

**Leadership for change
management; critical success
factors in leading change in medical
imaging departments in major
teaching hospitals in NSW**

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Dedication

This thesis is dedicated to my children Tavonga, Makatendeka and Munotidaishe who have endured the limitations on their play time with me as I completed this thesis. You have been very supportive in a very huge way, forgoing your fair share of time with me while I toiled to see this major milestone to the end. I have a huge amount of catching up to do.

To my wife, Persy, you have been a pillar of strength. Steadfastly patient while I undertook yet another course! Though I said this may be the last one, I am not so sure! You have been a resolute warrior and have unflinchingly supported me through this journey. You have said countless times that you have done the heavy lifting with me. I could not agree with you any less.

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To all those that I have not mentioned by name, thank you for your support. It is greatly appreciated.

Statement of Authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.



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Signature

16 May 2022

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Date

Declarations

I declare that this study has not been funded by any external agencies other than the Commonwealth of Australia through the Higher Degree Research Program.



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Signed

16 May 2022

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Date

Table of Contents

List of Tables	2
List of Figures and Illustrations	3
Abbreviations	4
Abstract.....	5
Chapter 1 – Introduction	8
1.1 Introduction.....	8
1.2 Background to the Research	9
1.2.1 The Australian Healthcare System.....	9
1.2.2 The NSW Health System	11
1.2.3 Local Health Districts (LHDs)	14
1.2.4 Organisational Structure.....	15
1.2.5 Healthcare Changes and Medical Imaging Services.....	18
1.2.6 Activity Based Funding (ABF).....	21
1.2.7 Emergency Treatment Performance	24
1.2.8 The Growth of Medical Imaging	25
1.2.9 Medical Imaging Departments in NSW	29
1.2.10 Equipment Procurement in Medical Imaging	31
1.2.11 Patient Considerations	33
1.3 Research Problem, Propositions and Contributions.....	34

1.4 Motivation for This Research.....	35
1.5 Justification for The Research	35
1.6 Research Outcomes	36
1.6.1 Additional Outcomes to Practice.....	37
1.7 Methodology.....	37
1.7.1 Scope.....	37
1.8 Outline of The Report.....	38
1.8 Conclusion	40
Chapter 2 – Literature Review	41
2.1 Introduction.....	41
2.2 Literature Review.....	41
2.3 Leadership.....	42
2.4 Management.....	43
2.5 Clinical Leadership and Management in Health Care.....	45
2.5.1 Medical Leadership	46
2.6 Leadership Theories	48
2.6.1 Behavioural Theories	48
2.6.2 Trait Theories.....	49
2.6.3 Contingency Theory	50
2.6.4 Path-Goal Theory	52
2.6.5 Leader-Member-Exchange (LMX Theory)	53
2.6.6 Power and Influence Theories.....	54
2.7 Leadership Styles	57
2.7.1 Consultative Leadership	57
2.7.2 Authentic Leadership	58

2.7.3 Transactional Leadership.....	60
2.7.4 Transformational Leadership	63
2.7.5 Laissez - Fairer Leadership	65
2.7.6 Servant Leadership	65
2.7.7 Variety of Leadership Styles in Healthcare.....	67
2.8 Research Questions 1 and 2	68
2.9 Change Management.....	68
2.10 Research Questions 3 and 4	73
2.11 Learning Organisations.....	73
2.12 Research Question 5 and 6	74
2.13 Critical Success Factors.....	74
2.14 Conclusion	75
Chapter 3 - Methodology	77
3.1 Introduction.....	77
3.2 Overview of Research Model.....	78
3.3 Justification for The Paradigm and Methodology Design.....	80
Step 1. Ethics Approval.....	81
Step 2. Participant Considerations.....	82
Step 3. Population Data Review	83
Step 4. Identification and Development of Data Collection Tools	83
Step 5. Identification of Change Management Projects	83
Step 6. Establish a Participant Cohort	84
Step 7. Obtain Informed Consent.....	85
Step 8. Undertake Baseline Leadership Style Inventory (LSI).....	85
Step 9. Design of Interview Tools	86

Step 10. Conduct Pilot Interviews	87
Step 11. Participant Interviews.....	88
Step 12. Review and Measure Project Success.....	89
Step 13. Thematic Data Analysis.....	89
Step 14. Undertake Final Leadership Style Inventory	90
3.4 Research Methodology Further Considerations	90
3.4.1 Further Ethical Considerations	90
3.4.2 Research Process and Multiple Data Collection Rounds.....	91
3.4.3 Researcher Ongoing Communication with Participants	93
3.4.4 Baseline Qualitative and Quantitative Project KPIs.....	93
3.4.5 Sampling Techniques Utilised	95
3.4.6 Leadership Style Inventory/Questionnaire	96
3.4.7 Data Collection Rationalisation	101
3.4.8 Discussion.....	101
3.5 Summary of Tools Used for Data Collection.....	103
3.6 Congruency of Methodology, Data Collection and Research Questions	103
3.7 Ethical considerations	104
3.7.1 The Researcher’s Knowledge of Medical Imaging Departments.....	104
3.7.2 Selection Bias	105
3.8 Confounders	105
3.8.1 The Element of Luck on Project Success	105
3.8.2 External Factors Impacting on Project Success	105
3.9 Conclusion	106
Chapter 4 – Results.....	107
4.1 Introduction and Overview	107

4.2 Sample Results	108
4.2.1 Characteristics	108
4.2.2 Project Demographics.....	110
4.3 Pilot Study.....	114
4.4 Leadership Style Inventory (LSI)	114
4.4.1 Authentic Leadership Questionnaire	114
4.4.2 Multifactor Leadership Questionnaire	117
4.5 Round One Interviews.....	120
4.6 Round Two Interviews	121
4.7 Round Three Interviews.....	122
4.8 Dominant Leadership Styles in the Local Health District	123
4.8.1 Nature of Leadership and Impact on Success.....	128
4.9 Reasons for Project Success Or Failure	129
4.9.1 Stakeholder Engagement	130
4.9.2 Planning	134
4.9.3 Education and Training.....	137
4.9.4 Resetting Expectations.....	139
4.9.5 Processes and Procedures.....	140
4.9.6 Other Reasons for Project Success	141
4.10 Strategies Utilised for Project Success	146
4.10.1 Consultation and Engagement.....	147
4.10.2 Workload Management	148
4.10.3 Education and Training.....	149
4.10.4 Explained Communication/Communication	152
4.10.5 Planning	154
4.10.6 Other Key Strategies Utilised	155

4.11 Leadership Style Influence from Learned Experience	162
4.12 Conclusion	164
Chapter 5 - Discussion	168
5.1 Introduction.....	168
5.2 Research Framework and Recap	168
5.2.1 Research Conceptual Framework	170
5.3 Overview of Findings	171
5.3.1 Family Values and Lifestyle Choices.....	174
5.3.2 Organisational Support.....	175
5.3.3 Project Types Found in Medical Imaging	176
5.3.4 Communication Styles That Work	177
5.4 Dominant Leadership Styles in Medical Imaging Departments	179
5.5 Leadership Styles and Change Management Outcomes	184
5.6 Strategies Used for Successful Change Management	186
5.6.1 Consultation and Engagement.....	186
5.6.2 Effective Leadership	188
5.6.3 Workload Management	189
5.6.4 Explained Communication	192
5.7 Why Do Some Projects/Processes Fail or Succeed?.....	193
5.7.1 Stakeholder Engagement	193
5.7.2 Planning	196
5.7.3 Education and Training.....	197
5.7.4 Resetting Expectations.....	198
5.7.5 Processes and Procedures.....	198
5.8 Leadership Style and Learned Experience	202

5.9 How Do “Learning” Leaders Fare in Future Projects?	205
5.10 Conclusion	208
Chapter 6 – Contribution, Conclusions, and Implications.....	210
6.1 Introduction.....	210
6.2 Research Conclusions	210
6.2.1 Dominant Leadership Styles	210
6.2.2 Strategies Used for Successful Change Management	212
6.2.3 Nature of Leadership and Change Management Processes	215
6.2.4 Why Do Some Projects/Processes Fail or Succeed?.....	216
6.2.5 Learning Leaders, Organisations, and Project Outcomes	216
6.3 Scholarly Contribution	218
6.4 Implications for Policy and Practice in Medical Imaging.....	222
6.4.1 Stakeholder Mapping.....	222
6.4.2 Project Documentation	223
6.4.3 Change Management and Project Management Training	224
6.4.4 Private Sector Managers.....	224
6.4.5 Public Sector Policy Analysts and Managers	225
6.5 Limitations	229
6.6 Further Research	229
6.7 Conclusion	230
References Cited.....	232
List of Appendices.....	275
Appendix A – Functions of the NSW Entities	276

Appendix B - Ethics Approval.....	279
Appendix C - Ethics Approval – Site Specific Authorisation	282
Appendix D – Participant Consent Form.....	284
Appendix E - Multifactor Leadership Questionnaire.....	286
Appendix F - Authentic Leadership Questionnaire	291
Appendix G – MLQ sample Results Interpretation.....	292
Appendix H – MLQ international normative samples – Oceania	304
Appendix I - Categorisation of Results from The Completed MLQ	305
Appendix J - Interview Questionnaire Round 1	306
Appendix K - Interview Questionnaire Round 2.....	307
Appendix L - Interview Questionnaire Round 3	308
Appendix M – Interview Transcript Coding	310
Appendix N - Round 1 – Sample Interview Transcript	311

List of Tables

Table 1 – Leadership Theory Summary	56
Table 2 – Authentic Leadership Domains	59
Table 3 – Transformational Leadership Dimensions	62
Table 4 – Leadership Styles Key Characteristics	66
Table 5 – Dimensions Of Transformational Leadership.....	98
Table 6 - Summary Of Tools Used For Data Collection	103
Table 7 – Project Duration By Round	111
Table 8 – Projects And Stakeholders Involved	112
Table 9 - Project By Type And Driver	113
Table 10 – Participant Results For The ALQ.....	116
Table 11 – Baseline And Final MLQ Results And Differences Over Time	117
Table 12 – Participation In Data Collection Processes.....	123
Table 13 - Self Reported Leadership Styles	127
Table 14 – Stakeholder Types	132

List of Figures and Illustrations

Figure 1: NSW Health Organisational Structure.....	13
Figure 2: Organisational Structure Of A Local Health District	17
Figure 3: Budget Illustration A Local Health District	22
Figure 4: Reporting Patient Costs Through The NHCDC.....	23
Figure 5: Thesis Outline.....	39
Figure 6: Sequence Of Research Methodology Steps	81
Figure 7: Data Collection Processes	91
Figure 8: Research Methodology Matrix.....	104
Figure 9: Participant By Role Type	109
Figure 10: Participants' Occupations By Classification	110
Figure 11 – Project Success And Leadership Style Utilised.....	129
Figure 12: Key Reasons For Project Success	130
Figure 13: Strategies Used For Project Success	146
Figure 14: Conceptual/Research Framework	170

Abbreviations

ABF	Activity Based Funding
ACI	Agency for Clinical Innovation
CEC	Clinical Excellence Commission
eMR	Electronic Medical Record
HREC	Human Research Ethics Committee
IMTD	Information Management and Technology Department
MRI	Magnetic Resonance Imaging
NEAT	National Emergency Access Target
NHCDC	National Hospital Cost Data Collection
NHHRC	National Health and Hospital Reform Commission
NHRA	National Health Reform Agreement
NSW Health	New South Wales Ministry of Health
PBS	Pharmaceutical Benefits Scheme
SLHD	Sydney Local Health District
SME	Subject Matter Expert
SWSLHD	South Western Sydney Local Health District
TAT	Turnaround Time

Abstract

Successfully leading change in public medical imaging departments is an enigma that has eluded most public health practitioners particularly in the Australian healthcare context. Research in other contexts has shown that at least 70% of change projects fail to achieve their intended objectives. The area of leadership in medical imaging is an under researched area of healthcare leadership. While various scholars (Barnard 2020; Grant-Smith & Colley 2018) have proposed that strong leadership is required for change management, none of them have fully discussed what this means.

This study setting is the medical imaging departments of public hospitals in a New South Wales Local Health District. The primary purpose of this research was to explore the leadership styles and critical success factors that led to successful change management projects or processes. The research utilised a mixed methods approach in a longitudinal study to answer six research questions. There is scant evidence of similar Australian studies utilising the same approach in medical imaging in NSW. In this research, leadership style changes of medical imaging leaders were studied as leaders undertook cycles of successive change management projects over a three-year period. Five data collection rounds were undertaken with the same participant cohort, including two leadership style inventories and three rounds of semi structured interviews.

This research has contributed to scholarship in three main ways: the use of a new approach in studying the research phenomena; answering the six research questions providing new insights into leadership in medical imaging in NSW; and by exploring the concept of strong leadership, defining, and understanding it. This research defined strong leadership as the ability to successfully implement change within an organisation. Leaders achieved change through the mechanism of a systematic process through which leadership activities are

undertaken, which influenced the attainment of organisational goals through the management of conflict, competing demands and divergent views within a complex organisation.

The research found that the dominant leadership style for successful change management in medical imaging in NSW was consultative leadership, contrary to the pre-existing literature on the widely practised leadership styles in healthcare situational, transactional, and transformational styles were the other prominent leadership styles found in this research.

This research further found that the use of the key strategies of consultation and engagement; workload management; education and training; communication and planning were critical enablers to project success. Similarly, stakeholder engagement; planning; education and training; resetting expectations and processes and procedures were the key reasons that drive project success in medical imaging.

This research also found that the nature of leadership impacted on change management processes in healthcare. For example, a consultative leadership approach positively influenced the change management processes. Following previous change management projects, this research found that medical imaging leaders' leadership styles were influenced by prior experience. Their leadership style was reshaped by learned experience of past change management. This meant that learning leaders achieved better outcomes in successive change management processes.

The significance of this research is that it presents new knowledge on leadership in medical imaging in healthcare. In doing so, it proposes new ways and strategies of successfully leading change management projects in healthcare.

This research also presents new knowledge on what effective leadership in medical imaging is and how it is characterised.

Chapter 1 – Introduction

1.1 Introduction

Rapid and timely diagnosis of diseases is a crucial tenant in the management of diseases (Li, J et al. 2021). Medical imaging tests including diagnostic and interventional radiology, and nuclear medicine facilitate the early diagnosis and intervention in disease management. Such services are offered in major tertiary public and private hospitals within New South Wales (NSW) and other parts of the world, for this purpose. Like other healthcare services, medical imaging processes are led by clinical and non-clinical personnel, who undertake a range of service delivery functions.

