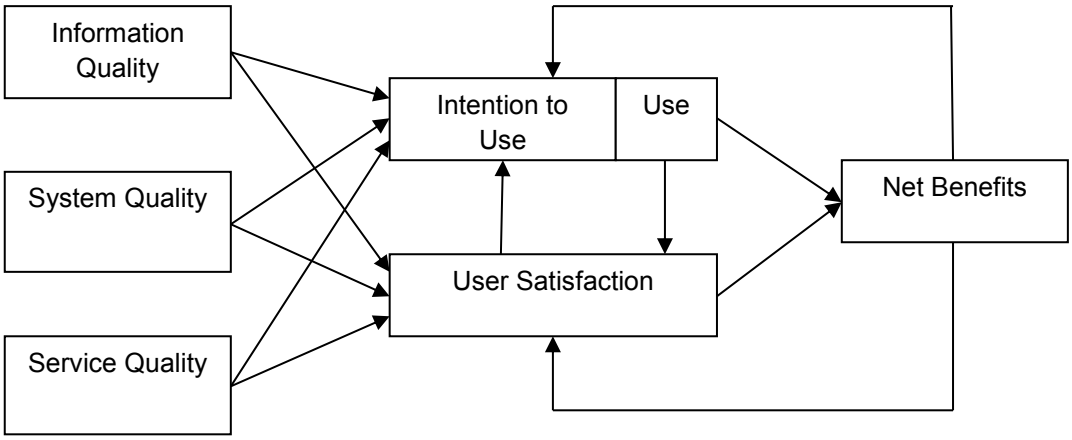


Figure 5-11 Updated D & M IS Success Model

DeLone and McLean refer to Shannon and Weaver's[195] definition of three levels of information:

Semantic: the success of the information in conveying the intended meaning;
Technical: the accuracy and efficiency of the communication system that produces information;
Effectiveness: the effect of the information on the *User.*

In the D & M Model illustrated in Figure 5-11, *Information Quality* measures **Semantic** success, *Systems Quality* measures **Technical** success and *Intention to Use*, *Use*, *User Satisfaction* and *Net Benefits* measure **Effectiveness**. In the updated model, the authors distinguish between Intention to Use and Use in an effort to highlight the former as an attitude and the latter as behaviour. Also in the updated model *Service Quality* is an additional

dimension, which the authors suggest, could measure overall quality of the service provided as opposed to individual system quality. These six dimensions are used to measure the dependent variable of IS Success. The authors found over 300 articles where the original model was referred to and made use of[194].

5.7.5.Proposing a Framework for Evaluation

Evaluating the success of a model in healthcare is difficult; the complexities of the healthcare organisation listed in Box 5-11 Characteristics of Healthcare Organisations, and the constant changing factors internally and externally make it difficult to state categorically that the changes, benefits, impacts to the patient or to the organisation are solely due to the implementation of a model. Consideration should be given to the context within which the model is applied: who the *User* is and whom the model will benefit. The potential for the vast variety of modelling tools application in healthcare is extensive therefore; a broad categorisation of modelling types is useful. Brailsford[196] proposes three categories: Models of the Human Body, Operational Models, and Strategic Models. Similarly, Pierskalla[197] categorises models into: Medical Management; Management of Operations; and System Design and Planning. Models of the Human Body (or the disease model) include evaluation of treatments and intervention, clinical or cost effectiveness of intervention and psychological process such as behaviours. Management of Operations Models are concerned with units such as clinics and departments and interested in patients at an operational level such as waiting lists, capacity planning, and patient flow. Strategic models are system-wide models, which take into account such factors

as the environment, politics and finance. This classification of models helps with the deliberation of whom the User is and who will benefit from the model.

In an effort to evaluate models in healthcare Figure 5-12 illustrates a proposed framework based on the DeLone and McLean IS Success Model.

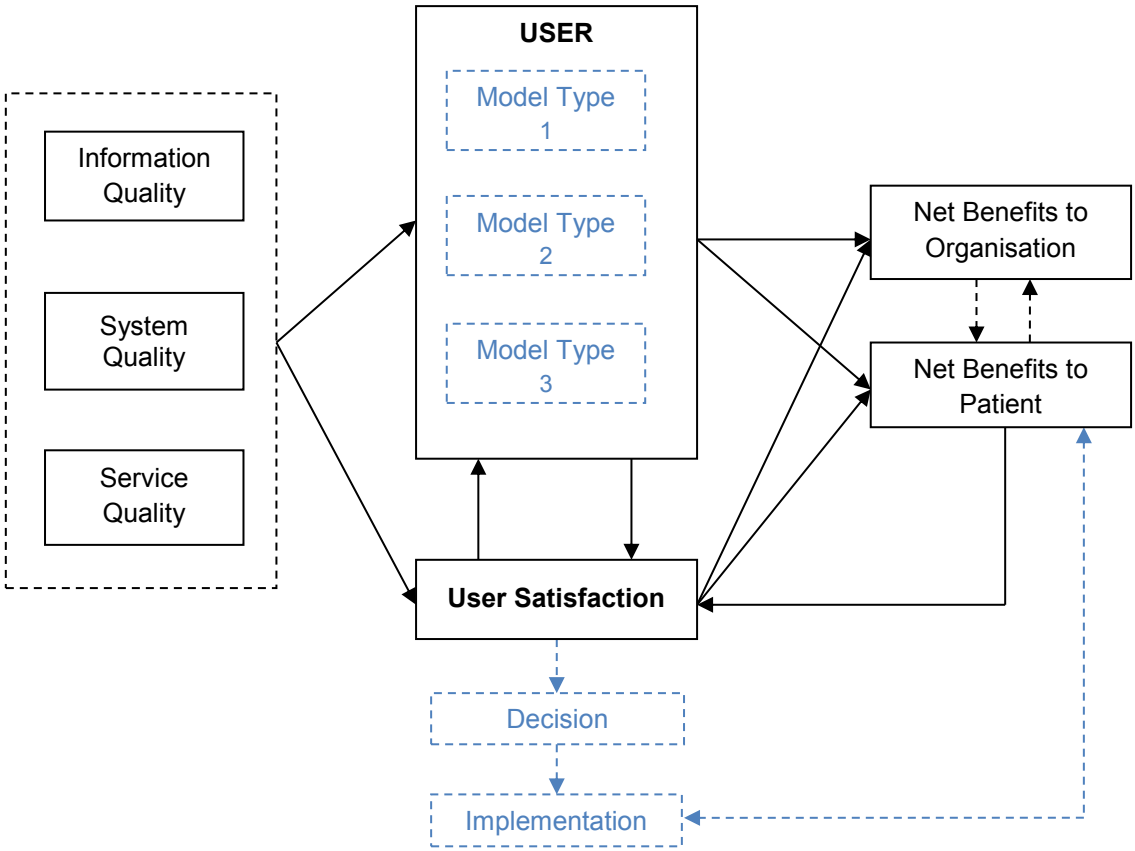


Figure 5-12 Evaluation Framework

Information Quality

Measures semantic success: the intended meaning within the model is easily understood and relevant to the *User*. Information Quality is measured by considering, for example, relevance, usefulness importance, and understanding.

System Quality

Measures technical success: the accuracy and efficiency of the output of the model. System Quality is measured by considering, for example, data accuracy, ease of use, access, adaptability, and reliability.

Service Quality

Measures service success: the quality of the service provision. Service Quality is measured by evaluating assurance, empathy, and responsiveness.

User

Measures effective success: the effectiveness of the model in delivering outcomes to the *User*. The frequency of *use* and regularity of *use* are suitable techniques to measure this category.

Model Type

The model type has a direct bearing on the context in which the model will be evaluated. A Type 1 model or a disease model will directly affect the patient and the outcomes to the patient's health therefore the *User* will be the clinician applying the model and, although the net benefit to the patient is the most relevant here, ultimately there will also be net benefit to the organisation through reputation if the outcomes are successful. A Type 2 model; an operations model, for instance one which considers capacity planning will benefit the organisation through better use of resources but will also benefit the patient by reducing waiting times, reducing bed stays etc. A Type 3 model; a strategic model considers the whole system for

instance emergency admissions. This type of model benefits the organisation by highlighting where small changes in one area can have large impacts on another area: Provided these impacts are acted upon the patient will also benefit from a more efficient system.

User Satisfaction

Measures effective success:the higher the satisfaction gained by the *User* because the model is easily understood; delivers accurate information efficiently; and the service received from the provider is efficient, the more the model will be used by the *User*.

Decision

In healthcare, the decision to implement a new model is not made in isolation, therefore although the *User* may be perfectly satisfied with the model's use the decision to implement may be made on the grounds of politics, environmental issues and or other priorities within the health service.

Implementation

In addition, although the decision may be made to implement a new model based on the *User* satisfaction, in healthcare the model may never be implemented due to the reasons given in Table 5-6 Implementation Barriers.

Net Benefits to Organisation

The Net Benefits to the organisation consider the impact, both positive and negative the model will have on the organisation. Net Benefits to the Organisation can be measured by considering Return-on Investment, operating cost reductions or staff reductions.

Net Benefits to Patient

The Net Benefits to the patient consider the impact, both positive and negative the model will have on the patient. If the net benefits to the organisation and to the patient are positive then the *Use*r satisfaction will increase and the model will continue to be used. The Net Benefit to the patient can be measured in reduced bed days or by a reduced patient pathway.

The six dimensions contained in Figure 5-12: Information Quality; System Quality; Service Quality; *User*; *User* Satisfaction; Net Benefits to Organisation; Net Benefits to Patient can be measured either individually or associated with another dimension to evaluate the success of a model. The Model Type determines the *User* of the model and hence the type of *User* Satisfaction gained. The *User*, as defined by Mingers[109] and reflected in**Error! Reference source not found.**, is: Analysts who are external experts in the modelling technique and use it in support of others; Facilitators who use a model in a situation to help others resolve a problem; and Participants who use the model, possibly assisted by a facilitator in order to resolve a problem. The definition of the participant is inclusive of the Decision-maker. The arrows contained in the illustration suggest how the outcomes can be measured: For instance, the three

categories of quality within the model have an influence on the *User* and *User* satisfaction, hence relationships should be found between these categories.

Information Quality, Systems Quality, and Service Quality can also be (loosely) connected to Mingers Framework (see Table 4-2). Ensuring the necessary information is available and the source of the information is validated will enhance the overall quality of the information in the model. Understanding the Purpose of the model will ensure the output is expected. The Service Quality of the model is dictated by What the system does; updates of new versions will need to be tracked by Service Quality.

In healthcare there is a great deal of emphasis placed on evaluating success through impacts or benefits (see 5.7.2) ; this can be difficult to measure in isolation (see 5.7.3), is the model alone directly responsible for the changes? Evaluating modelling success may be made easier if less emphasis is placed on Net Benefits and more emphasis is placed on User Satisfaction (see 5.7.1), at least then there is no ambiguity regarding the direct success of the model, the models success is based on the behaviour of the User and his/her willingness to regularly return to the model.

5.8. Discussion

There are many modelling techniques available to the Operational Researcher but the generic schematic of the Roles of Models (see Figure 4-11) is a useful base to examine the potential of the selected models to meet the objectives of Shifting the Balance of Care. Each selected model has been categorised and

examined against the SBC Improvement Areas. The assumptions and methods behind a model help in the process of the selecting the correct model to meet the objectives of the problem. However, examination of the categorisation of methods also emphasised that models can overlap and can be engaged sequentially in order to meet all of the objectives of the problem. The schematic of the Roles of Models (Figure 4-11) will be utilised in later chapters to explore the roles of specific models (see Chapters 6, 7 and 8). Evidence has also been provided of the success of the models use in healthcare as reported in the literature. However, the evaluation of success of models is questionable and the author proposes a standardised measure based on the DeLone and McLean Success Model [194]. Recognised and robust evidence of the successful application of a model will generate trust, reduce ambiguity, and increase the confidence of the user and the investor. Unfortunately, at this time this framework is theoretical, the next step would be to test it over a series of model applications in healthcare. However, the Evaluation Framework developed and described in this chapter will be used to assess individual models, presented as Case Studies in later chapters (see Chapters 6, 7 and 8), in answering the research question.

Nonetheless, evaluation of success cannot happen unless the model is implemented: there are several barriers to implementation and it is important to be aware of these barriers at the initial stages and address them where possible at the outset of a project. Nevertheless, a model, which is robustly evaluated as successful, would improve the perceptions of OR models and help to breakdown some of the barriers.

5.9.Conclusion

This chapter has attempted to integrate Operational Research, specifically modelling, with the eight Improvement Areas prioritised to Shift the Balance of Care. The chapter, with the aid of the theoretical assumptions and methods behind models, attempted to emphasise the potential of models to Shift the Balance of Care. However, to be successful, models need to be implemented and evaluated in a transparent, valid, and robust way; it is only then that the existing barriers to implementation of models in healthcare will be reduced.

Chapter Six

The Lean Methodology Case Study

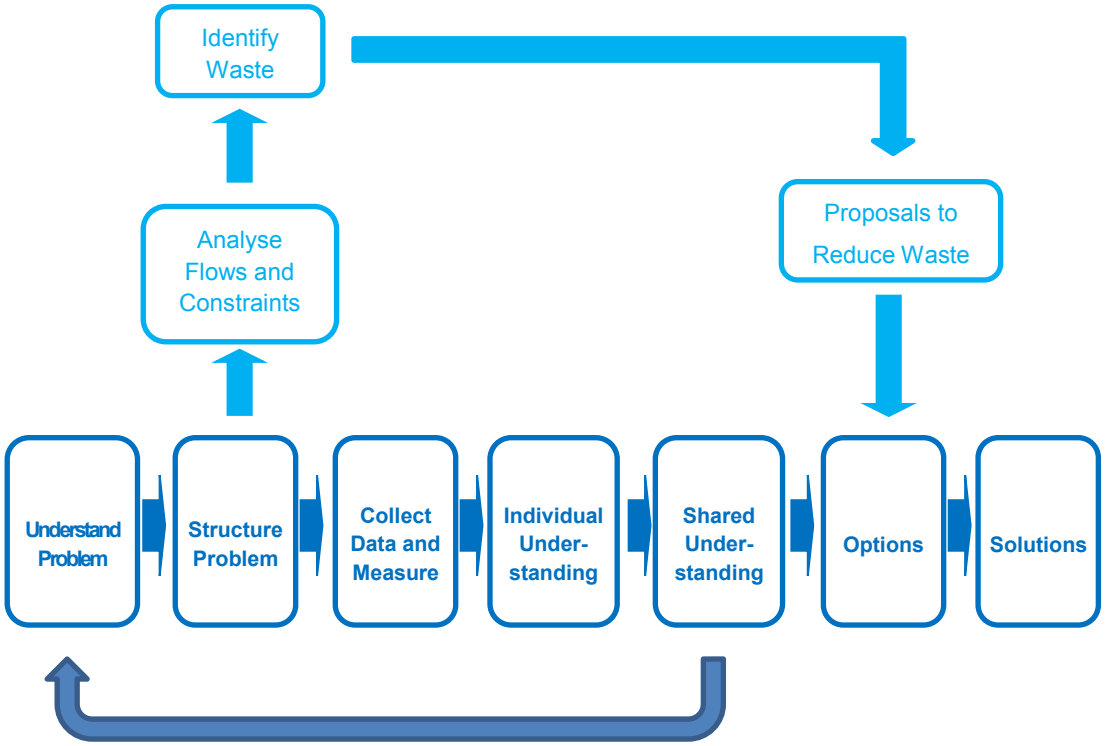


Figure 6-1 The Role of the Lean Methodology

6. Introduction

The following chapter is a Case Study, which introduces the philosophy, and principles of the Lean Methodology beginning with its Role in Shifting the Balance of Care (see Figure 6-1). The chapter then provides a historical perspective of Lean and discusses findings from the literature concerning the successes or otherwise of Lean implementation into healthcare and the subsequent implementation barriers experienced. The chapter then goes on to document the implementation of the Lean Methodology into the Back Pain Project in NHS Fife as well as providing empirical evidence evaluating the adoption of Lean in NHS Fife. Finally, the chapter evaluates Lean against the Evaluation Framework and appraises the role of the Lean model in Shifting the Balance of Care.

6.1.The Role of the Lean Methodology

The Lean Methodology schematic extends from the generic schematic of models (see Figure 4-11) as illustrated in Figure 6-1. The methodological assumption's purpose behind the Lean Methodology is 'a model to Improve patient flow through the eradication of waste' (see Figure 4-7) and is categorised as a 'soft approach' to structure unstructured problems (see Figure 4-10). The analysis of process flows and constraints can help to structure the problem; this analysis can then identify waste within the process (see Table 6-1). The subsequent reduction of waste is a combined effort by stakeholders that leads to a shared and enlightened understanding of the process and the

individual's place in the process. The reduction of waste by improving the flow of the process, allows options to be iteratively reviewed until the optimum solution is found.

Examination of the Lean Methodology against the eight prioritised Improvement Areas of Shifting the Balance of Care (see Table 5-1) identified the potential of Lean to have a positive impact on several Improvement Areas (see Table 5-3). The potential of Lean against the Improvement Areas will be further examined at the end of the chapter.

6.2.History of the Lean Methodology

The Lean methodology was developed by Toyota after World War II, although Henry Ford was the first to integrate the production process, Toyota developed a system which provided both continuity in process flow and a wide variety of products.[198] The idea of production flow was developed in Henry Ford's factory in America in 1913[199] where automobiles were produced using assembly lines and where workers specialised in one part of the process rather than several. The process in Ford increased production but could not offer variety in product type. Toyota a manufacturer of textiles in Japan was encouraged by the government to produce vehicles for war use[200]. After World War II, demands in the automobile industry grew; Toyota aware that production would need to improve to meet demand studied Ford's concepts and by considering the total process developed the Toyota Production System (TPS). By aligning machines in their process sequence, matching machines to the volume required,

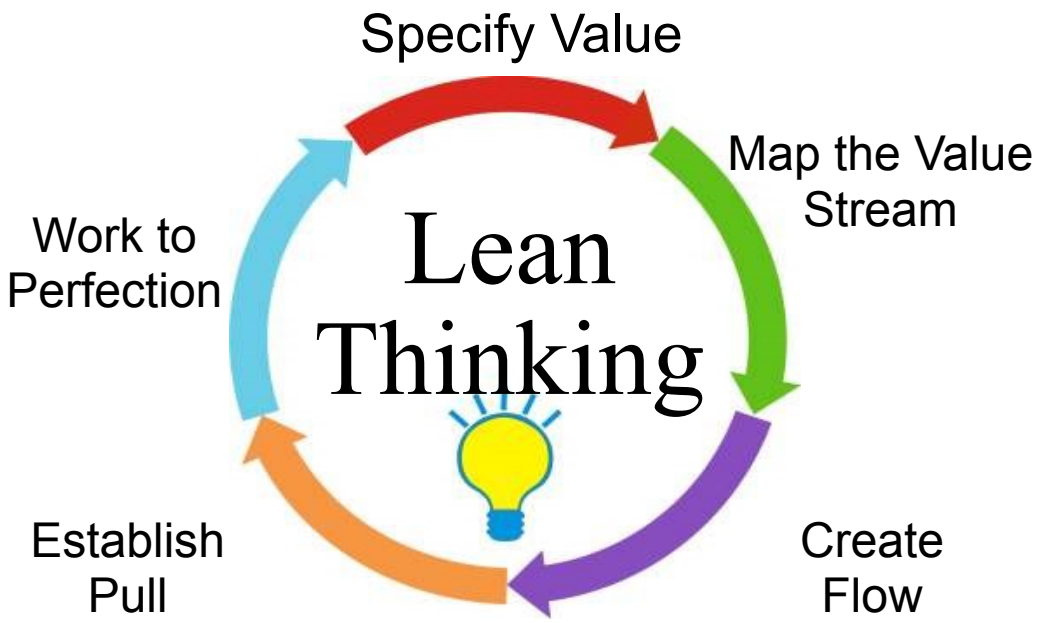
calibrating machines to make high volumes of a variety of parts, maintaining quality with the introduction of self-monitoring machines, and having the ability to inform the previous process step of material needs, Kiichiro Toyoda and Taiichi Ohno were able to produce low cost, high variety, high quality, and fast throughput automobiles to respond to changing customer needs [202] 203.

The team from Toyota began to lead workshops and presentations of TPS within Japan but it was not until 1975 that the first TPS handbook was translated into English. Interest in the system began to develop particularly in America who sent a delegation to see TPS in action in the Toyota plant. However, it was only after the publication of the book 'The machine that changed the world' by Womack, Jones and Roos in 1990[201] that the Western world began to appreciate the potential of Lean; a term the authors used to describe TPS[202] [203]. The authors after a five-year study of the Japanese automobile industry explained the concept of TPS and why Western manufacturers were failing whilst Japanese manufacturers were succeeding. Since the publication of the book, the philosophy of Lean has spread to other manufacturing industries and has also successfully been assimilated into service industries and the public sector despite its manufacturing roots [131].

6.3.The Principles of Lean

Lean is a philosophy that seeks to eliminate waste in all aspects of manufacturing or service activities: human relations, technology, and the management of materials and inventory.

The philosophy of Lean is built around five principles (see Figure 6-2)[204]:



Source: Lean Enterprise Institute (2010)[204]

Figure 6-2 The Five Principles of Lean

Value - Within a process activities are identified as value-adding, value-enabling and non-value adding or waste. Value-adding activities are any activities that change the form, fit, or function of a product or service and/or activities that customers are willing to pay for. Value-enabling activities are activities that the customer will not pay for but that are necessary to allow the value-adding activity to happen [204]. Only a small fraction of the total time and effort in any organisation actually adds value for the end user. By clearly defining Value within a process from the end user's perspective, all the non-value activities - or waste – are identified and can be targeted for reduction or removal. Value-enabling activities can sometimes be subjective therefore, it is important to discuss and reach agreement with key members on its definition.

The Value Stream – The Value Stream is the entire set of activities across all parts of the organization involved in jointly delivering the product or service. This represents the end-to-end process that delivers the value to the customer. Once it is understood what

the customer wants, the next step is to identify how the goods or service should be delivered.

Flow - Eliminating waste ensures that the product or service "flows" to the user without any interruption, detour, or waiting. In a manufacturing environment initial mapping of the Value Stream reveals, only 5% of activities add value, 35% are value-enabling and 60% are waste, in an office or retail environment 1% of activities are value adding, 50% are value-enabling and 49% are waste[205].

Pull - This is about understanding the user demand for goods or services and then creating the process to respond to this, such that only what the customer wants when the customer wants it is produced.

Perfection - Creating flow and pull starts with radically reorganizing individual process steps, but the gains become truly significant as the entire steps link together. As this happens, more and more layers of waste become visible and the process continues towards the theoretical end point of perfection, where every asset and every action adds value for the end customer.

Source: Cardiff University (2011)[206]

6.3.1.Identifying Waste (Muda)

Any value in the process, which is not value-adding, is considered non-value adding activities and is identified as waste[207], by reducing or eliminating waste a smoother, more efficient flow of the process is achieved. The *traditional* identification of waste, as classified by Hines and Rich (1997),[208] are categorised alongside the classifications of waste as identified and adopted within healthcare by the NHS Institute for Innovation and Improvement and illustrated in Table 6-1 :

TPS Waste (Muda) [208]	Definition[208]	Healthcare Waste[207]	Healthcare Definition[207]	Healthcare Example
Over-production	Leads to unnecessary lead times and WIP stocks, which can results in deterioration and displacement.	**Over-production**	Unnecessary activity 'just-in-case'	Excessive reporting, unnecessary tests repeatedly asking the patient the same questions, commonly termed 'taking a rainbow'.
Waiting	Waiting on next job or material for next job.	**Waiting**	Patient waiting or waiting on materials or results	Inpatients waiting in emergency department, patients waiting for discharge, physicians waiting for test results.
Transport	Movement of goods should be kept to a minimum. Material should be delivered to its point of use.	**Transportation**	Review process steps to ensure movement of patients and materials are kept to a minimum.	Moving patients to tests, patients having to attend different departments.
Inappropriate Processing	Using complex solutions when simple ones are more appropriate.	**Unnecessary Processing**	Using complex equipment to undertake simple tasks.	Multiple bed moves, re-testing, multiple assessments.
Inventory	Inventory beyond that needed to meet user demands negatively impacts cash flow and uses valuable floor space.	**Inventory**	Both patients and materials: holding inventory has detrimental effect on effectiveness.	Lab samples for testing, stocks on wards, dictation waiting for typing, patients in beds waiting for discharge.
Motion	Unnecessary motion of people or equipment. This is caused by poor workflow, poor layout, housekeeping, and inconsistent or undocumented work methods.	**Staff Movement**	Unnecessary movement of staff, patients or supplies.	Working across multiple sites, storage of consumables/equipment in unrelated places, poor ergonomic layout.
Defects	Production defects and service errors waste resources.	**Defects**	Relates to patients, supplies and administration: Defective procedures, admin and supplies.	Missing patient information, wrong information communicated, inappropriate and failed procedures.

Table 6-1 The Seven Types and Definitions of Waste

As can be seen in Table 6-1, the *traditional* definitions of waste relate more to manufacturing, whereas the healthcare definitions are more specific to health

e.g. TPS Over-production refers to stocks whereas health over-production relates to excessive reporting and unnecessary tests of the patients.

6.3.2.Lean Tools

There are numerous Lean tools available to implement the principles of Lean[209]. Table 6-2 lists only a few of the available tools, selected based on familiarity by the author and familiarity within NHS Fife (see 6.6.3.1.) In addition, the tools have been categorized into tools to aid understanding, tools to aid organizing and tools to aid problem solving in order to provide a foundation for the type of tasks the tools perform. Also, derived from the Evaluation Framework (see Figure 5-12), Table 6-2 also attempts to identify whom these tools will benefit the most: Patient, Organization or Both.

Tool	Description	Category
Voice of the Customer	Listening to the voice of the customer helps to identify the needs, wants and expectations the User has of the service, it also enables staff to see the service provided from the customer's perspective.	Understanding
Time Value Analysis	A tool used to visualize the effectiveness of the patient journey through observation. Divide the patient's process steps into Value Added, Value Enabling and Waste, and then eliminate waste.	Understanding
Process Observation	A tool used to visualize the effectiveness of the processes of the patient journey through observation.	Understanding
Visual Management	A management system, which aims to share information and participation using visual aids, provide a simple communication, easily understandable, continuously updated, and accessible to everyone.	Organising
SOP's	Standard Operating Procedures are a set of clearly written instructions, which outline the steps or tasks needed to complete a job, operation or operate a piece of equipment.	Organising
The 5S Pillars/6S	A simple tool to organise the workplace: **Sort** items into two categories necessary and unnecessary, disregarding the latter **Set in Order** Arrange items to minimise search time and effort. Designate area, with specified maximum levels of inventory for that area. **Shine** Reduce the risk of fire/injury by cleaning away the potential causes of accidents.	Organising

	Standardise to ensure sort, set-in-order, and shine are consistently followed across all users **Sustain** The 5 S's may be viewed as a philosophy, with employees following established and agreed upon rules at each step. By the time they arrive at Sustain they will have developed the discipline to follow the 5 S's in their daily work. **Safety** also added at times.	
Dashboards	Visual Communication Interface.	Organising
5 Whys/ Root Cause Analysis	A problem solving activity that gets to the root cause of a problem by asking 5 Why questions.	Problem-solving
3 C's	Concern, Cause and Counter-measure- identifying problems, defining their cause and addressing them. Linked to Root Cause Analysis	Problem-solving
Fishbone Diagram	A cause and effect diagram used in conjunction with Root Cause analysis.	Problem-solving
3M's	Triad: Muda, Muri and Mura; Waste, Excess Burden and Variation.	Problem-solving
Mapping the Current State	A map of the patient journey as it actually happens containing all of the relevant procedures and administrative processes.	Understanding
Lean Metrics	Provides a baseline which allows for comparative benchmarking and provides data for comparison of achievements or otherwise.	Understanding
Circle of Work	A tool used to visualize the effectiveness of the roles within a process through observation. The different roles of staff are 'Shadowed' and their activities are divided into Value Added, Value Enabling and Waste.	Understanding
Value Stream Mapping	A cross-functional team produce a visual map of the current state of the process identifying all the steps in a patient's pathway. Value Stream Mapping the process identifies waste and aims to achieve continuous flow. This streamlined process represents the future state, which can reduce costs and increase quality.	Problem-solving Understanding
Kaizen Event	Kaizen is the continuous improvement of a process, which involves all employees. A Kaizen Event or Kaizen Blitz takes place normally over five days and brings together key stakeholders to resolve issues in the delivery of a service. A Kaizen event is a way of realising performance improvements in a short space of time by identifying problems and eliciting ideas for solutions. A Kaizen event typically focuses on process efficiency through the elimination of waste in a system; identifying and eliminating any activities that do not add value to the process outcomes.	Problem-solving Understanding
Spaghetti Mapping	A diagram of the layout which is overlaid with the motion of the patient / family / caregiver / supply throughout the care experience or process which identifies inefficiency in layout or motion.	Understanding

Legend:

Patient	Organisation	Both

Table 6-2 Lean Tools

Use / Benefit	Identify Value	Map the Value Stream	Create Flow	Establish Pull	Pursue Perfection
	Understanding		**Problem-Solving**		**Standardisation**
Patient	1. Voice of the Customer Time Value Analysis Process Observation		2.		3.
Organisation	4. Mapping the Current State Lean Metrics Circle of Work		5. 5 Whys Root Cause Analysis 3 C's Fishbone Diagram 3M's		6. Visual Management SOP's The 5S Pillars/ 6S Dashboards
Both	7. Value Stream Mapping Kaizen Event Spaghetti Mapping		8. Value Stream Mapping Kaizen Event		9.

Table 6-3 Matrix of Lean Tools

Table 6-3 is a matrix of Lean tools derived from Table 6-2 and the Principles of Lean (see Figure 6-2) depicting; who will benefit from their use, the potential benefit of the tools use and how this benefit facilitates the five principles of Lean. The three tools in Box 1 are all suited purely to understand and value the customer/patients point of view, whereas the three tools noted in Box 4 are used by the organisation to understand processes or systems that are currently in place. There are two tools within the matrix, which merit two uses: in Boxes 7 and 8 Value Stream Mapping and Kaizen events. This is because the process of performing these tasks aids understanding but this process, sometimes with the use of other tools, also helps to identify problems, and finds solutions to the problems.

6.4.Lean in Healthcare

The first indications in the literature of the use of Lean in healthcare is in the 1990's, although not termed Lean these authors used manufacturing

approaches such as Just in Time to reduce physical inventory and the associated costs in healthcare settings [210, 211, 212]. Since then the NHS Modernisation Agency, and subsequently the NHS Institute for Innovation and Improvement, have actively promoted the use of the Lean methodologies in healthcare.

To evaluate the progress of Lean within healthcare Brandao de Souza [216] categorised two main types of Lean in the literature: Case Studies and Theoretical. Within these categories, sub-categories were also identified (see Figure 6-3 below):

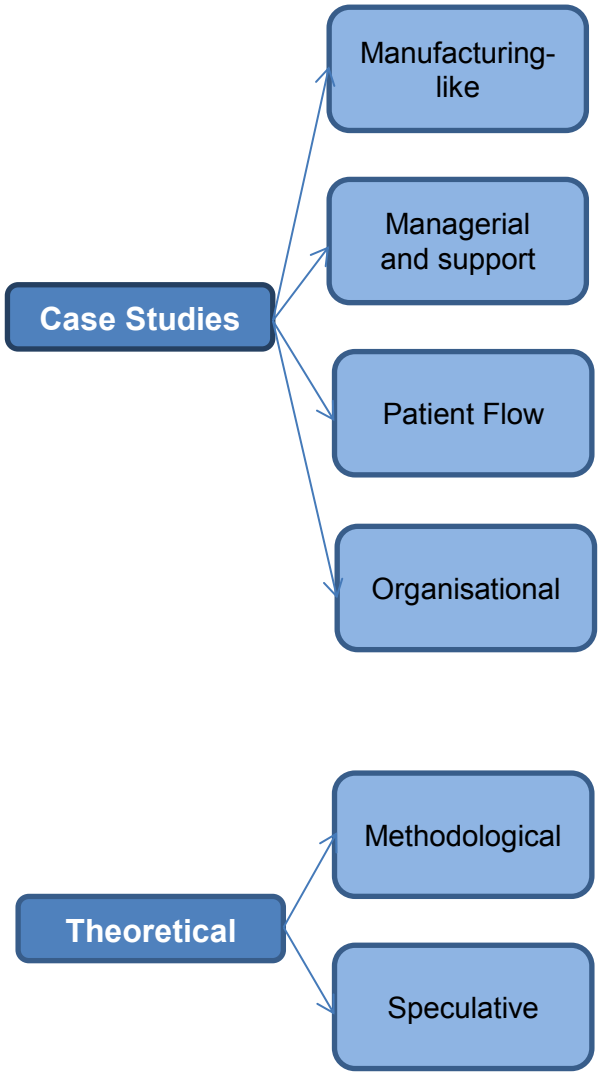
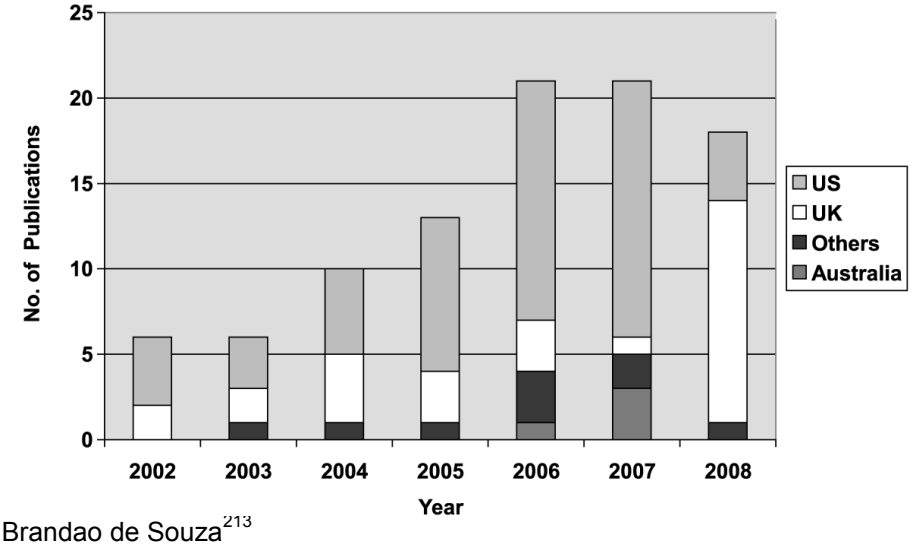


Figure 6-3 Taxonomy of Lean Healthcare Literature[216]

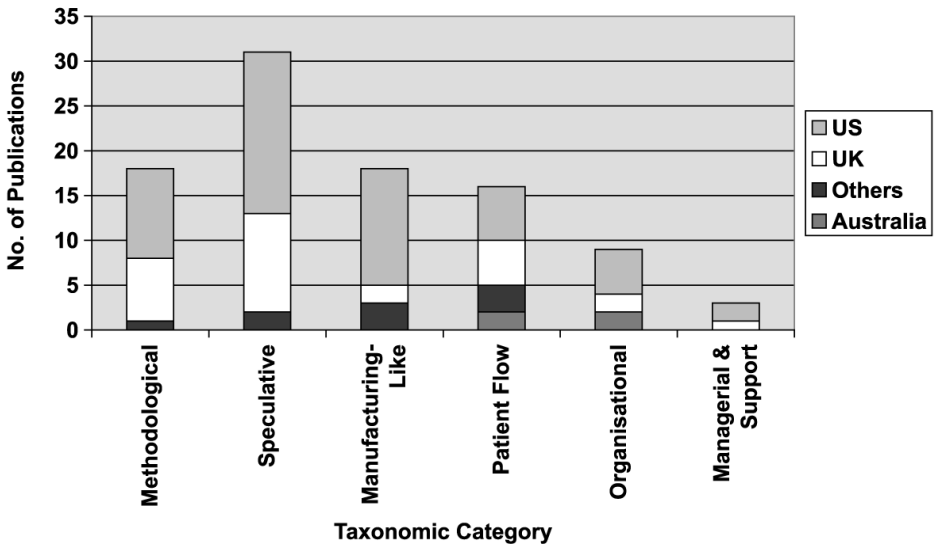
From the literature assessed [213], Case Studies typically discuss practical applications of Lean i.e. patient flow, information flow and material flow whereas theoretical papers speculate about the use of Lean or discuss integration or implementation issues of Lean (see 5.7).

Figure 6-4 below shows the number of publications dedicated to Lean in healthcare[213], from this graph it can be seen that the US have the highest proportion of publications but in 2008 there appears to have been an extensive increase in interest in the UK (see 5.6).



Source: Brandao de Souza[213]
Figure 6-4 Lean publications in Healthcare

Figure 6-5 below shows the sub-categories of publications. From this graph, it can be seen that the theoretical types of publications are by far the highest numbers and that in the UK very few Case Study type publications are published.



Source: Brandao de Souza [213]

Figure 6-5 Number of publications per taxonomic category (from each country) in Healthcare

Although there is belief in the potential of Lean in a healthcare setting[214] 215 218 [216] 217, the Case Studies published do not provide robust evidence of success (see 5.7), however it is acknowledged that it is difficult to provide evidence of effectiveness within a healthcare setting[214]. Joosten, Bongers, and Janssen[215] call for higher quality research to be adopted when reporting on outcomes of Lean with a more balanced view; Brandao de Souza was surprised not to find any literature, which criticised the use of Lean in healthcare[216]. A study[217] concerning the implementation of Lean into 152 hospital trusts in England identified six different approaches of Lean implementation, which they describe as: Tentative, Productive Ward only, Rapid Improvement Events, Few Projects, Multiple Projects, and Systematic with Few Projects being the most frequent. The difficulty is, by merely using the tools and techniques of Lean and not the adopting the Lean philosophy, success can be isolated to one department or division and does not take into account the overall strategy of the organisation [216] [217]. In addition, although there may be improvement to that area, of say, the

pathway, it does not consider what could be a negative impact on the rest of the pathway or organisation. There is evidence to suggest the systematic approach to lean implementation will improve performance based on 'Quality of Service' and 'Use of Resources'[217] but within the study only five hospitals fell into this category. Bolton Hospitals NHS Trust[218] was one of these hospitals and was the first hospital in the UK in 2005 to attempt to apply Lean principles across a hospital as a whole and one of a very few hospitals world-wide to engage in this process. Bolton Hospitals NHS Trust report that 'lean really can save lives[219] but that the process had not been without difficulty.

Table 6-4 illustrates the implementation barriers common to OR models previously listed (see Table 5-6) compiled from various sources including the Lean methodology. In addition, identified in Table 6-4 are the implementation barriers, which (according to the authors) are peculiar to the Lean implementation process, although it could be argued that these are similar barriers with a different name.

The manufacturing origins of Lean leads to the **perception** that Lean cannot be translated into services generally and healthcare specifically [218]; the perception being the adoption of Lean would lead to patients being treated like widgets on a production line and not therefore receiving the individual care they need [171]. Traditionally healthcare focuses on individual tasks to improve the patient journey; Lean however focuses on the process of the patient journey ensuring each task is in the right order at the right time in order to meet the needs of the patient.

Implementation Barriers Common to OR Models
Culture
Cost
Data
Conflict
Support
Experience
Silos
Organisational Momentum
Implementation Barriers Peculiar to Lean
Perception[218] [171]
Poor Communication[171] [131]
Lack of Knowledge/Awareness of Lean[131] [220]
Inappropriate Team Members [131]
Lack of Ownership [131]
Failure of Leadership [131]
Lack of Link to Strategy [131]
Functional Silos [171]
Professional Silos [171]
Lack of Sustainable Processes [220]
Inappropriate Processes for Lean Implementation [220]
Integrated Finance [221]
People [220]

Table 6-4 Lean Implementation Barriers

There is also the belief that value streaming the process is a cost cutting exercise, which will result in a reduction of resources and in less touch time with the patient [171]. However, value streaming the process results in less wasteful and value enabling tasks thereby increasing the time to care for the patient.

One of the main reasons for the misconceptions and mistrust of Lean is due to **poor communication**. Firstly, the terminology used in the Lean methodology contains many Japanese words to describe tools or systems and some of the English terms used do not have the same meanings in Lean as they do in everyday use[131] [171]. Secondly, the purpose, education, and outcomes of Lean

are not always clearly explained. Part of the reason for the poor communication of Lean is the **lack of knowledge and awareness** of Lean by staff and managers in healthcare [131]. Consequently, **team members** selected to implement the Lean process in a healthcare setting are often inexperienced or inappropriate for the task [131]. In addition, often the team members selected are not representative of all departments or positions, which can lead to feelings of exclusion and therefore disinterest in the project by those outside of the team[131] and **lack of ownership** of those within the team[131]. Furthermore, the lack of knowledge of Lean leads to poor decisions being made as to whether Lean is **appropriate** to solve a problem in a process or system[220].

Concentrating on individual tasks has led to a 'fire-fighting' culture within healthcare where a quick fix is required to address the immediate problem. Managers lack the skills to take an evidence-based approach to healthcare, to understand the root cause and to adopt a strategy, which will address the problem in the long term, thereby creating processes, which are less **sustainable**[220]. Indeed the **link to the Organisational strategy** is not made clear; Leaders fail to clarify the scope of the project and to drive the changes through in relation to the organisational strategy [131]. **Leaders** are also criticised for not being visible during the changes to encourage, often what are, fundamental changes and to offer advice during difficult transitions[131].

Within healthcare two types of silos exist: professional and functional. **Professional silos** [171] consist of care providers and non-care providers, **Functional silos**[171] consist of specialities that perform specific tasks. Within

each of these silos, many other sub-groups exist. As a result healthcare operations are extremely complex with poor communication, difficult and limited interactions and fragmented care[131] 171. The existence of silos makes it very difficult for Lean to be implemented. The Lean process takes a holistic view of the patient journey from beginning to end therefore all activities relating to the journey has to be known and connected. The delivery of healthcare is very complex and it is this complexity, which often magnifies barriers when implementing change (see 2.4).

Included in Table 6-4 is the implementation barrier **People.** There is a strong belief that people[220] are the main barrier to the implementation of Lean. However, there are reasons, justified or otherwise why people in healthcare have aversions to the implementation of the Lean methodology (or other OR models for that matter), therefore, it is these reasons and others that have been cited in the Table 6-4 as the main barriers to implementation.

It may be that the adoption of Lean in a healthcare setting is in a transitional phase: there is more evidence of the use of tools and techniques than the Lean Philosophy as a whole. The acknowledgement of the barriers to implementing Lean and the management of these barriers, may, in time, lead to the adoption of Lean Thinking at a strategic level and therefore allow trained staff to take ownership of the implementation of Lean more holistically221.

6.5.Lean in NHS Fife

The Lean Methodology is supported by the NHS as illustrated by its inclusion of the 'Lean Simulation Suitcase' on the Institute for Innovation and Improvement website, which is described as 'everything required to set-up and run Lean in the workplace'[222]. The application of the Lean methodology in NHS Scotland began in 2006 after the publication of the paper "Evaluation of the Lean Approach to Business Management and its use in the Public Sector" [131] .

The Scottish Government made finance available to NHS Boards to procure Lean consultancy services. In 2009, NHS Fife successfully bid for these monies[223] [224]. Although Fife had already embarked on individual targeted Lean projects, they were keen to formalise the use of Lean with a whole system approach to ensure a shared understanding within Fife of (1) Demand into services, (2) Current volumes, (3) Current patient flows, (4) Current productivity, (5) Current bottlenecks, (6) Current performance challenges, and (7) Impacts of known service changes. The bid documents state that NHS Fife fully embraced the Lean approach as the mechanism for delivering sustainable change and that Lean concepts and working practices will be embedded within the organisation through comprehensive redesign of clinical infrastructure and targeted transformation of high-impact clinical pathways. Fife's intentions are to:

- Introduce a Lean approach within all clinical and non-clinical services and departments

- Redesign patient pathways across the whole system utilising a Lean approach to deliver the objectives of Shifting the Balance of Care into the community and improve length of stay and admission rates.
- Redesign decision-making processes to ensure that the organisation supports and inspires front-line staff to introduce and sustain a culture of continuous quality improvement within their service and department.

6.6.Introducing Lean to the Back Pain Pathway

In 2010, NHS Fife procured funding from the Scottish Government to work with a partner to introduce Lean to an existing process within Fife. The Lean Demonstrator Project identified the focus of the project as Musculoskeletal Services. Musculoskeletal services has a high profile particularly with regard to inequitable and long waiting times, is an area of established redesign activity and one which interfaces with Primary, Secondary and Tertiary care. The Lean Demonstrator Project was commissioned by the Senior Management Team at Fife and presented to the Orthopaedics Steering Group (OSG). The OSG, who meet on a regular basis, would facilitate continual updates and reports of the projects progress, as well as deciding upon the specific project area to be demonstrated, the team leads, and the timing of the project.

The OSG decided that the Back Pain Pathway within the musculoskeletal service would be the specific project to be demonstrated: the existing Back Pain Pathway was not standardised within different areas of Fife, back pain referrals from GP's were inconsistent and ambiguous and because no back pain

consultants are employed in Fife confusion arose as to which consultant back pain patients should be referred.

The Back Pain Project process in relation to the five principles of Lean (see Figure 6-2) can be viewed in

Figure 6-6. During the project, the author worked alongside the lead from GE Healthcare, the Lean partner, and took an active part in the process: interviewing, designing, and distributing surveys, mapping the Back Pain Pathway and shadowing staff members. As stated in the methodology (see 4.2.3.2) participation of the researcher in an effort to facilitate change is an important aspect of Action Research. Therefore, the above activities on the part of the author would suggest an aspect of Action Research was performed.

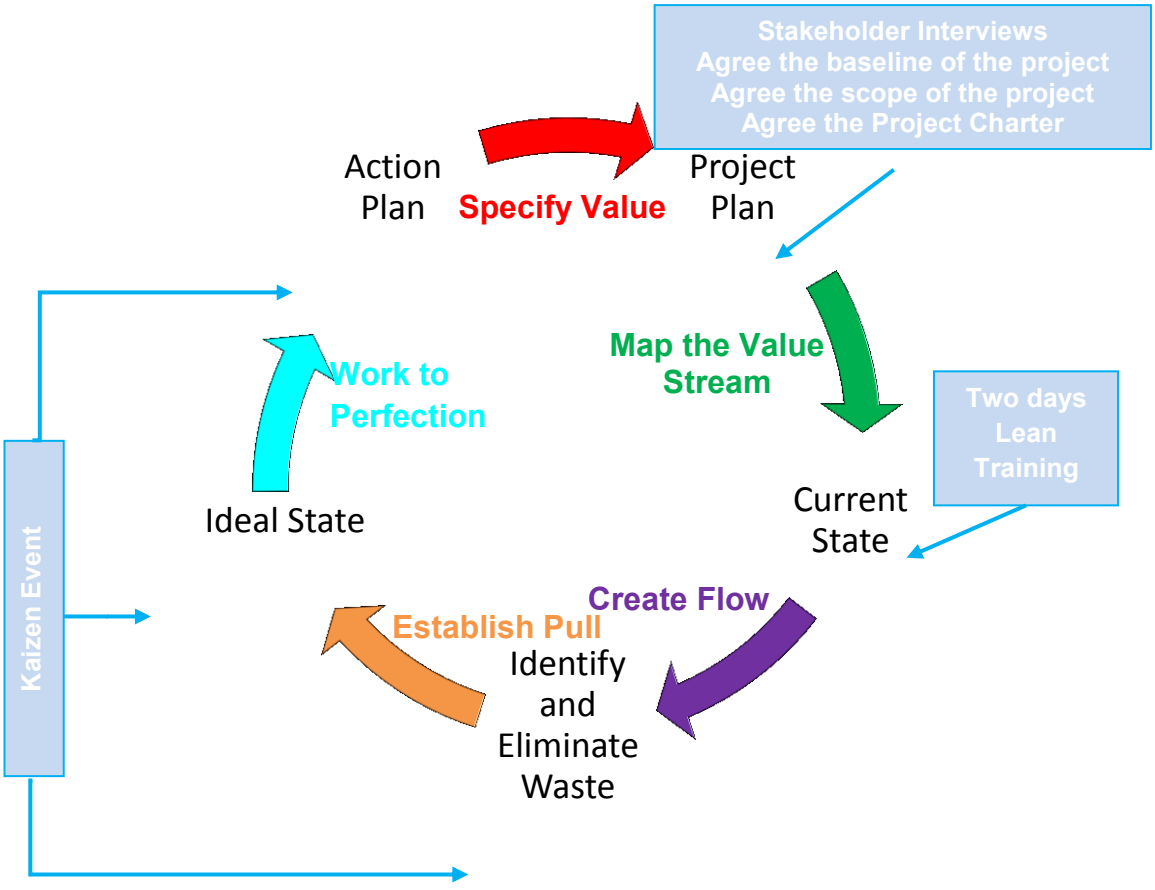


Figure 6-6 Back Pain Project Plan and Project in relation to the Principles of Lean

6.6.1.Involving Stakeholders

Key stakeholders involved in the back pain process were either interviewed or surveyed in order to understand the current state of the Back Pain Pathway and any related problem. The author was present with the GE lead at most of the interviews that took place. Included in the interviews was the Head Orthopaedic Consultant based at Ninewells hospital in Dundee. Tayside NHS employs back pain specialists therefore Fife NHS refer patients to Tayside for treatment. Unfortunately, the increasing number of referred patients and the reduced quality of referrals were a cause concern for Tayside. To include stakeholders and to discover baseline information for the Back Pain Pathway the following also took place:

Interviews with key members of the orthopaedics/physiotherapy teams;

Surveys conducted with staff and patients; the surveys were designed by the author and distributed by various members of the team including the author (copies of the questionnaires can be viewed in Appendix 7);

The current Back Pain Pathway was mapped by key members of the orthopaedics/physiotherapy team and the author an illustration of which can be viewed in Appendix 8; Staff were shadowed in acute hospitals and in physiotherapy clinics by various members of the back pain project team including the author.

6.6.2.The Project Charter

The purpose of the Project Charter is to set out formally the:

Problem Statement	All elective orthopaedic patients are not treated within 18 weeks from GP referral.
Scope of the Project	From patient presentation with back pain or related symptoms to GP to assessment and treatment on the correct pathway. Kirkcaldy and Levenmouth CHP would be used to pilot the project with a view to rolling out to the other two CHP's if successful.
Key Deliverables	For example: Patient receives timely treatment by the most appropriate person in the correct pathway for their needs.
Communications Strategy	Who will communicate with whom and when.
Project Team	The main team with direct responsibility.
Metrics	The measures, which will be used to evaluate success.
Project Plan	The timescale of each part of the project.

A copy of the Project Charter can be viewed in Appendix 9.

6.6.3.The Process

Approximately 30 people from key areas within Fife were invited by the Medical Director to attend a 2-day Lean training event, a 2-day Value Stream Mapping event and a 5-day Kaizen event. Again, in reference to Action Research (see 4.2.3.2) the author was a participant in all of the events.

6.6.3.1. Lean Training

The purpose of Lean training was to educate those who had no former knowledge of the Lean methodology; the result of the training would then allow them to participate fully in the Back Pain project. The author attended the Lean training event both to gain an understanding of how Fife interpreted and therefore taught Lean and as an observer. The interpretation of the Lean Methodology for the objectives of the training was from the viewpoint of healthcare but other services were discussed for comparison. The attendees at this event appeared to be attentive during the training. Initially, there were those who were sceptical, mainly because of Lean's roots in manufacturing, but they appeared to be open-minded about Lean by the end of the 2-day training.

6.6.3.2. Value Stream Mapping

The purpose of the Value Stream Mapping event was to map the current state of the Back Pain Pathway then, by distinguishing value, value enabling, and waste, and value stream the process. The author during this event observed but also contributed to administration when required to do so. This process was quite long and at times complicated, however the attendees at this event participated fully and remained enthusiastic through-out the two days.

6.6.3.3. Kaizen Event

The purpose of the Kaizen event was to prepare and agree an action plan for the back pain process. The action plan was based upon the data collected from key stakeholders and the Value Stream Mapping event. During Kaizen, attendees were separated, when appropriate, into work streams to allow speciality groups to concentrate on specific problem areas. The final day of the Kaizen was spent writing and presenting a 'report-out' to invited members of the Senior Management Team. The author's contribution during the Kaizen event

was varied: observation, participation, facilitation and administration. Several people formed a group to concentrate on the Back Pain Pathway flowing into the acute division. This group were extremely productive and were able to articulate an action plan quite easily. Another group formed to concentrate on the pathway into community care. This exercise proved to be more difficult: the three CHP managers were not all present which made it difficult for others to make decisions on their behalf and the autonomy of the three CHP's meant agreement on standardisation of some of the existing practices could not be reached.

A benefit of Kaizen is that changes which have been identified as 'quick fixes' can be addressed during the event itself: appropriate volunteers will facilitate the change either from the Kaizen base or by visiting the relevant site. This type of work occurred on a few occasions: a consultant visited a couple of GP's to offer explanation and gain feedback on a pro forma GP's would be required to complete for back pain patients and an AHP visited the orthopaedics department to display signage for a medical trolley. However, the quick fixes during the Kaizen week were limited.

6.6.4.The Action Plan and Related Outcomes

The detailed Action Plan was issued to the participants by the project lead shortly after the Kaizen event and can be viewed in Appendix 10. The outcomes of the Back Pain project were reported at a meeting with SMT and can be viewed in Appendix 11.Table 6-5 below was compiled by the author to align the metrics agreed in the Project Charter with the Action Plan and the outcomes.

	Action	Improvement Opportunity	Baseline	Outcome
1	Implementation of the referral Spinal Safety Checklist by all GPs within K&L CHP	Reduced number of 'hand-offs' in the patient pathway	Average of 3 to 4 hand offs	Clinical "hand offs " reduced by 50%
		Enhanced patient/staff experience.		Pathways disseminated via intranet, newsletters and training sessions.
		Improved clinical capacity		Orthopaedic clinic capacity increased by 32 outpatient appointment slots per month. Potential reduction in consultant administration time, however there has been an increase in ESP admin time for patients with low back pain conditions.
		Improved adherence with evidence based guidelines	50% of GP referrals had clinical examination findings missing. 'Red flag' indicators of serious pathology were not documented in 82 GP referrals audited.	16% of GPs in Kirkcaldy now using spinal safety check list, which provides national minimum information and 'Red flag' indicators.
2	Referrals processed through the Triage Hub	Reduced number of 'hand-offs' in the patient pathway	Average of 3 to 4 hand offs	Clinical "hand offs " reduced by 50%
		Enhanced patient/staff experience.		90% patient satisfaction with initial assessment at new triage clinic.
		Improved clinical capacity	Max waiting time Physio 21 weeks Physio DNA rate 12%	Orthopaedic clinic capacity increased by 32 outpatient appointment slots per month. Max waiting time Physio 12 weeks Physio DNA rate 9%
3	MRI accessible to GPs and Extended Scope Practitioners (ESPs)	Speedier access to diagnostic tests	MRI scans requested by secondary care by both Consultants and ESPs = 44%	MRI scan requested in triage service by ESP 33% No significant change in completed diagnostics prior to referral, although those with completed GP MRI would not be referred
		Cost avoidance/reduction	Radiographs Jan- May 2008 = 1648 MRI Jan- May 2008 = 330	Radiographs Jan – May 2011 = 1414 8% reduction MRI Jan- May 2011 = 398 20% increase Costs: MRI = £104.85 Plain radiograph = £53.97 GPs indicate that the use of MRI provides clinically useful information that prevents secondary care referrals and referrals to other services.
4	Integration of acute and community physiotherapy in support of the pathways	Number of patients seen in secondary care physiotherapy with non-specific low back pain	Jan – May 2008 = 81 referrals	Jan – May 2011 = 50 38% reduction
		Enhanced patient/staff experience	Staff surveys: 64% felt that classification of back pain patients was not standardized 91% thought pathways were unclear , 82% stated that appropriate exit routes for patients unclear	

		Reduced number of 'hand-offs' in the patient pathway	Average of 3 to 4 hand offs	Clinical "hand offs " reduced by 50%
		Improved clinical capacity	Max waiting time for Physio 21 weeks Physio DNA rate 12%	Max waiting time for Physio 12 weeks Physio DNA rate 9%
5	Establish Back Pain Clinic	Enhanced patient/staff experience		90% patient satisfaction with initial assessment at new triage clinic
		Reduced number of 'hand-offs' in the patient pathway	Average of 3 to 4 hand offs	Clinical "hand offs " reduced by 50%
		Improved clinical capacity		Orthopaedic clinic capacity increased by 32 outpatient appointment slots per month.
			Triage Time 10 days VHK	Triage Time 2 days
			Wait for first appointment Victoria Hospital 8 weeks	Wait for first appointment average 5 weeks
			Wait for physiotherapy 8 weeks Victoria Hospital	Wait for physiotherapy average 6 weeks
		Speedier access to diagnostic tests	Wait for MRI scan Victoria Hospital 4 weeks	Wait for MRI scan average 6 weeks
			Wait for MRI results Victoria Hospital 2 weeks	Wait for MRI results average 1.5 weeks

Table 6-5 Actions and Outcomes following Back Pain Project

The alignment of these documents into one table proved quite difficult. Although statistical data from the Back Pain project has, and still is, being collected there appears to be little consideration given to the original Action Plan. In order to calculate the impact of the Back Pain Project it should be necessary to revisit the original objectives set out in the Action Plan, however, in order to do this the original documentation and the related on-going data collected needs to be collated and examined against the objectives. Nevertheless, as is common in the health service[167], the key staff in a position to collate and analyse this data are too embroiled in actually changing the service and collecting the results to take the time to perform this extremely important task. Indeed the first attempt to collate the data and examine it against the objectives was performed by the author and subsequently sent to one of the project leads in the hope that they would provide information, which would fill-in what the author thought, were obvious gaps and for commentary on what had been achieved. Surprisingly, the project lead thought that the information collated in Table 6-5 was extremely

comprehensive and an extremely good indicator of the success and impact of the re-designed service, and went on to comment that the Table was 'probably the most robust evidence in Scotland (believe it or not) for a redesign of this kind'. It is perhaps therefore necessary to re-evaluate the expectations of the robustness of evidence that we, as academics and Operational Researchers expect; it is possible that in real life situations such as the Back Pain Project success is not measured on theoretical evidence but on actual changes experienced at an anecdotal level by the Users (see 5.7.5).

Notwithstanding, Table 6-5 clearly illustrates incidences of improvement e.g. reduction in hand-offs, reduction in waiting time and reduction in the length of the patient pathway. However, other areas have proved to be more difficult to measure or to change: Use of an electronic referral system of standardised pathways by GP's requires some GPs to change behaviours and working practices. In addition, those GP's willing to adopt the new system was thwarted by the fact that the electronic pathways were not clearly visible and therefore not accessible to GP's on the intranet. In addition, the table alludes to the difficulty in measuring savings on a Consultants time when his/her time will just be taken up with other activities e.g. education. However, all categories should contain a cost avoidance/reduction opportunity. With the exception of Task 3 the cost avoidance has not been either measured or not listed. It is difficult to understand fully the cost implications of repeating a project such as this if the costs are not included (see 8.6.3).

6.6.5.Roll Out of the Back Pain Project to other CHPs

As indicated, this project was a demonstrator confined to Kirkcaldy and Levenmouth CHP. On acceptance of the projects success by the Senior Management Team, the next step in the process was to roll out the project to Dunfermline and West Fife CHP and to Glenrothes and North East Fife CHP.

Included in the Back Pain Project were two pilot projects: *Project 1* operated in the Kirkcaldy and Levenmouth area, approximately once per week at Whytemans Brae Community Hospital. A small multidisciplinary team consisting of an orthopaedic surgeon and Allied Health Professionals with Extended Roles would use Electronic Referral Management triage to determine the correct pathway for the patient. The multidisciplinary team would have the ability to direct referrals to Orthopaedic Surgeons or 'redirect' referrals to other healthcare professionals for example Physiotherapy, Podiatry, Pain Management through agreed clinical pathways and with the agreement of the patient; *Project 2* operated in the Dunfermline and West Fife area at Queen Margaret Hospital. This project incorporated Electronic Referral Management triage but with a more traditional orthopaedic surgeon driven triage, using a 'buddy system' for the consultants individual specialty and with onward referral only to secondary care. Both projects ran in tandem with one another and after an agreed period, the projects would be compared to assess which had the most successful outcomes, if any. A report delivered later stated that the outcomes for both projects were both positive and negative: the clinical triage service reported positive outcomes of an increase in orthopaedics capacity of 32 patients per month, but the specialist still needed medical support as back up because of the complex conditions some patients presented with. However, despite both projects experiencing success another proposal, which highlighted

the benefits of a “one pot” centralised triage service based on *Project 1* with referrals from all three CHP’s being triaged at one place and then allocated to the appropriate consultant or service, was put forward.

Meetings with the new Directorate Manager continue; the aims of these meetings are to:

- Obtain agreement from all three CHPs to an integrated triage service and tackle any practical implications as a result i.e. standardised forms etc.;
- Address the lack of support from GPs in using the referral pro-forma either at all or correctly;
- Ensure all GPs has access to direct referral to MRI;
- Reduce variability of referral information from Primary Care;
- Improve links with tertiary services.

6.6.6.Evaluating the Success of the Back Pain Project

The goals and key deliverables set out in the Project Charter are analysed with reference to the outcomes, consideration is also given to the theoretical Evaluation Framework previously suggested (see Figure 5-12):

1.Back Pain Project

Model Type 2-Operations Model

a.Increased patient experience and better clinical outcomes

The evidence suggests that the patient experience has improved (see Appendix 12) with approximately 90% agreeing or fully agreeing that they had seen the right healthcare professional for their condition and approximately 75% agreeing or fully agreeing that their condition had been managed appropriately.

Net Benefit to Patient POSITIVE

b.Patient receives timely treatment by the most appropriate person in the correct pathway for their needs

The evidence suggests on average the patient pathway has been reduced and the wait time for first appointment, physiotherapy appointments (21 weeks to 12 weeks), triage (from 10 days to 2 days) and MRI results has reduced (2 weeks to 1.5 weeks).

Net Benefit to Organisation POSITIVE

c.Establishment of standardised pathways and clinical protocols across Fife with visible accountability

This is on-going and requires the full agreement of the three CHP's and GP's before being fully established.

Net Benefit to Organisation NA

d.Service bottlenecks identified and eliminated

An example of bottlenecks in this project is the waiting time for referral to an orthopaedic consultant: The evidence suggests a 38% reduction in patients seen in secondary care thereby reducing the wait times for other patients. However approximately 80% of patients would rather be seen by a specialist in a hospital than a specialist in the community (see Appendix 12).

Net Benefit to Patient POSITIVE

e.Improved cross organisation and multi-disciplinary team working

On-going particularly within CHPs who are endeavouring to improve equity of waiting time over the three geographical areas. However, this endeavour is especially complex; as well as consideration of standardised working, employee contracts and travel times need to be deliberated.

Net Benefit to Patient NA

f.Improved working lives

There is no evidence available at this time regarding a follow-up survey of employees.

Net Benefit to Organisation NA

g.Effective use of resources

There is evidence of effective use of resources concerning staff; Extended Scope Practitioners (ESP's) and the Consultant Physiotherapist are being fully utilised to undertake some of the responsibilities a consultant would normally take. Also GP access to direct referral to MRI scanning results in fewer appointments with consultants for MRI referral (hand-offs reduced from 3-4 to 1.5-2).

Net Benefit to Organisation POSITIVE

h.Services are delivered in a cost effective manner

With the exception of the limited costs submitted for MRI scanning, no other cost have been submitted.

Net Benefit to Organisation NA

i.Increased clinician satisfaction

Clinician satisfaction is not reported but anecdotal evidence suggests there is frustration that the pathways that are available to GP's on the intranet have not been fully adopted by GP's and that access to MRI scanning has been slow to roll out to other CHP's.

System Quality NEGATIVE

j.Robust intelligence about demand, capacity and performance is readily available

A higher level of data appears only to be available to management; members of the team specifically sought out the metrics gathered for this project.

Information Quality NEGATIVE

k.Return on investment

Return on investment has not been reported.

Net Benefit to Organisation NA

l.Overall Assessment

A recent document dated 19/12/2012 written by the project lead (USER) stated the following had been achieved by the back pain project:

- ✓ A clearly defined pathway for patients with low back pain in Fife (the pathways have now been rolled out across the three CHP's in Fife);
- ✓ The formation of a community musculoskeletal assessment service in Kirkcaldy with an increase in clinic capacity of 32 patients per month. This resulted in a patient satisfaction rate of over 90% with their initial appointment;
- ✓ A reduction in waiting times from 8 to 5 weeks for patients referred to the Orthopaedic service with low back pain;
- ✓ Training and direct access to imaging for extended scope physiotherapists seeing low back pain patients;
- ✓ A spinal safety checklist was developed for general practitioners (GP's) to help identify patients that were more appropriate for review by a medically qualified clinician (now replaced by a GP Musculoskeletal Referral Guidance Tool);
- ✓ A reduction in waiting times of approximately 10 weeks for patients with sciatica type symptoms, referred by GP's using direct access to magnetic resonance imaging (MRI) in Kirkcaldy;
- ✓ The majority of spinal patients are seen by physiotherapists;
- ✓ Clinical governance manual implemented for physiotherapists working in community musculoskeletal assessment services.

Source: Grant Syme Project Lead

User Satisfaction POSITIVE

Applying the Evaluation Framework of Figure 5-12 to the Project, albeit in a limited way, provides some evidence that the Back Pain Project produced more positive outcomes than negative, and was successful in achieving most of the Actions set-out (see Table 6-5). It would be interesting however to calculate the cost of the project. The main participants in this project are all employees of NHS Fife and are being paid accordingly; therefore, the largest cost factor of the project is that of time, particularly concerning the project lead who worked on the project along with continuing with the responsibilities of his own job. However, is it reasonable to consider the cost of a project like this in isolation? Consistent with the ethos of releasing time to care[225], even in today's economic climate, the important factor is not cost but providing a safe, efficient service to patients in need.

6.6.7.Back Pain Project as Action Research

With reference to Action Research (see 4.2.3.2), the author participated in this project at the beginning and was present when permission was given by SMT to roll out the project to the other CHPs. However, apart from the very early stages the author was not involved in the actual roll out. The priorities of the project leaders were to facilitate the roll out of the project with key members of the other CHPs, therefore keeping the author involved and updated was not a main concern of the project leaders. The time taken from the initial pilot project to the roll-out was considerable; therefore, the author also had other priorities during this time. During the pilot project, the author worked alongside other members of the Back Pain Project team to identify problems and find solutions:

another aspect of Action Research. However, the authors own priorities and the priorities of others meant that the author was not instrumental in the overall outcomes of the project. Nevertheless, if the success of a project is judged on the amount of experience gained by the Action Researcher then this project is an example of Action Research. The researcher, in this case the author, was given the opportunity to observe and participate in a Lean project from the outset and how Lean can gain results with the correct personnel and leadership pushing to its end goals.

6.7.Implementation of Lean in Fife

In its bid to the Scottish Government (see 6.5), NHS Fife stated its intention to introduce the Lean approach to clinical and non-clinical staff, to this end NHS Fife has undertaken Lean training programmes (see Table 6-6), which they deliver to staff who either volunteer or are volunteered by their line manager to participate. In order to determine if the experiences of Lean trainees agreed with the experiences of participants in the Back Pain Project and if Lean trainees felt that Lean concepts were embedded into the organisation and if they felt supported in their endeavours to introduce the Lean Methodology (see 6.5) a survey was designed (see 4.2.5.2.1,) conducted and analysed. The survey sought to establish if trainees had implemented Lean, which Lean tools they had used, the barriers to implementing Lean and how successful implementation had been. In addition, the survey would ascertain if trainees deemed the Lean Methodology to be part of the strategic decision-making within Fife. The survey results were then elucidated by interviewing key staff

members (see 4.2.5.2.1) who were in attendance at the Kaizen event (see 6.6.3.3) and who had also attended Lean training.

6.7.1.The Lean Survey

6.7.1.1. Target Population

The Redesign Team at Fife provided a list of NHS Fife staff members who had undertaken Lean training. This list was used to send emails via SurveyMonkey© to staff members inviting them to participate in the survey, (see Appendix 13 for Word version of questionnaire). Initially 339 surveys sent to staff members but this number reduced to 311 over time as the author received notification from members of staff that they had been unable to participate in Lean training, or who had left the Organisation. It is therefore highly likely that this also applied to other staff members' but who failed to advise the author. A follow-up invitation was sent two weeks after the initial invitation. The response rate at close was 26.7% with 83 members of staff responding to the survey, which is considered acceptable for an online survey[226].

The type of training that the respondents attended are shown in Table 6-6; the majority, 37%, attending a one-day awareness of Lean training course. Respondents to the survey included a wide variety of healthcare professionals from GP's to Consultants, from Administrators to Managers and from Physiotherapy to Child Protection.

Training Type	Description	%age
Visioning Events	Attendees have received a basic understanding of Value Stream Mapping and Lean Techniques.	23

Awareness Training	Attendees have been given an overview of Lean Techniques to a level that would enable them to apply basic Techniques in own workplace.	37
2 Day Training	Attendees have received more in-depth training to enable them to apply Lean Techniques in own workplace and also to facilitate others in applying these Techniques.	16
Day 3 Follow Up	Attendees have reviewed work that they have applied Lean to, and offered solutions to other attendees for other areas of improvement and received further guidance from trainers.	24

Table 6-6 Training Type Attended by Respondents in Percentages

6.7.1.2.Survey Structure

The structure of the survey is shown in Figure 6-7 along with the connections to the Evaluation Framework (see Figure 5-12) and was developed to evaluate the use of Lean in NHS Fife.

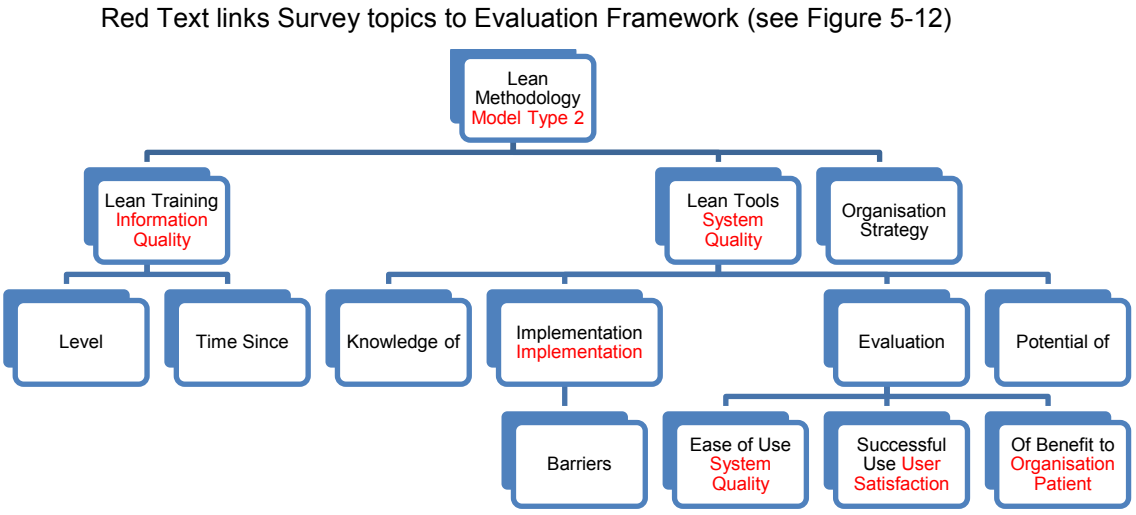


Figure 6-7 Structure of Lean Survey

6.7.1.3. Pilot Study

A pilot study was conducted with non-participating staff. The survey was deemed to be appropriate and acceptable with the exception of clarification of the wording in Question 5 which was changed from 'Have no knowledge of' to 'I do not recognise this tool'.

6.7.1.4.Survey Findings

The results of the survey were analysed using IBM SPSS Statistics 19 and Microsoft Office Excel 2010.

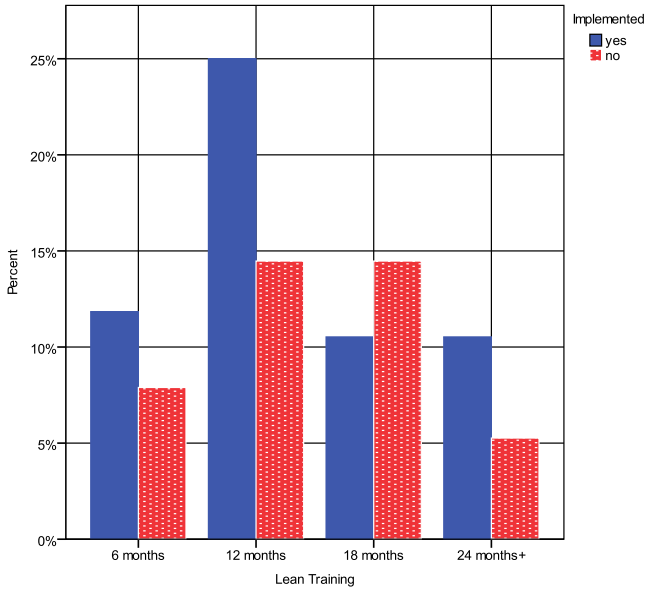


Figure 6-8 Time Since Lean Training Vs Implemented

The majority of participants undertook Lean training in the last 18 months but less than 60% have implemented any Lean tools since undertaking their training (see Figure 6-8). Although the majority of participants implemented Lean Tools within 12 months of Lean training, a chi-squared test revealed there is no relationship between when a participant undergoes training and when they then implement Lean tools.

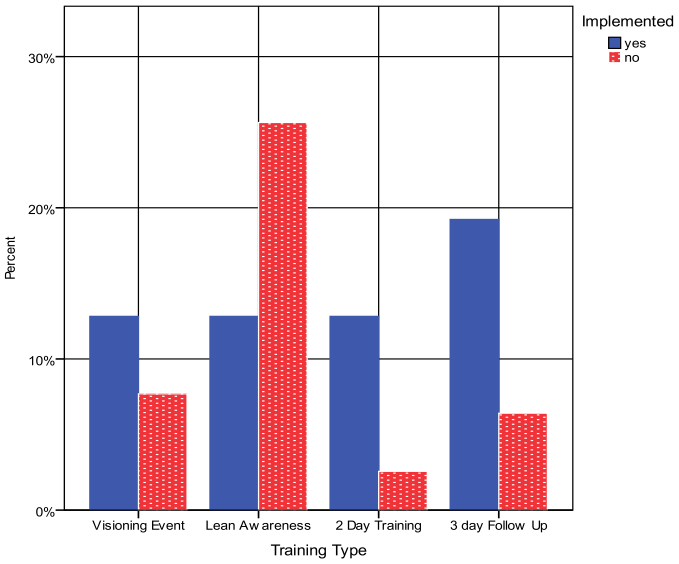


Figure 6-9 Type of Training Received Versus Implemented Tools

Figure 6-9 illustrates implementation of the Lean Tools is more likely by respondents who have undergone 3 days training but those who have only had one day of training are much less likely to implement the Lean tools. A Chi-squared test performed on the data reveals a significant difference between training type and if Lean tools have been implemented: χ^2=13.131 (3), p<0.05.

All of the Lean tools listed in the survey were recognised by the participants and are positioned in order of recognition in Figure 6-10, Mapping, 5 Whys, Value Stream Mapping, Fishbone Diagrams and 6Ss being the five most recognised. The Lean Tools itemised in each graph (here and going forward) are colour-coded as in Table 6-3 Matrix of Lean Tools, to identify the tool type. The top five recognised tools are fairly equally divided between Understanding, Problem-solving and Standardisation.

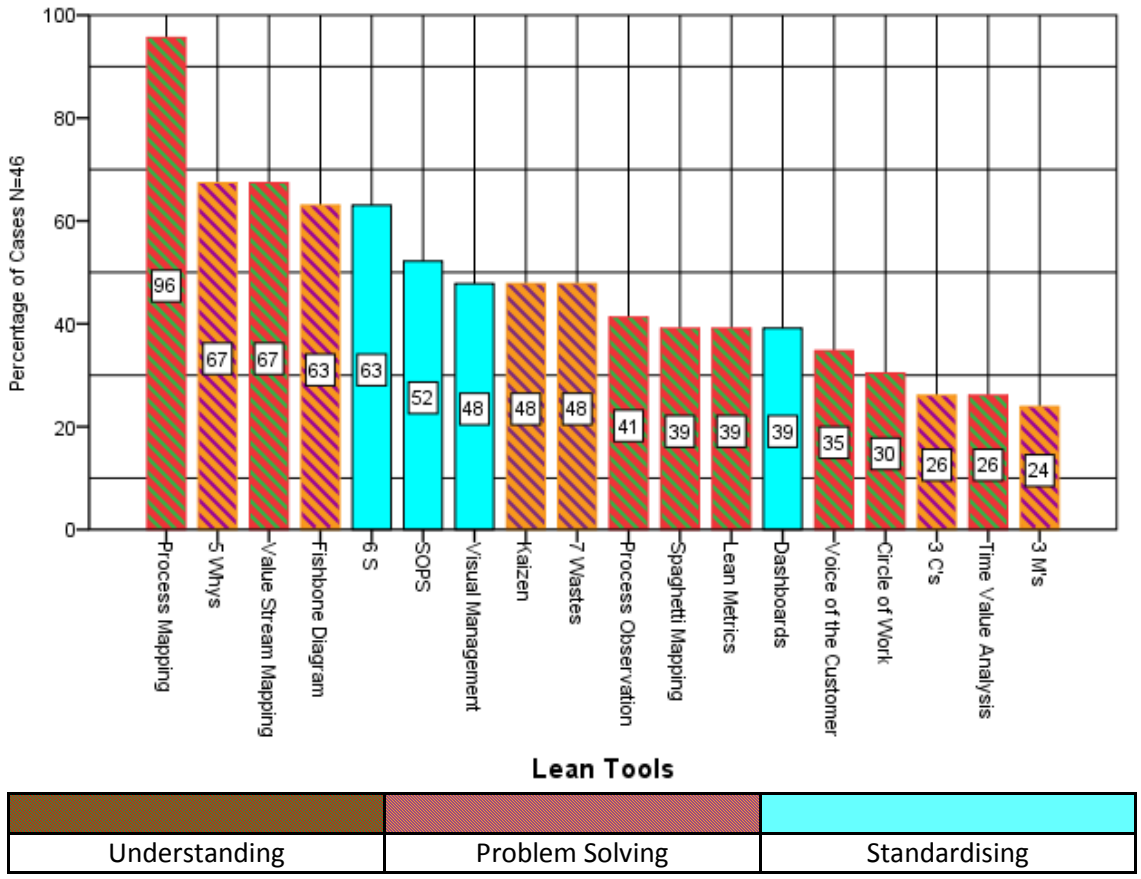


Figure 6-10 Knowledge of Lean Tools

However, the top five recognised Lean tools are not necessarily the easiest to implement: Value Steam Mapping is thought by over 20% of participants to be difficult to implement (see Figure 6-11).

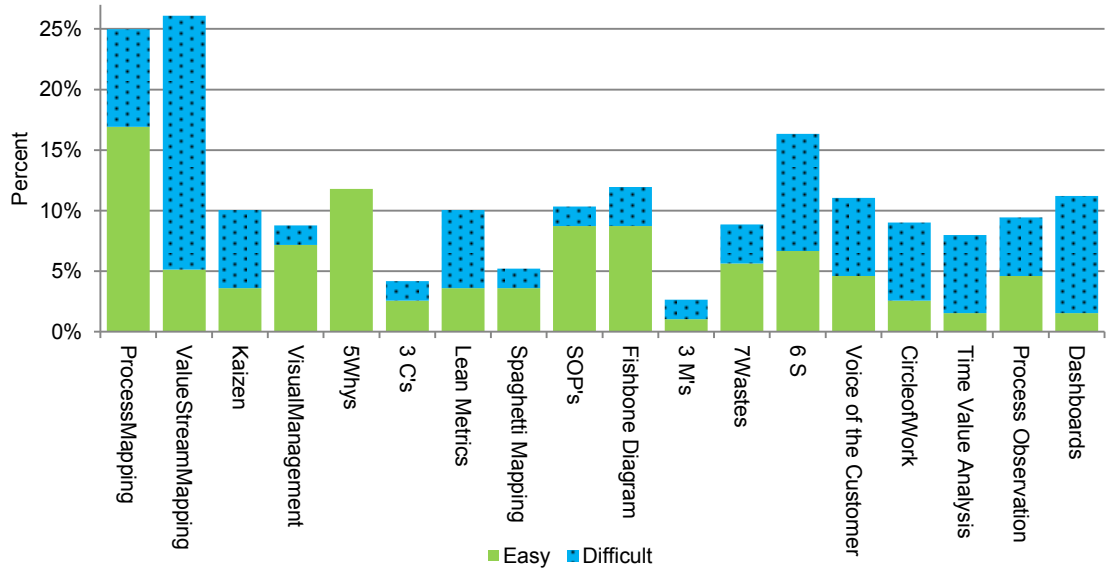


Figure 6-11 Ease of Implementing Lean Tools

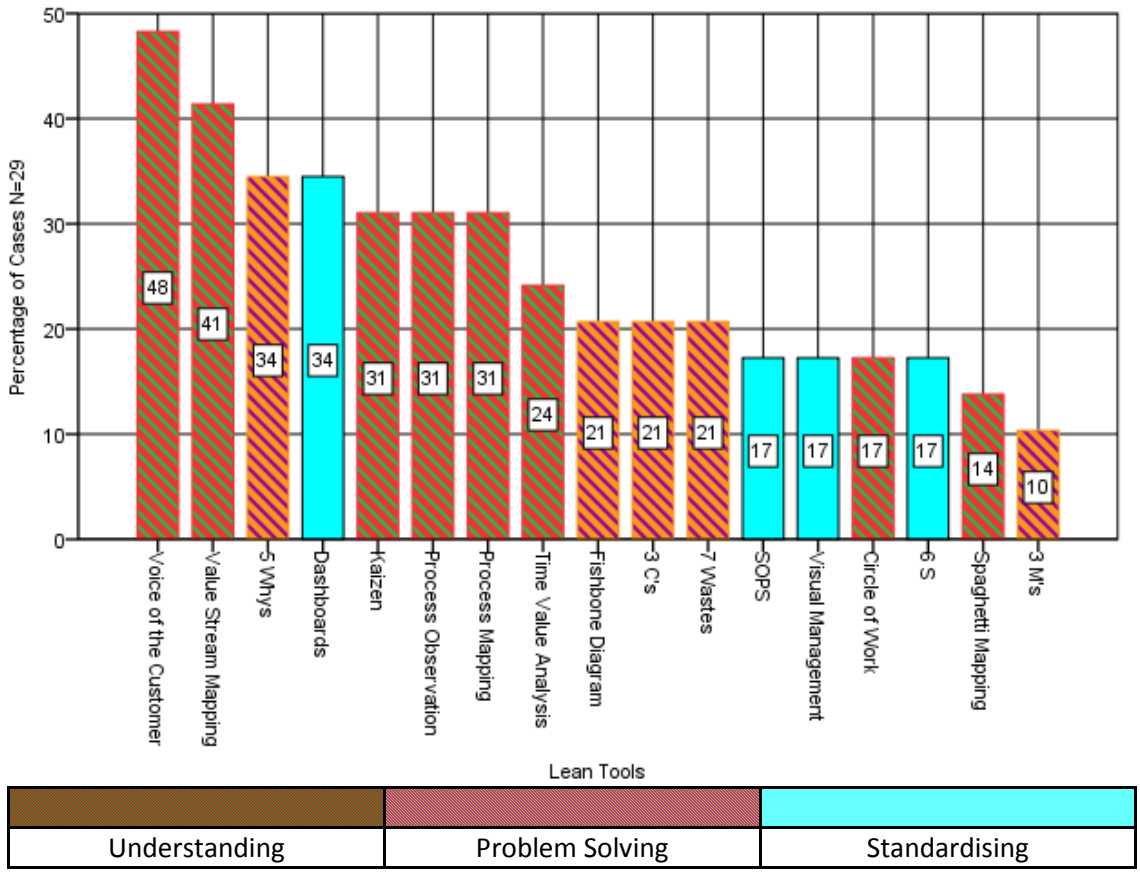


Figure 6-12 Potential for Implementation

Despite the difficulty in implementing tools such as Value Stream Mapping and Dashboards these tools are listed as having the most potential within the workplace in the future along with Voice of the Customer, 5 Whys and Kaizen (see Figure 6-12).

Figure 6-13 lists the implemented Lean tools and who respondents believe will benefit from their use. For the majority of tools respondents believe both the Organisation and the Patient will benefit the exceptions being Lean Metrics, Fishbone Diagrams, Time Value Analysis and Dashboards where respondents believe the Organisation will benefit the most. Surprisingly only three participants listed tools, which would only benefit the Patient this is summarised in Figure 6-14. Process Mapping is considered to be the easiest tool to

implement and also considered to be the most beneficial to both the organisation and patients.