Under the research topic: “Leadership for change management; critical success factors in medical imaging departments in major teaching hospitals in NSW”, this study investigated how the leadership and change management processes implemented in healthcare affect the outcomes of the change management process in medical imaging departments. The research was conducted at a micro setting, meaning with floor leaders or frontline leaders such a Senior MRI Radiographers as opposed to senior Chief Executive level leaders. The setting of the research is a NSW Health Local Health District (LHD), one of 18 such entities providing healthcare to the NSW public. This LHD called South Western Sydney Local Health District is the largest and fastest growing district in metropolitan Sydney, which is also one of the most geographically spaced areas in NSW (South Western Sydney Local Health District 2019).

This chapter, will include, firstly, a background to the research including a synopsis of the Australian healthcare system and secondly discussion of the NSW Health System which also includes the LHD structure is discussed. Thirdly, a brief discussion on healthcare changes follows and before activity-based funding (ABF) and the associated disease classification process is introduced. Then the research problem, motivation and justification for the research follows. The research questions are then introduced, together with the anticipated research outcomes. The conclusion of the chapter provides an outline of the research thesis. By exploring the leadership styles employed by medical imaging leaders, this research will provide a better understanding of the leadership styles employed by such leaders which lead to successful change management projects or processes. The next section provides some background information about the Australian private and public healthcare systems as well as medical imaging.

1.2 Background to the Research

1.2.1 The Australian Healthcare System

The Australian healthcare system follows the federal government system with the 3 governance levels at national (Commonwealth), State and local government levels. These levels manage different components of the healthcare system. According to Australian Institute of Health and Welfare (2021) the Commonwealth provides the broad functions of: developing national health policy; funding Medicare through the Pharmaceutical Benefits Scheme; funding state and territory public hospitals and other functions. State and territory governments; fund and manage public hospitals; regulate and licence private hospitals and other health premises and deliver community based and preventative programs. Finally, local governments undertake the delivery of community and home-based health and support services, environmental health services and other public health services.

Within the Australian health context, private and public hospitals provide care to citizens. According to Australian Institute of Health and Welfare (2009a), private hospitals are privately owned and operated institutions catering for patients treated by their doctor of choice, where patients are charged fees for accommodation and practitioner fees. Similarly, a public hospital is defined as one that is operated by, or on behalf of, the government of the state or territory in which it is established. This includes hospitals which are owned by private or charitable groups but are authorised or contracted by the government to deliver public hospital services (Australian Institute of Health and Welfare 2009b).

This research is only focussed on public hospitals. The key instrument underpinning the operational arrangements of public hospitals in Australia is the National Health Reform Agreement 2011, signed by all states and territories in August 2011. According to the NHRA (2011), the reforms' primary objectives were:

1. Reforming the fundamentals of our health and hospital system, including funding and governance, to provide a sustainable foundation for providing better services now and in the future.
2. Changing the way health services are delivered, through better access to high quality integrated care designed around the needs of patients, and a greater focus on prevention, early intervention, and the provision of care outside of hospitals.
3. Providing better care and better access to services for patients, through increased investments to provide better hospitals, improved infrastructure, and more doctors and nurses.

The NHRA (2011), set the tone for further refinements in the organisational structures implemented within the states. It also led to the establishment of the Local Health Networks (now known as Local Health Districts) within states and territories. Profligate expenditure on healthcare has continued (Briggs 2017), as life expectancy continues to increase for Australians. The Australian Institute of Health and Welfare (2014) estimated that 9.67% of GDP¹, or \$147.4billion, was spent on healthcare in 2012/2013 an increase of 1.5% from the prior year. This was significantly lower than the average 5.1% increase recorded since the 1980s.

The Department of Health (2020b) states that chronic illnesses have also continued to grow. However, new technology and the advancement of medicine has resulted in improved management of such diseases and consequently increased life expectancy for Australians to about 80 years for males and 84 years for females born in 2016/2018 (Australian Insititute of Health and Welfare 2021).

The evolution of the healthcare system has necessitated attempts to improve, accountability, performance, value for money and mere political expediency in the Australian healthcare system (Briggs & Isouard 2016; Duckett & Willcox 2015; Javanparast et al. 2018; Kay & Boxall 2015) including states, such as the NSW Health system, which is discussed in the next section.

1.2.2 The NSW Health System

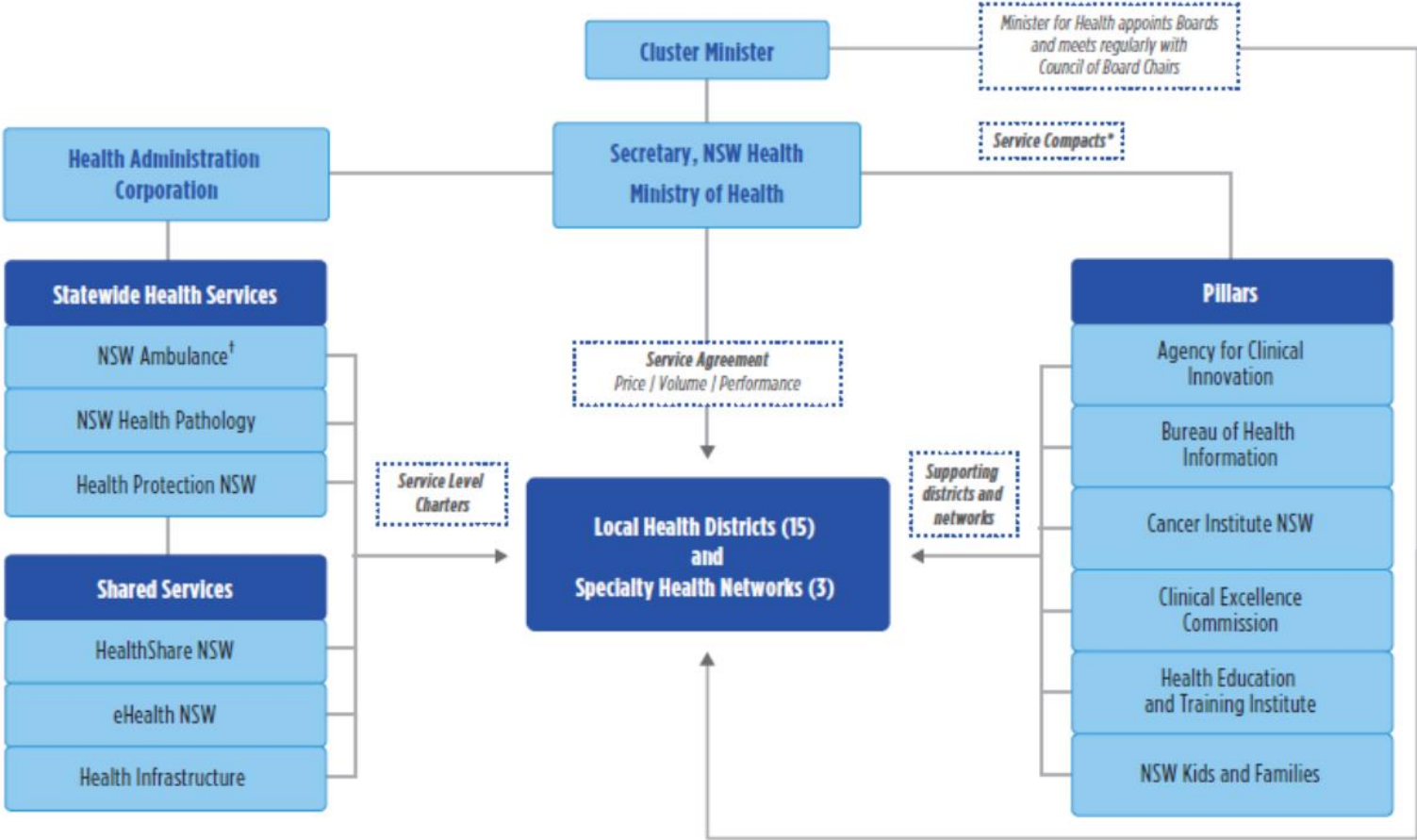
The NSW public health system has undergone significant organisational metamorphosis, which include the previous Area Health Service model (Javanparast et al. 2018; Liang et al. 2013; NSW Health 1997, 2015). The key influences on the current structure include the Garling Enquiry (Garling 2008) and

¹ Gross Domestic Product

the National Health and Hospital Reform Commission's (NHHRC) (Jowsey et al. 2011) National Health Reform Agreement (NHRA) 2011, as discussed above. Following the establishment of the LHDs across the State, the next paragraphs discuss their structures and governance arrangements.

The NSW government is part of state and territory parliaments and local government with shared responsibilities for healthcare policy, financing and delivery (Briggs 2017). The governance of the parliaments reflect that of elected government and such governance is known as the Westminster model (Chaplin 2020). As such, the NSW Ministry of Health being responsible for public health in the State. Figure 1 below details the structure of NSW Health, generally comprising of 15 LHDs and three specialty networks (NSW Health 2015). The LHDs are supported by six pillars namely, Agency for Clinical Innovation (ACI), Bureau of Health Information (BHI), Cancer Institute NSW, Clinical Excellence Commission (CEC), Health Education and Training Institute (HETI) and NSW Kids and Families. In addition, other NSW Health entities provide operational support and include state-wide services such as: NSW Ambulance, Health Infrastructure, Health Protection NSW, HealthShare NSW, NSW Health Pathology, Office of Health and Medical Research, St Vincent's Health Network, and eHealth. The detailed nature and function of these entities is presented in Appendix A.

FIGURE 1: NSW HEALTH ORGANISATIONAL STRUCTURE



*Service Compact – Instrument of engagement detailing service responsibilities and accountabilities
[†]No Service Compact between Ministry of Health and NSW Ambulance

Source: NSW Health 2022. Accessed on 5 April 2022 from: <http://www.health.nsw.gov.au/about/nswhealth/Pages/chart.aspx>

1.2.3 Local Health Districts (LHDs)

As shown in Figure 1 above, NSW currently has a total of 15 LHDs and three specialty networks. Eight cover the metropolitan regions and seven cover rural/regional areas. Of the three specialty networks, one covers three public hospitals operated by St Vincent's health while the other two provide children and paediatric services and forensic mental health, respectively. LHDs are led by a Board of directors appointed by the shareholder, who is the Minister for Health. The Board's role is focused on leading, directing and monitoring the activities of the LHDs and specialty networks and driving overall performance. Section 28 of the Health Services Act 1997 describe these functions which are summarised below (NSW Health 2015):

- The establishment of effective clinical and corporate governance frameworks.
- To support the maintenance and improvement of standards of patient care and services by the LHDs and to approve those frameworks.
- To ensure strategic plans to guide the delivery of services are developed for the LHD and to approve those plans.
- To approve systems that support efficient, economic, and budget conscious service delivery models that meet performance targets in accordance with the state-wide performance framework.
- To ensure equitable allocation and resource utilisation.
- To make recommendations regarding Chief Executive (CE) appointments or dismissals.
- To provide the Chief Executive of the LHD with the operational performance targets and performance measures to be negotiated in the service agreement for the district under the NHRA.
- To approve the service agreement for the LHD under the NHRA.
- To seek and engage providers, consumers, and other key stakeholders in the provision of health services.

Some of these functions are delegated to the Chief Executive (CE) who exercises them operationally under Board oversight. The CE's role is also espoused in legislation, under section 24 of the Health Services Act 1987 and is to manage and control the affairs of the LHD. Accountable to the Board, the CE is the principal officer of the LHD, with the delegation for contractually and legally committing the organisation. In contrast to the Board member appointment process by the shareholder, represented by the Minister for Health, the CE is appointed by the Secretary for Health (formerly the Director-General) in terms of section 116 of the Health Services Act 1997. All 18 CEs, the Secretary for Health and other Ministry of Health senior executives form a group called the NSW Health Senior Executive Forum, which drives the NSW Health agenda with their support teams.

1.2.4 Organisational Structure

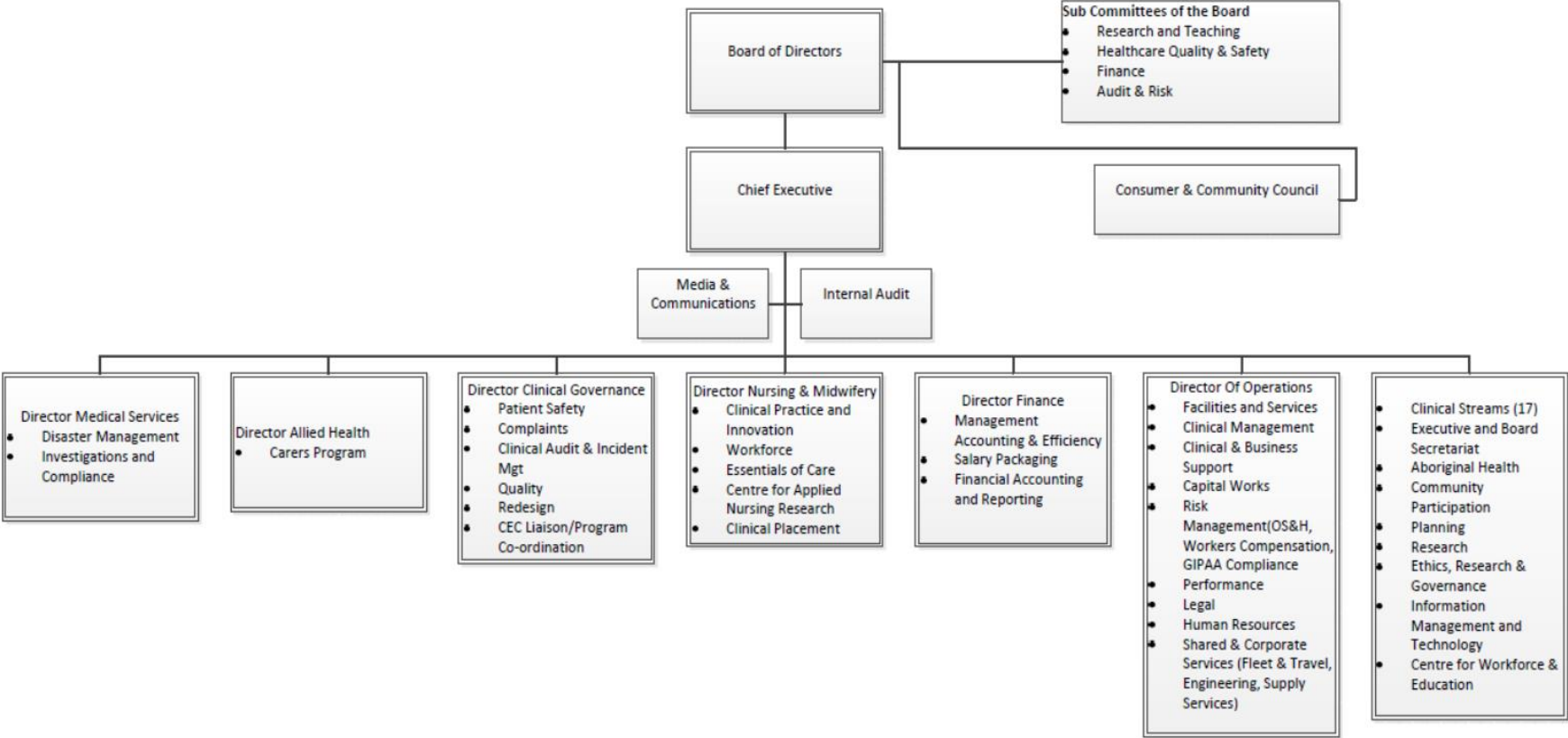
Ahmady, Mehrpour and Nikooravesh (2016), building on the work of Mintzberg (1972) suggest that organisational structure is a framework or system where tasks and duties are determined, divided, and coordinated to achieve organisational goals. The administration of the LHDs differs widely despite a common overarching governance framework. Several reasons including responsiveness to local requirements necessitates these differences. This research was conducted in a large LHD in NSW, which has undergone several restructures as discussed earlier. Like many Australian healthcare organisations, the LHD where the research was undertaken had a matrix organisational structure during the research period (Figure 2). Under this structure, there are 17 clinical directorates and networks, each headed by a Clinical Stream Director. The Clinical Stream Director reports directly to the CE and their function is to provide strategic advice to the CE and support effective governance across the facilities (hospitals and community health centres). While some literature supports clinical directorates due to their advantages in adapting and providing closer interaction

with the patient (Tuckett et al. 2015); facilitate a collaborative multidisciplinary approach and reduce interdisciplinary rivalry (Clarke, A et al. 2017); improve efficiency (Parthasarthy 2018), resource management (Gerring 2016) and service delivery (Stefanini et al. 2020), some other authors are not so convinced. Braithwaite and Westbrook, as reported by Long, Cunningham and Braithwaite (2013) found that the introduction of clinical directorates had increased organisational politics, while Sorensen et al. (2013) suggested that conflict arose between professions working in multidisciplinary teams. Coyle, Degeling and Gray (2017) further suggested that hybrid clinician managers' clinical autonomy was eroded in these structures.

Braithwaite (2018) found there are no discernible differences in organisational efficiency for restructured organisations either to clinical directorates or otherwise. It could be argued that there is no single acceptable organisational structure as different organisational structures have their advantages and disadvantages. Key considerations for organisations contemplating organisational structural changes are the balance between the pros and cons of alternative courses of action.

Braithwaite et al. (2017) and Edwards, N and Saltman (2017) recognised the complex nature of public health organisations as political; multi-stakeholder, and multi-dimensional, which suggests that different organisational structures that consider this complexity could work. For example, the presence or absence of a large Aboriginal population or migrant community may mean that one LHD may need to consider a structure that focuses on primary healthcare and health promotion strategies compared to another LHD with a different demographic composition.

FIGURE 2: ORGANISATIONAL STRUCTURE OF A LOCAL HEALTH DISTRICT



Source: South Western Sydney LHD Intranet. Accessed on 15 April 2015.

Figure 2 above depicts the organisational structure discussed in section 1.2.4. This hierarchical structure shows an overview of the matrix structure within the LHD. Areas of responsibility for each directorate and executive are summarised in the organisational structure above. Of note, under the purview of the Director Operations are the hospitals and other services that provide direct patient care (facilities and services). While most services are provided at the local hospital level, integrated networks at the clinical stream level exist to provide a strategic role for the clinical and non-clinical services, including standardising discipline specific clinical practices across the LHD (South Western Sydney Local Health District 2020). Healthcare changes have invariably made an impact on medical imaging services, and these are discussed in the next section.

1.2.5 Healthcare Changes and Medical Imaging Services

Health reforms in Australia between 2008 and 2011 by the Australian Labour governments precipitated a further number of changes in the operations of hospitals. The implementation of the Health Reform in NSW and wider Australia had major implications in the provision of healthcare generally and medical imaging specifically, through increasing demand among other considerations. Hollnagel and Braithwaite (2019), Kuziemyky (2016) and Erasmus et al. (2014) found that wider political and social contexts also influence complex adaptive systems such as health facilities. Over the past 25 years, medical imaging services' growth as service centre has been accelerated, particularly within the political context and health reforms. Compared with their position in the recent past, they now form an integral part of healthcare provision in public hospitals. Funding implications, timely patient access to services and a renewed focus on efficient resource utilisation have meant that imaging services have rapidly grown. For example, Interventional Radiology and Interventional Neuroradiology have become significant medical imaging specialties. Previously, medical imaging could have been absorbed as under a Medical or Surgical directorate's budget, however, the changes outlined above mean that

these service centres (medical imaging) are standalone more autonomous services with their own directorates, as is the case in the South Western Sydney LHD.

According to the Council of Australian Governments (2011), the National Health Reform Agreement (NHRA) 2011 resulted in several significant changes to hospital funding and operations in most Australian jurisdictions including the introduction of key performance indicators (KPIs). As most states were embracing Activity Based Funding (ABF), a new layer of complexity was introduced for medical imaging managers. Veronesi et al. (2014) discussed ABF as a new, transparent funding model where hospitals are funded according to activity performed with hospitals with potential to reduce waiting lists. This means that, if a hospital undertakes 50,000 episodes of care, the funding received by the hospital is a subset of all inputs in the episode of care. While this concept may seem quite straightforward, this is not necessarily the case for medical imaging departments. If each episode of care is allocated for example a CT scan, the cost of a CT scan is factored into the funding model. However, if an episode of care requires more than a single CT scan, then it creates a funding shortfall for the extra medical imaging activity. As the overall funding available to hospitals is activity dependent, how the funding is distributed within health services is problematic for medical imaging as it is not necessarily linked to the number of examinations performed per year. The implications for medical imaging services in this scenario would be the provision of multiple tests and only receiving funding for a single study. ABF is more fully discussed in section 1.2.5.

The NHRA linked hospital funding to performance. For example, Emergency Treatment Performance (ETP) was set as a performance benchmark within which hospitals were expected to perform. For health services to meet these mandated benchmarks, a team approach is required from all services involved including medical imaging departments, to minimise delays in service provision and

contribute to the timely provision of imaging services. A detailed discussion on ETP is provided in section 1.2.7. Today's medical imaging leader therefore faces new challenges in the provision of medical imaging services. The skillset previously adequate in the past to manage medical imaging departments is no longer adequate to manage these emerging challenges. Such challenges include the need to successfully lead change, optimising patient outcomes with minimal resources and increased innovation in service delivery among others.

Since the emergence of newer imaging technology, rationalisation of processes and appropriate resources utilisation is progressively becoming more important. Today's medical imaging manager is increasingly considering value for money propositions in financial decision making, which has led to the establishment of new roles in medical imaging such as business managers and operational managers. The business manager in medical imaging is responsible for establishing and maintaining systemic commercial processes; leading the establishment of new processing; providing commercial advice to other medical imaging leaders and leading the financial management function within medical imaging services. The operational manager is responsible for the leadership of operational processes across the medical imaging stream within the LHD. Working collaboratively, medical imaging leaders, are consistently required to manage quality in imaging. This includes the reduction in radiation exposure, procurement of appropriate equipment and clinical practices employed in the acquisition of images.

When x-ray technology commenced over 100 years ago, it became a gold standard for the provision of care where it was indicated. Griffin and Treanor (2017) found that improvements in how this technology was utilised have resulted in efficiency gains from financial and workflow perspectives. In the last 25 years CT usage has increased dramatically year on year. For example, data from the LHD shows that over the 10 year period between 2011 and 2019 the number of CTs ordered across the hospitals have increased by an average 19%

compared to hospital admissions that increased by about 3-4% annually (Lin 2021). This demonstrates that CT has become the test of choice, possibly due to the superior image quality provided when compared to x-rays. It can be reasonably expected that MRI will move in the same direction in the future for appropriate patients. While the demand for x-rays remains due to some patients (such as those with pacemakers or metal prosthesis) being unable to access MRI which uses magnet technology, it is evident that consumers are considering the significant radiation exposure risks prior to utilising these services (Government of Western Australia 2021d). Further discussion on the growth of medical imaging is undertaken in section 1.2.8.

The health reform sought to make improvement in the health system. For example, the National Health Reform Agreement (2011) aimed at improving patient access to services and public hospital efficiency through ABF among other objectives. Other initiatives stipulated as a result included the National Emergency Access Targets (NEAT) now known as Emergency Treatment Performance (ETP). A brief discussion on these key initiatives follows.

1.2.6 Activity Based Funding (ABF)

According to the Independent Health Pricing Authority (2019) (IHPA), ABF is a funding model where hospitals get paid by the funding agency, for the patient number and mix. A simplistic view of ABF is that funding is aligned to hospital activity, unlike the traditional block funding models that existed prior to the introduction of ABF in NSW and other states. Medical imaging is funded for inpatients through this process and through Medicare for outpatients. The next paragraphs describe a high-level application of this process. Except for Victoria where ABF has been a key part of public health expenditure and funding, the rest of the states had to make significant changes to their funding models.

In an ABF environment, there is a provider/purchaser arrangement where the NSW Ministry of Health and the Commonwealth are the purchasers of a set amount of annual activity from the provider (LHD or hospital). An illustration of this is shown in Figure 3 below:

FIGURE 3: BUDGET ILLUSTRATION A LOCAL HEALTH DISTRICT

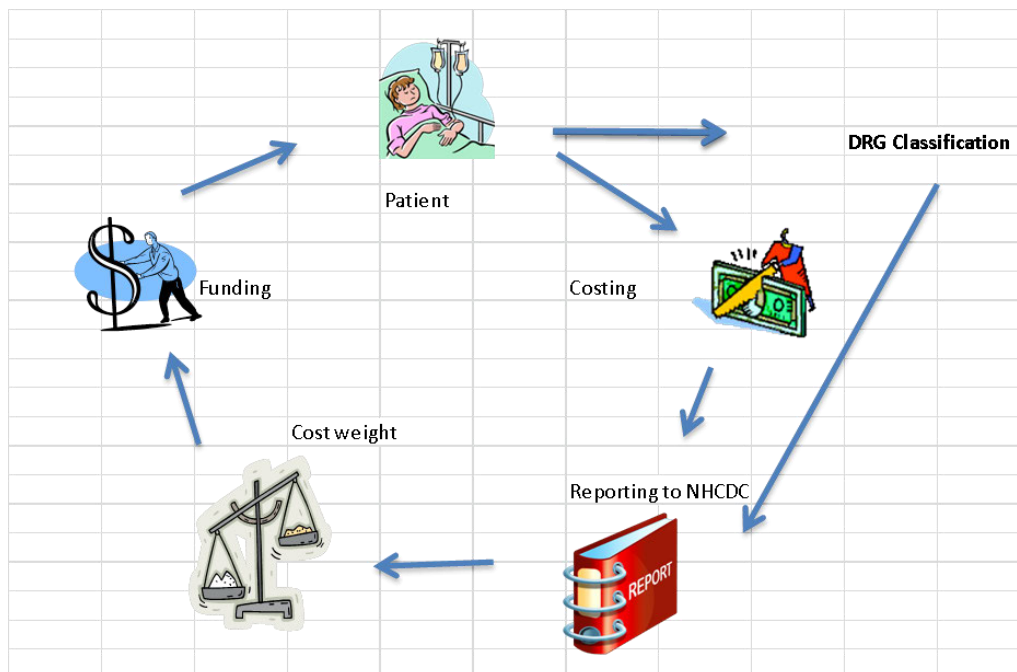
Hospital	Activity purchased by the Commonwealth from NSW Health		State Health ABF Budget	Activity purchased by NSW MoH from ABC LHD		ABC LHD ABF Budget	Activity purchased by the LHD from the hospital		Hospital ABFBudget
	Activity	Purchase Price		Activity	Purchase Price		Activity	Purchase Price	
X	65,000	\$ 4,971	\$ 323,115,000	65,000	\$ 4,500	\$ 292,500,000	65,000	\$ 4,200	\$ 273,000,000
Y	50,000	\$ 4,971	\$ 248,550,000	50,000	\$ 4,500	\$ 225,000,000	50,000	\$ 4,200	\$ 210,000,000
Z	40,000	\$ 4,971	\$ 198,840,000	40,000	\$ 4,500	\$ 180,000,000	40,000	\$ 4,200	\$ 168,000,000
TOTAL ABF BUDGET			\$ 770,505,000			\$ 697,500,000			\$ 651,000,000
Other services: Block funded									
	Mental Health		\$ 20,000,000			\$ 18,000,000			\$ 17,000,000
	Community Health		\$ 10,000,000			\$ 9,000,000			\$ 8,000,000
	Population Health								
Total Budget (ABF and Block Funding)			\$ 800,505,000			\$ 724,500,000			\$ 676,000,000

Source: Developed for this research.

In this simplified example, the purchaser (Commonwealth/State) requires 65,000, 50,000 and 40,000 episodes of care from hospitals X, Y and Z, respectively. These services are purchased by the State at a National price (\$4,971) denoted in terms of a National Weighted Activity Unit (NWAU). The states then procure similar activity from the LHD at a lower price than the NWAU. Similar negotiations and pricing occur until services are delivered at the department level. The reduction in price is done to accommodate overheads for managing this process. The next section discusses the NSW determination process.

The determination of the NWAU is a cyclical process undertaken by the IHPA from costing data provided by all states through the National Hospital Cost Data Collection (NHCDC) and the Diagnosis Related Groups (DRG) system for disease classification. This process is summarised by Figure 4 below:

FIGURE 4: REPORTING PATIENT COSTS THROUGH THE NHCDC



Source: Developed and adapted for this research

The DRG classification will identify the proportion of an episode of care out of the NWAU. For example, the classification of knee reconstruction may have a weight of 0.5 with 1 being the baseline. The weight for the knee reconstruction may be adjusted by factors such as 0.05 for rural and remote locations. The total funding for these episodes of care is a product of the adjustment factors and the activity undertaken, as agreed between the provider and purchaser. Within an ABF environment, medical imaging services must be more efficient by providing the right study, safely, efficiently the first time.

When LHDs receive their funding allocations, under the budget process, they have a revenue budget as well. This is a portion of funding that hospitals are required to generate to support their state budget allocation. As such, departments with an income earning capacity, such as medical imaging through outpatient work, play a critical role in revenue generation. LHDs are expected to utilise their funding allocations in the fiscal year in which it was allocated. Failure to spend within a fiscal year may result in a lower budgetary allocation in

succeeding years, i.e., “use it or lose it concept”, unless specific exemption is sought from the funder.