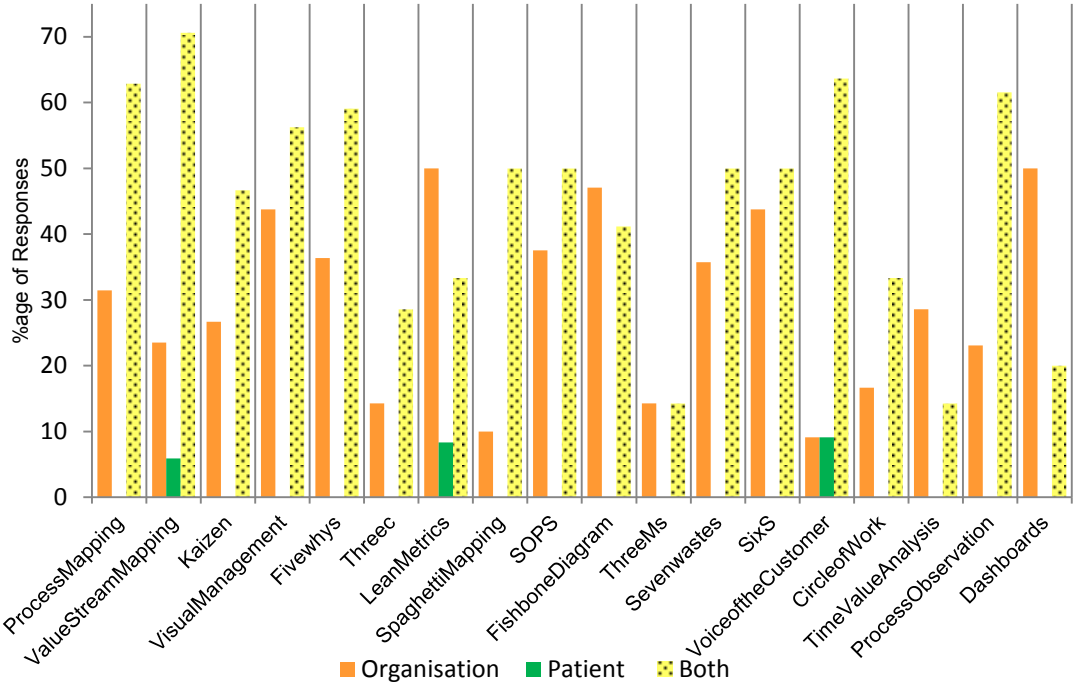


Figure 6-13 Who has benefitted from Lean Tools?

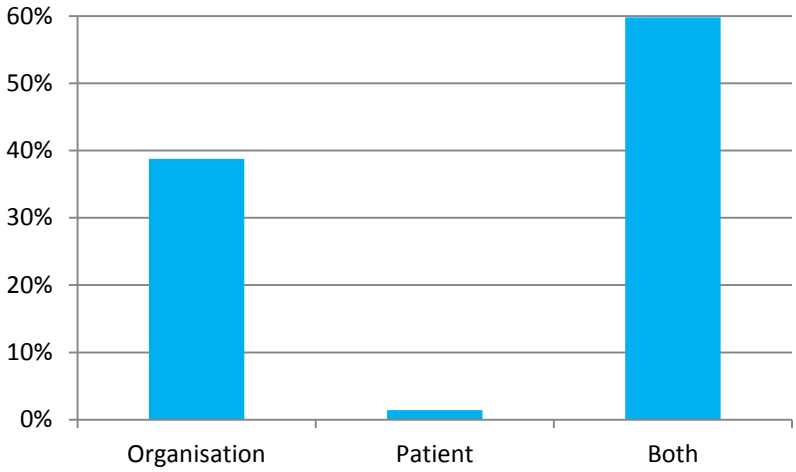


Figure 6-14 Who has benefitted summary

Figure 6-15 illustrates the correlation r=0.9 which exists between how easy lean tools are to implement and the benefits of Lean tools to both the organisation and patients: Process Mapping is considered to be the easiest tool to

implement and also considered to be the most beneficial to both the organisation and patients.

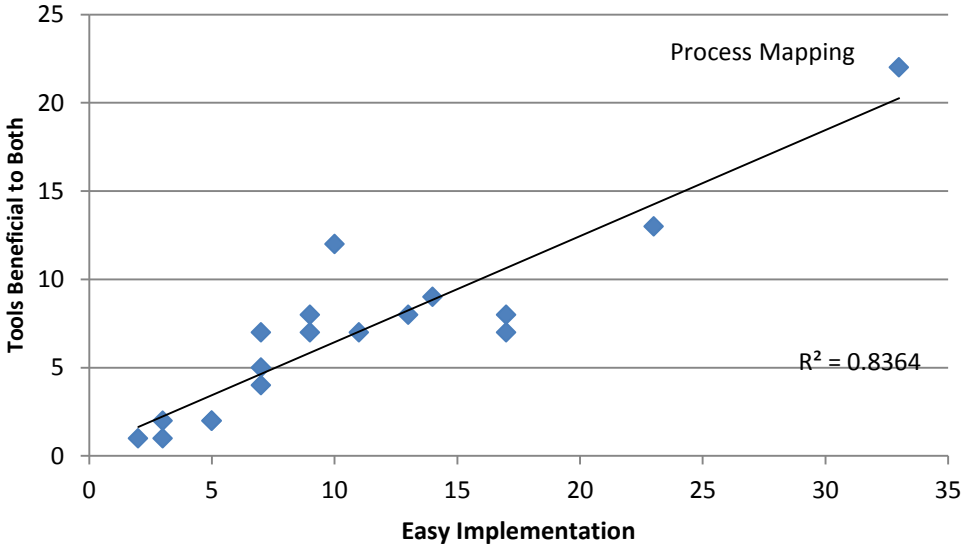


Figure 6-15 Ease of Implementation versus Tools Beneficial to Both

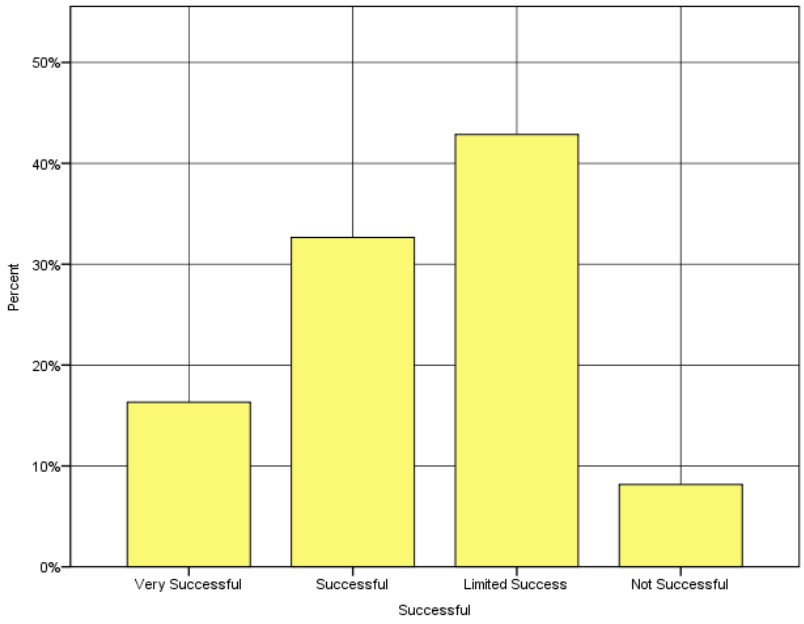


Figure 6-16 Are Lean Tools a successful addition?

Figure 6-16 illustrates 49% of participants, n=49, consider the implementation of Lean Tools into the workplace has been either successful or very successful.

The reasons given by participants reporting limited or no success include:

Culture	*"Cultural and organisational constraints and organisational development support"*
Organisational Momentum	*"Recognition by Senior Managers that achievement gained in using the tools do take time."*
	"Limited time and other constraints/ changing picture of the Board at this time"
Lack of Knowledge	*"Not had sufficient training in the other areas - just had some basic introduction. Current Business Manager not aware of LEAN or likely to be able to implement. New Business Manager coming in Jan 2012 - hopefully will have some more idea."*
Support	*"Also sign up from the team that is supported by senior managers to progress things forward."*
	"Spent a lot of time on the process and at the end of the process due to lack of buy in from key stakeholder the process appeared futile and non-implementable. However I found the whole process frustrating in that key stakeholders were not present and this made everything of very limited value."
	"The lack of support to help introduce these tools made it very difficult. The move form hearing about the concept of a tool to implementing it competently in the workplace is too a big gap"
Lack of Sustainable Processes	*"Lack of sustainability"*
	"It is difficult to sustain the changes and due to the way sundries are ordered and the pack sizes that they come in it is difficult to implement the lean methodologies"
Perceptions	*"I have struggled to get sceptical colleagues interested in the methodology"*
	"We are attempting to do different things for the same/similar ends"
Communication	*"If the process worked everyone would be talking about it. The fact that no one is suggests it is not working. If the process was to provide clear benefits then I can see the value of continuing with this."*

Silos	*"Only limited success as I have not been involved in any wide implementation of lean other than within department. Would be beneficial to implement wider in the organisation - set up work group, etc. to implement within other teams, wards and departments."*
	"Total waste of time - clinicians do not have time for organisational philosophy."

Figure 6-17 illustrates the successful implementation of the various tools with participants reporting the most success with Process Mapping, 5 Whys, Value Stream Mapping, Fishbone Diagrams, and SOP's.

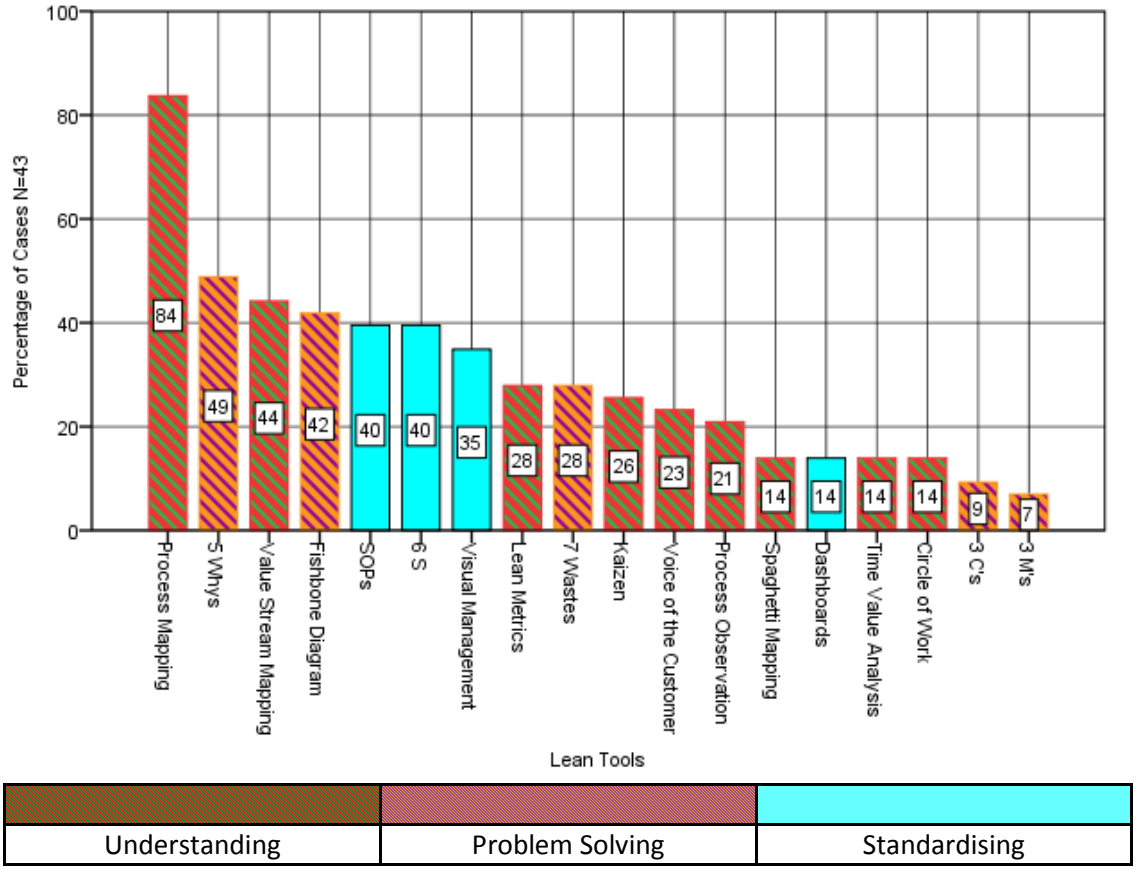


Figure 6-17 Successfully Implemented Lean Tools

Figure 6-18 illustrates the correlation r=0.94, which exists between successful implementation of Lean tools and how easy the tools are to implement: Process Mapping is considered to be the easiest tool to implement and also the most successful.

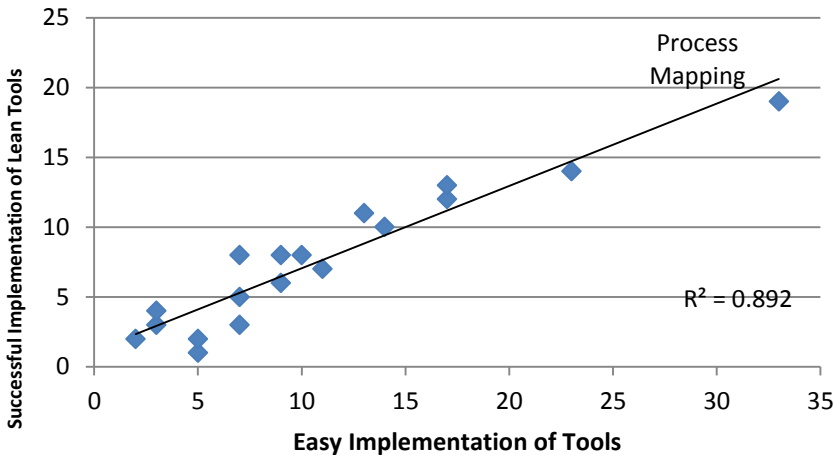


Figure 6-18 Ease of Implementation versus Successful Implementation

Figure 6-19 illustrates the participants who have attempted to evaluate the success of Lean Tools. 18% (n=34) employed Lean Metrics for evaluation, while 41% employed their own expert judgement to evaluate success, 41% were not able to evaluate success at all. Although no participants reported No Success, those applying expert judgement reported the greatest amount of limited success at 24% of the total. However, those participants applying Lean metrics reported Very successful or Successful equally.

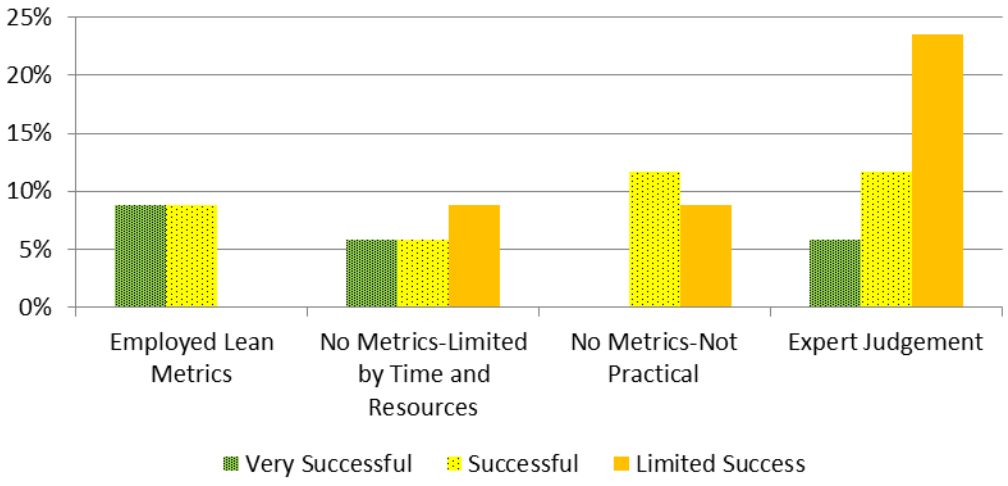


Figure 6-19 Evaluations of Lean Tools

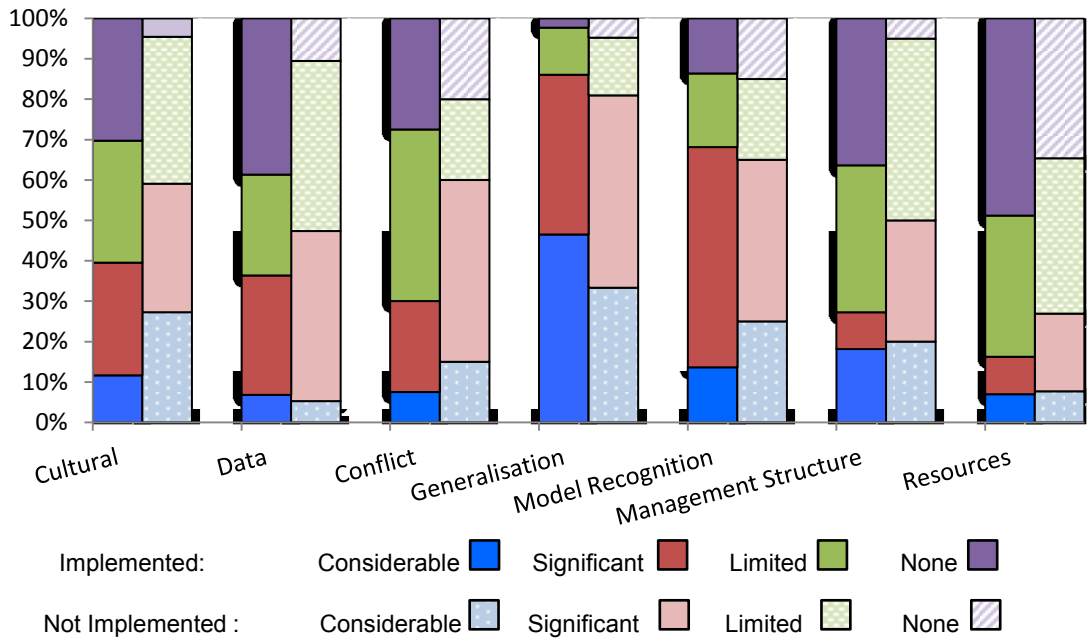


Figure 6-20 Implementation Barriers

Figure 6-20 illustrates the barriers to implementation of Lean tools and compares the perceived barriers to implementation of those participants who have implemented Lean tools and those that have not. Cultural (Culture), Data, Conflict, Generalisation (Silos) and Resources (Organisational Momentum) directly relate to the categorised barriers listed in Table 5-6 Implementation Barriers, Model Recognition (Lack of Knowledge) and Management Structure (Failure of Leadership) relate to the barriers listed in Table 6-4 Lean Implementation Barriers. The greatest barrier to implementation for those who have implemented the tools is listed as Generalisation (87% Considerable/Significant) followed by Model Recognition (69% Considerable/Significant); this is also the case for those who have not implemented Lean tools (81% and 65% Considerable/Significant respectively). However, variance does exist between both groups for Culture (40% & 59% Considerable/Significant), Conflict (30% & 60% Considerable/Significant), and Management Structure (27% & 50% Considerable/Significant). Chi-squared

performed on these variances produce significant differences at the 90% confidence limit for Conflict X^2=5 (1), p=0.025, n= 60 and for Management Structure χ^2=3.148 (1), p=0.076, n=64. Data was considered the fourth largest barrier by those who had implemented Lean (36% Considerable/Significant). However, Resources were rated as the lowest barrier (16% Considerable/Significant). Despite the barriers to implementation quoted here an analysis of the top three tools successfully implemented: Process Mapping, 5 Whys, and Value Stream Mapping, against Generalisation and Model Recognition revealed participants reported successful implementation in the majority of cases the exception being Value Stream Mapping where Partially Successful and Successful were equally weighted.

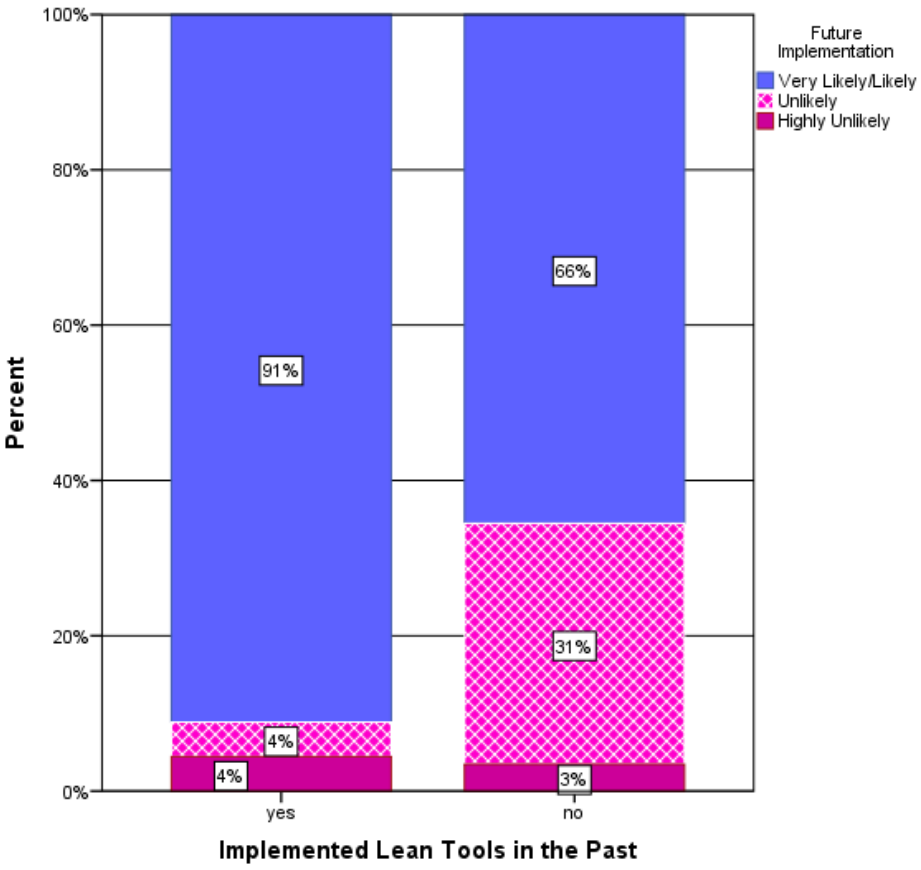


Figure 6-21 Likelihood of Lean Tools being Implemented in the Future

Figure 6-21 illustrates the likelihood of Lean tools being implemented in the future. Both groups: those who have implemented Lean tools and those who have not, show a high likelihood of implementing Lean tools in the future, particularly those who have already implemented Lean tools. However, 34% of those who have not implemented Lean tools are much less likely to implement Lean tools in the future.

Figure 6-22 addresses if the Lean methodology has been adopted at a strategic level by NHS Fife. The majority of participants including those that have implemented Lean tools are Unsure.

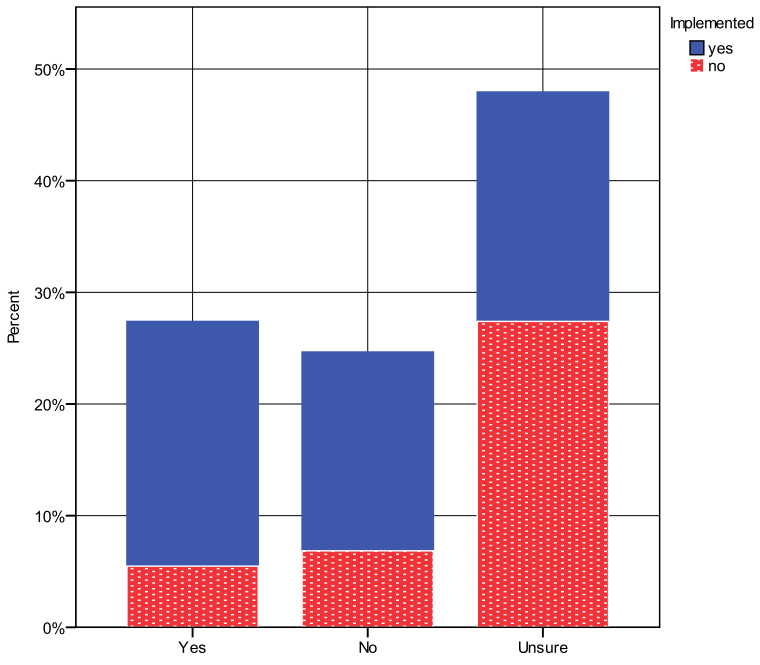


Figure 6-22 Lean Adopted at Strategic Level

Figure 6-23 illustrates whether participants believe that NHS Fife should adopt Lean at a strategic level. The 73% of participants believe it would be beneficial if Lean was adopted at a strategic level.

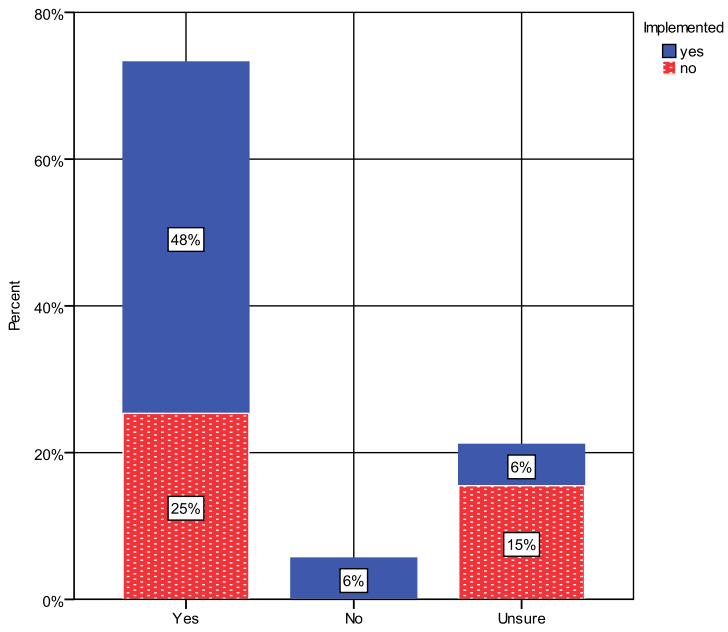


Figure 6-23 Beneficial if Lean Adopted at Strategic Level

6.7.2. Interviews

The interviews were planned to fill any gaps in the results of the survey and to explore further the issues raised in the survey.

6.7.2.1. Interview Design

Two interview scripts were constructed to capture respondents who had implemented Lean and those who had not, the templates can be viewed in Appendix 14. However, the interviews took the form of a semi-structured interview to allow for flexibility within the interview[91] of responses and follow-up questions. Thirteen respondents to the survey were randomly selected and invited to participate in a follow-up interview. Six respondents agreed to participate, two of which had not implemented Lean and one who attended the Kaizen event (see 6.6.3.3). Figure 6-24 depicts the structure of the interviews, an extension of Figure 6-7, illustrating the topics explored further through interviews. Figure 6-24 also depicts the relationship of the topics to the Evaluation Framework (see Figure 5-12).

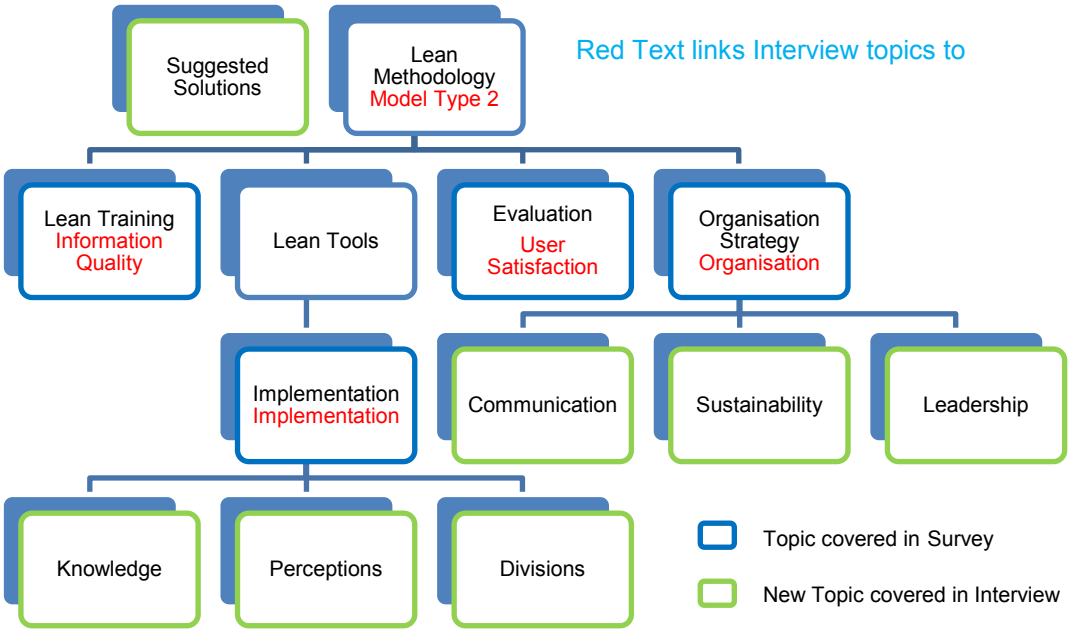


Figure 6-24 Stucture of Lean Interviews

6.7.2.2. Findings

The key messages from the interviews are categorised under each topic referenced in Figure 6-24 and are listed in Table 6-7 . Full transcripts of the interviews can be viewed in Appendix 15 to Appendix 20.

Lean Training	1.1	***'I think there is a definite value in those tools … definitely help people but I do think that it is a lot more difficult for somebody to do it (implement Lean) themselves as well compared to somebody else either using you as their project.'1***
	1.2	***'I am not comfortable with some of the tools; the training didn't give enough opportunity to use them in a 'safe environment.' 5***
	1.3	***'I really wanted to play with the tools to feel fully confident in utilising them, and more experiential learning would have suited me. Wonder if (though I would have avoided) some requirement to utilise the tools and write up might embed the learning?' 5***
	1.4	***'LEAN is a design planning technique, planning philosophy and design technique. It is not a simple transferable technique like how to use a spread sheet that you can send everybody; go to this training and then you will get things that you can use in your job, it is not. LEAN is not that. You start at top management.'2***
Evaluation	2.1	***'the only way you can measure it is how much and how long does it take me to do all of my work in that monthly cycle pre-LEAN, and how much and how long does it take me to do after - post-LEAN kind of situation.'1***

	2.2	*'I evaluated the project through reflection.'4*
	2.3	*'we did quite a bit of baseline data… The Back Pain (Project) is probably the most researched pathway, even in Scotland. We have actually got the base data in Fife to back and support the changes that we made. So there was no doubt that people were waiting for up to 21 weeks to get a return on results, so we have cut that down to what four weeks, a month. In the main the majority are getting them back within two or three weeks now.'6*
Knowledge	3.1	*'The wee staff nurse on the ward has not a Scooby do.'3*
	3.2	*'And she went oh I don't know she said they just made us do lots of diagrams of what we were doing and why we were running backwards and forwards twenty times and how they could only run backwards and forwards ten times and achieve the same thing. '3*
Perceptions	4.1	*'They are just not very good at making change. I think that is the problem.'6*
	4.2	*'every time these things come out there probably is a slight shift upwards in efficiency on an automatic kind of basis but then people do, I think, still see it as the new in-thing. I think there is also an automatic de-motivational aspect in there as well, when people just have that feeling of it's just a new thing, it's just the next thing that has come along.'1*
	4.3	*'There is some other cynicism in the room but it's the same with everything, you just have to get on with it.'3*
	4.4	*'Yes, well you've got to question whether it is just pure cynicism or whether it is factual on the basis of peoples' previous experiences of these new things have not produced.'1*
	4.5	*'I think people's passed experience. So they already, even if they've used our tool and not had it labelled as, they'll say oh we tried that in whatever and that didn't work.' 3*
	4.6	*'As any change theory will tell you different folk different reactions – much of the service are long serving and are comfortable so change requires careful selling'5*
	4.7	*'The attitude here I have seen in the last six, six and a half years LEAN is the cure for everything. If anything is wrong it is because of that.' 1*
	4.8	*'all that happens is they get frustrated so rather than blame the actual what is the underlying cause of the problem, they blame the mechanism or they blame the strategy or the model whatever is fuelling it. So the name is associated with the problems of implementing it, but the implementation problems are because of the underlying issues that are there, and are always there because nobody is tackling them as such.'6*

Divisions	5.1	*'I think we're a bit more cynical in the community and also everybody in acute is a managed person, they're an employee. We don't have that luxury in community. So even if I'm working with the District Nurses anything I do will impact on practice so I have to bring in or get buy in from the GPs or Practice Managers or whatever before we start, and working with independent contractors is so, so different cause they can just say no and walk away.'3*

	5.2	*'The other thing is that everybody that teaches LEAN or is involved in supporting projects like LEAN from the central team they all come from acute background so they are not, they don't have any kind of standing out in the community, and I think that is quite difficult as well and I don't know how we change that. I mean there was always this hope that it became one system but because that Directorate still sits under XX it's still seen as very centralist.'3*
	5.3	*'Lean is not the same in Community as it is in the Operational Division; Lean is more clinically led and more emphasis is given to it in OD.' 5*
	5.4	*'we've used it (Lean) a lot but there has also been lots of service re-design change, new hospital and for some clinicians there has been a lot of cynicism about it because it is about the Management of Change as well as LEAN isn't it and I think we maybe haven't managed the two of them side by side as well as we could have.'3*
	5.5	*'Well that's the key barrier; there is no mechanism in place to basically disinvest one area and move it to another area that that's the problem. They can do it on very small silent ways but we don't have enough staff. You know this idea for example primary care or secondary care don't have enough staff to move across the piece; At the end of the day you end up moving staff up say from primary care to secondary care and then we have a big debate about who is going to pay for the paper? Who is going to pay for the paperclips?'6*
	5.6	*'We are trying to run a uniform system with a strategy across four completely different units. I think that is the problem that each of those units has got different strategies and they've got their interpretation of that strategy - it's different. So you know there are very few folk in Fife as you know have got an overarching NHS Fife position that's the problem'6*
Communication	6.1	*'So, how can you relate somebody selling something when you never actually see the output of their own projects that they undertook in the organisation that I work for? That without a shadow of a doubt produces cynicism in peoples' minds straight away.'1*
	6.2	*'A lot of the communications that are filtered through that are very department specific oriented. The X-Ray Department will be closed. '1*
	6.3	*'I suppose I'm lucky in some ways I've been to some of these meetings. But I wouldn't imagine, for example, that your band sixes or your fives or sevens have got, they will be aware of things like releasing time to care and various other things, but as I suppose the actual strategy as such, the overarching strategy is probably not that clear to them.'6*
	6.4	*'So, some people might not have bought into it, or it might not be in their interests to buy into it If you are developing local services and you think you are doing a good job there why would you see that fitting into the national picture which again is removing control sometimes nobody is necessarily overviewing that whole pathway. I think that's the problem nobody is overviewing the whole piece of work well apart from SMTs, but they've all got within that their own sort of interests within that,.'6*
Sustainability	7.1	*'Yes it is sustainable, but as multi-service pathways we are dependent on others maintaining their input'5*
	7.2	*'I think the ones that I've been involved with are about changing something so it becomes mainstream so like the data entry if we get that*

		right then that will just become the norm. The stuff we've done around repeat prescriptions, it's now the norm. The stuff we've done about self-referral it's now the norm'3
leadership	8.1	***'The partner with the most to gain from the project proved to be the weakest and caused the most difficulties. Data provided by this partner was incorrect which resulted in the criteria of the project being flawed. There was a general lack of understanding between partners of working practices: projects should be able to cross departmental boundaries, surprisingly the biggest difficulty was not with social work but within our own service. The Lead person of a project is extremely important: this project needed a lead for each partner.' 4***
	8.2	***'Lean is not role modelled; there is no supporting descriptive statement.' 4***
	8.3	***'I think that connection between frontline and strategic, like every organisation, is lacking absolutely lacking. It is like I don't think senior managers are totally aware of what people do on the frontline. I don't think that the frontline people are aware of what the strategy of the organisation is and the people in the middle who are meant to connect these things I don't think it happens, you know, correctly and it is not probably through lack of effort'1***
	8.4	***'I think it's like people filter stuff out you know so SMT, down to their Managers and Instructors, down to the frontline things get filtered out … the more people that there are in-between, the more messages get filtered out both ways so that a message, .it's like Chinese Whispers almost a message from the top to the bottom the more people that it goes through the more diluted it kind of becomes'1***
	8.5	***'That's (SMT Leadership) the essential. I think, I think the difficulty you've got in Fife when you've got devolved power, control not everybody's, everybody's got their different drivers, the drivers are not necessarily all going in the same direction. So I think that's what makes it challenging So you've got different factors which you are then trying to align in order to try and get something going so the only people that really can drive that change has got to be SMT so, so because they are the only people within then if they've got their vested interests in terms of the devolved power that they have'6***
	8.6	***'I think that's the bottom line at the end it needs to be enforced, it needs to be policed, and that's the problem. Somebody can rubber stamp it, I think we've rubber stamped a few times, but again we are back to where we are it's about local interpretation. …there is not necessarily anybody has got the power, the autonomy to say yes that's the way this needs to be done. It's like well you don't like that well we need to put something else in place and I think that is the bottom line. It's how do you police it and then how do you make sure it's enforced, that's the hard bit.'6***
Suggested Solutions	9.1	***'Clear and accurate data, senior manager sign-up and recognised drivers of Lean across boundaries.' 4***
	9.2	***'The right people need to be promoted to Lean projects, Lean needs a driver. We (NHS Fife) are not good at providing rationale for decisions/changes etc. and we are not good at promoting success.'4***

	9.3	*'The Lean methodology should be included as part of every day practices-action learning, 1 to1 clinical supervision etc. It should be embedded in the everyday language. '4*
	9.4	*'Nursing is the biggest workforce; a cultural change is needed here. Senior Charge Nurses do not call Lean, Lean but Releasing Time to Care. Lean is a vehicle to enable change.'4*
	9.5	*'To start with philosophy, then methodology and then tools. If we want to use that (Lean) we have to start looking at the system to see what are the things, which we don't like in the system. Our view to this, things that it can do, put aside, if there are things that this is not happening but we should agree that this is not applicable to them.' 2*
	9.6	*'I don't think we share as much as we could and I know there was a suggestion at one point of having a kind of change method newsletter, but there are just so many newsletters out there I don't think that's the way to go. And there are problems with our NHS Fife website and Intranet so I'm not even sure that we could find somewhere on there that people could then dip in and out of. So I think that's the thing that although they've tried to do follow-up days you're still with your same cohort, so, you know, you're not mixing with many people.' 3*
	9.7	*'become more of the jeely in the piece rather than you know something extra.' 3*
	9.8	*'by seeking to take all involved with us, hearing their concerns and responding to these with clear evidence.' 5*
	9.9	*'I think clinicians could benefit from more management theory/training as part of their learning – they are joining organisations not in a clinical bubble.' 5*
	9.10	*'Discussion, feeding back effectively in teams about what's going on – journal club arrangements where service development is discussed not just clinical cases' 5*
	9.11	*'Because those who are responsible and have got the authority to change the design and planning of the system they have to do that first. And start from the top and come down. That is my suggestion.'2*

Table 6-7 Summary of Interviews

6.7.3.Discussion

The following discusses the findings of the survey and the follow-up interview responses listed in Table 6-7. Section 6.7.3.2. Implementation Barriers also notes, in red text, agreement with implementation barriers listed in Table 6-4.

6.7.3.1.Lean Training

All of the Lean Tools listed in the survey were recognised by the participants however, 42% of participants who have undergone Lean training with NHS Fife have not implemented any of the tools into their workplace and 34% of those

are unlikely to do so in the future. The time since undertaking Lean training appears to have no bearing on whether a participant has implemented the Lean tools. The amount of training a respondent has undertaken however appears to have an influence on whether the Lean tools are implemented: those receiving three days training are more likely to implement the tools. However, according to the description of the training types (see Table 6-6) all training with the exception of a Visioning Event should enable trainees to implement basic tools into the workplace. The interviewees appear to have enjoyed the Lean training and benefitted from learning about the methodology (see Table 6-7 1.1) but their opinions also convey a need to participate in more practical training which will give them the confidence to implement the Lean tools into a project (see Table 6-7 1.2 and 1.3), having the confidence and knowledge to implement the Lean tools is also implied from the survey: those respondents who had received three days of training are more likely to implement Lean tools (see Figure 6-9). There also appears to be a distinction made between implementing a project which will address a particular problem and Lean thinking as a philosophy which is applied to everyday working (see Table 6-7 1.4); not all of the interviewees who also replied to the survey implemented Lean tools as part of a project, some had applied Lean to their working lives.

6.7.3.2.Implementation Barriers

The trainees indicated a high recognition of Lean tools but interviewees felt this knowledge did not exist with frontline staff (see Table 6-7 3.1 and 3.2). The purpose of the tool (see Table 6-3) does not appear to have been given any preference during implementation. In addition, there appears to be a higher

perception amongst those who have not implemented Lean Tools of the existing barriers to implementation: 55% listed Considerable/Significant barriers whilst 44% of those who had implemented Lean tools listed Considerable/ Significant barriers. Participants in the survey were given a list of barriers: Cultural (Culture), Data, Conflict, Generalisation (Silos), Resources (Organisational Momentum), Model Recognition (Lack of Knowledge) and Management Structure (Failure of Leadership), which are discussed in the literature [131] [167] [171] [172] [173] [179] [216] [218] [219] [220] [221] to rate but were also given the opportunity to include other barriers they had experienced. Both participants who had implemented Lean tools and those who had not, indicated tools which are too general and have not been developed specifically for the organisation and tools which are not widely known within the organisation and therefore not trusted pose the biggest barriers to implementation (see Table 6-4: Silos, Lack of Knowledge). These findings are in line with others [131] [220] [172] [173]: the NHS has developed a culture of "silos" and therefore tends to work, organise and develop in a compartmentalised way: models developed for general use are perceived not to be specific or detailed enough to be beneficial in this type of environment. In addition, despite its promotion within the NHS Institute for Innovation and Improvement website[207], Lean as a methodology is still not widely known or fully understood among staff and therefore doubted.

The other barriers considered within the survey received varying ratings (see Table 6-4: Culture, Data, Conflict, Failure of Leadership), two of which highlighted significant differences in opinion to those that had implemented Lean and those that had not (see Table 6-4: Conflict, Failure of Leadership). However, where others[131] [218] have found lack of resources to be a significant

barrier to the implementation of Lean the survey found this to be the barrier rated the least significant (see Table 6-4: Resources). Nonetheless, the barriers rated considerable or significant within the survey whether real or perceived need to be addressed if Lean is to continue to be implemented in Fife.

The barriers to Lean emphasised in the survey were also stressed by the interviewees. There is a perception that Lean is yet another change to the way of working and why would this change make a difference when other models have not (see Table 6-7 4.2, 4.3, 4.4, 4.5, 4.8), (see Table 6-4: Silos); change is not embraced but neither is it managed well (see Table 6-7 4.1 and 4.6), (see Table 6-4: Failure of Leadership). The historical divisions within NHS Fife add to the implementation barriers; the working silos (see Table 6-4: Silos) still exist between nurses and consultants, clinicians and non-clinicians and between community and acute (see Table 6-7 5.1, 5.3, 5.6). These divisions add to the complexity of introducing any model but with Lean, there is an added barrier when the philosophy does not cross the boundaries of the divisions and leads to resentment and communication breakdown (see Table 6-7 5.2, 5.4, and 5.5), (see Table 6-4: Poor Communication).

Regardless of the reported barriers, Lean tools are still successfully implemented, and 91% of those who have implemented Lean tools will do so again. Perhaps the greater need is to address the perceptions of those who have not implemented Lean tools: 34 % of this group are unlikely to implement Lean tools in the future.

6.7.3.3.Organisational Strategy

> *"There is now a commitment to formalize the use of lean tools as part of a strategic improvement programme that will accelerate, integrate, add value to and sustain service improvement in Fife within a service improvement infrastructure that enables a whole system, integrated approach to be adopted for strategic planning, redesign, service transformation, and integration of a wide ranging service improvement portfolio."* [248]

Despite the above commitment, the vast majority of participants in the survey are Unsure if NHS Fife has adopted the Lean Methodology at a strategic level but also believe that NHS Fife would benefit from adopting Lean at a strategic level. From these responses, there is a clear indication that the commitment NHS Fife has made to the Lean methodology is not known by their staff and therefore not being communicated effectively. In line with previous findings [131] , the lack of strength between improvement programmes and organisational strategy will affect the adoption of Lean at organisational level and reduce its sustainability. Case Studies[131 217] have identified two main types of approaches to Lean implementation: Full Implementation and Rapid Improvement. Full implementation is a systematic approach to Lean, which requires a full cultural shift, a whole system change and links change with strategy and results in more sustainable change. In contrast, the rapid improvement approach has an immediate impact, is short and intensive, and concentrates on identified projects but does not necessarily result in sustainable change. It is clear from the survey that NHS Fife has not adopted a full implementation approach to Lean but have adopted a rapid improvement approach. This approach does not involve all staff at one time, which makes it difficult to change the culture of the

organisation and to share success and benefits when they are achieved. It is possible with clearer communication from Management of the links between strategic policy and Lean more staff members, who have undergone Lean training, would feel better supported to implement Lean into their workplace, and other staff members would recognise the Lean concept and therefore be less wary of it. It is also important when taking this type of approach to Lean to communicate success across the organisation when it happens and how it was achieved (see 6.7.2).

The method of communication and the lack of communication are reasons highlighted for the measured adoption of the Lean methodology across Fife. The adoption of Lean as a strategy for Fife is only known by personnel who have connections to the SMT: This message and therefore the philosophy of Lean is lost in a diluting effect in the many layers of management structure. Communication of Lean projects and more importantly communication of successful projects is not shared: not only does news of success not reach frontline staff but neither does it reach Lean trainees who, it may be argued, have a vested interest in results (see Table 6-7 6.1, 6.2, 6.3 and 6.4). Leadership within the Lean methodology is seen in two ways: leadership within a project, a project champion (see Table 6-7 8.1) and leadership from SMT (see Table 6-7 8.2, 8.3, 8.4, 8.5, and 8.6), a driver of the philosophy. Unfortunately, the interviewees perceive both types of leadership to be lacking within Fife but essential to the implementation and sustainability of Lean.

6.7.3.4.Evaluation

Those participants who have implemented Lean tools report 49% Successful or Very Successful and 43% report limited success. Process Mapping is reported to be successfully implemented by most people. The tools which are considered to be easier to implement directly correlate with successful implementation however no such correlation exists between tools considered to be difficult to implement and partial success of the lean tools. Nevertheless, it is challenging to understand fully on what basis participants evaluate the success of Lean tools; 18% of participants employed Lean metrics for evaluation but 41% employed neither Lean metrics nor expert judgement. With the exception of the Back Pain Project (see 6.6), evaluation using metrics was also not carried out by interviewees (see Table 6-7 2.3). Participants listed the Organisation and Both the Organisation and the Patient benefit from the implementation of Lean tools but only a very few listed just the Patient. This could be argued as understandable as any benefit to the patient in the first instance will ultimately benefit the organisation through positive feedback etc. However, any Lean tool, which improves the patient pathway through reduced waiting times, reduced discharge delays etc., will benefit the patient directly. Tools such as Process Observation and Time Value Analysis fit this category as well as Voice of the Customer, which allows the patient to have an input into their care (see Table 6-2). Lean tools which give a better understanding of the process and are an aid to benchmarking such as Lean Metrics or Process Mapping the Current State or which help to reorganise the workplace such as Visual Management and Dashboards or which find the cause of a problem such as 5 Whys will directly benefit the Organisation (see Table 6-2). Other tools

such as Value Stream Mapping and Spaghetti Mapping will directly benefit both the Organisation and the Patient (see Table 6-2). The majority of responses from the survey listed both the Organisation and the Patient will benefit from the Lean tools, the assumption being that if the Organisation benefits in the first instance then the patient will also ultimately benefit. However there is some evidence to suggest that it is not always the tools which are most beneficial which are taken into account whilst implementing Lean tools: a high correlation: r=0.9 exists between easy implementation and beneficial to both the organisation and the patient but no correlation exists between difficult to implement and beneficial to both.

6.7.3.5.Suggested Solutions

The solutions to improving the overall perception of Lean within Fife suggested by the interviewees were naturally based on their own observations: improved, effective communication channels promoting Lean projects and advertising success(see Table 6-7 9.5, 9.7 and 9.9); a designated driver of Lean representing the authority and a designated leader of Lean within a project who is empowered to cross all boundaries(see Table 6-7 9.1, 9.2 and 9.10); integration of the divisions by improving the flexibility of e.g. budgets; embedding the language of Lean into everyday working life and appreciating that Lean is not a quick fix to every problem that exists within Fife(see Table 6-7 9.3, 9.4, 9.6 and 9.8).

6.8.Evaluation of the Lean Methodology

This Case Study evaluated the Back Pain Project (see 6.6) and the implementation of the Lean Methodology in NHS Fife. The findings presented in

6.6.6 and 6.7.3.4 have been applied to the Evaluation Framework (see Figure 5-12) and depicted in Figure 6-25. The User of the model is taken from the perspective of the Participant, although it could also be the Facilitator (see Table 4-2). The Model Type is an Operations Model, although given that Lean is a philosophy it has the potential to be a Strategic Model.

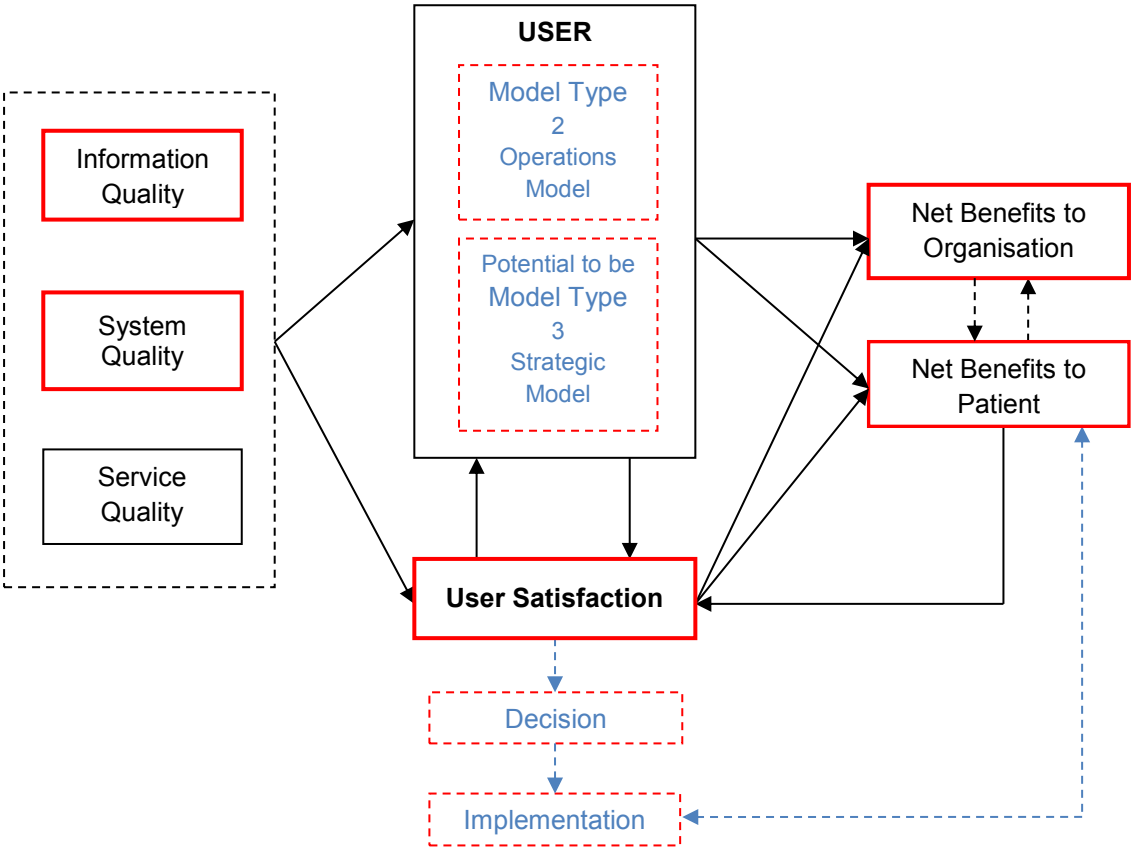


Figure 6-25 Applying the Evaluation Framework to the Lean Methodology

However, the evidence suggests (see 6.4 and 6.7.3.3); a rapid improvement approach is taken in Fife and not full implementation of Lean. Nevertheless, the Decision was taken to Implement the Lean Methodology into Fife NHS. From the evidence gathered Information Quality and System Quality could be measured and could also measure User Satisfaction, which could result in a Net Benefit to the Organisation and to the Patient. Both the Information Quality and the System Quality yielded a negative result in the Back Pain Project but a

mixed result by the Lean Trainees: Lean Training certainly provided the Trainees with the knowledge of Lean tools but not necessarily the confidence to use them. In addition, most of the Lean tools were not difficult to implement but some were perceived to be more difficult and hence not implemented as often. User Satisfaction was positive: the Trainees saw the potential of Lean tools and would choose to use them again, but the Trainees appear to be more sceptical about the Benefit of the Lean tools to the Patient and thought the Benefit of Lean tools would be to the Organisation. The main dissatisfaction of Lean is not in the tools but with the barriers to Implementation. The Back Pain Project was fully supported by SMT and had a dedicated, motivated leader; however, other projects or attempts to implement Lean have not had the same support, which has resulted in frustration and scepticism. A theory of the Evaluation Framework is that if the User is satisfied with the model he/she will return to the model for other projects, encapsulated in this theory is that the User will also communicate his/her satisfaction and encourage others to also use the model. However, the evidence in Fife is that User Satisfaction is not communicated and therefore success is not shared.

6.9.The Role of the Lean Methodology in Shifting the Balance of Care

The Lean Methodology has the potential to Shift the Balance of Care, assuming barriers are reduced to allow successful and sustained implementation. As identified in Figure 6-1, the Value Stream Mapping activity allows stakeholders from different departments to come together to examine a common process, identify waste in the process and put in place an action plan to reduce the waste.

	Improvement Area	Rate	Lean Methodology
1	Maximise flexible and responsive care at home with support for carers		
2	Integrate health and Social Care for people in need and at risk	***	The Kaizen event brought together many professionals from many divisions within health and Social Care, as well as patient representation, to Value Stream Map the Back Pain Pathway. Attendees commented on having the opportunity to meet with colleagues across all sectors and having the time to discuss issues. The Mapping Process identified many areas of waste: over-production; Waiting; Unnecessary Processing; Staff Movement and Defects and was able to identify that, with the development of a standardised integrated pathway, would reduce the patient's journey.
3	Reduce avoidable unscheduled attendances and admissions to hospital	***	The clinic, provided by the Consultant Physiotherapist in the Community, redirected patients away from the Orthopaedic Consultants in Acute care. In addition, the Electronic Referral Triage and the Spinal Safety Check (see 6.6.5) provide services, which could reduce unscheduled admissions.
4	Improve capacity & flow management for scheduled care	***	The Back Pain Project is a good example of how Lean can positively impact this Improvement Area. The Project identified preferred referral procedures to specific pathways depending on the type of back pain problem, to ensure the patient saw the right person at the right time. The new pathway, compared to the previous pathway for back pain patients, is more efficient and has reduced the time the patient waits for treatment. Value Stream Mapping the Back Pain Pathway resulted in improved referral procedures and direction for patients, resulting in improved capacity and a more efficient pathway.
5	Extend the range of services outside acute hospitals provided by non-medical practitioners		
6	Improve access to care for remote and rural populations	**	The Back Pain Pathway standardises referral and procedures for all patients in Kirkcaldy and Levenmouth resulting in equal access to care.
7	Improve palliative and End of Life care		
8	Better joint use of resources	***	The Kaizen Event brought together Acute and Community personnel who now both take responsibility for the Back Pain Pathway. In addition, the Back Pain Project facilitated the direct access to MRI by GP's. This step reduced the time the patient spent on the pathway, as previously patients had to see a consultant before being referred for an MRI scan. This step also makes better use of an existing resource: MRI scanning

Table 6-8 Potential Lean Improvement Areas

Value Stream Mapping the process, from the patients' perspective, will identify waste such as over-production, waiting and over-processing (see 6.3.1)

Table 5-3 rates the potential of Lean to have a positive impact on the eight Balance of Care Improvement Areas. An addition to Table 5-3 is Improvement Area 6. The Back Pain Project, by standardising referral procedures, improves

access to those in rural areas; this was not considered when compiling Table 5-3.

The Kaizen Event brought together Acute and Community personnel who now both take responsibility for the Back Pain Pathway. In addition, the Back Pain Project facilitated the direct access to MRI by GP's. This step reduced the time the patient spent on the pathway, as previously patients had to see a consultant before being referred for an MRI scan. This step also makes better use of an existing resource: MRI scanning. The Back Pain Project provides some evidence to vindicate the Role of Lean in Shifting the Balance of Care.

6.10.Discussion and Conclusion

There is evidence to suggest the Lean Methodology can be successful within healthcare: a project, which is well scoped, has clear metrics, has buy-in from stakeholders and is visibly approved and led by SMT, can succeed and improvements to a process can be measured. However, within NHS Fife barriers to implementation do exist. Some of these barriers such as the addition of practical elements to the training, improving the communication channels so that any success is advertised and disseminated to frontline staff and appointing a designated leader to a specific project can be addressed relatively easily if it is agreed they should be changed. However, barriers such as the existing divisions within Fife and visible endorsement by SMT are more complex and will take longer to resolve. The philosophy of Lean needs to be incorporated into everyday language, training, and working practices before Fife can move from a rapid improvement approach to a full implementation approach.

Chapter Seven

Process Mapping and Simulation Case Study

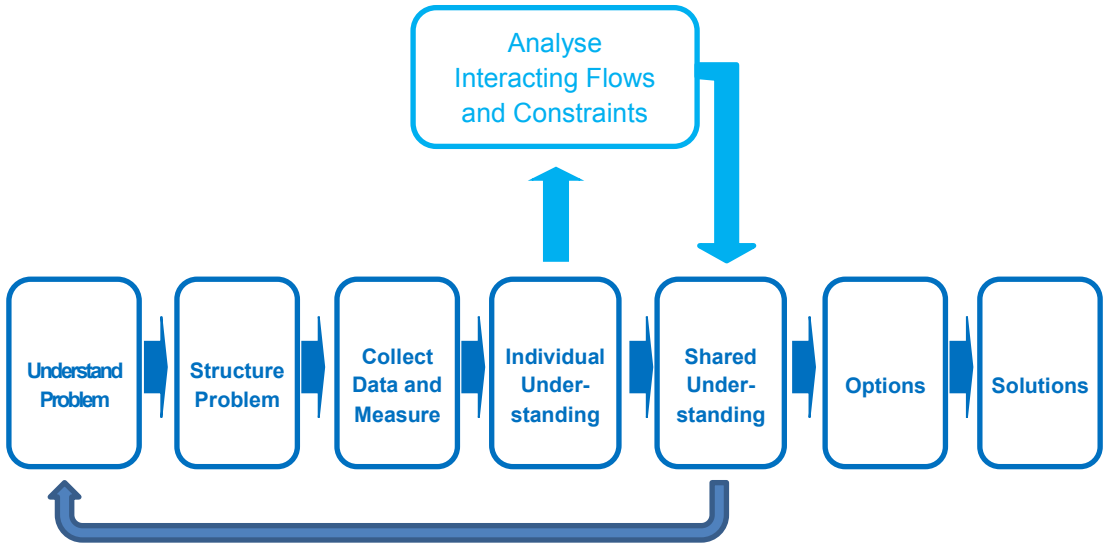


Figure 7-1 The Role of Process Mapping

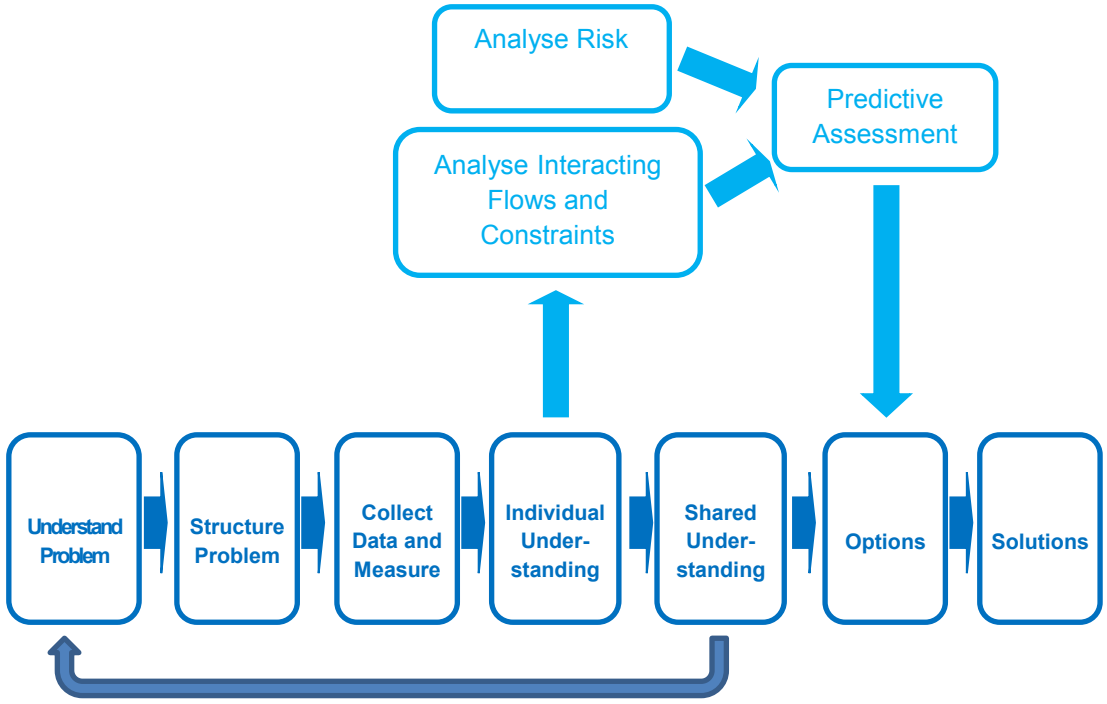


Figure 7-2 The Role of Simulation

7. Introduction

This chapter is a Case Study, which discusses Process Mapping and Discrete-event simulation beginning with their Role in Shifting the Balance of Care (see Figure 7-1 and Figure 7-2). Both models are discussed in this chapter together because the process of mapping a system, although can be used independently, often provides a basis for a simulation model; populating the map with entities that flow through the system with timings and capacity constraints reflecting the interactions of the real system. The chapter then provides a historical perspective of both models independently and discusses findings from the literature concerning the successes or otherwise of implementation into healthcare and the subsequent implementation barriers experienced. The chapter then goes on to document experiences of implementation of Process Mapping and Discrete-event simulation in NHS Fife as well as providing empirical evidence evaluating the potential of both models in NHS Fife. Finally, the chapter evaluates Process Mapping and Discrete-event simulation against the Evaluation Framework and appraises both models' Role in Shifting the Balance of Care.

7.1.The Role of Process Mapping

The Process Mapping schematic extends from the generic schematic of models (see Figure 4-11) as illustrated in Figure 7-1. The methodological assumptions behind Process Mapping are to 'Record existing processes, examine them thoroughly and develop improvements by: Eliminating unnecessary tasks; Clarifying roles within the process; Reducing delays and duplication (see Figure 4-7) and is categorised as a 'soft approach' to structure unstructured problems

(see Figure 4-10). Figure 7-1 illustrates the analysis of interacting flows and constraints by individuals mapping the process leads to the shared understanding of the whole process. Examination of Process Mapping against the eight prioritised Improvement Areas of Shifting the Balance of Care (see Table 5-1) identified the potential of Process Mapping to have a positive impact on several Improvement Areas (see Table 5-3), the potential of Process Mapping will be evaluated further against the Improvement Areas at the end of this chapter.

7.1.1. History of Process Mapping

In the late 19th century, a group of men including Frank Gilbreth developed a collection of tools to find the 'one best way' for processes to work in industrial engineering. One of these tools was the flow process chart – a lined, columnar form with sets of five symbols running down the page and a space adjacent to each set of symbols for a brief description. The process chart represents a process broken down into its component parts illustrated by symbols [228] and is a tool for visualising processes prior to improving them [227]. At around the same time Gilbreth joined two pioneering doctors in an American hospital and developed his ideas on motion study as well as continuing his work on Process Mapping.[227] In 1921, Gilbreth presented "Process Charts – First Steps in Finding the One Best Way" at the American Society of Mechanical Engineers (ASME) Annual Meeting. It was not however, until 1947, that the ASME standardised and published a set of symbols for Operation and Flow Process Charts. In the 1940s Ben S. Graham Sr. adopted the manufacturing process to accommodate an office environment and developed the horizontal process

chart to contain multiple information flows. Graham was also a great believer in the person doing the job is the person who knows most about the job and advocated that these workers should be part of the discussion when building a flow chart. In addition, Graham advanced process charting by employing illustrations to illustrate the relationships between multiple items[228].

7.1.2. Process Mapping in Healthcare

Process Mapping aids in the understanding of how care activities work and has developed and been applied to assist the comprehension of how people and resources co-operate to achieve outcomes, to redesign processes or to communicate standardised actions within a complex process[229]. The mapping of the process develops a shared understanding of the patient pathway capturing the patient journey, the flows of information and staff responsibilities. The mapping process produces a greater appreciation by staff of individual roles in the whole care system[230]. Patient pathways are seen as an important resource for implementing frameworks across the NHS[230] as well identifying bottlenecks in a process, they also highlight inefficiencies and ineffectiveness during a patients experience which can be amended and ultimately result in best practice.

7.1.2.1.The Benefits of Process Mapping

The benefits of Process Mapping can be categorised into five values:

i. Redesign

Mapping a patient journey will highlight relationships in core processes and how they can impact on each other; identifying delays, duplication, unnecessary steps, bottlenecks, constraints, non-value adding activities. In addition, Process

Mapping will emphasise variations in clinical practice, which can lead to the process being redesigned for the benefit of the patient, staff, and the organisation.

ii. Communication

The map will illustrate to staff their input into the whole pathway giving them a better understanding of their individual role within the whole process as well as an overview of the overall process highlighting the input from other staff members and the impact that they can have on one another; this develops a shared understanding of the problem. The process map can also help staff to appreciate the patient journey from the patients' perspective. A mapping exercise gives staff the opportunity to contribute ideas of their own when they may not normally have the chance to do so.

iii. Audit

Process Mapping identifies where resources are not being utilised effectively or efficiently which can result in capacity and demand analysis being undertaken.

iv. Enhanced Modelling

Problems identified in the process map such as bottlenecks can be further examined by other modelling techniques such as Simulation or MCDA.

v. Comparison

Mapping a process within a department, hospital or CHP can then be used to compare processes in another. These comparisons will highlight discrepancies, non-standardisation and will allow for sharing of ideas over existing boundaries.

7.1.2.2.Process Mapping Limitations

A study[229] identified and examined eight different process-modelling methods currently used within healthcare (see Table 7-1):

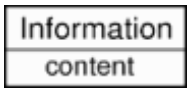
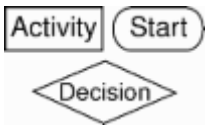
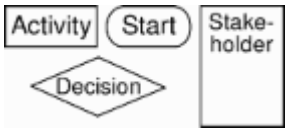
Diagram type	Nodes
①Stakeholder diagrams	
②Information diagrams	
③Process content diagrams	
④Flowcharts	
⑤Swim lane activity diagrams	
⑥State transition diagrams	
⑦Communication diagrams	
⑧Data flow diagrams	

Table 7-1 Diagram Types[163]

The authors caution that, although process modelling is a very useful tool, staff should be aware that these different modelling types exist and that the different types are more suited to different jobs e.g. when interactions between staff and departments are a concern communication diagrams should be produced[229]. There are also different mediums used when Process Mapping: post-it notes; text boxes, flowcharts; pictorial icon charts and stylised icons[230].

Although there are different mediums available to illustrate a patient pathway, one that has been developed in NHS Fife uses Visio software with stylised icons. This software is easy to learn and produces an illustration, which is easily understood by users and by participants[230]. The computerised nature of these pathways means that amendment is simple and immediate and through paper copies or e-copies ideas can be straightforwardly shared. The pathway-mapping tool has been extensively used throughout NHS Fife so much so that it is routinely employed when redesigning services.

The limitations of the patient pathway model can be the team who participates in the patient's process. If staff are not willing to contribute to the mapping of the path or in recognising failings in the path then the process will be compromised. In the same way, senior management need to be visible in their support of the mapping exercise[231] . In addition, an investigation of pathway mapping[232] found that, although claims are made that the process of mapping empowers the patient,[233] this was not the case, and that the patient was not involved in the decision-making process. In addition, the authors caution on the use of pathways as a universal panacea[232] and call for more approximation and flexibility to be applied[232].

7.2. The Role of Discrete-event Simulation

The Discrete-event simulation schematic extends from the generic schematic of models (see Figure 4-7) as illustrated in Figure 7-2. The methodological assumption's purpose behind Discrete-event simulation is to 'Explore the operation of complex interactions in health between discrete entities to aid

understanding and control' (see Table 4-2) and is categorised as a 'method to replicate or forecast system behaviour' (see Figure 4-10). Figure 7-2 illustrates the analysis of interacting flows and constraints whilst also analysing risk leads to a simulated assessment of the problem, which can result in options as potential solutions to the problem. Examination of Discrete-event simulation against the eight prioritised Improvement Areas of Shifting the Balance of Care (see Table 4-3) identified the potential of Discrete-event simulation to have a positive impact on several Improvement Areas (see Table 5-2), the potential of Discrete-event simulation will be evaluated further against the Improvement Areas at the end of this chapter.

7.2.1. History of Discrete-event Simulation

It was as a result of World War II that computer simulation came to the fore with the development of a model to solve problems encountered with the atomic bomb: Monte Carlo methods produced a simulation of the probabilistic problems concerned with random neutron diffusion [234]. The technological advancement and availability of computers in the '50's facilitated the further use and advancement of simulation modelling[234]. Keith Douglas Tocher designed and developed the General Simulation Program (GSP), the first general-purpose simulator to simulate the machine process in an industrial plant. Tocher, as well as other valuable contributions, wrote the first textbook in simulation, *The Art of Simulation* (1963), and developed the activity-cycle diagram (ACD) in 1964, which is still referred to today[235]. Another notable name in the development of simulation modelling, Geoffrey Gordon, introduced the General Purpose Simulation System (GPSS). GPSS was designed to assist rapid simulation modelling of complex systems[234] [235]. At this time, the results of

a simulation run were outputted as computer code until Amiry in 1965 added animation to the simulation to illustrate the simulation as it was running[236]. The development of high-level language, specifically written for simulation modelling, and the progression of computing: microcomputers and microprocessors[234] [235] [236] contributed to the continuous development of simulation. Further to this Hurrion developed Visual Interactive Simulation when he saw a need for better access and understanding of systems processes and did this by introducing an interactive display with icons representing entities[237]. In the 1990's the affordability and availability of personal computers and the development of Windows resulted in simulation modelling becoming more viable for commercial use[234].

7.2.2. Discrete–event Simulation in Healthcare

Simulation is defined as:

> *"Experimentation with a simplified imitation (on a computer) of an operations system as it progresses through time, for the purpose of better understanding and/or improving that system."*[238]

The two main types of simulation are Static and Dynamic [138], static simulation is the type developed and described in 5.4.10. Dynamic simulation is concerned with systems that vary through time. Within this type, there are three main kinds of simulation modelling: discrete-event simulation, continuous simulation and mixed discrete/continuous simulation. The majority of modelling in Management Science is discrete-event simulation [138] and this is the type of simulation modelling adopted here.

The basis of simulation is to model the progress of time and to model variability. Discrete-event simulation (DES) only models a change in the system when an event occurs. The operation of a system is represented as a sequence of Events, normally tracking an Entity; an Entity occupies a State for a period. An event marks the beginning and the end of an Activity; an Activity is a period of time when an Entity is changing State.

DES is used extensively within healthcare, its application dates as far back as the 1960's, particularly in the areas of patient flow and resource allocation[163]and allows practitioners to consider "what if" scenarios. DES uses quantitative data to predict outcomes when changes are made to a process. After a process has been mapped, DES identifies processes which when applied to computer software can simulate the outcomes when changes are applied to the processes and which can analyse the effects of uncertainties and assess the effects of proposed changes. In addition, there is interest in simulation modelling to incorporate costs and benefits into models to provide useful comparison of alternative strategies[239]. Unlike other modelling tools like Markov chain analysis, DES has the capability to consider complex scenarios; where timings maybe dependent on the characteristics of individual patients, particularly with regard to patient flows[163] where flows can be both planned and unpredictable. Traditionally, DES was viewed as providing an analytical tool based on "hard" data, which diagnosed system problems and offered solutions. This traditional view of DES has been recorded by Bowers et al[242] (see Figure 7-3) however, as also described by Bowers et al [242] DES has also been found to be a useful tool which also incorporates "soft" approaches to the analysis.

The use of both hard and soft approaches to DES makes DES particularly relevant to the needs of healthcare management 215. This approach results in disciplined data gathering and allows stakeholders to view their place in the system and become involved in devising improvements to the system. Other studies[240] have also found that managers benefit from working closely with the modeller during simulation modelling: gaining a greater appreciation of processes, helping to improve decision-making and the implications of changes to the system. DES has the flexibility to allow the stakeholder to become involved and communicate useful information at the model building stage rather than after the model is built. The softer approach, at the initial stages of model building, adds to the richness of the information available resulting in a more accurate model, better understanding by the model builder and one that the stakeholder fully comprehends[241].

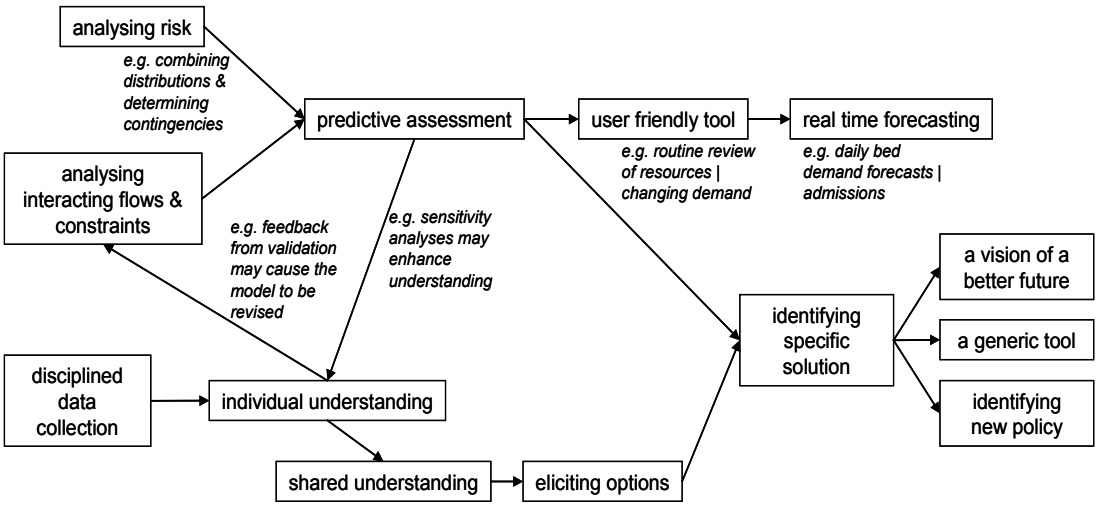


Figure 7-3 Mapping the Roles and Benefits of DES[242]

Despite the extensive use of DES in healthcare there is little evidence of the outcomes of model implementation239 [147]: A survey of simulation in healthcare found only sixteen projects reported successful implementation from the two hundred papers surveyed[243] and a systematic review in 2003 reported:

> *'… we were unable to reach any conclusions on the value of modelling in healthcare because the evidence of implementation was so scant.'* [244]

Furthermore, research undertaken by the RIGHT project[6] reports little change since 1981: categorising the degree of implementation of simulation studies as: Suggested- entirely theoretical, Conceptualized- discussed with client, and Implemented- used in practice, rapid reviews revealed 50% Suggested, 45% Conceptualized and only 5% Implemented. However, there is some evidence to suggest that more models are implemented than reported in the literature: 18% in the literature and 44% from a survey of authors[245] . The authors of this paper advocate that journal deadlines are one reason for the variation: the pressure to publish in journals negates the opportunity to wait for and report on outcomes.

7.2.3.Scenario Generator

Scenario Generator (SG) is a software tool based on discrete-event simulation modelling but was specifically designed to simulate high-level activity in health and Social Care organisations by the NHS and Simul8 Corporation[246]. The tool includes default data of population demographics and data on the incidence and prevalence of disease for each authority in the UK and includes four high level pathways including mental health, planned, urgent and maternity which can be refined to suit the user. In addition to this, the software provides access to 'What if?' scenarios, which supply detailed results of activity, flow, capacity, queues, and costs.

[6] http://www-edc.eng.cam.ac.uk/right/ Between 2007 and 2009 RIGHT carried out a pilot project, working with Government, Industry, and the NHS to create a framework, tools, and training that enables healthcare planners to select appropriate modelling strategies. However, the website is not up to date and the book published containing the framework is no longer available.

According to the NHS Institute for Innovation and Improvement website[247] Scenario Generator software is designed to:

i. Emulate a health system;
ii. Reflect changes in population, health prevalence, service configuration and capacity, and models of care;
iii. Allow examination of the impact of changes on flow, capacity, end-to-end transaction times and cost across the whole system;
iv. Highlight where changes to one pathway might impact other pathways within the system;

Intended for use by decision-makers and clinicians the Scenario Generator software will aid in the following:

i. Planning for changes in the way healthcare will be delivered;
ii. Appreciating the results of changes to the way that healthcare will be delivered;
iii. Exploring the impact of changes to demographics and disease prevalence on their existing and future models of service delivery;
iv. Investigating possible strategic approaches to reconfiguration of services;
v. Investigation of the performance of proposed changes in clinical practice.

NHS Fife purchased the software for Scenario Generator in 2008 to develop further work they had been conducting using Simul8.

7.2.4. Barriers to Implementation of Simulation Models

Implementation Barriers Common to Simulation Models
Culture [173]
Cost [173 163]
Data [173 170 163]
Conflict [163]
Support [170]
Experience [170 173]
Silos [173]
Organisational Momentum [170 163]

Table 7-2 Implementation Barriers Common to Simulation Models

The implementation barriers common to OR models listed in Table 5-6 also apply to simulation modelling, indeed barriers included in this table are specific to simulation modelling but were deemed (by this author) to be relevant to most OR models also. Table 7-2 lists the implementation barriers suggested in the literature, which are specific to simulation modelling. A more detailed explanation of the types of implementation barriers listed in Table 7-2 specific to simulation modelling are:

Culture

Healthcare is in a state of constant change [173] with social, economic and political influences change can come in the form of demographics, behavioural and social, organisational, political, strategic, technological and clinical which all add to the complexity of the organisation [171]. Added to this are Government imposed targets of prioritisation[173]. Health workers are, unsurprisingly, resistant, sceptical and suspicious[173] , particularly regarding models that originate in the manufacturing industry[173], of yet more change that a simulation model may bring[173 171].

Cost

Despite the cheaper more commercial software such as Simul8, the unavailability of the correct data and the unwillingness to share developed models has a detrimental effect on the time to build models and implies simulation is still considered to be an expensive option in healthcare[173 163]. In the manufacturing industry training in modelling techniques is much more the norm than it is in healthcare, therefore without in-house expertise specialists need to be bought-in[173]. In addition, due to the 'not invented here' syndrome, models tend to be bespoke for a particular health board or department [173] which, of

course, adds to the cost. Unfortunately, it is unlikely, even when simulation models are generic enough to be shared across health boards, that these Boards, having made the initial investment, will share the model with other 'outside' health organisations[173]. Cost also comes in the form of time[163]: Simulation modelling needs to be informed from the front line, with accurate data and is a process which takes time and is therefore not about quick fixes: Expectations of a model built to solve a particular problem can often be unrealistic.

Conflict

The Research Excellence Framework[248] is used to assess outcomes of funding bodies' investment in research in higher educational institutions. The criterion of assessment is the number and level of academic journal publications. Therefore, higher educational institutions apply pressure onto academics to publish in academic peer reviewed journals, consequently methodological or technological type papers are published which do not reflect the practical, simple requirement of health practitioners[171]. The pressure to produce methodologically advanced papers results in unnecessarily complex simulation models[173] [163]. In addition, users are confused and put-off by a model which produces complex data that they do not understand[170].

Data

Incompatibility of IT systems and the gathering of incompatible data normally require the modeller to either clean the data or collect data specifically before being in the position to input data into the model[170] [173]. In addition, the more complex the model the bigger the requirement for even more data[163]

Experience and Expertise

The unfamiliarity of Simulation models[173], the cost of trained analysts[170] , the lack of in-house expertise[173], and the common occurrence of changes in key personnel[170], adds to barriers to implementation.

Support

Sustained and reliable support from managers and/or leaders is crucial to model implementation [170]. Lack of knowledge and understanding of models and the model building process can result in managers not supporting key elements of the process when it is needed [170].

Silos

'The not invented here' syndrome is endemic in healthcare, each hospital or service demands a simulation purposefully built for their own use[173]. Bespoke models are extremely costly and therefore unlikely to be implemented[173] .

Organisational Momentum

The implementation of a model requires time and capacity[170] [163] of those who will use it. The successful implementation of a model also needs to be promoted and shared; however, often in healthcare time is not put aside to report on the success of a model[170].

7.2.4.1.Stakeholder Engagement

Underpinning all of these barriers is stakeholder engagement. It is acknowledged [249] [172] [170] [250] that the connection with stakeholders is crucial to successful model implementation. However, within healthcare numerous types of stakeholders exist with many roles within each type (see Table 2-1). The key then is to identify the stakeholders relevant to the project and to identify their

relevant input into the project. Brailsford et al [250] in a self-harm study distinguish five stakeholder categories: ownership; legitimacy; power; urgency; centrality and three resource categories: time; money; data. These stakeholders were then ranked according to their relevance to the project for each category. This process ensures the appropriate stakeholders are involved from the beginning of the project. Others[251] [252] consider the successful implementation of simulation modelling needs to be communicated effectively; it is not about health practitioners 'paying more attention'[251] but about those advocating its use ensuring that they are heard and demonstrating practical effective models which will make a difference.

7.2.5.Suggested Solutions to the Barriers

The development of a model which uses a generic toolbox for healthcare is a solution put forward to reduce costs and to advance the sharing of results across hospitals and health boards[167], this would also help to standardise the type of data required for input [252] 173. Modellers embedded within healthcare organisations[252] would help to overcome issues of distrust from staff and these modellers would already have a fundamental understanding of how the process/ system works. An additional benefit would be a simulation 'champion'; an enthusiastic advocate[173] of simulation modelling with decision-making power, who would drive projects forward until implementation is complete. Pitt[252] contrasts economic modelling and its pivotal use in health technology assessment (HTA) as advocated by NICE and the lack of similar support for simulation. Brailsford[173] is encouraged by the formation of MASHnet; a funded body which brings together academics, health practitioners and industry to

discuss and provide solutions regarding the implementation of simulation modelling. In addition, the NHS Institute on their website promotes simulation. However, given that MASHnet commissioned Pitt's report for the NHS Institute[253] it is questionable whether the solutions to implementation issues are any nearer to being resolved.

7.3. Process Mapping and Simulation Applications in NHS Fife

7.3.1. NHS Fife Physiotherapy Service

7.3.1.1. Process Mapping to Compare Physiotherapy Services

Process Mapping was utilised as part of the author's research for a Master of Research in Business and Management[254]. The aims of the research were: to establish the current referral routes utilised by decision-makers when referring to the Physiotherapy service and to map these routes onto the current pathway; to consider alternative pathways by examining barriers to referral; practice elsewhere and alternative referral routes; to recommend a redesigned patient pathway. With the collaboration and confirmation by staff at NHS Fife, pathway maps were drawn for the physiotherapy service available from the three CHP's as well as the acute division. The stylised icons developed by Fife[7] were applied in these maps to good effect and can be viewed in Figure 7-4, Figure 7-5, Figure 7-6, Figure 7-7 and Figure 7-8. By comparing the four maps the author was able to provide evidence of inequity of access, inequity of exit routes and non-standardisation of administration. Process Mapping was performed alongside SERVQUAL and staff interviews to formulate the following

[7] Developed by Ken Laurie and Mike Ghattas

recommendations : GPs should be given access to protocols and information leaflets for the main musculoskeletal conditions; An evaluation of the facilities and equipment in each clinic in each CHP should be performed, assessing fitness for purpose; A system of rotation should be established for higher Band physiotherapists, across the Operations Division and CHPs to encourage flexible working, these recommendations were incorporated into the evidence base for the Back Pain Project (see 6.6).