At both the LHD and hospital levels, funding is generally allocated for specific purposes or to specific accounts, such as: salaries and wages; equipment under \$10,000; equipment over \$10,000 and so on. There is usually a capital limit for equipment over \$10,000 imposed for each LHD by the Ministry of Health which is dependent on the LHD size and budget. For SWSLHD this cap was \$3.5million in the 2019/2020 fiscal year. Capital expenditure exceeding this amount would require Ministry of Health approval. While this capital cap constrains the ability of LHDs to expeditiously replace equipment, it also provides a structure for prudent financial management within LHDs. Funding is usually linked to the attainment of certain goals. One of these key deliverables is Emergency Treatment Performance, which is discussed next.

1.2.7 Emergency Treatment Performance

Between 2011 and 2019 the Commonwealth of Australia implemented the concept of National Emergency Access Target (NEAT) and later Emergency Treatment Performance (ETP) as part of the Health Reform. Both initiatives were aimed at treatment or discharge of patients presenting to emergency departments (EDs) within four hours. According to the Emergency Care Institute (2014), NEAT was aimed at having 90% of patients presenting to the ED being discharged, admitted to hospital or transferred to another hospital for treatment within four hours. Key to this approach is that clinical decision making will override these targets which facilitate safe patient care. Research by several authors (Di Somma et al. 2015; Guttmann et al. 2011; Morley et al. 2018; Pines et al. 2011; Sun et al. 2013) suggested that poorer patient outcomes resulted from delays in patients accessing treatment. NEAT/ETP was a crucial driver in clinical practice change with key performance indicators (KPIs) used to measure hospital performance across public health systems. These KPIs are tied to health funding in addition to the ABF discussed earlier in section 1.2.6.

The shift in hospital funding through ABF and NEAT/EAP resulted in unprecedented pressure in EDs and consequently radiology departments. Radiology departments provide crucial diagnostic services to support clinician decision making, through services such as computed tomography (CT), X-rays, Fluoroscopy, Ultrasound and Magnetic Resonance Imaging (MRI). Additionally, due to the evolution of clinical practice over the past few years, CT demand has continued to grow, replacing a general x-ray as the modality of choice. Better Health Victoria (2015) defined Computed Tomography (CT) as a medical imaging procedure that uses x-rays and digital computer technology to create cross sectional images of all the body structures including bone and soft tissue. At a major NSW public hospital, 60% of the total CT demand is driven from the emergency department (Lin 2021). For such a hospital, undertaking at least 1,600 CT examinations every month, 960 of these studies are ED referrals. Moreover, consistent with the peak period for ED presentations of between 6pm and 10pm, CT activity in an afterhours setting contributed two thirds of the total CT usage at the hospital. As pointed out earlier in section 1.1, medical imaging provides the invaluable diagnostic tools which assist physician disease diagnosis and treatment in an emergency department. Radiologists and ED physicians have to collaborate to ensure that imaging tests are prioritised for EDs or there exists a process for prioritising and performing imaging studies, taking into account ETP as a performance and quality metric. As the setting of this research project is in medical imaging, it is important to review its history and origins as presented in the next section.

1.2.8 The Growth of Medical Imaging

Medical Imaging has grown from predominantly x-ray and fluoroscopy usage 25 to 30 years ago to a greater use of new technologies such as computerized axial tomography (CAT), or simply computed tomography CT, and magnetic

resonance imaging (MRI). These modalities utilise the tomography technology to acquire images and will now be discussed in turn.

CT technology, commencing in the 1970s (Shaw, AS & Dixon 2015), is based on the ability to acquire multiple slices of body images versus one plain offered by the conventional x-ray technology (Cox & Lynch 2015; Government of Western Australia 2021a). These images are then reconstructed using computer software and interpreted by specialist doctors called radiologists. Parallel to the development of CTs is MRI technology, discussed in the next paragraph.

Also, in the 1970s MRI developed as a modality. Unlike x-ray based CTs, MRI utilises magnets for their technology thereby reducing radiation exposure. While still an expensive technology, the superior resolution and diagnostic quality from this technology is increasingly making clinical use of MRI more widespread (Government of Western Australia 2021c). The use of technology in assessing the structure or organs needed to be supported by the study of organ functions, which will now be discussed.

While radiology focuses on the structure of organs, there was a need to understand organ function. Again, x-rays played a crucial role in the 1950s, in the establishment of nuclear medicine as an imaging technique. It was discovered that some radioactive compounds such as Technicium 99m could be combined with méthylène diphospona and be absorbed by bones being invaded by tumours or cancerous cells (Government of Western Australia 2021b). This meant that cancers that typically spread to bones could be detected in the body through a nuclear bone scan and disease diagnosis achieved. Further technology advances have resulted in new technology such as positron emission tomography (PET). The premise of PET scanning is the use of chemical compounds such fluorine (F-18) that is incorporated into a glucose analogue called fluorodeoxyglucose (FDG)(Gaertner et al. 2015). In most cancers, glucose uptake is increased, and this increased uptake assists in the diagnosis of most

cancers (Hoffmeier et al. 2014). PET and CT technology continues to evolve with new medical technology of PET CTs becoming increasingly available.

With the advancement of technology, many other imaging disciplines have emerged such as Interventional Radiology. The British Society of Interventional Radiology (2020), defined interventional radiology as a range of techniques relying on the use radiological image guidance (X-ray fluoroscopy, ultrasound, computed tomography [CT] or magnetic resonance imaging [MRI]) to precisely target therapy. These techniques reduce the need for open surgery which increases the risk of infection, reduction in hospital stay, lower costs, provide greater patient comfort and reduced risks (British Society of Interventional Radiology 2020).

While technology has continued to evolve, so has management practice in medical imaging departments. The increased technology costs, advancement in technology has resulted in continuous changes in the medical imaging landscape. Gone are the days when medical imaging departments used to be only support departments, but they are now viewed as being more integrated in the holistic approach to healthcare provision through multidisciplinary approaches within NSW and Australia generally (Chew, Cannon & O'Dwyer 2020; Phillips, Smith & Straus 2013; Sacks et al. 2019). Not only do medical imaging departments have to continuously manage their equipment pool to keep pace with technological advancement, they must also manage the changing general healthcare landscape. Like other specialists in medicine, medical imaging practitioners continue to specialise in specific areas such as CT; MRI; Ultrasound; Interventional Radiology (IR) and the Nuclear Medicine specialties such as PET and Bone Studies. Medical imaging practice has been confounded by state and federal policies which were introduced since 2008 such as the Diagnostic Imaging Accreditation Scheme (DIAS), and the Diagnostic Imaging Quality Practice Program (DIQPP)(Department of Health 2016, 2020c). These initiatives

are intended to enforce service standards and quality through the incentivisation of investment in new equipment.

As technology has developed, anecdotally, patients and consumers are accessing information through the widespread usage of the internet or mobile technologies, medical imaging managers must increasingly manage more sophisticated customers who have a better understanding of the procedures they are undertaking (Kayser et al. 2015; Patel, Barker & Siminerio 2015). While customer experience was a consideration in the past, it is a major consideration for today's medical imaging manager. A significant number of customer complaints can adversely affect the perception of service provided by a medical imaging service. As such, the medical imaging manager is now required to proactively manage customer engagement processes to reduce reputational risk. Workforce considerations therefore play a key role in this process as discussed in the next paragraph.

The healthcare system generally is laden with an ageing workforce (Armstrong-Stassen et al. 2015; Callander et al. 2021; Gong & He 2019; Kagan & Melendez-Torres 2015; Lenthall et al. 2011) Medical imaging is not an exception. Managers are now required to proactively plan for succession (Howe et al. 2012), ensure staff maintain their skills and experience in accordance with professional bodies' accreditation requirements (Australian Health Practitioner Regulation Agency 2021)² and foster a good working environment for staff retention. In the NSW public health system, wages and remuneration conditions are governed by industry awards.

² Australian Health Practitioner Regulation Agency

1.2.9 Medical Imaging Departments in NSW

In NSW, there are two types of medical imaging practices, private and public ones. Private practices are independently owned and operated mostly by radiologists, while public imaging departments are associated with public hospitals in Australia. Unless practices are collocated within a private hospital where they perform inpatient studies, they predominantly undertake outpatient studies, compared to imaging departments in public hospitals. According to Royal Australia and New Zealand College of Radiology (2019)³, about 72% of diagnostic tests are undertaken by private practices with the remainder provided in public hospital departments. Anecdotal evidence suggests that public practices that manage inpatients, perform more complex and trauma type studies compared to outpatients who are usually mobile to seek services themselves. This research focuses on public imaging departments which are discussed next.

Most NSW public hospital radiology departments operate 24 hours a day, with a limited range of services out of business hours due to historical, resource rationalisation and other socio-economic and political considerations. These challenges are not unique to NSW LHDs, but also to most other public hospitals in Australia and internationally (Marino & Quattrone 2019; McCullough et al. 2020; Meng, Q et al. 2019). The demand for imaging in EDs significantly impacts on the effectiveness, timeliness, and efficiency of medical imaging departments. Coupled with changes in the hospital funding models in NSW as discussed in section 1.2.5, the case for changing work processes and workflows to improve efficiency, scarce resource management and managing emerging demands such as increasing community expectations cannot be more compelling (Bhattacharyya et al. 2019; Roberts et al. 2016).

³ Royal Australia and New Zealand College of Radiologists

Medical imaging departments like other health service departments, require a departure from the status quo to refocus healthcare delivery to different, more efficient ways in Australia and other jurisdictions. The complexity of healthcare does not make this task any easier, with multiple and usually non-mutually exclusive considerations at play. In attempting to refocus the provision of medical imaging services, effective leadership for change management is required. There does not seem to be an agreement in literature on what is strong leadership in healthcare, both generally and in medical imaging departments. Medical imaging departments for example, are faced with different situations requiring change through policy reforms. These changes include but are not limited to equipment procurement policies that recognise the capital-intensive nature of medical imaging. Existing policies, while encouraging investment in new equipment, do not go far enough or are incongruent with other budgetary processes utilised in the public health system, which include caps on capital expenditure as fully discussed in sections 1.2.6 and 1.2.11 of this chapter.

In change management implementation, the leadership and change management approach utilised is imperative in achieving success (Mehta, Maheshwari & Sharma 2014; Nging & Yazdanifard 2015). It is crucial for change management leaders to utilise an appropriate strategy that will result in the attainment of the intended objectives. The context within which public health organisation leaders must implement change, is complicated by several factors including state and federal government regulatory frameworks: incentives and disincentives for particular activities. For example, long waiting times in the emergency departments may necessitate hospitals offering GP clinics to co-locate next to EDs. These clinics may then attend to patients in higher triage categories (that is patients who are less sick). The funding of these services may not be clearly defined. These factors result in health services preferring to undertake approaches aligned to funding models in the provision of healthcare,

which may not necessarily be advantageous to the patient but are more pragmatic for health services.

1.2.10 Equipment Procurement in Medical Imaging

Following the budget discussion earlier in this chapter, it is important to recognise that medical imaging is a capital-intensive service as it requires expensive state of the art equipment. Moreover, with technological advancement, equipment often requires replacement within a 10 to 15-year period or sooner due to usage, obsolescence of existing equipment and other considerations. Equipment replacement in Australia is also encouraged by the Medicare capital sensitivity rules. According to the Department of Health (2020a), diagnostic equipment is allocated life ages for Medicare benefits purposes, a process known as capital sensitivity. The intend of this process is to encourage practices to replace diagnostic equipment regularly to ensure that patients have access to high quality diagnostic imaging services. To achieve this, Medicare will stipulate how much it will pay for a diagnostic imaging test, using Medicare item numbers. If tests are done using equipment within the life age of the equipment (mostly up to 10 years), then Medicare will pay 100% of the schedule item number. However, if the equipment used is older than 10 years then the Medicare rebate item number is reduced to 50%. Public and private hospitals rely on this funding for their outpatients, as it is a revenue stream for them. Equipment replacement becomes a key consideration for public hospitals as another income stream. The budgetary process and a primer of equipment budgeting was provided in section 1.2.6 above. In this section the process for capital procurement is further explored.

Different departments within the hospital and LHD generally maintain assets lists and risk rate their assets. As part of the budget process in the months leading to a new fiscal year, departments are requested by the LHD finance directorate to

nominate their equipment requirements or provide their “wish lists”. These are aggregated, with department representations made to the LHD executive and decisions made on the equipment to be procured at the LHD level. Once equipment procurement decisions are made, the department with approved purchases are notified and they go through the necessary procurement processes. Regularly, the Ministry of Health will have a centralised budget for high-cost equipment for example, CT scanners for medical imaging or Cardiac Catheter Labs. They will offer these funds to LHDs with caveats to “spend the funds within this financial year” or directly negotiate the procurement of these machines with equipment vendors. Where equipment procurement is done centrally, there is usually the risk that local requirements are rarely met, as consultation may not be at an appropriate level. Non-end users may make procurement decisions for inappropriate equipment type, or equipment that is non-compatible with an organisation’s existing fleet could be bought. The former process (“spend it within the financial year”), also adds to the complex dynamic when funds are availed in May for a 30 June financial year end when the procurement process includes several activities, such equipment testing. In most cases, equipment is shipped from overseas where there is a 4–6-week turnaround time from the time a purchase order is generated, for the acquisition. These timeframes are far longer in the COVID19 pandemic due to supply constraints caused by lockdowns (Magableh 2021). NSW Health has implemented state-wide contracts where equipment can be procured, however, not all products and vendors may be on these contracts due to the compliance requirements to be on such panels.

Service managers in medical imaging reported that equipment leasing was previously considered and was prominent in healthcare in the early 2000s in NSW. LHDs are now reluctant to lease equipment for several reasons, such as lack of expertise and proactivity in managing leases. Additionally, leases impose a significant recurrent burden on the operating budgets of hospitals if not managed well, hence their unpopularity and restriction from the Ministry of

Health in recent times. The patients as end users of equipment have some service expectations as they receive healthcare. These considerations are discussed in the next section.

1.2.11 Patient Considerations

The study was conducted in hospital settings and inherently most of the projects considered had some impact on patient welfare. The study was primarily investigating project leadership and management in medical imaging and their leadership behaviour, rather than project outcomes. Therefore, this research did not expressly examine patient opinions, as patients were not part of the study. However, a consideration of patient welfare was undertaken as part of this research, in so far as the projects undertaken by the LHD impacted on patient welfare. For example, change processes involving workflow reconfiguration while not directly targeting patient satisfaction, considered improving the ultimate patient experience as a goal of the change. These change projects undertaken were service improvement and quality improvement projects, viewed as low-risk projects within the SWSLHD and therefore requiring no ethics approval. However, these projects had relevant senior leadership approval and executive sponsorship. Section 1.2 provided a background to this research and discussed several issues impacting on medical imaging services including the Australian and NSW health context, funding arrangements; implications of health reforms in NSW; change drivers such as ABF and the growth of medical imaging. The next section discusses the research problem.