7.3.1.2.DES: Location of Services and the Impact on Healthcare Quality

The findings from the physiotherapy research (see 7.3.1.1) formed the basis of a further study concerned with location and delivery of Shifting the Balance of Care into the community and the resulting implications for the shift in quality of care[255]. The local simulation was developed further to gain insight into an idealised, generic service. The key inputs into the model were based on the location of treatment, the key inputs were: the patient's characteristics and clinical requirements; the services available at the various treatment centres; the times for the patient's to travel to each centre; and the current waiting times at each centre. Several options in managing the delivery of a physiotherapy service were considered and can be viewed in Table 7-3. In addition to these options patients were characterised into three types based on their willingness to travel: patients indifferent to travel; typical patients willing to travel and patients with restricted mobility.

option	key features
1. Single site	this may appear to offer the most effective, efficient and equitable organisation of care but fails to deliver any of the Balance of Care objectives
2. Local sites with all facilities	this idealised scenario offers the full range of staff and facilities at every site; the total capacity is not enhanced but all patients can receive the best possible care at their local site
3. Local sites with restricted facilities	a typical current provision implying good local care for some patients but lower levels of effectiveness and/or travel for others
4. Triage	a systematic approach to directing referrals to the most appropriate site considering patients' requirements and waiting lists; this could take a number of forms but in this study it is envisaged to be "virtual"
5. Flexible staff deployment	a proportion of the staff are peripatetic, allocated to different sites in response to variations in demand
6. Triage & flexible deployment	a combined approach moving both patients and staff to help ensure an effective and equitable service

Table 7-3 Physiotherapy Management Options

Discrete-event simulation modelling was performed using SIMUL8 software: The simulation was based on the pathway for Kirkcaldy and Levenmouth (see Figure 7-4) but also includes Centre 1, which represents the acute hospital in the area. The simulation model can be viewed in Figure 7-5. In keeping with Shifting the Balance of Care, the six domains of quality[256] were interpreted and utilised as metrics and can be viewed in Table 7-4.

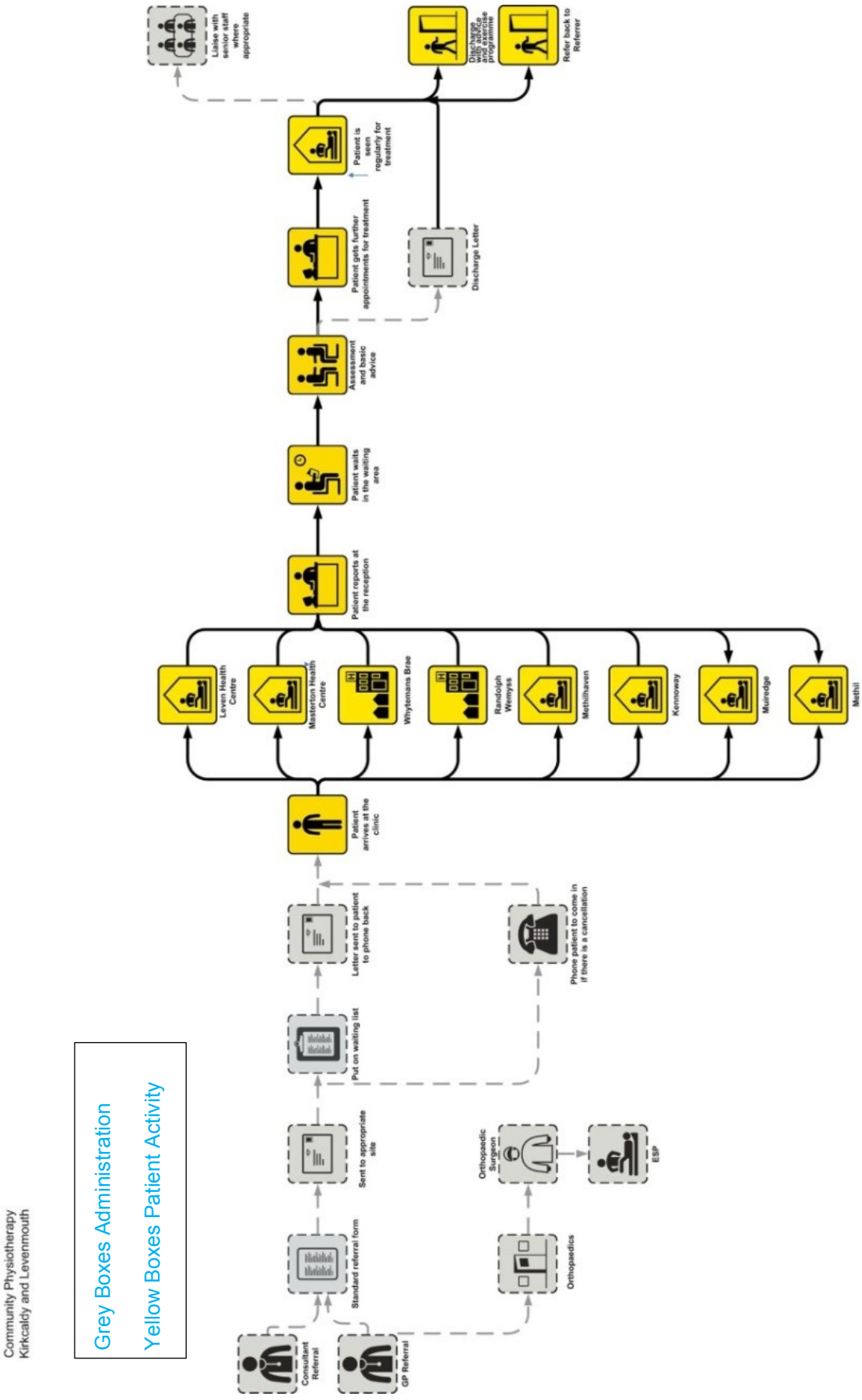


Figure 7-4 Pathway Map of Kirkcaldy and Levenmouth CHP Physiotherapy Service

Quality criterion	Simulation Output
Person centred	% receiving local care, provided at the nearest site % attending at just one site rather than being redirected to a second site
Safe	% of patients with a critical requirement some treated at a site with appropriate facilities to ensure safety
Effective	% of patients treated at sites i.e. receiving care at sites with the best possible facilities for patients' requirements
Efficient	complete programmes of patient physiotherapy care per annum
Equitable	standard deviation in waiting time
Timely	mean waiting time and % waiting > 12 weeks

Table 7-4 Quality Domain Metrics

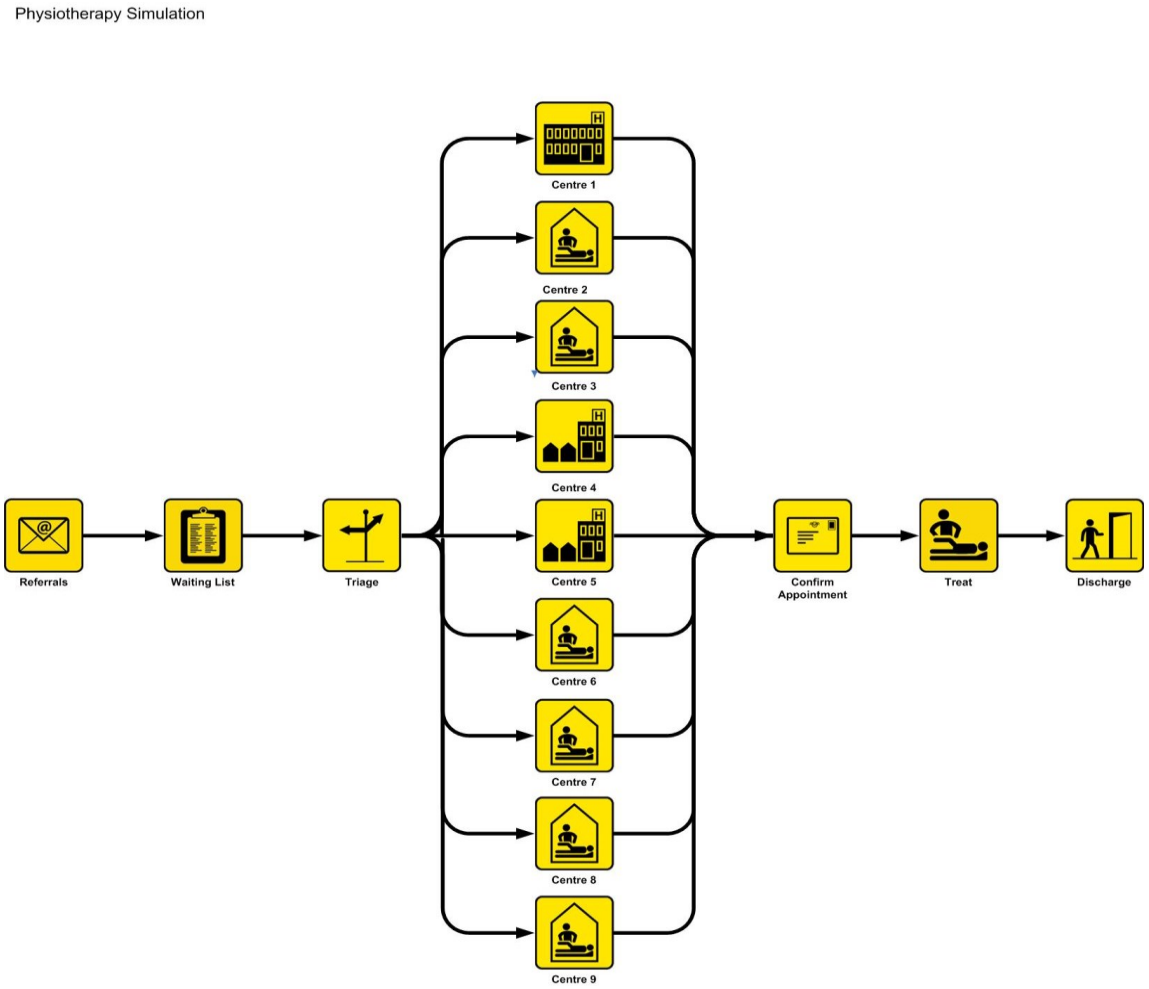


Figure 7-5 Siml8 NHS Fife Physiotherapy Model

The results of the simulation can be viewed in Table 7-5. None of the six options comes out top in all of the criteria, although **Option 1**, concentrating all physiotherapy care on a single site, performs well on all criteria with the exception of local care: many patients have to travel a significant distance with only 20% receiving local care. If there were the resources available to provide a full range of facilities at all of the treatment centres **Option 2**, local and highly effective care, could be provided for every patient. However, there would be localised difficulties with waiting times resulting in inequalities, as reflected in the standard deviation of 3.3 weeks and the 7% of patients waiting for more than 12 weeks for an appointment. Adopting a triage system to allocate patients to the most appropriate centre, **Option 4**, results in a service that ranks reasonably highly for every criterion; a substantial proportion of patients travel to receive more effective care, but most (70%) are treated locally. In order to maximise flexible and responsive care (see) staff should be redeployed to meet the patients' needs, **Option 5**. Such flexible staff deployment delivers local care. However, it is one of the least effective options (65%) since the local facilities are not always fully equipped. Combining triage with flexible deployment, **Option 6**, improves the efficiency of the service but reduces the number of patients receiving local care (69%).

The simulation provides an insight into managing physiotherapy services; however, the simulation does not include the costs of the redesign. The costs associated with redesigning the physiotherapy service to meet the various options would have a significant bearing on management decision-making, **Option 3**, local sites with restricted facilities; best reflects the current set-up and

would therefore not require investment. Unfortunately, **Option 3** performs the least best against the criteria.

	option	**Person Centred** Local care	**Person Centred** Not redirected	**Safe**	**Effective**	**Efficient** Patients p.a.	**Equitable** s.d of wait time	**Timely** <12 weeks	**Timely** mean wait (weeks)
1	single site	20%	100%	100%	100%	4118 ± 8	1.94 ±0.02	97.4 ±0.5%	7.09± 0.13
2	local sites with all facilities	100%	100%	100%	100%	4110 ±11	3.34 ±0.08	92.9 ±0.6%	6.84 ±0.32
3	local sites with restricted facilities	100%	98%	100%	65%	3805 ±11	4.11 ±0.09	86.7 ±0.9%	6.96 ±0.20
4	triage	70%	100%	100%	77%	4129 ±11	2.66 ±0.04	96.7 ±0.5%	6.86 ±0.14
5	flexible staff deployment	100%	98%	100%	65%	3816 ± 9	2.66 ±0.06	94.9 ±0.6%	7.03 ±0.15
6	triage & flexible deployment	69%	100%	100%	82%	4122 ± 9	2.35 ±0.03	96.6 ±0.5%	6.96 ±0.14
	best scenario	**2,3,5**	**1,2,4,6**	**1-6**	**1,2**	**1,4,6**	**1**	**1**	**2,4**
	worst scenario	**1**	**3,5**		**3,5**	**3,5**	**3**	**3**	**1,5**

Table 7-5 Comparison of Management Options

7.3.2.Redesigning Services for Older People

The Scottish Government through the JIT are working towards a Delivery Plan, as part of the Reshaping Care programme (see Table 3-4 Reshaping Care Pathway) – ensuring elderly people with complex needs are well supported: allowing older people to stay at home or to allow communities to offer supported care.

As part of the Change Fund allocation, (see 3.3.1.5) Fife was awarded over £2 million in 2012 to set up and run a service known as Hospital at Home (H@H) or the Virtual Ward (VW). A Virtual Ward is described: as using the same systems as a normal hospital ward without the physical building; where patients receive multidisciplinary preventative care at home through a combination of

home visits and telephone based care; where the staff mix is dependent on the patients' needs and the Virtual Ward has a fixed number of beds[257].

In an effort to reduce hospital admissions of older people, Fife has introduced a Hospital at Home service, which will be provided to elderly patients of 75 years and over. It is intended that the service will be available to patients from 8am to 10pm, initially for five days per week but moving to seven days per week. The purpose of the H@H is to divert patients, who meet the criteria at the times given above, away from Accident and Emergency (A & E) and the Acute Medical Admissions Unit (AMAU) to be being assessed, diagnosed, and subsequently cared for in their own homes. Three specialist teams covering all of Fife will run H@H and, given that the intention is to care for patients within their own homes, the service will also impact on the services provided by Social Care in Fife.

7.3.2.1.Modelling Services for Older People using Scenario Generator

Also, as part of the Reshaping Care for Older People programme run by the Joint Improvement Team (JIT)[258] NHS Fife were approached to build a model to illustrate the effect H@H would have on the 65 years and over population but also illustrate the effect of capping delayed discharge on acute beds. NHS Fife were approached because of their being one of the few authorities to have purchased SG software and because of their experience and willingness to use simulation modelling. The long-term expectation of JIT is to be able to demonstrate to other health authorities in Scotland the potential benefits to their services for older people based on the Fife model.

7.3.2.1.1.Aims and Objectives

The purpose of this modelling exercise is to explore the potential to reduce the number of acute beds required by older people. This will be investigated by the introduction of H@H for 75 year olds and over.

The scenarios identified for the study are shown in Table 7-6:

Scenario 1	Adults 16 years and over: Baseline
Scenario 2	Adults, 50% 75+ admitted to H@H working five days per week.
Scenario 3	Adults, 50% 75+ admitted to H@H working seven days per week.
Scenario 4	Adults, 60% 75+ admitted to H@H working five days per week.
Scenario 5	Adults, 60% 75+ admitted to H@H working seven days per week.
Scenario 6	Adults, 70% 75+ admitted to H@H working five days per week.
Scenario 7	Adults, 70% 75+ admitted to H@H working seven days per week.

Table 7-6 Scenarios identified for SG Study

7.3.2.1.2.Method

In order to understand the current system and before simulating options for H@H, the first step was to Process Map the current pathway for patients of 75 years and over. This was achieved through collaboration with staff at NHS Fife and can be viewed in Figure 7-6. The pathway illustrates the referral route, the service provision, and the exit routes available to patients. The Social Care pathway was also mapped to provide an overview of the possible routes taken by older patients (see Figure 7-7). The integration of healthcare with Social Care is highlighted in Figure 7-7.

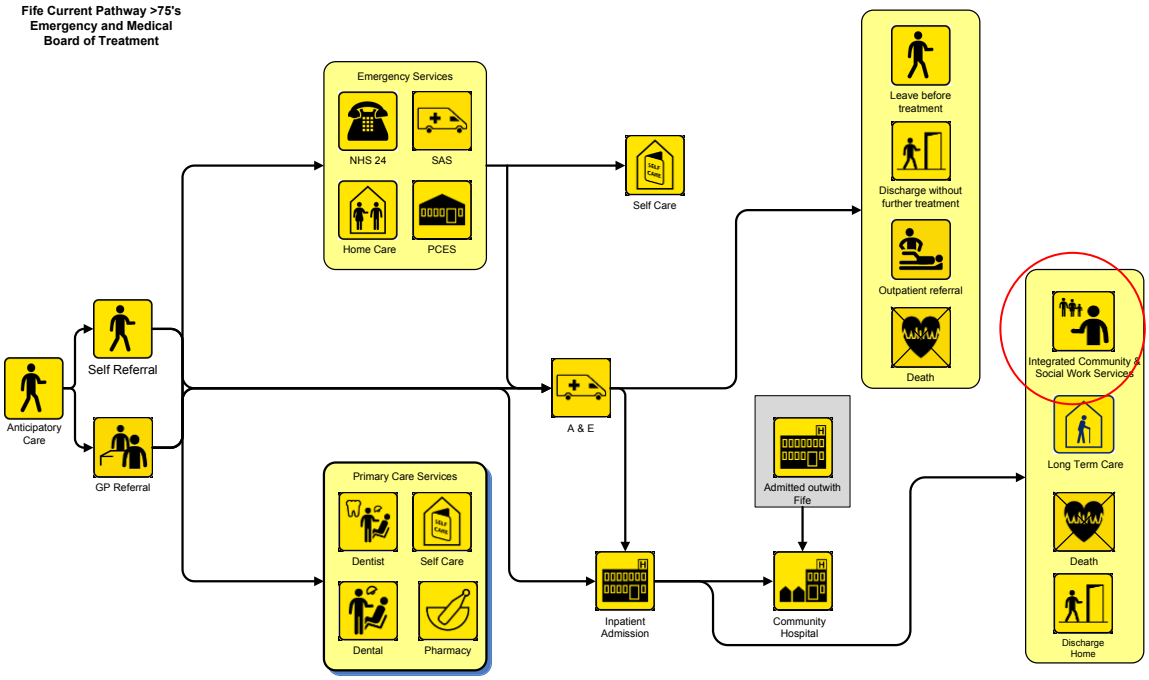


Figure 7-6 Fife Current Pathway for 75's and over.

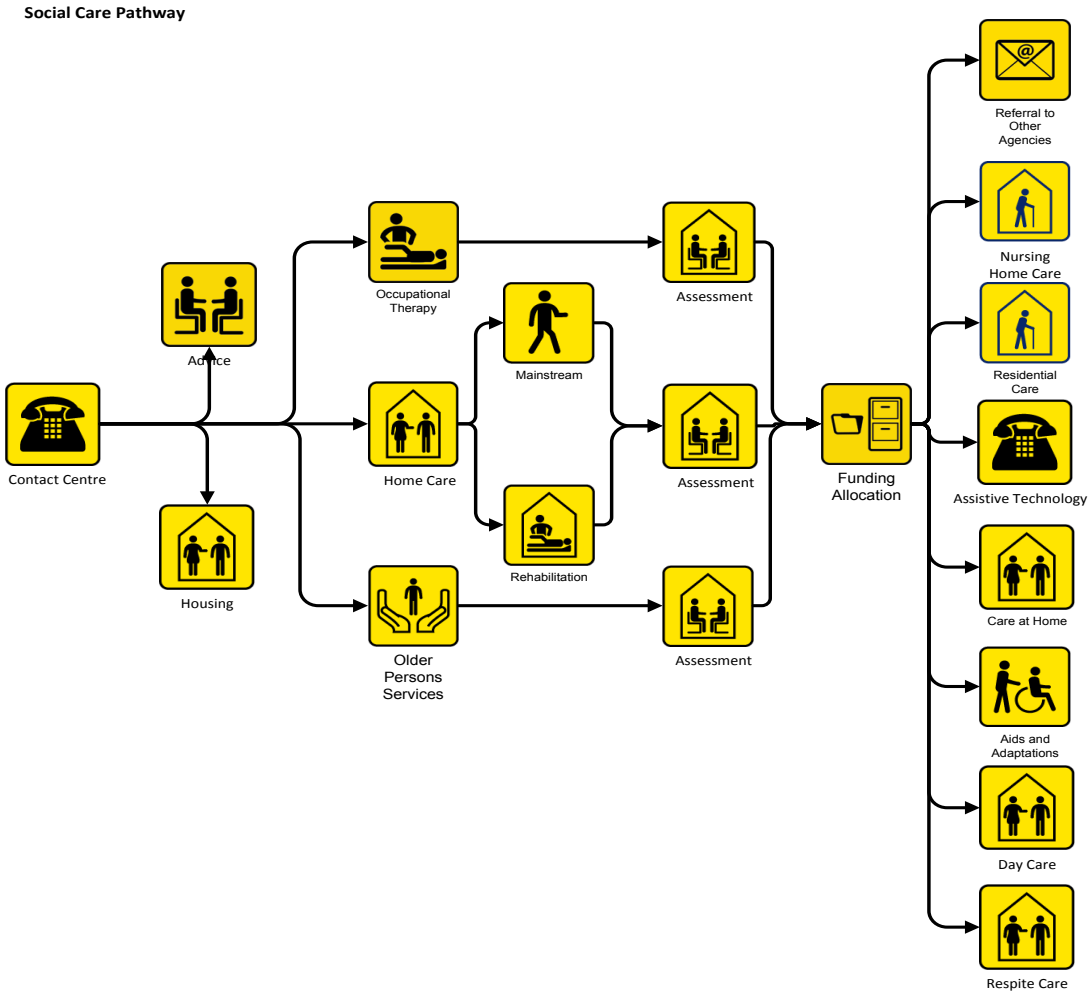


Figure 7-7 The Social Care Pathway

The concept of H@H is still very much in its infancy, despite being originally scheduled to start in October 2011, and there are very few exemplars to follow within the UK. However, the pathway for H@H was mapped based on the information available. The H@H pathway can be viewed in Figure 7-8; the map clearly illustrates how the Virtual Ward fits into the current pathway for 75's and over.

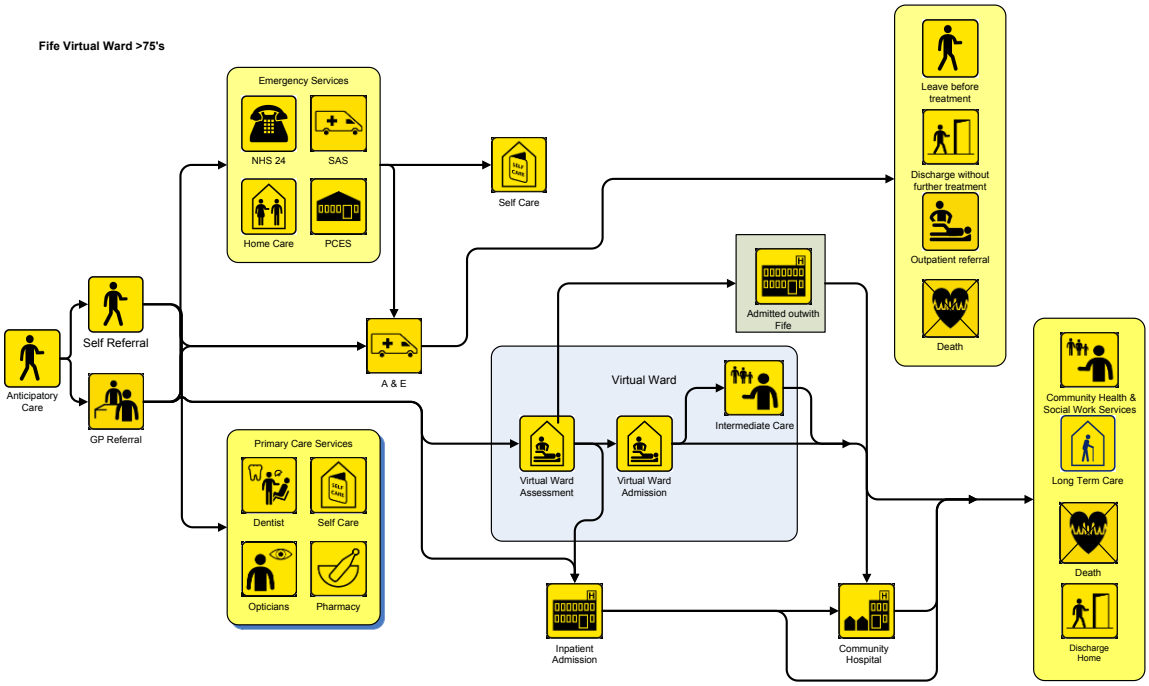


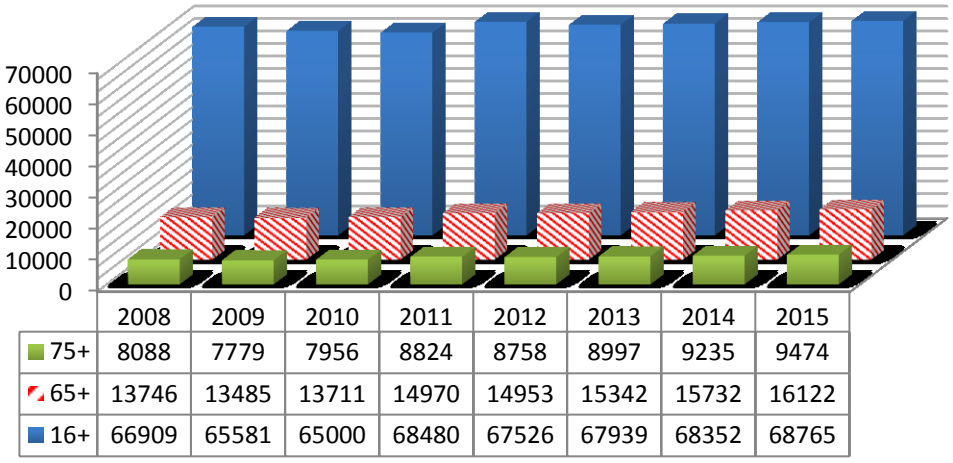
Figure 7-8 Fife Virtual Ward Pathway for 75's and over.

The default urgent pathway within Scenario Generator (SG) was the basis of the model: the software is embedded with health authority statistics therefore, Fife's demographics based on 2010 government statistics, and disease prevalence is included. The model is populated by Fife residents and therefore includes the tertiary services provided by Tayside, Lothian and Forth Valley health boards. The Fife resident adult population aged 16 years and over, attending Accident and Emergency (A&E) was modelled and would provide a

baseline for comparison. H@H in Fife is set up for older people 75 years old and over. Through consultation, it was decided that it would be reasonable to assume 50% of the population of 75+ year olds would initially be assessed before admittance to H@H. In addition, as it was not known how many 75+ year olds would meet the criteria of admittance to H@H after assessment, three scenarios were modelled representing: 50%, 60%, and 70% successful admittance. These percentages were thought to be realistic estimates of admittance for the Virtual Ward working both five days and seven days per week and which would produce results related to the reduction in the requirements of beds in acute and community hospitals, and therefore the reduction in costs, the demand which would be placed on the Virtual Ward, the demand placed on Social Services and the associated costs for both. Fifty trials, over a period of eight years from 1st January 2008 to 31st December 2015, were completed for each scenario, the mean, and 95% confidence limits of these trials recorded.

The data to generate the model was supplied by NHS Fife IS department. Data was provided for patients 16 years and over, 65 years and over and 75 years and over attending A&E (see Figure 7-9), patients admitted to Fife and the three tertiary hospitals as medical inpatients and surgical inpatients, and patients admitted to Fife community hospitals and tertiary community hospitals. The data was provided for four years from 2008-2011. The historical data provided by Fife IS department was used to calculate length of stay (los) numbers and referral rates. These calculations were also used to project the length of stay and the referral rates to be inputted into the pathway (see Appendix 21). The projections were calculated from the historical data and

forecasted until 2015, although SG has default projections, it was decided to employ the calculated projections in order to produce results, which fell within 5% of the historical data. In addition, the historical data reflects the already on-going improvements to services through technology and increased efficiencies. The historical attendances at A&E for 2008-2011 were used to forecast attendances for Adults, 65 year olds and over and 75 year olds and over and can be viewed in Figure 7-9.



	2008	2009	2010	2011	2012	2013	2014	2015
75+	8088	7779	7956	8824	8758	8997	9235	9474
65+	13746	13485	13711	14970	14953	15342	15732	16122
16+	66909	65581	65000	68480	67526	67939	68352	68765

Figure 7-9 Attendance at Fife A&E Base on 2008-2011 Historical Data

7.3.2.1.3.Results

The results produced by SG were exported to Excel where graphs of results and historically data were created. The historical data provided allows a hind cast to be performed on the first four years of the model results. These results validate the model and provide some assurances for the forecasted results produced for 2013-2015. The hind casts performed, with the exception of Community Hospitals, confirmed the model results fell within 5% of the known historical data (see Appendix 21).

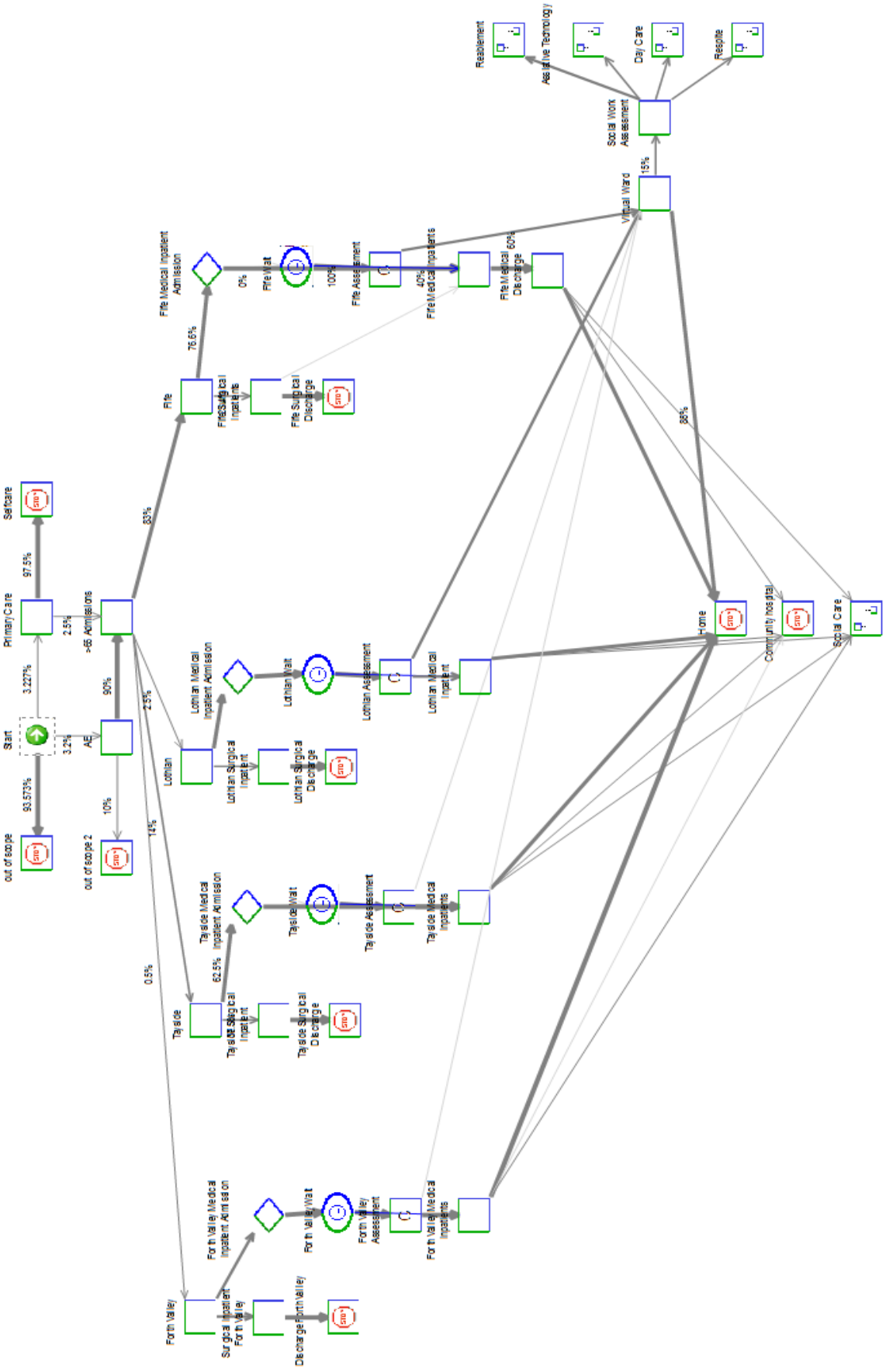
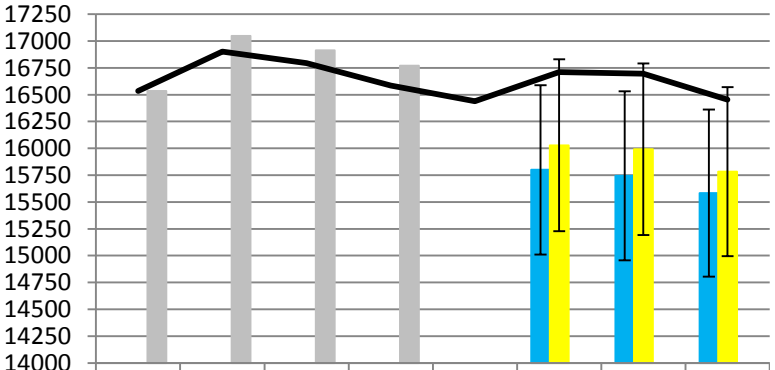


Figure 7-10 Scenario Generator Model

The SG model produced an abundance of results: results are produced for each station represented by a box in the model (see Figure 7-10), however the key results of interest to the study were:

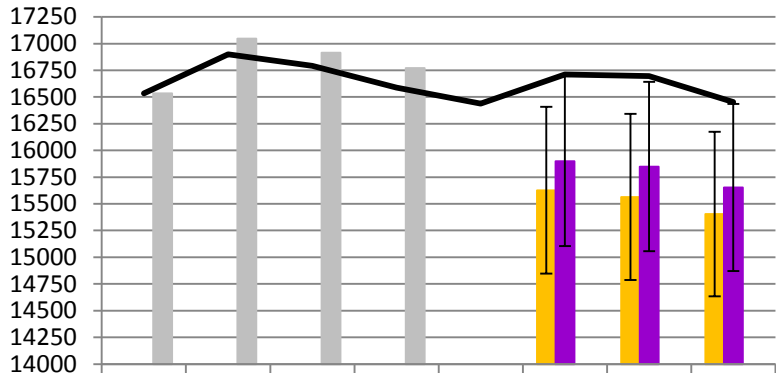
Medical Inpatient Admissions;
Medical Inpatient Bed Occupancy;
Community Hospital Admissions;
Admissions to the Virtual Ward;
Percentage Difference in Costs.

The following graphs depict the results produced; the historical data is shown by grey bars and the baseline data produced by SG from 2008-2015 (Scenario 1) illustrates the status quo and is depicted by a black line. As the results provided by SG are estimates, error bars are included to indicate ±5% deviation.



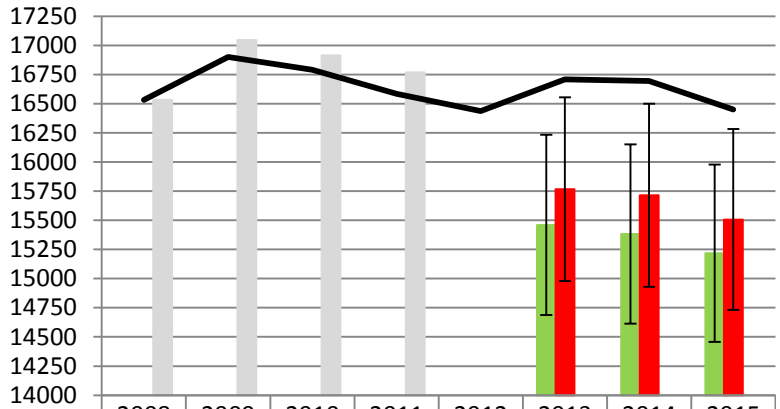
	2008	2009	2010	2011	2012	2013	2014	2015
VW 7 days 50%						15,800	15,745	15,582
VW 5 days 50%						16,028	15,991	15,783
Historical Data	16534	17047	16915	16770				
SG Baseline Data	16,534	16,901	16,793	16,587	16,438	16,711	16,696	16,453

Figure 7-11 Fife Medical Inpatient Admissions with 50% Admission to H@H (Scenario 2 and 3)



	2008	2009	2010	2011	2012	2013	2014	2015
VW 7 days 60%						15,627	15,564	15,405
VW 5 days 60%						15,900	15,849	15,652
Historical Data	16534	17047	16915	16770				
SG Baseline Data	16,534	16,901	16,793	16,587	16,438	16,711	16,696	16,453

Figure 7-12 Fife Medical Inpatients Admissions with 60% Admission to H@H (Scenario 4 and 5)



	2008	2009	2010	2011	2012	2013	2014	2015
VW 7 days 70%						15,461	15,382	15,218
VW 5 days 70%						15,768	15,715	15,508
Historical Data	16534	17047	16915	16770				
SG Baseline Data	16,534	16,901	16,793	16,587	16,438	16,711	16,696	16,453

Figure 7-13 Fife Medical Inpatients Admissions with 70% Admission to H@H (Scenario 6 and 7)

The three graphs above (Figure 7-11, Figure 7-12, Figure 7-13) provide evidence of a decrease in medical inpatient hospital admissions with a H@H provision in place. Figure 7-11 illustrates the potential reduction to medical inpatients in 2015 of 670 for 5 day working week and 871 for 7 day working with 50% admission to H@H, whereas 70% admission to H@H, as illustrated in

Figure 7-13, reduces admissions to medical inpatients by 945 for 5 day working and 1235 for 7 day working per week.

The potential reduction to medical inpatient admissions is reflected in the bed occupancy, which assumes the H@H patients would occupy a typical Length of Stay (LOS). Figure 7-14, Figure 7-15 and Figure 7-16 include the current number of 366 beds available in NHS Fife.

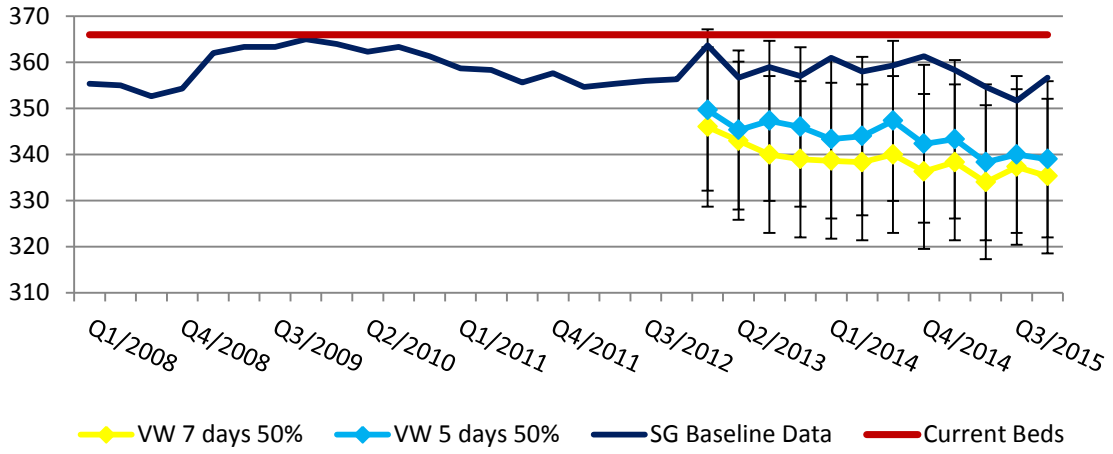


Figure 7-14 Medical Inpatients Bed Occupancy with 50% Admission to H@H (Scenario 2 and 3)

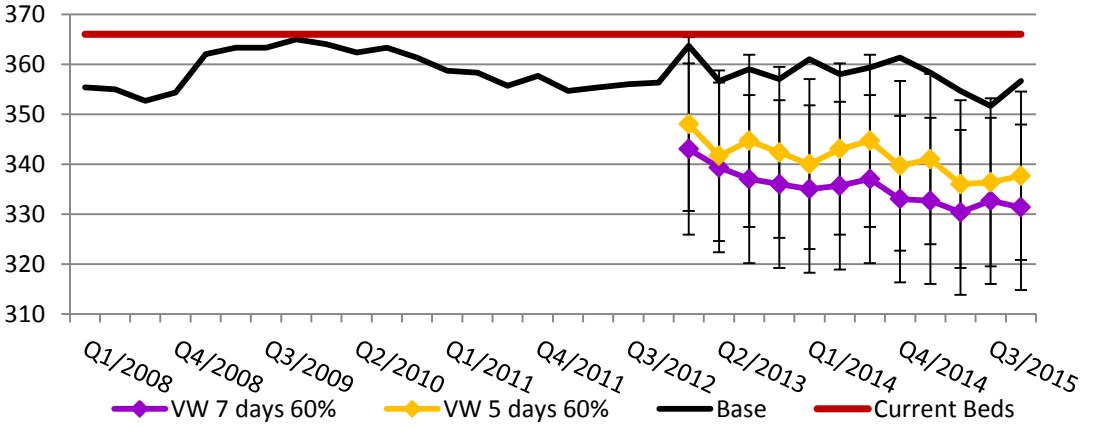


Figure 7-15 Medical Inpatients Bed Occupancy with 60% Admission to H@H (Scenario 4 and 5)

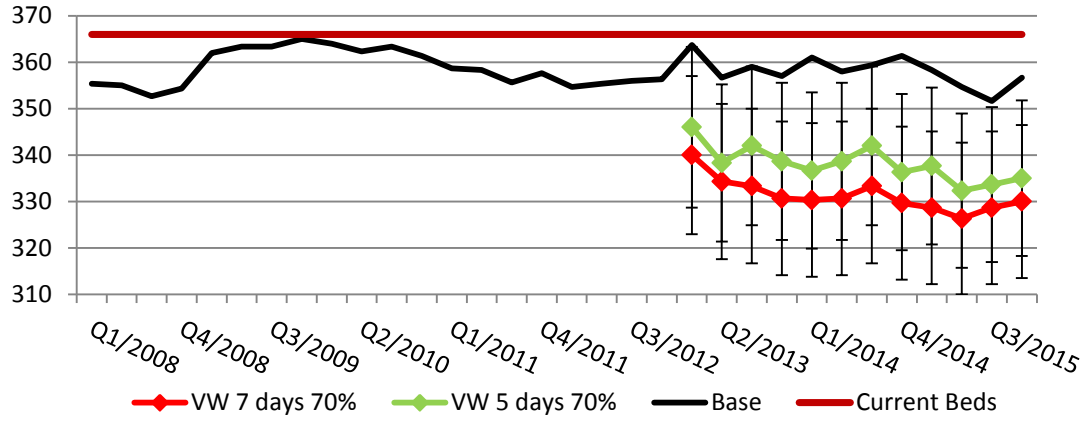


Figure 7-16 Medical Inpatients Bed Occupancy with 70% Admission to H@H (Scenario 6 and 7)

The default of SG is to apply 95% capacity to bed use, which is high compared to the normal ceiling placed on bed capacity of 85%, this of course further emphasises the imbalance between available beds and bed demand. The potential of Hospital at Home is to redress the balance between demand and capacity: 50% admission to the Virtual Ward whilst working 5 days per week in 2015 would results in a reduction in the demand of 18 beds and working 7 days; 22 beds. Increased admissions to the Virtual Ward will increase the reduction in the number of medical inpatient beds: 70% admission to the Virtual Ward whilst working 5 days in 2015 would results in a reduction in the demand of 22 beds and working 7 days; 27 beds.

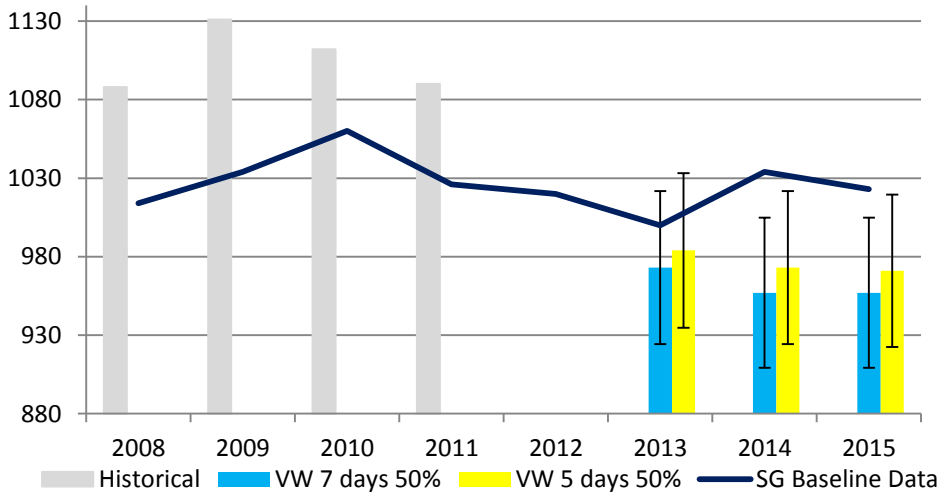


Figure 7-17 Community Hospital Admission with 50% Admission to H@H (Scenario 2 and 3)

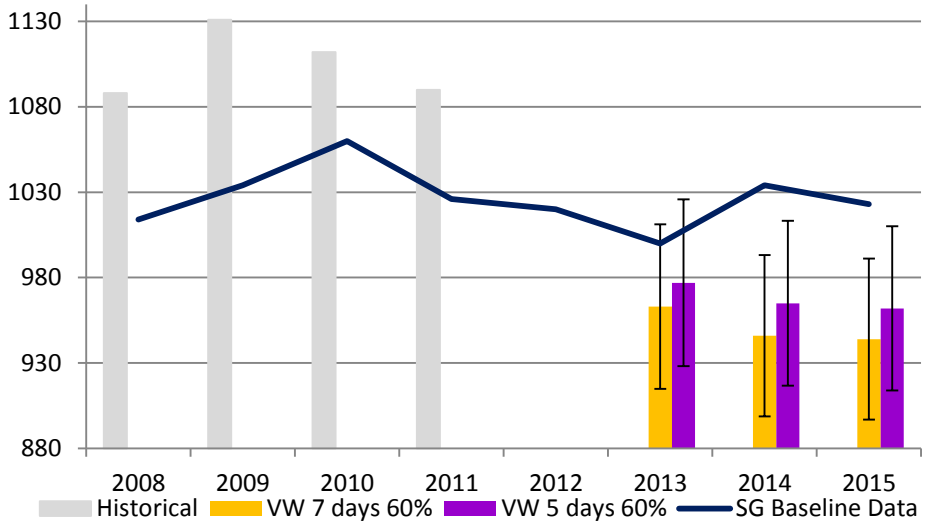


Figure 7-18 Community Hospital Admission with 60% Admission to H@H (Scenario 4 and 5)

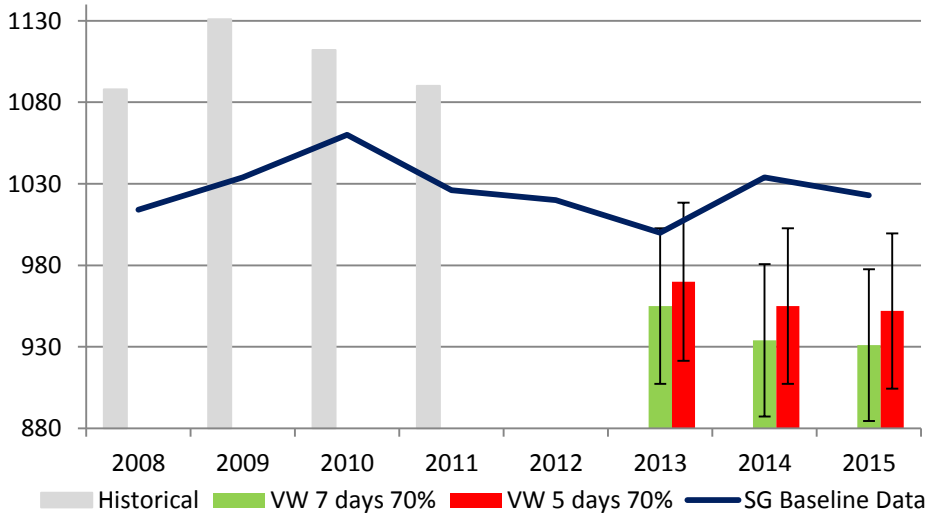
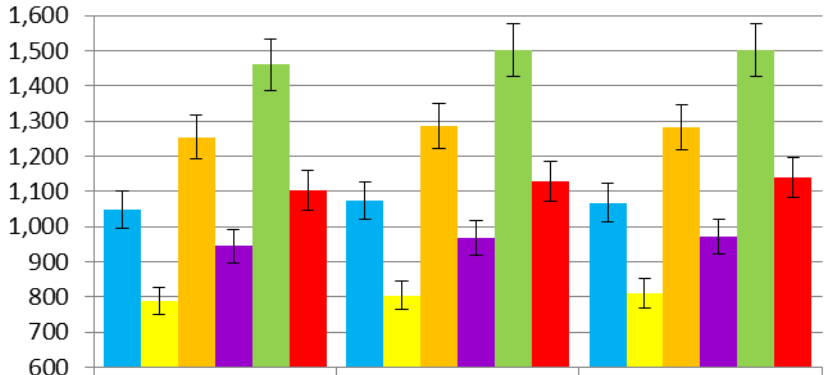


Figure 7-19 Community Hospital Admission with 70% Admission to H@H (Scenario 6 and 7)

Community hospital admission includes patients transferred from the tertiary areas of Lothian, Tayside and Forth Valley as well as from Fife. H@H provides the potential to reduce admissions to community hospitals in that the number of patients referred to community hospitals outside Fife will be reduced.

Due to the availability of the number of years of historical data the baseline data is outwith the 5% tolerance imposed of the historical data, however, there is still a potential reduction in community hospital admittance as illustrated in Figure 7-17, Figure 7-18 and Figure 7-19. Community hospital admissions will reduce

in 2015, if 50% admission to H@H is in place, by 52 for 5 day working and 66 for 7 day working. With 70% admission to H@H in place, these figures will increase: 71 for 5 day working and 92 for 7 day working.



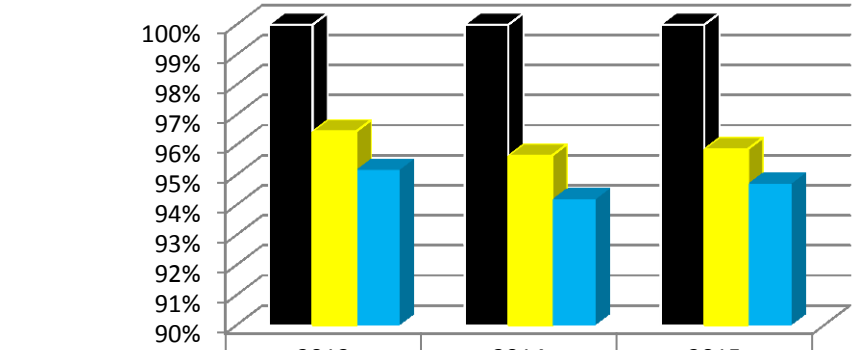
	2013	2014	2015
50% 7 days	1,048	1,073	1,068
50% 5 days	789	804	810
60% 7 days	1,254	1,287	1,281
60% 5 days	944	968	972
70% 7 days	1,461	1,501	1,503
70% 5 days	1,103	1,130	1,138

Figure 7-20 Hospital at Home Admissions 2013-2015

Admissions to the Virtual Ward will include patients aged 75 years and older from Fife and the three tertiary areas. The model calculates the number of 75+ year olds based on the historical data from 2008-2011 75+year old medical inpatients as a ratio of all adult medical inpatients. Fifty per cent of these older patients are assessed for suitability to Hospital at Home. Thereafter the model calculates, of the 50% assessed as being suitable for Hospital at Home, six scenarios as indicated in Table 7-6.

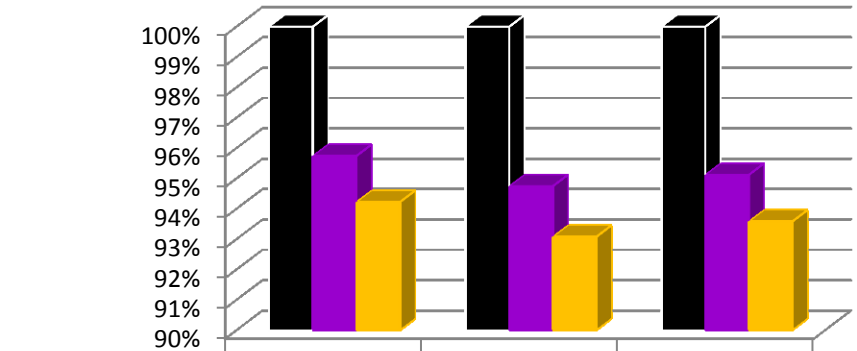
Figure 7-20 illustrates the potential number of patients who could be admitted to the Virtual Ward: the numbers range from 789 for 50% admittance 5 day working per week to 1503 patients for 70% admittance and 7 day working per week.

Costs based on current NHS costs are embedded in the SG software therefore costs were calculated for medical inpatient admissions; however charges were not made available to estimate the costs of the Virtual Ward. Therefore, Figure 7-21, Figure 7-22 and Figure 7-23 illustrate the percentage difference in costs, measured against the baseline data, of the impact to medical inpatient admissions of the Virtual Ward. As an example, the approximate baseline costs of adult medical inpatients for 2013 are £38,260,314, 3.55% difference in costs as indicated in Figure 7-21 would result in an estimated saving of £1,849,410.



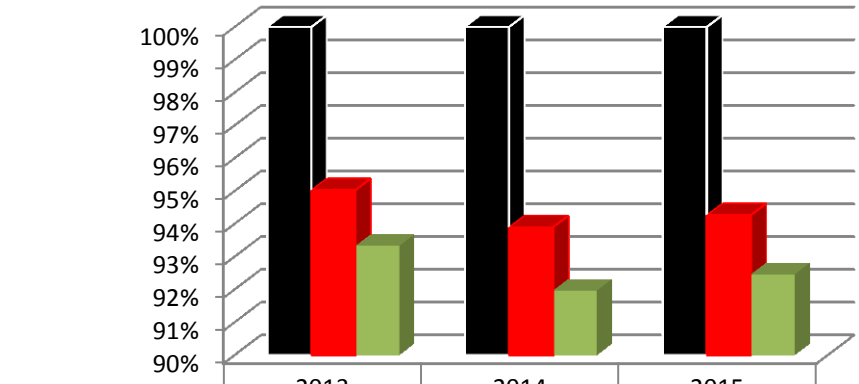
	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 50%	96.45%	95.64%	95.86%
VW 7 days 50%	95.17%	94.18%	94.71%

Figure 7-21 50% Admission to H@H %age Cost Difference against Medical Inpatients Baseline Costs



	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 60%	95.74%	94.74%	95.12%
VW 7 days 60%	94.23%	93.08%	93.58%

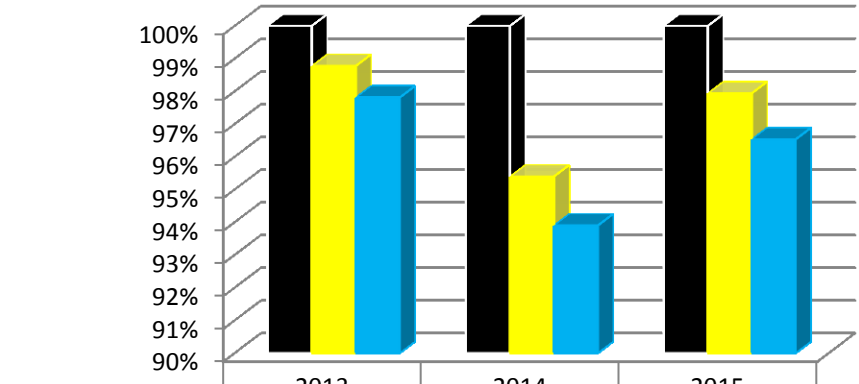
Figure 7-22 60% Admission to H@H %age Cost Difference against Medical Inpatients Baseline Costs



	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 70%	95.03%	93.90%	94.26%
VW 7 days 70%	93.33%	91.97%	92.46%

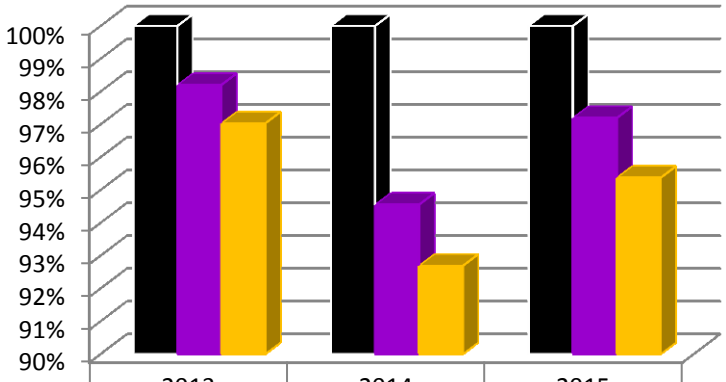
Figure 7-23 70% Admission to H@H %age Cost Difference against Medical Inpatients Baseline Costs

The percentage reduction in the costs range from 3.55%, with 50% inpatient admission and the Virtual Ward working five days, to 7.54%, with 70% inpatient admission and the Virtual Ward working seven days.



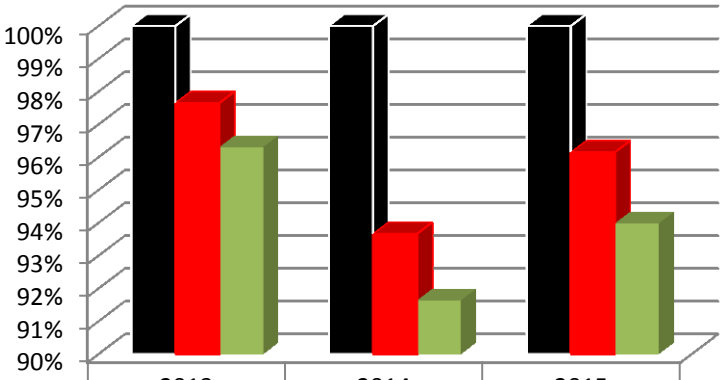
	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 50%	98.77%	95.40%	97.94%
VW 7 days 50%	97.81%	93.90%	96.53%

Figure 7-24 50% Admission to H@H %age Cost Difference against Community Hospital Baseline Costs



	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 60%	98.20%	94.55%	97.19%
VW 7 days 60%	97.03%	92.69%	95.37%

Figure 7-25 60% Admission to H@H %age Cost Difference against Community Hospital Baseline Costs



	2013	2014	2015
SG Baseline Data	100.00%	100.00%	100.00%
VW 5 days 70%	97.65%	93.66%	96.15%
VW 7 days 70%	96.31%	91.64%	93.98%

Figure 7-26 70% Admission to H@H %age Cost Difference against Community Hospital Baseline Costs

The SG model also calculates the costs of admission to a community hospital, again for the reasons stated above, the percentage difference in costs have been calculated. As illustrated in Figure 7-24, Figure 7-25 and Figure 7-26 the percentage difference increases in 2014 from 2013 but begins to decrease

again in 2015. The historical data provided by Fife IS department (see Appendix 21), shows a reduction in admissions to community hospitals in 2011 this has then been reflected in the calculated forecasted data for 2012-2015. As admission costs directly relate to the number of admissions this is reflected in the percentage difference in costs. However, the potential difference in costs still range from 1.23% with 50% community hospital admission and H@H working five days to 6.02% with 70% community hospital admission and H@H working seven days per week.

7.3.2.1.4.Outcome of the SG Modelling Exercise

The results presented above were supplied to members of the ICASS team at Fife. However, these members decided not to continue with SG modelling as:

> '*The modelling threw up too many questions for us, and many are unconvinced'.*

It is apparent from the sparse amount of information supplied by ICASS that the estimated Virtual Ward admission figures calculated by the model were lower than their expectations. They were also concerned with Community Hospital figures only containing those patients who had been admitted from acute hospitals and did not include referrals from elsewhere e.g. GPs.

7.3.2.1.5.Reflection

Simulating the impact of the introduction of Hospital at Home in Fife appears to provide evidence of the reduced number of beds and reduced number of admissions for inpatients and community hospital patients. Reducing Medical Inpatient admissions and the number of beds required is more in keeping with Shifting the Balance of Care (see Table 5-2). In addition, in 2011, 75+ year

olds accounted for 37% of all adult Medical Inpatient admissions and had an average length of stay of 11.5 days compared with the average of 7.3 days for all adults. The potential impact of the Virtual Ward would be to reduce the Inpatient Admissions by 7.5% and to reduce the total length of stay by approximately 12%. The historical data for Community hospital admissions indicates a reduction in admissions for the years 2010-2011. The community hospital data is made-up of admissions from acute hospitals only comparing the historical data it would appear that more patients were discharged home in these years than in previous years.

Although the results indicate a percentage difference in costs for both Inpatient Admissions and Community Hospital Admissions these costs do not take into account the cost of running the Virtual Ward. It is dependent on the costs of the Virtual Ward as to whether there is a cost saving to made by its introduction. Although treating older patients within their own homes is within the principles of Shifting the Balance of Care, the change in the demographics of the population and the current service provision, gives rise to the cost of taking care of older people as unsustainable (see 3.3.1.3.). Therefore, as well as shifting care closer to home, it is important that the cost of running the Virtual Ward is less than the savings made in acute and community hospitals. It is also important to note that real cost savings will not be realised by merely reducing admissions and therefore beds but by reducing enough admissions to close wards.

This modelling exercise using SG has taken approximately 12 months; far longer than it should have, but has provided many very valuable lessons during the process. Initially, the project consisted of three people, the leader, the modeller and the author. The author's role was to produce spreadsheets and graphs from the raw results, check for anomalies, and compare the outcomes. The modeller under the instruction of the leader constructed the models.

The original commissioners of the modelling exercise using SG were the JIT (see 3.4). The JIT were interested in exploring the SG software and approached Fife because the Redesign Team at Fife had invested in the SG software license, had experience running simulation models and because of Fife's proposal to use a percentage of their allocated Change Fund money to set-up Hospital at Home through ICASS. The JIT were initially interested in exploring the effect on the 65+ year old pathway by capping delayed discharges to fourteen days and by also exploring the effect of the Virtual Ward therefore the primary remit was set by them. However, this exercise relied on the cooperation of NHS Fife ICASS staff, particularly with reference to their resource planning of the Virtual Ward. NHS Fife staff, presumably because of the JIT's involvement, was wary of sharing information particularly concerning finances and failed to provide all of the data necessary to explore fully simulating the introduction of Hospital at Home.

Ten months into the project at a meeting organised by NHS Fife to discuss on-going projects potential duplication and information sharing, it was stated for NHS Fife's purposes the Hospital at Home modelling exercise should be

populated by adults 16 years and over as this would allow baseline comparisons to be made with the total number of medical inpatient beds available to NHS Fife.

7.3.2.1.6.Modelling Difficulties and Implementation Barriers

A few of the main difficulties experienced during this project can be viewed below and are categorised against the implementation barriers listed in Table 7-2 and are highlighted in red text:

Stakeholder Engagement

Involving stakeholders, having clear aims and objectives and correct and accurate data is crucial when model building but because this project centred around two separate stakeholder groups the purpose of the model became muddied, data inputs were estimated and the model became extremely complex (see 7.2.4.1: Stakeholder Engagement).

Hind cast results outside acceptable parameters

The acceptable parameters are set by SG at +-5% of the historical data, during the initial stages of the project only ten trials per scenario were run which was not enough to fully explore the randomisation of the various events and therefore hind casts of the results did not fall within the accepted parameters.

Incorrect data

The data provided by Fife's IS department has been reviewed and amended several times. Part of the reason for this was changes to the type of data being requested but also errors in the data provided. Furthermore, in the beginning only three years of historical data was available: 2008-2010, however data for 2011 became available during the project; models then had to be populated

again and re-run. Also data input errors by the modeller were found on several occasions, which affected the overall results (see Table 7-2: Data).

Change of modeller

Due to the cost of the software, only one version was available to the team. The modeller in the project had the software loaded onto his laptop; this meant access to the model was limited to times when the modeller was in the office. In addition, although the modeller found a glitch in SG that the programmers had to fix, it became apparent that he had not familiarised himself fully with the system and useful avenues were not being explored. In addition, this project was not the modeller's main work priority and deadlines for presentations were not being met. The leader of the project decided to remove the software from the modeller's laptop and load it onto a generally accessible machine to be specifically used for SG. In addition, in order to combat the over-reliance on one person, the leader arranged training for himself and the author in SG model building. Having gained insight into model building the decision was made by the leader and the author to rebuild the model from scratch as it was felt the model was unnecessarily complex (see Table 7-2: Cost; Experience; Conflict).

Scenario Variations

The number of scenarios modelled caused the main reason for the time taken to complete this project. An outline of the key model developments can be seen in Appendix 22. The excessive number of models and scenarios were as a direct result of unclear aims, conflicting outcome requirements, and wrong assumptions being made (see Table 7-2: Conflict).

User Friendliness of SG

The project utilised Scenario Generator Version 4.1.1 which is not particularly user-friendly particularly for the inexperienced modeller. The menu is not intuitive and unlike Simul8, illustration of the model running is not included. It is therefore impossible to check if calculated projections, referral rates etc. are being incorporated. This project required various scenarios to be run then compared with one another but the only way to compare scenarios is to copy an Excel table from the software for each step to be compared. This table, which includes data for each of the 50 trials completed, is then placed in an Excel file, the column containing the average of all of the trials is then copied into another Excel file. One scenario contained a minimum of ten steps to be copied into an Excel file this is not only extremely time consuming but also there is a great risk of human error (see Table 7-2: Cost).

7.3.2.2.Modelling Services for Older People using Simul8

7.3.2.2.1.Introduction

As discussed previously (see 7.2.3) Scenario Generator replicates a system at a high level, taking account of the whole system. DES using Simul8 replicates or forecasts processes within a system at an operational level i.e. staffing requirements. Whereas, SG was able to forecast admissions into hospital for Fife, the modelling exercise using Simul8 has the potential to cope with the variability in demand for admissions into acute care and will consider the staffing requirements, capacity, and costs of H@H.

The Virtual Ward simulation is based upon Fife NHS' Hospital at Home service. The service is available to patients aged 75 years and over where, if the patient

is deemed appropriate will be cared for at home and not admitted to Medical Inpatients. The Virtual Ward simulation uses the historical arrival pattern of patients to A &E and the referral model developed in the Acute Medical Admissions Unit (AMAU) simulations to generate the correct pattern of arrivals. Proportions of patients are identified as candidates for the Virtual Ward and undergo assessment followed by repeated episodes of care at home before being discharged. At various stages patients may be admitted as inpatients. In particular, if patients have to wait an excessive time for an assessment or for care on the Virtual Ward they will be admitted to inpatients.

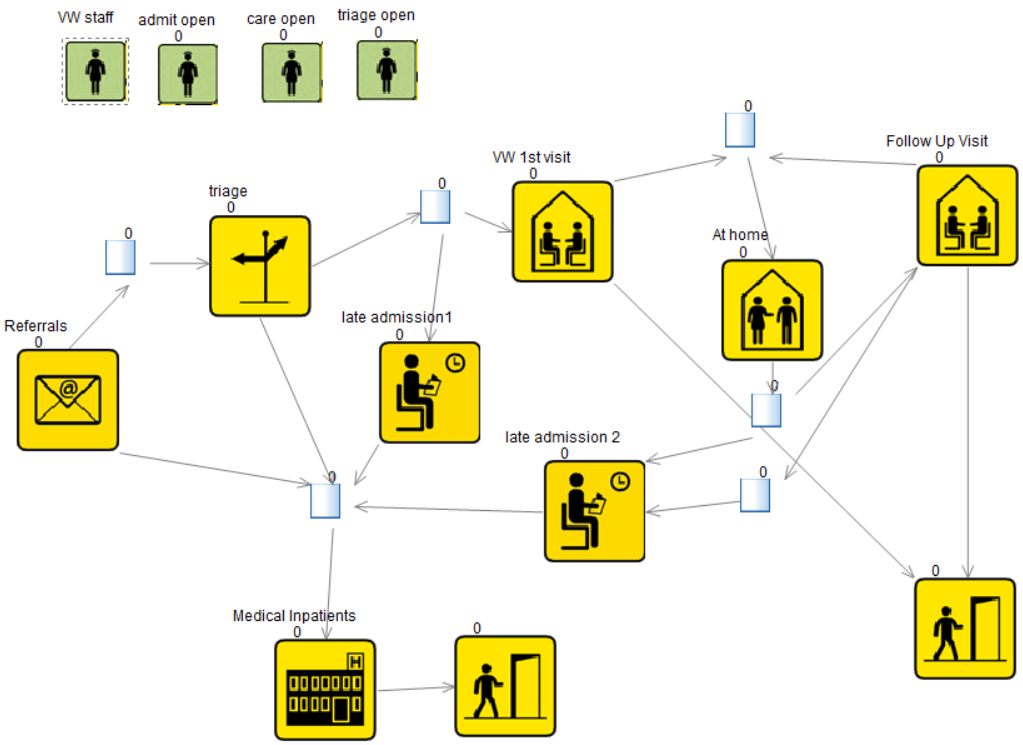


Figure 7-27 Simul8 H@H Model

7.3.2.2.2.Arrivals

While there could be multiple sources of patients, just one is considered here. This is modelled using a non-homogenous Poisson model with a transformation of the timescale to reflect the varying demand over the hour/ day.

The simulation employs a Poisson model with the probability of arrival reflecting the annual demand, as specified in the Simul8 spreadsheet “annual demand”. The annual demand is based on historical data from NHS Fife of Fife residents admitted as Medical Inpatients. The varying hourly and daily patterns of demand are specified in the spreadsheet variables “hourly demand” (168 hours for a typical week) and “weekly demand” (52 weeks). The proportions for each time period (hour or week) are specified and Visual Logic (on reset) determines the cumulative demand. The model then transforms the inter-arrival time (TA) generated by the simple Poisson model in the Visual Logic attached to each arrival distribution. During periods of high demand, the inter-arrival time is reduced; at times of low demand, the time is increased proportionally to the rate of arrival. This mechanism accurately reproduces the patterns of arrivals. This is in contrast to other, simpler approaches, which can generate large errors. The classic alternative is to use parameters (e.g. the mean demand) which vary over time: the classic problem is that an inter-arrival time sampled at a period of low demand can result in a short, busy period being completely omitted. The Simul8 “time dependent” distribution specification provides an option (“resample over run times to next slot”) which is designed to overcome this problem. This is fine in the case of very abrupt changes (very little activity followed by a busy period) but it can produce further errors by disrupting the arrival patterns.

“Referrals” generates patients with a weekly pattern of busy Mondays and Tuesdays (admissions being largely between 9 am and 4pm) and considerably less activity at weekends; this specified in the Simul8 spreadsheet “hourly demand”. A seasonal pattern, as specified in “weekly demand” can be

specified but this has not been used in the current model. Different demand patterns can be specified for each pathway.

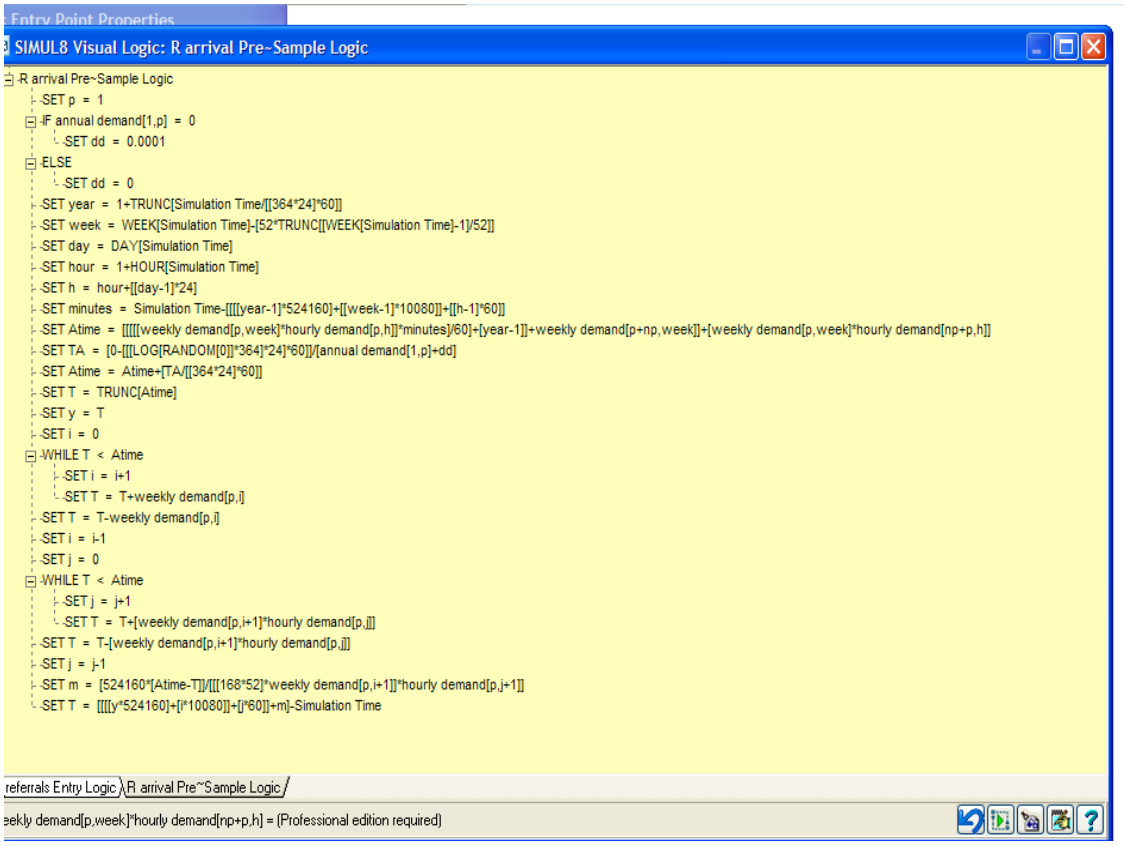


Figure 7-28 Transforming time to reproduce the arrival patterns

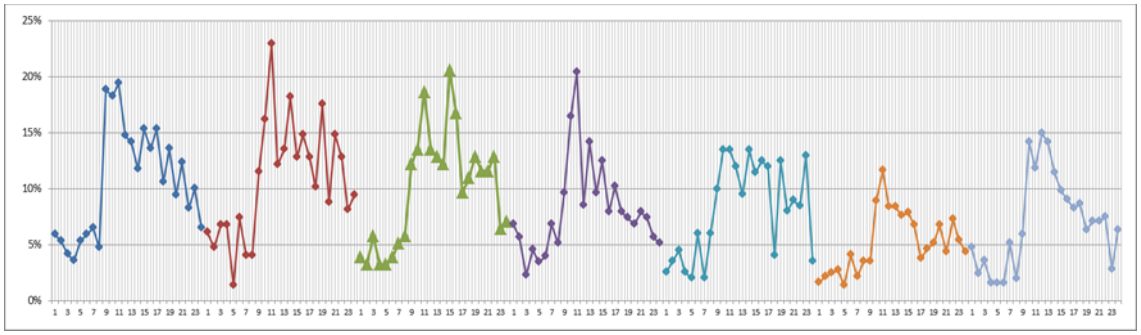


Figure 7-29 A weekly pattern of demand (7 days x 24 hours)

7.3.2.2.3.Resources and shifts

The VW assessment and care require a member of the "VW team". This team is a pooled resource, in that any member of the team can be called to work at any time:

VW open 08:00-22:00 7 days VW Care 08:00-21:00 7 days

VW admit 08:00-20:00 5 days Triage 08:00-20:00 7 days

Staff availability is specified as 85%, with a typical non-available time of 30 minutes, to model activities such as administration.

7.3.2.2.4.Key inputs

The key inputs are listed in Table 7-7.

Input variables	Explanation
hourly demand	Spreadsheet variable with n columns and 168 rows describing the hourly and daily variations in demand as a proportion of the total weekly demand.
weekly demand	Spread sheet variable with n columns and 52 rows describing the weekly variation as a proportion of the total annual demand
annual demand	Single column spread sheet variable with n rows: the total annual demand for each patient group/ source.
triage	12 hours of triage available per day, average time allocated per patient (= 30 minutes)
care category	1= admit as inpatient; not a candidate for H@H 2= assess as candidate H@H patient, but admit to medical inpatients 3= assess and accept as H@H patient
care	A distribution specifying the number of H@H care visits required based on historical data of medical inpatients length of stay.
1st visit	Average time allocated for visit (=120 minutes)
Follow-up visit	Average time allocated for follow-up visit (=30 minutes)
travel time 1	Average time required by H@H staff to travel to patient for visit; (=30 minutes)
maximum assessment wait	If this wait is exceeded, the patient is admitted to medical inpatients (=120 minutes)
maximum care wait	If this wait is exceeded, the patient is admitted to medical inpatients (=1440 minutes = 1 day)
care interval	time between follow-up visits (=1440 =1 day)

Table 7-7 Key Inputs into Simul8 H@H Model

The annual demand of 6650 referrals is based on medical inpatient (MI) admissions of Fife residents (see Appendix 23); the hourly demand has been calculated from 2006 AMAU data and 2011 arrival rates into A&E (see Appendix 24). The care category initially is set at a ratio of 50:15:35: 50% admitted to MI inpatients; 15% assessed as candidate for VW but admitted as inpatient to MI; 35% admitted to VW (see Appendix 25). The Follow-up visit occurs daily with the number of visits forming a distribution calculated based on the historical data of Medical Inpatients length of stay (see Appendix 26).

A further option for investigation was to apply a shift pattern to the pooled staff. A shift pattern was calculated based on average demand per day and per hour. Table 7-8 illustrates a proposed shift pattern and indicates the shifts: 8am-11am, 11am-4pm and 4pm-10pm as well as indicating the number of whole time equivalent (WTE) hours required per day on each shift. Details of the shift pattern calculations are in Appendix 32.

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Hours							
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	9	9	9	7	7	6	6
9	9	9	9	7	7	6	6
10	9	9	9	7	7	6	6
11	7	7	7	6	6	6	6
12	7	7	7	6	6	6	6
13	7	7	7	6	6	6	6
14	7	7	7	6	6	6	6
15	7	7	7	6	6	6	6
16	6	6	6	4	4	4	4
17	6	6	6	4	4	4	4
18	6	6	6	4	4	4	4
19	6	6	6	4	4	4	4
20	6	6	6	4	4	4	4
21	6	6	6	4	4	4	4
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0

Table 7-8 Proposed shift pattern indicating number of staff required

7.3.2.2.5.Aims and Objectives

The purpose of the modelling exercise using Simul8 is to explore the staffing levels required and the associated costs dependent on 75 years and older referrals to H@H.

7.3.2.2.6.Method

The method adopted for the Scenario Generator exercise was also adopted here (see 7.3.2.1).

7.3.2.2.7.Results

Ten trials were conducted for each scenario, the main scenario containing the inputs as above (see 7.3.2.2.4). The results produced by simul8 were imported into Excel. Table 7-9 provides a key to the abbreviations made in the graphs.

Abbreviation	Explanation
VW 5 days	Virtual Ward admitting 5 days per week
VW 7 days	Virtual Ward admitting 7 days per week
Cost Savings 5 days	Virtual Ward admitting 5 days per week associated cost saving
Cost Savings 7 days	Virtual Ward admitting 7 days per week associated cost saving
Shifts 5 days	Virtual Ward admitting 5 days per week with shift pattern
Shifts 7 days	Virtual Ward admitting 7 days per week with shift pattern
VW 6990	Virtual Ward admitting 5 days per week with annual demand of 6990 patients
VW 7250	Virtual Ward admitting 5 days per week with annual demand of 7250 patients
VW 50:10:40	Care Category Ratio

Table 7-9 Key to Graphs

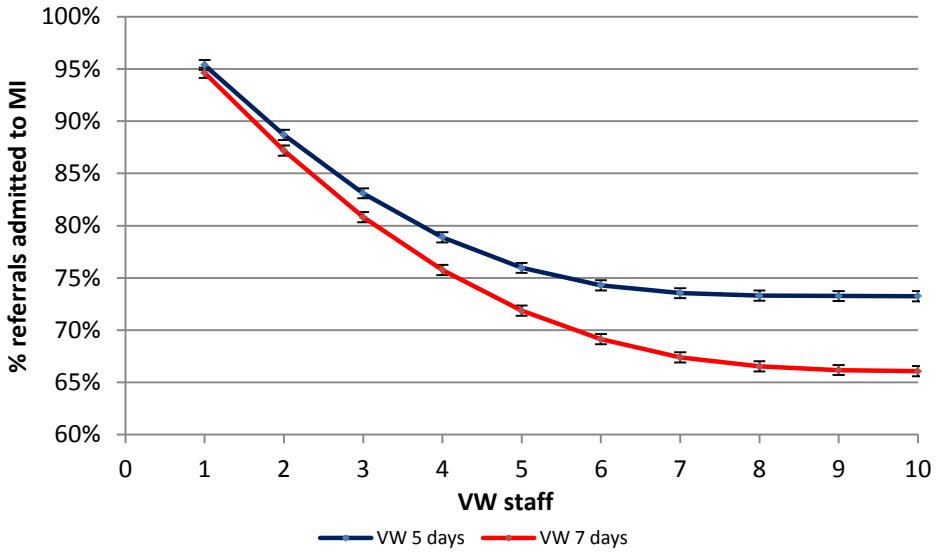


Figure 7-30 The Trade-off between VW Staff and Avoidance of MI Admissions

Figure 7-30 (see Appendix 25 for detail) illustrates the trade-off between the percentage of referrals to medical inpatients and the number of staff required to run the Virtual Ward (VW). As can be seen the percentage of referrals begins to level out between 7 and 8 members of staff at 73.3%±0.5%, consequently adding more members of staff at this point does not decrease the number of referrals to Medical Inpatients(MI). A further scenario was also explored where-by the VW admits at weekends as well as weekdays; this may be an option for

the ICASS team at a future date. As can be seen in Figure 7-30 the percentage of referrals to MI is decreased further and the optimum level of staff is between 8 and 9 at 66.2%±0.5%. One member of staff indicated in Figure 7-30 equates to 3.16 whole time equivalent (WTE) members of staff working a normal 37.5 hour week.

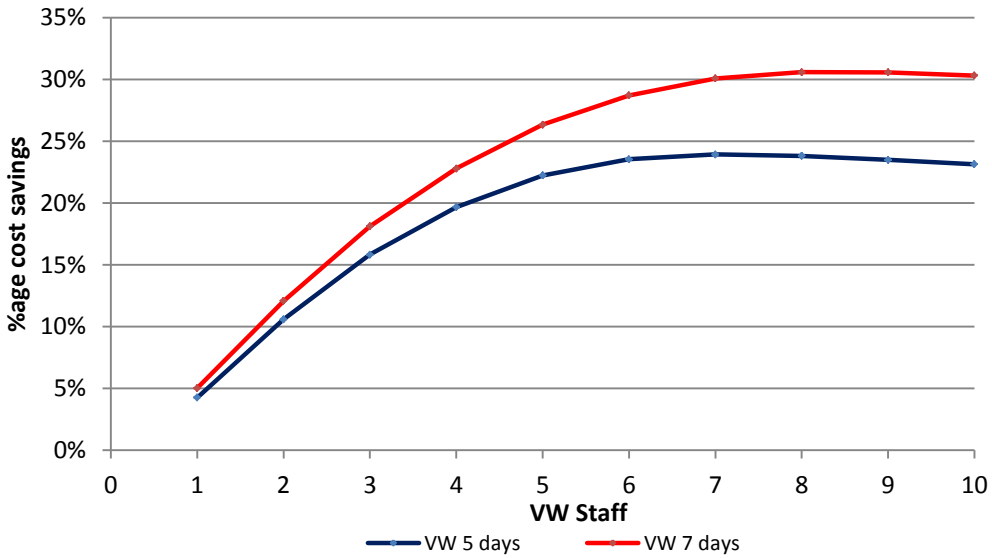


Figure 7-31 Percentage of Cost savings measured against MI Costs

The costs of MI admissions are calculated per day at £484 (see Appendix 28) and the costs of Hospital at Home are calculated based on an average salary and travel costs (see Appendix 29)(the length of stay is assumed to be similar to average length of stay in hospital). The simulation results were incorporated to calculate the difference in costs between all patients admitted to MI and proportionate numbers of patients being admitted to the Virtual Ward (see Appendix 30). Figure 7-31 indicates that savings will be made with only one member of staff working in the Virtual Ward. When further VW staff are employed (≥8) the additional savings associated with reduced MI admissions do not cover the additional staff costs. Savings optimise at 7 members of staff

with 23.9% cost savings. The cost savings were also calculated for 7 day working (see Appendix 31), but assume no over-time payment, the cost savings are optimised at 8 and 9 members of staff with 30.6% savings.

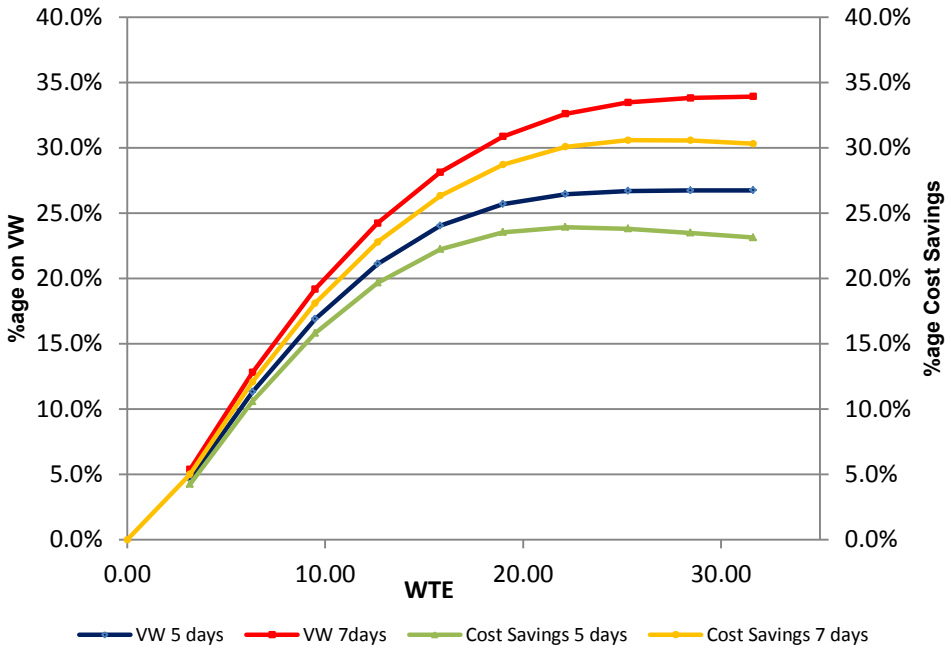


Figure 7-32 Staff WTE V's %age of Referred Patients admitted to VW and Cost Savings

Figure 7-32 illustrates the percentage of patients admitted to the VW for both five day and seven day working along with the associated percentage cost saving; this graph illustrates that the percentage of patients in the VW plateaus at around 25.3 WTE but that the percentage of cost savings begins to decrease at this point.

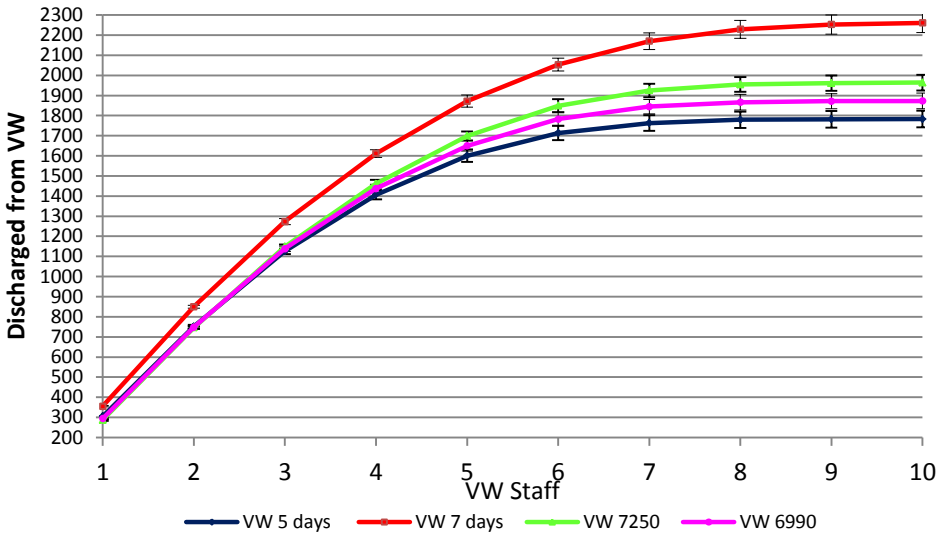


Figure 7-33 VW Staff V's Nos. Discharged from VW

As well as exploring the effects of seven-day admittance to the VW, other scenarios were also investigated: if the number of referrals reached the 2008 figure of 7250 p.a. or if the number of referrals reached the 2011 figure of 6990 p.a.. Figure 7-33 illustrates the comparison of 6650, 6990 and 7250 referrals of 75 year olds and over to MI, as well as a comparison of 7 day admittance to the VW with 6650 referrals. With eight staff members working 1779, 1872, 1961 and 2253 patients respectively would be discharged from the VW.

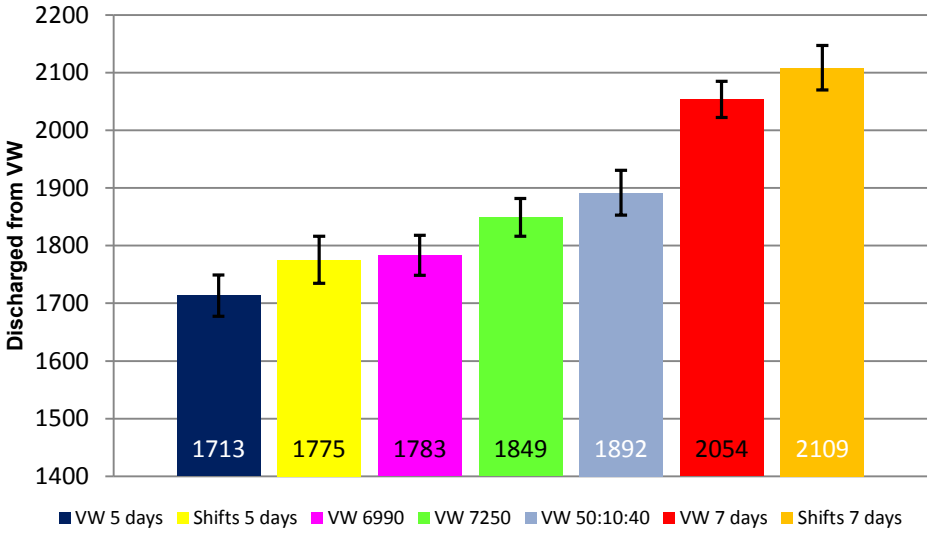


Figure 7-34 Comparisons of VW Options

In order to give a direct comparison of the various scenarios conducted Figure 7-34 illustrates the difference in the numbers of patients discharged from the VW. As well as seven day admittance and increased referrals, changing the care category ratio to 50:10:40, implementing a shift pattern (see Appendix 32) and implementing a shift pattern for 7 day admittance to the VW were all trialled. As illustrated in Figure 7-34 any condition which increases the referral rate or the following triage rate increases the number of patients discharged from the VW. However, the implementation of a shift pattern for six staff members increases the efficiency of the running of the VW with 62 more patients discharged for five day admittance and 55 more patients discharged for seven day admittance.

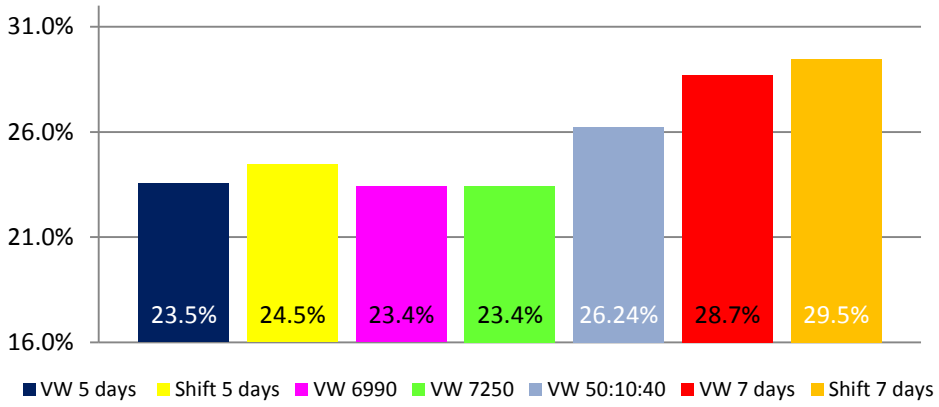


Figure 7-35 Percentage of Cost Saving Comparisons

Figure 7-35 illustrates the cost savings associated with the scenarios in Figure 7-34. The VW admitting for five days per week produces the same cost savings even when the initial referral numbers increase. Changing the care category to 40% of patients triaged and admitted to the VW increases the cost savings to 26.2%. Introducing a shift pattern to five-day admittance will improve cost savings but seven day admittance produces the highest cost saving overall at 28.7% and 29.5% with shifts.

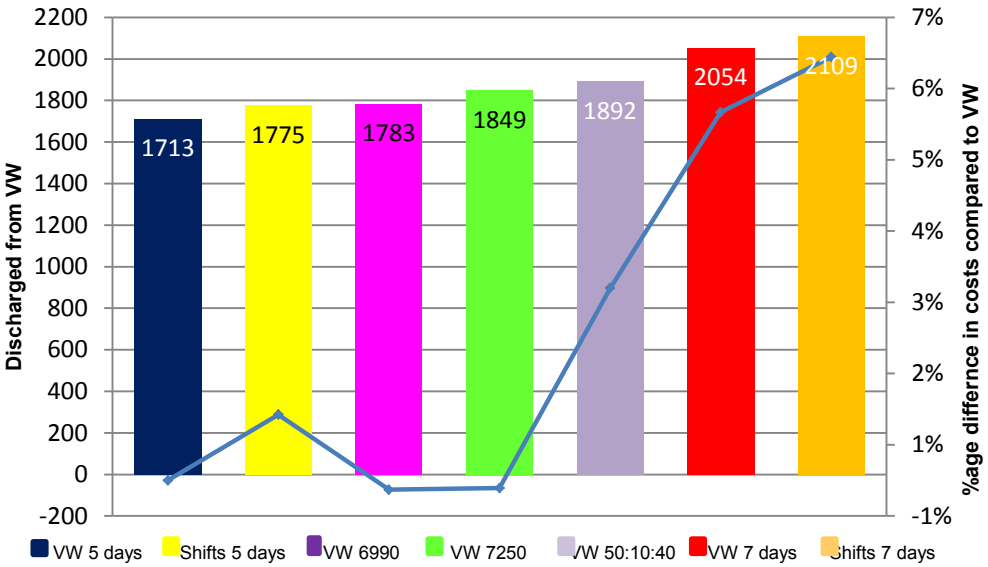


Figure 7-36 VW Discharge Options and Cost Savings

Figure 7-36 duplicates the data contained in Figure 7-34 but in addition compares the percentage cost saving with that realised for the VW. Introducing shifts to the VW is one per cent higher than the savings made on the VW without shifts.

7.3.2.2.8.Discussion

Within the limitations of the simulation, caring for older people in their own homes does reduce the number of medical inpatient admissions, this simulation exercise explores a few variations, but the amount of medical inpatient days saved is dependent on the number of older patients who can be admitted to the Virtual Ward. The number of patients admitted is calculated from a forecasted number of referrals and an arbitrary care categorisation. The criterion for accepting patients into the Virtual Ward is still under consideration but these decisions will have consequences on the outputs. For instance, if patients with conditions traditionally requiring a short length of stay are the main criteria for the VW then the number of patients discharged from the VW will increase. However, it is advocated[259] that the criteria for admittance to a Virtual Ward

should be determined using Predictive Risk Modelling[260]. This type of preventative model analyses data such as demographics, previous admittance, diagnosis, chronic conditions and community characteristics to determine the likelihood of a patient being admitted to hospital. This type of predictive assessment would at least be a more informed method of access to the Virtual Ward for patients their carers and staff to understand.

In the model described above the number of patients entering the Virtual Ward is not restricted by staffing numbers but by the admittance hours and by the care categorisation. The staff numbers reach an optimum point at around 8 members of staff when the Virtual Ward admits five days per week. Extending the admittance to seven days per week will increase the numbers on the Virtual Ward by approximately 20% with six staff members and increasing the percentage admitted to the Virtual Ward to 40% will increase the numbers on the Virtual Ward by 10%. Extending the days of admittance is a possible action for the future, which is being deliberated by Fife. The optimum configuration of the number of patients and caseload of staff is an area of debate in the literature [261] [262] [263] [264] : Higher caseloads are associated with care that is more reactive which results in higher hospital admissions [263]. Alternatively, lower caseloads increase the quality of the service delivery, but have implications on the cost-effectiveness of the scheme. Therefore, there appears to be a trade-off to be made between the qualities of care versus the size of the caseload. In addition, more complex patients require more time dedicated to their care, therefore, the case mix of patients has an impact on the size of caseload: [262]. However, a research paper found that case management has no overall impact

on hospital admission rates[265]. Authors in this area have suggested that a framework of target caseloads needs to be established [261] [262].

Based on the costs inputted the Virtual Ward will result in cost savings. The cost savings reach an optimum point at around seven members of staff when 23.9% of costs could be saved. However, making best use of staff time and implementing a shift pattern results in more patients admitted to the Virtual Ward and further cost savings. The cost savings made are dependent on the reduced admissions to unplanned acute care. The supporting evidence of Virtual Wards cost-effectiveness is divided: A review of home visits to elderly patients concludes there is no evidence to suggest a reduced effect on hospital admissions[266]; however, others say there is potential for savings to be made[267] [268]. A study of a Virtual Ward in Croydon, however, did report cost savings of £1 million, but the author did qualify this by saying because of other on-going improvements it was difficult to assign these savings purely to the Virtual Ward [259]. Others prefer to state that the cost-effectiveness of a Virtual Ward is yet to be established [261] [259].

However, the simulation modelling exercise does not explore the 'softer' side of the impact of a Virtual Ward(see 4.2.4.2): There is existing evidence stating that a Virtual Ward option is popular with both patients and staff[259]; there is a positive impact on mortality[266] [268] and services are delivered more effectively[268] and efficiently[268] [266].

7.3.2.2.9.Model Limitations

The following limitations of the model and subsequent amendments could provide further useful results:

1. The costs of the Virtual Ward are based on an average salary but do not take into account any resultant costs to Social Care. It is inevitable if patients are being cared for in their own homes receiving one visit per day from VW staff they will require additional input from Social Care i.e. help with dressing, help with meals, or mobility aids, in the true spirit of integrated care. Currently data is not available for these costs but should be included in the overall costs of the VW.

2. The simul8 model is generic: it represents the three Fife CHPs. It is possible, if each CHP is modelled separately, that the staffing figures could be less efficient if staff do not work across the CHP geographical border.

3. The model, and the data provided, assumes a fixed time to travel to patients. It is intended that each CHP's VW will work from a centralised location within the CHP area. However, considering the geographical area of Fife and of each CHP (see Figure 2-9) a fixed time for travel is not realistic. A model, which considers mileage, would provide a more accurate estimate of travel time and the associated costs both in monetary terms and the time left to visit with the patient.

4. Point 3 above gives rise to another consideration, should staff attend patients based on their geographical location and hence spend less time travelling or should staff practice continuity of care and only visit those patients that have been allocated to them no matter the location? The Quality Strategy[256] advocates continuity of care, whereby the patient regularly sees the same carer

and can therefore build a relationship with that carer, however, continuity of care is not necessarily the most efficient use of resources.

5. The model allocates any staff member from the VW pool to any patient on the VW. Two further scenarios could be explored here: the professional level of the staff member and whether staff should be accompanied by a colleague during visits to a patient's home. The first visit to the patient where the patient is assessed and treatment decided upon would be conducted by a higher grade nurse such as a Band 6 or 7, thereafter, depending on the condition of the patient care may be provided by a lower level nurse such as a Band 5 or 4. In addition, the Quality Strategy advocates safety for patients and staff, it is therefore important to recognise that for the majority of times the staff will be working on their own and take precautions accordingly [269] Ideally it should be possible to explore the trade-off between efficient use of staff (e.g. despatching the nearest staff to the VW patient) with continuity of care and with the professional level of the care giver as a key measure of quality and safe working.

7.3.2.2.10.Implementation Barriers

The main implementation barriers found during this exercise are listed below and illustrated with reference to Table 7-2 and highlighted in red text. The main implementation barrier to simulating H@H was the modelling exercise using SG: The intention was to use the high-level outputs from SG to inform the Simul8 model but because the SG project took so long, time ran out for the Simul8 modelling exercise to be presented to Fife staff. The results were submitted to Fife later but feedback has not yet been received (see Table 7-2: Conflict). The data received for both SG and Simul8 did not include enough

information to evaluate fully the costs of H@H, therefore it is difficult to assess how cost effective H@H can be (see Table 7-2: Data). The input of Social Care into H@H was not explored due to the lack of input from stakeholders (see 7.2.4.1: Stakeholder Engagement).

7.4.Evaluation of Process Mapping and Discrete-event Simulation

This Case Study presented experiences of Process Mapping, Discrete-event simulation using Scenario Generator software and Discrete-event simulation using Simul8 software. The experiences have been applied to the Evaluation Framework (see Figure 5-12) and depicted in. Figure 7-37.

User

The User of a Process Mapping model can be an Analyst, Facilitator or a Participant but the User of a Simulation model tends to be an Analyst (see Table 4-2). Due to time constraints and changes in personnel the Process Mapping and Simulation modelling exercises described in this Case Study were not implemented into NHS Fife and therefore, the User in relation to the Evaluation Framework will be taken from the perspective of the Analyst (the author).

Model Type

The Model Type of Scenario Generator is Type 3- Strategic Model. SG has the ability to replicate or Forecast the whole system and therefore is capable of demonstrating the effect of change within one process can affect the whole system. The evidence suggests that Process Mapping can also be described as a Type 3 model; the high-level approach to estimating admittance into H@H was Process Mapped in the first instance to understand the current pathways. Process Mapping H@H and DES using Simul8 to forecast H@H are Type 2

Models- Operations Models. From the experience discussed Information Quality, System Quality, and Service Quality can all be measured and can be used to measure User Satisfaction that could result in a Net Benefit to the Organisation and to the Patient.

Information Quality

The Information Quality of the three models: Process Mapping (PM), Scenario Generator (SG) and Simul8 (S8) all were relevant, useful and easily understood.

PM POSITIVE

SG POSITIVE

S8 POSITIVE

System Quality

Process Mapping is particularly easy to use, is readily accessible and easily understood. SG on the other hand is not particularly user friendly or adaptable: changes are time-consuming. In addition, the cost of the software reduces its accessibility. Simul8, however, does not have the same associated costs is easily adapted and is reliable.

PM POSITIVE

SG NEGATIVE

S8 POSITIVE

Service Quality

With the exception of SG, service provision was not required for the other two models. In the case of SG, due to the inexperience of the modellers with what is relatively new software, the service provision was overall good. The service providers, although not always available, were empathetic and encouraging.

PM NA

SG POSITIVE

S8 NA

Net Benefits to Organisation

Although the models were not implemented into Fife, in the main, there are still Net Benefits to the Organisation of the experiences recorded above. Process Mapping physiotherapy services (see 7.3.1) informed metric collection for the Back Pain Project (see 6.6). The results of the Scenario Generator project provided information to staff, which made them question their approach to H@H. The results of the Simul8 project have been sent to Fife for use in their discussions about H@H going forward. However, since these models have not been implemented, there can be no recognised Net Benefit to Patient.

PM POSITIVE

SG NEGATIVE

S8 Unknown

User Satisfaction

From the User's perspective, the satisfaction of use of these models is mixed. Process Mapping is easy to use and clearly illustrates the patient's pathway. It also provides a sound basis for further modelling i.e. DES.

PM POSITIVE

Many of the difficulties using SG were the result of poor aims and objectives and changes in personnel. The results produced by SG appear to be valid; however, although there are many benefits to SG, overall using the model was frustrating and time consuming.

SG NEGATIVE

Simul8 has been tested over a far greater period of time than SG; therefore, using the model did not throw up the same frustrations as SG. The results, although not validated by staff, exemplify the flexibility of the model to test different options for comparison.

S8 POSITIVE

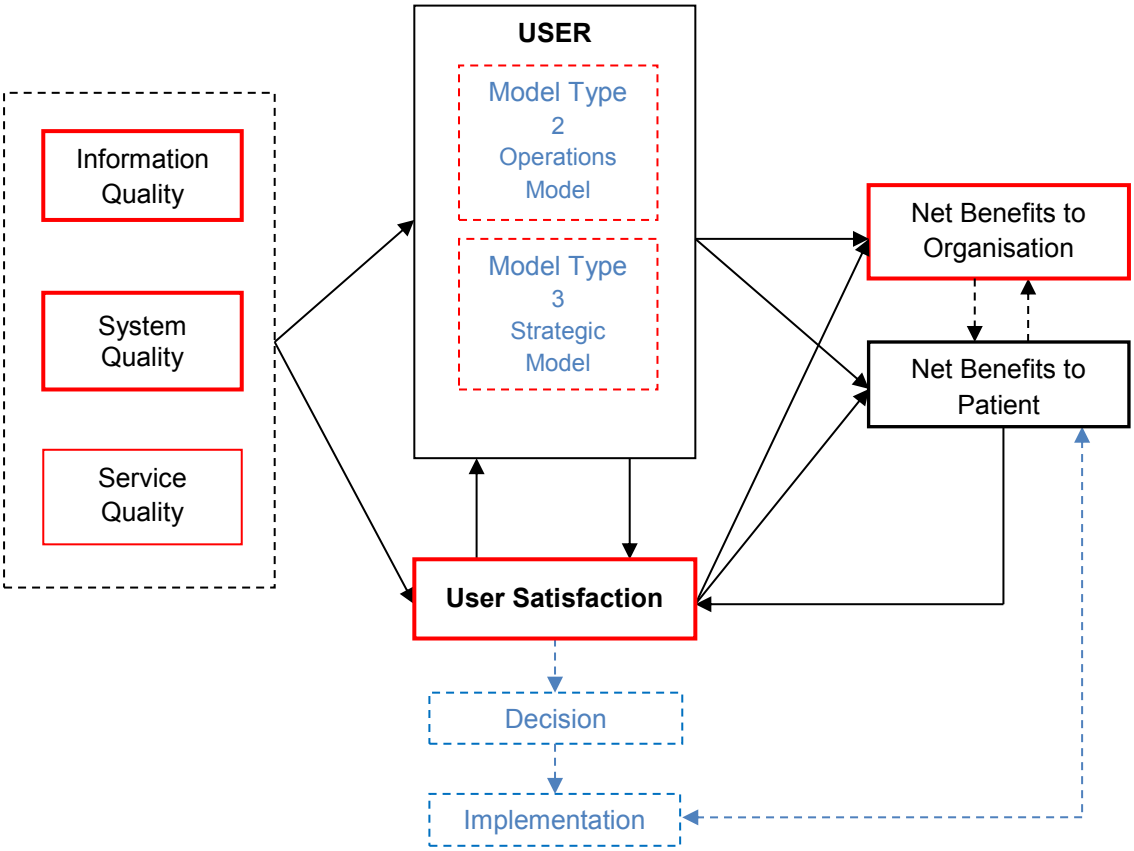


Figure 7-37 Applying the Evaluation Framework to Process Mapping and DES

7.5.The Role of Process Mapping and DES in Shifting the Balance of Care

Process Mapping and Simulation are capable of providing different roles in Shifting the Balance of Care (see Figure 7-1 and Figure 7-2) but also can be combined to provide options for solutions to a problem. Process Mapping is an uncomplicated tool, which does not necessarily require an investment in expensive software is relatively easy to learn and is therefore accessible to all healthcare staff. Provided staff are willing to engage fully in the process many, if

not all, of the implementation barriers described (see Table 5-6) are negated. Pathway Mapping facilitates a shared understanding of complex processes and provides a qualitative grounding for obtaining redesign ideas. Pathway Mapping a redesign process to Shift the Balance of Care allows participants to value their role in the process as well as providing an overview of the whole system.

The Role of Simulation as described in Figure 7-2 accounts for discrete-event type simulation. Simulation allows for safe, non-intrusive experimentation of systems, which manipulates factual data and can produce outcomes measuring supply and demand, risks, and contingencies and can produce predictions based on historical data. Simulation is also capable of considering and incorporating 'softer' data, which encourages greater communication and appreciation of the whole system. Although the software used in Simul8 and SG are both based on discrete-event simulation, the roles they perform in Shifting the Balance of Care are at different levels. Simul8 facilitates the Shift in the Balance of Care by allowing experimentation of redesign ideas: shifting care from acute services into the community or at home can be examined with reference to efficiencies, costs and care of the patient at operational levels. SG on the other hand is capable of simulating redesign at a strategic level. It is possible to simulate systems using the generic pathways but by bespoke tailoring of the pathways such as redirection or adding supplementary paths facilitates consideration of outcomes such as shifting care into the community and caring for people in their own homes. SG does not however take into account soft data as Simul8 does, but requires hard data to produce results.

Improvement Area		Rate	Process Mapping	Rate	Discrete Event Simulation
1	Maximise flexible and responsive care at home with support for carers	***	Process Mapping the current pathway of elderly patients entering acute care provided insight into the path and the interaction of the pathway with other services. Inclusion into the Pathway of H@H identified the potential impact H@H would have on others. The Process Mapping model formed the basis for the SG and Simul8 modelling exercises.	***	Modelling H@H using SG provided estimated forecasts of the reduced numbers admitted to MI due to redirection; Simul8 modelling provided options for staffing levels and estimates of the associated costs;. DES identified possible numbers of patients entering H@H and the impact this would have on other services. In addition, DES identified required staffing levels and potential cost-savings.
2	Integrate health and Social Care for people in need and at risk	***	Process Mapping the H@H pathway identified where integration with between acute and community hospitals as well as Social Care occurred in the Pathway. PM has the potential to scrutinise each service in the pathway for inefficiencies and duplication, which would is not obvious until the whole process is mapped out.	**	Although simulating H@H was able to propose options for an efficient service at both high and operational levels, it could not fully consider the potential options for fully integrating care: health, social, 3rd sector due to lack of input and data.
3	Reduce avoidable unscheduled attendances and admissions to hospital				
4	Improve capacity & flow management for scheduled care	***	Redirecting patients from acute scheduled care to care in their own homes will improve the capacity and flow of those patients still receiving scheduled care within an acute environment. The new Pathway into H@H improves flow for other patients admitted to MI.	***	Simulating the H@H service provided potential reductions in numbers of older people being admitted into acute care, allowing for better management of other scheduled patients.
5	Extend the range of services outside acute hospitals provided by non-medical practitioners				
6	Improve access to care for remote and rural populations	***	Comparison of the Process Maps of the Physiotherapy provision within Fife, identified inequity of access, and exit routes and non-standardised administration. Identifying best practice, meant recommendations for improvements were made.		
7	Improve palliative and End of Life care				
8	Better joint use of resources				

Table 7-10 Potential Process Mapping and Simulation Improvement Areas

7.6. Discussion and Conclusion

Process Mapping proved to be a useful tool in both examples described above (see 7.3.1.1 and 7.3.2); the mapping process is comprehensible to most people, easy to use, and accessible. Without unnecessary complexity, it can demonstrate areas appropriate for redesign or improvement. Process Mapping is also useful as a first step in more complex modelling (see 7.3.1.1 and 7.3.2) and can provide an overview of integrated systems (see 7.3.2). However, it is important to ensure the Process Map is accurate and reflects the systems; this normally requires the full co-operation of the staff working within the process, it is also important to acknowledge the expectations of the clients and what they would consider to be the key inputs of the mapping process.

Discrete-event simulation using Simul8 software has the capability to produce generic insights of a system. The example above (see 7.3.1.2) based the simulation on specific results gained from a previous study[254] and from information gleaned from the literature. Despite the lack of primary data, the simulation was able to provide a comprehensive list of options for management's appraisal. The second simulation using Simul8 (cross–reference 7.3.2.2) used the available data to explore options, however, the initial simulation also leads to the exploration of further scenarios management should consider.

Discrete-event simulation using SG facilitated the examination of outputs, which linked tertiary services with the main Fife services and incorporated disease prevalence and local demographics into the calculation. Despite the lack of data

pertaining to H@H, the SG model provided comprehension of a redesigned pathway map, which included a new facility. Whilst redesigning a new service such as this, the next step would then be to populate the model with collected data as it became available and to adjust the model as necessary. Nevertheless, to populate the model with actual data the model requires to be implemented in some form, even as a pilot study, but the barriers which hinder the possibility of implementation are prevalent in this study. Although the model itself posed problems with regards to user friendliness (see 7.3.2.1.5), known barriers such as: Experience and Expertise; change in personnel, Data; supply of incorrect data, Support; lack of support and Engagement with Stakeholders; a confused brief of the project from two client groups all contributed to the failed implementation of the model recommendations.

What is apparent from the models described: Process Mapping; Discrete-event simulation using Simul8 and Discrete-event simulation using Scenario Generator, is that they are all capable of facilitating healthcare redesign, and, particularly relevant to Shifting the Balance of Care, at a holistic level, but their application is better placed in some situations than in others. Pathway Mapping defines complex systems over many services, divisions, and departments and, by unravelling the complexities, leads to shared understanding, which, by itself, can elicit new ideas for improvement. Discrete-event simulation at an operational level can be applied when a system is already explicitly defined and will produce quantitative recommendations to improve a system or process. Discrete-event simulation performed at a strategic level, such as the use of Scenario Generator, again performs best when pathways are initially well

defined but has the capability of redirecting pathways to produce recommendations for change. It is important therefore to understand the capabilities of these models and to apply them appropriately. Nevertheless, these models can also be applied consecutively: Process Mapping clarifies and makes explicit the system, which can then be employed as the first step in simulating a process both at operational and strategic levels. In addition, the results gained from simulating a process at the strategic level can then be employed to populate a simulation at the operational level.

From the findings of this Case Study, there is evidence to suggest that at least four of the eight priority Improvement Areas of Shifting the Balance of Care can be delivered by the implementation of Process Mapping and Simulation type models.

Chapter Eight

SoApt: Service Option Assessor and Prioritisation Tool

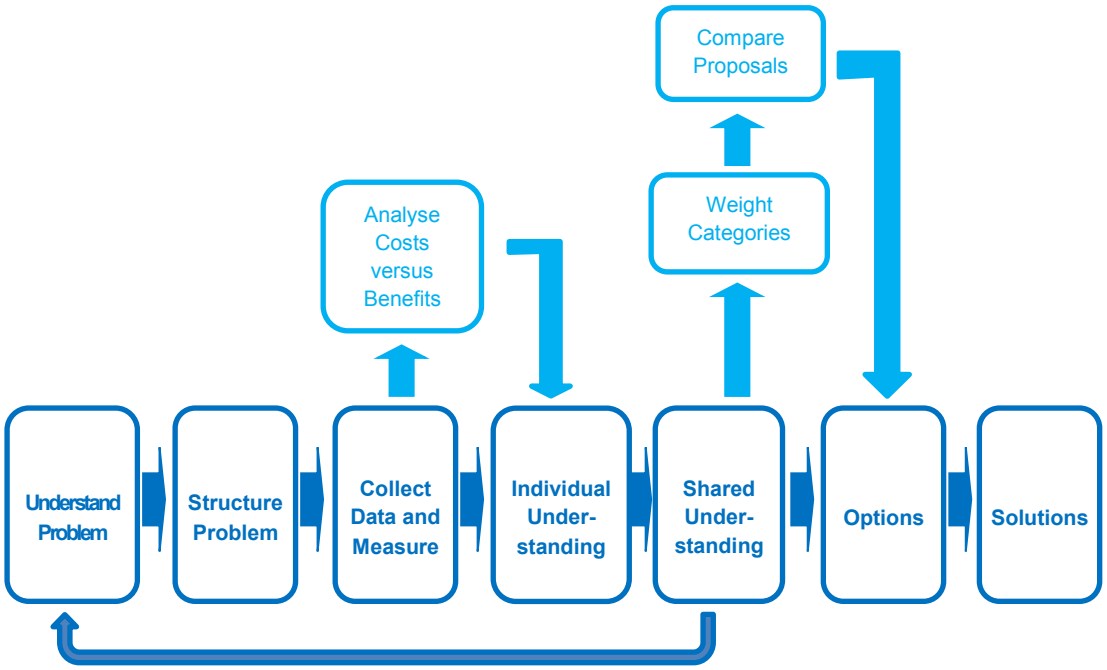


Figure 8-1 The Roles of the SoApt Model

8. Introduction

Managing scarce resources is one of the most important challenges facing health services. To manage scarce resources Decision-makers must choose which type and quantity of care to provide for different populations and for different individuals from a given, limited budget. Decision-makers face the challenge of prioritising between competing proposals all of which have claims on a limited budget[297]. Shifting the Balance of Care[4], Government HEAT targets[270] and the Quality Strategy document[256] are just a few directives where Decision-makers, and health staff, are asked to reflect critically on practices that are taken for granted and not just ask if it can be improved but also ask if it needs to be done at all[231]. Proposals for consideration of a limited budget therefore take the form of new or improved treatments or new or redesigned systems which claim to meet the requirements of local or national directives. To Shift the Balance of Care, Decision-makers must decide how to best invest their available budget to address effectively the priorities of Shifting the Balance of Care. An Option Appraisal or Priority Setting model will aid the Decision-maker in the onerous task of choosing one proposal over another. However, such a model must have an inherent understanding of the complexity of healthcare decision-making: political constraints at local and national level, the priorities of Shifting the Balance of Care and an understanding of the objectives whilst balancing the robustness of the model with simplicity and ease of use[144].

This chapter is a Case Study, which reflects the development of a new model, SoApt, initially designed for use within NHS Fife. The model was developed to

provide an option assessment tool, which identifies the priorities of investment decisions through the analysis of costs and benefits. The chapter first discusses the Role of the SoApt model then positions the model within Mingers methodology framework (see Table 4-2) and Williams' methods framework (see Figure 4-10). The chapter also explains the background to the model's development and reviews the literature relating to option assessor type models, as well as the theory of model development. After explaining the stages involved in the development of the SoApt model, the chapter then discusses the barriers to implementation and evaluates the model against the Evaluation Framework (see Figure 5-12). Finally, the chapter appraises the Role of SoApt in Shifting the Balance of Care.

8.1.The Role of the SoApt Model

The SoApt Model schematic extends from the generic schematic of models (see Figure 4-11) as illustrated in Figure 8-1. The collection of and subsequent analysis of the costs and benefits of a proposal leads to the individual understanding by the proposer. Submission of a proposal leads to shared understanding with the Decision-makers. Weighting the criteria of the proposal, according to the priorities of the Decision-maker, allows for the comparison of several proposals, which reflect the local and national priorities. A comparison matrix of several proposals gives the Decision-maker options of investment opportunities, which should lead to solutions to existing problems. The methodological assumption behind the SoApt model has been applied to Mingers framework (see Table 4-2) and is illustrated in Table 8-1. (A complete version, including SoApt is illustrated in Appendix 37). The underlying

assumption of the purpose of the SoApt model is to 'Prioritise and allocate resources based on scoring and weighting of benefits and costs of a given proposal'. In addition, SoApt is categorised as a 'soft approach' to structure unstructured problems when examined against Williams[112] categories of methods (see Figure 4-10).

Methodology/ technique	What it does: A system to...	Ontology	Epistemology	Axiology			
		What it assumes to exist	Representation by modelling...	Necessary information	Source of information	Users	Purpose in order to...
SoApt	Support decisions-makers prioritise investment (or disinvestment) options when faced with alternatives and limited resources	Lack of resources to invest in all project opportunities	Costs and benefits of the project, matrices of all proposals	Costs and benefits of projects or proposals, local and national priorities, budgets	Proposers, decision-makers	Decision-makers	Prioritise and allocate resources based on scoring and weighting of benefits and costs of a given proposal

Table 8-1 The SoApt Model Applied to Mingers Framework

8.2.Background to the Development of the SoApt Model

The Redesign Team at NHS Fife asked for assistance in developing a modelling tool that would provide a simple evaluation of a proposed new or redesigned service and whether the improved service would provide a Return on Investment (ROI). The ROI is a performance measure used to evaluate the efficiency of an investment. The calculation for ROI is shown below; the result is expressed as a percentage or a ratio.

ROI= (Financial gain from Investment-Financial cost of Investment)
/Financial cost of Investment

The term ROI in the broadest sense attempts to measure the simple financial profitability of a project that has received investment. In an effort to provide high

quality care in a more cost-effective manner, healthcare providers have found it necessary to implement a series of decision support strategies designed to improve outcomes of care. In theory, if the strategy has measurable benefits it is accompanied by additional costs. A return-on-investment methodology is used to assess the financial impact of operating expenses of services compared to revenue gains from service delivery. However, unlike traditional return-on-investment models, in healthcare, benefits are normally gained from cost avoidance rather than from revenue improvement. A traditional ROI analysis weighs the financial impact of operating expenses with the revenue gains from service delivery. If the revenue returns exceed costs, the investment is justified, and if funds are available, then capital is provided for the investment[271].

The Redesign Team requested a model to be created which would serve as a tool to aid in decision-making when deciding on projects or proposals to invest in that provided high quality care for the patient. The initial discussions with the Redesign Team included reference to the model as a “Ready Reckoner Tool” (a prioritisation tool) and a “Return on Investment Tool” which provided an initial insight into the type of model that was required. The main concern of the Redesign Team was to balance, what could be considered, the cost of a project and the difference the project could make to the care of the patient. It was decided with the client that any proposal, whether new or redesigned, should consider the **Costs** to the NHS as well as the benefits to the patient in the form of care: the **Impact on Care,** which would address the potential for a ROI tool. However, the calculation of **Costs** to the organisation and of the **Care** of the patient had the potential to be complex and in conflict with one another:

applying a value to the benefits of care to the patient is difficult and controversial particular if a monetary value is applied[278].

8.3.Developing an Option Appraisal Model

In order to meet the remit of the client, priority setting type models were reviewed in the literature to generate ideas and the theory of developing a new model was examined.

8.3.1.Option Appraisal and Priority Setting in Healthcare

8.3.1.1.Economic Evaluation

In healthcare resources are scarce; Decision-makers must decide which resources to invest in to maximise health benefits to society and to minimise opportunity costs of healthcare services. Economic Evaluations (see 5.4.9) compare two or more healthcare interventions and provide evidence of costs and outcomes to Decision-makers as to why one intervention should be invested in over others[157]. The purpose of any Economic Evaluation is to use scarce resources to maximise benefits whilst minimising the opportunity cost [158.]

Two of the main principles of Economic Evaluation: opportunity cost and marginal cost/marginal benefit are deliberated when evaluating the resulting outcomes of these measures. The opportunity cost is the benefit sacrificed when investment is made in the other service and the marginal cost/benefit is the additional benefit gained (or lost) when one more monetary unit is spent[272]. Mitton [272] believes it is the failure to take into account these two main principles that the maximum health gain to the population is not achieved when evaluating treatments and services.

However, the impact of Health Economics in the NHS is limited[273]; Economic Evaluation influences are difficult to detect[274] particularly with regard to decision-making[275]. Lack of interpretation skills, lack of timely and sufficient information and limited access to information are obstructions met by Decision-makers when faced with health economics [275.] Economic Evaluations at the local level are considered to be inaccessible, not timely enough, not transparent, and not close enough to the real world. Decision-makers at the local level believe there are no incentives to use Economic Evaluations, that they do not have the proper skills and understanding to interpret the results[276] and that Economic Evaluation does not appreciate the focus of decisions at local level[277].

Cost-effectiveness analysis is the most widely used Economic Evaluation in healthcare because it is considered to be the most simple to apply[278]. However, cost-effectiveness analysis is criticised for only allowing comparison of the impact of a specific treatment or service on a particular group of patients with a particular condition[158] [278]. Cost-utility analysis is deemed a more appropriate Economic Evaluation because it combines more than one outcome measure, which can be used for comparison over different conditions and patient groups [279, 278]. The commonly used unit of measurement in Cost-utility analysis; the QALY is a single measure combining many possible outcomes and allows for, in theory, comparison over a wide range of treatments and services. However, the QALY is criticised for not including non-health benefits and costs in the calculation[160], not being meaningful and transparent, not considering equity in the delivery of healthcare and not being robust in the data gathered to produce the QALY measure[279, 280].

Whereas it is acknowledged that Decision-makers understand the principles of economics; scare resources where choices need to be made and the opportunity cost of that choice, health economists are criticised for not fully understanding nor appreciating the context and practicalities Decision-makers need to consider [275]. However, Decision-makers have little knowledge of the mathematical frameworks and theories of health economics, Kernick[273] suggests an emphasis on the concepts and education of its principles would be more beneficial and that health economists should work more closely with other disciplines in an effort to share understanding and to provide a practical solution to patient care and service delivery.

8.3.1.2.Programme Budgeting and Marginal Analysis

Programme Budgeting and Marginal Analysis (PBMA) is a priority setting technique which incorporates the two main principles of Economic Evaluation: opportunity cost and the marginal benefit, to support Decision-makers in healthcare[281]. PBMA involves two related but separate activities: PB considers current spending retrospectively and divides the current spending into different programmes, which helps to identify the areas where resources are spent. A panel of experts then examines each programme, considering the MA of each in turn. Analysis of spending over the programmes can highlight variances in terms of strategy or effectiveness.

Figure 8-2 illustrates the five known universal stages of PBMA [281] [280] [282] [282].

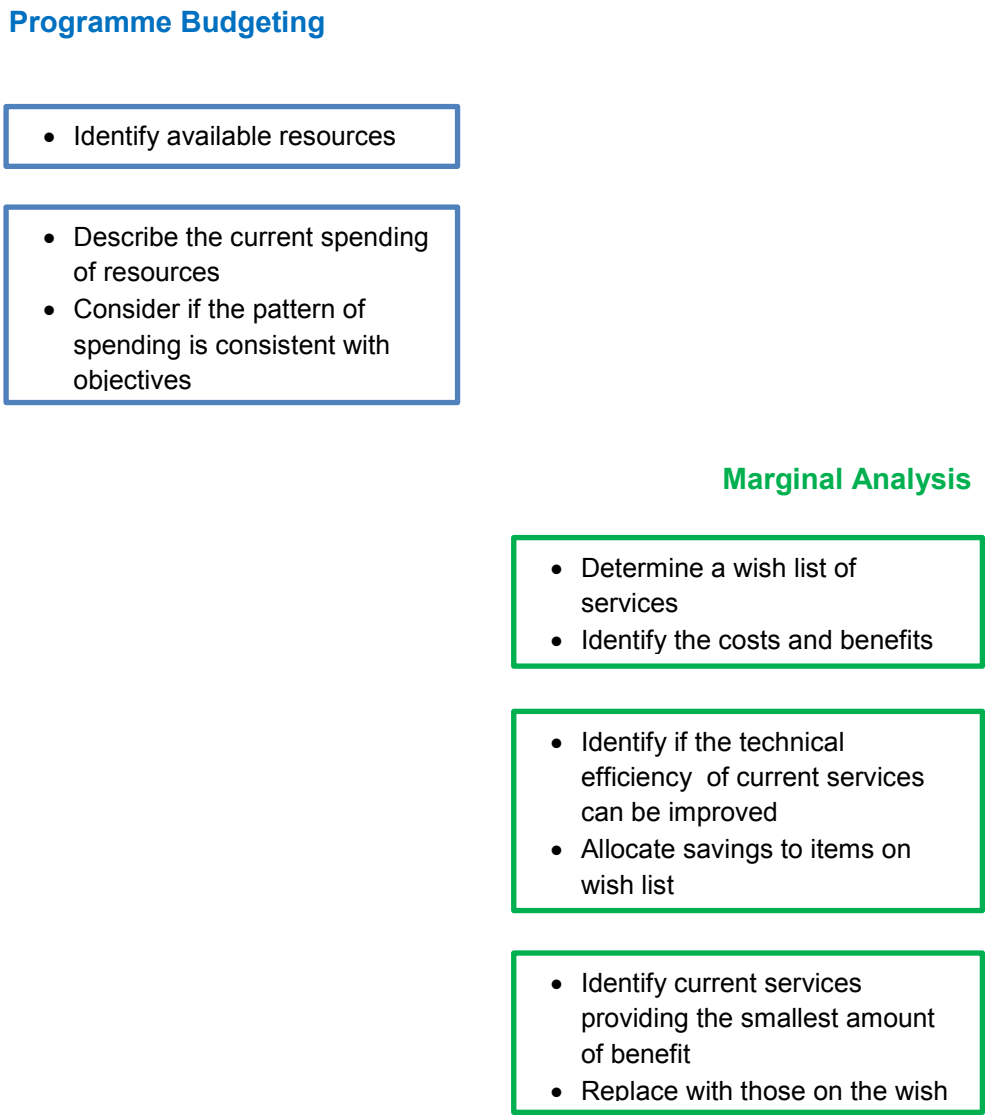


Figure 8-2 Programme Budgeting and Marginal Analysis

Whereas studies have considered only the Programme Budgeting[283] or the Marginal Analysis[284] [285] part of this technique there is also evidence of the use of PBMA in many healthcare locations[286, 287, 288, 289, 290] . Indeed an international evaluation of PBMA after 25 years in the health sector reported a positive impact of PBMA with 52% of health authorities continuing to use the techniques after experimental application[291] . Where PBMA has been successful researchers and health authorities have reported advantages such as a

process which: is based on value judgements but are explicitly made; [285] [286] is rational and evidence based [286] ; encourages cooperative working between purchasers and providers, hence working towards common goals [285] [286] ; can highlight where there is inequity of service between patient groups or geographical locations. Studies have also reported the structure of the expert panel can also add credibility to the recommendations for investment and disinvestment [286] .

However, since Mitton and Donaldson's 2001 paper[291] reporting the success of PBMA there has been little reference to PBMA in the literature since 2003[292]. It is suggested that despite reported success, there are disadvantages and drawbacks that still require to be addressed[289] : When considering Programme Budgeting, services cannot always easily be broken down into their component parts, which therefore leads to lack of data for associated costs [289] [293]. The framework is also said to be data hungry; information on costs and alternative treatments are either not available or are limited in their detail. The process of bringing a multi-disciplinary team together can be time consuming and costly[282], also difficulties can arise when deciding who to include in the panel to ensure the relevant expertise is available[293] and representative of public preferences[281] . It is also reported that team members are reluctant to disinvest a service even when another service is more beneficial [281]. Criticisms are also made of the time PBMA takes to reach recommendations[293] and the number of health representatives involved; the opportunity costs of attending PBMA meetings: Mitton et al [287] reported panel sizes up to 12 experts over duration of up to 12 months. The success of PBMA relies on the culture of the organisation:

organisational barriers, weak leadership, and the disengagement of stakeholders are not conducive to successful PBMA implementation [272] [281]. In addition, PBMA does not lend itself to transferring resources between one service and another[294]; this is problematic within healthcare, but particularly prohibitive when Shifting the Balance of Care.

8.3.2.Multi-Criteria Decision Analysis

Multi-Criteria Decision Analysis (MDCA)[295] (see 5.4.5) is a technique which aids users in controlling large amounts of complex information in a consistent way by identifying preferred or acceptable options or by weighting or ranking options in an effort to aid decision making.

A key objective of MCDA is the interventions under consideration should be consistent with the Decision-makers objectives; however, the Decision-maker may have many objectives but may not necessarily be aware of the importance of one objective over another. The process of MCDA allows these objectives and their importance to the Decision-maker to emerge in a transparent manner. The two-stage process consists of firstly deciding what the options and alternatives are and then deciding which criteria will be used to evaluate the options. The second stage consists of building a model, which reflects Decision-makers objectives along with weights, which will be applied to the decision-making criteria[296]. MCDA eliminates intuitive decision-making: the criteria are mutually exclusive and because they are weighted, it helps Decision-makers to identify their policy-making preferences in a systematic and transparent process[143].

8.3.2.1.Multi-Criteria Decision Analysis and Economic Evaluation

Multi-criteria decision analysis is not yet obvious in healthcare decision-making but is widely used in other fields [143], however, there is some evidence to suggest its success used alongside Economic Evaluation[143]. Whereas Economic Evaluation can consider only one criterion at a time and is not always relevant to the Decision-maker, MCDA takes a holistic approach and considers multiple, complex criteria simultaneously[296]. It then can combine these multiple benefits into one single measure of utility. MCDA combined with PBMA challenge Decision-makers to define and defend benefits entered on a "wish list" of services[297]. Decision-makers when deciding on priorities for healthcare services tend to employ instinctive and informal judgements which can lead to important information being lost; can consider their own objectives first[143]; do not always know what their main priorities are and do not always know the consequences of selecting one service over another[296]. MCDA facilitates a discussion that encourages the Decision-maker to articulate his/her preferences and then compares these preferences in a consistent and transparent manner. It also reduces the barriers of conflicting criteria and conflicting views of stakeholders towards different criteria, of researchers failing to hear the needs of Decision-makers[296], of researchers failing to appreciate the real-world context of Decision-makers and of underlying economic theory[296]. The MCDA process is logical in its approach, which allows for defensible prioritisation of criteria[296].

8.3.2.2.Option Appraisal

Option Appraisal is a systematic examination of the advantages and disadvantages of each practical alternative way of solving a problem or

improving a deficiency[298]. As illustrated in Figure 8-3 Option Appraisal is very similar to PMBA in that the various options of service delivery or treatments are assembled but Option Appraisal considers a 'long list', which is then reduced to a 'short list' after deliberation. The benefits of each option are weighted and then scored as in MCDA and then measured against the costs associated with that option and presented in table form. As well as the costs and benefits of each option, the table should identify any risks associated with the proposal; in addition, Galloway[299] recommends any impact on other services negative or otherwise should also be highlighted. The final step is to identify the preferred option; the proposal that brings the maximum benefit for the minimum costs.

However, similar to PBMA Option Appraisal requires teams of stakeholders to participate in the process; this can be time consuming and costly. In addition, measurement of benefits and costs particularly those costs from outside the health service can be difficult to calculate. A further drawback of Option Appraisal is the effectiveness and accuracy of the appraisal relies fully on the skill of the person completing it, according to Mooney and Henderson[298] this is often lacking.

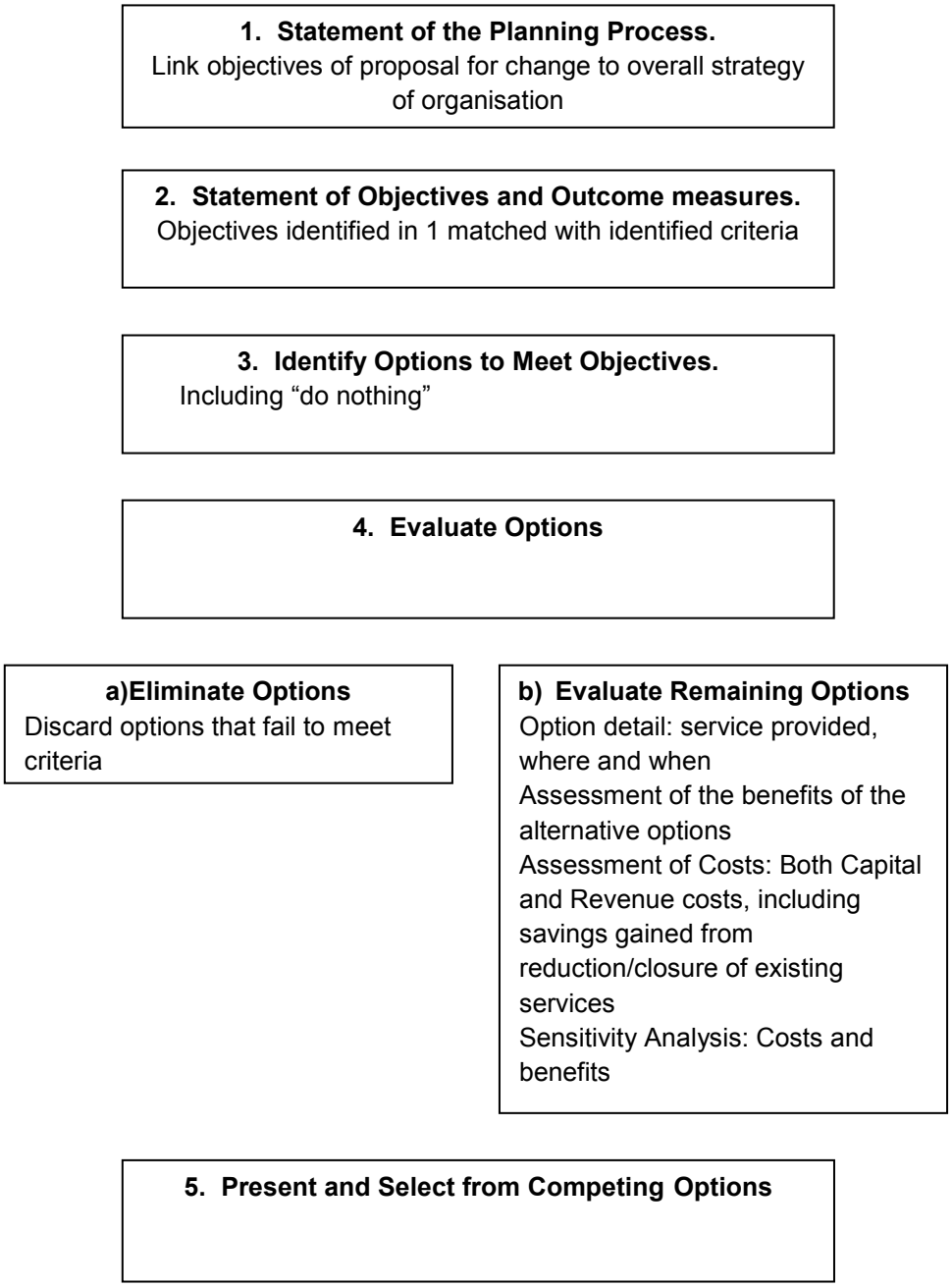


Figure 8-3 The steps of Option Appraisal

8.3.2.3.Other Priority Setting Models

Two other models of note are cited in the literature: A study, which follows the principles of MCDA, was performed in an English Primary Care Trust[300]. This study weighted seven criteria before scoring, and then progressed to generate a 'cost-value ratio' by dividing the net financial impact by the weighted benefit score. Interventions with the lowest ratio had the highest priority. However, as

the authors acknowledge, the ratio scoring is biased as it does not contain an interval property, also this study does not take into account the time the project may take to be fully operational, nor does it consider the number of people the intervention will affect. A further study carried out in the Argyle and Clyde Health Board[294], following the principles of cost effectiveness analysis, developed a Prioritisation Scoring Index (PSI). Nine criteria, including 'Quality of Life' and 'Strength of Evidence', are allocated weighted scores by a panel or team; these scores are averaged to give the PSI. The PSI is then ranked with the highest score first. The additional cost of intervention per person is calculated and ranked with lowest score first. The average of both ranks is then calculated and presented for discussion. The authors contest this method is preferable to PBMA because it has the potential to consider interventions both within and across health programmes, whereas PBMA does not (see 8.3.1.2). One advantage of this study is that it considered the marginal cost; the cost of each additional person and not the overall cost. However, this study does not consider the number of people the intervention will help in comparison to other interventions.

8.3.2.4. Comment on Priority Setting Models

A study evaluating the best way to compare costs and benefits reported Decision-makers found graphical representation of costs versus benefits useful and easy to understand[280].

8.3.3.Principles of Model Development

Within healthcare where resources are scarce, where there are many political and local objectives and where there is a high amount of public scrutiny, Decision-makers need to decide which services to prioritise and distribute to the population which will give maximum benefit. Modelling offers a timely evaluation to assess costs and benefits of a health intervention in a real-world situation; models are often used to compare one intervention over another whilst evaluating the impact on resources available and the impact on the care of the patient.

There are times when the current OR models available to the researcher do not quite fit the remit required and a new model needs to be developed. Developing a new, successful model requires consideration of many factors: Table 8-2 illustrates the general principles of building a new model in healthcare. The checklist in Table 8-2 was formulated from several authors who have all suggested principles and frameworks for consideration when model building, albeit some are suggestions for specific types of models.

It is clear from Table 8-2 that many aspects of model building need to be considered. Evidence of the application of these principles will be proposed in the development of the SoApt model (see 8.5).

8.4.Scope of an Option Appraisal Model in Healthcare

In addition to the theory of the development of the model, the scope of the model should also be considered:

1.	Objective	There should be a clear statement of the objective instigating the analysis. The objective of the evaluation and of the model should be defined.[301]
2.	Scope	The rational of the model should be clearly stated, and the model inputs should be consistent with the stated rational and overall objective of the model. The outcomes of the model should reflect the rational and scope of the model and should be consistent with the objective of the evaluation.[301] The scope should also clearly state the accessibility of users to the model.
3.	Accessible	The model should be accessible to a range of users; these users should be stated in the scope of the model.
4.	Potential for Development	The model should not be static; there should be flexibility to develop the model as circumstances and technology change.[302]
5.	Structure	The structure of the model should be consistent with the inputs and outputs of the model and the process and should be presented in a clear logical manner.[303] [304]
6.	Data identification	Methods for identifying data should be transparent and it should be clear that the data identified are appropriate given the objectives of the model. There should be good reason of any choices that have been made about which specific data inputs are included in a model. Data that is particularly sensitive should be clearly identified. Where expert opinion has been used to estimate particular parameters, sources, and methods of elicitation should be described.[301]
7.	Data incorporation	All data incorporated into the model should be described with clear traceable sources[301]Data input should avoid duplication and be unambiguous.
8.	Simple	Models should only contain information and data that is relevant and will significantly impact outcomes[304] whilst the workings of the model should be understood and therefore trusted by the user.[115]
9.	Transparent	Data and information used in the model should be well documented, easy to source and easy to understand [304] to allow for scrutiny by interested parties.
10.	Validity	Internal validity: Models should be subjected to internal testing to ensure calculations are accurate and consistent with the specifications of the model[303] Face validity: Model outputs should be understandable by the user, or easily explained.[303] External Validity: the extent the model can be generalised to other health departments, health conditions, health authorities and to other social departments should be clearly stated [302].
11.	Time horizon	A model's time horizon should extend far enough into the future for it to reflect important differences between options[301] [305]
12.	Sensitivity Analysis	Models should include sensitivity analysis to evaluate the robustness of the outputs if key variables are altered. [304] [305]

Table 8-2 Principles of Model Development

8.4.1.The Purpose of the Model

The three main levels of focus for Shifting the Balance of Care are: Location; Responsibility and Focus. The sub-levels of each of these areas such as systems, technology, geography, premises, and staff-relocation are numerous. A model or tool which identifies the priorities between the sub-levels and

assesses if there is subsequent Impact on Care for the patient would be a useful resource to a Decision-maker who has to decide; if a proposal is worth investing in, if the proposal should have priority over another proposal, if the proposal will deliver and if the proposal meets the demands of Shifting the Balance of Care.

8.4.2.Recognising the Importance of the Patient Experience

A new or redesigned service, which meets the current priorities within the NHS, is concerned with creating an efficient service, which meets the needs and values of the population. Better Health, Better Care[17] and The Healthcare Quality Strategy for NHS Scotland[256] clearly prioritise the care of the patient and emphasise the importance of communicating and collaborating with patients as part of their healthcare: A tool, which merely evaluates the cost of one service against another, is no longer valid. Therefore, a model or tool is required to measure the values of the patient in such a way that one service can be compared with another based on cost, quality, and patient's views and scored accordingly.

8.4.3.A Simple Tool for Proposers and Decision-makers

A model, which measures both costs and benefits, could be complex. However, a model, which is uncomplicated and not time consuming for Users to complete, would be more beneficial and more likely to be adopted [173]. In addition, a model, which provided Decision-makers with a simple assessment of whether a proposed project was firstly, pertinent to the current political and

clinical priorities within the NHS at local and national level and secondly, would assess if a return on investment could be made would be useful.

Through-out the development of the Option Assessor model it has been important to consider the User. To this end wherever possible inputs have been simplified and duplication of inputs has been avoided. The intention of the model is for use by two people or two teams of people: the Proposer and the Decision–maker. The Proposer, within the context of this writing, is the individual or team who champion the new or redesigned service; it is their proposal for improvement of a service but which requires authorisation and investment before implementation, as such, the Proposer is the User who scores the criteria and sub-criteria (see 8.5.1.3). Conversely, the Decision–maker is a member of the management team or the management team itself who has the authority to allow the proposal to go ahead and who will sanction the investment, it is there job to decide where investment will be made and where high impacts will be achieved to meet the criteria of Shifting the Balance of Care.

8.5.Development of the SoApt Model

The following details the development of an Option Assessment Model developed for use in Fife. Throughout the description, the text refers to Table 8-2 to highlight where these principles have been incorporated.

8.5.1.Identifying the Criteria of the Model

Having established the tool should evaluate the two main branches of **Costs** and **Impact on Care**, in line with current Economic Evaluation techniques (see 5.2); the criteria, which would make up the evaluation of costs and the evaluation of care, would also need to be determined. Figure 8-4 illustrates the first draft of the various criteria considered. These components were drawn from several literature sources[306] [307] [157] [308] to firstly establish what criteria should be considered costs and which should be considered benefits, and secondly to assess the criteria which should be included in the evaluation which reflected the priorities of Shifting the Balance of Care and healthcare generally. For each branch: **Cost** and **Impact on Care**, criteria and sub-criteria have been identified and allocated. However, as Figure 8-5 illustrates development of the criteria and the sub-criteria continued to be adapted as discussion with the client, understanding of the model and the model's use were advanced (*See Table 8-2 Principle 4*).

8.5.1.1.Defining the Criteria of the Model

As the criteria and sub-criteria of the model continued to develop, it became clear that definitions of these criteria were also necessary to avoid misinterpretation and misunderstanding by the User. A colour coding system was also adopted utilising visual management techniques (see Table 6-2) which illustrated through colour what constituted **Costs** and what constituted **Impact on Care** making both easier and quicker to identify (see *Table 8-2 Principle 8*), an example of the criteria definitions can be viewed in Figure 8-6.

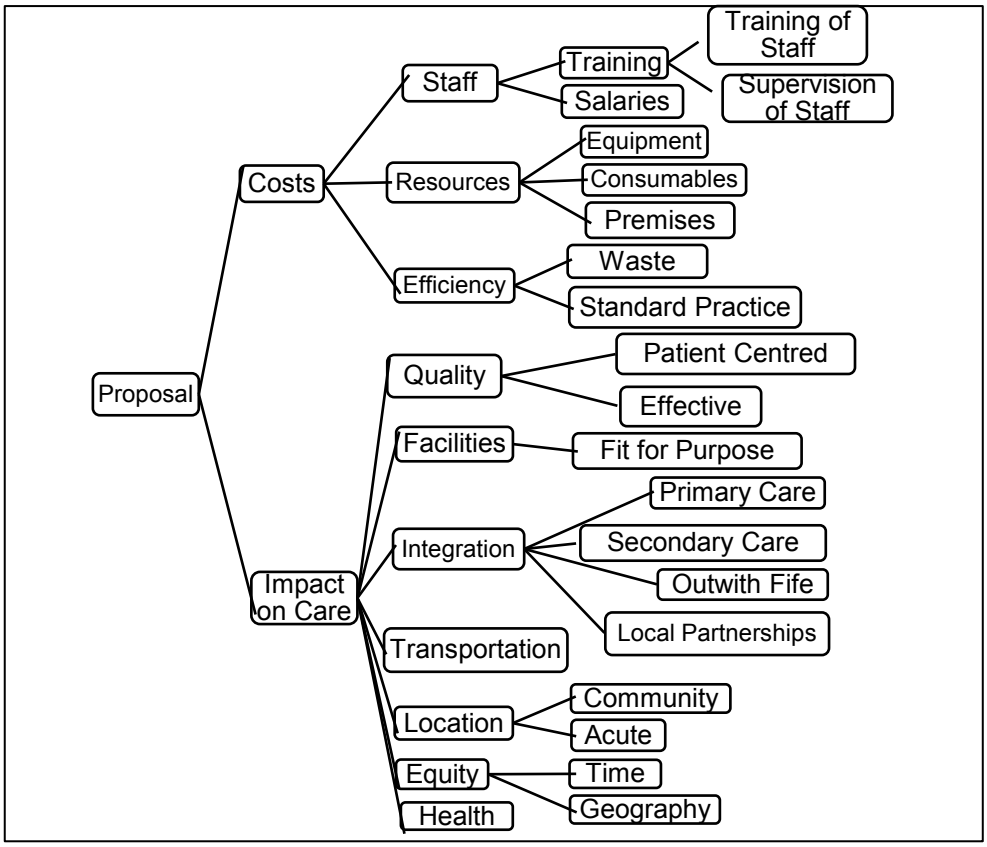


Figure 8-4 First Draft of Criteria

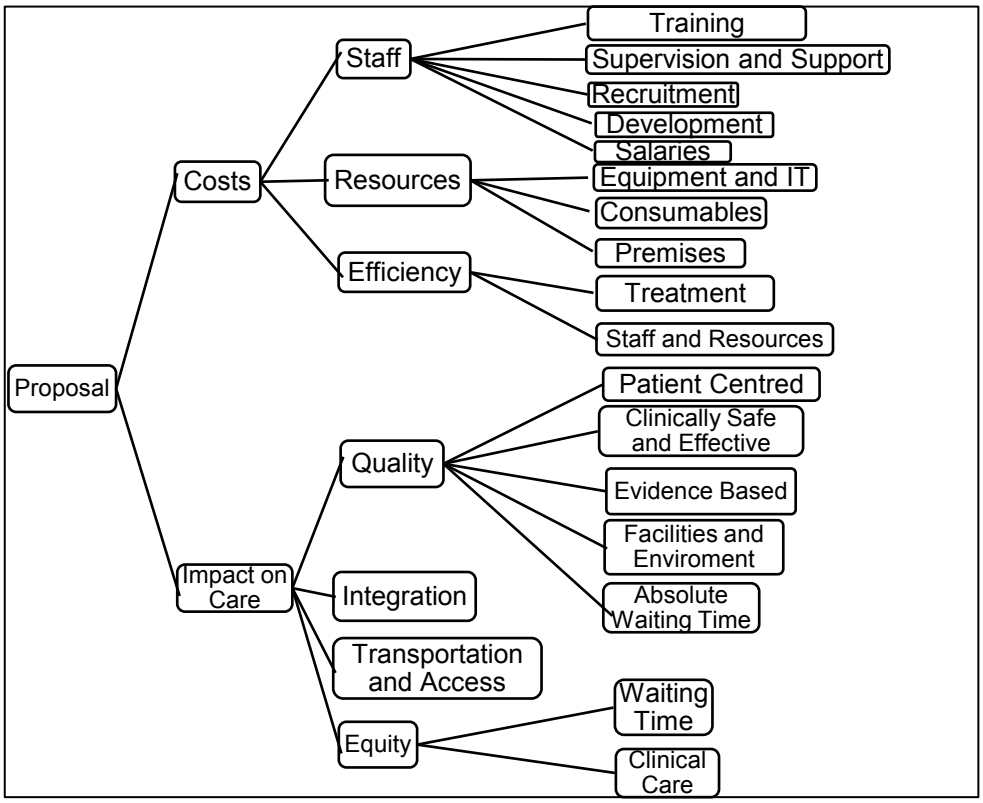


Figure 8-5 Development of Criteria

CRITERIA	DEFINITION
Costs	The difference in costs the proposal will bring compared to the current costs
Staff	*Change in staffing and support*
Training	Additional training required to deliver the proposal
Supervision and Support	Additional Supervision and support of staff to deliver the proposal
Recruitment	Additional recruitment of staff required to deliver the proposal
Development	Development costs including the setting up of protocols, double running costs
Salaries	Staff salaries: staff numbers, no. of shifts
Resources	*Change in the requirement for all non-staff resources*[1]
Consumables	Consumables required for the proposal
Equipment & IT	Equipment and IT required for the proposal: is there joint use?
Premises	The premises the proposal will be housed in: is there joint use?
Other Services	Impact on other services
Efficiency	*Avoiding Waste such that resources deliver more patient care*[2]
Treatment	Reduction in inappropriate referrals into secondary care, reduction in variation in unscheduled admissions[3], reduction in review:new ratio,[4] reduction in emergency inpatient bed days[5]
Staff and Resources	Utilisation of staff time and resources, i.e. staff to patient ratio, time spent, do staff travel to the patient?
Duplication	Reduced duplication with other services
Impact on Care	The impact the proposal will have on the care of the patient: -5=care much reduced, -2.5=care reduced, 0=neutral, 2.5=care improved, 5=care much improved
Quality	*The quality of care the patient receives*
Patient Centred	Responsive to patient preferences, needs and values [6]
Patient Choice	Where the patients preferences for care are given priority and patients are informed and involved in the care-plan
One-stop care	Where care is based around the patient
Clinically Safe and Effective	Appropriate care leading to safe and successful outcomes for the well-being of the patient
Evidence Based	There are documented outcomes of like proposals or success elsewhere.
Facilities & Environment	Fit for purpose and condusive to patient care
Absolute Waiting Time	Increased capacity leading to a reduction in the number of weeks the patient waits before treatment.[7]
Integration	*Integrates health and social care in primary, secondary, local partnerships or other partnerships*[8] including the vountary sector
Transport and Access	*Convenience to the patient of location and availabilty*
Equity	*Quality of care is consistent and reduces variability in treatment*
Waiting Time	Waiting time does not differ due to location, status, ethnicity, gender[9] or physical ability.
Clinical Care	Treatment does not differ due to location, status, ethnicity, gender or physical ability.

Yellows indicate Impact on Costs, Greens indicate Impact on Care

1 Wyatt S (2009) Shifting Balance of Care: High Impact Changes, No. 8 Improve joint use of resources (Developing Community Care Centres).
2 The Scottish Government (2009) The Healthcare Quality Strategy for Scotland, Draft Strategy Document. Institute of Medicine 6 dimensions of quality, pg12.
3 Wyatt S (2009) Shifting Balance of Care: High Impact Changes, No. 3 Reduce variation in unscheduled admissions.
4 The Scottish Government(2010), NHS Performance Targets, Efficiency Targets for 2010/2011
5 The Scottish Government(2010), NHS Performance Targets, Treatment Targets for 2010/2011
6 The Scottish Government (2009) The Healthcare Quality Strategy for Scotland, Draft Strategy Document. Institute of Medicine 6 dimensions of quality, pg12.
7 The Scottish Government(2010), NHS Performance Targets, Access Targets for 2010/2011
8 Wyatt S (2009) Shifting Balance of Care: High Impact Changes, No. 2 Integrate health and social care and support for people in need
9 The Scottish Government (2009) The Healthcare Quality Strategy for Scotland, Draft Strategy Document. Institute of Medicine 6 dimensions of quality, pg12.

Figure 8-6 Criteria and Definitions

The exercise of defining the criteria also allowed a clearer understanding by the author and also alerted the author to be vigilant of overlapping criteria and duplication, which could result in double counting (see *Table 8-2 Principle 7*). It was also at this stage that HEAT targets (see 3.4.1.3) were introduced as a resource for deciding on appropriate criteria (see *Table 8-2 Principle 6*). The HEAT targets from 2008-2011[309] were considered, but as the HEAT targets are often specific to particular diseases or conditions, they were adopted only where appropriate, however, through comparison, the ethos of the targets had already been included through other resources previously mentioned [306] [307] [308]*(*see *Table 8-2 Principle 10)* which added to the robustness of the criteria and the confidence the author had in the criteria.

8.5.1.2.Formally Adopting The Healthcare Quality Strategy for NHS Scotland

In May 2010 the Scottish Government published The Healthcare Quality Strategy for NHS Scotland[256], which adopts the six internationally recognised dimensions of healthcare quality: Person-centred, Safe, Effective, Efficient, Equitable and Timely and aims to put people at the centre of the NHS, value NHS staff by making it easier for them to do the right thing by each patient every time and include improvements which are measurable for those services considered by users to be important.

As stated previously (see 8.5.1), the six dimensions of quality, published in the draft strategy document[307], were integral to the criteria and sub-criteria of the model. However, with the formal adoption of the six dimensions of quality by the Scottish Government[256] for the whole of the NHS it was considered appropriate

to emphasise the dimensions of the strategy as the main criteria within the model. With very little adjustment, Person-centred, Safe, Effective, Equitable and Timely became the main criteria for **Impact on Care** with the appropriate sub-criteria apportioned accordingly (see *Table 8-2 Principle 6*). The criterion Efficient was the main criterion to score the **Impact on Costs/Organisation**. Costing the differences a new or redesigned service will bring is less subjective: costs or cost estimates will already be available. It was therefore decided that the Impact on Cost to the Organisation would no longer be a statement scoring system but estimates of actual costs. The costs were divided into Capital: investments and Recurring: costs, which would recur through the life of the project. The criterion Staff and Resources were counted as monetary estimates whereas Efficiency was calculated as a percentage of savings made. To allow this calculation to be made additional data including the current cost per patient, the expected volume of patients per annum and the expected life of the project were added to the model; as a result a new cost per patient could be calculated: the **Impact on Cost/Organisation**.

The criteria of the Quality Strategy provide recognisable statements current to the debate of highlighting quality in healthcare. The sub-criteria were debated with the client for relevance but it was decided that it was important to reflect the Improvement Areas of Shifting the Balance of Care, the associated HEAT targets and the associated Change Fund criteria (see Appendix 34).

8.5.1.3.Scoring the Criteria of the Model

It was decided that the initial model should include the benefits of a Multi-criteria Decision Analysis (MCDA), which had the potential to address the prospect of a Ready Reckoner tool which could cope with complex questions as well as being a model which was easy to understand due to the visual application of the V.I.S.A. software[310] and with a statement scoring system thereby ensuring a model which was simpler to understand and therefore more accessible to potential users(see *Table 8-2 Principle 3*).

MCDA using V.I.S.A software [310] defaults to a scoring level of 0-100, the User will score each criterion 0 for poor and 100 for very good, however it was quickly felt that 0-100 was too broad and unnecessary *(*see *Table 8-2 Principle 8).* The model User was asked to consider each criteria in turn and to decide if the new or redesigned proposal would be better, the same, or worse than the current system in place. Key to this model is that it is only the differences in the new proposal to the current service that are evaluated *(*see *Table 8-2 Principle 8).* The User is asked to assign a score of 10 for improved, 5 for neutral and 0 for worse to each criterion of care. However, the impact on patient care of a redesigned service can be difficult to measure. This model relies on the expertise of those that provide the service to state where a new or redesigned service will improve the care the patients receive. The scoring was changed to better reflect a positive or negative score given to the patient experience: a score of 5 represents care of the patient *much improved*, 2.5 represents care *improved*, 0 represents *no change* to the care of the patient, -2.5 represents care of the patient *reduced* and -5 care of the patient *much reduced*.

8.5.1.4.Weighting the Criteria of the Model

IMPACT ON CARE	
CRITERIA	**SUB-CRITERIA**
Person Centred	Patient Choice
	Continuity and Coordination of Care
	Facilities & Environment
	Access
Safe	Safe
Effective	Prevention
	Provision of Care
	Integration
	Evidence Based
Timely	Waiting Time
Equitable	Waiting Time
	Clinical Practice

Table 8-3 Criteria and Sub-criteria defining the Impact on Care

The criteria and sub-criteria, which are used in the final model to evaluate the Impact on Care, are depicted in Table 8-3. In MCDA the User is asked to ascertain weights for each criterion, if a model contains sub-criterion then the user determines the weights for the sub-criterion, which in turn determines the weights of the criterion. The summed weights add up to one. The user decides if one criterion is more important than another is and allocates a weight accordingly. Initially, it was felt that the weighting of the criterion would be left up to the Decision-maker: influenced by the current priorities in healthcare and the current local needs of the organisation. However, it was decided that this approach was too haphazard and not systematic enough to ensure consistency, which is vital when designing a model to help compare very diverse proposals across many application areas. The weight should not be fixed in perpetuity but reviewed in a formal manner (see *Table 8-2 Principle 11*).

One method to elicit weights in this manner is the Analytic Hierarchy Process (AHP)[311] [312]. The AHP is a comprehensive framework for organizing and analysing complex decisions. The framework provides a basis for structuring decision problems, for representing and quantifying elements of the problem, for relating those elements to overall objectives, and for evaluating alternative solutions. The decision problem is broken down into smaller hierarchical elements each of which can be analysed independently; the Decision-maker then systematically weighs the various elements by comparing them one against another relative to their impact on an element above them in the hierarchy. Typically, Decision-makers use their judgment about the relative meaning and importance of the various elements. The elements of the decision problem are assigned numerical weights based on the derived judgments. However, the AHP method is criticised in the literature [313] [314] for questions to the Decision-maker being open to interpretation, the scale used to measure the intensity of preference and rank reversal: the addition of a new alternative may affect the rankings of the previous alternatives[315].

The method chosen to elicit weights was the Swing Weight method, partly in order to avoid the controversy, which appears to surround AHP, but mainly because this is the method the V.I.S.A. software uses and therefore using the illustrations of the software would be easier for the Decision-maker to understand. Both AHP and Swing Weights are examples found in Multi-attribute value tree analysis (MAVT)[316]. MAVT attempts to give importance statements a specific meaning and uses preference statements to support the decision making process. Swing weighting captures both the psychological concept of

importance and the extent to which the implemented measurement scale differentiates between alternatives [316]. The V.I.S.A. software includes two types of swing weights: Across Tree Weights and Within Family Weights. Across Tree Weights assigns weights to all of the bottom level criteria and if normalised will equal one. In contrast, the sub-criteria belonging to a criterion when applying Within Family weighting equals one.

Given that the model is arguably complex, it was decided the Within Families approach would be applied. The criteria and sub-criteria as identified in Table 8-3 were presented to the Decision-maker, who should set the weights: beginning with the main criteria he was asked a series of questions, which would lead to him ranking the criteria, based on the current priorities within NHS Fife. He was then asked to apportion 100% to the criteria based on their ranking positions. The resulting criteria weights can be viewed in Figure 8-7. This exercise was then repeated for each of the sub-criterion, the results of which can be viewed in Figure 8-8, Figure 8-9 and Figure 8-10 (see *Table 8-2 Principle 9*).

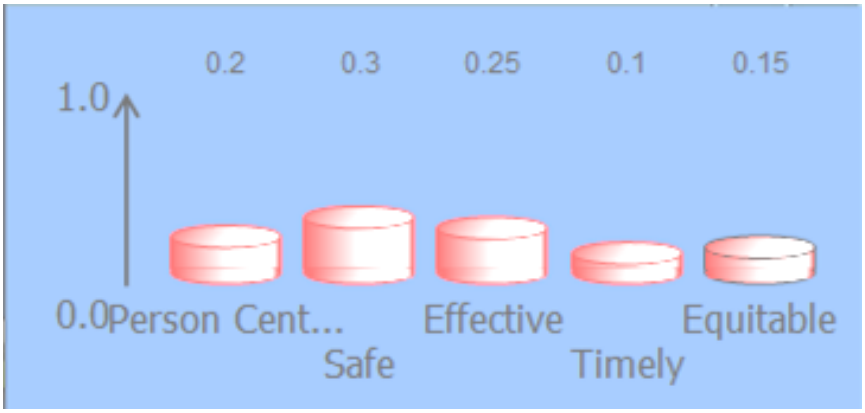


Figure 8-7 Weights apportioned to criteria

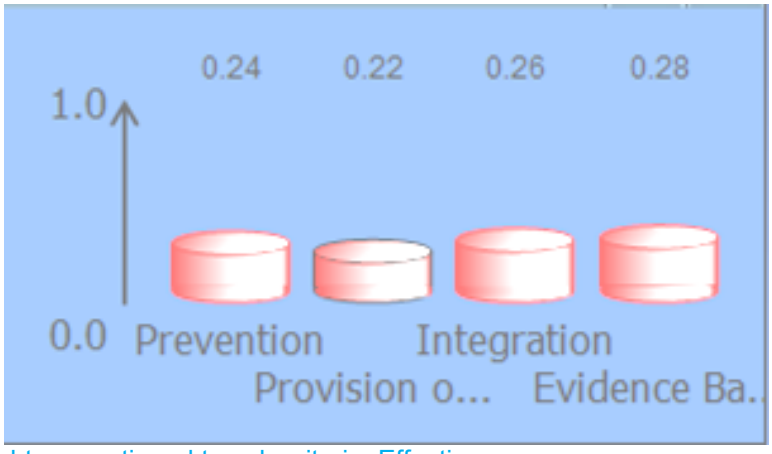


Figure 8-8 Weights apportioned to sub-criteria: Effectiveness

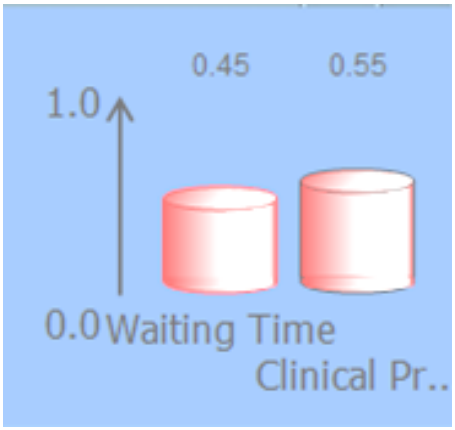


Figure 8-9 Weights apportioned to sub-criteria: Equitable

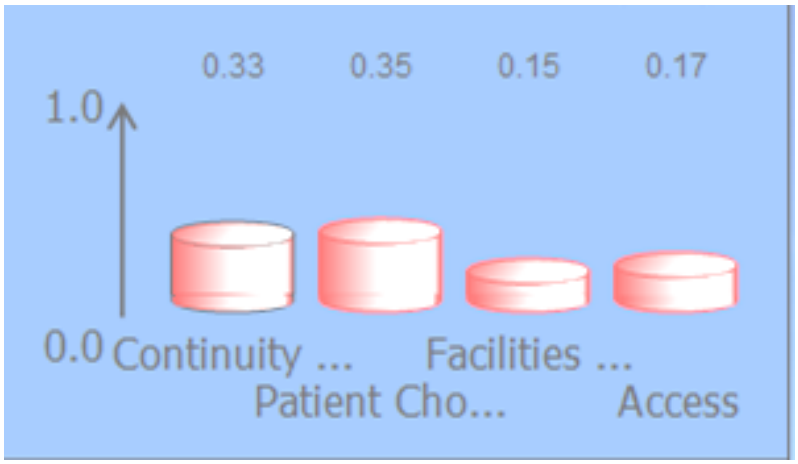


Figure 8-10 Weights apportioned to sub-criteria: Person Centred

8.5.2.Access

During the process of developing the criterion for the MCDA it was recognised that not all Users would have access to VISA software; therefore an Excel model was also developed in tandem (see *Table 8-2* Principle 3). Initially it was

felt that the Excel model could be used in conjunction with the MCDA software with this model having the advantage of graphically depicting the cost score against the care score. However, by applying the principles of MCDA of scoring and weighting to the Excel model it was concluded that the VISA software could be represented through an Excel model, recognising that a certain amount of the flexibility offered by the VISA software may be lost but also recognising the preference to give Users better access to the model. In addition, to improve the user-friendliness of the model, Users are asked to select an appropriate statement from a drop-down menu when scoring the criterion; each statement has a hidden score, which is used to calculate the average score for cost and care for each criterion (see *Table 8-2 Principle 8*).

8.5.2.1.Users

The Decision-makers section of the model included the scoring, weighting, and graphical output; the Proposers section provided the definition of each criterion, the scoring itself and an additional "justification" column, which invited the user to justify the scores they had allotted pertinent to their proposal.

It became clear that the Proposer did not need access to the Decision-makers inputs and the Decision-maker did not need access to the Proposers' inputs. To this end, the interface of the model developed so that the Proposers' inputs automatically updated the Decision-makers section (see *Table 8-2 Principle 8*).
In addition, as part of a normal auditing process the Proposer requires to be accountable for the project, therefore three additional columns were included: **timescale**; how long it would take for that part of the proposal to be put in

place, **measure**; the data which would be used to measure and assess if that part of the proposal was successful and **responsibility**; the person responsible for that part of the proposal being carried out. These three inputs substantiate the textual justification and score allocated by the Proposer, which negates, at least partially, any criticism that could be directed at the subjectivity of scoring the Impact on Care. They also add to the robustness of the model (see *Table 8-2 Principle 9)*.

8.5.3.Model Structure

8.5.3.1.Proposers Section

8.5.3.1.1.Impact on Care

The model development, to this point, presented the costs, or **Impact on Costs/Organisation,** as the first branch of the model; this was felt to be sending the wrong message as costs could be perceived to have priority over **Impact on Care**. From the outset of the model development, the difference in quality of care to the patient a new or redesigned service would bring was considered to be as important if not more so than the resultant cost. It was essential therefore to emphasise the importance of the care of the patient by ordering the model such that the **Impact on Care** appeared first in the model and was therefore the first consideration of the Proposer (see *Table 8-2 Principle 2 and Principle 5*).

NB It is interesting to note that since the time the model was developed the (verbal) emphasis on patient care has changed. With the current economic climate the emphasis has been much more about savings; although care of the

patient is still important; the priority is to be more efficient in delivering a service.

8.5.3.1.2.Impact on Costs/Organisation

A significant input from the Redesign Team at NHS Fife was the terminology commonly used in the NHS when referring to costs: Cost Avoidance, Cost Reduction and Cash Releasing. Cost Avoidance is the reduction from a projected (unbudgeted) level of spending had the action or improvement decision not taken place in the year, Cost Reduction is the reduction from a projected (budgeted) level of spending in the year and Cash Releasing is the recurrent level of financial savings, from the annual budget allocation, that can be released for investment elsewhere on a recurring basis. It was decided for ease of use for the Proposer and familiarity that these common terms should be incorporated into the model under the criteria Efficiency. Therefore, instead of percentages, Efficiency would now be represented as monetary sums under the columns “Minor capital”; “In year revenue” and “Recurrent revenue” (see *Table 8-2 Principle* 8). This alteration to the layout of the model also reduced the possibility of duplication or double-counting: the **Impact on Costs/Organization** was now clearly defined and is illustrated in Table 8-4: Staff and Resources are considered as Costs whereas Efficiencies are considered as Savings (see *Table 8-2 Principle 5*).