1.3 Research Problem, Propositions and Contributions

Section 1.2 above outlined the increasing challenges in a dynamic environment, faced by medical imaging department, which require addressing through research informed leadership processes. This research investigated how leadership in healthcare affects the outcomes of the change management process in medical imaging departments. It investigated the leadership styles that optimise change management processes and lead to successful change in public hospitals. In so doing, this research highlights the critical success factors for leading change, the strategies implemented for leading change and the key reasons for project success or failure. Through this research, learning leaders and organisations were explored, to understand whether learning leaders or organisations achieved better outcomes in subsequent change management processes, compared to those who did not leverage their learning from prior projects or processes.

As noted earlier, the literature does not seem to agree on what effective leadership is in medical imaging departments. More appropriate may be the research of strong leadership as effective leadership. This research further investigated what effective leadership means for leaders in medical imaging. Medical imaging departments are faced with different situations requiring change through policy reforms for example. Some authors, (Glouberman & Zimmerman 2016; Ratnapalan & Lang 2020) argued that healthcare processes are heterogeneous in terms of range and variety of tasks. Medical imaging processes, however, can be both homogeneous and heterogeneous due to the customisation of service delivery or the emergence of personalised medicine therapies. For example, a radiology department may have a set process for undertaking CT studies. However, where there are patients with acute renal failure, requiring CTs with contrast, these patients must be accommodated, and special precautions undertaken to provide the CT safely (Government of Western Australia 2021a) .

This research investigated the following questions:

1. What are the dominant leadership styles for change management approaches in medical imaging departments?
2. What strategies are used for successful change management in medical imaging?
3. How does the nature of leadership and change management processes in healthcare impact on the success of change management processes?
4. Why do some projects/processes fail or succeed?
5. How is the healthcare leader's leadership style influenced and reshaped by learned experience in prior change management processes?
6. How do "learning" leaders achieve better outcomes in successive change management processes?

1.4 Motivation for This Research

The researcher was employed within the LHD at the commencement of the research. When seeking literature to support evidence practice or ways of providing leadership, there was an observation that most of the leadership literature within the healthcare setting was broad, general and did not pertain to medical imaging. Medical imaging, like other diagnostic testing services, is quite capital intensive and change management when undertaken, needs to be effective and with minimal downtime. Coupled with the researcher's interest in leadership theory, this set the scene for the need to undertake medical imaging specific leadership research.

1.5 Justification for The Research

This research aims to identify those leadership styles that can be utilised in the health system to progress improvement and change projects. There is scant literature on leadership and change management within medical imaging in healthcare, as fully discussed in chapter 2 of this thesis. This thesis examined the

leadership styles for leadership and change management processes in healthcare and seeks to add to the theory and scholarly literature on leadership styles in medical imaging departments. It will make these contributions by answering the research questions outlined above. The implications of this research include informing public medical imaging departments attempting to manage increasing demands for diagnostic imaging tests and effect how medical imaging departments will configure their workflows to achieve sustained performance improvement.

Strong leadership for change management was identified as being required (Ajayi 2002; Ajmal et al. 2012; Grant-Smith & Colley 2018). Chapter 2 will identify that literature does not seem to define what this effective leadership is, in healthcare generally and medical imaging departments specifically.

This research will provide guidance on the use of evidence informed change and leadership management processes in public hospitals with diverse stakeholders competing for scarce resources. The implications of this project will have an impact on the way local medical imaging departments undertake change management process both within Australia and internationally.

1.6 Research Outcomes

Informed by the answers to the research questions, this research study will lead to the following research outcomes, which will contribute to the outlined areas of leadership theory:

- i. Addition to the knowledge on the relationship between leadership and change management in healthcare and specifically medical imaging.

- ii. Whether certain types of leadership styles optimise outcomes to change management processes in healthcare and specifically medical imaging.
- iii. Assess the applicability of leadership theory to complex environments such as healthcare and specifically medical imaging departments.
- iv. Identify critical success factors for successfully leading for change management in healthcare organisations.

1.6.1 Additional Outcomes to Practice

This research was conducted by a practitioner within medical imaging as discussed in section 1.4. It is therefore important that the research considers the adoption of these additional implications on practice such as:

- i. Leadership practices that result in improving patient access to imaging services, patient safety, and quality.
- ii. Interpretation of whether power and influence theory and other leadership styles are crucial to successful change management process in medical imaging.
- iii. Identification of the critical success factors of effectively leading for change in major public institutions.
- iv. Contribution to leadership and change management capacity for practice changes in medical imaging departments.

1.7 Methodology

1.7.1 Scope

This research is a mixed methods longitudinal study that sequentially examines the leadership style and change management behaviours of leaders through change management processes in medical imaging, over several successive projects or processes. The research investigated these through case studies of

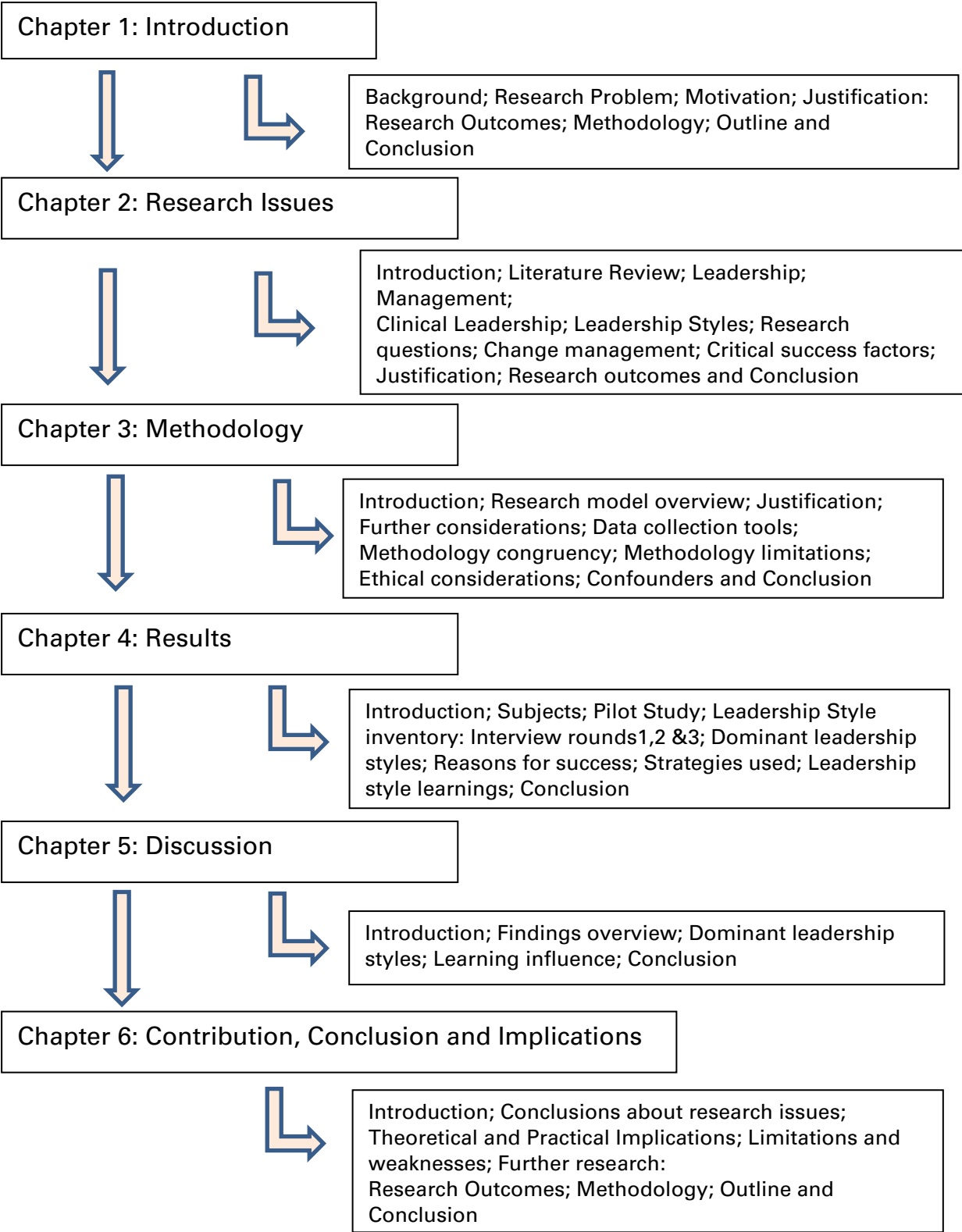
change management processes in medical imaging departments and draws intra organisation change management process comparisons and those led external to the organisation, state, country and internationally.

1.8 Outline of The Report

This thesis consists of six chapters as outlined in Figure 5. Figure 5 outlines the chapter on the right-hand side with the section heading contained in that chapter outlined on the left-hand side. A summary of each chapter is provided in the next paragraphs.

The thesis was introduced in this chapter, with a background of the research context provided. A brief synopsis was provided for the research problem together with the justification for this research. The research questions were introduced in this chapter, along with an overview of the contribution to literature together with the research outcomes was also undertaken in this Chapter. A broad methodology overview was also introduced in this chapter. The next chapter, Chapter 2 presents the research issues. In this chapter, a literature review will be provided. Chapter 3 discusses the research approach identifying the Methodology, data collection and analysis to be conducted, and the participants of the research. Chapter 3 also outlines the scope of this study. Chapter 4 discusses the results of the research both from a quantitative and qualitative perspective as this is a mixed methods study. The next chapter, Chapter 5 discusses the findings of the study and provides clarifications and further commentary on the previous chapter. This chapter also answers the research questions and discusses gaps in literature. Lastly, Chapter 6 provides a conclusion to the research and provide implications to practice. It also outlines the limitations of this research while also propose future research directions resulting from this study.

FIGURE 5: THESIS OUTLINE



Source: Developed for this research

1.8 Conclusion

This chapter has provided a background to the research study and highlighted the increasing pressure on the LHD. There is scarcity of resources which necessitates the need for the LHD to continually undergo change processes seeking value for money propositions, improved patient outcomes or to meet emerging patient expectations. An illustration of the funding processes for hospitals in NSW has been provided together with a discussion for emergent demands such as the Emergency Treatment Performance.

An overview of the research problem was provided in tandem with the research questions together with the research justification, expected outcomes and brief introduction of the methodology to be utilised. A research outline was also provided which provides details about the structure and what the reader should expect to find in this research. The next chapter provides a literature review of the literature relevant to this research.

Chapter 2 – Literature Review

2.1 Introduction

The previous chapter introduced this research, research questions and expected theoretical contribution. This chapter reviews leadership theory as it applies to this study. The literature review presented in this chapter, discusses the various leadership models as proposed by different scholars. Firstly, this chapter discusses the research problem. In this part of the discussion, the research questions will be introduced, building on the justification for the research as discussed in section 1.4 of the previous chapter. When the literature review is presented, the research gaps identified will be highlighted. The research questions immediately follow the relevant literature review, with a summary of the anticipated research outcomes provided at the end of the chapter. Secondly, the propositions or research issues are discussed and finally the anticipated scholarly contribution of this research outlined. This chapter also defines leadership, and various theories are reviewed with a focus on the leadership in healthcare, so that the later chapters can build on this review.

2.2 Literature Review

An extensive literature review was undertaken for this research project. More than 800 articles were reviewed and due to the breadth of the leadership literature, a structured approach was considered, and discussions were conducted under the following broad headings: Leadership Theory; Leadership Styles; Measurement tools for leadership style. Further discussion will also be conducted for change management and learning organisations.

2.3 Leadership

Kotter (2008) as referred to in Western (2019) and others (Bratton & Gold 2017; DuBrin 2015) defined leadership in terms of coping with change, responding to or creating chaos to some extent, with Stanley (2016) being more explicit in identifying the purpose of leadership as setting the vision; values and communicating these to their followers. Stanley (2016); Redknapp et al. (2015) and Hutchinson and Jackson (2013) further suggested that leaders in this context, motivated, set direction and inspired a group for a shared goal. This results in leadership's functionality being; innovation, direction, communication and keeping people on track in difficult times. Similarly, Rittinger (2014) defined leadership as guiding and assisting followers to the right path as it is vital for goal achievement through employee engagement. Others such as Bui (2020); Goh (2020); Hsu and Lamb (2020); and Rebelo, Lourenço and Dimas (2019) suggested that leadership is associated with the stimulation and motivation of people to reach common goals. Northouse (2021) suggested that leadership is a process where an individual influences a group of individuals to achieve a common goal. The common theme running through these definitions is that leadership involves the influence of others to achieve set objectives. The way these objectives are attained varies for several reasons including the personality of the individuals or groups leading and that of the followers. Depending on one's school of thought, it is fair to say that leadership development is a lifelong process as discussed by Liu, Z et al. (2020) who suggested that leader development is an ongoing process across the entire lifespan. The Northouse definition of leadership is adopted in this study. This researcher is interested in healthcare leadership particularly leadership from medical imaging leaders, who are the subject of this research. While leadership has been studied in healthcare, for example in nursing, medicine, leadership in medical imaging departments remains an under researched area. This study seeks to contribute to this gap in literature.

The literature also discussed that for project or processes to be successful, effective leadership is required. Such literature, however, does not discuss what this entails. Strong leadership has been described in terms of the results it yields, for example, the International Institute of Directors and Managers (2020) identified the five main results that great leaders produce, which are: high percentage of top performers; higher employee retention; higher productivity; consistent growth and consistent results. However, some of these results are not applicable within public health settings, where for example organisational growth is not a key consideration. This study proposes that strong leadership is leadership that results in successful change management projects or processes. It is important for this research to explore what effective leadership entails, particularly what it means for medical imaging leaders, its characteristics and how it is enacted. Leadership should be viewed as distinct from management, which is discussed in the next section.

2.4 Management

Management is defined as the attainment of organisational goals in effective and efficient manner through planning, organising, leading and controlling organisational resources (Daft & Marcic 2016; Gomes et al. 2014; Grisaffe, VanMeter & Chonko 2016). Similarly, Burrell and Morgan (2017) and Fayol (2016) defined management as forecasting and planning, organising, commanding, co-ordinating and controlling. Both definitions are distinct from influencing others in the attainment of organisational goals. The former definition is the one adopted for this research. In medical imaging, participants who perform a management function and are recognised as managers by the LHD are the leaders who have been selected to participate in this research. Further discussion on the sample selection is provided in Chapter 3 following. These managers are the health service managers that are discussed in the next paragraphs.