Impact on Costs/Organisation	
SAVINGS	
CRITERIA	**SUB-CRITERIA**
Efficient	Cost Avoidance including impact on other services
	Cost Reduction including impact on other services
	Cash Releasing including impact on other services
COSTS	
CRITERIA	**SUB-CRITERIA**
Staff	Training
	Supervision and Support
	Recruitment
	Development
	Salaries
Resources	Consumables
	Equipment & IT
	Premises
	Other Services

Table 8-4 Criteria and Sub-criteria defining the Impact on Costs/Organisation

8.5.3.1.3.Status Report

In addition to the Proposer's input page, it was decided to include an additional page, which would determine the progress of a proposal at any given time. This record of progress sets out the key people with responsibility, the target dates set, the progress made against the target dates and the actual benefits and savings achieved compared to the estimated benefits and savings and would update automatically depending on the Proposer's initial inputs. This is an important addition to the model: Programme monitoring of investments made into redesign projects by the NHS is criticised for being sparodic at best[8]. Scrutiny by decision-makers in the NHS of claims made by projects to improve services does not appear to be formally or systematically performed. The record of status of a given proposal serves as a confirmation or otherwise of progress and attainment of deadlines for the Proposer but in addition, the Status Report serves as a monitor and verification of outcomes for the Decision-maker.

[8] Communications with the Redesign Director NHS Fife February, 2011

8.5.3.2.Decision-makers Section

The Decision-makers section had also grown to two pages: Project Options page and Project Comparator page. The Project Options page gives all of the detail initially inputted by the Proposer and calculates the projects costs and care scores. The Project Comparator simply gives the graphical output, presented in the form of a matrix. The matrix is a two-dimensional representation, which measures the Impact on Care scores against the Impact on Costs/Organisation. The matrix has the capability to include all of the Proposals under consideration at one time for each individual patient.

An additional matrix, which incorporated the volume of patients who would benefit from the new or redesigned service, was later added. Therefore, within the Comparator page, the Decision-maker, by studying both matrices: individual and population, could easily appreciate firstly, the impact on an individual basis of a new or redesigned service in comparison to another new or redesigned service and secondly, could easily interpret the comparison of the effect of the volume of patients benefitting from the new or redesigned service: i.e. if a new service benefitted 10000 patients and another new service benefitted 1000 patients, all things being equal, then the service with the larger volume would gain higher scores.

At the request of SMT a Budget Page was also incorporated. This was done in the form of a simple table consisting of the total amount of money the Decision-maker had to spend and against each Proposal, the total amount of investment required. The Decision-maker merely selects from a drop-down menu “yes” or

"no" of their intention to invest in the Proposal. If the selection is "yes" the required amount of investment is subtracted from the budget total.

8.5.3.2.1.Output

With the additions and alterations being made to the model, the Decision-makers section was becoming unnecessarily complex. In order to return to the original ethos of the model of one of simplicity and logic, the structure of the Decision-makers section was amended: The first page of the model seen by the Decision-maker is the Comparator page, the output of this page is the matrices and the Weightings table, this page gives the Decision-maker all of the information he/she needs in the first instance when comparing the benefits of one project against another (see *Table 8-2 Principle 8*).

The weightings given to the criteria and sub-criteria were always felt to be an important task. Ideally, the weightings would be decided on by a group of stakeholders on a regular basis to give a representative view of the importance of each criterion, also the weightings would be influenced by the current climate within the NHS providing a mechanism for expressing and translating strategy into operational decisions. To emphasise the importance of weightings and the task to be carried out by Decision-makers, the Weightings table established in 8.5.1.4 was incorporated into the Comparator page. The detail of the Project is included in the Project Options Detail page; this meant that the Decision-maker only had to consider the detail of the Project if he wished to do so. The final page available to the Decision-maker is the Budget page: this page, as well as illustrating a brief resume of the project(s) under consideration, also includes

the total investment required, a running total of the budget, the ROI and the Payback period.

8.5.4.Model Development Summary

The model development compares favourably with Table 8-2: all of the principles have been followed. However, one aspect of Principle 10, Validity specifically External validity has not been met; this will be discussed later in this chapter (see 8.7). This aside, the favourable outcomes in comparison to Table 8-2, in theory at least, should result in a successful model.

8.6.The Current Option Assessor Model

The current model is called SoApt: Service Option Assessor and Prioritisation Tool. Originally, the model was named HOPA: Healthcare Option Assessor but the name was changed to reflect the success of the model in evaluating Social Care projects as well as healthcare projects and the integration of both.

8.6.1.The Distinctive Principles of SoApt©

SoApt combines the concepts of PBMA, MCDA and incorporates the concepts of economic theory. The aspects of PBMA[317] incorporated include: Identifying available resources; Identifying the costs and benefits of services; Identifying the current services providing the least amount of benefit. PBMA aims to perform a rigorous analysis of the opportunity costs and marginal benefits; these involve explicit value judgements. SoAPt also insists on a strict division between costs (Marginal Impact on Costs/Organisation) and benefits (Marginal

Impact on Care). The concepts of MCDA [314] incorporated into the model are: the Criteria are mutually exclusive; the Criteria are scored and the Criteria are weighted. In addition, the concepts of economic theory are incorporated by including the Opportunity Cost: The benefit sacrificed when investment is made in another service and the marginal cost of the additional benefit gained when one more monetary unit is spent.

Unlike other models identified in the literature (see 8.3), which emphasise a single measure of costs and benefits, SoApt considers costs and benefits as two distinct dimensions and illustrates these measures on a two-dimensional matrix, which distinguishes the options with the potential to have a substantial impact on costs and care from the options with a smaller impact. In addition, the outputs of SoApt are reported both in terms of marginal costs and benefits per patient in the target group and also for total population of the target group.

The Impact on Care is estimated using five of the standard dimensions of the Healthcare Quality Strategy[256]. The sixth dimension is incorporated to calculate Savings to measure the Impact on Costs/Organisation. This helps to ensure that the SoApt analysis relates to the continuing healthcare quality debate across Scotland. These dimensions are extended into a number of sub-criteria, each with a clear description in an attempt to reduce ambiguity. The criteria are sufficiently generic that they have proved to be applicable in a wide range of healthcare and Social Care applications but also reflect the priorities of Shifting the Balance of Care. This approach differs from all other models reviewed, which often develop new hierarchies of criteria for each application, increasing

implementation costs and reducing the potential for wider comparisons of options across diverse services.

Rather than being solely a tool for measuring options when allocating limited budgets, SoApt encourages programme monitoring (see 8.5.3.1.3). Option proposers have to identify measures of success and targets for performance, related to the Quality dimensions and their sub-criteria. The success of the project, assuming that it is selected, is reported in comparison to the targets. SoApt is intended to be an open access tool, rather than one just used by the budget holder deciding between options.

8.6.1.1.Access and Transparency

SoAPt exploits the flexibility of MCDA scoring, accepting expert judgement to estimate the impact on benefits. This process is explicit such that the logic is transparent with an audit trail. Such flexibility in using expert judgement reduces the implementation task, though at the potential cost of a loss of rigour compared to PBMA. The use of simpler, judgement-based estimates increases access to the model. It can be used by stakeholders with relatively little training, though some support will be needed initially. As such, SoAPt can be used by option proposers for self reflection, with iterations of the analysis enriching their case, or discarding it. SoAPt provides a common structure to help stakeholders articulate their case, ensuring that it receives a fairer consideration by the budget holder.

The SoApt weighting of the criteria reflects the priorities agreed by senior management in the health board. This provides a mechanism to translate strategy into operational decision making.

In summary, the benefits of SoApt are listed in Table 8-5.

Benefit	Explanation
Standardised completion of a project proposal	Completion of a project proposal is standardised against the criteria and sub-criteria incorporated in the model. As a result, an articulate Proposer or a person proficient in writing business cases does not have an unfair advantage over one who is not. In addition, the requirement to complete each of the various sections within the model ensures the Proposer does not bias the proposal in favour of his/her own interests.
Standardised criteria to measure project proposal	Although the metrics used to measure the success or otherwise of a proposal can be adapted to suit the proposal itself, the model demands that metrics are cited for each criteria and sub-criteria.
Encourages the consideration of the opportunity cost	In the savings section, the Proposer is asked to consider if the impact of savings will impact other services. Also the Decision-maker when deciding which project to invest in must also consider the other proposals that they will not be investing in.
Opportunity to reflect local and national priorities through weighting	The weighting of the criteria and sub-criteria on a regular basis allows the Decision-maker to update the weighting depending on the current local and national priorities.
Potential to compare several project proposals on one matrix	Matrices, individual and population, allow a direct comparison of several proposals at one time.
Evaluates proposals relating to Social Care provision as well as Healthcare provision.	The model, although originally developed to evaluate healthcare projects can also evaluate Social Care projects. The implication of this is the model also has the potential to evaluate projects, which integrates both health and Social Care services.
Includes ROI for each case	The Return on Investment for each proposal is calculated automatically based on the information furnished by the Proposer.
Includes regular reporting of tracking and outcomes.	The Project Status Report tracks if the proposal is meeting the targets set by the Proposer.
SoApt can be used as a disinvestment tool as well as an investment tool.	Projects, which are not going to plan, can have the investment withdrawn. Also, projects can be identified, when there is no longer money available for investment, to decide which project should be disinvested in.

Table 8-5 Benefits of the SoApt Model

Figure 8-11 Impact on Care©

PROJECT OPTION ASSESSOR- Proposal

Project Scope:	Virtual Ward; caring for adults 75 years and over at home	Project ID:	A
		Project Name:	Integrated Community and Assessment Support Service
		Project Lead:	Brenda
		Cost of Current Service Provision (estimated as cost per head)	£2,265
		Current Service Volume (patients p.a.)	2200
		Estimated Life of Project (years)	3

IMPACT ON CARE			THE DIFFERENCES IN CARE THE NEW SERVICE WILL BRING COMPARED TO THE CURRENT SERVICE				
CRITERIA	SUB-CRITERIA	DEFINITION OF CRITERIA	DIFFERENCES in new service compared to current service	SCORING the DIFFERENCES	MEASUREMENT used to evaluate new service	TIMESCALE	RESPONSIBILITY
Person Centred	Client Choice	Where clients and their carer's preferences for care are given priority and clients are enabled to be involved in their care-plan.	Clients encouraged to participate in decision making and given choice of care where appropriate , enabling them to achieve and sustain their maximum potential	Care Much Improved	Client survey	6	BT
	Continuity and Coordination of Care	Seeing the same healthcare professionals throughout care provision which is well coordinated between different staff, different departments, different hospitals and staff in primary care.	Consistency and continuity of care across Fife (3 geographic teams)	Care Much Improved	Client survey	6	BT
	Facilities & Environment	Fit for purpose and condusive to client care at home or other care facility.	Clients seen mainly in own enviroment, staff co-located to facilitate optimum communication	Care Much Improved	Admission to acute	6	KL
	Access	Convenience of access to care and location of care.	Clients seen mainly in own enviroment, if care required outwith home then care provided in a single centre in one geographical area	Care Much Improved	Number of admissions to acute	6	KL
Safe	Safe	Reducing adverse events leading to safe and successful outcomes.	Reduced risk of hospital acquired infection, also improvement in clinical information sharing	Care Improved	Secondary infection monitor	6	KL
Effective	Prevention	Promoting preventative and anticipatory care and self-management.	Client enabled to maintain independence	Care Much Improved	Number of admissions to acute	6	KL
	Provision of Care	Care is consistently provided by the right person in the appropriate place at the right time thereby improving the health and well-being of the Client.	Timely care provided in the right place by the right person	Care Much Improved	Client survey	6	BT
	Integration	Integrates health and social care in primary, secondary, local partnerships and/or the 3rd sector.	Whole system integrated model	Care Much Improved	Delayed Discharge	12	KL
	Evidence Based	There are documented outcomes of like proposals or success elsewhere.	Gwent	Care Much Improved		0	
Timely	Waiting Time	Improved effectiveness and efficiency of care reducing the time the Client waits before treatment.	Target wait time in place	Care Improved	Wait time	6	KL
Equitable	Waiting Time	Waiting time does not differ due to location, status, ethnicity, gender or physical ability.	Improved equity of wait due to geographical service delivery	Care Improved	Wait time comparison across three localities	6	KL
	Clinical Practice	Clients are given the same opportunity of treatment which does not differ due to location, status, ethnicity, gender or physical ability but is based on Clients needs.	Consistency of clinical practice across the three teams	Care Improved	Client Survey Comparison	6	BT

8.6.2.The Structure of SoApt

The following illustrates each page of the SoApt model and explains their use.

Figure 8-11 illustrates the Impact on Care completed by the Proposer (see *Table 8-2 Principle 5 Principle 10*). The Proposer begins by completing the top of the page, which includes information such as the Project Name, Project Lead, and Project Scope (see *Table 8-2 Principle 1 Principle 2*). The Proposer continues to complete the page for each sub-criteria and criteria by stating the benefits, scoring the benefits from Care Much Improved to Care Much Reduced, stating the measurement that would be used to track the benefits, the time frame of when the measurement would take place and the person with responsibility for that part of the proposal (see *Table 8-2 Principle 3 Principle 7*).

The Proposer is then required to complete the Impact on Costs/Organisation section of the page as illustrated in Figure 8-12. The Proposer completes the savings the project will bring in relation to Cost Avoidance, Cost Reducing and Cash Releasing and then continues to complete the Costs of the project following the sub-criteria and criteria provided (see *Table 8-2 Principle 6 Principle 7*). The model is devised to consider the Impact on the Costs/Organisation of projects over a period of three years (see *Table 8-2 Principle 11*). The logic behind this is that a period of three years is enough time for a project to be assimilated into the ‘normal’ service provision.

Figure 8-12 Impact on Costs/Organisation©

IMPACT ON COSTS/ORGANISATION

SAVINGS

THE EFFICIENCY SAVINGS THE NEW SERVICE WILL PROVIDE COMPARED TO THE CURRENT SERVICE

CRITERIA	SUB-CRITERIA	DEFINITION OF CRITERIA	REASON for EFFICIENCY SAVING	Year	Capital	In Year Revenue	Recurrent Revenue	MEASUREMENT used to calculate efficiency saving	TIMESCALE	RESPONSIBILITY
Efficient	Cost Avoidance including impact on other services	The reduction from a projected (unbudgeted) level of spending had the action or improvement decision not taken place (in year).		1	£0	£0			0	
				2						
				3						
	Cost Reduction including impact on other services	The reduction from a projected (budgeted) level of spending (in year).	Reduction in acute beds @ £225/day	1	£0	£0	£1,158,914	available bed days	12	
				2			£4,183,466			
				3			£3,968,399			
	Cash Releasing including impact on other services	The recurrent level of financial savings (from the annual budget allocation) that can be given up (released) for investment elsewhere on a recurring basis.		1			£0		0	
				2						
				3						

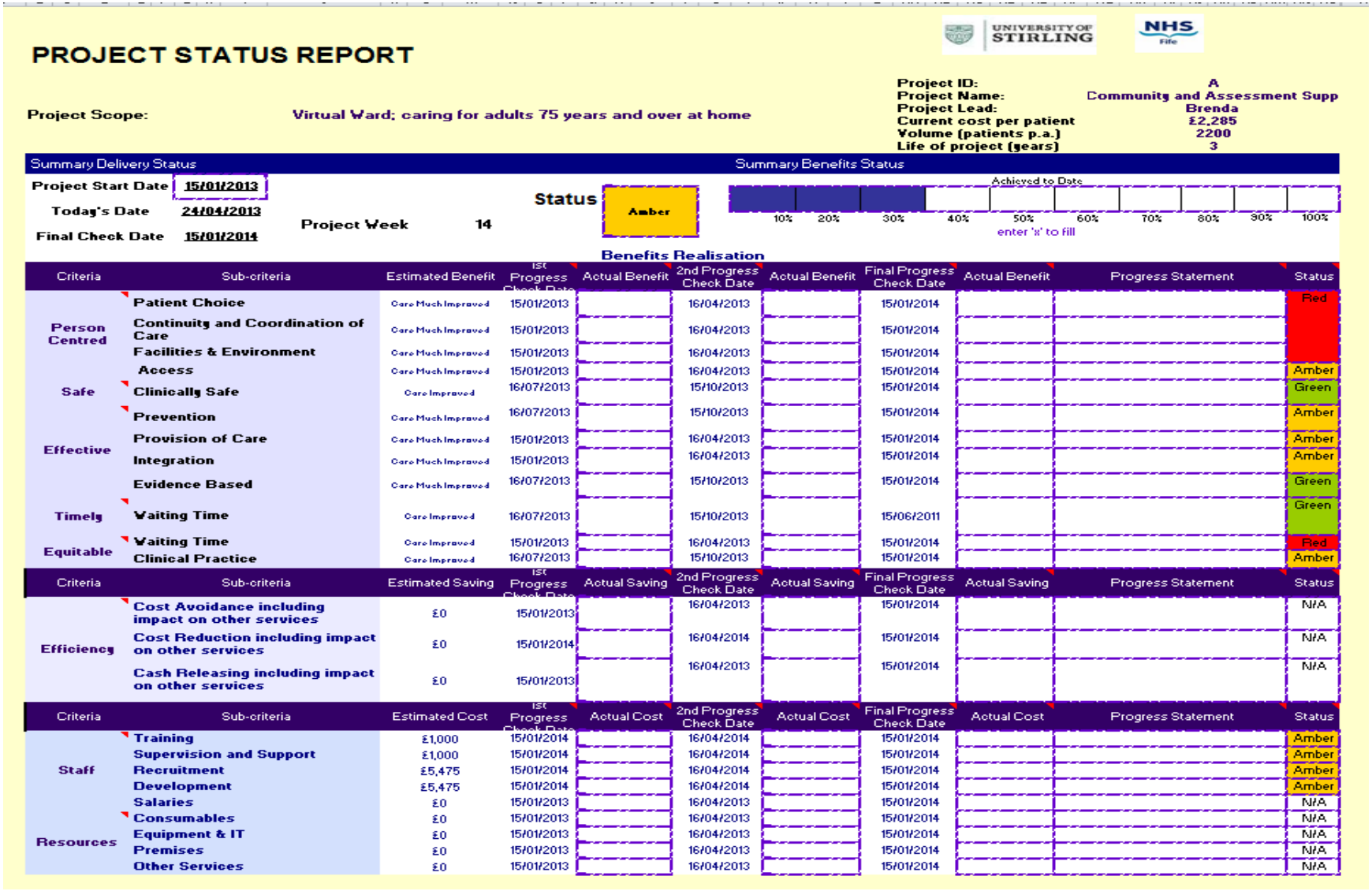
COSTS

THE ADDITIONAL COSTS THE NEW SERVICE WILL BRING COMPARED TO THE CURRENT SERVICE

			REASON for ADDITIONAL COST	Year	Capital	In Year Costs	Recurrent Costs	MEASUREMENT used to calculate additional cost	TIMESCALE	RESPONSIBILITY
Staff	Training	Additional training required to deliver the proposal	£1365 per person, mixture of in-house provision and external for each team	1		£32,760	£0	Training costs	12	
				2		£0	£1,000	Refresher costs	12	
				3			£1,000	Refresher costs	12	
	Supervision and Support	Additional Supervision and support of staff to deliver the proposal	Consultant Geriatrician 18.75 hrs@ £60 for each team	1			£5,475	invoice	12	
				2			£5,475	invoice	12	
				3			£5,475	invoice	12	
	Recruitment	Additional recruitment of staff required to deliver the proposal		1		£0	£0		0	
				2						
				3						
	Development	Development costs including the setting up of protocols, double running costs		1		£0	£0		0	
				2						
				3						
Resources	Salaries	Additional Staff salaries: staff numbers, no. of shifts	1* Band 7, 3.52* Band 6, 2* Band 5, Suport Worker Band 3*3.44	1		£0	£2,079,528	Salaries	12	
				2			£2,079,528	Salaries	12	
				3			£2,079,528	Salaries	12	
	Consumables	Additional Consumable costs required for the proposal	Travel expenses @ £3000/annum per team	1	£0	£0	£87,840	Travel expenses	12	
				2			£87,840	Travel expenses	12	
				3			£87,840	Travel expenses	12	
	Equipment & IT	Additional equipment and IT required for the proposal		1	£0	£0	£0		0	
				2						
				3						
	Premises	Additional costs for premises the proposal will be housed in		1	£0	£0	£0		0	
				2						
				3						
	Other Services	Additional costs as a result of impact on other services		1	£0	£0	£0		0	
				2						
				3						

Figure 8-13 illustrates the Project Status Report, which is also completed by the Proposer (see *Table 8-2 Principle 9*). This page is used to track a project after it has been approved for investment; as well as allowing the Proposer to monitor their project it serves as a monitor for the Decision-maker to track the progress of their investment and to decide whether to continue with the scheduled investment. The tracking of a proposal adopts *traffic light* system currently in use in Fife: red-no progress, amber-partial progress and green-complete. Such cells as the dates are automatically updated depending on the input by the Proposer (see *Table 8-2 Principle 3 Principle 8*).

Figure 8-14 illustrates the page the Decision-maker consults to decide which project to invest in (see *Table 8-2 Principle 5 Principle 10*). The information inputted by the Proposer automatically updates the two matrices; one that shows the Impact on Care versus the Impact on Costs/Organisation for individuals and one, which shows the Impact on Care versus Impact on Costs/Organisation for the total population the project, will help (see *Table 8-2 Principle 8 Principle 9*). Both matrices have built-in sensitivity to illustrate movement of 5% either side of costs and benefits *(*see *Table 8-2 Principle 12*). The model is designed to compare 13 projects on one matrix but potentially could compare more. This page also includes the Weights grid, which is a record of the weights apportioned to the criteria, and sub-criteria by the Decision-maker (see *Table 8-2 Principle 9*). This process ideally should take place at least twice per year to properly reflect the current priorities at local and national levels (see *Table 8-2 Principle 4*).



PROJECT STATUS REPORT

UNIVERSITY OF STIRLING

NHS Fife

Project Scope: Virtual Ward; caring for adults 75 years and over at home

Project ID:	A
Project Name:	Community and Assessment Supp
Project Lead:	Brenda
Current cost per patient	£2,285
Volume (patients p.a.)	2200
Life of project (years)	3

Summary Delivery Status

Project Start Date	15/01/2013
Today's Date	24/04/2013
Final Check Date	15/01/2014
Project Week	14
Status	Amber

Summary Benefits Status

Achieved to Date

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

enter 'x' to fill

Benefits Realisation

Criteria	Sub-criteria	Estimated Benefit	1st Progress Check Date	Actual Benefit	2nd Progress Check Date	Actual Benefit	Final Progress Check Date	Actual Benefit	Progress Statement	Status
Person Centred	Patient Choice	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Red
	Continuity and Coordination of Care	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			
	Facilities & Environment	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			
	Access	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
Safe	Clinically Safe	Care Improved	16/07/2013		15/10/2013		15/01/2014			Green
	Prevention	Care Much Improved	16/07/2013		15/10/2013		15/01/2014			Amber
Effective	Provision of Care	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
	Integration	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
	Evidence Based	Care Much Improved	16/07/2013		15/10/2013		15/01/2014			Green
Timely	Waiting Time	Care Improved	16/07/2013		15/10/2013		15/06/2011			Green
Equitable	Waiting Time	Care Improved	15/01/2013		16/04/2013		15/01/2014			Red
	Clinical Practice	Care Improved	16/07/2013		15/10/2013		15/01/2014			Amber

Criteria	Sub-criteria	Estimated Saving	1st Progress Check Date	Actual Saving	2nd Progress Check Date	Actual Saving	Final Progress Check Date	Actual Saving	Progress Statement	Status
Efficiency	Cost Avoidance including impact on other services	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Cost Reduction including impact on other services	£0	15/01/2014		16/04/2014		15/01/2014			N/A
	Cash Releasing including impact on other services	£0	15/01/2013		16/04/2013		15/01/2014			N/A

Criteria	Sub-criteria	Estimated Cost	1st Progress Check Date	Actual Cost	2nd Progress Check Date	Actual Cost	Final Progress Check Date	Actual Cost	Progress Statement	Status
Staff	Training	£1,000	15/01/2014		16/04/2014		15/01/2014			Amber
	Supervision and Support	£1,000	15/01/2014		16/04/2014		15/01/2014			Amber
	Recruitment	£5,475	15/01/2014		16/04/2014		15/01/2014			Amber
	Development	£5,475	15/01/2014		16/04/2014		15/01/2014			Amber
Resources	Salaries	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Consumables	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Equipment & IT	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Premises	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Other Services	£0	15/01/2013		16/04/2013		15/01/2014			N/A

Figure 8-13 Project Status Report©

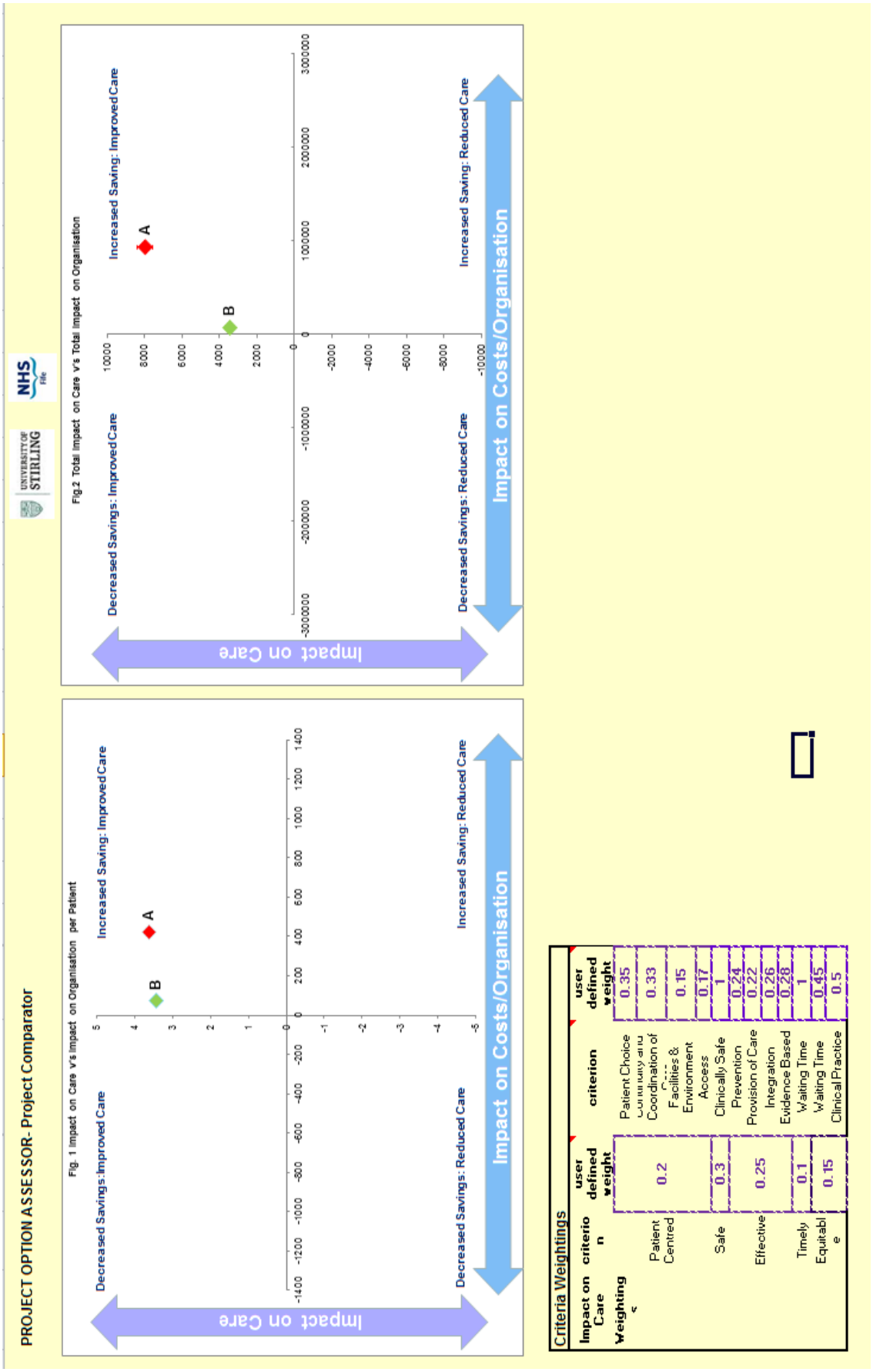
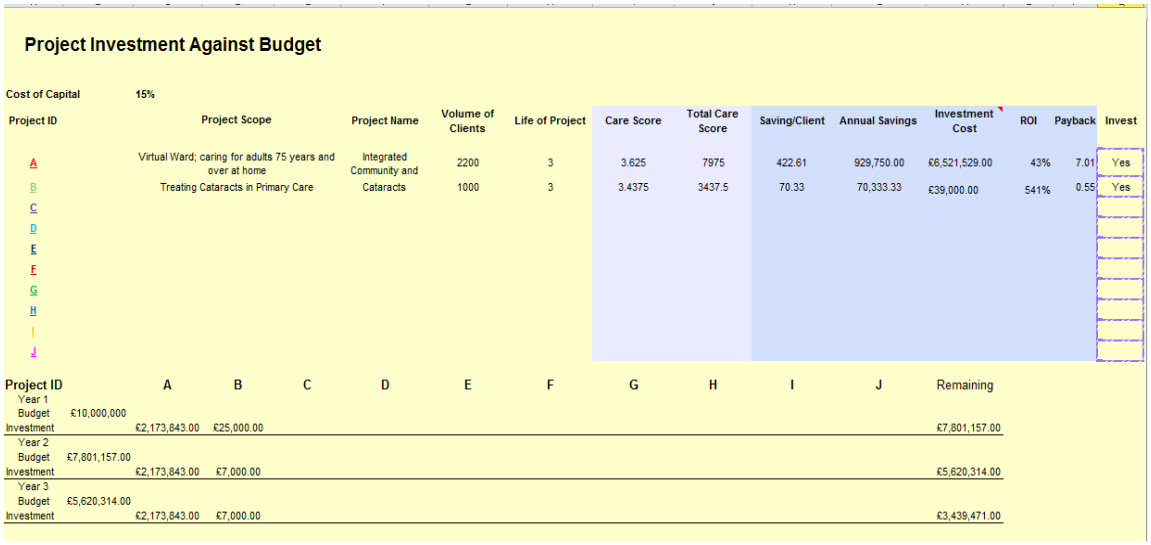


Figure 8-14 Comparator Page©



Project Investment Against Budget

Cost of Capital 15%

Project ID	Project Scope	Project Name	Volume of Clients	Life of Project	Care Score	Total Care Score	Saving/Client	Annual Savings	Investment Cost	ROI	Payback	Invest
A	Virtual Ward; caring for adults 75 years and over at home	Integrated Community and	2200	3	3.625	7975	422.61	929,750.00	£6,521,529.00	43%	7.01	Yes
B	Treating Cataracts in Primary Care	Cataracts	1000	3	3.4375	3437.5	70.33	70,333.33	£39,000.00	541%	0.55	Yes
C												
D												
E												
F												
G												
H												
I												
J												

Project ID		A	B	C	D	E	F	G	H	I	J	Remaining
Year 1 Budget	£10,000,000											
Investment		£2,173,843.00	£25,000.00									£7,801,157.00
Year 2 Budget	£7,801,157.00											
Investment		£2,173,843.00	£7,000.00									£5,620,314.00
Year 3 Budget	£5,620,314.00											
Investment		£2,173,843.00	£7,000.00									£3,439,471.00

Figure 8-15 Budget Page©

Figure 8-15 illustrates the Budget page, which can be used by the Decision–maker to establish the ROI and payback period of investing in a particular project as well as the running budget amount he/she has at his/her disposal.

Figure 8-16 depicts the detail of the projects being proposed, this page is automatically updated on completion by the Proposer of the Project. The Decision-maker can access this page if he wishes to look at the detail of a proposal (see *Table 8-2 Principle 9*).

PROJECT OPTION ASSESSOR- Project Options

Project ID:								A			B		
Project Name:								Integrated Community and Assessment			Cataracts		
Project Lead:								Brenda			GM		
Current cost per								2285			1000		
Volume (patients p.a.)								2200			1000		
Life of project (years)								3			3		
Impact on Care	criterion 1	weight 1	criterion 2		weight 2	weight total		care score			care score		
	Patient Centred	0.2	Patient Choice		0.35	0.07		Care Much Improved			Care Much Improved		
			Continuity and Coordination of Care		0.33	0.066		Care Much Improved			Care Much Improved		
			Facilities & Environment		0.15	0.03		Care Much Improved			Care Much Improved		
			Access		0.17	0.034		Care Much Improved			Care Much Improved		
	Safe	0.3	Clinically Safe		1	0.3		Care Improved			Care Improved		
			Prevention		0.24	0.06		Care Much Improved			Neutral		
	Effective	0.25	Provision of Care		0.22	0.055		Care Much Improved			Care Improved		
			Integration		0.22	0.065		Care Much Improved			Care Much Improved		
			Evidence Based		0.26	0.07		Care Much Improved			Care Much Improved		
	Timely	0.1	Waiting Time		1	0.1		Care Improved			Care Much Improved		
	Equitable	0.15	Waiting Time		0.45	0.071		Care Improved			Care Improved		
			Clinical Practice		0.526	0.079		Care Improved			Care Improved		
Total Care Score		1				1		3.625			3.4375		
Impact on Organisation							Year	Capital	In Year Revenue	Recurrent Revenue	Capital	In Year Revenue	Recurrent Revenue
		£	Cost Avoidance including impact on other services				1	£0	£0	£0	£0	£0	£0
							2	£0	£0	£0	£0	£0	£0
							3	£0	£0	£0	£0	£0	£0
Savings	Efficient	£	Cost Reduction including impact on other services				1	£0	£0	£1,158,314	£0	£0	£0
							2	£0	£0	£4,183,466	£0	£0	£0
							3	£0	£0	£3,368,399	£0	£0	£0
			Cash Releasing Efficiency Savings including impact on other services				1	£0	£0	£0	£0	£0	£85,000
							2	£0	£0	£0	£0	£0	£85,000
		£					3	£0	£0	£0	£0	£0	£80,000
			Savings from Project					£0	£0	£3,310,779	£0	£0	£250,000
			Total Savings						£3,310,779			£250,000	
		£		training			1		£0	£1,000		£20,000	£0
							2		£0	£1,000		£0	£2,000
							3		£0	£1,000		£0	£2,000
				supervision and support			1		£0	£5,475		£0	£5,000
							2		£0	£5,475		£0	£5,000
							3		£0	£5,475		£0	£5,000
	Staff			recruitment			1		£0	£0		£0	£0
							2		£0	£0		£0	£0
							3		£0	£0		£0	£0
				development			1		£0	£0		£0	£0
							2		£0	£0		£0	£0
							3		£0			£0	£0
Costs				salaries			1		£0	£2,073,528		£0	£0
							2		£0	£2,073,528		£0	£0
							3		£0	£2,073,528		£0	£0
		£		consumables			1	£0	£0	£87,840	£0	£0	£0
							2	£0	£0	£87,840	£0	£0	£0
							3	£0	£0	£87,840	£0	£0	£0
				equipment & IT			1	£0	£0	£0	£0	£0	£0
	Resources						2	£0	£0	£0	£0	£0	£0
							3	£0	£0	£0	£0	£0	£0
				premises			1	£0	£0	£0	£0	£0	£0
							2	£0	£0	£0	£0	£0	£0
							3	£0	£0	£0	£0	£0	£0
				other services			1	£0	£0	£0	£0	£0	£0
							2	£0	£0	£0	£0	£0	£0
							3	£0	£0	£0	£0	£0	£0
			Investment Required for Project					£0	£0	£6,521,529	£0	£20,000	£13,000
			Total Investment						£6,521,529			£33,000	
			Total Revenue of Project						£2,783,250			£211,000	
			Saving per patient						£422.61			£70.33	
			Projected new cost per patient						£1,862.39			£923.67	

Figure 8-16 Project Detail

8.6.3.Testing the Model with Change Fund Proposals

Following a suggestion made by the SMT, the project groups who had been awarded funding from the Change Fund initiative (see 3.3.1.5) were approached to input their proposals into the model; thereby testing its validity and usefulness. The projects, which had been awarded funding in Fife at that time, were identified as Telecare, Hospital at Home, Re-enablement, Local Area Project Leaders and Community Equipment. The prioritisation model was originally designed for healthcare type projects; however, all of the projects were totally based in Social Care or integrated Health and Social Care. Nevertheless, although the project leaders of these projects had misgivings about the suitability of the model for Social Care issues, it was found, with very little adjustment, the model adapted well to projects embedded in Social Care.

All of the project leaders were able, in the main, to complete the **Impact on Care** part of the model but not all had fully considered how the differences in care for each criterion and sub-criterion would be measured and expressed concern that they had not fully taken all of these factors into account. Only two of the project leaders were in a position to furnish costs, to complete the **Impact on Costs/Organisation** part of the model, pertaining to their projects; two expressing the need to consult with accountants. However, none of the project leaders were able to furnish any information relating to Efficiency: the savings that would be made to their own and other departments. The project leaders found this part of the model difficult and although a normal requirement of any business plan had not considered savings to any effect and stated that this was not usually required in monetary values. It is interesting to note that costs and

savings were not published as part of the self-report by recipients' requirement for Change Fund monies (see 3.4.1.4).

The non-completion of the input of the projects into the model was reported back to SMT who required that the completion should be followed-up. However, a change in personnel in the Change Fund administration resulted in no follow-up taking place (see Table 5-6 Implementation Barriers).

8.6.4.Feedback

Throughout the development of the model, various members of Fife NHS and Social Care staff, including management, financial and clinical staff, were presented or tested the model. The feedback received from staff members including SMT is listed in Table 8-6, a fuller table is in Appendix 35, all comments were gratefully accepted and acted upon if agreeable and at all possible during development.

Generally, the feedback was very positive although comment was made that the model looked complex initially, most could see the logic of the model and actually found the model made them question areas they had either taken for granted or not considered at all.

Individual Feedback	Assistant Director of Finance *I think the only comment I have relates to the relative complexity of the schedules. I appreciate that you have set out instructions, however I think the ability for individuals to come to terms with the schedules will only come with familiarity. There will also be other issues (political for example) which will impact on a decision, however I assume this is something that will be agreed outside the model.*
	Participants of 3 Day Lean Training. *Model easy to complete but financial figures difficult to access (but this is normal with business cases).* *Good emphasis on the quality of life of the individual but concerned with the bias of the Proposer.*
	It is a very logical model and extremely thought-provoking. It alerted me to things I hadn't necessarily considered when compiling the project and made me think I had more homework to do before submitting my idea.
Strategic Clinical Change and Development Team meeting	*The group had a discussion around the Prioritization Tool and how it would be more beneficial for service developments rather than redesign projects. The tool would highlight the savings/spend which could be incurred during the course of the project; this may also highlight the initial investment required, etc. It was agreed that the tool could also be used to highlight where disinvestment is required.*
SMT	*'The model appears to be very robust.'* *'This model requires a strategy to be in place with regards to prioritisation, we do not have that.'* *'I do not agree with the so called benefits of weighting the categories.'* *'Weighting is extremely important and needs careful consideration, I have put forward proposals in the past and have regretted not giving due time to weighting the categories which, had I, would ultimately have changed my decision.'* *'I do not think savings should be separated from the benefits.'* *'What use is a prioritisation tool for investment when there is no money to invest?'* *'Links to boxes with standard costs would be useful, for instance bed day costs, people often use the blue book costs which is an overinflated saving unless you are completely closing a ward.'*
Change Fund Teams	*'This (the model) has highlighted areas that I had not considered'* *'I have not thought through all of the measures identified here'* *'The model appears to be very robust'* *'I will need to go away and think about it; this is not something I had thought of'*

Table 8-6 Feedback

8.6.5.Pilot Study

The SoApt model was presented to several members of the Integrated Resource Steering Committee working on behalf of the Scottish Government. A large aspect of the Public Bodies Bill[318] is an integrated budget across health

and Social Care. The committee members determined the model was very timely and would be useful to Decision-makers from individual health boards to decide how to invest their new budgets. It was therefore agreed that the SoApt model would be piloted in Highland (the only health board to date who has integrated health and Social Care) as part of their 'Strategic Commissioning for Older People in the Highlands: Developing a priority setting process'. The key partners of the group, who will take this project forward, are Glasgow Caledonian University; The Highland Community Care Partnership; Scottish Government and the Joint Improvement Team. The stated outcomes of the process are: Development and implementation of an informed approach to priority setting; Decisions for re-allocation of resources to better meet specified criteria; Modelling of a process that can be used within and across service areas in the future; Learning; partnership and organisational development (local and national); Development of peer support networks, self-management, and maximising the potential to develop stronger and more resilient communities. The Lead of the committee indicated the SoApt model would meet many of the above criteria. The pilot is due to begin in 2013 and outcomes will be recorded after completion.

8.7.Implementation Barriers

Barriers which can be associated with the implementation of SoApt are referenced from Table 5-6 and are noted in red text. Specific barriers found are Organisational Momentum and Support. Despite favourable testing of the model, NHS Fife has not yet adopted the model as they could not envisage its

use in the current climate and had not formed a prioritisation strategy (see Table 8-6, SMT) (Culture). Fortunately, the Integrated Resource Steering Committee does have a prioritisation strategy and consider piloting the model a worthwhile project particularly in the current climate.

An identified limitation of the model is not with the model itself but with the lack of savings information Proposers had available[179] (Data). However, the Government's emphasis on accountability of those managing the delivery of healthcare[318] may change the attitude towards the importance of providing information relating to savings, as Return on Investment cannot be calculated without it.

Piloting the model in Highland will also address a potential limitation of the model not met in Table 8-2: Validity, specifically external validity. Given that the model was developed explicitly for the Redesign Team at Fife, it is not yet known if the model can be generalised to other health authorities.

8.8.Evaluation of the SoApt Model

This Case Study presented the development of SoApt: an option assessor model. The evaluation of the model is measured against Table 8-2 and the feedback received and applied to the Evaluation Framework (see Figure 8-17).

User

The User of the SoApt model is the Participant: the Proposer and the Decision-maker (see Table 4-2).

Model Type

The Model Type of SoApt is Type 3- Strategic Model. SoApt has the ability to reflect the strategy of the organisation through the investment choices made.

From the experience discussed Information Quality, System Quality and Service Quality can all be measured and can be used to measure User Satisfaction, which could result in a Net Benefit to the Organisation.

Information Quality

The Information Quality of the SoApt model was relevant, useful and easily understood. However, Fife staff's experience of using the model was that the data required to fully informing the model: Efficiency Savings, was not readily available to them. Although not a fault of the model itself, this data is required and therefore it is important that Users are made aware of this requirement in order to prepare for the inputting process. NEGATIVE

System Quality

SoApt, despite initial trepidation, is easy to use, is readily accessible and easily understood. The standardised format negates the need to be an articulate business case writer and places the emphasis on the proposal itself rather than the quality of writing. POSITIVE

Service Quality

The service provision of the SoApt model is yet to be tested. NA

Net Benefits to Organisation

The benefit of the SoApt model is to the organisation, the model provides options for Decision-makers on the prioritisation of proposals or projects to invest in by reflecting the current priorities at local and national level and by standardising the scores of proposals in line with Shifting the Balance of Care.

POSITIVE

Net Benefits to Patients

The benefit to the patient of the SoApt model is not particularly in the Use of the model but the outcome of the model's use. The SoApt model emphasises the importance of the care of the patient throughout input to the model.

User Satisfaction

From the User's perspective, the satisfaction of Use of the model is generally favourable: Users appreciated the logical structure of the model, the insight it gave them and the emphasis placed on the patient/client during the inputting process. POSITIVE

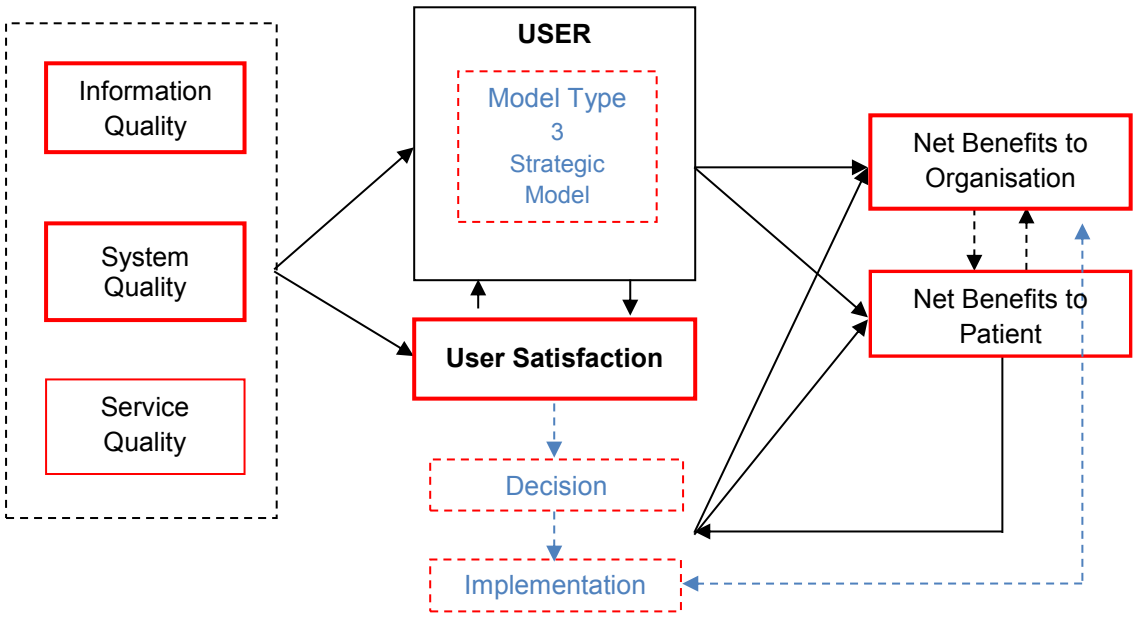


Figure 8-17 Applying the Evaluation Framework to the SoApt Model

8.9.The SoApt Case Study as Action Research

With reference to Action Research (see 4.2.3.2), the author led the development of the SoApt model from the outset. Following the remit of the

client the model was required to facilitate change in how prioritisation of investment decisions is made in Fife[111]. The development of the model followed the process cycle (see Figure 4-8); many iterations of the model were produced before a satisfactory model emerged.

8.10.The Role of SoApt in Shifting the Balance of Care

The role of SoApt in Shifting the Balance of Care is less about addressing the eight Improvement Area priorities (see Table 5-1) directly and more about providing a tool to firstly systematically scope projects which address the eight priorities and secondly about aiding Decision-makers to prioritise these projects with the potential to directly address the priorities of Shifting the Balance of Care. A model, such as SoApt, with the potential to weight the categories to reflect the priorities of Shifting the Balance of Care provides a tool to aid in decision-making that is robust, logical and transparent and therefore should ensure that investment made in projects concentrate on Shifting the Balance of Care and meet the priorities and needs of patients and clients at a local and national level (see 3.4).

Table 8-7 rates SoApt with three stars against each Improvement Area. This is not the biased view of the author but a reflection of SoApt's role in Shifting the Balance of Care. The potential of SoApt is to provide a tool, which will measure the benefits and costs of proposals submitted to address any of the Improvement Areas in a standardised, transparent format.

Initially, with reference to Williams[112] , SoApt was categorised as a 'soft approach', however, on reflection, SoApt could also be considered 'a method to

calculate the attribute of a system'. SoApt does structure a problem but it also can provide the mechanisms to calculate the efficiency savings and costs of a project broken down into revenue type. (see Appendix 36 for updated OR Methods and their related models.)

	Improvement Area	Rate	SoApt
1	Maximise flexible and responsive care at home with support for carers	***	SoApt has the potential to enhance decision-making to find the 'best' proposal to meet the requirements of each Improvement Area.
2	Integrate health and Social Care for people in need and at risk	***	
3	Reduce avoidable unscheduled attendances and admissions to hospital	***	
4	Improve capacity & flow management for scheduled care	***	
5	Extend the range of services outside acute hospitals provided by non-medical practitioners	***	
6	Improve access to care for remote and rural populations	***	
7	Improve palliative and End of Life care	***	
8	Better joint use of resources	***	

Table 8-7 Potential SoApt Improvement Area Adapted from Table 5-3

8.11.Discussion and Conclusion

A review of the literature found the remit of the model requested by the client was not delivered by existing option assessor type models; therefore, a new model was developed and the scope defined. In order to ensure the efficacy of the model the principles of model development were established and adhered to as far as possible. Although one aspect of the principle Validity was not met other principles such as Accessibility, Structure and Transparency received positive comments from the feedback received (see Appendix 35).

After much iteration, the current model: SoApt provides a standardised structure based on existing, accepted criteria, which incorporates the priorities of Shifting the Balance of Care. The model is accessible to both Proposers and Decision-makers, which combines the objectives of both into one output. As well as providing standardised input for the Proposer, the model provides a monitor of progress for use by both the Proposer and the Decision-maker. The scoring allocated by the Proposer against each criterion is substantiated by providing additional measurable information. Two-dimensional outputs measuring the Impact on Care and the Impact on Costs/Organisation deliver the outcomes for the individual patient in the target population and the total of the target population over several proposals. The Decision-maker, having allocated weights to the criteria which reflect local and national priorities, selects the proposals which best meet the current priorities and can operationalize the health authority's current strategy.

As the model has yet to be applied more widely, the barriers to implementation have not been fully explored, although to be implemented the model's purpose needs to be understood and prioritisation of services part of the strategy of a participating health authority.

Measured against the Evaluation Framework, the model's outlook is encouraging; the feedback received was generally favourable, although the access to Savings data needs to improve to generate a favourable result for Information Quality.

The Role of SoApt in Shifting the Balance of Care is to provide Decision-makers with a systematic and transparent mechanism to select proposals, with

the most benefit to the patient/client and the most efficient for the organisation, which will meet the priorities of Shifting the Balance of Care.

Chapter Nine

Modelling the Shift in the Balance of Care

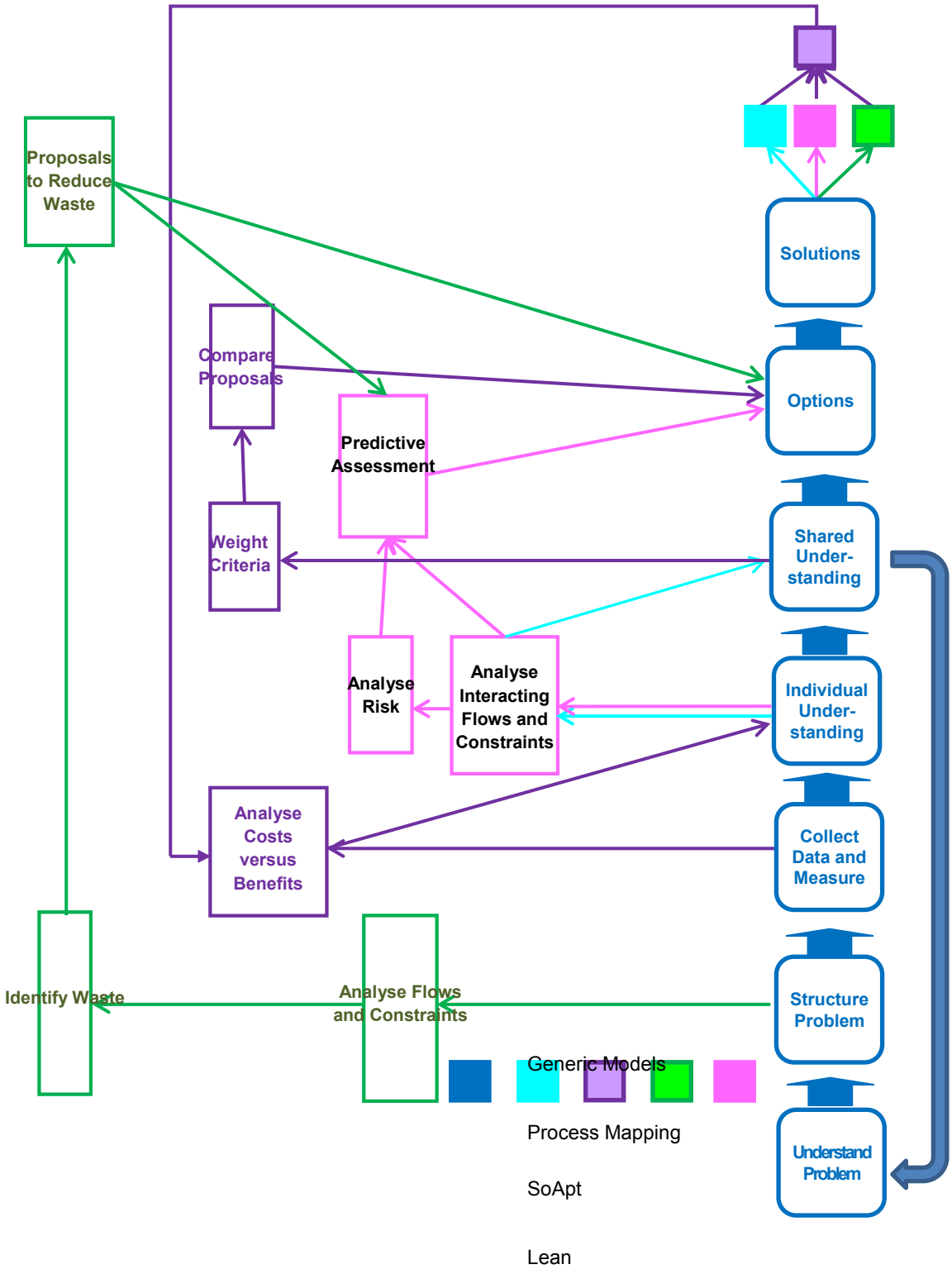


Figure 9-1 The Role of Models in Healthcare

This chapter assimilates the findings from the literature and Case Studies to determine if modelling has a role in Shifting the Balance of Care. The theoretical frameworks and the experiences and findings from the Case Studies are reviewed to compare and consider the roles and barriers of modelling in healthcare. The Roles of Models (see Figure 9-1) are examined against the eight priority Improvement Areas to establish if modelling can facilitate the delivery of the Shift in the Balance of Care.

9.1.Shifting the Balance of Care In NHS Scotland

9.1.1.Overview

Shifting the Balance of Care (SBC) encompasses many of the proposed ideas common to previous Government papers[42] [45] [46] [47] [48] such as health inequality gaps, reducing wait times, forming partnerships with patients and shifting care into the community, to reform healthcare in Scotland (see 3.5). It also tackles the growing concern regarding the care of an aging population recognising that current spending is not sustainable (see 3.3.1.3.1). The rationale behind Shifting the Balance of Care is to launch a new model of care led by CHPs, which provide continuous, preventative, integrated care, embedded in communities, with high-tech team-based resources, geared towards long-term conditions and considers patients and carers as partners (see Table 3-1). The concept of Shifting the Balance of Care provides a holistic approach to healthcare reform, which spans many stakeholders including primary, secondary, community and acute care, as well as Social Care, the third sector, the patient and the patient's carer.

9.1.2.Priorities of Shifting the Balance of Care

The SBC Delivery Group identified several areas of improvement to Shift the Balance of Care (see 5.3.1), but in order to galvanise thinking and action, eight areas of improvement were prioritised (see Table 5-1). Recommended Shifts to meet the Improvement Areas are illustrated in the Improvement Framework (see Figure 5-2). It is with reference to the eight priority Improvement Areas that the findings of this research are measured.

9.1.3.Progress of the Shift in the Balance of Care

Other Government policy documents[17 49 51 52 61 83], the review of evidence[55], the Quality Strategy[256], the Change Fund[57], as well as the National Performance Framework (see 3.4.1.2), and HEAT targets (see 3.4.1.3), underpin the Shift in the Balance of Care. The Quality Strategy positions the standard of quality expected in the delivery of healthcare across Scotland, particularly the shift in Effective care. The Change Fund provides monies to health authorities to stimulate the shift in the care provision for the older population to proactive, anticipatory care provided in the community or at home.

To appraise the progress of the Shift in the Balance of Care several sources were reviewed[70 76 78 82]. There is evidence to suggest some progress towards the shift according to the National Performance Framework and HEAT targets however, the Christie report[64], reviewing all public services, found a system, which is unaccountable and manages from the top with short-term strategies resulting in a system unresponsive to individual needs and unable to put in place preventative measures. In addition, Audit Scotland[70] reported a failing of

CHPs to make any discernible Shift in the Balance of Care. The Performance Framework and the HEAT targets tend to measure tangible, individual metrics, whereas these reports, by gathering and interpreting all of the evidence, provide a holistic view of the progress.

However, another measure of the progress of the Shift in the Balance of Care is the establishment of the Balance of Care ethos into NHS policy as evidenced by the National Performance Framework, the HEAT targets and the work carried out by the Joint Improvement Team and the Integrated Resource Framework. Therefore, as well as becoming embedded in government targets, Shifts in the Balance of Care is manipulated by these performance measures. Although there is evidence of some progress, Shifting the Balance of Care is a slow process hindered by the complexity (see 2.4) of the NHS, the number and input of stakeholders (see Table 2-1) and by the culture (see 1.1) of the NHS itself.

The cost-effectiveness of aspects of the Shift in the Balance of Care is questionable, there is divided evidence of cost-savings when caring for people in their homes[266] [268] [259] [261] , although care at home and care in the community does rely on unpaid carers and volunteers. There is also difficulty with budgets crossing the boundaries between health and Social Care, highlighting a lack of understanding in cost savings as a result of service change. Participants completing the Efficiency section of the SoApt model (see 8.6.3) emphasised this finding.

9.2.Review of Models

9.2.1.Model Selection

In order to answer the research question, ten models, familiar to Operational Research, were selected to examine their capability in facilitating the Shift in the Balance of Care. The models were selected on the basis of the 'preunderstanding' by the author, access to various models, models familiar to NHS Fife and models adopted by NHS Fife at the time of the research. In addition, models and software such as Simul8, Scenario Generator, the Lean methodology, Process Mapping and Statistical modelling in the form of Forecasting are all recommended / promoted by the NHS Institute for Innovation and Improvement[319] . In addition, the models provide examples of each of Williams[112] categorisations (see Appendix 36).

9.2.2.Methodological Assumptions of Models

Mingers[109] Framework (see Table 4-2) was applied to the selected models to examine the methodological assumptions underlying each model in a healthcare setting. Application of the Framework to the selected models classifies the models into their relevant parts: what the model does what it needs, how it is represented, who will use it, and what the purpose of the model is. The Framework provides a detailed definition of each model, which was applied when deliberating the Roles of Models in Healthcare and the Roles of Models in Shifting the Balance of Care (see 9.6 and 9.7).

9.2.3.Methods of OR Models

Unlike Mingers[109] who applied an individual purpose to each model, Williams[112] categorises the purpose of models into four basic groups, which he describes as the methods of models (see Figure 4-9). Application of Williams' categories to the selected models revealed the majority of models selected are categorised as soft methods (see Figure 4-10). There are no models examined in the thesis, which meet the category of Optimisation methods. However, it could be argued that tools used as part of the Lean methodology, are used to optimise a process (see 6.3), Lean is an iterative process that seeks to reach 'perfection'. Williams' categorisations are a useful start when selecting a model to perform a particular task, however, the framework does not reveal that the purpose of a model can sometimes be multiple or sequential (see 9.6.1). Nevertheless, the categorisation of methods of models was another useful tool when deliberating the Roles of Models.

9.2.4.The Purpose of Models and their Application to Improvement Areas

The key message from each High Impact Improvement Area was deliberated with a view to applying a model type, which would best support the desired improvement to Shifting the Balance of Care (see Figure 5-8). This assessment along with the' Purpose of' each model was used to allocate a rating system to the capacity of each model to impact the eight priority Improvement Areas, both in relation to the Improvement Area and the other models available.

Table 9-1 links the method of the model, sub-divided into the related models (see Figure 4-10) along with the Purpose of the models (see Table 4-2), along with the associated Shifting the Balance of Care High Impact Improvement

Area (see Table 5-3). This table gives a textual overview of the selected models and their potential impact on Shifting the Balance of Care. An example of a study from the literature is provided for at least one of the Improvement Areas to justify its selection and subsequent rating.

Method	Model	Purpose: In order to…	Improvement Area
Soft Methods	Process Mapping	Record existing processes; develop improvements by eliminating unnecessary tasks, clarifying roles within the process, reducing delays and duplication.	1 2 3 4 6 8
	Lean Methodology	Improve patient flow through the eradication of waste.	1 2 4 8
	SSM	Learn about and improve a problematic situation by gaining agreement on feasible and desirable change.	2 7
	Experience Based Design	Put patients first by listening to their views.	1 7
	Multi-criteria Decision Analysis	Aid in the process of difficult decision-making.	8
	Discrete Choice Experiments	Determine patient's preferences.	3
Methods to calculate the attribute of a system	Statistical Modelling	To find relationships, differences and independence between variables.	3
	SERVQUAL	Determine gaps between Users expectations and perceptions of the quality of health services	2
	Economic Evaluation	Choose a system, which optimised benefits whilst minimising the opportunity costs.	8
Methods to replicate or forecast system behaviour	Discrete-event Simulation	Explore the operation of complex interaction between discrete entities to aid understanding and control.	1 2 3 4 5

Table 9-1 Methods, Models, Purposes and Improvements

Process Mapping has the potential to address the majority of the priority Improvement Areas. An example of the evidence found in the literature described the Mapping of patient pathways in an acute hospital resulted in less activity taking place in the hospital and more within the community both at the beginning and towards the end of the patient's care[127], Improvement Area 4. Discrete-event simulation according to Table 9-1 has the next highest impact on the Improvement Areas. An example from the literature provides evidence in

relation to Improvement Area 4 of a Brazilian hospital able to increase productivity by 51% by simulating the scheduling of surgery into groups[165]. Other examples from the literature providing evidence of models included: The Lean methodology was applied to a Pathology department to improve the turn-around time of results, the outcomes of the implementation of Lean was an improvement in productivity, which increased discharge time and effectively made more beds available[133], Improvement Area 8. Soft Systems Methodology was incorporated into a study to improve integration and communication between an acute inpatient unit and a rehabilitation service unit, Improvement Area 2. Elective joint replacement patients were exposed to the ebd process in a hospital in Bolton, by listening to the experience of patients and staff the hospital was able to make cultural changes, which benefitted the patient's care [142], Improvement Area 1. Multi-criteria Decision Analysis was constructed to produce a ranked list of proposals for selection by a Primary Care Trust, the proposals were scored and weighted on the criteria which the participants considered best met their patient's care[144], Improvement Area 8. Discrete Choice Experiments were employed to elicit the preferences of patients towards different services[146], Improvement Area 3. Statistical Modelling was used effectively as part of a post-graduate study to identify GP practices, which were inappropriately referring physiotherapy patients to acute hospitals [254], Improvement Area 3. Gaps found using SERVQUAL in the service quality of West Midland hospitals[154], Improvement Area 2. Cost-effectiveness analysis found that injection and exercise delivered by therapists was more cost effective than exercise alone, Improvement Area 8.Deliberation of each Improvement Area, the Purpose of Models, and examples of evidence would

suggest modelling has the potential to Shift the Balance of Care. Also apparent from these deliberations is that not all Improvement Areas are served well by modelling e.g., Improvement Area 5, and that some models have the potential to serve more than one Improvement Area e.g. Process Mapping.

9.3.Review of Case Studies

9.3.1.Case Study Model Selection and Methods

The models: the Lean Methodology, Process Mapping, and Discrete-event simulation were selected based on the work taking place within NHS Fife at the time of the research. In addition, a new model SoApt is also examined as a Case Study. The model was developed at the request of the Redesign Team at NHS Fife, to produce an aid to Decision-makers with redesign investment decisions when faced with a limited budget.

9.3.1.1.Lean Methodology

The Lean Methodology Case Study encompassed two aspects: the action, implementation, and impact of the Back Pain Project and an evaluation of the Lean Methodology as it existed in Fife. Participation[103] [111] by the author in the Back Pain Project, although only until the preparation of roll-out, determines this research as Action Research as well as a Case Study. The author was a member of the team to action change[93] in the Back Pain Pathway, participation included observation, data collection and data analysis. The Back Pain Project is an example of Lean as a methodology: the Project Charter, the Kaizen Event, Value Stream Mapping, the Action Plan and various other tools used in the project are all included in the methodology. However, DES could be used with

Lean if the need arose to simulate an option before application. The evaluation of the implementation of Lean in Fife included a survey and follow-up interview to determine the application of Lean and the barriers to implementation.

9.3.1.2.Process Mapping

The Process Mapping Case Study included reference to research, which used Process Mapping to compare the delivery of physiotherapy from CHPs and acute divisions. In addition, the Case Study examined Process Mapping in the H@H research. The Process Maps were informed by, either, direct contact or emails, with stakeholders.

9.3.1.3.Discrete-event Simulation

The Discrete-event simulation Case Study was combined with the Process Mapping Case Study as Process Mapping preceded and informed the Discrete-event simulation research. The Process Mapping research of physiotherapy led to a theoretical DES study about location of care. Process Mapping H@H informed the simulation studies using Scenario Generator and Simul8. Scenario Generator provided the opportunity to investigate the impact of H@H at a strategic level, secondary data from Fife IS department and forecasting the data to 2015 along with discussions with the H@H team provided the input for the model. Simul8 provided the opportunity to explore the impact of H@H at an operational level, the results from SG and secondary data from Fife IS department provided the input for the Simul8 study.

9.3.1.4.SoApt

The SoApt Case Study deliberated the development of a new option assessor model. The model was developed following the remit of the client, with reference to the literature and through discussions with Fife staff. The SoApt

Case Study is also an example of Action Research within a Case Study structure; the author followed the iterative process of Action Research by diagnosing, planning, taking action and evaluating (see Figure 4-8) until a satisfactory model emerged.

9.4.Implementation Barriers

There are many barriers to implementation of models cited in the literature (see 5.6), and these listings were categorised and used to construct a table of common barriers to implementation of OR models in the NHS (see Table 5-6), perceived additional barriers related to Lean Implementation were also added (see Table 6-4) and interpretation of barriers specific to simulation models were listed in Table 7-2.

Table 9-2 summarises the implementation barriers highlighted in the Case Studies. All of the main barriers to model implementation have also been found through the Case Study analysis, the only exception being Support but it could be argued that Failure of Leadership could also be categorised as Support. Data and Conflict were found to occur in both the Lean Methodology and Simulation; both experienced inaccurate Data and Conflict between management and staff in Lean, and stakeholders and modellers in DES. Added to this table is Stakeholder Engagement, considered as underlying all modelling implementation barriers[320] [172] [170] [321], however, in the Process Mapping Case Study, lack of Stakeholder Engagement meant failure to fully map Social Care's input into H@H. In addition, the SoApt Case Study was not fully piloted in Fife, as SMT could not envision the use of SoApt in the health authority.

Nevertheless, the findings of this research only found one implementation barrier associated with Process Mapping. This could be a reflection of the simplicity of the Process Mapping model: the model is easy to access, straightforward to apply and understand and is transparent.

The Evaluation Framework (see Figure 5-12) was derived from the DeLone and McLean's IS Success Model[194] to provide a measure of whether the application of a model in healthcare is successful. Current evaluations appear to lack clarity (5.7.1), do not explore fully the quality criteria of the model, are bias towards the Organisation (see 5.7.2), or cannot guarantee the model is exclusively responsible for improvements (see 5.7.3).

9.5.Evaluation Framework and Modelling Success

The User Satisfaction of the Lean Methodology was positive, the team leader of the Back Pain Project concluded Lean facilitated the change in the Back Pain Pathway (see 6.6.6), and the Lean trainees confirmed they would continue to use the Lean Tools where appropriate (see 6.7.3.2) . The User Satisfaction for Process Mapping and for Simul8 was also positive (see 7.4), although the User Satisfaction of Scenario Generator was negative due to the difficulty and time taken to run the model (see 7.4). The evaluation of the SoApt model was also positive but access to cost-saving data compromised the Efficiency section of the Model (see 8.8).

Implementation Barriers Table 5-6, Table 6-4, Table 7-2	The Lean Methodology	Process Mapping	Discrete-event simulation	SoApt
Culture (included in Lean survey)	Sceptical attitude toward further change			Fife had not adopted a Strategic Policy for investment although advocated nationally.
Data (included in survey)	Difficult and time-consuming to access reliable data		Incomplete, inaccurate data	Incomplete cost savings data
Conflict (included in Lean survey)	Conflict between management/ departments		Conflict between modeller and stakeholders	
Experience			Experience of modellers and NHS Fife of SG	
Support				
Silos (Included in Lean survey- Generalisation)	Model not made for healthcare- not trusted, working silos difficult to cross.			
Cost			Cost of SG software	
Organisational Momentum (Included in Lean survey- Resources)	Lack of time			
Table 6-4				
Poor Communication	Success not communicated			
Lack of Knowledge (Included in Lean survey- Model Recognition)	Tools and model not known by staff and management			
Failure of Leadership (Included in Lean survey-Management Structure)	Change not managed			
Lack of Link to Strategy	Link of strategy not clear or articulated			
Underlying Barrier				
Stakeholder Engagement		Lack of input		Lack of conviction

Table 9-2 Case Studies: Implementation Barriers

Robust evaluation of a model's success could help to reduce the barriers to implementation of Culture, Silos, Communication, Stakeholder Engagement, and Conflict. The satisfactory use of a model by the User encourages the User to return to the model to undertake further tasks; as a result, the User will be positive about the models Use in communication with others, in addition, the benefits of the model are transparent; the User has clarity about who will benefit from the model.

9.6.The Role of Models in Healthcare

The generic schematic of the Role of Models was created with reference to Mingers[106] , Williams[112] and Bowers et al [242] to illustrate, in a simplistic way, the overall purpose of modelling in healthcare. The generic schematic formed the basis for a schematic to be derived for each specific model explored in the Case Studies (see 6, 7, 8). Each model is combined with the generic schematic as illustrated in Figure 9-1. The Lean Methodology, analyses flows and constraints by analysing complex systems of interacting and varied demands, Lean identifies wasteful processes, which inform, and can subsequently be rectified, by stakeholders. Process Mapping is depicted as a model which collects and measures data to Process Map a patients journey; the flows of entities with interacting and complex demands supported by constrained resources are analysed and potential problems detected which facilitate a shared understanding of problems by stakeholders. Discrete-event simulation also analyses the complex patients' journey but is also capable of analysing risk, providing the basis for predictive assessment which can then suggest

options and test solutions. The SoApt model, collects and measures data in order to calculate the costs and benefits of a proposal. Individual understanding is gained by the Proposer and is then shared with the Decision-maker when he/she submits the Proposal; the Decision-maker applies weights to the criteria of the proposal reflecting the current local and national priorities, which results in potential options and informed solutions. In addition, Figure 9-1 demonstrates the common stages of these models but also the diversity of purpose of each model (see 9.2.4).

9.6.1.The Role of Sequential and Multiple Models

OR models do not need to be applied in isolation: models can also be used consecutively to address different parts of a problem situation. In the Hospital at Home Case Study (see 7.3) Process Mapping was used to map the current pathway of medical inpatients over 75 and to illustrate the integration with Social Care, the map was then updated to illustrate the path patients would take when Hospital at Home was included. The pathway along with the relevant data was then inputted to build high-level scenarios using Scenario Generator to provide estimates of the impact of Hospital at Home on acute medical inpatient admissions. Data produced by Scenario Generator and the mapped pathways were then used to add to the data to inform a Simul8 simulation. The Simul8 simulation produced scenarios, which provided estimations of the trade-off between staffing levels and the numbers admitted to Hospital at Home. In other studies by the author[322] [254], Process Mapping was effectively used sequentially with SERVQUAL and the Soft Systems methodology was successfully used with SERVQUAL and Statistical Modelling. With reference to

Mingers[109] Framework, the roles of models can be used sequentially or in tandem to solve a problem situation.

9.7.Review of Models to Shift the Balance of Care

As illustrated in Figure 9-1 the models examined in the Case Studies: the Lean Methodology, Process Mapping, Discrete-event Simulation as well as a newly developed model: SoApt are capable of improving understanding of a problem at either an individual or group level, however, the Roles of Models applies to healthcare or indeed any organisation. Therefore, the Roles of Models are examined here with reference to the eight priority Improvement Areas to determine if models can facilitate the Shift in the Balance of Care.

9.7.1.The Lean Methodology

The Lean Methodology's role in Shifting the Balance of Care is to identify waste in a pathway and to reduce or eliminate waste, thereby resulting in a more efficient service. Assessment of Lean in relation to the eight Improvement Areas can be reviewed in Table 9-3. The Back Pain Project appears to provide evidence of improvement in Areas 2, 3, 4, 6 and 8: The Kaizen Event brought together stakeholders, including patient representatives, to Value Stream Map the Back Pain Pathway. The integration and discussion of staff from various departments and services including Physiotherapy, Pain Management, Orthopaedics, Diagnostic imaging, Information Services etc. resulted in an action plan for a streamlined pathway, which reduced the patient's journey and ensured patients were directed to the 'right' person for treatment. The

community based clinic, led by the Consultant Physiotherapist, triaged and treated patients normally referred to Consultants in Acute Care but also providing intermediary care, which helped to reduce avoidable attendances. Value Stream Mapping the Back Pain Pathway resulted in improved, standardised referral procedures, particularly for GP's and a more direct and shorter pathway for patients, which improved capacity by creating a more efficient.The Back Pain Pathway is standardised for all patients across Kirkcaldy and Levenmouth and eventually across Fife. Therefore, access to treatment is standardised across all areas including rural. Both Acute and Community care have taken responsibility for the Back Pain Pathway both divisions work together to provide the best care for the patient. In addition, GP's have direct access to MRI scanning in acute care, thereby the patient can be referred directly to MRI scanning without needing to be referred to the Consultant first. In addition, the additional referrals to MRI ensure the resource is more fully utilised.

9.7.2.Process Mapping

Process Mapping's role in Shifting the Balance of Care is to analyse the pathway resulting in a shared understanding of the individual's position and responsibility within the process as well providing a holistic view of the process. Assessment of Process Mapping in relation to the eight Improvement Areas can be reviewed in Table 9-3. The Case Study related to Process Mapping (see Chapter 7) appeared to provide evidence of improvement for Areas 1, 2, 4 and 6. Process Mapping identified the current pathway of elderly patients and then, with the inclusion of H@H, identified the impact the new pathway would have

on other services. Process Mapping H@H highlighted the integration between acute and community hospitals as well as Social Care. The new Pathway into H@H improves flow for other patients admitted to Medical Inpatients by increasing the capacity available. Process Mapping identified non-standardisation, and inequalities of practice and administration. The comparison allowed recommendations to be made around best practice.

9.7.3.Discrete-event Simulation

Discrete-event simulation's role in Shifting the Balance of Care is to perform 'what if' scenarios, which will result in options for a solution or solutions to a problem. The actions of this process also improve the individual and shared understanding of those involved. Assessment of DES in relation to the eight Improvement Areas can be reviewed in Table 9-3. The Case Study involving DES appeared to provide evidence of improvement in Areas 1, 2 and 4. DES using SG identified the possible numbers of patients entering H@H and the impact this would have on other services. In addition, DES using Simul8 identified required staffing levels and potential cost-savings of H@H as well as exploring staffing options and opening hour's options. DES highlighted the impact H@H would have on acute and community services. Simulation identified the potential reduction in numbers of elderly patients admitted to Medical Inpatients, allowing for increased capacity and options for management of other scheduled care patients.

9.7.4.SoApt

SoApt's role in Shifting the Balance of Care is to improve understanding at an individual level, which then leads to shared understanding of redesign proposals. Weighting and scoring the criteria allows Decision-makers the opportunity to reflect their priorities over standardised criteria and sub-criteria. Given a limited budget, proposals under consideration are compared in relation to their costs and benefits against the criteria, thereby giving Decision-makers options and finally solutions on what proposals to invest in that will best meet the Decision-makers local and national priorities. The SoApt model does not directly facilitate change in any of the Improvement Areas: SoApt's role is to aid Decision-makers in selecting the proposal that will best facilitate change in the eight Improvement Areas. However, having ensured the sub-criteria of the model are interlinked with the Improvement Areas safeguards that the principles of Shifting the Balance of Care are at the forefront of the selection process.

9.8.The Roles of Models in Shifting the Balance of Care

From the evidence gathered in the Case Studies, the Lean Methodology, Process Mapping and Discrete-event simulation models have the potential to address six out of the eight priority Improvement Areas (see Table 9-3). All three models have the potential to impact Areas 2 and 4. The SoApt model, as a model to calculate the costs and benefits of a proposal incorporating any model, has the potential to impact all eight Improvement Areas.

Modelling has the potential to effect change in any organisation, however, the complexities of the NHS with its many functional and working silos, divisions and departments (see 2.4), and with the input of a wide and varied number of stakeholders (see Table 2-1), modelling is particularly suited to effecting change. Modelling has the potential to: Be objective and traceable in decision making, effectively providing an audit trail for stakeholders; Facilitate effective participation of all stakeholders, providing opportunities for divisions, departments and individuals to come together; Understand patient preferences and the variety of stakeholder priorities, by understanding the complex structures that exist; Provide the structure that helps assimilate all relevant data, in a systematic and transparent way; Analyse current practice and compare options; Assess options thereby selecting the most appropriate, based on objective practices; Offer a vision of the new system for reference during implementation, to keep stakeholders informed and engaged; Establish a basis for evaluation and feedback for future redesign exercises, by maintaining metrics before and after implementation. These attributes have the potential to make effective change in Shifting the Balance of Care.

Improvement Area							
1 Maximise flexible and responsive care at home with support for carers	2 Integrate health and Social Care and support for people in need and at risk	3 Reduce avoidable unscheduled attendances and admissions to hospital	4 Improve capacity and flow management for scheduled care	5 Extend scope of services provided by non-medical practitioners outside acute hospital	6 Improve access to care for remote and rural populations	7 Improve palliative and end of life care	8 Improve joint use of resources (revenue and capital)
Lean Methodology							
	The Kaizen Event brought together stakeholders, including patient representatives, to Value Stream Map the Back Pain Pathway. The integration and discussion of staff from various divisions resulted in a streamlined pathway, which reduced the patient's journey.	The community-based clinic triaged and treated patients normally seen by Consultants in Acute Care.	Value Stream Mapping the Back Pain Pathway resulted in improved referral procedures and direction for patients, resulting in improved capacity and a more efficient pathway.	.	The Back Pain Pathway is standardised for all patients, therefore access to treatment should also be standardised.		Both Acute and Community have taken responsibility for the Back Pain Pathway and the patients thereof. In addition, GP's have direct access to MRI scanning, reducing the wait time for patients and ensuring the resource is fully utilised.
Process Mapping							
PM identified the current pathway of elderly patients and then with the inclusion of H@H identified the impact the new pathway would have on other services.	Process Mapping H@H highlighted the integration between acute and community hospitals as well as Social Care.		The new Pathway into H@H improves flow for other patients admitted to MI.		Process Mapping used to compare practices identified non-standardisation and inequalities.		
Discrete-event Simulation							
DES identified possible numbers of patients entering H@H at the impact this would have on other services. Also, DES identified required staffing levels and potential cost-savings of H@H.	DES highlighted the impact H@H would have on acute and community services.		Simulation identified the potential reduction in numbers of elderly patients admitted to MI, allowing for better management of other scheduled care patients.				
SoApt							
The SoApt model will aid in the decision-making process of deciding where investment should be made: Projects that aim to address any of the eight Improvement Areas given above can be measured and compared using the model.							

Table 9-3 Models and their Roles in Shifting the Balance of Care

9.9.Review of the Methodology

Dividing the Literature Review into two parts (Chapter 3 reviews the development, implementation and progress of Shifting the Balance of Care whereas Chapter 5 reviews OR modelling, specifically ten selected models) is unorthodox but it was important to the author to review the selected models using a framework. The methods of Mingers[106], Williams[112] and Bowers[242] were presented in the Methodology chapter (Chapter 4) and contributed to the framework which was utilised to provide appropriate tabulation and comprehensive standardised treatment [323] of the models reviewed in Chapter Five.

The case study approach of the research allowed the author to apply a selection of appropriate methods across the sub-case studies[90] (see Chapters 6, 7 and 8) which resulted in a rich picture of data (see Figure 9-2). Action Research, which is often associated with case studies[111], is also employed in the research (see 6.6 and Chapter 8). The iterative process of Action Research served to validate the results by reducing researcher bias: continually feeding back to the client/participants. Other validation of findings included triangulation using a survey and follow-up interview as well as comparing historical data with forecasted data (see Figure 9-2).

Typical of case study research it is difficult to determine generalizability, aspects of the research i.e. Process Mapping provided evidence of generalizability in healthcare (see Figure 9-2) however, the research provides a snap-shot of modelling in Fife through distinct projects and it is possibly this context which occludes the overall generalizability of the research.

Strategy		Model	Research	Method	Detail	Validity and Reliability
Case Study	Action Research	The Lean Methodology	Back Pain Project	Observation Secondary Data Questionnaires	Observation of the project, secondary data and questionnaires utilised to gather metrics.	Before and After metrics gathered. Feedback from participants.
			Implementation in Fife	Survey Interview	Survey gathered experiences of Lean Trainees, Interviews provided further detail.	Interviews provided triangulation with survey results.
Case Study		Process Mapping	Physiotherapy Service	Secondary Data	Summary of previous research results.	Both studies provided evidence of similar, positive experiences
			Hospital at Home	Informal Interviews	To provide the data to map the process.	
		Discrete Event Simulation	Hospital at Home	Secondary Data Informal Interviews	Process Map of pathway and historical data along with data provided by participants.	Results of simulation were validated against historical data.
Case Study	Action Research	SoApt	SoApt Building	Informal Interviews	Iterative discussion to perfect the model to meet the client's demands.	Iterative feedback with multi-level personnel
			SoApt Testing	Secondary Data	Data provided by participants to test model.	Data validated by other staff but necessary data not always available.

Figure 9-2 Summary of the Research Methodology

The case study approach with a pragmatic overview allowed an honest, realistic account of the implementation of models into healthcare or indeed any complex, messy organisation. The theory of modelling provides a systematic, transparent approach to a problem-situation; however, in healthcare as in other social organisations, people and politics influence progress (see Chapters 7

and 8). and although many of the associated barriers have been highlighted (see Table 5-6) and addressed it is unlikely they will be completely eradicated.

9.10.Conclusion

There does appear to be evidence that modelling has a role to play in Shifting the Balance of Care. It is important however, to be aware that different modelling types have different methodological approaches and therefore perform different tasks, also, that a variety of models are capable of addressing the main impact areas in Shifting the Balance of Care. Nevertheless, it is also important to be aware the various roles of models can be used sequentially or in tandem with one another (see Figure 9-1). Consequently, the decision to apply an OR model to undertake the Improvement Areas of Shifting the Balance of Care necessitates knowledge of modelling types in order to select the model capable of undertaking the task.

However, the barriers to implementation of models in healthcare challenge the application of modelling in Shifting the Balance of Care. A robust Evaluation Framework may go some way to reduce some of the barriers.

Chapter Ten

Conclusions, Recommendations and Limitations

10. Introduction

The purpose of this chapter is to address the research question by briefly summarising the findings of the research. The limitations of the research will also be discussed along with the opportunities for further work.

10.1. Overview of the Research

This research, with reference to the literature, application of Mingers and Williams' frameworks, the development of a new model, the categorisation of implementation barriers and the development of an Evaluation Framework has attempted to determine the conditions under which OR modelling can Shift the Balance of Care.

10.2. Findings of the Research

10.2.1. What are the priorities of Shifting the Balance of Care?

The priorities of Shifting the Balance of Care are clearly stated in the eight Improvement Areas (see Table 5-1) and are supported by Government's emphasis of bringing about change in the way healthcare is delivered. Although other areas for improvement have also been identified (see Figure 5-1), these eight areas are the focus for this research.

Shifting the Balance of Care is intended to improve health outcomes: by reducing health inequalities, providing services that are personal to the patient, are efficiently delivered closer to home and which promote independence.

Successive Government administrations have tried to address these common themes with varying degrees of realisation. The Performance Framework and the HEAT targets set by Government position the areas where change is needed the most and guide the health service in the direction of where change is required, however, the HEAT targets are not always achieved and have recently been the subject of criticism in the media. There is also the realisation that the current system is no longer sustainable: with older people living longer, the changing demographics of the population has resulted in the need for urgency toward change.

There is no doubt the ethos of Shifting the Balance of Care is about people: giving people a voice in their care needs, bringing care closer to home to improve accessibility, improving the access to care for all people despite their geographical location, meeting the needs of people more at risk and providing care quickly and efficiently. However, there is also no doubt that the underlying need to Shift the Balance of Care is one of reducing costs to maintain a sustainable health service.

10.2.2. What is the Role of Modelling in the NHS and in Shifting the Balance of Care?

Modelling has the potential in all organisations to:

Facilitate effective participation of stakeholders;
Acknowledge patient preferences and the variety of stakeholder priorities;
Analyse current practices and compare options;
Provide structure to assimilate all relevant data;

Take into account complexities;
Evaluate options thereby selecting the most appropriate;
Offer a vision of the new system for reference before and during implementation;
Be transparent;
Provide an audit trail for stakeholders;
Establish a basis for evaluation and feedback for future redesign exercises.

However, given the complexities of the NHS and the number and variety of stakeholders, it is due to the attributes or roles of modelling that modelling is particularly suited to addressing problem situations within the NHS e.g. allow for complexities, facilitate effective participation of stakeholders etc. In addition, Shifting the Balance of Care is embedded in the reform of the NHS, the eight priority Improvement Areas are emphasised to facilitate the change. Modelling can systematically and transparently breakdown the Improvement Areas in order to evaluate options and provide solutions, which will have a positive impact on improvement e.g. provide an audit trail, provide structure to assimilate problems etc. These roles provide a robust tool for NHS staff to effect change and solve problems, particularly if crossing the existing boundaries within the NHS. Mingers' framework, Williams' classification, and Bowers were consulted to produce a schematic, which represented the generic role of models (see Figure 4-11). Using the generic schematic as a base, the schematic of individual models were also drawn. This exercise emphasised the individual roles of models but also that models can be used in multiples or in sequence to understand a system, to calculate a systems attributes, to replicate a system and to forecast a system (see Figure 9-1).

Furthermore, assessment of models against the Improvement Areas also highlighted that models are capable of addressing more than one Improvement Area but that not all Improvement Areas are served well by modelling.

What is clear is that from the variety of models available it is important to choose the model, which the researcher has experience in, but to also ensure the chosen model is suited to the task. Reference to Figure 4-10 helps Decision-makers, or modellers select the particular OR method required for their research and then select from the suggested models in that category.

10.2.3. Which models have the potential to impact the Shift in the Balance of Care?

Ten models were evaluated against the eight Improvement Areas of Shifting the Balance of Care and supporting evidence of their use in healthcare was cited. Three models: Lean methodology; Process Mapping and Simulation, were investigated further to assess their impact on Shifting the Balance of Care using Case Studies.

The results of the implementation of the Lean Methodology did indicate that the care of Back Pain patients had improved and met areas pertinent to Shifting the Balance of Care. The pathway provided a clear referral route reflecting the patient's condition; the pathway was more efficient which resulted in patients receiving treatment quicker and in more patients receiving the appropriate appointments. In addition, the number of patients receiving care in an acute setting was reduced whilst the numbers of patients cared for in the community increased. The desired outcomes of the project were clearly stated at the start

of the project and measures for comparison taken: it was then possible to compare the actual outcomes of the project.

Process Mapping the introduction of Hospital at Home to patients of 75 years and over proved an informative exercise in firstly, establishing the current pathway and secondly, establishing the pathway patients would take when Hospital at Home was included. Hospital at Home requires input from Healthcare staff as well as Social Care staff; the mapping exercise illustrated (albeit limited) the integration of both services in the care of the patient and provided an overview of the integrated systems.

In addition, to investigate H@H two types of simulation were employed: high-level simulation using the software Scenario Generator and operational simulation using the software Simul8. Scenario Generator provided 'what if' scenarios for each criterion applied for admittance to Hospital at Home. Scenario Generator provides an overview at a high or strategic level of the process, which generated data on the potential to reduce bed numbers in acute and community hospitals by redirecting patients 75 years and over into Hospital at Home and by doing so, reduce the average length of stay of patients in acute care. Although the modelling exercise also produced data relating to the savings that could be made, the simulation did not take into account the cost of running Hospital at Home as the detail of this information was not available. Therefore, the actual cost saving was not generated by applying Scenario Generator. Simul8 also provided 'what if' scenarios but at an operational level: the number of staff required and the available hours. The 'What if' scenarios

generated by Simul8 provided useful and constructive information relating to staffing levels, availability of Hospital at Home and the potential bed days saved for management to consider when redesigning or implementing a new service. Unlike Scenario Generator, further details of potential costs and savings were extracted from Simul8, however, the cooperation of stakeholders was not fully engaged therefore the simulation lacks information on the input of time, staff and costs required from Social Care.

A new model: SoApt was developed as an option assessment tool to help Decision-makers determine which new or redesigned services should be invested in given their limited resources. With reference to the literature, the Principles of Model development were established; the development of SoApt followed this framework to ensure a model, which was robust and fit for purpose. The model has the potential to aid Decision-makers Shift the Balance of Care by facilitating the assessment of proposals by consideration of the impact the proposal will have on the patient and the impact the proposal will have on the organisation.

10.2.4.What are the barriers to implementation of models in the NHS?

Unfortunately, despite the success of implementation of OR models within other organisations and industries, within healthcare there are many existing barriers which challenge the implementation of OR models. With reference to the literature, the main implementation barriers found in healthcare were categorised and listed. Despite efforts to reduce the barriers to implementation this research found barriers for each of the main categories: Culture, Data,

Conflict, Experience, Support, Silos, Cost, Organisational Momentum, Communication, and Lack of link to strategy and, Stakeholder Engagement.

Understanding the Axiology of a model may alert modellers to the potential barriers prevalent to that particular model e.g. A model which is dependent on hard data may experience Data quality barriers, conversely a model which relies on input from stakeholders may experience Stakeholder Engagement barriers.

However, given the complexity of the NHS organisation and the type and number of implementation barriers experienced (see Table 9-2), it is recognised that OR modelling may well never overcome all of these barriers and that successful projects may be limited. Nonetheless, communicating success could increase confidences in implementing OR models.

10.2.5.What constitutes a successful model? How are they evaluated?

When a model is implemented into a healthcare setting, it is difficult to evaluate success: healthcare is extremely complex with many integrating demands and flows of patients. Can the impact of a models success be isolated in such a large and complex organization? Several evaluation studies are cited but none suggests a framework for evaluation to ensure standardization and consistency of measures from the viewpoint of the User.

A framework[193] [194] which appears to be successful in evaluating information systems was adapted to suggest a framework for evaluating models in healthcare. Although only a proposal at this stage, the Framework identifies six

criteria to measure the success of the model, the criteria can be measured independently or in association with another criterion. Currently models are identified by attempting to isolate metrics to evaluate success. The main difference of the Evaluation Framework is the Framework considers the User and the User Satisfaction of the model delivery. Ultimately, a model is considered successful if the User returns to the model to undertake further tasks. A robust evaluation of a models success will negate at least some of the barriers to implementation particularly, Culture, Conflict, Communication, and Silos.

10.3.Recommendations to Advance the Shift in the Balance of Care

10.3.1.Modelling the Shift in the Balance of Care

The use of models is highly recommended to facilitate the Shift in the Balance of Care. However, Managers, Health Authorities and staff must ensure that the reason for the model's use is clearly stated, the model or model(s) selected are fit for purpose, and the modeller has been trained in the model's use.

Training staff on the importance of understanding the metrics of change will provide informed evaluations of the cost effectiveness of a Shift in the Balance of Care.

10.3.2.The SoApt Model

The SoApt Model should be adopted by each health authority in order to prioritise budget spending on investments, which will deliver the greatest impact on Shifting the Balance of Care based on the benefit to the patient and the

benefit to the Organisation. This will ensure the Shift in the Balance of Care is prioritised within the Health Authority and that investments made are an effective and efficient use of funding which reflects the national and local priorities of the Authority.

10.3.3.Barriers to Implementation of Models

In order to encourage the use of models in healthcare the identified barriers to implementation need to be negated. Modellers need to familiarise themselves with the types of barriers which are prevalent to the implementation of OR models and appreciate that Stakeholder Engagement has the potential to positively influence all of these barriers. In addition, comprehension of the Axiology of each model will help modellers appreciate the particular barriers, which are possibly more relevant to a chosen model. Nevertheless, it is pertinent to highlight, with the exception of lack of Stakeholder Engagement in one study (see 9.4), Process Mapping modelling was implemented without barriers.

Improving the communication channels promoting the use of models will also help to negate the barriers. Returning to a dedicated website to Shifting the Balance of Care would provide a platform to promote success and report change. This website could also be used to promote various models and their purpose and possibly offer training provision on their use.

10.3.4.The Evaluation Framework

Adoption of the Evaluation Framework will provide a robust measure of a models successful use as well as negating some of the barriers to

implementation. It is not always possible, given outside influences and the difficulty in isolating metrics, to measure rigorously the impact a model has on a problem situation. By emphasising the User and the User Satisfaction, the success of a model is measured on its Use. Positive experience of a models Use will encourage further Use and the sharing of the experience with others.

10.4.Contributions to NHS Scotland

This research has attempted to provide evidence of the merits of OR models and their potential to facilitate healthcare reform in the NHS. The Lean Methodology case study (see Chapter Six) has provided some evidence that the employment of the Lean Methodology can shorten the pathway of a back pain patient in Fife. The SoApt model (see Chapter Eight) is recognised by the Scottish Government has having potential to improve the decision-making process of decision-makers when faced with limited budgets. Process Mapping a patient's pathway (see Chapter Seven) is easily understood by users highlights duplication and instigates discussion around a problem situation. However, the barriers to implementation of models (see Table 5-6) need to be recognised and understood by practitioners. The Back Pain Project highlighted in Chapter Six, exemplifies how the barriers to implementation can be overcome by good leadership (leaders which are supportive, active and visible and who communicate with participants). However, decision-makers who are not convinced by the merits of a model will not fully engage in a project and the barriers to implementation will become more prevalent (see Hospital at Home Chapter Seven). The lack of quality and availability of data is a recognised

difficulty and therefore a barrier to implementation of models in the NHS (see Chapter Seven and Eight). Modellers and decision-makers must define the data requirements from the outset of a project and understand the limitations of poor or unavailable data to ensure a successful project and avoid 'time-wasting' (see Chapter Eight).

10.5.Contributions to the Research Theory

10.5.1.Principles of Model Development

The Principles of Model Development (see Table 8-2) was derived from the literature from several authors who have suggested principles and frameworks for consideration when model building. The Model Development table provides a guide to potential model builders of the criteria that should be met when developing a new model. The Principles of Model Development were followed by the author and were found to provide valuable direction when developing the SoApt model, which resulted in a robust, transparent model.

10.5.2.Evaluation Framework Proposal

The Evaluation Framework is derived from a successful model currently used to evaluate information systems. The Framework, unlike other evaluation models in healthcare, emphasises the User and User Satisfaction as measures of the success of a model, which negates the difficulty of proving improvements found are due exclusively to the implementation of the model. An acceptable and robust measure of a successful model is important to generate trust and confidence in a model and therefore promote the model's use.

10.5.3.The Role of Models Schematic

The Role of Models schematic is derived from Mingers[109], Williams[112], and Bowers et al.[242] to provide a simple illustration of the iterative process of modelling and the particular functions a model can perform. The schematic provides an easily read guide to modellers when choosing a model to improve a problem situation. The schematic, as used in this research, can be adopted to ascertain if a model meets the criteria required to facilitate improvement.

10.5.4.Service Option Assessor and Prioritisation Model: SoApt

The development of the SoApt model contributes a new option assessor model, which is accessible to both the Proposer of a service and to the Decision-maker providing services. The model incorporates the criteria of the Quality Strategy[256] to score a new or redesigned service and presents outputs two-dimensionally in the form of a matrix.

10.6.Limitations of the Research

Although great effort has been made to ensure the adequacy of the research's conceptual and methodological contribution, the study is not without its limitations:

The study was restricted by time and events in Fife: ideally, all of the models would have been applied to more than one project as in Process Mapping the Physiotherapy Service (see 7.3.1) and Hospital at Home (see 7.3.2) this would

have allowed for some measure of generalizability of the models over different project types.

The study was mainly conducted within NHS Fife: although opportunities to network with other health authorities were always taken advantage of, the opportunity to conduct research on modelling application in other health authorities was not available.

The Evaluation Framework (see Figure 5-12) is proposed to validate a model's success. The author referred to the feedback received and the results gained during the case studies to populate the Framework; however the Framework remains to be tested by another party to validate the results.

A mixture of methods was employed in the case studies to provide a rich mixture of results. This mix also provided validity by triangulating results i.e. the Lean Methodology case study (see Chapter 6) employed observation, surveys, interviews and secondary data to explore the role of Lean in Shifting the Balance of Care (see Figure 9-2). The results suggest OR modelling can breakdown holistic approaches to health reform such as Shifting the Balance of Care but can not be generalised to addressing the whole system of change that some health reform requires.

10.7.Reflections

The subject of the three Case Studies reflects the activities of the Redesign team at NHS Fife at the time of the research. It was important that the research I undertook served a practical and useful purpose to the organisation, and was not manufactured for the sake of the thesis. Therefore, I found I had to react

and adapt to themes as they arose. I found working with the NHS extremely enjoyable, challenging, and frustrating. A new idea or a new project was met with enthusiasm and always with the need for great urgency, and then the bureaucratic machine would kick in: people were unavailable; meetings would be postponed; data could not be gathered or took too long to accumulate; people would not share information, meetings had to be held with sub-committees before decisions could be made. Interest in the idea would be lost, a new idea would be introduced, and the cycle would begin again. As a result, ideas for projects were put forward that did not materialise, projects were started and not completed, and often projects went off at tangents. However, undertaking this research afforded me unique insight into the workings of the NHS that would probably only be afforded to employees or contractors. Some people, for their own reasons, would not share information or fully engage in the research or with me, others, however, were kind and extremely generous with their time, information, and advice. I leave this research with a sense of unfinished business and it is my hope that I will have the opportunity to work with the NHS again.

10.8.Future Work

Based upon the experiences of this research and its limitations, ideas for future research are advocated:

10.8.1.Framework for Evaluation of Modelling Success

The Evaluation Framework was employed within the Research subjectively to evaluate the success or otherwise of the implementation of a model in healthcare. A study to fully test the model and its ability to evaluate OR models would involve gathering data relating to each measurable criteria over a series of OR models.

10.8.2.SoApt Model Implementation

To test fully the validity of SoApt by continuing to work with the Scottish Government, the IRF and pilot Health Authorities toward full implementation of the model across all health authorities as a standardised tool for option assessment of redesigned services.

10.8.3.Hospital at Home in Fife

To further utilise Simul8 and Discrete-event simulation research to fully explore the cost of running Hospital at Home including the additional costs to Social Care, and the optimal mix of staff required to delivery H@H safely and efficiently, In addition, to explore the trade-off between continuity of care and the implications on travel time.

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Appendices:

Appendix 1 HEAT Targets Summary

HEAT TARGETS >March 2013	Target	Outcome
H Suicide Reduction	2013	
H SIMD Child Fluoride Varnishing	Mar 2014	
H Child Healthy Weight Interventions	Mar 2014	
H Smoking Cessation	Mar 2014	
H Detect Cancer Early	2014/15	
H Antenatal Access	Mar 2015	
E Reduce Carbon Emissions and Energy Consumption	2014/15	
A Psychological Therapies Waiting Times	Dec 2014	
T Accident and Emergency (A&E) Attendances	2013/14	
T Delayed Discharge (14 days)	Apr 2015	
T Emergency Bed Days for 75+	2014/15	
HEAT TARGETS FOR 2012/13	**Target**	**Outcome**
E Financial Performance: NHS Boards are required to operate within their Revenue Resource Limit (RRL), their Capital Resource Limit (CRL) and meet their Cash Requirement.	2012/13	
E Reduce Carbon Emissions and Energy Consumption: NHSScotland to reduce energy-based carbon emissions and to continue a reduction in energy consumption to contribute to the greenhouse gas emissions reduction targets set in the Climate Change (Scotland) Act 2009.	2012/13	
A CAMHS (26 weeks referral to treatment): Deliver faster access to mental health services by delivering 26 weeks referral to treatment for specialist Child and Adolescent Mental Health Services (CAMHS) services from March 2013; reducing to 18 weeks from December 2014; and 18 weeks referral to treatment for Psychological Therapies from December 2014.	Mar 2013	
A Drug and alcohol treatment waiting times (3 weeks RTT): By March 2013, 90 per cent of clients will wait no longer than 3 weeks from referral received to appropriate drug or alcohol treatment that supports their recovery.	90%	91%
T Stroke Unit: To improve stroke care, 90% of all patients admitted with a diagnosis of stroke will be admitted to a stroke unit on the day of admission, or the day following presentation by March 2013.	90%	78%
T MRSA/MSSA Reductions: Further reduce healthcare associated infections so that by March 2013 NHS Boards' staphylococcus aureus bacteraemia (including MRSA) cases are 0.26 or less per 1,000 acute occupied bed days; and the rate of Clostridium difficile infections in patients aged 65 and over is 0.39 cases or less per 1,000 total occupied bed days.	0.26	0.30
T C. diff Infections : Further reduce healthcare associated infections so that by March 2013 NHS Boards' staphylococcus aureus bacteraemia (including MRSA) cases are 0.26 or less per 1,000 acute occupied bed days; and the rate of Clostridium difficile infections in patients aged 65 and over is 0.39 cases or less per 1,000 total occupied bed days.	0.39	0.30
T Delayed Discharge (28 days): No people will wait more than 28 days to be discharged from hospital into a more appropriate care setting, once treatment is complete from April 2013; followed by a 14 day maximum wait from April 2015.	0	220

HEAT TARGETS FOR 2011/12	Target	Outcome
H: Alcohol Brief Interventions Achieve agreed number of screenings using the setting-appropriate screening tool and appropriate alcohol brief intervention, in line with SIGN74 Guideline.	61,081	97,830
H: Inequalities Targeted Cardiovascular Health Checks Achieve agreed number of inequalities targeted cardiovascular Health Checks	26,682	47,776
E: Financial Performance NHS Boards are required to operate within their Revenue Resource Limit (RRL), their Capital Resource Limit (CRL) and meet their Cash Requirement.		**MET**
E: Cash Efficiencies NHS Boards to deliver a 3 per cent efficiency saving to reinvest in frontline services	3%	**3.6%**
E: Reduce Carbon Emissions and Energy Consumption NHSScotland to reduce energy-based carbon emissions and to continue a reduction in energy consumption to contribute to the greenhouse gas emissions reduction targets	3% 1%	**2.6%** **2.1%**
A: Cancer From the quarter ending December 2011, 95 per cent of all patients diagnosed with cancer to begin treatment within 31 days of decision to treat, and 95 per cent of those referred urgently with a suspicion of cancer to begin treatment within 62 days of receipt of referral.	95% 95%	96.9 % 98.2 %
A: Waiting Times (18 weeks referral to treatment)Deliver 18 weeks referral to treatment	90%	92.0 %
T: Emergency Bed Days 75+ Reducing the need for emergency hospital care, NHS Boards will achieve agreed reductions in emergency inpatient bed days rates for people aged 75 and over between 2009/10 and 2011/12 through improved partnership working between the acute, primary and community care sectors.		7.6%
HEAT TARGETS FOR 2010/11	**Target**	**Outcome**
H: Suicide Prevention Training NHS to support a national reduction in the suicide rate of 20 per cent by 2013 by ensuring 50 per cent of key frontline staff in mental health and substance misuse services, primary care, and accident and emergency being educated and trained in using suicide assessment tools/suicide prevention training programmes by 2010.	50%	52%
H: Child Dental Registrations 80 per cent of all three to five year old children to be registered with an NHS dentist by 2010/11.	80%	88%
H: Child Healthy Weight Interventions Achieve agreed completion rates for the child healthy weight intervention programme by 2010/11.	6,317	8,406
H: Alcohol Brief Interventions Achieve agreed number of screenings using the setting-appropriate screening tool and appropriate alcohol brief intervention, in line with SIGN 74 guidelines by 2010/11.	149,449	174,205
H: Smoking Cessation NHS Boards to support 8 per cent of their smoking population in successfully quitting (at one month post quit) over the period 2008/09 - 2010/11.	83,975 Quits	89,075 Quits
H: Exclusively Breastfed Increase the proportion of new-born children exclusively breastfed at six to eight weeks from 26.6 per cent in 2006/07 to 33.3 per cent in 2010/11.	33.4%	26.5%
H: Inequalities Targeted Health Checks Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2010/11.	23,597	41,107
E: Electronic Management of Referrals To increase the percentage of new GP outpatient referrals into consultant led secondary care services that are managed electronically to 90 per cent from December 2010.	90%	81%
E: Same Day Surgery The target is to achieve 80 per cent of British Association of Day Surgery (BADS) surgical procedures performed in a day case or outpatient setting by March 2011	80%	80.7%

E: Emergency Inpatients Average Length of Stay The target is to achieve a reduction of the average length of stay per hospital episode (for acute inpatients discharged following an urgent, emergency or other non-routine, unplanned admission) to 3.9 days by 2010/11	3.9 Days	3.3 days
E: Review-to-New Outpatient Attendance Ratio The target is to achieve a reduction of the review to new outpatient attendance ratio to 2.21 by the year ending March 2011	2.21	2.09
E: Financial Performance NHS Boards are required to operate within their Revenue Resource Limit (RRL), their Capital Resource Limit (CRL) and meet their cash requirement	Operate within RRL, CRL and cash req't	NHS Boards operated within RRL, CRL and cash req't
E: Cash Efficiencies NHS Boards to meet their 2 per cent Efficient Government savings target	2.0% savings	3.1% savings
E: Reduce Carbon Emissions and Energy Consumption NHSScotland to reduce energy-based carbon emissions and to continue a reduction in energy consumption to contribute to the greenhouse gas emissions reduction targets set in the Climate Change (Scotland) Act 2009.	3% Carbon Reduction and 1% Energy Reduction	4.6% Carbon Reduction and 3.5% Energy Reduction
E: Knowledge Skills Framework (KSF) NHS Boards should ensure that all staff on Agenda for Change permanent contracts take part in an annual review against a KSF post outline. Information on levels of competence and identified training needs must be made available through Boards recording summary information from at least 80 per cent of development reviews on eKSF by end of March 2011.	80%	85%
A: GP 48 Hour Access/ Advance Booking Provide 48 hour access or advance booking to an appropriate member of the GP Practice Team by 2010/11.	90% for both 48 Hour Access and Advance Booking	94% for 48 Hour Access 85% for Advance Booking
A: Inpatient / Day Case 9 Weeks No patient will wait longer than 9 weeks from being placed on a waiting list to admission for an inpatient or day case treatment from 31 March 2011.	0 waiting over 9 weeks	229 waiting over 9 weeks
A: Drug Treatment Waiting Times By March 2013, 90 per cent of clients will wait no longer than 3 weeks from referral received to appropriate drug or alcohol treatment that supports their recovery. As an interim milestone towards delivery of the target, by December 2010, 90 per cent of clients referred for drug treatment will receive a date for assessment that falls within 4 weeks of referral being received and 90 per cent of clients will receive a date for treatment that falls within 4 weeks of their care plan being agreed	90% for both 4 week assess and 4 week treatment	92% for 4 week assess and 97% for 4 week treatment
T: Psychiatric readmissions Reduce the number of readmissions (within one year) for those that have had a psychiatric hospital admission of at least seven days by 10 per cent by the end of December 2009.	10% reduction on year ending Dec 2004 baseline	25% reduction on year ending Dec 2004 baseline
T: Long Term Conditions Bed Days To achieve agreed reductions in the rate of hospital admissions and bed days of patients with primary diagnosis of chronic obstructive pulmonary disease, asthma, diabetes or coronary heart disease from 2006/07 to 2010/11	Reduce to 8,511 Bed Days per 100,000 Pop	8,041
T: Complex Care Needs: Care at Home Increase the level of older people with complex care needs receiving care at home.	33.5%	32.3%
T: Dementia Each NHS Board will achieve agreed improvement in the early diagnosis and management of patients with dementia by March 2011	39,578 Dementia diagnoses on QOF	40,195 Dementia diagnoses on QOF
T: Staphylococcus Aureaus Bacteraemia (SAB) To reduce all staphylococcus aureaus bacteraemia (including MRSA) cases by 30% by 31 March 2010 and to achieve a further reduction in	41% reduction on 2005/06	37% reduction on 2005/06 baseline

cases of 15% by 31 March 2011	baseline	
T: C Diff Infections To reduce the rate of Clostridium difficile infections in patients aged 65 and over by at least 30% by 31 March 2011	30% reduction on 2007/08 baseline	71% reduction on 2007/08 baseline
T: Emergency Bed Days 65+ By 2010/11, NHS Boards will reduce the rate of emergency inpatient bed days for people aged 65 and over, by 10% compared with 2004/05	10% reduction on 2004/05 baseline	6.2% reduction on 2004/05 baseline
HEAT TARGETS FOR 2009/10	**Target**	**Outcome**
H: Inequalities Targeted Health Checks Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2009/10	28,455	29,433
E: New Outpatient Appointment DNA Rate Boards to deliver improved efficiencies through a reduction in the DNA (Did Not Attend) rate of the first outpatient appointment	9.2%	10.5%
E: Financial Performance NHS Boards are required to operate within their Revenue Resource Limit (RRL), their Capital Resource Limit (CRL) and meet their cash requirement	Operate within RRL, CRL and cash req't	NHS Boards operated within RRL, CRL and cash req't
E: Cash Efficiencies NHS Boards to meet their 2 per cent Efficient Government savings target	2.0% savings per annum	NHS Boards delivered in excess of 2.0% savings
E: Reduce Carbon Emissions and Energy Consumption NHSScotland to achieve a climatically adjusted reduction in energy consumption of 2% per annum	4% reduction on 2007/08 baseline	4.2% reduction on 2007/08 baseline
E: Universal utilisation of CHI (radiology requests) Universal utilisation of Community Health Index (CHI)	97%	99%
A: Drug treatment waiting times To agree a target to offer individuals with problem drug use faster access to appropriate treatment to support recovery	Agree a target	Target Agreed and included in 2010/11 HEAT
A: Access to specialist CAMHS To agree a target for Child and Adolescent Mental Health Services (CAMHS) referral to treatment waiting time	Agree a target	Target Agreed and included in 2010/11 HEAT
A: 18 Weeks Referral to Treatment (Part 1) No patient will wait longer than 12 weeks from referral (all sources) to a first outpatient appointment from 31 March 2010	0 waiting over 12 weeks	140 waiting over 12 weeks
A: 18 Weeks Referral to Treatment (Part 2) No patient will wait longer than 12 weeks from being placed on a waiting list to admission for an inpatient or day case treatment from 31 March 2010	0 waiting over 12 weeks	85 waiting over 12 weeks
T: Use of Anti-depressants Reduce the annual rate of increase of defined daily dose (DDDs) per capita of anti-depressants to zero by 2009/10	0% growth in use of DDDs	2.1% growth in use of DDDs
T: Complex care needs: care at home Increase the level of older people with complex care needs receiving care at home	32.8%	32.0%
T: Healthcare Associated Infections Reduce all staphylococcus aureaus bacteraemia (including MRSA) cases by 30% by 31 March 2010	Reduce to 1,945 infections	1,983 infections
HEAT TARGETS FOR 2008/09	**Target**	**Outcome**
H: Coronary heart disease mortality in deprived areas 2005-2007	Reduce Mortality	Met
E: Community Health Index (CHI) usage	97%	97.2%
E: Sickness absence	4.00%	4.43%

E: Staff with a KSF personal development plan	100%	92%
E: Financial Performance	Financial balance	Met
E: Cash efficiencies	2%	Met
A: 48-hour access to primary care team	100%	100%
A: All-cancer waiting times	95%	96.0%
A: Ambulance response times	75%	77%
A: Outpatients waiting over 15 weeks from GP referral	0	39
A: Inpatients/day cases waiting over 15 weeks	0	72
A: Patients waiting over 6 weeks for key diagnostic tests	0	52
A: Wait times at A&E	98%	97.7%
HEAT TARGETS FOR 2007/08	**Target**	**Outcome**
H: Childhood vaccinations	95%	94.3%
E: Financial Performance	Financial balance	Met
E: Sickness Absence	4%	5.08%
A: 48 hour access to GP	100%	100%
A: Ambulance response (Cat A)	75%	68%
A: 4hr A&E treatment	98%	98%
A: First outpatient appointments (18 weeks)	0	0
A: Inpatient or day case waiting times (18 weeks)	0	0
A: Cataract surgery (18 weeks)	0	3
A: Hip surgery (24 hours)	98%	97.0%
A: Cancer waiting times (62 days)	95%	94.1%
A: Breast cancer waiting times (31 days)	98%	83%
A: Cardiac waiting times (angiography)	0	6
A: Cardiac waiting times (intervention)	0	0
A: Diagnostic tests (9 weeks)	0	110
T:Delayed discharge	0	0
T:Cervical screening	80%	82.6%

Appendix 2 National Performance Framework

Appendix 3 High Impact Areas Linked to Improvement Areas

Enhance informal carer capacity Reduce acute bed days	Rehabilitation and reablement	Community urgent response systems	Voluntary sector organisations	Better pharmaceutical care	Self referral	Obligate networks
Existing housing, equipment & adaptations Reduce acute bed days, improves patient experience, increases independence and choice	Anticipatory care and crisis prevention Reduce acute bed days	Near patient testing	Electronic record and shared information	Referral management	Extending non-med professional roles	Improved EOL and palliative care for all
Extra care houses	Case manager - Personalised care	Community transport	Clinical & Social Networks	Understand and reduce variation	Psycho-social report	Plan EOL care with family and carers
Redesign homecare	Extended community teams Reduce readmissions; improve patient experience	Integrated equipment & adaptation service		Redesign care pathways Reduce acute bed days	Single point of access in care pathway	Local care centres / hubs
Telecare 24/7 risk management Reduces acute bed days, reduces adverse events, increases the use of non medical practitioners	Single 24/7 point of contact	Self-held personal care plans	Mentoring & peer support dependent people	Reduce peri-operative beddays	One stop shop	Integrated budgets
Tele-medicine & tele-health Reduces acute bed days, Reduces adverse events, Increases the use of non medical practitioners, Increases dependence and personal choice, Reduces carbon footprint through less travelling and	Overnight response for people in need	User participation in care planning	Co location	Quality & standardisation of routine care	Innovative prescribing & access to medication	Generic workers
Self directed support	Intermediate level alternatives Reduce acute bed days	Resources aligned to care pathways	Better management of transitions	Non medical prescribing	Mobile services	Aligned financial incentives

Appendix 4 High Impact Changes within Improvement Areas

Shaded areas to demonstrate multiple impacts of 19 short listed High Impact Changes

Extend the range of services outside acute hospitals provided by non medical practitioners	Improve access to care for remote and rural populations	Improve palliative and End of Life care	Better joint use of resources (revenue & capital)
Enhance unpaid carer capacity and support	Enhance unpaid carer capacity and support	Non medical prescribing within protocols for common conditions	Single 24/7 point of contact for local information and access to community services
Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	More investment into improvement in existing housing, equipment & adaptations	Expand intermediate level services to provide alternatives to admission to acute hospitals
Use tele-medicine & tele-health to support care delivery	Use tele-medicine & tele-health to support care delivery	Redesign care pathways to optimise capacity and provide care closer to home	Better community transport
Multi-disciplinary extended community teams including carers and users.	Anticipatory care and crisis prevention.	Redesign home care services to provide flexible responsive intensive support	Third sector organisations contributions
Single 24/7 point of contact for local information and access to community services	Multi-disciplinary extended community teams including carers and users.	Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	Continuity of information across organisational boundaries.
Overnight response for people in need	Robust community emergency and urgent response systems	Use tele-medicine & tele-health to support care delivery	Align health and social care terms and conditions of service to enable joint working
Expand intermediate level services to provide alternatives to admission to acute hospitals	Develop more near patient testing	Extend gold standard EOL care to everyone in their last 12 months of life	Better management of age transitions
Robust community emergency and urgent response systems	Better community transport	Plan EOL care with family and carers with particular focus on last 48 hrs	Redesign care pathways to optimise capacity and provide care closer to home
Develop more near patient testing	Third sector organisations contributions	Equitable funding for each CHP community including acute hospital costs	Integrated services across health and social care with single point of access
Integrated equipment library and adaptations service	Mentoring, peer support/ expert patients to encourage self-care	Case manager or key worker to coordinate personalised care	Develop community hospitals/local care centres/hubs to provide wide range of facilities
Better medicines management by pharmacists	Co location of services and teams across agencies	Multi-disciplinary extended community teams including carers and users.	Aligned /Pool budgets between health and social care

Redesign care pathways to optimise capacity and provide care closer to home	Improve referral management by developing a feedback mechanism	Overnight response for people in need	Develop multi-skilled generic workers working across organisations
Improve quality and standardisation of routine health & social care through use of protocols	Redesign care pathways to optimise capacity and provide care closer to home	Expand intermediate level services to provide alternatives to admission to acute hospitals	Equitable funding for each CHP community including acute hospital costs
Non medical prescribing within protocols for common conditions	Electronic prescribing and postal dispensing	Develop more near patient testing	
Change referral permissions so that people can self refer	Mobile services to support community hospitals and extended teams	Integrated equipment library and adaptations service	
Screening, consultation & treatment by non medical practitioners	Obligate networks between remote and rural areas and larger centres	User participation in care planning	
Equitable funding for each CHP community including acute hospital costs	Equitable funding for each CHP community including acute hospital costs	Third sector organisations contributions	
Integrated services across health and social care with single point of access		Continuity of information across organisational boundaries.	
Community based one stop shops/ 'fast' clinics		Increase clinical and social network effectiveness	
Better access to psycho-social support		Better access to psycho-social support	
		More extra care (new) houses	
		Enhance unpaid carer capacity and support	
		Self directed support	
		More domiciliary assessment and rehabilitation	
		Anticipatory care and crisis prevention.	
Maximise flexible and responsive care at home with support for carers	**Reduce avoidable unscheduled attendances and admissions to hospital**	**Integrate health and social care for people in need and at risk**	**Improve capacity & flow management for scheduled care**
More investment into improvement in existing housing, equipment & adaptations	More investment into improvement in existing housing, equipment & adaptations	Redesign care pathways to optimise capacity and provide care closer to home	Use tele-medicine & tele-health to support care delivery

Enhance unpaid carer capacity and support	Enhance unpaid carer capacity and support	Community based one stop shops/ 'fast' clinics	Develop more near patient testing
Use tele-medicine & tele-health to support care delivery	Joint targeting of resources towards those people who are at risk	Improve quality and standardisation of routine health & social care through use of protocols	Improve referral management by developing a feedback mechanism
Redesign home care services to provide flexible responsive intensive support	Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	Redesign home care services to provide flexible responsive intensive support	Understand and reduce variation in health and social care
Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	Use tele-medicine & tele-health to support care delivery	Use tele-care to provide 24/7 risk management, remote, personalised, specialist support	Redesign care pathways to optimise capacity and provide care closer to home
More extra care (new) houses	More extra care (new) houses	More extra care (new) houses	Reduce pre-operative bed days
Plan EOL care with family and carers with particular focus on last 48 hrs	Case manager or key worker to coordinate personalised care	Mentoring, peer support/ expert patients to encourage self-care	Improve quality and standardisation of routine health & social care through use of protocols
Develop multi-skilled generic workers working across organisations	Single 24/7 point of contact for local information and access to community services	Align health and social care terms and conditions of service to enable joint working	Change referral permissions so that people can self refer
Equitable funding for each CHP community including acute hospital costs	Overnight response for people in need	Case manager or key worker to coordinate personalised care	Screening, consultation & treatment by non medical practitioners
Case manager or key worker to coordinate personalised care	Expand intermediate level services to provide alternatives to admission to acute hospitals	Multi-disciplinary extended community teams including carers and users.	Equitable funding for each CHP community including acute hospital costs
Single 24/7 point of contact for local information and access to community services	Robust community emergency and urgent response systems	Single 24/7 point of contact for local information and access to community services	
Overnight response for people in need	Integrated equipment library and adaptations service	Overnight response for people in need	
Develop more near patient testing	Anticipatory care and crisis prevention.	Anticipatory care and crisis prevention.	
Integrated equipment library and adaptations service	Third sector organisations contributions	Self directed support	
Self-held personal care plans/records	Continuity of information across organisational boundaries.	Continuity of information across organisational boundaries.	
User participation in care planning	Better medicines management by pharmacists	Integrated equipment library and adaptations service	**integrate health & social care continued:**
Joint targeting of resources towards those people who are at risk	Understand and reduce variation in health and social care	Understand and reduce variation in health and social care	Expand intermediate level services to provide alternatives to admission to acute hospitals

Third sector organisations contributions	Screening, consultation & treatment by non medical practitioners	Mobile services to support community hospitals and extended teams	Use tele-medicine & tele-health to support care delivery
Better medicines management by pharmacists	Community based one stop shops/ 'fast' clinics	Third sector organisations contributions	Self-held personal care plans/records
Mentoring, peer support/ expert patients to encourage self-care	Mobile services to support community hospitals and extended teams	Joint targeting of resources towards those people who are at risk	Develop multi-skilled generic workers working across organisations
Redesign care pathways to optimise capacity and provide care closer to home	Plan EOL care with family and carers with particular focus on last 48 hrs	Non medical prescribing within protocols for common conditions	Equitable funding for each CHP community including acute hospital costs
Non medical prescribing within protocols for common conditions	Develop community hospitals/local care centres/hubs to provide wide range of facilities	More investment into improvement in existing housing, equipment & adaptations	Plan EOL care with family and carers with particular focus on last 48 hrs
Electronic prescribing and postal dispensing	Equitable funding for each CHP community including acute hospital costs	Integrated services across health and social care with single point of access	Develop community hospitals/local care centres/hubs to provide wide range of facilities
Self directed support		Enhance unpaid carer capacity and support	Aligned /Pool budgets between health and social care
More domiciliary assessment and rehabilitation		Co location of services and teams across agencies	User participation in care planning
Anticipatory care and crisis prevention.		Better management of age transitions	Increase clinical and social network effectiveness
		Better medicines management by pharmacists	Better community transport
		Better access to psycho-social support	Robust community emergency and urgent response systems

Appendix 5 Justification for selection of modelling techniques in each Improvement Area

	Improvement Area	
Process Mapping	1 ***	Integrated pathways supporting multi-agency support
	2 **	Integrating care pathways across organisational boundaries
	3 **	Care pathways developed across health and social care will help to identify only people who need specialist care and ensure that these are the only people who are taken to acute hospitals.
	4 ***	Redesigning pathways to improve flow with reduced number of steps, improve effectiveness of care, reduce waiting times.
	5 *	Redesigned pathways which include non-medical professionals
	7 *	Individual pathways reflecting the end of life plan
	8 ***	Redesign pathways to improve better use of resources, improve communication across public and voluntary sector, maximise use of buildings.
Simulation	3 ***	Intermediate care responses to prevent admission can be simulated to assess the most appropriate also simulating the discharge procedure could identify the most efficient pathway to adopt to avoid discharge delays and hence shorten length of stay.
	4 ***	Simulation will identify the most efficient way to improve the effectiveness of care.
	5 ***	Simulation will identify the most cost –effective use of non-medical practitioners.
	6 **	Simulation will help to identify the most efficient way to provide services for rural groups.
	8 **	Simulation can assess the various resources available and estimate a combination of resources which will be the most efficient.
SERVQUAL	2 ***	SERVQUAL can serve as a means to establishing what people want during their care process.
	6 **	Analysis of a SERVQUAL questionnaire will aid decision-makers in understanding the expectations of rural communities so that they can plan accordingly.
Statistical Modelling	1 **	A simple score sheet listing high risk factors could alert carers when a patient is reaching a state when immediate intervention is required.
	3 **	Modelling referral data to highlight areas of concern.
	4 *	Statistical modelling will provide the background data when re-designing pathways.
	8 **	Statistical analysis of data collected for arrivals; planned and emergency, length of stay, case mixes can produce patterns and probabilities which can be used to understand and therefore improve the use of hospital resources
SSM	2 **	SSM brings professionals, patients and carers together to consider the planning process of an individual's needs.
	3 *	Improving the planning process will reduce avoidable unscheduled attendances to acute care.
	5 *	SSM can bring together non-medical practitioners with clinical leaders to discuss and plan the best use of their

		skills.
	6 *	SSM can bring together community care teams with technology to plan care for rural communities which encourages them to use care available locally, it will also help to identify where staff are frustrated with a particular process.
	7 ***	The soft approach of SSM lends itself to planning and meeting end of life care plans.
MCDA	3 **	MCDA can help to identify the alternative care available to patients to prevent unscheduled attendances at acute hospitals.
	5 *	MCDA can help to identify the area's most in need of help from non-medical practitioners and also identify where they would serve best.
	8 ***	Traditionally, each part of the public sector has tended to plan and manage its own resources independently of other sectors: Each sector has its own staff, its own buildings and its own information systems. Multi-criteria decision analysis will consider the alternatives available for joint use of resources: facilities, buildings, technology etc and assign a weighted score to each identified criteria: cost, communication levels etc.
LEAN	3 ***	Value stream mapping the discharge procedure of patients will highlight delays and therefore the waste associated with the process, the team would then produce an action plan to eliminate the waste thereby reducing discharge time.
	4 ***	Value stream mapping the care process will reduce the number of steps and reduce the number of people and length of the pathway.
	5 **	Value stream mapping will identify where the referral process can be improved.
	8 ***	Value stream mapping services which involve integrated teams will highlight waste and inefficiencies due to duplication and redundant steps. This process will also highlight common resources: equipment and buildings, which could be shared.
ebd	1 ***	The ebd approach is a powerful account of the service user's personal experience, assuming that staff and management act on the negative parts of that experience.
	2 ***	The aim of this improvement area is to move from "doing to" to "doing with" people who need care. Experienced Based Design therefore is ideally suited to this area where patients are central to redesigning or improving a service.
	7 ***	The experience sharing of people who have reached end of life could be fundamental to improving palliative care, although the benefits may not help them directly, they will surely help others who follow.
Health Economics DCE	2 ***	The culture of healthcare is move from 'doing to' to 'doing with' patients and their carers. A DCE can establish the preferences of patients who choose to self-manage their own care, this can lead to more personalised integrated care for the patient and their family.
	3 **	A well planned discrete choice experiment may help to explain why and under what circumstances people access emergency care rather than care which is available locally. This type of research can also establish the trade-offs people are willing to make which would encourage them not to access emergency care; this is information decision makers would then use when planning care locally.

Appendix 6 Key steps in Realist Review

Step 1: Clarify scope

a. Identify the review question
- Nature and content of the intervention
- Circumstances or context for its use
- Policy intentions or objectives

b. Refine the purpose of the review
- Theory integrity – does the intervention work as predicted?
- Theory adjudication – which theories fit best?
- Comparison – how does the intervention work in different settings, for different groups?
- Reality testing – how does the policy intent of the intervention translate into practice?

c. Articulate key theories to be explored
- Draw up a 'long list' of relevant programme theories by exploratory searching (see Step 2)
- Group, categorize or synthesize theories
- Design a theoretically based evaluative framework to be 'populated' with evidence

Step 2: Search for evidence

a. Exploratory background search to 'get a feel' for the literature

b. Progressive focusing to identify key programme theories, refining inclusion criteria in the light of emerging data

c. Purposive sampling to test a defined subset of these theories, with additional 'snowball' sampling to explore new hypotheses as they emerge

d. Final search for additional studies when review near completion

Step 3: Appraise primary studies and extract data

a. Use judgement to supplement formal critical appraisal checklists, and consider 'fitness for purpose':
- Relevance – does the research address the theory under test?
- Rigour – does the research support the conclusions drawn from it by the researchers or the reviewers?

b. Develop 'bespoke' set of data extraction forms and notation devices

c. Extract different data from different studies to populate evaluative framework with evidence

Step 4: Synthesize evidence and draw conclusions

a. Synthesize data to achieve refinement of programme theory – that is, to determine what works for whom, how and under what circumstances

b. Allow purpose of review (see Step 1b) to drive the synthesis process

c. Use 'contradictory' evidence to generate insights about the influence of context

d. Present conclusions as a series of contextualized decision points of the general format 'If A, then B' or 'In the case of C, D is unlikely to work'.

Step 5: Disseminate, implement and evaluate

a. Draft and test out recommendations and conclusions with key stakeholders, focusing especially on levers that can be pulled in here and-now policy contexts

b. Work with practitioners and policy-makers to apply recommendations in particular contexts

c. Evaluate in terms of extent to which programmes are adjusted to take account of contextual influences revealed by the review: the 'same' programme might be expanded in one setting, modified in another and abandoned in another.

Appendix 7 Back Pain Project Surveys

Community Physiotherapy Patient's Satisfaction Survey
Low Back Pain Conditions Only

NHS Fife

We would like to know how you feel about the services we provide so we can make sure we are meeting your needs. Your responses are directly responsible for improving these services. All responses will be kept confidential and anonymous. Thank you for your time.

Please tick one box only

	< 6 weeks	< 3 months	< 6 months	< 12 months	> 12 months
1. Approximately how long ago did you first experience problems to do with your condition?	☐	☐	☐	☐	☐
2. Approximately how long ago did you first approach your GP with your condition?	☐	☐	☐	☐	☐
3. Approximately how many appointments have you had for your back condition to date with doctors, physiotherapists and other health professionals?	1 ☐	2-3 ☐	4-5 ☐	5-6 ☐	>7 ☐

How satisfied are you with the following: *Please tick one box only*	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
4. **Staff:**					
a. Gives you treatment for your back condition that helps	☐	☐	☐	☐	☐
b. Gives you good advice for your back condition	☐	☐	☐	☐	☐
c. Explains what you want to know about your back condition	☐	☐	☐	☐	☐
d. Takes enough time with you	☐	☐	☐	☐	☐
e. Friendly	☐	☐	☐	☐	☐
f. Listens to you	☐	☐	☐	☐	☐
5. **Ease of getting care:**					
a. Hours Clinic is open	☐	☐	☐	☐	☐
b. Convenience of Centre's location	☐	☐	☐	☐	☐
6. **Waiting:**					
a. Time waiting for an appointment with a physiotherapist	☐	☐	☐	☐	☐
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
7. **Expectations:**					
a. I expected to have an x-ray	☐	☐	☐	☐	☐
b. I expected to have a scan	☐	☐	☐	☐	☐
c. I expected to see an Orthopaedic Consultant	☐	☐	☐	☐	☐
d. I expected to see a Physiotherapist	☐	☐	☐	☐	☐
8. **Personal details:**					
a. I am asked for my personal details about myself and my condition too many times by too many different members of staff	☐	☐	☐	☐	☐

CHP Name_____

b. The questions asked the most are:
Please use the space provided

9. Please feel free to add any comments, suggestions or issues you may have about the service provided by NHS Fife for low back pain conditions in the space below.

Thank you for completing this survey

NHS Fife Job Satisfaction Survey
Low Back Pain Conditions

NHS Fife

Training

1. **In the last 12 months, have you taken part in any of the following types of training, learning or development, which relate to low back pain conditions?**
Please tick Yes or No for each of the following:

	Yes	NO	N/A
a Taught courses (internal or external)	☐	☐	☐
b Any supervised on-the-job training	☐	☐	☐
c Having a mentor	☐	☐	☐
d Shadowing someone	☐	☐	☐
e e-learning / online training	☐	☐	☐
f Keeping up-to-date with developments in your type of work (e.g. by reading books or journals, or by attending seminars or workshops)	☐	☐	☐
g Other methods of training, learning or development *(please specify)*			

2. **Thinking about <u>any</u> training, learning or development that you have done in the last 12 months to what extent do you agree or disagree with the following?** *Please tick one box*	Strongly disagree	Disagree	Neither	Agree	Strongly agree	N/A
a My training, learning and development have given me a clear understanding of the different types of low back pain conditions.	☐	☐	☐	☐	☐	☐
b It has given me confidence to treat patients with low back pain conditions.	☐	☐	☐	☐	☐	☐
c It has given me confidence to make decisions concerning patients with low back pain conditions.	☐	☐	☐	☐	☐	☐

Low back pain Conditions

3. **To what extent do you agree or disagree with the following statements relating to low back pain conditions?** *Please tick one box*	Strongly disagree	Disagree	Neither	Agree	Strongly agree	N/A
a The classification of the different types of low back pain are standardised in NHS Fife	☐	☐	☐	☐	☐	☐
b There are clear, existing pathways for patients with low back pain conditions in Fife.	☐	☐	☐	☐	☐	☐
c There are clearly defined and accessible exit routes for patients with low back pain conditions in Fife.	☐	☐	☐	☐	☐	☐
d I have an appropriate choice of exit routes for patients with low back pain conditions in Fife.	☐	☐	☐	☐	☐	☐

Job Satisfaction

4. **Thinking about low back pain conditions specifically, to what extent do you agree or disagree with the following statements?** *Please tick one box*	Strongly disagree	Disagree	Neither	Agree	Strongly Agree	N/A
a I have had sufficient training to cope with patients with low back pain conditions.	☐	☐	☐	☐	☐	☐
b I am fully supported by my line manager in treating patients with low back pain conditions.	☐	☐	☐	☐	☐	☐
c If I am unsure of treatment, I can seek advice easily which will help with patients with low back pain conditions.	☐	☐	☐	☐	☐	☐
d I am satisfied with the quality of care the service allows me to deliver to patients with low back pain conditions.	☐	☐	☐	☐	☐	☐
e I am often unable to directly access the appropriate care that the patient needs.	☐	☐	☐	☐	☐	☐
f I am happy to refer a patient back to the GP if I cannot give them the care that they need.	☐	☐	☐	☐	☐	☐

PTO

Job Location_____ Job Role_____

5. **Please feel free to add any comments, suggestions or issues you may have about the service provided by NHS Fife for low back pain conditions in the space below.**

Thank you for completing this survey.

Operation Division Patient's Satisfaction Survey
Low Back Pain Conditions Only

NHS Fife

We would like to know how you feel about the services we provide so we can make sure we are meeting your needs. Your responses are directly responsible for improving these services. All responses will be kept confidential and anonymous. Thank you for your time.

Please tick one box only

	< 6 weeks	< 3 months	< 6 months	< 12 months	> 12 months
1. Approximately how long ago did you first experience problems to do with your condition?	☐	☐	☐	☐	☐
2. Approximately how long ago did you first approach your GP with your condition?	☐	☐	☐	☐	☐
3. Approximately how many appointments have you had for your back condition to date with doctors, physiotherapists and other health professionals?	1 ☐	2-3 ☐	4-5 ☐	5-6 ☐	>7 ☐

How satisfied are you with the following: *Please tick one box only*	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
4. **Staff:**					
a. Gives you treatment for your back condition that helps	☐	☐	☐	☐	☐
b. Gives you good advice for your back condition	☐	☐	☐	☐	☐
c. Explains what you want to know about your back condition	☐	☐	☐	☐	☐
d. Takes enough time with you	☐	☐	☐	☐	☐
e. Friendly	☐	☐	☐	☐	☐
f. Listens to you	☐	☐	☐	☐	☐
5. **Ease of getting care:**					
a. Hours Clinic is open	☐	☐	☐	☐	☐
b. Convenience of Centre's location	☐	☐	☐	☐	☐
6. **Waiting:**					
a. Time waiting for an appointment with a consultant	☐	☐	☐	☐	☐
b. Waiting for tests to be performed	☐	☐	☐	☐	☐
c. Waiting for test results	☐	☐	☐	☐	☐
7. **Expectations:**	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
a. I expected to have an x-ray	☐	☐	☐	☐	☐
b. I expected to have a scan	☐	☐	☐	☐	☐
c. I expected to see an Orthopaedic Consultant	☐	☐	☐	☐	☐
8. **Personal details:**					
a. I am asked for my personal details about myself and my condition too many times by too many different members of staff	☐	☐	☐	☐	☐

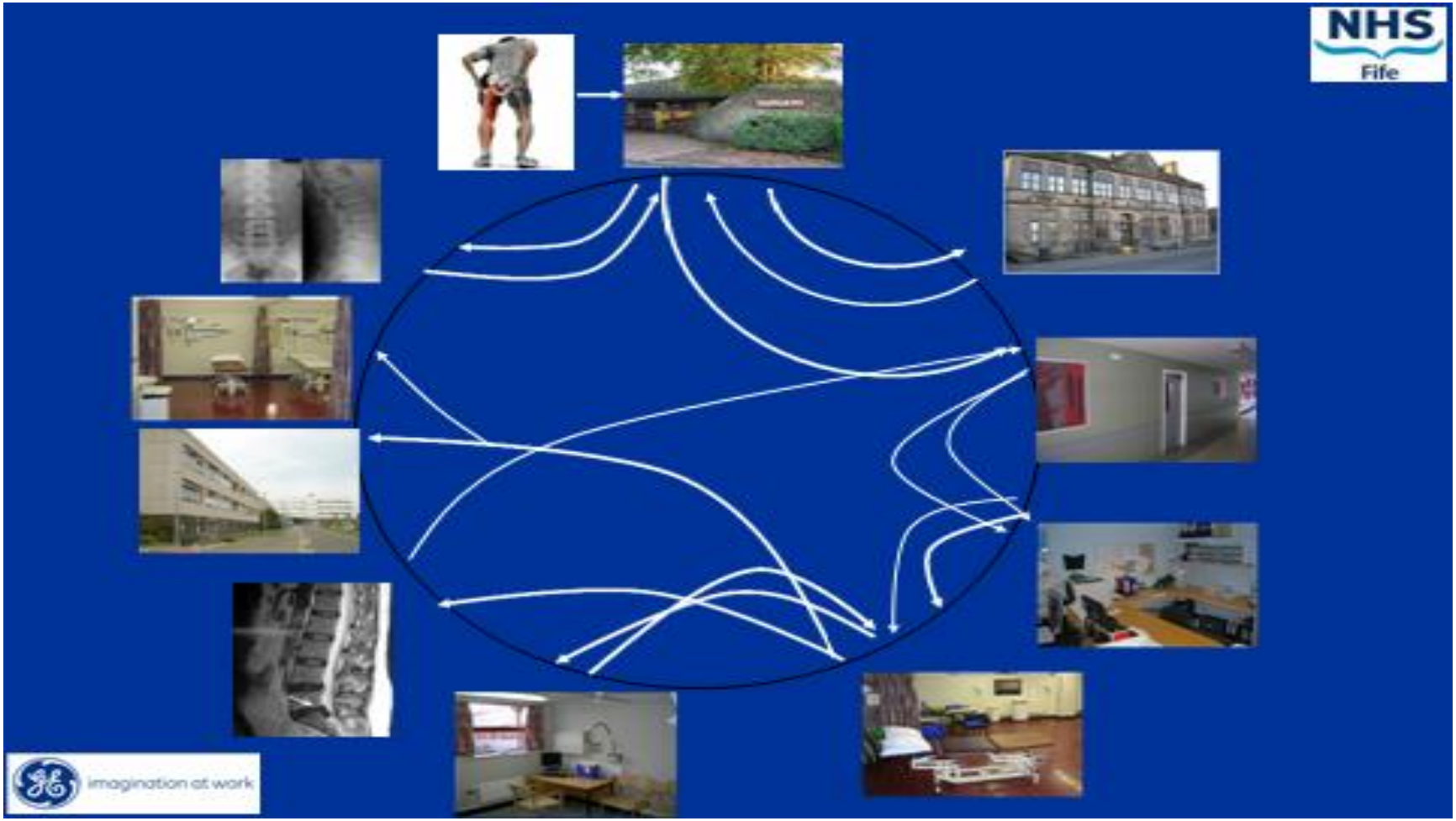
Hospital Name_____ Clinic Name_____

d. The questions asked the most are:
Please use the space provided

9. Please feel free to add any comments, suggestions or issues you may have about the service provided by NHS Fife for low back pain conditions in the space below.

Thank you for completing this survey

Appendix 8 Typical Back Pain Patient Pathway



Appendix 9 Project Charter

NHS Fife Lean Demonstrator Project
Project Charter

PROBLEM STATEMENT

NHS Fife is in the process of a comprehensive Strategic Change Programme in order to meet the current and forthcoming clinical, demographic and resource challenges of its population. In Scotland, by 2011 all elective orthopaedic patients are to be treated within 18 weeks from General Practitioner Referral.

Significant challenges face NHS Fife to deliver 18 week RTT and shifting the balance of care. In the face of constrained resources and in the context of the quality strategy it is important that a sustainable solution be found.

The board has decided to use Lean to potentiate and enhance the significant body of work currently and previously undertaken on Orthopaedic: MSk (Back Pain) services.

IN SCOPE FOR GE DEMONSTRATOR

- Agree project metrics
- From patient presentation to GP with back pain or related symptoms to assessment and treatment where necessary within the correct pathway (including where referral is received and triaged into the appropriate secondary/tertiary care pathway)
- Proof of concept of a comprehensive pathway for Fife patients will be demonstrated within Kirkcaldy and Levenmouth CHP
- Identification of financial impact and benefit of the demonstrator
- Basic Lean training to core team members
- Pan-Fife roll-out after proof of concept has been achieved
- Optimise patient experience

OUT OF SCOPE FOR GE DEMONSTRATOR

- Dunfermline and West Fife and North-East Fife and Glenrothes CHPs for the period of the demonstrator project only
- Proforma for patients presenting with Back Pain (already being taken forward)
- Large scale staff training
- Implementation of a wider improvement programme

ALREADY UNDER DEVELOPMENT

Proforma, ERMS, AHP and GP access to MRI, Triage hub pilot

FUTURE DEVELOPMENT

Referral to tertiary services

GOALS & KEY DELIVERABLES

- Lean Demonstrator Project planned to be completed by 30 day report out
- Increased patient experience and better clinical outcomes
- Patient receives timely treatment by the most appropriate person in the correct pathway for their needs
- Establishment of standardised pathways and clinical protocols across Fife with visible accountability
- Service bottlenecks identified and eliminated
- Improved cross organisation and multi-disciplinary team working
- Improved working lives
- Effective use of resources
- Services are delivered in a cost effective manner
- Increased clinician satisfaction
- Robust intelligence about demand, capacity and performance is readily available
- Return on investment

COMMUNICATIONS STRATEGY

- Weekly meeting between Ken Laurie, Grant Syme, Stacey Reay and Michael White
- Weekly (and as required) progress updates to Executive Sponsor
- Fortnightly 30 minute update at Orthopaedic Service Transformation Group Meeting
- Interview sessions scheduled with all major stakeholders
- Broader involvement in the organisation will take place in the subsequent phases of the project (e.g. Kaizen)

PROJECT MANAGEMENT TEAM

Brian Montgomery, Ken Laurie, Grant Syme, Les Bisset, Ed Dunstan, Fiona Cameron, Lesley Bruce, Brenda McFall, Linda Noble, Key stakeholders from other CHPs

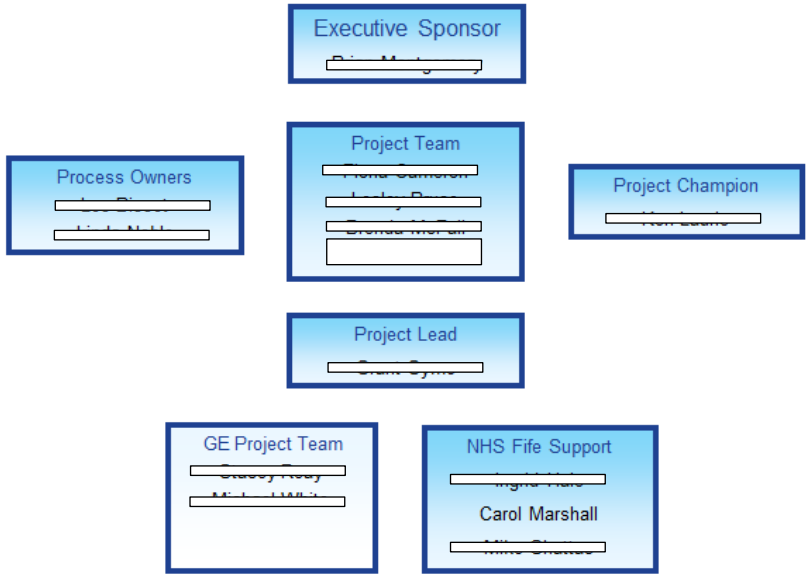
CORE GE TEAM

Stacey Reay, Michael White

imagination at work

NHS Fife Lean Demonstrator Project

Project Team



For the purpose of clarity, metrics are usually established during the Value Stream Mapping (VSM) exercise. Those highlighted below are therefore, at this juncture of a high level and anticipatory nature. If ratified at the VSM (05-06.08.2010) these metrics will contain a greater level of detail.

QUALITY DIMENSION/ IMPROVEMENT OPPORTUNITY	ANTICIPATED OUTCOME	MEASURE (ACTION)	BASELINE	TARGET
Number of 'hand-offs' in the patient pathway for patients with low back spinal pain	The number of 'hand-offs' experienced by patient are reduced, this will mean fewer steps in the pathway involving less professional time and therefore freed-up capacity that can be used elsewhere resulting in shorter waiting time in total and quicker access to the appropriate treatment	Reduction in total time on patient pathway before treatment (VSM)		
Enhanced patient/staff experience	Consistent high levels of patient/staff satisfaction	Patient/staff satisfaction survey scores		
Improved clinical capacity	Better utilisation of staff and resources resulting in enhanced patient throughput and reduction in waiting times	Audit of clinic utilisation rate and clinic templates Audit of physiotherapy DNA rate	12%	6%
Speedier access to diagnostic tests	GPs and ESPs directly request MRI scans resulting in appropriate and timely patient triage/treatment which means that more patients are dealt with without referral to secondary care. Therefore any increase in investigations is offset by a reduced number of referrals	Audit of MRI scans independently requested by ESPs and GPs Audit of completed diagnostic testing prior to referral	0%	
Improved adherence with evidence based guidelines	Patients get access to the right treatment from the right person at the right time in the right place. Reduction in clinical incidents and near misses in patients with low back spinal pain	Audit of practice against national guidelines Audit of clinical incidents and near misses in patients with low back spinal pain		
Number of patients seen in secondary care physiotherapy with non-specific low back pain	Marked reduction of patients seen in secondary care physiotherapy with non-specific low back pain. These patients will still be seen elsewhere albeit more appropriately and this will free up capacity in secondary care.	Frequency count of number of patients seen in secondary care physiotherapy		
Cost avoidance/reductions	Efficient and effective patient pathways reduce long patient waits Establishment of Standard Operating Procedures reduce variation in inventory held and budgetary overspends Reduction in terms of cost of lumbar spine radiographs, where any increase in MRI (the right test) will be offset by a reduction in plain films (the wrong test).	Reduction in the number of funded waiting list initiatives Reduction in inventory held Frequency count of lumbar spine radiographs		

NHS Fife Lean Demonstrator Project

Project Plan

Plan for Demonstrator Project in Orthopaedics (MSK, Back Pain)	31/05/2010	07/06/2010	14/06/2010	21/06/2010	28/06/2010	05/07/2010	12/07/2010	15/07/2010	16/07/2010	19/07/2010	26/07/2010	02/08/2010	03/08/2010	04/08/2010	05/08/2010	06/08/2010	09/08/2010	10/08/2010	11/08/2010	12/08/2010	13/08/2010	16/08/2010	23/08/2010	30/08/2010	06/09/2010	13/09/2010
Pre-Work										X	X															
Observations & Data Collection										X	X															
Basic Training										X	X															
Prep for VSM/Kaizen										X	X															
Value Stream Analysis										X	X															
KAIZEN WEEK										X	X															
30 Day Follow-Up										X	X															
30 Day Report-Out										X	X															

Two weeks that Orthopaedics Department are unavailable marked with X

Whole project team to attend milestone meetings after VSM, Kaizen and 30 Day Follow-Up.

Appendix 10 Back Pain Project Action Plan

MSK BACK PAIN SERVICE - ACTION PLAN

Task #	Six Dimensions of Quality	Action	Owner	Team	Target Completion	% complete				Comments	Implemented	Dependencies
						25%	50%	75%	100%			
1	**Patient Centred, Effective, Efficient, Equitable, Safe and Timely**	**Implementation of the referral Spinal Safety Checklist by all GPs within K&L CHP**	**L Bisset/B Montgomery/ G Syme**									
a.	Patient Centred, Effective, Efficient, Equitable, Safe and Timely	Complete updated Spinal Safety Checklist	[redacted]	G S[redacted]	Pathway complete 27.08.10 SCI gateway access in place 04.10.10					G Syme and J Gibson have met and agreed inflammatory pathway. Dr Gibson to confirm pathway with radiology re. GP access. G Forrest to complete checklist on SCI gateway and liaise with Dermot Killeen (eHealth) regarding availability to all K&L GPs.	✓	
b.	Efficient and Equitable	Attend Clinical Forum for K&L CHP	[redacted]	[redacted]	18.08.10					Positive support received from all GPs present (minuted 18 08 10)	✓	Completed
c.	Efficient and Equitable	Contact LMC for support/approval	[redacted]	L B[redacted]ry	Oct-10					L Bisset/B Montgomery to seek LMC approval for pathways and spinal safety checklist (LMC meets monthly - next mtg date tbc)		
d.	Patient Centred, Effective, Efficient, Equitable	Protected Learning Time (PLT) Workshop session	[redacted]	E [redacted] lyne, R C	02.11.10					PLT sessions run through all 3 CHPs. 2011 dates to be confirmed.	✓	Mr Dunstan undertaking both PLT and Conference
e.	Patient Centred, Effective, Efficient, Equitable	Annual K&L CHP Conference Education Session. Mike Ghattas to produce posters. Prepare pack with Pathways and Spinal Safety Checklist	[redacted]	G S[redacted] Cam	02.11.10					Stand booked at K&L CHP Conference. M Ghatas/F Cameron to prepare posters. L Hutchison to investigate if education sessions available with J Pearson.	✓	Session booked at K&L CHP Mr Dunstan and G Syme to attend. Poster completed just needs printed. Pack with Pathways and safety check list still need compiling
f.	Effective, Efficient, Equitable	GP Education sessions and cross boundary communication.	[redacted]	[redacted] F Cameron/P Lynch	Sept/Oct 2010					Check current status of Closer Working Agreement with Dr A Kilpatrick through Orthopaedic STG (L Noble/L Bisset). Identify MSK education opportunities for GPs using orthopaedic surgeons and ESPs.	✓	Mr Dunstan organised dates for 23.11.10 and 01.12.10. P Lynch undertaken session with GPs in D&WF
g.	Patient Centred, Effective, Efficient, Equitable, Safe and Timely	Email and hard copy of pathways and Spinal Safety Checklist with covering letter to all GP's in K&L CHP from L Bisset/B Montgomery	[redacted]	L B[redacted]ry, B M[redacted]	23.09.10					M Ghattas to send completed pathways as .jpg files to L Bisset/B McFall for distribution. Orthopaedic STG to approve letter for sign off by L Bisset/B Montgomery	✓	
h.	Patient Centred, Effective, Efficient, Equitable, Safe and Timely	Laminate front sheet of Spinal Safety Checklist for GPs to stick to their surgery wall and enclose with the letter in 7 above	[redacted]	M S[redacted]	04.10.10					M Ghattas to send completed pathways as .jpg files to L Hutchison for distribution to all GP Practice Managers in K&L CHP with letter in 1g. Above.	✓	Back Safety check list completed, sent to L Hutchison. Laminated and awaiting covering letter for GPs.
i.	Efficient and Equitable	Ask GPs/GP Groups for their engagement ideas	[redacted]	All	Ongoing					I Hale to undertake scoping of GP ideas for cross boundary communication.	✓	Ideas meet with GP Practice Managers, Meet with GP SubCommittee
2	**Effective, Efficient, Equitable**	**Referrals processed through the Triage Hub**	[redacted]	F [redacted] e, E D[redacted]								

Appendix 11 Back Pain Project Final Report to SMT

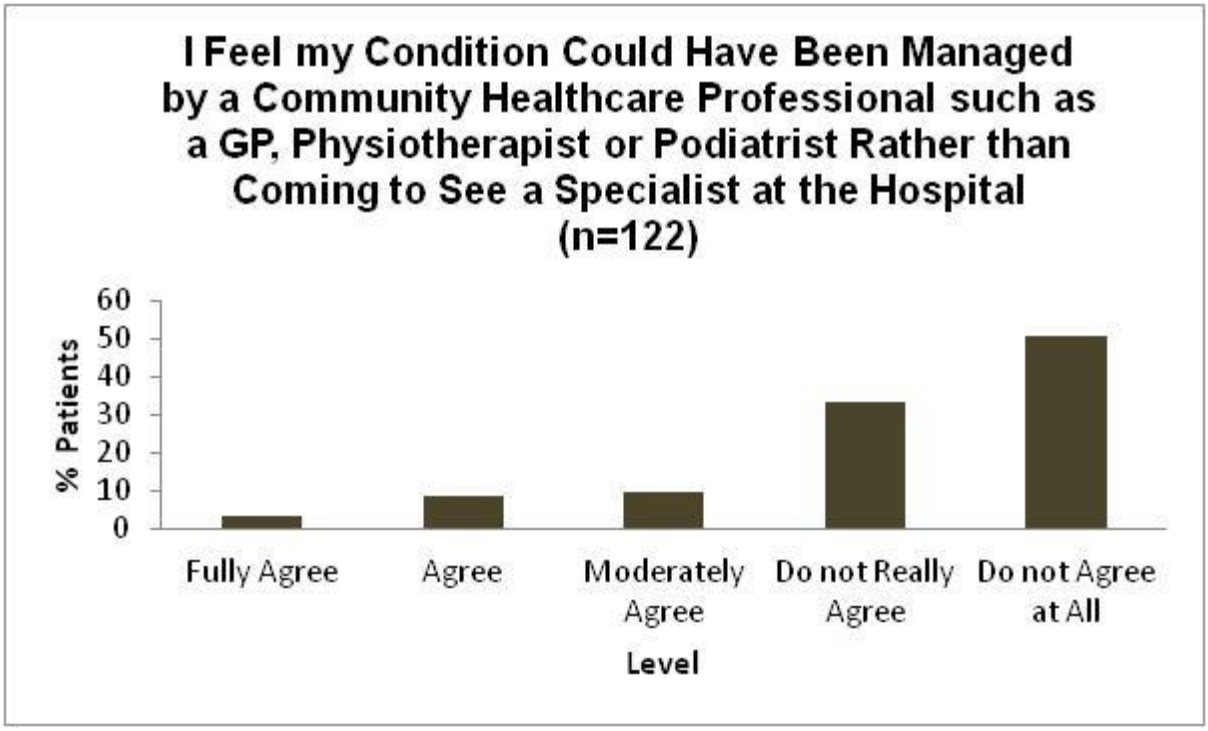
QUALITY DIMENSION/ IMPROVEMENT OPPORTUNITY	ANTICIPATED OUTCOME	MEASURE (ACTION)	BASELINE	OUTCOMES
Number of 'hand-offs' in the patient pathway for patients with low back spinal pain	The number of 'hand-offs' experienced by patient are reduced, this will mean fewer steps in the pathway involving less professional time and therefore freed-up capacity that can be used elsewhere resulting in shorter waiting time in total and quicker access to the appropriate treatment	Reduction in number of clinical "hand offs"	An average of 3 to 4 "hand offs" dependant on pathway	Clinical "hand offs " reduced by 50%
Enhanced patient/staff experience	Consistent high levels of patient/staff satisfaction	Patient/staff satisfaction survey scores	Staff surveys showed that: 64% felt that classification of back pain patients was not standardised 91% thought pathways were unclear for back pain patients 82% stated that appropriate exit routes for patients with back pain were unclear	90% patient satisfaction with initial assessment at new triage clinic Pathways disseminated via intranet, newsletters and training sessions. Staff satisfaction survey still to be carried out

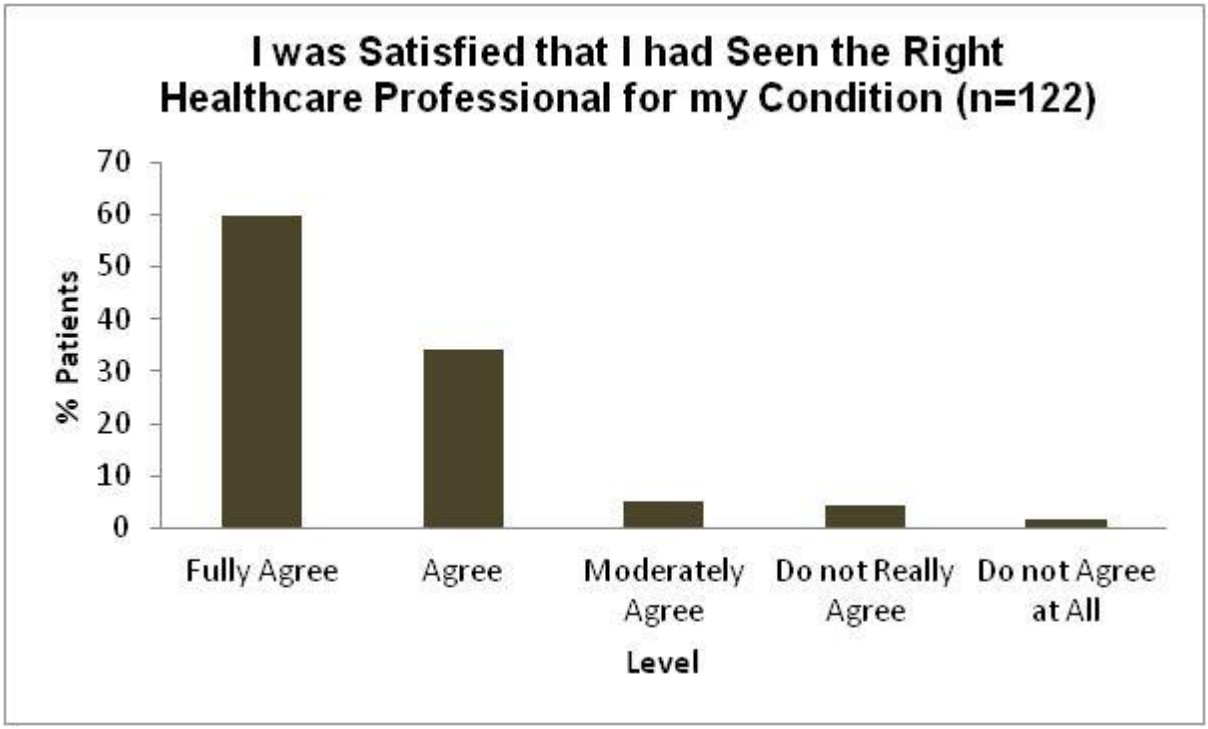
Improved clinical capacity	Better utilisation of staff and resources resulting in enhanced patient throughput and reduction in waiting times	Audit of clinic utilisation rate and clinic templates Audit of physiotherapy DNA rate	Consultant clinics routinely have no spare capacity Max waiting time for physio 21 weeks Physio DNA rate 12%	Orthopaedic clinic capacity increased by 32 outpatient appointment slots per month. Potential reduction in consultant administration time , however there has been an increase in ESP admin time for patients with low back pain conditions. Max waiting time for physio 12 weeks Physio DNA rate 9%
Speedier access to diagnostic tests	GPs and ESPs directly request MRI scans resulting in appropriate and timely patient triage/treatment which means that more patients are dealt with without referral to secondary care. Therefore any increase in investigations is offset by a reduced number of referrals	Audit of MRI scans independently requested by ESPs and GPs Audit of completed diagnostic testing prior to referral	MRI scans requested by secondary care by both Consultants and ESPs = 44%	MRI scan requested in triage service by ESP 33% 'Detection rate' for significant pathology requiring a medical opinion 70%. No significant change in completed diagnostics prior to referral, although those with completed GP MRI would not be referred
Improved adherence with evidence based guidelines	Patients get access to the right treatment from the right person at the right time in the right place. Reduction in clinical incidents and near misses in patients with low back spinal pain	Audit of practice against national guidelines Audit of clinical incidents and near misses in patients with low back spinal pain	50% of GP referrals had clinical examination findings missing. 'Red flag' indicators of serious pathology were not documented in 0% of 82 GP referrals audited.	16% of GPs in Kirkcaldy now using spinal safety check list, which provides national minimum information and 'Red flag' indicators. Needs further promotion.

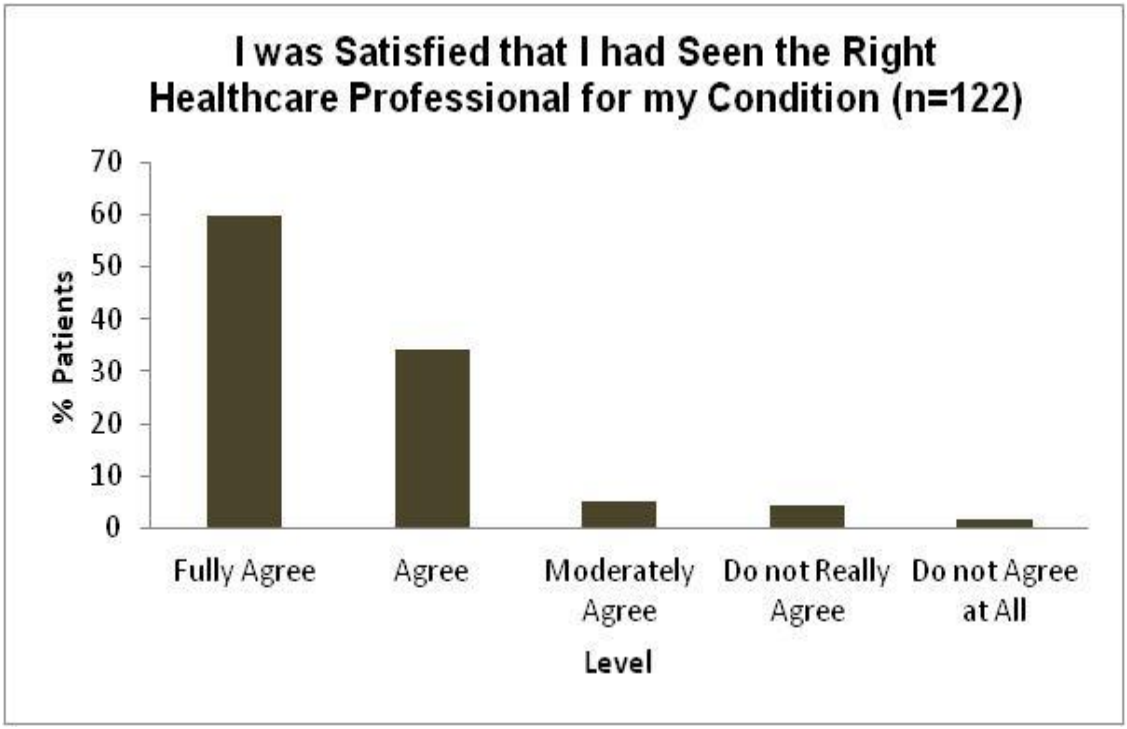
Number of patients seen in secondary care physiotherapy with non-specific low back pain	Marked reduction of patients seen in secondary care physiotherapy with non-specific low back pain. These patients will still be seen elsewhere albeit more appropriately and this will free up capacity in secondary care.	Frequency count of number of patients seen in secondary care physiotherapy with low back pain	Jan – May 2008 = 81 referrals	Jan – May 2011 = 50 38% reduction Staff lists have been combined and staff have been moved from secondary to primary care.
Cost avoidance/reductions	Efficient and effective patient pathways reduce long patient waits Though this has resulted in a reduction in plain film x-rays any savings are minimal and do not offset the financial impact of any potential increase in MRI scans.	Reduction in the number of funded waiting list initiatives Frequency count of lumbar spine radiographs	Radiographs Jan- May 2008 = 1648 MRI Jan- May 2008 = 330	Given that this was a demonstrator project and that international research demonstrates that attempts to identify and ring fence 'freed up' medical time from such service redesign is limited as unmet need, previous over booked clinics, teaching, education, and research and audit tend to fill any potential voids then the limitations of the project have to be acknowledged. Radiographs Jan – May 2011 = 1414 8% reduction MRI Jan- May 2011 = 398 20% increase Costs: MRI = £104.85 Plain radiograph = £53.97 Despite the increase in more expensive MRI scans this is offset in several ways. Plain radiographs are of little value in

				diagnosing lumbar spine pain and deliver high doses of radiation to patients with associated risks. GPs indicate that the use of MRI provides clinically useful information that prevents secondary care referrals and referrals to other services.

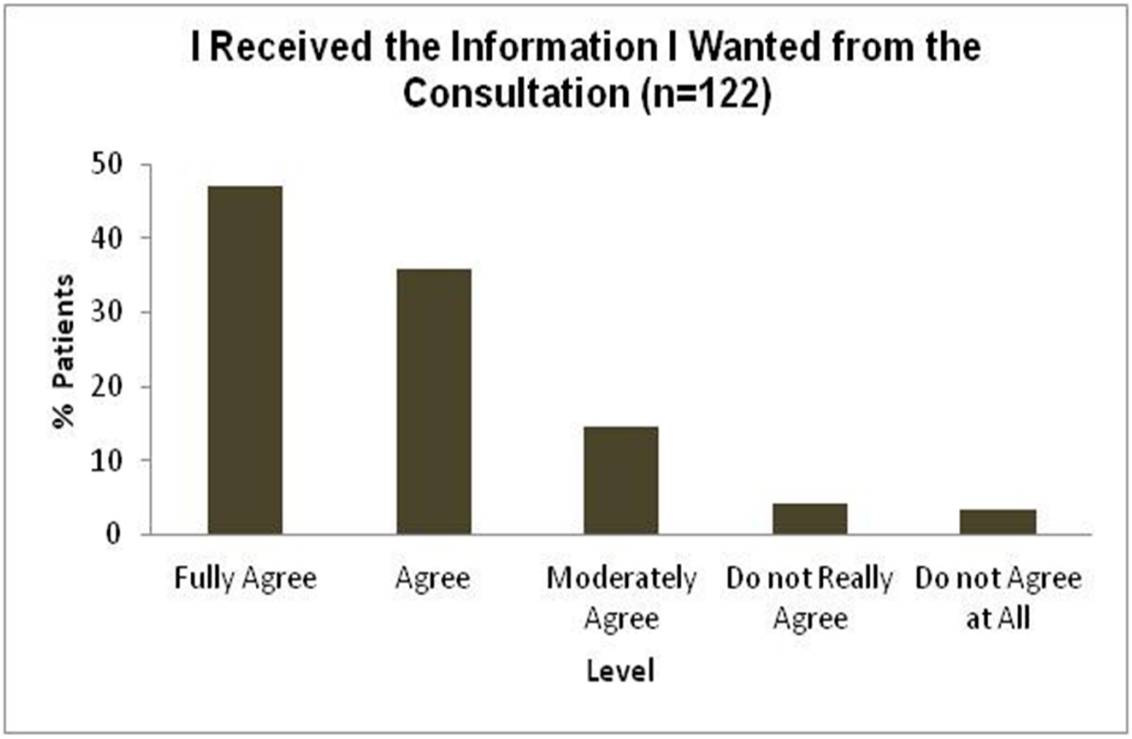
Appendix 12 Patient Satisfaction

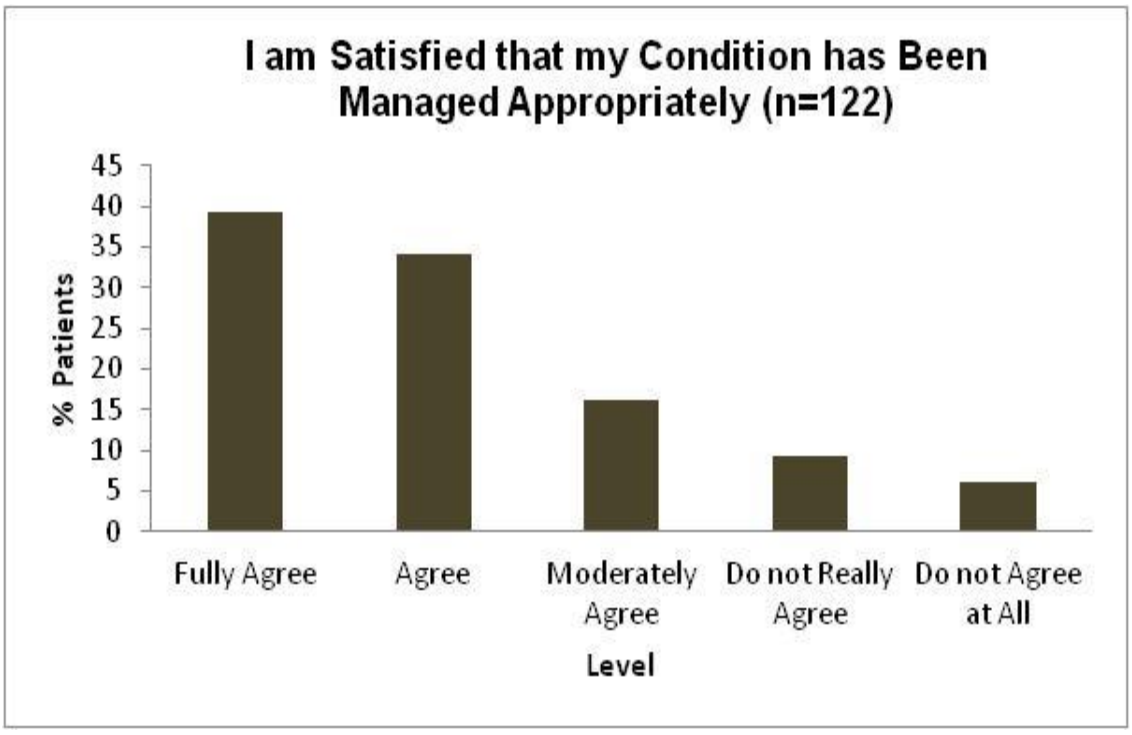





I was Satisfied that I had Seen the Right Healthcare Professional for my Condition (n=122)
% Patients
70
60
50
40
30
20
10
0
Fully Agree
Agree
Moderately Agree
Do not Really Agree
Do not Agree at All
Level


After Seeing my GP there was an Acceptable Time Lapse to Being Seen by a Hospital Specialist (n=122)
% Patients
40
35
30
25
20
15
10
5
0
Fully Agree
Agree
Moderately Agree
Do not Really Agree
Do not Agree at All
Level





Source: Grant Syme

Appendix 13 Lean Survey

I understand that you recently participated in Lean Training with NHS Fife. I am interested in the implementation of Lean Tools from the Lean Methodology into the workplace and would appreciate it if you would complete this short questionnaire.
Thank you for your time.
1. What is your current position within the NHS?

2. Please briefly describe your role and responsibilities?

3. Approximately, when did you undertake Lean training?
In the last:

- 6 months
- 12 months
- 18 months
- 24 months
- 30 months
- 36 months
- 36 months +

4. Have you implemented any tools from the Lean methodology into your workplace since undertaking your training?
(If NO please go to Question 12)

- Yes
- No

5. Which Lean tools have you implemented? (Please give your opinion on all that apply). A Glossary of Terms is provided at the end of this document.