Kippist (2012); McGivern et al. (2015) and Mangold et al. (2014) found that the role of the health service manager was increasingly complex, requiring professional, well-trained managers to have management skills and knowledge. This has led to the evolution of health service management increasingly becoming professional to the extent of having a professional college, the Australasian College of Health Service Managers (ACHSM), educating and upholding standards, like other colleges in healthcare, such as the Royal College of General Practitioners (RACGP). Brooke-Sumner et al. (2019) and Nyikuri et al. (2015) found that health service managers' ability to rapidly adapt to changing policy directives, landscapes and build relationships and staff resilience are crucial to weathering the complex challenges they face from healthcare systems and communities. Uvhagen et al. (2018) and Brooke-Sumner et al. (2019) also found that in top-down hierarchies, health service managers have a key role in determining task prioritisation and their perceptions of policies and innovations exert a strong influence on implementation of these policies and innovations.

Within the LHD, health service managers are usually non-clinicians who are distinct from clinical leaders as fully discussed in section 2.5. below. Health service managers (or managers who are non – clinicians) usually possess healthcare leadership skills and other skills, that allow them to support or lead the provision of healthcare, in areas such as finance (resource allocation); corporate services type functions such as hotel services (cleaning; patient transport; porters and meal management), human resource management and other specialist areas (Knol, Janssen & Sol 2014; Lacity, Khan & Yan 2017). An understanding of health service management is important and relevant for this study as some of the leaders who are the subject of this research, are health service managers. Leadership within medical imaging departments is not only from health service managers as discussed above, but also from clinical leaders who are discussed in the next section.

2.5 Clinical Leadership and Management in Health Care

Edmonstone (2017) and Stanley et al. (2017) identified key skills that clinical leaders such as doctors; nurses; radiographers and other allied health professionals are recognised to possess. Such elements include clinical expertise; effective communication and interpersonal skills; empowerment, respect for others, team building; driving change, making care better, providing quality care; and vision. While Edmonstone (2017) and Stanley et al. (2017) suggest that some of these attributes are evident in clinical nurses, some need to be developed. For example, the demonstration and translation of their clinical values and beliefs into actions and functions of their management role (Démeh & Rosengren 2015; Doherty 2013; Erol et al. 2015; West et al. 2015). Such skills would fully harness the potential of frontline clinical nurses, radiographers, and other clinicians to be effective leaders, who are engaging and can make a positive and significant contribution to the quality of healthcare to their patients.

Kang et al. (2020); Maghsoudi, Cascon-Pereira and Beatriz Hernández Lara (2020); Okpala (2018) and VanVactor (2012), suggest a collaborative leadership model in healthcare organisations. VanVactor suggests the definition of collaboration management as involving multiple elements that can involve simple coordination, synergistic behaviour, mutual work processes and partnerships (VanVactor 2012). These are crucial tenets of change management projects or processes at major public hospitals in NSW. While the VanVactor (2012) study correctly identified key aspects in leadership processes that distinguish it from management, its limitations include the very high-level discussion that does not offer practical solutions in application for healthcare managers considering implementation of these approaches. For example, this study does not provide examples of where collaborative leadership has been practiced in healthcare, such as new multidisciplinary approaches in the provision of healthcare including physicians, nurses, pathology, radiographers, physiotherapists, and other health professionals.

A review of clinical leadership literature identified that practitioner literature such as Itri and Lawson (2016); Kruskal et al. (2012); Matalon et al. (2018) & Shah et al. (2013) does not adequately discuss management or leadership theories or critical success factors for change management in medical imaging departments. In such practitioner literature, targeted primarily for medical imaging practitioners, gaps exist where there is no adequate discussion on leadership theories, its congruency and applicability with practice and change management processes in public hospitals. For example, while Kruskal et al. (2012) discussed LEAN⁴ methodology and the value addition proposition for patients, they did not adequately discuss leadership theory and linkage on leadership styles such as transformational leadership.

A subsection of clinical leadership is medical leadership, discussed in the following paragraphs.

2.5.1 Medical Leadership

An emerging type of leadership in healthcare is Medical Leadership. Andersson (2015); Sebastian et al. (2014); and Mintz and Stoller (2014) defined medical leadership as consisting of fully trained physicians occupying leadership roles relevant to the practice of medicine. Medical leadership can include resource management, decision making, recruitment and medical consulting as well as implementing changes and improvements in hospital and clinical settings. Sebastian et al. (2014) also suggested that medical leadership is evident at both strategic and operational levels with cases where doctors are executive leaders and are no longer delivering clinical care. Sebastian et al. (2014) also suggested that medical leadership is evident at an operational level where doctors possessing no formal management leadership position lead operational activities because of their clinical expertise and credibility. The medical imaging setting has medical leaders as defined by (Andersson 2015); Mintz and Stoller

⁴ A systematic process for reducing waste in a manufacturing or service process.

(2014) and Sebastian et al. (2014) and also some hybrid doctor-managers as discussed by (Coleman 2017) and Kippist, Hayes, and Fitzgerald (2012) who assume both a clinical and a managerial role to influence the strategic and operational levels.

Medical leadership often leads itself to medical dominance in clinical practice. Medical dominance is the use of selective resources to restrict and exclude other professions from gaining legitimacy in healthcare, through the three modes of subordination, limitation and exclusion (Kippist 2012). She also found that in Australia for example, only medical clinicians can refer patients to medical specialists in the public healthcare system, thus taking control of their own work and that of other professionals. This allows medical doctors to remain dominant over other professions. Such dominance thus transcends other areas of leadership with the capacity and ability to directly influence the leadership styles at the ward and department levels. It becomes apparent that medical leadership has an influence on the leadership styles of followers of those medical doctor-led-departments. This research is set in a LHD where medical doctors lead many departments.

As discussed in Chapter 1, the structure of medical imaging departments is such that it can lead to medical dominance in the leadership of clinical departments in the LHD including medical imaging departments. Coupled with the high technological requirements of medical imaging departments, an engagement of the entire team is necessary, and this is often seen through the medical leaders who provide the driving force in the shape and operations of the service. An understanding of medical leadership is relevant to the leadership culture that may be observed in medical imaging departments.

2.6 Leadership Theories

Several leadership theories with relevance to this research exist and include Behavioural Theory (de Graaf 2019), Trait Theories (Ghasabeh, Soosay & Reaiche 2015), Contingency or Situational Theories (Mango 2018), Path-Goal Theories (Malik, Aziz & Hassan 2014), Power and Influence Theories (Olley 2021) and Leader-Member Exchange Theories (Orr & Cleveland-Innes 2015). These theories have been chosen and are discussed in this chapter as they contribute to the exploration of the leadership styles utilised by medical imaging leaders within NSW public hospitals. The theories will be discussed in the paragraphs that follow. In the discussion of these theories, the researcher will explain their additional relevance to this research.

2.6.1 Behavioural Theories

Behavioural theorists such as Lewin, Lippitt and White (1939) and McGregor (1960) focused on the actual behaviour of the leaders, for example whether a leader makes autocratic decisions without consulting others. Such leaders are called autocratic leaders whereas democratic leaders allow for team or follower participation in the decision-making process. Laissez-faire leaders on the other hand, have a “hands off” approach and do not interfere, allowing the team or followers to make most of the decisions. One such behaviour is consultative leadership. Kovach (2018) and Deshwal and Ashraf Ali (2020) suggested that these theories are premised on the assumption that an effective leader is one who exhibits behaviours that are most conducive to group productivity and psychosocial growth in any achievement environment. Robbins and Judge (2017) extended this theory, believing that people could be taught leadership through education and instruction.

As this research explores the nature of leadership within the healthcare setting, it is useful to study behavioural theories and how they impact on healthcare

leadership and particularly medical imaging leaders. For example, if behavioural studies of other healthcare leaders have shown that certain traits lead to successful leadership practices, it is important to examine this for medical imaging leaders and assess such traits against leadership success or failure. An examination of the behavioural characteristics of healthcare leaders was undertaken in this research through the interview process and utilisation of the leadership style inventory (LSI) as part of the data collection process, fully described in Chapter 3 of this thesis.

2.6.2 Trait Theories

Trait theories are based on the premise that leaders have certain common characteristics or traits that make them effective leaders. Trait theorists, Stogdill (1948); Stogdill and Bass (1981); Mann, RD (1959) and Lord, De Vader and Alliger (1986), believed that leadership was an innate quality, someone was born with or without and was not a quality that could be learnt. This theory was further adopted by Northouse (2019) and further developed by Yukl (2019) who suggested that the big five broadly defined personality traits are:

- i. Surgeoncy – in a leader requires extroversion, energy and a high activity level, and a need for power (assertiveness).
- ii. Dependability – Conscientiousness in leaders requires dependability, personal integrity, and the need for achievement.
- iii. Agreeableness – in leaders requires a need to be cheerful and optimistic, nurturing (sympathetic, helpful) and a need for affiliation.
- iv. Adjustment - means that a leader must show emotional stability, self-esteem, and self-control and
- v. Intellectual outlook - outlook in leaders indicates that they must be curious and inquisitive, open minded and learning oriented.

However other theorists have developed different views, for example, Robbins and Judge (2017) and Kovach (2018) discussed how the theory was able to forecast leadership outcomes but indicated trait theories' inconclusiveness in rationalising leader behaviours. As this study explores the nature of leadership in medical imaging departments, this theory was utilised in the exploration of the characteristics of healthcare leaders. The trait theoretical lens was utilised to evaluate the specific characteristics of medical imaging leadership. Trait theory also presupposes that leaders are inquisitive and learning oriented. This theory's relevance is also underscored by the need to understand the learning leader and organisation. For example, this research draws on the experience of medical imaging leaders as they undertake successive change management projects over time.

2.6.3 Contingency Theory

Contingency theory, also known as situational theory, is based on the premise that there is no right or wrong leadership style. The leadership style to be employed depends on the situation and the maturity of the individuals being led.

Leading proponents of contingency theory include Hersey, Blanchard and Natemeyer (1979), Fiedler (1967) and House and Mitchell (1975). Concurring with the last three authors, Utecht and Heier (1976) postulated that there are three main situational variables that determine the favourability or unfavourability of a situation to a leader. These are: leader member relations, task structure and leader position power.

The first, is concerned with the amount of tension involved in the interpersonal relationship between the leader and the group members and are in part dependent on the leader's personality (Utecht & Heier 1976). The second refers to whether the job is done a certain way, such as a step-by-step procedure

(structured), or whether there is no particular way to do the task and the requirements are quite vague (unstructured) (Utecht & Heier 1976). The third one posits that position power is the degree to which the position itself enables the leader to get his group members to comply with and accept his/her direction and leadership (Utecht & Heier 1976).

Later literature from Cherry (2012) and Amanchukwu, Stanley and Ololube (2015) on contingency leadership states that success is dependent on several variables such as leadership style, qualities of followers and situational variables. Kovach (2018) and Deshwal and Ashraf Ali (2020) also discussed that effective leaders can adapt their leadership style based on the nature of the group, situation and objectives to be achieved. This is an important consideration in a complex environment such as healthcare. This view is supported by Ghazzawi, Shoughari and Osta (2017) who suggested that situational leadership demands that leaders vary their behaviour and leadership style according to their followers; commitment to the goals. For example, if followers in the medical imaging department were unable or unwilling to carry out some tasks, then clear and specific directions must be given by the leader. This makes contingency theory relevant for this study, which explores the critical success factors for leading change in medical imaging departments and healthcare.

Healthcare is hierarchical in nature both from an organisation wide, leadership perspective as well as from a professional level for clinicians. For example, the Chief Executive of a LHD has overall responsibility in the management of resources and outcomes for a population within a local governance area. Clinicians on the other hand play both a dual role as hybrid clinical managers and as clinicians only. Kippist (2012) found that the goal of senior management may be to minimise costs while clinicians are more concerned with having state of the art equipment for clinical practice. Contingency theory thus posits this

study within the context of the healthcare leader and explores the medical imaging leader's leadership style within different contexts with different variables. As discussed in section 1.2, healthcare in Australia undergoes regular significant change hence this theory is relevant for this study in such a context.

2.6.4 Path-Goal Theory

House and Mitchell (1975) outlined the functions of leaders as; clarifying pathways for subordinates; removal of obstacles impeding subordinates from attaining goals and increasing rewards when subordinates achieve excellent results. To achieve organisational goals is one key requirement for enterprises. McKenna (2020) theorised that the effective leader is one who supports subordinates through paths which ultimately lead to organisationally desired and individually valued outcomes.

According to Boonyachai (2011), the Path-Goal theory was developed to describe the way that leaders encourage and support their followers in achieving the goals they have been set by making the path that they should take clear and easy. Robbins, Bergman and Stagg (2014) theorised that leaders must support their subordinates in achieving the goals of their organisations. The leaders in an organisation must all provide similar pathways to achieve goals of the organisations. Jones and George (2017) believed that the path goal model was a way in which leaders provided clarity to motivate subordinates to achieve specific results. They recognised four types of behaviours: directive, supportive, participative, and achievement oriented, which they believed, the success of each was hinged on the subordinate.

The path goal theory may be beneficial for leaders and followers to follow and was chosen to explore the healthcare leadership styles in medical imaging. In clinical practice, evidence informed protocols and practices are exercised. For

example, in medical imaging, protocols exist on the process for conducting a CT Brain or a CT abdomen. Some studies require chemicals or reagents known as contrast and the patient preparation for those studies differs accordingly. Medical doctors lead the way in establishing these protocols and directing their teams to follow these prescribed pathways. Through this process, the path goal theory is seen in action and its understanding is crucial in understanding the leadership behaviour of medical imaging leaders.

2.6.5 Leader-Member-Exchange (LMX Theory)

Nie and Lämsä (2015) proposed that the LMX is rooted in role theory, popularised by, Graen (1976); Dienesch and Liden (1986); Sparrowe and Liden (1997) and social exchange theory whose main proponents were, Wayne and Green (1993) and Erdogan, Kraimer and Liden (2002).

Graen and Uhl-Bien (1991) postulated that in LMX, there are three elements; the leader, follower and the exchange relationship. Yukl (2013b) further explained that the manager/subordinate relationship develops over time because of the role making processes and social exchange between them, with managers developing stronger relationships with some subordinates than others. Where mutual trust and loyalty exists, subordinates are provided with more responsibility with those trusted by the manager seen to be given more responsibility (Yukl 2013b). Interviews were utilised in this healthcare context research and sought to test the assertion by Yukl (2013a).