	Knowledge of Tool	Tool Implementation	Tool Success
ProcessMapping Current State	I have some knowledge of this Tool		
ValueStream Mapping			
Kaizen			
VisualManagement			
5Whys			
3Cs			
Lean Metrics			
Spaghetti Mapping			
SOPs			
Fishbone Diagram			
3Ms			
7Wastes			
6S			
Voice of the Customer			

	Knowledge of Tool	Tool Implementation	Tool Success
CircleofWork			
TimeValueAnalysis			
Process Observation			
Dashboards			
Other(Please State)			

6. From the list above, are there tools which you have NOT IMPLEMENTED but which you feel have the potential to make a difference within your workplace?

	Clear Potential	Some Potential	No Potential
Process Mapping Current State	*From the list above, are there tools which you have NOT IMPLEMENTED but which you feel have the potential to make a difference within your workplace? Process Mapping Current State Clear Potential	Process Mapping Current State Some Potential	Process Mapping Current State No Potential
Value Stream Mapping	Value Stream Mapping Clear Potential	Value Stream Mapping Some Potential	Value Stream Mapping No Potential
Kaizen	Kaizen Clear Potential	Kaizen Some Potential	Kaizen No Potential
Visual Management	Visual Management Clear Potential	Visual Management Some Potential	Visual Management No Potential
5 Whys	5 Whys Clear Potential	5 Whys Some Potential	5 Whys No Potential

	Clear Potential	Some Potential	No Potential
3C's	3C's Clear Potential	3C's Some Potential	3C's No Potential
Spaghetti Mapping	Spaghetti Mapping Clear Potential	Spaghetti Mapping Some Potential	Spaghetti Mapping No Potential
SOPs	SOPs Clear Potential	SOPs Some Potential	SOPs No Potential
Fishbone Diagram	Fishbone Diagram Clear Potential	Fishbone Diagram Some Potential	Fishbone Diagram No Potential
3M's	3M's Clear Potential	3M's Some Potential	3M's No Potential
7 Wastes	7 Wastes Clear Potential	7 Wastes Some Potential	7 Wastes No Potential
6 S	6 S Clear Potential	6 S Some Potential	6 S No Potential
Voice of the Customer	Voice of the Customer Clear Potential	Voice of the Customer Some Potential	Voice of the Customer No Potential
Circle of Work	Circle of Work Clear Potential	Circle of Work Some Potential	Circle of Work No Potential
Time Value Analysis	Time Value Analysis Clear Potential	Time Value Analysis Some Potential	Time Value Analysis No Potential
Process Observation	Process Observation Clear Potential	Process Observation Some Potential	Process Observation No Potential
Dashboards	Dashboards Clear Potential	Dashboards Some Potential	Dashboards No Potential
Other(Please State)	Other(Please State) Clear Potential	Other(Please State) Some Potential	Other(Please State) No Potential

7. Do you consider the implementation of the Lean Tools into your workplace to be a successful addition?

Very Successful

Successful

Limited Success

Not Successful

8. If not successful, why not?

9. If you have implemented any Lean Tools were you able to evaluate their success?

I was able to employ Lean metrics (see Glossary) to measure success.

I did not have enough time and resources to employ Lean metrics.

It was not practical in this instance to employ Lean metrics.

I was able to use individual expert judgment to evaluate success but not formal Lean metrics.

Other (please specify)

10. Do you consider the Tools have been successful at a Decision-maker level or at a User level?
(Please see Glossary for an explanation of these terms)

Decision-maker

User

Both

11. Given the Lean Tools you have implemented into your workplace, who would you consider has benefited the most?

	NHS Organisation	Patient (or family)	Both	N/A
Process Mapping Current State	*Given the Lean Tools you have implemented into your workplace, who	Process Mapping Current State Patient (or family)	Process Mapping Current State Both	Process Mapping Current State N/A

	NHS Organisation	Patient (or family)	Both	N/A
	would you consider has benefited the most? Process Mapping Current State NHS Organisation			
Value Stream Mapping	☐ Value Stream Mapping NHS Organisation	☐ Value Stream Mapping Patient (or family)	☐ Value Stream Mapping Both	☐ Value Stream Mapping N/A
Kaizen	☐ Kaizen NHS Organisation	☐ Kaizen Patient (or family)	☐ Kaizen Both	☐ Kaizen N/A
Visual Management	☐ Visual Management NHS Organisation	☐ Visual Management Patient (or family)	☐ Visual Management Both	☐ Visual Management N/A
5 Whys	☐ 5 Whys NHS Organisation	☐ 5 Whys Patient (or family)	☐ 5 Whys Both	☐ 5 Whys N/A
3C's	☐ 3C's NHS Organisation	☐ 3C's Patient (or family)	☐ 3C's Both	☐ 3C's N/A
Lean Metrics	☐ Lean Metrics NHS Organisation	☐ Lean Metrics Patient (or family)	☐ Lean Metrics Both	☐ Lean Metrics N/A
Spaghetti Mapping	☐ Spaghetti Mapping NHS Organisation	☐ Spaghetti Mapping Patient (or family)	☐ Spaghetti Mapping Both	☐ Spaghetti Mapping N/A
SOPs	☐ SOPs NHS Organisation	☐ SOPs Patient (or family)	☐ SOPs Both	☐ SOPs N/A
Fishbone Diagram	☐ Fishbone Diagram NHS Organisation	☐ Fishbone Diagram Patient (or family)	☐ Fishbone Diagram Both	☐ Fishbone Diagram N/A
3M's	☐ 3M's NHS Organisation	☐ 3M's Patient (or family)	☐ 3M's Both	☐ 3M's N/A

	NHS Organisation	Patient (or family)	Both	N/A
7 Wastes	7 Wastes NHS Organisation	7 Wastes Patient (or family)	7 Wastes Both	7 Wastes N/A
6 S	6 S NHS Organisation	6 S Patient (or family)	6 S Both	6 S N/A
Voice of the Customer	Voice of the Customer NHS Organisation	Voice of the Customer Patient (or family)	Voice of the Customer Both	Voice of the Customer N/A
Circle of Work	Circle of Work NHS Organisation	Circle of Work Patient (or family)	Circle of Work Both	Circle of Work N/A
Time Value Analysis	Time Value Analysis NHS Organisation	Time Value Analysis Patient (or family)	Time Value Analysis Both	Time Value Analysis N/A
Process Observation	Process Observation NHS Organisation	Process Observation Patient (or family)	Process Observation Both	Process Observation N/A
Dashboards	Dashboards NHS Organisation	Dashboards Patient (or family)	Dashboards Both	Dashboards N/A
Other(Please State)	Other(Please State) NHS Organisation	Other(Please State) Patient (or family)	Other(Please State) Both	Other(Please State) N/A

12. In your experience, what are the barriers to implementing Lean Tools? (Please tick all that apply)

	Considerable Barrier	Significant Barrier	Limited Barrier	No Barrier
CULTURAL-sceptical attitude towards further change	*In your experience, what are the barriers to implementing Lean Tools? (Please tick all that apply) CULTURAL-sceptical attitude towards further change	CULTURAL-sceptical attitude towards further change Significant Barrier	CULTURAL-sceptical attitude towards further change Limited Barrier	CULTURAL-sceptical attitude towards further change No Barrier

	Considerable Barrier	Significant Barrier	Limited Barrier	No Barrier
	Considerable Barrier			
DATA- difficult and time consuming to access reliable data	DATA- difficult and time consuming to access reliable data Considerable Barrier	DATA- difficult and time consuming to access reliable data Significant Barrier	DATA- difficult and time consuming to access reliable data Limited Barrier	DATA- difficult and time consuming to access reliable data No Barrier
CONFLICTING OBJECTIVES	CONFLICTING OBJECTIVES Considerable Barrier	CONFLICTING OBJECTIVES Significant Barrier	CONFLICTING OBJECTIVES Limited Barrier	CONFLICTING OBJECTIVES No Barrier
GENERALISATION- Tools will not work because they are too general and not applicable to your workplace	GENERALISATION- Tools will not work because they are too general and not applicable to your workplace Considerable Barrier	GENERALISATION- Tools will not work because they are too general and not applicable to your workplace Significant Barrier	GENERALISATION- Tools will not work because they are too general and not applicable to your workplace Limited Barrier	GENERALISATION- Tools will not work because they are too general and not applicable to your workplace No Barrier
MODEL RECOGNITION- Tools not widely known and therefore not trusted	MODEL RECOGNITION- Tools not widely known and therefore not trusted Considerable Barrier	MODEL RECOGNITION- Tools not widely known and therefore not trusted Significant Barrier	MODEL RECOGNITION- Tools not widely known and therefore not trusted Limited Barrier	MODEL RECOGNITION- Tools not widely known and therefore not trusted No Barrier
MANAGEMENT STRUCTURE- Makes it difficult to achieve quick decisions/approval	MANAGEMENT STRUCTURE- Makes it difficult to achieve quick decisions/approval Considerable Barrier	MANAGEMENT STRUCTURE- Makes it difficult to achieve quick decisions/approval Significant Barrier	MANAGEMENT STRUCTURE- Makes it difficult to achieve quick decisions/approval Limited Barrier	MANAGEMENT STRUCTURE- Makes it difficult to achieve quick decisions/approval No Barrier
LACK OF RESOURCES	LACK OF RESOURCES e.g.	LACK OF RESOURCES e.g.	LACK OF RESOURCES e.g.	LACK OF RESOURCES e.g.

	Considerable Barrier	Significant Barrier	Limited Barrier	No Barrier
e.g. Time	Time Considerable Barrier	Time Significant Barrier	Time Limited Barrier	Time No Barrier
OTHER (Please Specify)	OTHER (Please Specify) Considerable Barrier	OTHER (Please Specify) Significant Barrier	OTHER (Please Specify) Limited Barrier	OTHER (Please Specify) No Barrier

13. Is it likely that you would (continue to) implement Lean Tools into your workplace in the future?

- Very Likely
- Likely
- Unlikely
- Highly Unlikely

14. The Lean Methodology is a mindset of creating an organization that continuously improves its process, while respecting its people with a focus on adding value to its patients. Do you consider that your organisation has adopted the Lean Methodology at a strategic level?

- Yes
- No
- Unsure

15. Do you consider your organisation would benefit from adopting the Lean Methodology at a strategic level?

- Yes
- No
- Unsure

Thank you for completing this survey- Your time is much appreciated!

GLOSSARY OF TERMS:
CIRCLE OF WORK- Tool used to visualise the effectiveness of the roles within a process through observation; Shadow different roles.
DASHBOARDS- visual communication interface.
DECISION-MAKER- Person or persons who consider efficiencies at a strategic level.
FISHBONE DIAGRAM- a visual map, part of Root Cause Analysis.
KAIZEN- a group of relevant individuals come together over a period of days to identify and provide solutions.
LEAN METRICS- To provide a baseline, To enable comparative benchmarking, To demonstrate what has been achieved, To compare actual outcomes with expected outcomes, To encourage a culture of continuous improvement.
PROCESS MAPPING CURRENT STATE- A map of a patient journey of the relevant procedures and administrative processes of what actually happens.
PROCESS OBSERVATION- Tool used to visualise the effectiveness of the patient journey through observation.
SOPs- Standard Operating Procedures: A tool for capturing the best method capable of sustaining Quality, Cost, Delivery and Safety.
SPAGHETTI MAPPING- A visual tool to show the motion of the patient, family, staff; highlights waste TIME VALUE ANALYSIS- Tool used to visualise the effectiveness of the patient journey through observation.
THE SIX PILLARS OF 6S- Sort, Set in order, Shine, Safety, Standardise, Sustain.
USER- Person or persons using a tool at ground level to improve effectiveness as well as efficiencies.
VALUE STREAM MAPPING- Time series of all activities and steps (both value add and non-value add) required to bring a product, service or capability to the customer.
VISUAL MANAGEMENT- To visually share information.
VOICE OF THE CUSTOMER- Listening to the customer's wants and needs.
3C's- Concern, Cause and Counter-measure 3M's- Waste (Muda) - Non Value Add, Excess Burden (Muri) - Overburdening people, processes or equipment, Variation (Mura) – Inconsistency.
7 WASTES- Waiting, Over Processing, Re-work, Motion, Production, Inventory, Transport.
5 WHYS- Asking progressive questions to get to the cause of a problem.

Appendix 14 Lean Interview Frame

Lean Questions Implemented

1. Why did you participate in Lean training?
2. In what way did you implement Lean, what type of project was it?
3. Did you implement it on your own or as part of a team?
    a. What was the selection process for members of the team?
4. What were the biggest difficulties in implementing Lean?
    a. Did you feel you had support from your line manager?
    b. Did you feel other staff appreciated what you were trying to do?
5. How do you think these issues could be resolved?
6. Did you feel the training helped you to implement Lean?
    a. Would you like to undertake further Lean training?
    b. Is there anything else you would like to be included?
7. Do you consider Lean to be a useful/successful methodology?
8. How would you evaluate this?
9. Can you attribute success solely to Lean?
10. Did you share your experiences with others within Fife?
11. Are you aware of other Lean projects within Fife?
    a. Are you aware if these were successful or not?
12. Do you think your project or other projects are sustainable?
13. Do you think the inclusion of the Lean methodology is part of Fifes strategy?
14. Do you think if it was more people would be aware of it and it would be easier to implement new projects?
15. How do you think this should be resolved?

Lean Questions Not Implemented

1. Why did you participate in Lean training?
    a. Why have you not implemented Lean since your training?
2. How do you think these issues could be resolved?
3. Did you feel the training inhibited you from implementing Lean?
    a. Would you like to undertake further Lean training?
    b. Is there anything else you would like to be included?
4. Do you consider Lean to be a useful/successful methodology?
5. How would you evaluate this?
6. Can you attribute success solely to Lean?
7. Are you aware of other Lean projects within Fife?
    a. Are you aware if these were successful or not?
8. Do you think your project or other projects are sustainable?
9. Do you think the inclusion of the Lean methodology is part of Fifes strategy?
10. Do you think if it was more people would be aware of it and it would be easier to implement new projects?
11. How do you think this should be resolved?

Appendix 15 Interview Transcript

Lean Questions — Implemented
Clinical Services Support Manager — 3 Day training

So you have, you did the three day training.

Yes

And you have implemented LEAN.

I've used some of the training in different bits.

So first of all why did you decide to participate in LEAN training in the first place?

My role is kind of split into three main ones. The kind of middle part of my role is working with the GP Practices around either delivery of care or small projects that they want to do as well as working with the managed services. And I done LEAN, I did it about it was a one day thing donkey's years ago when I worked in Tayside so I had used some of the tools so when this was offered, because there was nothing else really, apart from CPD time there was nothing really because I've done the middle management course. I've done some of our modules by universities so it was like no well I thought then actually probably knowing the profile LEAN has within the Board it was probably a good time to do something a bit more structured.

Okay and did you find it useful?

Yes, yes. Bits of it re-emphasised what I had used in the past and made me realise yes you are using them correctly. The other bit that I found useful was actually the interface with the other people, the networking with different people across the organisation.

Sharing experiences – it's really important isn't it? So you did implement LEAN. In what way have you implemented LEAN?

I've been leading on the changes to GMS contract this year the GP's for our CHP well parts of it have ended up being across the whole organisation – you know these things that go on so one of the things that we are looking at for next year is A&E data.

Right.

So anecdotally people kept telling us that the data was incomplete but I've actually been able to get the data and work through it in quite a systematic way, process mapping it, and then kind of fishing out well why has that not happened? Why does this not happen? So we're now at the stage of going to the kind of relevant people so the leaders and saying right well we need this data for, this is our understanding of why it is not completed and what can we do to change processing the system?

Good. Okay. So are you doing this on your own or are you a part of a team of people?

I am working on behalf of the PMS Monitoring Group which is the group that monitors the GP contract on behalf of NHS Fife. And we set up a sub-group within that called the Data Quality and Primary Care Group so at the moment it is chaired by Information Services but it will be eventually a Practice Manager that chairs it and I have got one of my practices to agree to me using their data – anonomised to actually do the kind of work and prove where the gaps are.

So instead of people saying well we know that is not well filled in, I now can say 77% of that is either blank or other and for presenting complaint what does that tell us – you know. In all my clinical history never has somebody said to me I've come because I've got AN other. You know.

Yes.

I'm doing it kind of on behalf of different bits of the system.

Are you part of a team?

Yes

So how was that team selected? Was it selected because it was part of another group or was it specifically selected?

When we – I was given it as part of my job last year to look at. And a lot of it I did as a previous project with some of my practices looking at data that was collected and shared with them and just what use was that and you know if they get figures. About 27 emergency referrals what does that mean to them? So we'd looked specifically at a couple of areas and we are trying to work out
pathways, so you refer to them, but actually, you could have done de de de. It's a bit more process mapping, the result not just being the referral or the prescription. You know that kind of thing so our Clinical Director XXXX was very interested because some of the data that went out last year was incomplete shall we say. It wasn't of a good quality in our practices - because of the relationship we have my phone was red hot and my emails so X as the Executive took a proposal to PMS and Primary Care SMT and he is the Executive Sponsor for the group. Because I live just down from Information Services and because you know as I've got an interest I was slighted and what we've agreed is that the group of representation from the 3 CHPs somebody from the managed part of the CHP but also it will have General Practitioners and Practice Managers so we have managed to get that across the patch and we've got Primary Care Departments, Risk Analyst Departments now.

And do you know if all of these people have got a knowledge of LEAN?

XX who is our Head of Information Services yes she has definitely and her and I did dialogue together so it's kind of, I always think of these things as part of a tool box, you know, they are not fixed to one model so if something is not working I am quite happy to go and try something different. I wouldn't think that Practice Managers are much into LEAN and I'm not sure about the other kind of managed people.

So does that hinder the project in any way when you've not got the LEAN background?

No I don't think so. I think you know being able to say to them that this is a, and I tend not to label it, this is a tool that I've used in the past for this, that and the other. We'll try it for this rather than say this is a LEAN tool. Because I think sometimes, depending on what people's experience has been if you say this is part of dialogue or this is part of LEAN or this is part of they switch off before you've even started so I tend not to use the proper label.

There is definitely that. I don't know is it an attitude? Possibly? What's been your experiences of the biggest difficulties that you've had in implementing LEAN techniques?

I think people's passed experience. So they already, even if they've used our tool and not had it labelled as, they'll say oh we tried that in whatever and that didn't work. There is a lot of people in Fife who have only ever worked in Fife, they trained in Fife or they started their job in Fife and they've worked their way up and they can be quite, I find them quite blinkered at times. I've worked on several Boards and you know well I'll say to people you know that there are things outside the boundaries of Fife and I'm still an incomer and I've been here ten years.

Yes, and you will be for a long time yet. Ten years is nothing is it? And so did you feel that you had support from your boss when you were trying to implement?

Yes.

So that made it slightly easier for you, and what about the staff around about you - did you feel that, or were you getting that cynicism from some?

We are quite a diverse team and we've actually shrunk over the last year because of cuts and people have left and we've not been able to replace so we are a different structure totally as a team to when I did my LEAN days. XX who is our Head of Clinical Governance, my direct Line Manager and she is very for kind of different facilitator, for useful method, so there was never a problem there. X who is our Admin person she has never done anything but she is always interested if you've been on a course, right so what did that mean? Or it says in these, she does a lot of minutes, it says in these minutes de de de what is that? So she is good and we've now got a Clinical Governance Facilitator XX and X has been around the system, she won't mind me saying that, so she's done some LEAN stuff as well so she is for it. So I think as a team we are quite keen on it. There is some other cynicism in the room but it's the same with everything, you just have to get on with it.

Is there is a way of dealing with these pre-conceived ideas do you think? Is there a way that that could be helped?

I think it has to be done on an individual basis doesn't it? It's about the person being involved in something where it works.

Yes

They can see that there is an end result or they hear from somebody well do you know we used that process and actually it wasn't as crap as I thought it was going to be, or maybe it was the way that they put it over, or whatever, and I think there is no one size fits all with those kind of people is there? It's about the individual and just seizing the moment.

Do you think overall that LEAN is successful as a methodology?

Yes I think, I don't think you could take it as one thing and put it in and adopt it 100% and it would be. Fine. I think there are aspects of it that have helped us. I think we've used it a lot but there has also been lots of service re-design change, new hospital and for some clinicians there has been a lot of cynicism about it because it is about the Management of Change as well as LEAN isn't it and I think we maybe haven't managed the two of them side by side as well as we could have.

So how would you evaluate the success then?

Well if I can get some process changes to get my others and my blanks then I would say that was a success. I think it has to be almost kind of concrete things, it's not a kind of up here, it's about, right we used that.

So successes that you've had with LEAN have you shared that, have you communicated that?

Yes. Like feedback anything, it depends on where we've used it so I've done some stuff. We have our own website as a CHP so we've being doing some stuff around about development and I've used kind of like again process right what do we want? Where are we at? What needs to happen in the middle. So we've done some stuff around about secure repeat prescriptions ordering for the GP Practices. So what we did was we got one pilot GP Practice and they were really good and we got fifty patients and we did an evaluation and all the rest of it and then we've used their experience to market it really to the other practices. For bigger things whatever group they're relevant to, so if it is just General Practice it tends to go back to the General Practice Group if it's wider than that it's Clinical Governance and I have to do a six monthly report anyway because of the diversity of my role through the Clinical Governance Group. The Clinical Governance Group has got public members, it's got a Non-Executive Director of the Board you know and the minutes from that then go up the system to the Board. So yes we do share. I don't think we share as much as we could and I know there was a suggestion at one point of having a kind of change method newsletter, but there are just so many newsletters out there I don't think that's the way to go. And there are problems with our NHS Fife website and Intranet so I'm not even sure that we could find somewhere on there that people could then dip in and out of. So I think that's the thing that although they've tried to do follow-up days you're still with your same cohort, so, you know, you're not mixing with many people.

It's not going any further or it's kept within your own CHP or within that group even very local yeah. So therefore are you aware other LEAN projects in Fife.

I know of a couple but only because I know people who are doing them and I've met them at other things and they've mentioned them. It's not that they've directly communicated it, so the person that I was meeting with this morning knows X and said oh did you know X doing?, and because of the dialogue we have, small learning sets, and there's a lot of OD staff involved in them and obviously they are involved in some of the facilitation etc. So kind of hearing about them on the grapevine but not in any formal way.

What projects is it that you've heard about?

Heard about some of the stuff around about the orthopaedic re-design, some of the dermatology re-design so most of them have been kind of like quite high level whole system change.

And within that chat did you hear if they were successful or not?

There were different views. Depending on who you speak to. Particularly with the dermatology one. You get very different views about how successful things are.

It comes back to evaluation, evaluating success doesn't it? And who you speak to and do you think the LEAN projects particularly that you've experience of are sustainable?

I think the ones that I've been involved with are about changing something so it becomes mainstream so like the data entry if we get that right then that will just become the norm. The

stuff we've done around repeat prescriptions, it's now the norm. The stuff we've done about self-referral it's now the norm you know so they've not been, kind of the whole reason for starting them has been to get something mainstream rather than to change something particularly for a short period of time or to gain something.

So there have been sustainable projects then? NHS Fife's strategy overall are you aware that LEAN is part of that strategy?

Yes but only because I'm quite nosey so I do go look at thing like passed Board Agendas and I do look at papers that have been submitted to the Board, but not through anybody kind of, and it was mentioned when we did our LEAN training that part of the reason the funding had been secured for us to be away from our posts and for them to do the training was that LEAN was a methodology that was going to be core to change within NHS Fife.

So you as an individual have sought it out almost? So do you think it's communicated effectively to people?

The wee staff nurse on the ward has not a scooby do. Even I would say more senior staff have got quite significant health problems so I'm quite often a user as well as an employee.

So you've seen both sides.

Unfortunately lately. So I was in the Vic when things were particularly bad and it was hitting the front pages of the papers everyday and everything. And it was really interesting because a number of years ago there was very similar problems with the Medical Admissions Unit at Queen Margaret and a significant amount of time and money was spent doing LEAN in the ward with the staff. They were released for days and in kind of cohorts and also in doing some stuff around about releasing time to care and what a difference it was like night and day. And whilst I never like being in, it become a place where at least I felt safe and what have you. When I was over at the Vic in February it was back to what it used to be in Queen Margaret and I'd mentioned to one of the Charge Nurses and I said oh this is just like going back before you did LEAN and she went oh what is that and she had been around at that time but she didn't understand what the LEAN methodology was and she is a band six. And I was thinking right okay you are kind of, that you are a really good clinician and all the rest of it, but obviously the message isn't filtering through. Now interestingly I was back in in March where things were like night and day and things had really improved and I was speaking to the same Charge Nurse again and she went oh yeah she said we've been LEANED again. She said and I was able to say oh that they did that before but I knew nothing about it but at least I knew the word. So and I said so what do you understand about it now? And she went oh I don't know she said they just made us do lots of diagrams of what we were doing and why we were running backwards and forwards twenty times and how they could only run backwards and forwards ten times and achieve the same thing. And I thought okay you've done it for an end and I can understand that but the people who've participated obviously only had a minimal understanding of what they were doing.

That's my next question, if it was communicated more effectively would it be easier to implement new projects?

Yes I think it would. And I don't know they've started a kind of like middle management course and there is, I noticed when I was having a look at it, that Ken goes to one of the days and talks about change methodologies etc including LEAN so if they are getting it in there at the kind of

band six to, I think it's six and sevens it's targeted at, then yes maybe it will start to kind of become more of the jelly in the piece rather than you know something extra.

Just something interesting that was mentioned this morning there was a definite difference in attitude I think or understanding maybe of LEAN between acute and community. Would you agree with that?

Yes.

Why do you think that is?

Because I think it's been used more in acute in problem areas.

Fire fighting?

Yes, like they've done in other places it's almost like it's been heralded as if you do this, if you look at this using LEAN everything will be resolved. Whereas I think we're probably a bit more cynical about it.

That's the wrong message that's been given isn't it?

I think we're a bit more cynical in the community and also everybody in acute is a managed person, they're an employee. We don't have that luxury in community. So even if I'm working with the District Nurses anything I do will impact on practice so I have to bring in or get buy in from the GPs or Practice Managers or whatever before we start, and working with independent contractors is so, so different cause they can just say no and walk away. There is nothing I can do about that. So you have to be more inventive on how you sell something and you cannot flannel them whereas, and I can't just go in and say we are doing this two weeks on Tuesday and this is what we are hoping to get out of it. Whereas they can do that in acute. And I think that is where you get this difference and it's not just with this it's with a whole lot of things you know.

Do you think communication and strategy, at high level, communication of success would help resolve these issues?

The other thing is that everybody that teaches LEAN or is involved in supporting projects like LEAN from the central team they all come from acute background so they are not, they don't have any kind of standing out in the community, and I think that is quite difficult as well and I don't know how we change that. I mean there was always this hope that it became one system ?????? but because that Directorate still sits under XX it's still seen as very centralist.

Appendix 16 Interview Transcript

Lean Questions — Not Implemented
Senior Information Analyst — Visioning Event

I sent out a survey on LEAN and you wrote a comment on it that it seemed to come from a view that you didn't agree with so I was interested to get your thoughts, sorry I've got a tape recorder on, do you mind?

No, no - I can stand it.

I was just interested to get your views on it. And just to see why you thought my survey was biased because my survey was based on the literature actually. I wasn't trying to come from any particular angle but you obviously got the sense that I was, so I'm interested to find out why and what your thoughts are? What I'm trying to establish is what the feeling is of LEAN in Fife particularly. So LEAN is deemed to be a strategy of Fife and I'm not sure that people on the frontline are aware of that. So that is one side of it and then how do you resolve that really. And then the other side of it that I'm interested in generally from modelling is how do you evaluate if a model has been successful when you have got so many other factors that could influence it? So my other question is well how do you evaluate LEAN? How do you evaluate if somebody has said that this has been a successful project because of LEAN how do you know? So it is two totally different angles but that is what I'm interested in. So when you wrote that comment I was interested in your views really.

Okay. About the survey my feeling when I looked at that was that that was some sort of standard questions. There wasn't room there to express your real feedback so I got the impression it is going, okay so some programmes go on here all the time under the name of LEAN, and there was, the intention was to get some feedback some figures to say that that has been 95% or 87% successful or something like that. In the way the questions were put and the feedback was sourced it was bound to lead into oh in 95% of the cases the participants said that this helped them, this improved them but

Sorry to interject I think that what I was trying to do was just get a baseline of where people were and then my intention was to follow that up with interview. But I can assure you that that has not been my results. Not at all.

Very good. Very good. That was my impression from the survey. But, if I explain my views about the LEAN and how it has been undertaken in Fife then that might clarify my point.

Right. I don't know if you know my background or not. Before coming here 6/7 years ago I was 10 years as a lecturer at Heriot Watt University and most of the time, the last few years of that, I was teaching Management Information Systems, Computer Integrated Manufacture. I was teaching what now you call LEAN. I would refer to the whole class of LEANs as modern management. LEAN is one aspect of thinking a philosophy of that. This is a lot of things in there just in time of the mass production technology, material requirements, planning, quality management, this whole thing and to LEAN is a way of thinking. It is common sense. Now I used to teach that. Now when I came here, and you probably know on the whole of this apparently is presumably is xxxx is bringing this in, xxxx?

Okay. When I came here the first day I was for eighteen months working on a project he was my boss. Okay it became very clear to me that not just the idea, the understanding within NHS Fife is that they have got the wrong end of the stick. Their understanding of LEAN is quite,

quite, quite mistaken. So why am I saying that? Because you are from a University, you should, I expect you to understand that. For any system you need to look at what it can and what it cannot do. It is no good assuming that you have got panacea; a view for everything. Everything that is wrong or is not so good is because it is not according to LEAN. If you, according to LEAN were x or anything, and if you know x everything would be, this is the attitude that has been there right. Now LEAN is a useful method, useful technology as I said I have to write to this and make my students understand what it is for their future career. So I am the last one to say that it is no good. To start with LEAN you have to look at the method a lot, at the limitation of that. I started being familiarised with that in 1993, which is about 18/19 years ago. Now, there as you know this has come from manufacturing. Right even in manufacturing industries if you are talking macro if we talk macro if the general atmosphere, economic atmosphere is in-favourable to a sector of industry no amount of anything would save that. Right for instance the textile industry the situation is that it is unfavourable whatever amount of new technologists methodologists choose to use that can't save it.

That is where I come from: textiles.

Textiles okay. Now if you bring that into this method into the Health Service. Now if general macro-economic situation and social political situation is in a way that is in-favourable to NHS as we know it to survive it won't. Now in those industries or here on the margin it can make, improve things right, so that is the first thing. It is not going to save something which the macro-economic situation is not letting it. But now within that now we want to use this management this modern management techniques and philosophies, methodologies, tools. To start with philosophy, then methodology and then tools. If we want to use that we have to start looking at the system to see what are the things which we don't like in the system. Our view to this, things that it can do, put aside, if there are things that this is not happening but we should agree that this is not applicable to them. The attitude here I have seen in the last six, six and a half years LEAN is the cure for everything. If anything is wrong it is because of that. Now they way they are now, they are doing every few months courses. LEAN is a design planning technique, planning philosophy and design technique. It is not a simple transferable technique like how to use a spread sheet that you can send everybody go to this training and then you will get things that you can use in your job it is not. LEAN is not that. You start at top management.

Top and very higher middle management at the Director level. They are the ones who can design the system as a Scot who once spoke to me; very rich man, we are implementing systems as we find them, you know, very little room for manoeuvre ourselves. Right you start there. Now what he is doing he's pretending he has been pretending he has been misusing the word LEAN. To say that there is a technique like every simple task every???? ???? Send them over there. I am not saying that it is not useful it is good. If anybody wants to go and learn about it then fine but that is not going to necessarily to help improve the things. Start from the top and then they come and implement it in their areas of responsibility. The last thing I would say in that is that when they are putting this training that I am assuming that you your questionnaire is trying to get feedback from those people who have participated in this training course what do they get in the training. They get some sort of like I put that lecture to in generalities. This is poor system, this is ancient system. I was teaching those things in university. In a workplace you don't do that you put your, you say we have got this system let's look at that. You see this is how this system will work, this part, I don't know outpatients for paediatric blah, blah blah. Look at that this is they way it works, see this is where it is wrong and in order to use this methodology we do it that we do a hands on thing. I went to one and I think probably out of, just checking the views, near it came out to July a year and a half. They said something about the orthopaedic team. I went there as a representative of our department and I raised some questions, I tried to be helpful. He didn't like me asking questions. The man

or the people who organised that who are taking LEAN is using it criticise everything. By bringing that you are expecting say here management top management questions to question the way they have been doing. Now the people who are throughout pretending that they are bringing this philosophy I can't stand.

This is what one gets if one wants to improve the things there. I don't want the resources of NHS be wasted by anyone hiring somebody from a private company GE whatever, private company. The person who comes there can't answer my basic questions. The things now, they cost money, taxpayer's money, cost money for a private company who for profit they are coming and pretending to bring something here that people inside here are more capable to implementing themselves; If they go the right way about it. They can do that. You see I was in danger of losing my job there. Because I am just questioning don't mislead people, don't waste the resources of an organisation like NHS a public organisation taxpayer for one thing that you are not capable of applying it properly. Right. That is my, I must admit, when I wrote that thing in your in the feedback I was not expecting you to come and listen to me right. I am quite surprised that you are listening to that right. I'm not saying ?????

I don't actually disagree with a lot of what you are saying. I think LEAN is a thinking it's a philosophy and I think possibly that the NHS and I'm not sure if this is true for all of the NHS but certainly Fife it's been tackled in the same way that a lot things are tackled and that is by it is almost like a fire fighting attitude. Let's throw LEAN at it and see if it works. I haven't got a problem with the training. I think I think it is a good idea to inform as many people as you can because if then, they do eventually get it, and if they do try to filter it down from the top, then people will understand what they are talking about.

Yes.

Which is what needs to be done. I just spoke to Scott he was aware of GE he didn't know what they were here to do and he doesn't know if it was successful and that is where Fife falls down. Because as far as I am aware the Back Pain Project was or there is a certain amount of success with it. That is something that should be shared.

Oh yes yes that's right.

But the hospitals that seem to be more successful are the ones that look at the whole philosophy of LEAN and implement it you know system wide if you like.

I good amount, because I'm not successful there because I'm not there and I'm not following the literature, I'm not looking at it I haven't got time for that but as I looked I have yet to see a real genuine case of improvement here. What I see and what I read they are rhetoric I don't see any, the way I partly describe, to say to publish something and say look this was the system we looked at, this was what was wrong on that, this is what we did and this was the result in a well thought out evidence based paper or publication. I'm afraid I haven't seen yet. As I said I'm not into it all, the time, it is not my field any more and I'm not following all the things but what comes to me from here or there I have only seen claims and rhetoric about LEAN.

It's not they say we used it, they just say we used it and it improved things. I want to see how, whatever system here in Fife, how they find out and what did they do. Okay this is wrong because of they are not doing it according to LEAN or according to any of the model. I would love to see that's fine I want to be part of it.. But their approach is all wrong, all they want some sort of rhetoric what words to say, pretend they pretend they are doing something good. One

thing is that he wanted to have a portfolio that is done, a lot of these things what GE was, is creating a portfolio. I don't know. He said at the beginning that if there is a feedback come to me blah blah blah.

I just wanted it to work.

How would you resolve it?

They should start realistically. They shouldn't use it oh this is something we are going to use and we are going to it will succeed. No. Let's look at the system to see what are the weaknesses of the systems? What part of it is, can be cured by LEAN, and what part can't. Admit okay we looked at that we listed something in this case often 100% of the things which are wrong we identified 65% of it is because of lack of modern thinking or LEAN thinking – 35% of it is not applicable.

Let's put it aside for the time and we concentrate in that. And as I said from top down. Because those who are responsible and have got the authority to change the design and planning of the system they have to do that first. And start from the top and come down. That is my suggestion.

Appendix 17 Interview Transcript

Lean Questions | Not Implemented
Performance Management Coordinator | 2 Day Training

So the first question I wanted to ask you is why you decided to participate in the LEAN training in the first place – were you asked to or did you do it voluntarily?
It is a voluntary situation but it was just one of those situations where you think if there's anything there that you think could have helped, you know let's just see if there is something there that is going to move it forward and obviously we had an external organisation in dealing with this so you are thinking that there must be some sort of element of importance so to speak so it was worthwhile seeing if there was any value in it to see if there was anything new in it.
So who was the external organisation then?
It was GE Healthcare.
So you did training with them?
The training wasn't with them but it was them that came in and brought this sort of LEAN methodology with them so to speak and they had strategic sort of people with them.
So I see that you did the two day training?
I honestly can't even remember that as it is going back a year and a half.
I have you down as doing the two day training.
Right then. I maybe did.
There is a follow-up day available.
I've definitely not done a follow-up day.
Is that something that you would be interested in doing?
No.
Why?
Because I didn't feel that the value from it was worthwhile.
What was it about – the methodology itself or the training?
No no the training was fine – the methodology I think is fine. However I do find it very common-sensical okay. I do find it very simplistic. I do believe that it is something that everybody should be doing anyway and, if they weren't doing it, I would actually question why they were employed in the first place,
Okay.

That's how simplistic in the sense that I saw it as far as waste was concerned I can see a value in the methodology – I can understand what was going on but I did feel that it was a little too simplistic and the common theme I felt was that it was too common-sensical.
You have not implemented any LEAN yourself. What is the reason for that?
Well again I think that the planning necessary around implementing something like that to actually find out about the waste, the waste that you can take out of it. I think that for the amount of effort and time and resources going into that would not have benefited what would have come out of the other end.
Okay – but you don't know that.
Well I don't know that, I don't know that but I would say that it is a common-sensical approach as well. You are right I don't know but I can confidently say that in my opinion I presume that the output at the other end would not have been worth it.
Okay
I am going to confidently presume that the output at the other end would not have been worth it. I would have been more than happy for anybody to come in and LEAN me rather than me do it. I would have been quite happy about that but I've not personally seen the value in me doing it for myself for the things that I am doing.

Okay so if someone were to introduce a project into what you were doing?
Yes so if someone wanted to view my workload as a project I would be quite comfortable with that yeah.
But it is not something that you want to do for yourself?
No
Is that also because you don't feel comfortable instigating this for yourself or is it just that you don't feel that you have the time or as you said that the time would be worth it?
I don't think the time would be worth it at the other end.
Do you feel that the training that you had has given you the tools to allow you to do it if you did decide to?
I think there is a definite value in those tools maybe for some people that think that yeah but and I think that those tools are definitely there, and definitely help people but I do think that it is a lot more difficult for somebody to do it themselves as well compared to somebody else either using you as their project.
So if you were asked to lead it within your department would that be something that you would be willing to do?
No because I don't think anybody particularly sees the overall value for it and I don't think there would be the motivation on behalf of 80-90% of the people to actually be prepared to get involved in it.

That is interesting.
The other thing that you've got to look at is that in these days when we are talking about the efficiency aspect etc. etc. the last thing that people want, because people are under a lot of pressure to produce more etc. in less time, you know people are leaving and work is being absorbed left, right and centre and when you lose maybe some jobs in the past that were on a perfect balance, where they say that it should be an 80-85% fill with and the other 15-20% should be like a floating time to implement and deal with projects like this, but because people leave, because work get absorbed people's filling of job becomes tighter and tighter towards that kind of breaking point and therefore putting extra time to do things like this actually people end up not having the time to do it because that 15-20% leeway has gone you know.
Well part of the methodology, and I'm not trying to preach to you hear, part of the methodology is that you are releasing time in a lot of ways and although you are investing time initially to go through the project etc. at the end of it, it should release more time. So it is almost like an investment to release the time but you don't really see it like that do you?
No no I do see it like that but what I was saying is that I don't think that the effort and time I would put in to do that would be worthwhile and would release enough time for me to actually make it viable you know.
Okay fair enough. In some cases LEAN itself is deemed successful and I know what you feel yourself towards it but I'm interested to know how you feel it could be evaluated if LEAN is successful
Well to me the only way it can be evaluated would be if myself and my workload was a project and my work tends to focus on a monthly cycle and the only way you can measure it is how much and how long does it take me to do all of my work in that monthly cycle pre-LEAN, and how much and how long does it take me to do after - post-LEAN kind of situation.
So some sort of benchmark measure?
Yes
And that assumes that, because another interesting aspect I think, and this is totally my opinion now, is that any attention it doesn't really matter what the model is, or what the methodology is, but any attention given to anything is going to, usually going to lead to improvement, not necessarily down to the methodology you know what I mean, just the fact that it is getting that attention or that person is getting that attention would you agree with that?

Yes, but that also maybe comes back to the fact that they think it is another management or another management cycle. This is the new thing and I think it does and every time these things come out there probably is a slight shift upwards in efficiency on an automatic kind of basis but then people do, I think, still see it as the new in-thing. It is a generic sweeping statement but I do think that most people just see it as oh this is the next thing, these are the new words, this is the new kind of speak and I think that as much as there is an improvement in the short term efficiencies just because there is something else, I think there is also an automatic de-motivational aspect in there as well, when people just have that feeling of it's just a new thing, it's just the next thing that has come along.

Do you think that is peculiar to healthcare that kind of cynicism or do you think that across the board because there has been a lot of changes to healthcare?

I worked in Royal Mail for 20 years and I've been here for 4 years and I think that that is a common denominator, a common denominator across these two big organisations that I have worked for now.

So it is because it's a big bureaucratic organisation?

Maybe because they were or are two big bureaucratic organisations yeah could be.

Because it is something that healthcare gets accused of this particular type of cynicism because there has been so many changes that, you know, yet another change?

Yes, well you've got to question whether it is just pure cynicism or whether it is factual on the basis of peoples' previous experiences of these new things have not produced

Scepticism, scepticism is a better word actually than cynicism,

Yeah we've seen it all before. One example I could sort of say is that as far as I am aware when GE Healthcare came in they were actually meant to be carrying out two, three, four LEAN projects on specific specialties. I have never heard anything about any output from that which again totally negates, in my opinion, the whole LEAN project because they are trying to encourage people in there, you've got the people who are in here to promote it with their strategic team and I have never seen an output from the projects that they personally were meant to be undertaking within NHS Fife. So, how can you relate somebody selling something when you never actually see the output of their own projects that they undertook in the organisation that I work for. That without a shadow of a doubt produces cynicism in peoples' minds straight away and it might well be that they have done and it might well be that it's out there but it's never been made blatantly obvious to me that this is LEAN training.

What would make it blatantly obvious to you?

Well when you get invited for example to the follow-ups etc to me it should be that you went on LEAN training, the two day course or whatever, and as you are aware GE Healthcare were the ones who promoted this. These were the projects that GE Healthcare were involved with to promote this LEAN and these are the results of theirs, and as you can see, there were big improvements in the methodology etc. This is what they personally done in their projects and attachment of their project papers but all of that substance just vanishes.

That is interesting.

Everything is just words on a screen just saying to you do you want to go to this?, do you want to go to that? There's never any substance.

So maybe some sort of direct communication with those that have taken the time to do LEAN training by that I mean direct email just with "this is where we are with LEAN, this is what people have done", a sharing almost – would that help?

A sharing of, yeah even, because you know what it is like, benchmarking is like, because you do become blinkered in yourself. I am not immune to that and I can see that's why I'd be quite happy for someone else to come in and use me as a project and that eh. You do become blinkered and it is always better with a second, third, fourth pair of eyes, but I do still think that it is really important that if a public service body bring in a private company to promote something that their own projects that they have undertaken in that organisation are put forward and

shown to be and have been successful but, as I say, I might have missed something, I might have not seen it, I might have thought I'll get back to that later but I'm fairly certain that I haven't, but again I'll say that I might have done and in that respect that would help to motivate and push me into the right oh what is it that they have done? Can I relate that to what I do? Alright oh I could maybe do that oh I could maybe do that. But as I say one of the reasons is that I don't think that a lot is the time factor about putting the time in that exactly. One of the things that I'd put down just now is that I do the lead discharge report and this used to take a full day to do the full daily discharges report so I am trying to automate things because it is just a spread sheet that you fill up with millions and millions of pieces of data so it is trying to get automated. So, I just automate it now so that in 1 minute and 40 seconds I get all my numbers. So, I've already cut one full day down to at this moment in time four hours and I'm hoping to get that down to at least two hours right so again I believe I've got justification for saying that I don't think that what I could get out of LEAN and putting it into that work is going to benefit me.

Is that something that you would have done anyway? Without doing any LEAN training that is something that you would have done anyway?

Yes, this is something that I would have done automatically anyway. Again this goes back to my point that my perception is that there is a lot of common-sense stuff in this so why would I spend a full day doing something when I feel that if I can put the time in to do it, fair enough, I'm putting a fair bit of time in, but what I'd be able to do is press a button and cut something down from a full day, but it's not one continuous day it's maybe two hours this day, two hours the next day, two hours the next day and the whole thing will get done in two hours which means I can engross myself in something else, you know what I mean.

Maybe the difference is because you work on your own and you can do that but somebody that is part of a bigger process where they can see that there is an inefficiency but then how do they go about changing that - maybe that's the difference?

Definitely maybe there is a big difference then.

Because you can do that yourself.

Yeah I can see that.

You don't need to bother anybody else about it. You don't need to depend on anybody else to give the okay to do it.

Definitely.

But you have kind of answered my other question as well which was on LEAN projects in Fife and are you aware of them which you obviously are. Do you know specifically what they were?

No

Have you heard of the Back Pain Project?

No, I maybe have but again that's not something that is stuck in there.

I don't think that it is fully complete yet but they have made big differences in the patient pathway for that in the area of backpain. So that is something that really needs to be out there and people made aware of.

Absolutely but then sometimes people think that there is rather too much detail there but I think for you to actually be successful in something you actually need the detail to be there to understand the detail. I don't think that you can wipe out that middle block of substance and go from ????

Are you aware that LEAN is part of NHS strategy?

Yes but I think that they have got lots of different elements that are part of their strategy but I think that there is a big, again this is personal opinions, a big disconnection between strategic values in this organisation, the frontline working operations and, I think that connection between frontline and strategic, like every organisation, is lacking absolutely lacking. It is like I don't think senior managers are totally aware of what people do on the frontline. I don't think that the frontline people are aware of what the strategy of the organisation is and the people in the middle who are meant to connect these things I don't think it happens, you know, correctly and it is not probably through lack of effort etcetera etcetera

Again do you think that that is down to the culture of it being a fire fighting culture that you are just dealing with problems as they come up? And that so much time has had to be spent on that that there is not a lot of room left for anything else?
But that is exactly why you would have something like LEAN.you know. Certainly since I came here, like I said I spent 20 years in the Royal Mail, and you can take this lightly, seriously whatever, but I was astounded when I came here to realise that Royal Mail were 20 years ahead of the Health Service as far as technology etc was concerned.
That's interesting.
And information and stuff, I could not, I was honestly astounded. Royal Mail to me were so much more ahead of their game, very, they had a fire fighting not a culture but the nature of their business was such that you could not predict. Unlike the Health Service where you can predict and plan ahead for patients coming into the system you know. Royal Mail can't tell people when to post letters therefore they have an automatic fire fighting system that they have to deal with on a daily basis in and out. Health care should really be able to know exactly when, and they obviously don't know the number of referrals that are coming in, but they can certainly plan for the number of people coming into hospital for necessary operations etc.

I was astounded getting back to the fire fighting point how much fire fighting really goes on and the reason that I know that is when I first started here I worked on the Performance Management Team for about the first couple of years and helped them set up the NHS Fife Performance Management Teams and the national targets coming in from the government which were normally three year time spans. It was like we've got six months to go, how are we doing? We know something about that now eh but from four or five years ago to now that has actually changed okay so there is a definite shift and it is happening but obviously getting back to the size of the organisation and the bureaucracy etc. it's there but it tends to be very slow. There are so many different layers; I think there is too many layers of management in the Health Service.

Is that how you would resolve it then this difference between what the strategy is down to the frontline staff and getting that communication down there would it be to take some of the layers out? How would you change it? How would you resolve it so that frontline staff are more aware and so that is goes both ways actually?
So that it goes both ways yeah. I think it's like people filter stuff out you know so SMT, down to their Managers and Instructors, down to the frontline things get filtered out and okay down and likewise it will get filtered down well and the more people that there are in-between, the more messages get filtered out both ways so that a message. It's like Chinese Whispers almost a message from the top to the bottom the more people that it goes through the more diluted it kind of becomes eh. So to give you an example when I first started in the Management Team, I was a Performance Management Co-ordinator which is a Band 5 and I had a boss XX who was a band 8A, and there was a next level of report who was a Senior Manager, then there was a next level of reporting which was XX, Director of Planning f, Senior Managers, then there was XX and then there was XX which to me just seems ludicrous you know. Me a frontline employee so to speak I've got a boss and then there is three at Senior Management before you get to the very top of the tree. What is the communication structure coming down eh I don't know if it is maybe coming down through the hierarchical level or not I think there is room for as far as the LEAN methodology is in that respect I think that is a big waste a big big waste.
Moreover that is LEAN as well looking at people as well not so much about taking people out but for making that communication process a lot more efficient.
I think communication is seriously important.
Do you look at the Intranet?
Yes
So there is some communication filtered in there is there or not enough in your view?

A lot of the communications that are filtered through that are very department specific oriented. The X-Ray Department will be closed. There is a lot of just utter, it's not rubbish obviously because people need to know it, but from where I'm sitting it's not exactly that important it's not is not organisational wide necessary.

So it is sifting out the specific information and putting them towards that department and then it is giving and it's making sure that general information is known to everybody. So its management effective isn't it?

Yeah I think we use those sort of mediums that they've got the groupings of, people they just need to sort that out, obviously sending messages to everybody okay everybody in NHS Fife I know. Although they have adapted that in just the last couple of days. But it didn't encourage you to look at anything you just literally got everything.

No I can understand that people become tired of that and don't know how to decide what to read

And then you miss things.

Appendix 18 Interview Transcript

Lean Questions — Implemented
Senior Nurse Older People's Services — 3 Day Training

Why did you participate in Lean training?

I participated in Science in Action training and Lean training seemed to be an obvious next step. I wanted to see improvement; there are many layers in the different processes and too many people want too many things out of a limited resource. Lean makes you ask: Why are we doing that?

In what way did you implement Lean, what type of project was it?

Early Supported Discharge; mainly pathway mapping

Did you implement it on your own or as part of a team?

Part of a Team

What was the selection process for members of the team?

The staff who were available and willing.

What were the biggest difficulties in implementing Lean?

Culture, ritualistic practice, lack of time. It was an ambitious project covering Operational Division, Community and Social Work.

Did you feel you had support from your line manager?

Yes

Did you feel other staff appreciated what you were trying to do?

Although the project was not successful the pathway mapping is still referred to two years on. The partner with the most to gain from the project proved to be the weakest and caused the most difficulties. Data provided by this partner was incorrect which resulted in the criteria of the project being flawed. There was a general lack of understanding between partners of working practices: projects should be able to cross departmental boundaries, surprisingly the biggest difficulty was not with social work but within our own service. The Lead person of a project is extremely important: this project needed a lead for each partner.

How do you think these issues could be resolved?

Clear and accurate data, senior manager sign-up and recognised drivers of Lean across boundaries.

Did you feel the training helped you to implement Lean?

Yes

Is there anything else you would like to be included?

I would like to see a buddy system put in place where the trainee is linked to an ongoing project and has a mentor within the project. This would allow the trainee to see difficulties and experience dialogue first hand.

People attending Lean training should be people about to instigate a project or have a proposal for a project and produce a project charter either before the training or during the training.

Networking support would also be useful.

Do you consider Lean to be a useful/successful methodology?

Very Useful.

How would you evaluate this?

Our project was not successful for the patient but was successful for learning. I evaluated the project through reflection.

Can you attribute success solely to Lean?

Did you share your experiences with others within Fife?

Are you aware of other Lean projects within Fife?

Not really, not with any detail, but should all projects be labelled, we maybe need a project register.

Are you aware if these were successful or not?

Do you think your project or other projects are sustainable?

Do you think the inclusion of the Lean methodology is part of Fifes strategy?

Yes it is but would not have known this had we not been told at Lean training.

Do you think if more people were aware of it would be easier to implement new Lean projects?

Lean is not role modelled; there is no supporting descriptive statement.

How do you think this should be resolved?

The right people need to be promoted to Lean projects, Lean needs a driver. We (NHS Fife) are not good at providing rationale for decisions/changes etc. and we are not good at promoting success.

The Lean methodology should be included as part of every day practices-action learning, 1 to1 clinical supervision etc. It should be embedded in the everyday language.

Nursing is the biggest workforce; a cultural change is needed here. Senior Charge Nurses do not call Lean Lean but Releasing Time to Care. Lean is a vehicle to enable change.

Appendix 19 Interview Transcript

Lean Questions — Implemented
Service Development Manager — 3 Day Training

This is a partial transcript as much of the interview was lost.

Why did you participate in Lean training?

I knew quite a lot about Lean already and I was curious to see if there was anything new.

In what way did you implement Lean, what type of project was it?

Mainly pathway mapping

Did you implement it on your own or as part of a team?

Part of a Team

What was the selection process for members of the team?

The staff who were available and willing.

What were the biggest difficulties in implementing Lean?

Collecting reliable data, lack of time and conflicting objectives.

Did you feel you had support from your line manager?

Yes, but that is not always the case for others, particularly when the line manager does know about Lean and has not received any training.

Did you feel other staff appreciated what you were trying to do?

I do not speak to people in Lean terms; I will use the tools and the methodology but will not say 'this is a Lean project'. I do not want a negative reaction before I even start therefore I avoid using the terminology.

Is there anything else you would like to be included?

As I said I knew about Lean already but there wasn't anything new introduced to the training but I don't think it properly prepares you for undertaking a Lean project on your own. I would like to see a hands-on approach introduced to the training where the trainees are given practical situations and have to provide a solution using Lean. Working with other people who are about to embark on a project would also be useful.

Are you aware of other Lean projects within Fife?

I am aware of a couple of other projects but that is because of where I worked before my boss was involved with SMT and kept me in the loop.

Are you aware if these were successful or not?

I work part-time and therefore my working time is very focused, I don't look on the intranet for anything unless it directly affects me.

Do you think the inclusion of the Lean methodology is part of Fifes strategy?

Yes but again that is because of where I worked before, Lean is not the same in Community as it is in the Operational Division; Lean is more clinically led and more emphasis is given to it in OD.

Do you think if more people were aware of it would be easier to implement new Lean projects?

We are not very good at advertising success; people would be less sceptical if they knew if a project worked.

Appendix 20 Interview Transcript

Lean Interview | Implemented
Consultant Physiotherapist | Visioning Event

You did a wee bit of LEAN training why did you decide to participate in that?
Well it was part of the project and then obviously it was a stimulus and catalyst for change so I think it did provide a mechanism to bring people together, bring the stakeholders together, look at the pathways, look at the wastage the I think that was the main thing it was mainly a catalyst, a good opportunity I think it did that you know.
So you participated in the LEAN training that was part of the LEAN Project then?
The LEAN Project yes.
Had you come across LEAN before then?
We had LEAN in Lothian.
Lothian is big on LEAN isn't it?
Yes so I've used it. It depends on whether you think that's LEAN in terms, I suppose LEAN it's more of a short sharp thing isn't it - true LEAN and I suppose what we are doing is almost like releasing a time to care thing. It's more of a long we're trying to employ sort of short sharp LEAN principles to something that was going to be a bigger - it was a bigger project. So it was probably more a releasing of time to care type project if you look back on it because I mean looking at the service it wasn't the type of thing that was like a laboratory or something where you were just changing something and then going, you could go out to implement it rapidly could you. It wasn't that type of thing because some of the, I think that was the problem, because some of the issues were too big for that particular project but at the same time the actual, the actual principles over the long-term principles. I think that is maybe where some people got a bit frustrated with it because they were looking for a quick fix, in the space of like a month or two where there were issues there that, as you know, that were requiring more a long term, it was philosophical changes that were required and sort of service re-design changes which were never going to happen in the space of a week or two months or even three months do you know what I mean. But despite that there was a lot of, I think there was a lot of good stuff produced. I mean I think the changes that we made were certainly better than they were. I mean you've got to look back and think what we've got now is better than what we were three years ago or whatever two years ago when we started that when we embarked on that.
How important do you think it was to that LEAN project to have the backing of SMT?
Well its essential isn't it? That's the essential. I think, I think the difficulty you've got in Fife when you've got devolved power, control not everybody's, everybody's got their different, the different drivers, you know, the drivers are not necessarily all going in the same, same direction. So I think that's what makes it challenging do you know what I mean? As I keep saying, in Fife it all comes back to sort of four things, it comes back, it comes back to budgets, control of budgets, it comes back to well, it comes back to control in terms of who is controlling the budgets, in terms and conditions because there are different terms and conditions across the different divisions and then I suppose you could argue the ideologies is the fourth thing on top of that, do you know what I mean. So you've got different factors which you are then trying to align in order to try and get something going so the only people that really can, not necessarily drive it, well you know and drive that change has got to be SMT so, so because they are the only people within then if they've got their vested interests in terms of the devolved power that they have which, it depends on which way you look at it isn't it it's the old sort of ways whether you know, the problem is that we've got we've got a national pathway haven't we, we've got a national plan.
Yes
People are trying to role that out and at the same time ten/fifteen years ago they wanted to devolve power for localisation, serve up local leads so do you know what I mean, it's balancing up those two different drivers which sometimes can be yeah it can be tricky, but it's even more

tricky when you are trying to make changes, when somebody's like, you know, even simple daft things like an administration cover, who is going to fund that? Who is going to change that? Where is that money going to come from? How is that money going to transfer across the boundary? That's your, that's your, that's your problems there, that's where the time gets held up you know what I mean. So we probably could have implemented a lot, better change or quicker change, but we couldn't do it because of these other issues some of them are still on-going to this day.

You were one of the very few people that said that LEAN is, comes to us from a strategic level, from the top?

I think that is probably because, you know I worked with X in Lothian before.

Do you think that's why - something to do with your place and where you are and your position?

And I know where he is coming from, do you know what I mean and I think that's where, well I think that's where the organisation is trying to go. They've invested a lot of time, effort, XX has put a lot of time and effort into LEAN so if that's not a strategic driver then, then. I think people get frustrated because they can't bring about the changes for the very reasons that I've talked about do you know what I mean so.

How do they get that across though because it's not coming across that LEAN is part of their strategy to other people that I've spoken to?

I think that is where as I say it gets diluted, that message gets diluted, because it is got to go in each area and then interpreted into what they believe is right based on their, for all good reasons, based on their local needs do you know what I mean? So, so some people might not have bought into it, bought into that or it might not be in their interests to buy into it do you know what I mean. If you are developing local services and you think you are doing a good job there why would you see that fitting into the national picture which again is removing control sometimes nobody is necessarily overviewing that whole pathway. I think that's the problem nobody is overviewing the whole piece of work well apart from SMTs, but they've all got within that their own sort of interests within that do you know what I mean, so it's nobody's fault it's just, it's just the way things have evolved, and the way things have, the way they were empowered in the past.

Yes

So it's like having one thing and then you're asking to do something different. You can't just suddenly change. I think we are moving, it's a lot better than it was, I think anyway, from when I first came here, like two or three years ago primary/secondary care didn't speak to each other at all do you know what I mean more or less because I think we are getting somewhere. We're getting that kind of sort of cross-way discussion now which we weren't getting before which is good.

You mentioned a couple of times there when you were talking about resources and money that was, was not considered to be a high barrier as far as implementation is concerned.

Well that's the key barrier, do you know what I mean. At the end of the day, in terms of if there is no mechanism in place to basically disinvest one area and move it to another area that that's the problem. They can do it on very small silent ways but we don't have enough staff. You know this idea for example primary care or secondary care don't have enough staff to move across the piece. You see the problems, as I say it's trying to get admin and staff even down at Whitemans Brae the problems there was we don't have enough pool in primary care to basically drive that. There is not enough people there with the training and the skills to do that and the question is then who is going to fund that training, who is going to pay for sick cover etc, do you know what I mean so that is where the mechanism are not in place to allow that to happen. So yeah I think it is I think it is. It's not the case so much as the monies themselves it's the mechanism to disinvest it in one area and invest it in another area, that's the key area. It's not the money per se it's the mechanisms in place. At the end of the day you end up moving staff up say from primary care to secondary care and then we have a big debate about who is going to pay for the paper? Who is going to pay for the paperclips? Do you know what I

mean? It is that type of thing because there's no, because they are configured differently so for example primary care don't necessarily have an admin and clerical budget defined or admin supplies budgets defined whereas they might have that in the OD so the problem is then well you say you are using our resources but where is that money going, where is the mechanism to release that money in primary care to allow it to happen. To transfer across the OD or vice versa and that's, that's where some of the issues are a problem.

Do you think it is best suited to LEAN is best suited to possibly acute care rather than for instance out in the Community?

Well I think the principles are okay. I think we have taken the principles on board. I think obviously if you look at LEAN, the actual original Toyota and all of that type of thing it was more of a factory basis than a voluntary where you are changing, if you like mechanisms within short sharp within a short period of time. Whereas I think what we are now, we didn't probably call it, but it was probably more releasing time to care is probably based on LEAN principles but it is more of a long-term.

If you look at the principles of LEAN it is a long-term, it should be a philosophy.

Yes, I am talking about, in terms of like having a Kaizen and then going out and changing things.

Using the tools do you mean?

Yes using the tools that are not necessarily designed for the Health Care, Health Care System, you know the actual, the principles but the actual I suppose the way it was actually originally designed was more for production lines and you do something shorter, you know you cut the distance you are walking in a lab or whatever. I think it's more, so I think we have taken the principles, I think we have. It is interesting though, I mean the people that were on that event, do you know, I think they were in the main, some people were pretty sceptical whether you needed the five days or well that's a difference in the NHS. I don't think the company the NHS could afford to take staff out for five days but in some ways the way it worked having a two day thing here or in modifying the principles slightly for the NHS we might need to do, but I think that most of the people who were on it felt it useful to have the stakeholders there even for a short period of time, targeting areas bringing the orthopaedic surgeons in for half a day or you knew that whenever the bit that they were discussing, do you know what I mean. So I suppose yes ideally it would be great to have everybody there for the five days or whatever but in reality I don't think that can be done.

It worked out quite well having that drop in principle didn't it?

It did. Having the key people there most of the time and then people dropping in for the bits that they needed to be dropping in for. So I think it did work. It did work reasonably well.

Yes. Now one of the other things that I'm trying to establish is how you, well no actually first of all have you, apart from the Back Pain Project, are you aware of other LEAN projects that have gone on in NHS Fife?

Well yes, I think there has been, mental health, there's been mental health ones. There's been other small bits, for example there's been small bits locally for example, here, for example you know X has been doing some stuff here, locally in terms of looking at actual patient delivery on the ground and how this department works really. So I am aware of other bits and bods going on. Whether you get the full overview of it then, you are hearing it through sort of word of mouth, do you know what I mean, or it is delivered through different forums that you are invited to, whether it be clinical forums or you know. Yes, in a way but as I say you know I'm more aware of the overall strategies such a lot. I suppose I'm lucky in some ways I've been to some of these meetings. I've seen Brian's plans so you know.

So you are in that position where you are actually getting that kind of attention?

But I wouldn't imagine, for example, that your band sixes or your fives or sevens have got, they will be aware of things like releasing time to care and various other things, but as I suppose the actual strategy is such, the overarching strategy is probably not that clear to them.

That is certainly what's coming across. The success of projects hasn't been communicated or even on-going projects hasn't been communicated. It is not filtering down. Do you think that would help with some of the barriers?

It would do but I mean it comes back to with what I started with. We are trying to run a uniform system with a strategy across four completely different units. I think that is the problem that each of those units has got different strategies and they've got their interpretation of that strategy - it's different. So you know there are very few folk in Fife as you know have got an overarching NHS Fife position that's the problem do you know what I mean? Apart from some people on the SMT, there's the odd person like myself, XX, there is actually very, very few people across Fife who are looking at it with a complete overview do you know what I mean? It is all to do with delivering in their particular area, which again there is nothing wrong, there is nothing wrong with that if that's, if that is the strategy that you want to do but I am kind of aware now that we seem to be running conflicting strategies to some degree.

Yes.

We are trying to run this, we are trying to run this overall unified system but at the same time we've still got these very empowered areas which again is nobody's fault. I mean it's, you could argue that that's an advantage. So it depends where you are coming from philosophically. Do you know what I mean?

Well the other question I was going to ask was just on the success, how do you, you know when these projects have been implemented? One of the problems that I've got is how do you evaluate success? How do you evaluate that the LEAN methodology has been successful?

Yes I mean I think, I think we have shown without a doubt because we did quite a bit of baseline data you know what I mean

On the Back Pain Project?

The Back Pain Project. The Back Pain is probably the most researched pathway, even amongst even in Scotland do you know what I mean? We have actually got the base data in Fife to back and support the changes that we made. So there was no doubt that people were waiting for up to 21 weeks to get a return on results, so we have cut that down to what four weeks, a month. In the main the majority are getting them back within two or three weeks now. We have ownership of that pathway; we have never had ownership of the pathways before. We have got the pathways on the internet; we never had any defined pathways before. The waiting time's down for those patients, somebody is actually taking an interest in them. The feedback, the patient feedback was good for their first appointment. There is still bits of it that are not right but then that's because we are relying on a tertiary study. Back Pain is probably not the best one to pick to some degree because, well it was a good one to pick because of various other drivers, but in terms of actually it was dependent on tertiary pathways as well. So in some ways we have no control over the tertiary pathways so you can only look after the bit that you are sort of empowered to look after. Which I think we have, there is no doubt that we have made a bit of a difference to that.

A recent one?

Yes yes. So there was a paper went to SMT in fact to update that it had all the up-to-data, in fact, it also had some of the research that we had done as well. Which was for orthopaedics in its totality which again was very, very positive.

Just on the Back Pain Project I suppose there was a couple of things but one of the sticky points was with CHPs and that just seemed like a much longer-term project than changing the pathways for back pain from the point of view, we talked about integrating CHPs and trying to organise physiotherapists so that there was equity of care as far as waiting times were concerned and things like that. Is there any progress been made on that side of that?

Yes there is significant progress in terms of integrating it but that is in terms of a clinical integration and a service integration in the sense of that we have got some equity. I mean the waiting times; I can't remember what the waiting times were here, twenty odd weeks, that is

down that's down to what less than six. In fact it is less than six. The waiting time at Leven was up at twenty odd weeks – that is down.

And what has changed that?

Because we are moving staff within the problem is we are curtailed, that is what I am saying, we can only work within the confines that we have do you know what I mean? Because it eventually gets to the point we are back to the same thing, it's about ideology, about control; back to about budgets do you know what I mean? It's like they are trying to make an efficiency saving in OD to do with physio. They have got an efficiency saving to make and you know the CHPs and that's obviously sometimes they have got different ideology about how they are going to make those savings. So, they might need their staff up there. The other thing is as well as I say, the other factor is the terms and conditions. Terms and conditions are different so you can't just move a member of staff here and say well you go up and do a leadership role up in the hospital, despite the fact that it might be the same band. So you could have a band seven who is out here in the community and will be mainly clinically based and have their grading based basically on clinical. Whereas in the hospital they might have a leadership and clinical role. But why would a member of staff here, unless they are wanting to develop their career in some other shape or form, why would they want to give that up to go and suddenly take on a whole, you know, take on four or five staff a leadership role plus have a clinical role.

So the terms and conditions dictate that, I mean so they couldn't be made to do that if you like?

Well I think there is enough flexibility, flexibility to a degree do you know what I mean, but there's, the other thing as well is that these folk have not done that for years so then you get into training and then you're asking somebody, you have to train them up to do that. So the question is who is going to fund that training? Where does that funding come from? Do you know what I mean, so and then the other thing as well is I suppose from an industrial relations point of view they will say well it is a change in it's customs and practice, it's job description to some degree do you know what I mean? So in some ways we will have to get there, I mean, eventually we will have to look at changes that we can't, you know, we are running out of staff. Do you know what I mean? You can see for example there, you know, we have got a member of staff off on maternity leave in the OD so one of the physios had to, well Ginny had to move back to cover that. But the only reason she is the only one with a "leadership" kind of arm to her job whereas the rest of the staff they either haven't done that or they haven't been exposed to that in the past or, I'm not saying that they are not capable of doing that, I'm just saying you know.

It would take a wee bit of training?

It would take a bit of training first plus they might say well that's not necessarily what's in my sort of job role to do that. So those are an issue. But in terms of where we were when I think we first met like three years ago we are miles we are in a completely different place.

And what about the boundaries between the CHPs – have they got any looser or are they still?

Well they were very much, each CHP did their own thing because that suited their purpose.

I think we have narrowed, just through I suppose natural, X obviously retired here so XX then has taken on the management on mainly for primary care for this and a bit of Glenrothes. So in some ways that makes it a lot easier because you've got one manager who can then, who has got a bit more flexibility. The difficulty you have got is again simple things like travel. People have got a base, for example you can't just move somebody that has got a base, well you can, you can move from West Fife and bring them out here but the cost involved in that, they would be on protected travel pay for so long. So it's not as simple as that but it is a bit easier to have it just because you have got one manager, and then you have got one manager in OD now so we have only got two real managers as such so in some ways that makes life a lot easier. Whereas before I think previously I think we had about four, four or five managers that you had to go through. So simple things like that probably have made a difference. X has made a difference in terms of having that more strategic role in terms of in the management role across

the piece so we can move about. You can then have a discussion with X and then okay I'm not saying it's that easy all the time but for the very reasons that I've alluded to but at least we are now having those discussions.

Where they weren't happening before?

Yes, where they weren't happening before so that's been a positive thing.

Absolutely yes. As far as the pilot projects were concerned, your triage, you did two pilot projects – one in Victoria and one in Queen Margaret, they ran together and then we had the meeting where the outcomes were given for both of these projects which to me were, well both of them seemed to be positive. You seemed to get good results from both of them. But then there was a third project proposed, or a third idea proposed which wasn't piloted.

That is still on-going. That has got held up for the very issues that were, that's more X's bag to do with Orthopaedics whereby again that is to do with philosophy. In fact we have got a meeting, I think we are talking about meeting next week or something, again it depends, again the issue in Fife here is they need to nail their sort of colours to the mast basically in terms of what philosophy they want to use for dealing with MSK/Orthopaedic referrals. So you can certainly do what you had in West Fife which was you have the boxes, so they GP marked shoulder or whatever and then it goes into the shoulder box, then they had the orthopaedic surgeons buddied-up. Then you had the model in Kirkcaldy/Levenmouth which was referring into a sort of "Central Hub" with one AHP and one Orthopaedic Surgeon taking ownership for that. And then they had a similar model I suppose to West Fife up in North East Fife but again that is a smaller area. They only have one Orthopaedic Surgeon there so it's slightly different – so it's the high bidder of the two. So the idea is whether, well maybe not North East Fife, but for the other two would be whether you had one central pot. But in order to work that system, if you are going to do that, then you need certain criteria and it's well documented what criteria you need. You need to have information from the GPs to have that in which case then, maybe not necessarily the word proforma scares people to death but you do need some kind of drop-down tick box – that's what they have been doing in like Ayrshire and Arran and places like that. If you are going to work that model then you have got to have certain information to allow that to happen. You have then got to be, if you are basing it around the GP, then you have got to have an Education Strategy for GPs, not necessarily an Education Strategy, that is the wrong word, but an information dissemination saying what the criteria are. So again we are back to this. We are trying to be, you have got to have a pathway, but that pathway has got to be managed. So the question is then who is going to manage that pathway, manage that across the piece and who has got the power, the control and the ability to manage it and move budgets and disinvest the money there to allow that pathway to happen? The issue is if you look at some of these other Boards they are Single System Boards if you follow me. To some degree their AHP Services are all one system, they might have one CHP or whatever, but they haven't signed-up for that pathway whereas the question is well who is going to drive that pathway to work. And I think we are getting there, we are getting there because we are going to have to get there, but the question is who is going to rubber stamp that at the end of the day.

Is the Central Triage been piloted at all?

Yes well Kirkcaldy/Levenmouth was the Central Triage.

Yes but I mean because it kind of moved, and this is what I didn't understand, because it moved from, there was two proposals on the table and then there was a third proposal brought up at the meeting which was slightly different.

Well the third was slightly different but it was more or less the same as the Kirkcaldy/Levenmouth.

It was the same model but it was for the whole of Fife.

It was for the whole of Fife.

So that is why I am wondering if that has been piloted.

Well you wouldn't pilot it because we've already piloted it.

Because you piloted it in Kirkcaldy/Levenmouth? So mainly what you are looking for is just approval?

The main driver for that, again, X is probably the better person to speak to there, but the main driver for that is capacity and demand. So it is the ability to know, it's again somebody, or some people, or a small group of folk knowing where your capacity and demand, or matching capacity and demand is. So in order to do that you have got to have an overview or otherwise what happens is you have ten, fifteen folk involved in the process who are then maybe, for example if you have got one knee surgeon, or one ankle surgeon then they will kind of just look after their bit, on necessarily their patch, they are not necessarily looking across the divide. They might have a different philosophy about who they give to say, for example, podiatrists or who they give to their ESP type thing so you are not necessarily matching. So it is about having that dashboard to look and see, not everybody is going to look at that dashboard. If you have got fifteen folk all able to referral manage then you don't have any control over that. That is what we are finding. You end up with all folk get booked into that or they get booked onto one site so there is a whole raft of work that needs done on that, but again we are back to the same, the reason why we had two systems in the first place was because one of the CHPs didn't want the other system. So the question then is who is going to make the decision to say that's the one we're going to now.

That's the one you are going to have.

And if you are going to go down that route then you've got to say well you are going to have to have the infrastructure to support that. The infrastructure to support that would obviously involve dissemination of guidelines; not necessarily the passive use of guidelines but the active use of guidelines is I think the term you want to use. The passive use of guidelines has been shown not to work. So you have to have the active and we are working on that just now. You then have to have some sort of information dissemination in terms of, and we have started doing bits of that. Recently myself and some of the orthopaedic surgeons have been up at North East Fife doing teaching, education there and we are going to Dunfermline and West Fife this Wednesday but again we are doing that but it is all very much kind of ad hoc, it's not part of a strategy as such. I got invited up there and then got invited to there so.

So you are dependent on the invitation really?

You are dependent on the invitation and the question then is, is that my job to do that? Or who is going to pay that, who is going to fund that? It is all very well me sort of doing bits of that but what is it I'm delivering and why am I delivering that. It's just a case of, there is not necessarily an overview of that.

So where are you with the kind of triage project? Has the Kirkcaldy and Levenmouth been adopted for Dunfermline or are they still using their own one?

No they are still using the same two models that we have been using. I think there is a meeting next week – I think X is going to that next week.

And so are you hoping to have everybody using the same model. Would that be what you are wanting from the proposal?

I think that's X, X is dealing more with that, she is leading more on the orthopaedic thing. I think that is her vision but I think it makes sense to have the one model. Again, you are back to where I started again, you are back to about philosophy. You could argue that that suits them over in West Fife, as a CHP it meets the local needs there and then that seems to meet the local needs of Kirkcaldy/Levenmouth so you could argue that, but I suppose as I say mainly from the capacity and demand and having dashboards and making sure waiting times are equitable, you have an overview of it then you probably need one system.

Yes.

I mean there is more radical models that you can use. I was down at West, I was down as I say, I think I was down at another Board last week. Again and this is where people nationally are interpreting differently about what they have down there. They have like a four tier system, so the first tier is basically referral for red flags for GPs so if there is anything serious in

pathology etc that gets referred up into orthopaedics. The second level is management, self-management for patients. The GP gives them advice sheets whatever. The third level is referral to an MSK service hub, which includes AHPs, podiatry, orthopaedics and then basically what happens is the GP will mark the box. So if it is a shoulder pathway he will put that, if it's for the knee pathway he will put that and then attached to that there is, it's not necessarily a proforma, but there is maybe five or six pull-down boxes that he has got for that referral to be processed. It then comes up; it gets triaged by an AHP so there is no orthopaedic people so based on the pathway a lot of those patients if they are for orthopaedics they will go straight to orthopaedics. If they are for example back pain they will go straight to they'll just go to the AHPs. They are managed by the AHPs and then there is another level of care they have got within that level for example the AHPs would deal with that back pain service within the community. And then the fourth level would be referral up. So it is very much this kind of staged approach.

So they are like filtering out aren't they?

So they filter out. Which we have got, so, part of the problem I think in Fife is that we have not been very good at articulating what the philosophy is. Our philosophy is slightly different. I think what we are saying is that our philosophy is based around the CHPs, based around primary care but in order for that to happen there has got to be certain mechanisms put in place to allow that to happen. I am not convinced that we've done them to a degree but it's not necessarily been articulated that that's what is happening, that that is what the model is. For this other Board for example the eighteen weeks does not kick in until that AHP is sending that on. So if I saw the patient as part of physio and I got the MRI scan, then it is only when I get the results of the MRI scan and I refer it on that that eighteen weeks kicks in.

It takes a lot of pressure off?

So it takes a lot of pressure off. Whereas what we are doing and this is where Fife, we are a bit too honest, to some degree, because what we are doing is we are actually measuring that eighteen weeks. So the minute that is hits that referral, but in order for that to work you have to have this other supported layer based around the AHP and the community services. Again it depends on your philosophy. There is no right way or no wrong way to do it. But what we have got at the moment we have got four or five of those systems and a wee bit of everything. We are not particularly clear; nobody is particularly clear what we are actually doing. So I suppose that's why next week at this meeting that's what I need to say. We need to decide, if that is the model that we are going for which is basically GP based around that and then referral up, electronic referral management system based then that is fine but you need certain pre-requisites for that to work. So again that comes back to what we were talking about who then at the end of the day is going to rubber stamp it and say that is the model for Fife?

So when you say that we are not very good at articulating it do you think by that it needs "a person" as you say, to rubber stamp it and in that way it would be articulated?

Yes, it could be, I think yes, I think that's the bottom line at the end it needs to be enforced, that's the bottom line, it needs to be policed, that's the problem. Somebody can rubber stamp it, I think we've rubber stamped a few times, but again we are back to where we are it's about local interpretation. People sort of, there is not necessarily anybody has got the power, the autonomy to say yes that's the way this needs to be done. It's like well you don't like that well we need to put something else in place and I think that is the bottom line. It's how do you police it and then how do you make sure it's enforced, that's the hard bit.

Yes

Especially when you have got as I say when you've got devolved control and devolved power that's the problem, and everybody's got different drivers.

And as far as LEAN is concerned would you, is it something that you would adopt again?

Yes, yes I think we would, I think most people would. I think they're probably doing it, I think the thing with LEAN is that they are probably doing it to some degree. I know there is a classical

way of doing it but I think people in the main are doing bits of it. Whether they are doing it to its full, give it its full "merit" that is maybe a different question. But I think people are used to that, I think people are quite used to that model as opposed to some of the other models like quality control or RES, one times VSR. It is each to their own. But I don't know I think it did.

Well I am wondering if LEAN becomes almost like a subconscious thought, because you know these principles and so you maybe in your day to day, you are maybe applying them all the time actually, because as someone said to me it's almost common-sense isn't it? And it is actually, a lot of it is.

I think in the Health Service we are quite happy putting up bits of paper and mapping out whether they do it the classic way as I say and maybe the bit we don't do is the bit to do with the wastage and all that but I think people are quite visual in that respect. So I think they do, I think they are quite used to that. They are just not very good at making change. I think that is the problem. I don't think that is anything to do with a personal thing I think it is to do, well you've seen it yourself, you've watched these folk like

The amount of change?

The NHS is a multi-layered and a multi-cultural organisation. It's a beast to try and I think we are a bit harsh on ourselves in Fife to be honest. Recently I've been about different Boards and sort of stuff. I think we are all not very good at selling it, I think that is the problem. We are not very good at packaging what we have done.

I would agree with that.

We are maybe a bit too honest. But I think in terms of what we measure we've got some of the most robust measures that I've seen going about. Other people seem to package things better and when you actually look a bit deeper there is nothing there. I think that is a wee bit, I don't understand how we are, we're maybe just a bit shy in coming forwards maybe I don't know but other Boards seem to, other Boards seem to think that what they are doing is innovative but we've been doing it for years, but we don't seem to think that it's particularly that good.

I don't think that Fife is very good at just advertising itself if you like.

If you look at that visual stuff, the visual stuff that X's done in terms of those pathways they are about the best in Scotland those pathways in terms of how they look and probably in terms of the detail that's in those pathways. Whereas other people will go and bring a Word document out and say that's my pathway.

But other people would be jumping up and down at those pathways.

Absolutely

But whereas we're kind of like well oh X's went out and done some, he's went out and taken it elsewhere. I think the other problem as well, in a bizarre sort of way, they are so good they're not that transferable. Unless you get a web link you can't show folk them. So you end up showing people in a daft little Powerpoint slide, and then they're ah right there's nothing to them, yet when you see them actively live, intranet based

And everything that's behind them.

And everything that's behind it then they go yes that's impressive so in other ways we are actually victims of our own success there to some degree. Whereas other people would be able to stick up a pdf Powerpoint and go right that's really great and we're going well

And the other thing that I've come across is the objection to the terminology, in some ways. I don't know why but LEAN seems to adopt its own, well not LEAN, but Fife seems to adopt its own language, would prefer to use its own language. So for instance I heard Kaizen being described as visioning because it is a term that has been used before, visioning has been used before, and somebody else said to me they would put in another LEAN project but they wouldn't call it LEAN.

See I think that that is a consequence the problems that they have. So again we are back, I keep coming back to these sort of, I just keep saying it now all the time. I keep coming back to these four issues and because they can't, you know it's not like going up a cul-de-sac, we keep

going around there and all that happens is they get frustrated so rather than blame the actual what is the underlying cause of the problem, they blame the mechanism or they blame the strategy or the model whatever is fuelling it. So it is easier to, it's a bit like when we had the Dialogix folk didn't want the Diaolgix, they don't like calling it Dialogix so it's association. So the name is associated with the problems of implementing it, but the implementation problems are because of the underlying issues that are there, and are always there because nobody is tackling them as such. I'm not saying they are not there to be tackled maybe as I say there could be strengths to what we are doing. I'm just aware that we are trying to run a national, I suppose the tide has gone in a different direction do you know what I mean and in some ways we are not built for that direction so we are swimming against it to some degree and I think that is the problem. If somebody said tomorrow right we are going back to having CHPs or whatever and we are going back to local control, local needs and that. Let's not bother about the eighteen weeks and let's not bother about shifting the balance I don't think that that would be a problem.

Appendix 21 NHS Fife Adult Historical Data with SG Results

Adults												
	A&E Attendances			A& E Admissions			MI Activity			Community Hospital		
	Historical	SG	Error	Historical	SG	Error	Historical	SG	Error	Historical	SG	Error
2008	66909	66948	-0.06%	30078	30120	-0.14%	16534	16534	0.00%	1088	998	8.27%
2009	65581	65533	0.07%	30841	30730	0.36%	17047	16901	0.86%	1131	1036	8.40%
2010	65000	65054	-0.08%	30540	30539	0.00%	16915	16793	0.72%	1112	1038	6.65%
2011	68480	68515	-0.05%	30145	30198	-0.18%	16770	16587	1.09%	1090	1035	5.05%
	Forecasted			Forecasted			Forecasted			Forecasted		
2012	67526	67937	-0.61%	30376	29915	1.52%	16961	16438	3.08%	1102	1009	8.44%
2013	67939	67893	0.07%	30366	30366	0.00%	17018	16711	1.80%	1101	1008	8.42%
2014	68352	68304	0.07%	30356	30303	0.17%	17076	16696	2.22%	1099	1030	6.31%
2015	68765	68659	0.15%	30346	30343	0.01%	17133	16453	3.97%	1098	1003	8.66%

Adults					
Fife MI			Fife Community Hospitals		
Historical			Historical		
Year	LoS	St Dev	Year	LoS	St Dev
2008	8	16.2	2008	56.2	61.3
2009	8	14.1	2009	50.9	53.1
2010	8	15.5	2010	55.3	51.7
2011	7	13.7	2011	49.4	43.7
Forecast			Forecast		
Year	LoS	St Dev	Year	LoS	St Dev
2012	7.15	13.35	2012	48.95	38.9
2013	6.96	12.74	2013	47.35	33.48
2014	6.77	12.13	2014	45.75	28.06
2015	6.58	11.52	2015	44.15	22.64

Appendix 22 Scenario Generator Models

Description	Scenarios
65+ 14 days maximum delayed discharge with Virtual Ward	3
65+ 14 days maximum delayed discharge with Virtual Ward- no inflation	3
65+ 14 days maximum delayed discharge with Virtual Ward- no inflation including Tayside	3
65+ 14 days maximum delayed discharge with Virtual Ward- no inflation, including Tayside, 1 team 2012, 3 teams 2013 and 2014	3
65+ 3 days and 13 days maximum delayed discharge with Virtual Ward- no inflation, including Tayside	7
65+, 75+, 3 days and 13 days maximum delayed discharge with 50%, 60%, 70% Virtual Ward, projections, no projections, including Tayside	15
65+ 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian	6
65+ 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working	7
Adult Baseline, +65 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working	7
Adult Baseline, +65 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working, with projections	7
Adult Baseline, +65 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working, with projections LOS <4 days	7
Adult Baseline, +65 LOS <4 days 60%, 70% and 80% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working, without projections	7
Adult Baseline, +65 LOS <4 days 60%, 70% and 80% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working, with projections	7
Adult, 50%, 60% and 70% Virtual Ward including Tayside, Forth Valley and Lothian, 5 day and 7 day working, with projections	7

Appendix 23 Medical Inpatients 75+

Fife Residents 75+					
MI Admissions					
	Fife	Tayside	Lothian	Forth Valley	Total
Historical					
2008	6252	876	118	8	7254
2009	6270	859	98	15	7242
2010	6110	921	75	12	7118
2011	6074	828	83	6	6991
Forecasted					
2012					6923
2013					6832
2014					6740
2015					6649

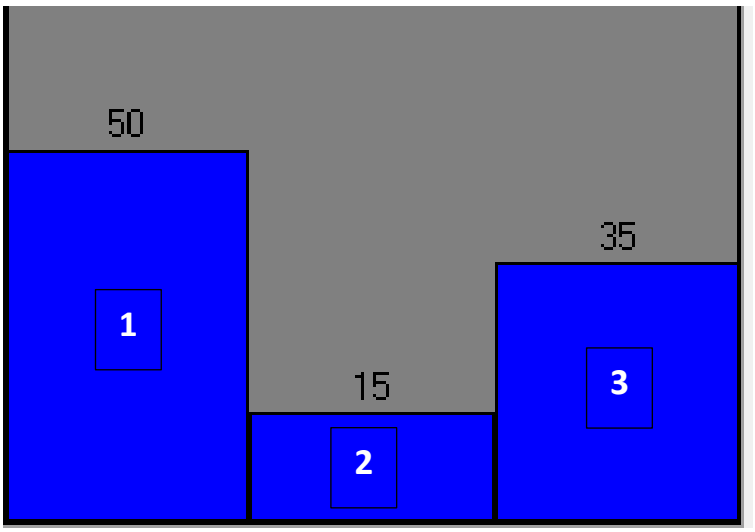
Fife Residents 75+		
MIAdmissions		
Historical		
	ave los	sd los
2008	12.5	19.2
2009	11.8	16.7
2010	12.2	17.8
2011	11.5	16.4
Foecasted		
	ave los	sd los
2012	11.35	15.7
2013	11.09	14.97
2014	10.83	14.24
2015	10.57	13.51
Average	11.5	16.1

Appendix 24 A&E Arrival Pattern and AMAU Admissions Pattern

	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
12:00am to 12:59am	0.189	0.004	0.170	0.004	0.113	0.003	0.226	0.005	0.094	0.002	0.111	0.001	0.231	0.003
01:00am to 01:59am	0.170	0.004	0.132	0.003	0.094	0.002	0.189	0.004	0.132	0.002	0.148	0.002	0.115	0.002
02:00am to 02:59am	0.132	0.003	0.189	0.005	0.170	0.004	0.075	0.002	0.170	0.003	0.167	0.002	0.173	0.002
03:00am to 03:59am	0.113	0.002	0.189	0.005	0.094	0.002	0.151	0.003	0.094	0.002	0.185	0.002	0.077	0.001
04:00am to 04:59am	0.170	0.004	0.038	0.001	0.094	0.002	0.113	0.002	0.075	0.001	0.093	0.001	0.077	0.001
05:00am to 05:59am	0.189	0.004	0.208	0.005	0.113	0.003	0.132	0.003	0.226	0.004	0.278	0.003	0.077	0.001
06:00am to 06:59am	0.208	0.005	0.113	0.003	0.151	0.004	0.226	0.005	0.075	0.001	0.148	0.002	0.250	0.004
07:00am to 07:59am	0.151	0.003	0.113	0.003	0.170	0.004	0.170	0.004	0.226	0.004	0.241	0.002	0.096	0.001
08:00am to 08:59am	0.604	0.013	0.321	0.008	0.358	0.009	0.321	0.007	0.377	0.007	0.241	0.002	0.288	0.004
09:00am to 09:59am	0.585	0.013	0.453	0.011	0.396	0.009	0.547	0.011	0.509	0.009	0.611	0.006	0.692	0.010
10:00am to 10:59am	0.623	0.014	0.642	0.016	0.547	0.013	0.679	0.014	0.509	0.009	0.796	0.008	0.577	0.008
11:00am to 11:59am	0.472	0.010	0.340	0.008	0.396	0.009	0.283	0.006	0.453	0.008	0.574	0.006	0.731	0.010
12:00pm to 12:59pm	0.453	0.010	0.377	0.009	0.377	0.009	0.472	0.010	0.358	0.007	0.574	0.006	0.692	0.010
13:00pm to 13:59pm	0.377	0.008	0.509	0.013	0.358	0.009	0.321	0.007	0.509	0.009	0.519	0.005	0.558	0.008
14:00pm to 14:59pm	0.491	0.011	0.358	0.009	0.604	0.014	0.415	0.009	0.434	0.008	0.537	0.005	0.481	0.007
15:00pm to 15:59pm	0.434	0.009	0.415	0.010	0.491	0.012	0.264	0.006	0.472	0.009	0.463	0.005	0.442	0.006
16:00pm to 16:59pm	0.491	0.011	0.358	0.009	0.283	0.007	0.340	0.007	0.453	0.008	0.259	0.003	0.404	0.006
17:00pm to 17:59pm	0.340	0.007	0.283	0.007	0.321	0.008	0.264	0.006	0.151	0.003	0.315	0.003	0.423	0.006
18:00pm to 18:59pm	0.434	0.009	0.491	0.012	0.377	0.009	0.245	0.005	0.472	0.009	0.352	0.004	0.308	0.004
19:00pm to 19:59pm	0.302	0.007	0.245	0.006	0.340	0.008	0.226	0.005	0.302	0.006	0.463	0.005	0.346	0.005
20:00pm to 20:59pm	0.396	0.009	0.415	0.010	0.340	0.008	0.264	0.006	0.340	0.006	0.296	0.003	0.346	0.005
21:00pm to 21:59pm	0.264	0.006	0.358	0.009	0.377	0.009	0.245	0.005	0.321	0.006	0.500	0.005	0.365	0.005
22:00pm to 22:59pm	0.321	0.007	0.226	0.006	0.189	0.004	0.189	0.004	0.491	0.009	0.370	0.004	0.135	0.002
23:00pm to 23:59pm	0.208	0.005	0.264	0.007	0.208	0.005	0.170	0.004	0.132	0.002	0.296	0.003	0.308	0.004
	8.113	0.177	7.208	0.180	6.962	0.166	6.528	0.137	7.377	0.136	8.537	0.087	8.192	0.117

The data above is based on historical data received from NHS Fife.

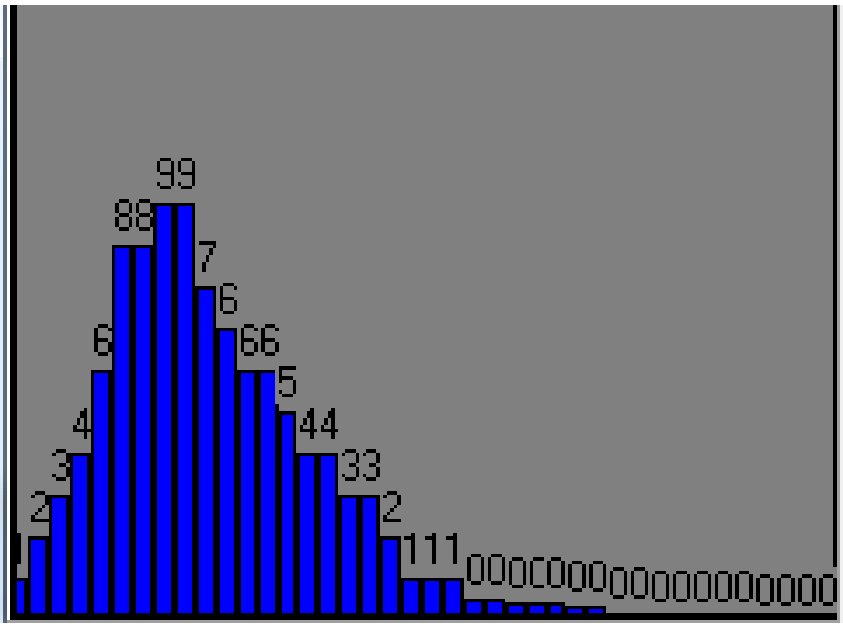
Appendix 25 Care Category Ratio



1= admit as inpatient; not a candidate for H@H
2= assess as candidate H@H patient, but admit to medical inpatients
3= assess and accept as H@H patient

Percentage ratio applied to Care Category (1, 2 or 3) inputted into Simul8 H@H model.

Appendix 26 Length of Stay Distribution



Distribution of the length of stay of patients (in days) admitted to H@H based on historical data inputted into Simul8 H@H model.

Appendix 27 Simul8 Results

using	virtual ward1D5.S8		
W staff=	10		
Simulation Object	-95%	Average	95%
discharge from VW	1741.983	1783.1	1824.217
discharge from ward	4825.818	4873.9	4921.982
late admission1	516.748	532.9	549.052
late admission 2	0	0	0
Queue for VW 1st visit	28.27983	28.87952	29.47921
Queue for VW care	114.8741	116.7381	118.6022
ward admit %	72.76345	73.24951	73.73558
VW staff=	9		
Simulation Object	-95%	Average	95%
discharge from VW	1740.039	1781.8	1823.561
discharge from ward	4826.536	4874.5	4922.464
late admission1	517.2357	533.7	550.1643
late admission 2	0	0	0
Queue for VW 1st visit	29.30741	29.93202	30.55662
Queue for VW care	116.333	118.248	120.163
ward admit %	72.77162	73.26103	73.75043
VW staff=	8		
Simulation Object	-95%	Average	95%
discharge from VW	1738.338	1779.2	1820.062
discharge from ward	4828.652	4877	4925.348
late admission1	518.3673	536.2	554.0327
late admission 2	0	0	0
Queue for VW 1st visit	31.24031	31.88148	32.52265
Queue for VW care	117.6494	119.2973	120.9453
ward admit %	72.81254	73.29691	73.78128
VW staff=	7		
Simulation Object	-95%	Average	95%
discharge from VW	1723.818	1763	1802.182
discharge from ward	4846.727	4894.8	4942.873
late admission1	535.0812	552.9	570.7188
late admission 2	0	0	0
Queue for VW 1st visit	35.44948	36.24907	37.04865
Queue for VW care	123.1698	124.0639	124.958
ward admit %	73.07187	73.5392	74.00653
VW staff=	6		
Simulation Object	-95%	Average	95%
discharge from VW	1677.652	1713.4	1749.148
discharge from ward	4893.461	4944.9	4996.339
late admission1	582.0746	603.5	624.9254
late admission 2	0	0	0
Queue for VW 1st visit	42.46353	43.4577	44.45187
Queue for VW care	123.8664	125.4582	127.0501
ward admit %	73.86704	74.2948	74.72257
VW staff=	5		
Simulation Object	-95%	Average	95%
discharge from VW	1569.426	1600.6	1631.774
discharge from ward	5004.046	5055.9	5107.754
late admission1	687.0317	714.9	742.7683

late admission 2	0	0	0
Queue for VW 1st visit	53.37575	54.1614	54.94705
Queue for VW care	128.7096	130.3731	132.0366
ward admit %	75.57926	75.95834	76.33742
VW staff=	4		
Simulation Object	-95%	Average	95%
discharge from VW	1383.086	1406.8	1430.514
discharge from ward	5197.558	5251.4	5305.242
late admission1	873.697	910.7	947.703
late admission 2	0	0	0
Queue for VW 1st visit	66.43349	67.65052	68.86755
Queue for VW care	136.9643	138.8979	140.8315
ward admit %	78.6133	78.88769	79.16209
VW staff=	3		
Simulation Object	-95%	Average	95%
discharge from VW	1111.363	1125.2	1139.037
discharge from ward	5471.828	5531.2	5590.572
late admission1	1145.823	1190.7	1235.577
late admission 2	0	0	0
Queue for VW 1st visit	80.92165	82.00182	83.08199
Queue for VW care	144.1167	147.2732	150.4297
ward admit %	82.91435	83.09478	83.27521
VW staff=	2		
Simulation Object	-95%	Average	95%
discharge from VW	742.8966	751.6	760.3034
discharge from ward	5835.527	5903.1	5970.673
late admission1	1510.298	1563.4	1616.502
late admission 2	0	0	0
Queue for VW 1st visit	96.00611	96.89095	97.77578
Queue for VW care	167.1546	170.5503	173.9459
ward admit %	88.52043	88.69144	88.86244
VW staff=	1		
Simulation Object	-95%	Average	95%
discharge from VW	301.5229	305.4	309.2771
discharge from ward	6277.328	6346.8	6416.272
late admission1	1954.562	2008.9	2063.238
late admission 2	0	0.3	0.64553
Queue for VW 1st visit	111.3257	111.7091	112.0925
Queue for VW care	246.7916	254.2609	261.7303
ward admit %	95.2961	95.38267	95.46923

WTE	VW staff	ward admit %	error	% on VW	Discharge from VW	Error
31.62	10	73.2%	0.5%	26.8%	1783	41.12
28.46	9	73.3%	0.5%	26.7%	1782	41.76
25.30	8	73.3%	0.5%	26.7%	1779	40.86
22.13	7	73.5%	0.5%	26.5%	1763	39.18
18.97	6	74.3%		25.7%	1713	35.75
15.81	5	76.0%		24.0%	1601	31.17
12.65	4	78.9%		21.1%	1407	23.71
9.49	3	83.1%		16.9%	1125	13.84
6.32	2	88.7%		11.3%	752	8.70
3.16	1	95.4%		4.6%	305	3.88

admit open wendVW staff=	10		
Simulation Object	-95%	Average	95%
discharge from VW	2212.713	2260.7	2308.687
discharge from ward	4351.743	4393.9	4436.057
late admission1	49.42808	55.5	61.57192
late admission 2	0	0	0
Queue for VW 1st visit	7.43801	7.92854	8.41908
Queue for VW care	117.1002	118.6353	120.1703
ward admit %	65.53296	66.06809	66.60323
admit open wendVW staff=	9		
Simulation Object	-95%	Average	95%
discharge from VW	2204.943	2252.7	2300.457
discharge from ward	4359.098	4401	4442.902
late admission1	55.89112	62.8	69.70888
late admission 2	0	0	0
Queue for VW 1st visit	10.56715	11.24137	11.91559
Queue for VW care	119.3713	120.508	121.6447
ward admit %	65.64725	66.17639	66.70554
admit open wendVW staff=	8		
Simulation Object	-95%	Average	95%
discharge from VW	2184.815	2229.4	2273.985
discharge from ward	4378.804	4423.4	4467.996
late admission1	75.71684	86.3	96.88316
late admission 2	0	0	0
Queue for VW 1st visit	15.32661	16.40669	17.48677
Queue for VW care	121.1758	122.4445	123.7131
ward admit %	66.02017	66.52343	67.02669
admit open wendVW staff=	7		
Simulation Object	-95%	Average	95%
discharge from VW	2128.902	2170.1	2211.298
discharge from ward	4436.104	4483.3	4530.496
late admission1	130.0027	145.3	160.5973
late admission 2	0	0	0
Queue for VW 1st visit	23.12235	24.36897	25.61558
Queue for VW care	124.3459	125.7087	127.0715
ward admit %	66.91479	67.39137	67.86795
admit open wendVW staff=	6		
Simulation Object	-95%	Average	95%
discharge from VW	2022.059	2053.6	2085.141
discharge from ward	4550.694	4601.3	4651.906
late admission1	236.5363	262.1	287.6637
late admission 2	0	0	0
Queue for VW 1st visit	3408%	35.60774	3713%
Queue for VW care	127.4156	128.6071	129.7986
ward admit %	68.76589	69.12789	69.48989
admit open wendVW staff=	5		
Simulation Object	-95%	Average	95%
discharge from VW	1841.931	1872.2	1902.469
discharge from ward	4730.838	4782.2	4833.562
late admission1	414.1288	443.8	473.4712
late admission 2	0	0	0
Queue for VW 1st visit	46.77766	48.092	49.40633
Queue for VW care	134.0508	135.2965	136.5421

ward admit %				71.50813	71.8582	72.20828
admit open wendVW staff=				4		
Simulation Object				-95%	Average	95%
discharge from VW				1592.489	1611.3	1630.111
discharge from ward				4985.47	5043.4	5101.33
late admission1				663.2949	705.1	746.9051
late admission 2				0	0	0
Queue for VW 1st visit				60.58335	61.97967	63.376
Queue for VW care				140.2016	141.9914	143.7813
ward admit %				75.52574	75.76349	76.00125
admit open wendVW staff=				3		
Simulation Object				-95%	Average	95%
discharge from VW				1258.698	1273.8	1288.902
discharge from ward				5313.821	5379.7	5445.579
late admission1				994.1028	1041.9	1089.697
late admission 2				0	0	0
Queue for VW 1st visit				76.08888	77.33874	78.5886
Queue for VW care				153.5571	154.9085	156.2599
ward admit %				80.5313	80.80442	81.07755
admit open wendVW staff=				2		
Simulation Object				-95%	Average	95%
discharge from VW				842.9695	850.2	857.4305
discharge from ward				5740.444	5804	5867.556
late admission1				1415.813	1466.5	1517.187
late admission 2				0	0	0
Queue for VW 1st visit				93.06495	93.88135	94.69776
Queue for VW care				176.7822	178.8037	180.8253
ward admit %				87.05044	87.19729	87.34414
admit open wendVW staff=				1		
Simulation Object				-95%	Average	95%
discharge from VW				352.2613	355.5	358.7387
discharge from ward				6229.052	6295.2	6361.348
late admission1				1906.673	1958.6	2010.527
late admission 2				0.23102	1.3	2.36898
Queue for VW 1st visit				109.5276	109.8655	110.2033
Queue for VW care				288.4281	292.6571	296.8861
ward admit %				94.55239	94.62374	94.69509
weekend						
31.62	10	66.1%	0.5%	33.9%	2261	47.99
28.46	9	66.2%		33.8%	2253	47.76
25.30	8	66.5%		33.5%	2229	44.58
22.13	7	67.4%		32.6%	2170	41.20
18.97	6	69.1%		30.9%	2054	31.54
15.81	5	71.9%		28.1%	1872	30.27
12.65	4	75.8%		24.2%	1611	18.81
9.49	3	80.8%		19.2%	1274	15.10
6.32	2	87.2%		12.8%	850	7.23
3.16	1	94.6%		5.4%	356	3.24

Appendix 28 Costs per day

Cost Book 2008/2009 Cost per Day				
		Direct £	Allocated £	Total £
General Medicine	Average	259	225	484
General Surgery	Average	450	200	650

Source: NHS Fife

Appendix 29 Salaries

	Salary £
Nurse Practitioner: Band 7	48900
Nurse Practitioner: Band 6	35795
Nurse Practitioner: Band 5	35795
Nurse Practitioner: Band 3	22425
Staff Sickness Absence Cover 21%	

Source: NHS Fife

Appendix 30 Costs 5 Day Working

	VW	WTE	VW	MI	MI	Beddays	Beddays Saved	MI Cost	VW Cost	Travel Cost	Total Cost	Saving	
	5 days admit												
10	26.75%	31.62	1779	73.25%	4871	51487	18803	24919924	1131886	94864	26146674	7873928	23.1%
9	26.74%	28.46	1778	73.26%	4872	51496	18795	24923843	1018697	85377.6	26027918	7992684	23.5%
8	26.70%	25.30	1776	73.30%	4874	51521	18770	24936050	905509	75891.2	25917450	8103152	23.8%
7	26.46%	22.13	1760	73.54%	4890	51691	18599	25018479	792320	66404.8	25877203	8143399	23.9%
6	25.71%	18.97	1709	74.29%	4941	52222	18068	25275538	679131	56918.4	26011588	8009014	23.5%
5	24.04%	15.81	1599	75.96%	5051	53391	16899	25841485	565943	47432	26454859	7565743	22.2%
4	21.11%	12.65	1404	78.89%	5246	55451	14840	26838067	452754	37945.6	27328767	6691835	19.7%
3	16.91%	9.49	1124	83.09%	5526	58408	11883	28269344	339566	28459.2	28637369	5383233	15.8%
2	11.31%	6.32	752	88.69%	5898	62342	7949	30173362	226377	18972.8	30418712	3601890	10.6%
1	4.62%	3.16	307	95.38%	6343	67045	3246	32449759	113189	9486.4	32572434	1448168	4.3%
0	0	0	0	100%	6650	70290.5	0	34020602	0		34020602	0	0.0%

Appendix 31 Costs 7 Day Working

VW	WTE	VW	MI	MI	Beddays	Beddays Saved	MI Cost	VW Cost	Travel Cost	Total Cost	Saving	
7 days admit												
33.93%	31.62	2256	66.07%	4394	46440	23851	22476762	1131886	94864	23703512	10317090	30.3%
33.82%	28.46	2249	66.18%	4401	46516	23775	22513606	1018697	85377.6	23617681	10402921	30.6%
33.48%	25.30	2226	66.52%	4424	46760	23531	22631671	905508.5	75891.2	23613071	10407531	30.6%
32.61%	22.13	2168	67.39%	4482	47370	22921	22926950	792319.9	66404.8	23785675	10234927	30.1%
30.87%	18.97	2053	69.13%	4597	48590	21700	23517724	679131.4	56918.4	24253774	9766828	28.7%
28.14%	15.81	1871	71.86%	4779	50509	19781	24446592	565942.8	47432	25059967	8960635	26.3%
24.24%	12.65	1612	75.76%	5038	53255	17036	25775195	452754.3	37945.6	26265895	7754707	22.8%
19.20%	9.49	1277	80.80%	5373	56798	13493	27490150	339565.7	28459.2	27858175	6162427	18.1%
12.80%	6.32	851	87.20%	5799	61291	8999	29665043	226377.1	18972.8	29910393	4110209	12.1%
5.38%	3.16	358	94.62%	6292	66511	3779	32191566	113188.6	9486.4	32314241	1706361	5.0%
0.0%	0.00	0	100.0%	6650	70291	0	34020602	0	0	34020602	0	0.0%

Appendix 32 Shift Pattern

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Calculated hours each week	Actual hours each week	Total available WTE hours	Average demand each hour	Average demand: available hours
Hours												
0	0	0	0	0	0	0	0				2.1%	
1	0	0	0	0	0	0	0				1.9%	
2	0	0	0	0	0	0	0				2.0%	
3	0	0	0	0	0	0	0				1.7%	
4	0	0	0	0	0	0	0				1.2%	
5	0	0	0	0	0	0	0				2.3%	
6	0	0	0	0	0	0	0				2.2%	
7	0	0	0	0	0	0	0				2.2%	
8	9	9	9	7	7	6	6	36	53		4.7%	6.1%
9	9	9	9	7	7	6	6	54	53		7.2%	9.2%
10	9	9	9	7	7	6	6	63	53		8.3%	10.7%
11	7	7	7	6	6	6	6	46	45		6.1%	7.9%
12	7	7	7	6	6	6	6	47	45		6.2%	8.0%
13	7	7	7	6	6	6	6	45	45		6.0%	7.7%
14	7	7	7	6	6	6	6	48	45		6.3%	8.1%
15	7	7	7	6	6	6	6	43	45		5.6%	7.3%
16	6	6	6	4	4	4	4	37	34		4.9%	6.3%
17	6	6	6	4	4	4	4	30	34		4.0%	5.1%
18	6	6	6	4	4	4	4	38	34		5.1%	6.5%
19	6	6	6	4	4	4	4	32	34		4.2%	5.4%
20	6	6	6	4	4	4	4	34	34		4.5%	5.8%
21	6	6	6	4	4	4	4	35	34		4.6%	5.9%
22	0	0	0	0	0	0	0				3.6%	
23	0	0	0	0	0	0	0				3.0%	
Calculated hours each day	104	106	98	81	80	51	69				100.0%	77.6%
Actual hours each day	98	98	98	75	75	72	72					
Average demand each day	17.70%	18%	16.60%	13.70%	13.60%	8.70%	11.70%					
										588		

Appendix 33 SoApt

PROJECT OPTION ASSESSOR- Proposal

Project Scope:	Virtual Ward; caring for adults 75 years and over at home	**Project ID:**	A
		Project Name:	Integrated Community and Assessment Support Service
		Project Lead:	Brenda
		Cost of Current Service Provision (estimated as cost per head)	£2,285
		Current Service Volume (patients p.a.)	2200
		Estimated Life of Project (years)	3

IMPACT ON CARE			THE DIFFERENCES IN CARE THE NEW SERVICE WILL BRING COMPARED TO THE CURRENT SERVICE				
CRITERIA	**SUB-CRITERIA**	**DEFINITION OF CRITERIA**	DIFFERENCES in new service compared to current service	SCORING the DIFFERENCES	MEASUREMENT used to evaluate new service	TIMESCALE	RESPONSIBILITY
Person Centred	Client Choice	Where clients and their carer's preferences for care are given priority and clients are enabled to be involved in their care-plan.	Clients encouraged to participate in decision making and given choice of care where appropriate , enabling them to achieve and sustain their maximum potential	Care Much Improved	Client survey	6	BT
	Continuity and Coordination of Care	Seeing the same healthcare professionals throughout care provision which is well coordinated between different staff, different departments, different hospitals and staff in primary care.	Consistency and continuity of care across Fife (3 geographic teams)	Care Much Improved	Client survey	6	BT
	Facilities & Environment	Fit for purpose and condusive to client care at home or other care facility.	Clients seen mainly in own enviroment, staff co-located to facilitate optimum communication	Care Much Improved	Admission to acute	6	KL
	Access	Convenience of access to care and location of care.	Clients seen mainly in own enviroment, if care required outwith home then care provided in a single centre in one geographical area	Care Much Improved	Number of admissions to acute	6	KL
Safe	Safe	Reducing adverse events leading to safe and successful outcomes.	Reduced risk of hospital acquired infection, also improvement in clinical information sharing	Care Improved	Secondary infection monitor	6	KL
	Prevention	Promoting preventative and anticipatory care and self-management.	Client enabled to maintain independence	Care Much Improved	Number of admissions to acute	6	KL
Effective	Provision of Care	Care is consistently provided by the right person in the appropriate place at the right time thereby improving the health and well-being of the Client.	Timely care provided in the right place by the right person	Care Much Improved	Client survey	6	BT
	Integration	Integrates health and social care in primary, secondary, local partnerships and/or the 3rd sector.	Whole system integrated model	Care Much Improved	Delayed Discharge	12	KL
	Evidence Based	There are documented outcomes of like proposals or success elsewhere.	Gwent	Care Much Improved		0	
Timely	Waiting Time	Improved effectiveness and efficiency of care reducing the time the Client waits before treatment.	Target wait time in place	Care Improved	Wait time	6	KL
Equitable	Waiting Time	Waiting time does not differ due to location, status, ethnicity, gender or physical ability.	Improved equity of wait due to geographical service delivery	Care Improved	Wait time comparison across three localities	6	KL
	Clinical Practice	Clients are given the same opportunity of treatment which does not differ due to location, status, ethnicity, gender or physical ability but is based on Clients needs.	Consistency of clinical practice across the three teams	Care Improved	Client Survey Comparison	6	BT

IMPACT ON COSTS/ORGANISATION

SAVINGS

THE EFFICIENCY SAVINGS THE NEW SERVICE WILL PROVIDE COMPARED TO THE CURRENT SERVICE

CRITERIA	SUB-CRITERIA	DEFINITION OF CRITERIA	REASON for EFFICIENCY SAVING	Year	Capital	In Year Revenue	Recurrent Revenue	MEASUREMENT used to calculate efficiency saving	TIMESCALE	RESPONSIBILITY
Efficient	Cost Avoidance including impact on other services	The reduction from a projected (unbudgeted) level of spending had the action or improvement decision not taken place (in year).		1	£0	£0			0	
				2						
				3						
	Cost Reduction including impact on other services	The reduction from a projected (budgeted) level of spending (in year).	Reduction in acute beds @ £225/day	1	£0	£0	£1,158,914	available bed days	12	
				2			£4,183,466			
				3			£3,968,399			
	Cash Releasing including impact on other services	The recurrent level of financial savings (from the annual budget allocation) that can be given up (released) for investment elsewhere on a recurring basis.		1			£0		0	
				2						
				3						

COSTS

THE ADDITIONAL COSTS THE NEW SERVICE WILL BRING COMPARED TO THE CURRENT SERVICE

			REASON for ADDITIONAL COST	Year	Capital	In Year Costs	Recurrent Costs	MEASUREMENT used to calculate additional cost	TIMESCALE	RESPONSIBILITY
Staff	Training	Additional training required to deliver the proposal	£1365 per person, mixture of in-house provision and external for each team	1		£32,760	£0	Training costs	12	
				2		£0	£1,000	Refresher costs	12	
				3			£1,000	Refresher costs	12	
	Supervision and Support	Additional Supervision and support of staff to deliver the proposal	Consultant Geriatrician 18.75 hrs@ £60 for each team	1			£5,475	invoice	12	
				2			£5,475	invoice	12	
				3			£5,475	invoice	12	
	Recruitment	Additional recruitment of staff required to deliver the proposal		1		£0	£0		0	
				2						
				3						
	Development	Development costs including the setting up of protocols, double running costs		1		£0	£0		0	
				2						
				3						
	Salaries	Additional Staff salaries: staff numbers, no. of shifts	1* Band 7, 3.52* Band 6, 2* Band 5, Suport Worker Band 3*3.44	1		£0	£2,079,528	Salaries	12	
				2			£2,079,528	Salaries	12	
				3			£2,079,528	Salaries	12	
	Consumables	Additional Consumable costs required for the proposal	Travel expenses @ £3000/annum per team	1	£0	£0	£87,840	Travel expenses	12	
				2			£87,840	Travel expenses	12	
				3			£87,840	Travel expenses	12	
Resources	Equipment & IT	Additional equipment and IT required for the proposal		1	£0	£0	£0		0	
				2						
				3						
	Premises	Additional costs for premises the proposal will be housed in		1	£0	£0	£0		0	
				2						
				3						
	Other Services	Additional costs as a result of impact on other services		1	£0	£0	£0		0	
				2						
				3						

PROJECT STATUS REPORT

Project Scope: Virtual Ward; caring for adults 75 years and over at home

Project ID:	A
Project Name:	Community and Assessment Supp
Project Lead:	Brenda
Current cost per patient	£2,285
Volume (patients p.a.)	2200
Life of project (years)	3

Summary Delivery Status

Project Start Date	15/01/2013
Today's Date	24/04/2013
Final Check Date	15/01/2014

Project Week 14

Status: Amber

Summary Benefits Status

Achieved to Date

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

enter 'x' to fill

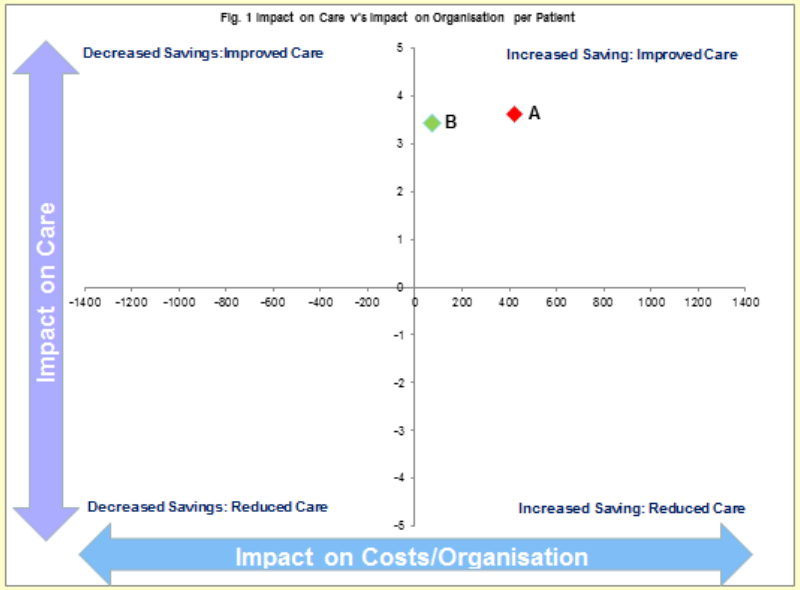
Benefits Realisation

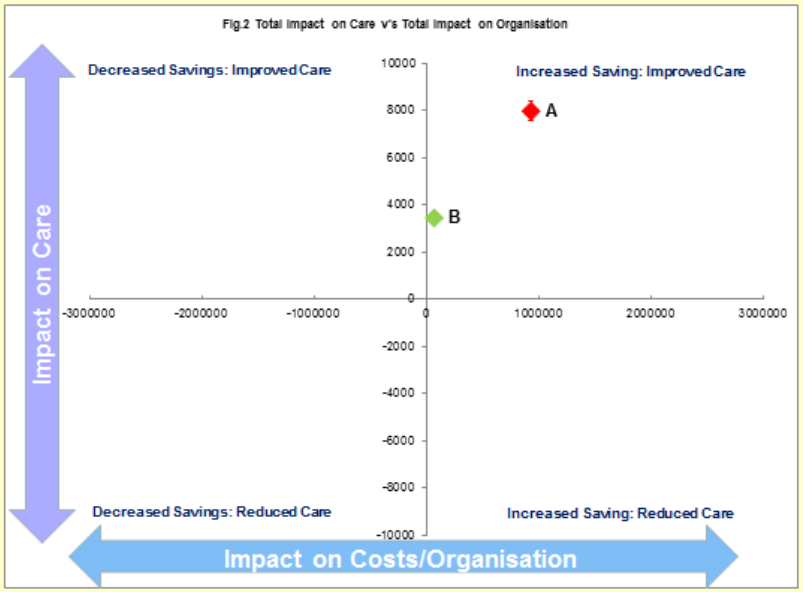
Criteria	Sub-criteria	Estimated Benefit	1st Progress Check Date	Actual Benefit	2nd Progress Check Date	Actual Benefit	Final Progress Check Date	Actual Benefit	Progress Statement	Status
Person Centred	Patient Choice	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Red
	Continuity and Coordination of Care	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			
	Facilities & Environment	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			
	Access	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
Safe	Clinically Safe	Care Improved	16/07/2013		15/10/2013		15/01/2014			Green
	Prevention	Care Much Improved	16/07/2013		15/10/2013		15/01/2014			Amber
Effective	Provision of Care	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
	Integration	Care Much Improved	15/01/2013		16/04/2013		15/01/2014			Amber
	Evidence Based	Care Much Improved	16/07/2013		15/10/2013		15/01/2014			Green
Timely	Waiting Time	Care Improved	16/07/2013		15/10/2013		15/06/2011			Green
Equitable	Waiting Time	Care Improved	15/01/2013		16/04/2013		15/01/2014			Red
	Clinical Practice	Care Improved	16/07/2013		15/10/2013		15/01/2014			Amber

Criteria	Sub-criteria	Estimated Saving	1st Progress Check Date	Actual Saving	2nd Progress Check Date	Actual Saving	Final Progress Check Date	Actual Saving	Progress Statement	Status
Efficiency	Cost Avoidance including impact on other services	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Cost Reduction including impact on other services	£0	15/01/2014		16/04/2014		15/01/2014			N/A
	Cash Releasing including impact on other services	£0	15/01/2013		16/04/2013		15/01/2014			N/A

Criteria	Sub-criteria	Estimated Cost	1st Progress Check Date	Actual Cost	2nd Progress Check Date	Actual Cost	Final Progress Check Date	Actual Cost	Progress Statement	Status
Staff	Training	£1,000	15/01/2014		16/04/2014		15/01/2014			Amber
	Supervision and Support	£1,000	15/01/2014		16/04/2014		15/01/2014			Amber
	Recruitment	£5,475	15/01/2014		16/04/2014		15/01/2014			Amber
	Development	£5,475	15/01/2014		16/04/2014		15/01/2014			Amber
Resources	Salaries	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Consumables	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Equipment & IT	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Premises	£0	15/01/2013		16/04/2013		15/01/2014			N/A
	Other Services	£0	15/01/2013		16/04/2013		15/01/2014			N/A

PROJECT OPTION ASSESSOR- Project Comparator





Criteria Weightings

Impact on Care Weightings	criterion	user defined weight	criterion	user defined weight
	Patient Centred	0.2	Patient Choice	0.35
			Continuity and Coordination of Care	0.33
			Facilities & Environment	0.15
			Access	0.17
	Safe	0.3	Clinically Safe	1
	Effective	0.25	Prevention	0.24
			Provision of Care	0.22
			Integration	0.26
			Evidence Based	0.28
	Timely	0.1	Waiting Time	1
	Equitable	0.15	Waiting Time	0.45
			Clinical Practice	0.5

Project Investment Against Budget

Cost of Capital 15%

Project ID	Project Scope	Project Name	Volume of Clients	Life of Project	Care Score	Total Care Score	Saving/Client	Annual Savings	Investment Cost	ROI	Payback	Invest
A	Virtual Ward; caring for adults 75 years and over at home	Integrated Community and	2200	3	3.625	7975	422.61	929,750.00	£6,521,529.00	43%	7.01	Yes
B	Treating Cataracts in Primary Care	Cataracts	1000	3	3.4375	3437.5	70.33	70,333.33	£39,000.00	541%	0.55	Yes
C												
D												
E												
F												
G												
H												
I												
J												

Project ID		A	B	C	D	E	F	G	H	I	J	Remaining
Year 1 Budget	£10,000,000											
Investment		£2,173,843.00	£25,000.00									£7,801,157.00
Year 2 Budget	£7,801,157.00											
Investment		£2,173,843.00	£7,000.00									£5,620,314.00
Year 3 Budget	£5,620,314.00											
Investment		£2,173,843.00	£7,000.00									£3,439,471.00

PROJECT OPTION ASSESSOR- Project Options

	criterion 1	weight 1	criterion 2	weight 2	weight total	A	B	C	D	E	F	G
Project ID:						A	B	C	D	E	F	G
Project Name:						Integrated Community and	Calercole	#REF!	#REF!	#REF!	#REF!	#REF!
Project Lead:						Brenda	CH	#REF!	#REF!	#REF!	#REF!	#REF!
Current cost per patient:						2285	1000	#REF!	#REF!	#REF!	#REF!	#REF!
Volume (patients						2200	1000	#REF!	#REF!	#REF!	#REF!	#REF!
Life of project						3	3	#REF!	#REF!	#REF!	#REF!	#REF!
Impact on Care						care score	care score	care score	care score	care score	care score	care score
	Patient Centred	0.2	Patient Choice	0.35	0.07	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
			Continuity and Coordination of Care	0.33	0.066	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
			Facilities & Environment	0.15	0.03	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
			Access	0.17	0.034	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
	Safe	0.3	Clinically Safe	1	0.3	Care Improved	Care Improved	#REF!	#REF!	#REF!	#REF!	#REF!
	Effective	0.25	Prevention	0.24	0.06	Care Much Improved	Neutral	#REF!	#REF!	#REF!	#REF!	#REF!
			Provision of Care	0.22	0.055	Care Much Improved	Care Improved					
			Integration	0.22	0.065	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
			Evidence Based	0.26	0.07	Care Much Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
	Timely	0.1	Waiting Time	1	0.1	Care Improved	Care Much Improved	#REF!	#REF!	#REF!	#REF!	#REF!
	Equitable	0.15	Waiting Time	0.45	0.0711	Care Improved	Care Improved	#REF!	#REF!	#REF!	#REF!	#REF!
			Clinical Practice	0.526315789	0.0789	Care Improved	Care Improved	#REF!	#REF!	#REF!	#REF!	#REF!
Total Care Score		1			1	<u>3.625</u>	<u>3.4375</u>	<u>#REF!</u>	<u>#REF!</u>	<u>#REF!</u>	<u>#REF!</u>	<u>#REF!</u>

Impact on Organisation				Year	A Capital	A In Year Revenue	A Recurrent Revenue	B Capital	B In Year Revenue	B Recurrent Revenue
Savings	Efficient	£	Cost Avoidance including impact on other services	1	£0	£0	£0	£0	£0	£0
				2	£0	£0	£0	£0	£0	£0
				3	£0	£0	£0	£0	£0	£0
		£	Cost Reduction including impact on other services	1	£0	£0	£1,158,914	£0	£0	£0
				2	£0	£0	£4,183,466	£0	£0	£0
				3	£0	£0	£3,968,399	£0	£0	£0
			Cash Releasing Efficiency Savings including impact on other services	1	£0	£0	£0	£0	£0	£85,000
				2	£0	£0	£0	£0	£0	£85,000
		£		3	£0	£0	£0	£0	£0	£80,000
	Savings from Project				£0	£0	£9,310,779	£0	£0	£250,000
	Total Savings					£9,310,779			£250,000	
Costs	Staff	£	training	1		£0	£1,000		£20,000	£0
				2		£0	£1,000		£0	£2,000
				3		£0	£1,000		£0	£2,000
			supervision and support	1		£0	£5,475		£0	£5,000
				2		£0	£5,475		£0	£5,000
				3		£0	£5,475		£0	£5,000
			recruitment	1		£0	£0		£0	£0
				2		£0	£0		£0	£0
				3		£0	£0		£0	£0
			development	1		£0	£0		£0	£0
				2		£0	£0		£0	£0
				3		£0			£0	£0
			salaries	1		£0	£2,079,528		£0	£0
				2		£0	£2,079,528		£0	£0
				3		£0	£2,079,528		£0	£0
	Resources	£	consumables	1	£0	£0	£87,840	£0	£0	£0
				2	£0	£0	£87,840	£0	£0	£0
				3	£0	£0	£87,840	£0	£0	£0
			equipment & IT	1	£0	£0	£0	£0	£0	£0
				2	£0	£0	£0	£0	£0	£0
				3	£0	£0	£0	£0	£0	£0
			premises	1	£0	£0	£0	£0	£0	£0
				2	£0	£0	£0	£0	£0	£0
				3	£0	£0	£0	£0	£0	£0
			other services	1	£0	£0	£0	£0	£0	£0
				2	£0	£0	£0	£0	£0	£0
				3	£0	£0	£0	£0	£0	£0
	Investment Required for Project				£0	£0	£6,521,529	£0	£20,000	£19,000
	Total Investment					£6,521,529			£39,000	
	Total Revenue of Project					£2,789,250			£211,000	
	Saving per patient					£422.61			£70.33	
	Projected new cost per patient					£1,862.39			£929.67	

Item	Year	C Capital	C In Year Revenue	C Recurrent Revenue	D Capital	D In Year Revenue	D Recurrent Revenue	E Capital	E In Year Revenue	E Recurrent Revenue	F Capital	F In Year Revenue	F Recurrent Revenue	G Capital	G In Year Revenue
training	1		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!
supervision and support	1		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!
recruitment	1		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!
development	1		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!
salaries	1		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!	#REF!		#REF!
consumables	1	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
equipment & IT	2	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
premises	2	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
other services	2	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Investment Required for Project		#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total Investment			#REF!			#REF!			#REF!			#REF!			#REF!
Saving per patient			#REF!			#REF!			#REF!			#REF!			#REF!
Projected new cost per patient			#REF!			#REF!			#REF!			#REF!			#REF!

Appendix 34 Justification of Sub-criteria

Project Scope	**Criteria 1, 12**
Project ID	
Project Name	
Project Lead	
Cost of Current Service Provision	
Current Service Volume	
Estimated Life of Project	

Criteria	Definition	Sub-criteria	Definition	Impact Area	Heat Target	Change Fund
Person Centred	Providing care that is responsive to individual personal preferences, needs and values and assuring that patient values guide all clinical decisions.	Patient Choice	Where patients and their carer's preferences for care are given priority and patients are enabled to be involved in their care plan.	**1, 7**	**T1 11/12, T7 9/10, T12 10/11**	**2, 10**
		Continuity and Coordination of Care	Seeing the same healthcare professionals throughout care provision which is well coordinated between different staff, different departments, different hospitals and staff in primary care.	**2**	**T1 11/12, T8 10/11**	**2**
		Facilities and Environment	Fit for purpose and conducive to patient care at own home or other care facility.	**1, 3, 7**	**T7 9/10**	**2**
		Access	Convenience of access to care and location of care.	**6**		
Safe	Avoiding injuries to patients from healthcare that is intended to help them.	Clinically Safe	Reducing adverse events leading to safe and successful outcomes.	**1,3, 4**	**T3 11/12**	**10**
Effective	Providing services based on scientific knowledge.	Prevention	Promoting preventative and anticipatory care and self-management.	**3, 4**	**T1 11/12 T12 10/11**	**10**
		Provision of Care	Care is consistently provided by the right person in the appropriate place at the right time thereby improving the health and well-being of the patient.	**3,4**	**T4 11/12 T1 11/12 T8 10/11**	
		Integration	Integrates health and social care in primary, secondary,	**2, 5**	**T1 11/12, T4**	**7a, 11**

			local partnerships and/ or the 3rd sector.		11/12	
		Evidence Based	There are documented outcomes of like proposals or success elsewhere.			4
Timely	Reducing waits and sometimes harmful delays for both those who receive care and those who give care.	Waiting Time	Improved effectiveness and efficiency of care reducing the time the patient waits before treatment.	4	A2 11/12	
Equitable	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location or socio-economic status.	Waiting Time	Waiting time does not differ due to location, status, ethnicity, gender or physical ability.	6		
		Clinical Practice	Patients are given the same opportunity of treatment which does not differ due to location, status, ethnicity, gender or physical ability but is based on patient's needs.	4, 6		
Efficient	Avoiding waste, including waste of equipment, supplies, ideas and energy	Cost Avoidance, including impact on other services.	The reduction from a projected (unbudgeted) level of spending had the action or improvement decision not taken place in year.	8		6
		Cost Reduction, including impact on other services.	The reduction from a projected (budgeted) level of spending in year.	8		6
		CRES, including impact on other services.	The recurrent level of financial savings (from the annual budget allocation) that can be released for investment elsewhere on a recurring basis.	8	E2 11/12	6,7b

High Impact Areas

1. Maximise flexible and responsive care at home with support for carers

Most people want to be cared for safely in their own home for as long as possible. The ideal situation is that packages of care should be assessed and planned with an individual (and their carer) and then reviewed and adapted to reflect their changing circumstances and/or growing dependency, thereby reducing or delaying the need for people to move out of their homes.

2. Integrate health and social care to support people in need and at risk

Many people find the maze of health, social care and housing services, benefits and procedures confusing. People with more than one long term condition, often with complex needs, may be visited or contacted by a number of different people from different departments in different organisations who may not fully understand the individual's holistic needs.

The number and proportion of the population with health and social care needs is increasing as the population ages. For example, later in life many people may be living with more than one long term condition and an increasing number of people will have dementia. People with cognitive and physical needs may be vulnerable and require integrated, personalised responses from statutory and third sector providers of care and support.

3. Reduce avoidable unscheduled attendances and admissions to acute hospitals

Emergency admissions and attendances at A&E departments have increased over the last decade despite the population size remaining more or less constant. Part of the increase may be due to the 'aging' of the population.

Studies have demonstrated that a significant proportion of A&E attendances are for conditions that could be better managed in the community by the patient, their GP or another member of the primary care team. People, particularly those who live close to an acute hospital, tend to use A&E departments as the first place to seek healthcare treatment, even though this may not be the most appropriate place to be treated. This is particularly true of people who seek treatment outside working hours.

Recent work mapping health care expenditure has shown that in many Board areas around 25-30% of NHS Boards' total budgets are spent on unscheduled admissions to acute hospitals. Of those who are admitted to hospital as an emergency, the majority are over 65 years old. Some people may be admitted because there are no 'safe' alternatives and not necessarily because they need specialist care.

4. Improve capacity and flow management for scheduled care

Reducing waiting lists and waiting times for scheduled care has been a focus of attention over many years, mainly for acute hospitals. It remains a priority for the Scottish Government, which has set out a whole patient journey waiting time target of 18 weeks from general practitioner referral to treatment by December 2011.

There is often a significant variation in the rate of referral for specialist scheduled care, both in terms of volume of referrals and the point in the disease pathway at which these referrals are made. While some of this variation is attributable to differences in demography and local characteristics of the population, some is also due to variation in clinical practice. This needs to be better understood, as variation can be very expensive unless it results in improved outcomes.

5. Extend scope of services provided by non medical practitioners outside acute hospital

The NHS, Local Authorities and third sector partners are responding to the changing needs of patients and local communities by providing more local services and more individualised packages of care for key groups.

Non-medical professionals (e.g. nurses, pharmacists, optometrists, chiropodists, physiotherapists, psychologists, occupational therapists, dieticians, dentists and speech and language therapists) have a pivotal role to play in providing care in primary and community settings. They have an extensive range of skills and knowledge that can enhance workforce capacity in communities and support delivery of more care outside acute hospitals. They are increasingly working as part of extended clinical teams, providing better access to information, advice and treatment.

6. Improve access to care for remote and rural areas

Around 20% of Scotland's population live in areas that have been classified as remote and rural. Delivering high quality care in these areas is challenging and without careful planning and management could potentially lead to inequalities in access. Within the remote and rural communities of Scotland, the skills and expertise of health and social care professionals will need to be effectively deployed if communities are to have local access to the widest possible spectrum of care.

These issues were explored by a national working group who published a report 'Delivering for Remote and Rural Healthcare' in May 2008. The recommendations are being implemented through the Rural and Remote Implementation Group (RRIG). The key recommendations include:

- integrated and co-located extended community care teams
- increased use of Telecare, Telemedicine and Telehealth solutions to support local care delivery and diagnosis
- more anticipatory care
- the development of obligate networks linking rural communities and specialist care
- the importance of the role of integrated community transport

Remote and Rural Communities are often at the leading edge of what is possible in relation to shifting the balance of care, particularly in terms of what can be provided in a community setting.

7. Improve palliative and end of life care

About 55,000 people in Scotland die each year. Some 60% of these people die in hospital.

In the past, many people died suddenly and at any age, usually from infectious diseases. Today, the majorities of deaths are of people over the age of 65 and follow a period, possibly prolonged, of illness and/or frailty. This has wide-reaching implications for the type of care that will be required for people in future, and particularly in their last year of life.

Palliative and end of life care are integral aspects of the care delivered by all health or social care professionals to those living with and dying from any advanced, progressive or incurable condition. Palliative care is not just about care in the last months, days and hours of a person's life, but about ensuring quality of life for both patients and families at every stage of the disease process from diagnosis onwards.

There is still inequality in access to palliative and end of life care. Most people with cancer have good access. However, it is also important to ensure that people who die of frailty and/or dementia also have access to good quality care and support.

8. Improve joint use of resources (revenue and capital)

NHS Scotland and Local Authorities currently make significant investment choices that determine the way that health and social care services are shaped and delivered in order to meet the expectations of the Scottish public.

The dual pressures offered by demographic change and recent economic challenges make the efficacy and efficiency of those choices ever more important. The traditional planning and investment approach characterised by a focus on opportunities in the margins, whilst rolling forward budgets based on historic spend patterns, will not keep pace with challenges on this scale.

Health Improvement Targets for 2011/12

- Achieve agreed number of screenings using the setting-appropriate screening tool and appropriate alcohol brief intervention, in line with SIGN 74 guidelines during 2011/12.
- Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2011/12.
- Reduce suicide rate between 2002 and 2013 by 20%.
- Achieve agreed completion rates for child healthy weight intervention programme over the three years ending March 2014.
- NHSScotland to deliver universal smoking cessation services to achieve at least 80,000 successful quits (at one month post quit) including 48,000 in the 40% most-deprived within-Board SIMD areas over the three years ending March 2014.
- At least 60% of 3 and 4 year olds in each SIMD quintile to have fluoride varnishing twice a year by March 2014.

Health Improvement Targets for 2010/11

- Achieve agreed completion rates for child healthy weight intervention programme by 2010/11.
- Achieve agreed number of screenings using the setting-appropriate screening tool and appropriate alcohol brief intervention, in line with SIGN 74 guidelines by 2010/11.
- Reduce suicide rate between 2002 and 2013 by 20%, supported by 50% of key frontline staff in mental health and substance misuse services, primary care, and accident and emergency being educated and trained in using suicide assessment tools/ suicide prevention training programmes by 2010.
- Through smoking cessation services, support 8% of your Board's smoking population in successfully quitting (at one month post quit) over the period 2008/9 - 2010/11.
- Increase the proportion of new-born children exclusively breastfed at 6-8 weeks from 26.6% in 2006/07 to 33.3% in 2010/11.
- Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2010/11.
- At least 60% of 3 and 4 year olds in each SIMD quintile to have fluoride varnishing twice a year by March 2014.

Health Improvement Targets for 2009/10

- 80% of all three to five year old children to be registered with an NHS dentist by 2010/11.
- Achieve agreed completion rates for child healthy weight intervention programme by 2010/11.
- Achieve agreed number of screenings using the setting-appropriate screening tool and appropriate alcohol brief intervention, in line with SIGN 74 guidelines by 2010/11.
- Reduce suicide rate between 2002 and 2013 by 20%, supported by 50% of key frontline staff in mental health and substance misuse services, primary care, and accident and emergency being educated and trained in using suicide assessment tools/ suicide prevention training programmes by 2010.
- Through smoking cessation services, support 8% of your Board's smoking population in successfully quitting (at one month post quit) over the period 2008/9 - 2010/11.
- Increase the proportion of new-born children exclusively breastfed at 6-8 weeks from 26.6% in 2006/07 to 33.3% in 2010/11.
- Achieve agreed number of inequalities targeted cardiovascular Health Checks during 2009-10.

Efficiency Targets for 2011/12

- NHS Boards to operate within their agreed revenue resource limit; operate within their capital resource limit; meet their cash requirement.

- NHS Boards to deliver a 3% efficiency saving to reinvest in frontline services.
- NHSScotland to reduce energy-based carbon emissions and to continue a reduction in energy consumption to contribute to the greenhouse gas emissions reduction targets set in the Climate Change (Scotland) Act 2009.

Efficiency Targets for 2010/11

- NHS Boards to deliver agreed improved efficiencies for 1st outpatient attendance DNA, non-routine inpatient average length of stay, review to new outpatient attendance ratio, same-day surgery and pre-operative stay.
- NHS boards to operate within their agreed revenue resource limit; operate within their capital resource limit; meet their cash requirement.
- NHS boards to meet their cash efficiency target.
- To increase the percentage of new GP outpatient referrals into consultant led secondary care services that are managed electronically to 90% from December 2010.
- NHSScotland to reduce energy-based carbon emissions and to continue a reduction in energy consumption to contribute to the greenhouse gas emissions reduction targets set in the Climate Change (Scotland) Act 2009.
- NHS Boards should ensure that all staff on Agenda for Change permanent contracts take part in an annual review against a KSF post outline. Information on levels of competence and identified training needs must be made available through Boards recording summary information from at least 80% of development reviews on eKSF by end of March 2011.

Efficiency Targets for 2009/10

- NHS Boards to deliver agreed improved efficiencies for 1st outpatient attendance DNA, non-routine inpatient average length of stay, review to new outpatient attendance ratio and day case rate by March 2011.
- NHS boards to operate within their agreed revenue resource limit; operate within their capital resource limit; meet their cash requirement.
- NHS boards to meet their cash efficiency target.
- To increase the percentage of new GP outpatient referrals into consultant led secondary care services that are managed electronically to 90% from December 2010.
- NHS Scotland to reduce emissions over the period to 2011
- Achieve universal utilisation of CHI (radiology requests)
- NHS Boards to ensure at least 80 per cent of staff covered by Agenda for Change to have their annual Knowledge Skills Framework development reviews completed and recorded on e-KSF by March 2011.

Access Targets for 2011/12

- From the quarter ending December 2011, 95 per cent of all patients diagnosed with cancer to begin treatment within 31 days of decision to treat, and 95 per cent of those referred urgently with a suspicion of cancer to begin treatment within 62 days of receipt of referral.
- Deliver 18 weeks referral to treatment from 31 December 2011.
- By March 2013, 90% of clients will wait no longer than 3 weeks from referral received to appropriate drug or alcohol treatment that supports their recovery.
- Deliver faster access to mental health services by delivering 26 weeks referral to treatment for specialist Child and Adolescent Mental Health Services (CAMHS) services from March 2013; and 18 weeks referral to treatment for Psychological Therapies from December 2014.

Access Targets for 2010/11

- Provide 48 hour access or advance booking to an appropriate member of the GP Practice Team by 2010/11.
- From the quarter ending December 2011, 95 per cent of all patients diagnosed with cancer to begin treatment within 31 days of decision to treat, and 95 per cent of those referred urgently with a suspicion of cancer to begin treatment within 62 days of receipt of referral.
- Deliver 18 weeks referral to treatment from 31 December 2011. No patient will wait longer than 12 weeks from referral (all sources) to a first outpatient appointment from 31 March 2010. No patient will wait longer than 9 weeks from being placed on a waiting list to admission for an inpatient or day case treatment from 31 March 2011.
- By March 2013, 90% of clients will wait no longer than 3 weeks from referral received to appropriate drug treatment that supports their recovery. Waiting times appropriate to alcohol treatment will be defined and incorporated into a target covering both drugs and alcohol by April 2011.
- By March 2013 no one will wait longer than 26 weeks from referral to treatment for specialist CAMHS services. During 2010/11 the Scottish Government will work with NHS Boards to develop an access target for psychological therapies for inclusion in HEAT in 2011/12.

Access Targets for 2009/10

- Provide 48 hour access or advance booking to an appropriate member of the GP Practice Team by 2010/11.
- The maximum wait from urgent referral with a suspicion of cancer to treatment is 62 days; and the maximum wait from decision to treat to first treatment for all patients diagnosed with cancer will be 31 days from December 2011.
- Deliver 18 weeks referral to treatment from 31 December 2011. No patient will wait longer than 12 weeks from referral to a first outpatient appointment from 31 March 2010. No patient will wait longer than 12 weeks from being placed on a waiting list to admission for an inpatient or day case treatment from 31 March 2010.
- To offer drug misusers faster access to appropriate treatment to support their recovery.
- NHS Boards to deliver faster access to Child and Adolescent Mental Health Services.

Treatment Targets for 2011/12

- Reducing the need for emergency hospital care, NHS Boards will achieve agreed reductions in emergency inpatient bed days rates for people aged 75 and over between 2009/10 and 2011/12 through improved partnership working between the acute, primary and community care sectors.
- To improve stroke care, 90% of all patients admitted with a diagnosis of stroke will be admitted to a stroke unit on the day of admission, or the day following presentation by March 2013.
- Further reduce healthcare associated infections so that by March 2013 NHS Boards' *staphylococcus aureus* bacteraemia (including MRSA) cases are 0.26 or less per 1000 acute occupied bed days; and the rate of C *lostridium difficile* infections in patients aged 65 and over is 0.39 cases or less per 1000 total occupied bed days.
- To support shifting the balance of care, NHS Boards will achieve agreed reductions in the rates of attendance at A&E between 2009/10 and 2013/14.

Treatment Targets for 2010/11

- To achieve agreed reductions in the rates of hospital admissions and bed days of patients with primary diagnosis of COPD, Asthma, Diabetes or CHD, from 2006/07 to 2010/11.
- Increase the level of older people with complex care needs receiving care at home.

- Each NHS Board will achieve agreed improvements in the early diagnosis and management of patients with a dementia by March 2011.
- To support shifting the balance of care, NHS Boards will achieve agreed reductions in the rates of attendance at A&E
- To reduce all *staphylococcus aureus* bacteraemia (including MRSA) cases by 30% by 31 March 2010 and to achieve a further reduction in cases of 15% by 31 March 2011; and to reduce the rate of *Clostridium difficile* infections in patients aged 65 and over by at least 30% by 31 March 2011.
- By 2010/11, NHS Boards will reduce the emergency inpatient bed days for people aged 65 and over, by 10% compared with 2004/05.

Treatment Targets for 2009/10

- QIS clinical governance and risk management standards improving.
- Reduce the annual rate of increase of defined daily dose per capita of anti-depressants to zero by 2009/10, and put in place the required support framework to achieve a 10% reduction in future years.
- Reduce the number of readmissions (within one year for those that have had a psychiatric hospital admission of over 7 days by 10% by the end of December 2009).
- To achieve agreed reductions in the rates of hospital admissions and bed days of patients with primary diagnosis of COPD, Asthma, Diabetes or CHD, from 2006/7 to 2010/11.
- Improvement in the quality of healthcare experience.
- Increase the level of older people with complex care needs receiving care at home.
- Each NHS Board will achieve agreed improvements in the early diagnosis and management of patients with a dementia by March 2011.
- To support shifting the balance of care, NHS Boards will achieve agreed reductions in the rates of attendance at A&E, between 2007/08 and 2010/11.
- To reduce all staphylococcus aureus bacteraemia (including MRSA) by 30% by 2010; to introduce and comply with local antimicrobial policies by 2010; and to reduce the rate of C.diff infection in hospitals by at least 30% by 2011.
- By 2010/11, NHS Boards will reduce the emergency inpatient bed days for people aged 65 and over, by 10% compared with 2004/05.

The Quality Ambitions

Three Quality Ambitions provide the focus for everything NHSScotland does in its aim to deliver the best quality healthcare to the people of Scotland and, through this, make NHSScotland a world leader in healthcare quality.

Person-Centred

There will be mutually beneficial partnerships between patients, their families and those delivering healthcare services which respect individual needs and values and which demonstrate compassion, continuity, clear communication and shared decision-making.

The aims are:

- to improve and embed patient-reported outcomes and experience across all NHSScotland services
- to support staff, patients and carers to create partnerships which result in shared decision-making
- to inform and support people to manage and maintain their health, and to manage ill-health

Safe

There will be no avoidable injury or harm to people from healthcare they receive, and an appropriate, clean and safe environment will be provided for the delivery of healthcare services at all times.

The aims are:

- to secure the improvements which have been delivered through the success of the Scottish Patient Safety Programme, and roll out across other areas of NHSScotland activity
- to support integrated programme of action to reduce occurrence of Healthcare Associated Infection (HAI)

Effective

The most appropriate treatments, interventions, support and services will be provided at the right time to everyone who will benefit, and wasteful or harmful variation will be eradicated.

The aims are:

- to ensure continuity in all care pathways through implementation of long-term conditions action plan
- to apply information from quality data to drive consistently better care across NHSScotland
- to increase focus on preventative and anticipatory care and intervention

The Quality Ambitions

In order to be recognised as having world-leading healthcare services, we need to set out a clear set of ambitions with related measurable and achievable objectives (interventions) on which we can report progress.

Better Health, Better Care was based on the Institute of Medicine's six dimensions of quality. These six dimensions will remain central to our approach to systems-based healthcare quality improvement:

Person-centred:
Providing care that is responsive to individual personal preferences, needs and values and assuring that patient values guide all clinical decisions;
Safe:
Avoiding injuries to patients from healthcare that is intended to help them;
Effective:
Providing services based on scientific knowledge;
Efficient:
Avoiding waste, including waste of equipment, supplies, ideas, and energy;23 **Equitable***:*
Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location or socio-economic status; and
Timely:
Reducing waits and sometimes harmful delays for both those who receive care and those who give care.

We have a clear and shared vision for high quality healthcare services in Scotland which is derived from what people have told us they want and need:

Caring and compassionate staff and services;
Clear communication and explanation about conditions and treatment;
Effective collaboration between clinicians, patients and others;
A clean and safe care environment;
Continuity of care; and
Clinical excellence.

Our Commitment to Equality

NHSScotland is committed to understanding the needs of different communities, eliminating discrimination, reducing inequality, protecting human rights and building good relations by breaking down barriers that may be preventing people from accessing the care and services that they need, as well as meeting the legal duties in relation to age, race, disability and gender. It aims to address inequalities by recognising and valuing diversity, promoting a person-centred approach and involving people in the design and delivery of healthcare.
There are strong linkages between some of the key actions required and being taken forward to address health inequalities in Scotland, and proposed drivers of our quality strategy. In particular the person-centred and clinical effective drivers (specifically through long-term conditions) have the potential to address the health problems of many of those who carry a disproportionate burden of ill-health in our communities. Each of the aligned and integrated national programmes, intiatives and interventions pursued in support of achieving the three Quality Ambitions will require to be fully assessed in terms of their impact on equalities through a Health Inequalities Impact Assessment (HIIA), which includes mandatory Equalities Impact Assessment (EQIA). Through this we will ensure that the Quality Strategy optimises its impact on reducing inequality across Scotland.

The Improvement Interventions

Person-centred
We have a number of programmes and pilots in operation at present which are aimed at putting people at the centre of care and at supporting the development of relationships between NHSScotland staff, patients and carers which result in shared decision-making, better experiences and outcomes for patients and carers, and greater job satisfaction for staff. For example, there is the *Patient Experience Programme (Better Together)* (currently focusing on inpatients, general practice and long-term conditions), the S*elf Management Strategy*, *Keep Well* and *Well North*, *Living and Dying Well,* the

Delivering Patient-centred Care Programme underpinned by '*Curam*', the carer information strategies, *Scotland Cares* and the other work streams underway to develop further the caring and enabling aspects of the Nursing, Midwifery and Allied Health Professions. There is also the work to enhance the performance of NHSScotland as a Health Promoting Health Service, using every patient encounter as an opportunity to improve health.

This strategy sets out how this and other work will be brought together more coherently, visibly and consistently and integrated with new developments such as the work on supporting 'relationship-based care', and shared decision making tools (for which there is strong evidence of improved patient choice, better experience and lower utilisation of expensive interventions). We will also ensure that our investment in our capital infrastructure provides the appropriate environment to support high quality healthcare experience and outcomes.

We will implement a generic and appropriate approach for measuring individual patients own assessments of the quality of the outcome of their healthcare episode, whether in primary, secondary or emergency care, so that a patient-based measure of health outcomes and experience can also be used to drive improvement in the quality of healthcare services.

In order to capture patients' assessment of their relationship with the healthcare professional supporting them, in such a way that it can be used to inform improvement, a measurement technique known as the *Consultation and Relational Empathy (CARE)* measure has been developed in Scotland. The *CARE* measure has been well validated with doctors, both with GPs in primary care and consultants in secondary care. We will pursue the introduction of the use of the *CARE* measure in all clinical appraisals and with other healthcare professionals. We will be able to use these measures to highlight action needed to ensure equity in terms of health outcomes and experience. Other tools to support staff, patients and carers in achieving the mutually beneficial partnerships we want will be developed, where appropriate, including outcomes approaches such as *Talking Points*.

Our initial improvement interventions will be:

Implementation of the new Self-Management Strategy
Implementation of the Patient Rights (Scotland) Bill in 2011;
Action in response to the first results of the Better Together Patient Experience surveys;
Collection of appropriate data to measure patient reported outcomes (PROMS);
Shared decision-making defined, supported and measured;
Implementation of the CARE approach in primary and community care;
Building on the principles of the Quality and Outcomes Framework (QOF) to maximise quality in the other contractor areas;
Enhanced management of falls, pressure area prevention and nutrition;
Improve resources to support better health literacy;
Develop evidenced interventions to support improved person-centredness;
Develop a programme of action to ensure that peoples' equality needs are gathered, shared and responded to across health services by Summer 2011; and
Introduce interventions to improve staff experience.

Safe

The Scottish Patient Safety Programme is now making a significant impact across the NHS in Scotland. It represents an ambitious effort to make substantial safety improvements for the benefit of patients across a health system, and has gained significant ownership and buy-in from NHS staff. It aims to implement a set of key evidence-based interventions uniformly across all acute hospitals in Scotland, and to deliver significant reductions in premature mortality and in adverse events. We will roll out the successful focus on patient safety into a range of other care environments, and will develop appropriate approaches to improving safety in primary care and in mental health involving the contribution of both patients and staff.

NHSScotland's eHealth Strategy launched in June 2008 is focused on using information to improve quality. Good progress is being made in developing information technology and

improving the business processes necessary to ensure that we get benefit from our investment in eHealth. The aim is to build a 'virtual patient record' that will contribute towards safety, continuity of care and collaborative decision making. With additional investment planned for 2010/11, key eHealth contributions to better quality care will include:

Development of the Emergency Care Summary (ECS) and the Emergency Palliative Care Summary to enable, for example, their use in planned care as well as emergency care and extend as the Electronic Care Summary;
Implementation of the 'clinical portal' programme to enable better sharing of patient information;
Continued development of the 'patient portal' to allow patients access to information about their health; and
Work on ways to bring clinical data to frontline staff.

Finally, we will ensure that the *Scottish Patient Safety Programme*, combined with our comprehensive HAI agenda, delivers change on the ground, so frontline staff can deliver a higher level of service to patients.
Our initial improvement interventions will be:

Accelerate roll out of the Scottish Patient Safety Programme in acute care, reducing hospital mortality and harm;
Implement patient safety programmes for primary care and mental health;
Accelerate medicines reconciliation across all transitions of care;
Ensure synergy with the work of the HAI taskforce to secure further reductions in infection; and
Extend the Electronic Care Summary and make widely available.

Effective
We will continue to focus on primary prevention of health problems, shifting the balance of care to prevention and early intervention. We will identify and reduce inappropriate variation in clinical practice and in provision of care packages and treatments across all healthcare pathways so that the best care is consistently provided by the right person in the appropriate place at the right time. We will also implement our proposals to improve standards of care for long-term conditions and acute care in hospital, in the community and through supported self-management. Through these measures we will ensure that clear and challenging quality outcomes and success indicators are established for services for older people, and people with long-term conditions, and that there is leadership and capacity to support improvement. Much of the work required to improve quality and ensure sustainability of services for people with long-term conditions will involve primary and community care services, and supporting the drive to shift the balance of care away from hospital services towards the community.
Shifting the balance of care and enhancing prevention and anticipatory approaches has the potential to make services more efficient and sustainable by avoiding the development of disease and unnecessary hospital admissions, reducing avoidable days in hospital and improving patient experience. However, where hospital admission is required, we will ensure that patients receive high quality, evidence-based healthcare from well trained and empowered staff. We will support those with the most complex needs by ensuring that each of them has an integrated and shared *Anticipatory Care Plan* in place. Making this aspiration a reality will require a firm commitment to excellent cooperation and communication throughout the different stages in the care journey.
We will continue to deliver our policy of reshaping the medical workforce so that the medical contribution is delivered predominantly by trained doctors, rather than doctors in training, and in collaboration with the extended multi-professional clinical team with the appropriate skill mix and capability.
We will also ensure that NHSScotland staffs are properly supported, through new development packages where necessary, to provide anticipatory health and healthcare advice and support to people and their carers, tailored to the social, psychological and economic circumstances of their lives.

We will support a step change in health literacy across the whole population, taking full advantage of existing and new approaches to communications, technology and resources to ensure that everybody has access to the information and advice they need, when they need it,

to support them to maintain their health and wellbeing, manage ill-health and have the confidence to participate fully in shared decision-making.
With NHSScotland assets currently valued at approximately £5bn it is important that these assets are effectively managed to ensure the availability of appropriate, clean and safe healthcare environments which are central to the delivery of high quality healthcare. We will ensure that the *NHSScotland Property and Asset Management Policy* establishes an aligned approach to arrangements required by Boards for the safe and effective operation of their assets including premises, medical equipment vehicles and IT.
Our initial improvement interventions will be:

Preventative and anticipatory approaches, building on and extending initiatives such as Keep Well/Well North, alcohol brief interventions and smoking cessation;
Implement the Long-term Conditions Action Plan;
Initiating a process of refreshing the suite of care pathways in close collaboration between secondary and primary care with clear prioritisation;
Introduce and share Anticipatory Care Plans for 5 per cent of the population most at risk of hospital admission;
Implement the major national strategies; Better Cancer Care, Mental Health Primary Care, Heart Disease and Stroke, Dementia and Living and Dying Well;
Establish the appropriate healthcare skills and roles required to deliver high quality healthcare, and, through the use of the NHSScotland Career Framework and local/national workforce planning, establish plans to reshape the workforce accordingly;
Ensure all our GP enhanced services are fit for the purposes of this strategy;
Implement the Strategic Options framework for emergency response in remote and rural areas;

Leading Better Care implemented across all Boards by December 2010;
Implement the Releasing Time to Care approach across acute and community teams in all Boards; and
Ensure high impact Efficiency and Productivity approaches are implemented reliably – (e.g. disinvestment, reduce harmful and wasteful variation (GP referrals, hospital length of stay, prescribing etc)).

Quality Infrastructure
A key requirement to realise our Quality Ambitions is for our systems and actions to be integrated and aligned across the whole NHS system. We need to identify and remove any hurdles and barriers presented by the current approaches to policy development and delivery across Scottish Government and NHSScotland. Responsibility for taking this action lies ultimately with NHSScotland Senior Management and with Scottish Government Ministers and senior officials.
We will establish a new Quality Alliance to involve all key stakeholders and oversee the implementation of the Quality Strategy, and to ensure whole-system integration and alignment. The initial actions required include a simplification of the policy and delivery landscape with the introduction of a new approach to ensure that
The Healthcare Quality Strategy for Scotland Our Response Making It Real – Clinical Quality Indicators before Patients and public – variation in experience, care and outcomes around nutrition, pressure areas and falls. Staff – no reliable local or national measure of the impact of nursing and midwifery care on quality. Actions a core set of evidence-based Clinical Quality Indicators (CQIs) were developed for nursing to support the measurement of the quality, safety and reliability of care. The initial focus was on CQIs applicable to inpatients, in a variety of specialties, on: food, fluid and nutrition; falls; and pressure area care. After Patients and public – evidence, for example in one NHS Board, that food, fluid and nutrition compliance is up from 50 per cent to 95 per cent, pressure area care from 60 per cent to 80 per cent, and falls compliance from 64 per cent to 66 per cent, and average compliance for all three CQIs has risen from 70 per cent to 90 per cent – real improvements for patients. Staff – Better evidence, owned and used by ward staff to identify and support improvement actions, leading to better job satisfaction.

OPSIG Technical Group

Change Fund: Criteria for Assessing Proposals

No.	Criteria	Yes/No/ N/A	Comments (as required)
1.	Is the proposal clear in its **aims**, **objectives** and **outcomes**?		
2.	Does the proposal **fulfil the key Reshaping Care for Older People policy goal** of optimising independence and wellbeing for older people at home or in a homely setting?		
3.	Does the proposal focus on **improving quality, value and outcomes?**		
4.	Does the proposal provide **evidence** to support the view that the proposal will produce the outcomes expected?		
5.	Does the proposal detail how the **focus of care will be shifted** from institutional to community/home settings?		
6.	Does the proposal detail how **core budgets will be shifted**?		

7.	Does the proposal take a **whole system approach**?		
	a. Have **interdependencies** between services been identified?		
	b. Have services which will be **de-commissioned** once the proposed service is established been identified?		

	b. Does the proposal identify whether it will result in **older people with higher level needs living in housing** rather than care homes or long stay hospitals?		
8.	Does the proposal identify the **double running resources** required in the change period?		
9.	Does the proposal provide realistic **timescales** for delivering improvement?		
10	Does the proposal detail how it will reliably and systematically **deliver safe, effective and person-centred care** with and for older people?		
11	Is the proposal clear about the **links with non-statutory organisations** such as voluntary and independent providers and community groups?		
12	Is the proposal clear about how it **fits with Fife's Draft Joint Health and Social Care Strategy for Older People**?		
13	Has the proposal identified appropriate **measures of success** that demonstrates the proposed outcomes support and sustain care for older people that is **personalised and outcomes focussed**?		
14	Has the proposal identified how these measures of success will be **monitored**?		
15	If appropriate, have **housing implications** of the proposal been addressed? For example:		
	a. Does the proposal identify whether the outcomes will result in ***more, or proportionately more*** older people living in housing rather than care homes or long stay hospitals?		

	c. If yes to either of the above, does the proposal identify the **likely profile of older people** who will be living in housing rather than care homes and hospitals?		
	d. Does any part of the plan involve a need for **rapid response services** in order to avoid emergency admission to hospital or speedier discharge?		

Outcome		
Does the proposal meet the Change Fund criteria?	Yes	No
If No: What changes are required to allow the proposal to meet the Change Fund Criteria?		

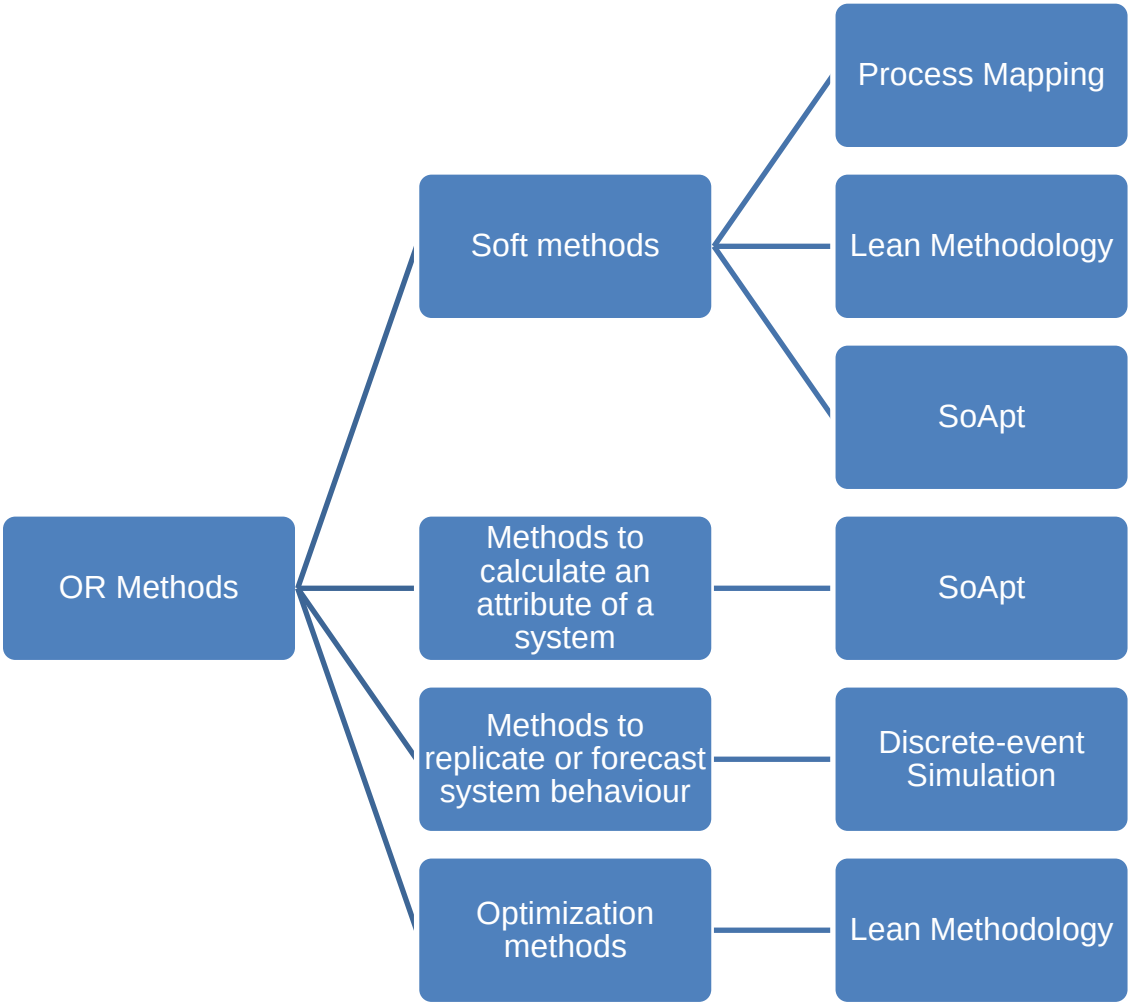
Appendix 35 SoApt Feedback

Individual Feedback	Assistant Director of Finance NHS Fife *I think the only comment I have relates to the relative complexity of the schedules. I appreciate that you have set out instructions, however I think the ability for individuals to come to terms with the schedules will only come with familiarity. There will also be other issues (political for example) which will impact on a decision, however I assume this is something that will be agreed outside the model.*
	Assistant Director of Finance NHS Fife *Thanks for sharing this with me. I have spent some time going through this and hopefully understanding it. Overall I think it is excellent.* *You won't be surprised that my comments are similar to yesterdays and are around how you quantify quality. How could, for example, you define "much" and ensure that there is consistency between individuals? This specifically relates to Scoring the Differences where there are options for "care improved" and "care much improved".* *I also we need to think what we are saying in scoring this. For example in Proposal A under the Criteria "Safe" we have "Care Much Improved". Does that mean that the current care is unsafe to a lesser or greater degree? If that proposal isn't prioritised how do we deal with this sub-optimal safety? I think asking the same type of question for each of the Criteria would be useful. I would be surprised if proposals identified that we were currently providing care that was to some degree unsafe, ineffective, lacking in clinical evidence and inequitable to name just a few of the criteria.* *Hope that above are useful and will let you know if anything else comes to mind. Haven't looked in detail at the Finance part but looks fine - always happier when counting quantity.*
	Participants of 3rd Day Lean Training. *Interface easy to use.* *The Guidelines were very useful.* *Completing the **Impact on Care** part was thought-provoking.* *I liked it because the patient is kept to the forefront of your mind when completing the form.*
	RB 30th June *Model easy to complete but financial figures difficult to access (but this is normal with business cases).* *Good emphasis on the quality of life of the individual but concerned with the bias of the Proposer.*
	HL 19th April

	It is a very logical model and extremely thought-provoking. It alerted me to things I hadn't necessarily considered when compiling the project and made me think I had more homework to do before submitting my idea.
Strategic Clinical Change and Development Team meeting	*The group had a discussion around the Prioritisation Tool and how this it would be more beneficial for service developments rather than redesign projects. The tool would highlight the savings/spend which could be incurred during the course of the project; this may also highlight the initial investment required, etc. It was agreed that the tool could also be used to highlight where disinvestment is required.* *The tool would enable the monitoring of projects and could also give a method of monitoring funding in respect of spend or Milestones being given to a project to receive funding.*
SMT 7th March	The model was presented to the meeting in its full format which with hindsight was the wrong thing to do: too much information in a very short period of time. *The model appears to be very robust.* *This model requires a strategy to be in place with regards to prioritisation, we do not have that.* *I do not agree with the so called benefits of weighting the categories. Weighting is extremely important and needs careful consideration, I have put forward proposals in the past and have regretted not giving due time to weighting the categories which, had I, would ultimately have changed my decision.* *I do not think savings should be separated from the benefits.*
SMT Meeting 4th July	HOPA was presented in a different format at this meeting: rather than present the model as at the last meeting, the benefits of the model were presented with examples of the benefits. Comments included: *What use is a prioritisation tool for investment when there is no money to invest?* *The model began as a prioritisation tool for waiting list initiative money however the basis of the model has now changed to one of an impact assessment tool which reflects the priorities within the NHS today.* *Models like this, although admittedly I would not be using it, locks people into a new language which can be restrictive.* *Provides a good structure and framework for developing business cases and projects* *In what way does this model follow the SCIM manual?* (The Scottish Capital Investment Manual (SCIM) provides guidance in an NHS context on the sector-specific processes and techniques to be applied in the development of infrastructure projects within NHSScotland.) *The model was never intended to follow the SCIM manual the categories were always to be based on the Quality Strategy document which is an important document within the NHS and one which is being adopted across the board.* *We do not use these financial terms anymore.*

	It was suggested that a bank of common costs would be a useful addition to HOPA so that Proposers are using standard costs where possible. However this suggestion was dismissed on the basis that standard costs are not available; there is no such thing as standard costs. *The model has the potential to be used also as a Disinvestment Tool.* *It was agreed at this meeting that the model would be used to assess proposals for the Change Fund. A list of successful applicants would be forwarded to enable the data to be inputted into HOPA. This exercise would address two issues:* *Does HOPA work?* *Do the proposals which have already been approved perform well when inputted into HOPA?* *Links to boxes with standard costs would be useful, for instance bed day costs, people often use the blue book costs which is an overinflated saving unless you are completely closing a ward.*
Change Fund Teams	*'This (the model) has highlighted areas that I had not considered'* *'I have not thought through all of the measures identified here'* *'The model appears to be very robust'* *'I will need to go away and think about it; this is not something I had thought of'*

Appendix 36 Methods of OR Models



Appendix 37 Methodologies of OR Models

Methodology/technique	*What it does: A system to...*	*Ontology*	*Epistemology*	*Axiology*			
		What it assumes to exist	***Representation by modelling...***	***Necessary information***	***Source of information***	***Users***	***Purpose in order to...***
Process Mapping	Illustrate throughput providing a clearer understanding of a process or series of parallel processes and peoples places within that process.	Interdependent entities and activities which transform inputs into outputs	Flow diagrams, visual interactive software	Entities, their interactions, and behavioural patterns	Participation and experiences of stakeholders in the mapping process	Analyst Facilitator Participants	Record existing processes, examine them thoroughly and develop improvements by: Eliminating unnecessary tasks; Clarifying roles within the process; Reducing delays and duplication; Reducing the number of staff required.
Lean Methodology	Improve efficiency by reducing waste	Inefficient flows across technologies, assets and departments resulting in waste	Lean tools including value stream mapping	Hard and soft information and stakeholders views about processes and systems	Stakeholder experience and observation, data collection using Lean tools	Facilitator Participants	Improve patient flow through the eradication of waste
***Discrete-event simulation**	Simulate the behaviour of particular entities and the activities they undergo in a visual interactive form	Entities and activities with stable patterns of statistical behaviour that form inter-linked processes	Activity-cycle diagrams, entity life cycles, visual, interactive software	Entities, their interactions, and the behavioural patterns	Observation and measurement of real-world entities and procedures	Analyst	Explore the operation of complex interactions in health between discrete entities to aid understanding and control
SoApt	Support decisions-makers prioritise investment (or disinvestment) options when faced with alternatives and limited resources	Lack of resources to invest in all project opportunities	Costs and benefits of the project, matrices of all proposals	Costs and benefits of projects or proposals, local and national priorities, budgets	Proposers, decision-makers	Decision-makers	Prioritise and allocate resources based on scoring and weighting of benefits and costs of a given proposal