According to Chen et al. (2014), the more positional power an individual has, the more authority the individual presents, the more obedience employees will show. This view may be contrary to the highly specialised roles within a healthcare setting where medical dominance exists in the majority of clinical specialties (Germov 2019; Willis 2020). Additionally, Hsiung and Bolino (2018)

postulated that leaders have relatively high-quality exchange relationships with some employees and relatively low-quality relationships with others. This approach may not work in healthcare due to the interdependencies of sub specialities and the key role played by each profession.

Recent research by Gottfredson, Wright and Heaphy (2020) suggests that new and valid constructs and measures of leader follower relationships must be developed which involve; clearly conceptualising leader-follower relationship constructs; developing valid measures aligned with the construct and ensuring the research design surrounding the construct limits which affect endogeneity bias. Despite the emerging view discussed earlier, the LMX theory is relevant for this research as it is at the intersection of the leader- follower relationship and the exchange relationship. Okello and Gilson (2015) found that trusting relationships between frontline staff and management exerted a strong influence on staff retention, motivation and quality of care, with Scott, Mathews and Gilson (2012) further suggesting it may influence the adoption of innovations. Within healthcare, medical doctors' professional standing through their leadership role in clinical practice is quite high and is reinforced through a multidisciplinary approach to healthcare, where medical doctors take a leadership role and are quite influential (Edwards, N & Saltman 2017). This leadership role transcends to the ward and departmental levels. The LMX theory could explain why medical imaging doctors influence how their departments are run and consequently the outcomes of projects within those departments. The relevance of this theoretical lenses for this research cannot be understated.

2.6.6 Power and Influence Theories

Power and Influence theorists' approach is to view the way in which leaders use their power and influence to get things done. This then informs the leadership styles that emerge. French, Raven and Cartwright (1959) suggested that there are

five sources of power: three positional – legitimate, reward and coercive and two personal sources – expert and referent.

Legitimate power comes from the belief that someone has the formal right to demand and expect compliance and obedience from others (Bolman & Deal 2017). Reward power is premised on the ability of someone's ability to compensate for compliance for example a manager's ability to influence a subordinate through rewarding desired behaviour in the form of a pay rise (Daft & Marcic 2016). Expert power is based on one's superior skill and knowledge, for example a doctor has expert power over a patient (Thompson, Zald & Scott 2017). Referent power on the other hand relates to the perception of attractiveness, worthiness and right to respect from others (Luhmann 2018). Finally, coercive power stems from the belief that someone can punish others for non-compliance, for example a line manager will usually hold coercive power over their subordinate. Raven's model suggested that a leader should use personal power while building their expert power.

Williams, Perillo and Brown (2015) found that the lack of authority to change practise is a barrier to the implementation of change. They also found that this barrier is linked to having a supportive employment culture that break down hierarchical workplace structures. If staff feel they can make changes by having their inputs and ideas accepted, they feel empowered to enact changes within an organisation. For example, in medical imaging, this translates to staff members feeling that they have the decision-making ability to effect positive patient outcome impacting changes.

The use of power and influence leads to several leadership styles including transactional leadership, transformational leadership, and authentic leadership (Cummings et al. 2018), with these discussed further in the sections that follow.

Conducting this study with an understanding of power and influence theory is relevant for this research. This is because leadership in healthcare is hierarchical, and this structure is derived from the distribution of power and influence within the different organisational levels. For example, health service managers control resources, budgets, and ultimately patient outcomes through the allocation of such resources. Clinicians through medical dominance, on the contrary exert their influence through clinical practice and their excellence in their clinical field (Braithwaite et al. 2017; Kippist 2012). An exploration of the extent to which their coercive power and influence is demonstrated, is crucial in how they lead in their departments hence the relevance of power and influence theory in this research.

Table 1 below summarises the discussed leadership theories outlining their characteristics.

TABLE 1 – LEADERSHIP THEORY SUMMARY

Leadership Theory	Main proponents	Focus
Behavioural	Lewin, Lippitt, and White (1939) and McGregor (1960)	Actual behaviour of the leaders, for example whether a leader makes autocratic decisions without consulting others.
Trait	Stogdill (1948); Stogdill and Bass (1981); Mann (1959); Lord, De Vader, and Alliger (1986) and Kirkpatrick and Locke (1991)	Leadership is an innate quality; one is born with or without it.
Contingency	Hersey, Blanchard, and Natemeyer (1979), Fiedler (1967) and House and Mitchell (1975). Utecht and Heier (1976)	There is no right or wrong leadership style.
Path-Goal	House and Mitchell (1975)	Encourage and support followers in achieving the goals by making the path that they should take clear and easy.
Power and Influence	French, Raven and Cartwright (1959)	How do leaders use power and influence to get things done?

Leader-Member-Exchange (LMX)	Graen (1976); Dienesch and Liden (1986)	Manager/subordinate relationship which influences trust and allocation of work.
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Source: Developed for this research

Thus far, discussion and summarisation in Table 1 has occurred on the main leadership theories that exist and their main proponents. Discussion has also occurred regarding the relevance of these leadership theories in so far as they contribute to the leadership styles of medical imaging leaders. The next sections will discuss the leadership styles that have been developed from these leadership theories.

2.7 Leadership Styles

Leadership styles emanate from broad leadership theory groups. This section will discuss the following leadership styles as they continue to evolve and due to their relevance to this research; consultative leadership; transformational leadership; transactional leadership; authentic leadership; situational leadership; servant leadership; clinical leadership.

2.7.1 Consultative Leadership

Hornickel (2012) suggested that consultative leadership is a leadership style where the leader considers that team members have a lot of knowledge and experience, that if one garners, would provide one with information for decision making. He also suggested leaders do not lead in a vacuum and this is ever more important in complex organisations such as healthcare.

Additionally, Kissane-Lee et al. (2016) found that surgical trainees preferred consultative leadership during their training compared to the autocratic leadership they actually received in their training.

Consultative leadership is relevant for this study due to the nature of contemporary healthcare provision, through multidisciplinary teams. As such, it is important to consider consultative leadership as a style practiced by healthcare leaders. For example, Vainieri et al. (2019) and Oostra (2016) found that clinical engagement promotes a greater connection between the medical profession and the organisational environment.

2.7.2 Authentic Leadership

Authentic leadership theory is an emerging style inspired by Shakespearean Hamlet, "to thine own self be true". This has been embraced by practitioners such as Blake (2020); Ulrich (2020) and academics alike (Dinh et al. 2014; Gardner et al. 2011; Wang, D-S & Hsieh 2013). Authentic leadership can be described as a process that draws from both positive psychological capabilities and a highly developed organisational context, resulting in a greater self-awareness and self-regulated positive behaviours on leaders and associates, fostering positive self-development (Anderson, MH & Sun 2017; Haslam, Reicher & Platow 2020; Luthans, Youssef & Avolio 2015) and Walumbwa and others as cited in Schnackenberg and Tomlinson (2016) described authentic leadership as requiring four key components of: fostering greater self-awareness, an internalised moral perspective, balanced processing of information and relational transparency for leaders working with followers, to foster self-development.

Dinh et al. (2014) and Haslam, Reicher and Platow (2020) described authentic leadership as a pattern of transparent and ethical leadership behaviour encouraging openness and input between leaders and followers in the decision-making process. This process requires balanced consideration of followers input and negative and positive perspectives prior to making important decisions. In this model, the authentic leader thus sets high ethical and moral standards.

Despite the relative infancy of authentic theory, compared to say LMX theory, there have been a handful of studies on authentic leadership in general industry and a very few studies in medical imaging. For example, Anitha (2014) and Leroy, Palanski and Simons (2012), linked work attitudes and outcomes, trust in management, organisational commitment (Peus et al. 2012) and nurses perception of their manager's authenticity, (Laschinger & Smith 2013; Wong & Spence-Laschinger 2013) who found a positive correlation between trust and authentic leadership.

Studies on authentic leadership have been in the Canadian healthcare context (Dwyer & Revell 2016; Wong & Spence-Laschinger 2013) with scant Australian studies found in the researcher's literature review. The applicability of authentic leadership within the Canadian healthcare system raises transferability and applicability considerations of this leadership style within an Australia and New South Wales context due to the federal or state-based jurisdiction similarities. For this reason, it is worth considering whether authentic leadership is evident in NSW notwithstanding the socio-political and economic differences between the former and later countries.

Authentic leadership is measured by the Authentic Leadership Questionnaire (ALQ) as developed by Walumbwa et al. (2008) (Avolio, Wernsing & Gardner 2018; Roof 2014) . Like the Multifactor Leadership Questionnaire, introduced in section 2.7.4, the ALQ measures four domains of; self-awareness; relational transparency; internalised moral perspective; balanced processing. The aggregate score of these measures, decides whether a leader practices authentic leadership or not. The higher the score, the more the leader is viewed as practising authentic leadership. The discussion in the following paragraphs will focus on the four authentic leadership domains as discussed by Walumbwa et al. (2008).

TABLE 2 – AUTHENTIC LEADERSHIP DOMAINS

Domain	Discussion
Self-Awareness	The self-awareness domain refers to a leader who seeks feedback to improve interactions with others and accurately describes how others view his or her capabilities.
Relational Transparency	The relational transparency domain refers to a leader who says exactly what he or she means and is also willing to admit mistakes when they are made.
Internalised Moral Perspective	The internalised moral transparency domain refers to a leader who demonstrates beliefs that are consistent with actions and makes decisions based on his/her core beliefs.
Balanced Processing	The balanced processing domain refers to a leader who solicits views that challenge his or her deeply held positions and carefully listens to different points of view before coming to conclusions.

Source: Developed for this research

2.7.3 Transactional Leadership

Golla (2012) considered transactional leadership to be a style in which leaders promote employee self-interest through the promise of rewards in return for performance. This was supported by Sparh (2016) who said that transactional leadership focused on results, conforms to an existing organisational structure and utilises the organisation's reward or penalty system. She also suggested that this type of leadership is for maintaining routine with leaders possessing formal authority and positions within the organisation.

Sparh (2016) distinguished transactional leadership from transformational leadership by saying that the former is a reactive approach that features both positive and negative reinforcement while the latter is a proactive approach that emphasises motivation and inspiration. Further differences include that transactional leadership is a "telling" style while transformational leadership is a "selling" style. Zehir et al. (2011) also found that transactional leaders basically operate within an existing culture as opposed to those who try to change the culture to meet new expectations.

Bass and Avolio (1990) developed the tool used to measure transactional and transformational leadership. Transactional and transformational leadership were found to contain several dimensions. Smith, TD, Eldridge and DeJoy (2016) defined transactional leadership as a corrective approach with two dimensions of contingent reward and management by exception (both passive and active). The researcher discusses the transactional leadership dimensions of Contingent Rewards; Management by Exception (Active) and Management by Exception (Passive) in the paragraphs that follow as they are measured on a scale and as developed by Bass and Avolio (1990). The transformational leadership dimensions are tabulated in Table 3 below with a summary provided.

TABLE 3 – TRANSFORMATIONAL LEADERSHIP DIMENSIONS

Dimension	Discussion
Contingent Rewards	The Contingent reward dimension refers to leaders who discuss clearly, the responsibilities for specific tasks and projects, stating the objectives clarifying rewards and punishments and express satisfaction when they get the correct output.
Management by Exception (Active)	The Management by Exception (Active) dimension refers to leaders who focus on careful monitoring of deviations, mistakes, and errors and on quick and thorough corrective measures, if appropriate. Leaders practicing an active management by exception use to keep track of mistakes, concentrate on errors and exceptions from the rule and on the treatment of these oversteps mistakes, concentrate on errors and exceptions from the rule and on the treatment of these oversteps.
Management by Exception (Passive)	This refers to leadership behaviours typical where the leader takes corrective measure, but only after the fire has started. The behaviour is thus not proactive, but reactive and focused on punishment. Passive leaders do not; clarify misunderstandings, make their expectations clear; set clear objectives and performance standards for their followers. This style has very often a serious negative effect upon individual, group and organisational results. The rewards system proposed in this type of leadership is oxymoronic to the rewards system within the public health system where wages are set through employee bargaining and an awards system.

Source: Developed for this research

As this research seeks to ascertain the leadership styles practiced by medical imaging leaders in healthcare, it is relevant to understand how transactional and transformational leadership is measured. Tables 2 and 3 provide the domains and dimensions respectively that are measured in this research in determining the extent to which that leadership style is utilised.

2.7.4 Transformational Leadership

The adoption of transformational leadership has gained prominence in most healthcare settings particularly among the nursing workforce (Daly, J et al. 2015; Northouse 2021; Simons & Lomax 2021; Stanley & Stanley 2018). Burns (1978); Sadiq (2020) and Emere, Aigbavboa and Thwala (2018) defined transformational leadership as an approach that causes change in individuals and social systems through creating valuable and positive change in followers so that they becomes leaders themselves. Tajasom et al. (2015) also defined transformational leadership as helping followers to accomplish organisational goals and mission by working with them and through them.

Expanding on the work by Burns (1978), Stanley (2016) discussed the four themes of vision, communication, trust and self-knowledge as crucial in effecting transformational leadership. In a healthcare setting, transformational leadership empowers the clinician to make meaningful changes to their clinical practice. However, Northouse (2012) defined transformational leadership as a process focused on creating significant changes in followers transforming others and creating significant changes in people's lives and organisations. This more inclusive definition is adopted throughout this thesis.

In implementing transformational leadership, Yergler (2012); Meng, J and Berger (2019) and Vito (2020) argued that the creation of culture and its management are the only thing of real importance for leaders to do. Transformational leadership is important in healthcare due to the continuous state of changes. Previous solutions to issues are no longer adequate, due to the increasing influence and role of governments through policy and funding; the evolution of medicine and the increasing consumer or patient expectations from healthcare providers make it necessary for healthcare organisations to continuously evolve. For these reasons, transformational leadership in healthcare has been viewed as the most appropriate type of leadership (Antonakis & Day 2017; Lunenburg 2013; Sadiq 2020; Silva

2016; Uhl-Bien et al. 2014). Simons and Lomax (2021) reviewed transformational change in a general health care setting and discussed its importance in improving health care quality and safety. They highlighted the need for a bottom up, transformational leadership in the NHS⁵. The notion that all transforming or changing from the status quo continues to be an appealing concept to healthcare practitioners. For example, Kessler (2017), Simpson (2012) and Güven (2013) suggests that transformational leaders commit people to action and converts leaders into agents of change. In the healthcare environment of continuous change, transformational leadership may be the best approach for effective change management.

The National Institute for Health Research (2013), identified that there was a lack of empirical research focusing on organisational context. Their research suggests that most research tends to focus on descriptive and anecdotal research on leadership traits and personal characteristics, underplaying the importance of both internal and external organisational contexts. Also, a plethora of studies that has focused on transformational leadership in nursing exists such as Doody and Doody (2012); Drenkard (2013); Luzinski (2012) and Hutchinson and Jackson (2013). This literature review has identified a lack of longitudinal studies, transformational leadership in medical imaging. This research project will identify leadership styles used in change management processes in medical imaging settings.

The five dimensions of transformational leadership of; Idealised Influence; Idealised Behaviour; Inspirational Motivation; Intellectual Stimulation and Individualised Consideration as outlined by Bass and Avolio (1996) are discussed in section 3.5 in the next chapter where data collection and the methods utilised is fully discussed.

⁵ National Health Service

The MLQ is thus a tool that measures both Transactional; Transformational and Laissez Faire leadership styles and is fully described in section 3.5.6. Febres (2017); Meeks Jr (2020) and Salary (2019) found that the transformational leadership style was better than the transactional CR and the transactional MBEA leadership styles and results in a highly satisfied workforce.

2.7.5 Laissez - Fairer Leadership

This leadership style is premised by a group that makes decisions on its own, as the leader has no real authority, according to Boonyachai (2011); Liphadzi, Aigbavboa and Thwala (2017) and Emere, Aigbavboa and Thwala (2018). Yukl (2010) and Yahaya and Ebrahim (2016) suggested that Laissez-faire is the absence of effective leadership. The MLQ as discussed earlier is one tool that measures this type of leadership hence becomes relevant for this study. According to Bass and Avolio (2004) and Asrar-ul-Haq and Kuchinke (2016), this leader avoids decision making and responding to queries, with the typical behaviours being that the leader avoids involvement completely, even non responsiveness to threats and challenges arising. Such leaders are of the view that the challenges will go away on their own. According to Muenjohn and Armstrong (2015), subordinates of laissez -faire leaders are left to their own devices and have to seek assistance and supervision from alternative sources.

2.7.6 Servant Leadership

First articulated by Greenleaf (1977), servant leadership focuses on serving the highest need of others to help them achieve their goals. The servant leader leads due to their desire to serve people. According to DuBrin (2015), a servant leader is a moral leader whose purpose is accomplished by the degree to which their subordinates become autonomous. Also, according to Trastek, Hamilton and Niles (2014) and Hanse et al. (2016), servant leadership focuses on the leader's development through

awareness and self-knowledge, which enable the leader to understand their purpose, beliefs and characteristics.

The qualities and characteristics of servant leaders as identified by Spears and Lawrence (2016); Gandolfi and Stone (2018) and Parris and Peachey (2013) include; listening, empathy, healing, awareness, persuasion, conceptualisation, foresight, stewardship, commitment to the growth of people and community building. It may be suggested that healthcare workers in the profession to primarily serve other and possess most of these characteristics. However, the researcher is not asserting that healthcare leaders are servant leaders, in the absence of further research. This research project seeks to investigate the nature of that leadership hence the relevance of the servant leadership discussion in this chapter.

Hunter et al. (2013) and Samaibekova and Kocherbaeva (2019); suggested that people follow servant leaders because they trust them. However, this may not be the only reason why people follow servant leaders. Within the healthcare setting, followers do not necessarily choose their leaders. They work with leaders' positions with little choice regarding who they work with.

Following the discussion on Authentic; Consultative; Transactional; Transformational; Laissez Fair; Servant; Clinical and Medical leadership, Table 4 below summarises the key descriptors and dimensions.

TABLE 4 – LEADERSHIP STYLES KEY CHARACTERISTICS

Leadership Style	Dimensions	Descriptions
Authentic	Self-awareness; Relational transparency; Internalised moral perspective; Balanced Processing	Process that draws from both positive psychological capabilities and a highly developed organisational context, resulting in a greater self-awareness and

		self-regulated positive behaviours on leaders and associates, fostering positive self-development
Consultative	Consultative Leadership	Leader consideration of team members' expertise for decision making.
Laissez-Faire	Laissez-Faire Leadership	Absent leadership, where a group that makes decisions on its own, as the leader avoids decision making.
Transactional	Contingent Rewards; Management by Exception (Active); Management by Exception (Passive)	Results oriented style premised on contingent reward for employees in return for performance.
Transformational	Idealised Influence (IIA); Idealised Behaviour (IIB); Inspirational Motivation (IIM); Intellectual Stimulation (IS); Individualised Consideration (IC)	Process focused on creating significant changes in followers transforming others and creating significant changes in people's lives and organisations.
Clinical	Clinical Leadership	Clinical leaders such as doctors and nurses possessing clinical expertise and other skills in the provision of healthcare.
Medical	Medical Leadership	Fully trained physicians occupying leadership roles relevant to the practice of medicine

Source: Developed for this research

2.7.7 Variety of Leadership Styles in Healthcare

Within the healthcare setting, there is a variety of leadership styles utilised by medical imaging leaders. All leadership styles depicted in Table 4 exist within healthcare or medical imaging. As discussed earlier, Cook et al. (2012); Daire and Gilson (2014) and Gilson (2016) found that health service managers and clinical managers are expected to manage facility resources, shape the organisational culture, influence individuals and relationships, motivate all cadres of staff,

sustain links with the various tiers of the health system and lead organisational change. To undertake these tasks, it is therefore important that they use a range of skills to meet the demand of complex health systems. In medical imaging for example, it would be expected that there is a range of skills and leadership styles utilised from the variety discussed in this chapter. Chapman, Johnson and Kilner (2014) found that there was a variety of styles used by medical leaders in conducting their roles in the NHS in the UK. Findings of this study will be compared to these previous findings to understand the similarities or differences between the UK and Australian healthcare systems. The next paragraph highlights the gaps in literature and motivation for this study, immediately followed by the research question.

The impetus created by the lack of research on leadership styles implemented in medical imaging departments motivates this research as it influences clinical leadership and general leadership practice. The preceding literature gaps drive the need for this research and leads to the first research question below. Further research questions for this thesis are preceded by relevant literature reviews. This research will explore the leadership styles applied in medical imaging departments and attempts to address the following questions 1 and 2:

2.8 Research Questions 1 and 2

1. What are the dominant leadership styles for change management approaches in medical imaging departments?
2. What strategies are used for successful change management in medical imaging?

2.9 Change Management

This research is not researching change management per se. However, it is investigating the leadership of change management projects or processes in medical

imaging departments. According to Thomson III et al. (2016), about 70% of organisational change management projects fail, and failed innovation projects are particularly common in medicine. With this level of project failure, it is critical to understand the critical success factors of implementing change in public health in medical imaging in New South Wales. Edwards, N and Saltman (2017) suggested that hospitals are hard organisations to change, particularly publicly owned and operated hospitals. Australian public health systems are heavily influenced by the socio-political and election cycles, with the major political parties using healthcare as a key battle ground. As such change fatigue may be argued as a major barrier to change among the dominant medical and nursing workforces (Aguirre, von Post & Alpern 2013; Stensaker & Meyer 2012). Additionally, there is an apathy to change in most countries with both managers and staff, despite constant calls for improvements in efficiency, quality, and responsiveness, that little will be different tomorrow or next year. This makes a compelling case for researching change management techniques that will allow leaders to implement change, even in the most challenging of circumstances.

The evolution of the Australian and NSW Health system discussed in section 1.2 also demonstrated that the public hospital system is in a continuous state of flux (NSW Health 1997). The review of change management literature suggests that there are a few distinct models of managing change such as the eight step process by Kotter (1995) and the three step change management model by Lewin (1951). These models are extensively used in most change management literature.; Aggarwal and Swanwick (2015); Doherty (2013) and Spurgeon et al. (2017), concluded that within hospitals and primary care practices, the engagement of clinicians was necessary to bring about changes, development and strengthening of clinical leadership. In healthcare, leaders often find themselves allocated to projects by necessity, either through legislation or being tapped on the shoulder. This is contrary to Rosenbaum, More and Steane (2018) and Tudor (2014) who suggested that when we choose

projects for ourselves, we are far more committed to the outcome (almost by a factor of five to one).

In healthcare, change management is also commonly undertaken following case study reviews. For example, the Bundaberg Hospital enquiry (Day, G & Casali 2015; Delaney 2015; Edwards, MS, Lawrence & Ashkanasy 2016) conducted a case study review following very adverse events and outcomes to patients. Their study was pre-emptive and aimed at informing decision makers to effect structural changes in the governance arrangements of their entities before the occurrence of adverse events. Their approach of process review at Bundaberg hospital is symptomatic of change management processes in healthcare (Casali & Day 2015; Wu et al. 2021).

While there is value in clinician literature in quality improvement and a practical application of initiatives, there is paucity of research on leadership and change management theory and its applicability in healthcare, particularly on leading change effectively and successfully in medical imaging departments. For example, Itri and Lawson (2016) proposed that situational leadership may be the more suitable approach for managing change, dictated by events on the ground. This view was not supported by Gareis (2013) and Silvius and Schipper (2015) who suggested that transformational leadership, which challenges the status quo, then involves planned change and implementation may be more appropriate. He also proposed radical repositioning which involves an organisational change management process in response to a crisis. It can be noted therefore that most practitioner literature or models remain quite general and remain vague about how planning, implementation and diffusion occur and its linkage to theory.

While some work has been undertaken on the value chain of business models in Radiology by Enzmann (2012), limited work has been undertaken by researchers on radiological processes and how they impact on patient flow, access and

improved patient care. Mascia, Morandi and Cicchetti (2014) postulated that the increasing demand for better clinical safety outcomes, need for efficient economic resources, has encouraged substantial renovation of practices, models, and structures adopted within healthcare organisations. Seltzer et al. (1994) undertook a study to assess whether total quality management systems could be used for expediting reporting in a radiology department. They looked at a variety of interventions including reviewing workload, team reporting processes and additional resourcing to improve radiology reporting. They concluded that total quality management systems accelerated radiology reporting. However, the limitations of this study are that it only reviewed a component of patient access to CTs. Other components that might impact on reporting speed such as responsible ordering of CT tests by emergency departments or other clinicians were not addressed by this study.

For change to occur, there should be an enabling environment and an organisation's readiness to change. Brooke-Sumner et al. (2019); Cresswell and Sheikh (2013) and Williams, Perillo and Brown (2015) found that an organisation readiness to change comprised of an organisation's staff's joint commitment to implement a change, and staff members' shared belief in their capability to achieve the change. Aarons, Hurlburt and Horwitz (2011) found that attitudes to evidence-based practices have an influence in the adoption of innovations.

In implementing sustained change, Gilson (2016) suggested that pursuing small wins was important as these tended to build participants' confidence to develop an understanding of each other and tackle further long term change. For example, in medical imaging, this may be the development of a clinical protocol by a change team, that is a precursor to the procurement, installation and commissioning of a new MRI machine to conduct specific heart studies. The development of the protocol ensures that the team members understand what is required of them. When the bigger project is implemented, participants can

visualise the end goal and can therefore fully participate in the intervening steps to bring the project to fruition. While change is necessary Thomson III et al. (2016) suggested that radiology lacks the necessary change management skills to effectively undertake change. This study contributes to the skills development process and adds to leadership literature in medical imaging departments.

Leadership and change management processes that address these burgeoning costs are not only crucial in Australia but also other western countries, managing increasing radiological and healthcare costs. Increasing diagnostic tests usage cannot be underestimated in modern day medicine. Ahn et al. (2014); Gilbert et al. (2012) and Morton and Korley (2012) researched the increased usage of CT and MRI imaging services in EDs in the US between 1998 and 2007 without a corresponding increase in life threatening conditions. However, work by Rodriguez et al. (2013) and Kea et al. (2013) indicates that less than 2% of CT tests were therapeutically inconsequential indicating appropriate CT head usage in their study. Brady, Cain and Johnston (2011) found that the usage of CT scans increased by two to three times between 1985 and 2005 in Australia. Considering the findings by Ahn et al. (2014); Gilbert et al. (2012) and Morton and Korley (2012), there is evidence of the increased healthcare costs due to increased CT usage. In an environment of financial austerity currently prevailing in NSW and Australia, taming healthcare costs is crucial as well as research on change management processes that will address these ballooning healthcare costs is of paramount importance. Australian Institute of Health and Welfare (2019) advised that the health expenditure to GDP increased by 1.2% in 2017/2018 to 10% the previous year, representing AUD185.4 billion spent on health goods and services. In the same period, hospitals spend an additional AUD3.5billion compared to the previous year. Additionally, a quarter of the taxation revenue nationwide goes into health expenditure, which by any measure is significant.

These gaps in the change management literature has resulted in this researcher asking the research questions 2 and 3;

2.10 Research Questions 3 and 4

3. How does the nature of leadership and change management processes in healthcare impact on the success of change management processes?
4. Why do some projects/processes fail or succeed?

2.11 Learning Organisations

Hsu and Lamb (2020); Schneper (2020) and Wen (2014), defined learning organisations as those that required employees skilled at creating, acquiring and knowledge transfer. Bevan et al. (2012) also defined organisational learning as the capacity or processes within an organization to maintain or improve performance based on experience. Edmondson (2018) and Tannenbaum and Cerasoli (2013) suggested that such individuals could assist firms to cultivate tolerance, foster open discussion and think holistically and systematically, which would allow organisations to be able to adapt to unpredictable environmental change leading to competitive advantage. Ayres (2012); Mafle Ferreira Duarte, Sahakian and Ferreira Neto (2021); Scharmer and Kaufer (2013); and Cousins (2018) supported this view and suggested that organisations and their leaders have to be learning organisations and leaders. Leaders are the change agents in the implementation of change processes and projects, and it is crucial that they utilise the lessons learnt from previous projects to improve future leadership capability.

The existing literature reviewed, discussed learning organisations in most environments other than healthcare. Donaldson (2018) and Franklin et al. (2014) suggested that the NHS did not have an adequate systematic process for adverse incident reporting. In healthcare, such systems are crucial to identify systemic

shortcomings, trends and hopefully learn from mistakes of the past. The Bundaberg hospital case study (Day, G & Casali 2015; Edwards, MS, Lawrence & Ashkanasy 2016) is an example where other organisations can learn from the mistakes of others due to the tragic patient outcomes highlighted in the inquiry.

From this literature and discussion on learning organisations, this researcher defines “learning leaders” as those that create or acquire knowledge from past change management processes and apply such learning in future settings, to improve the outcomes of later change management processes. This study is a longitudinal study examining the change in leadership styles of medical imaging leaders over time as they lead change projects. A discussion on learning leaders and learning organisations is relevant as it allows an exploration of how learning affects future outcomes.

Despite the benefits identified in literature above, this researcher’s literature review has identified scant medical imaging literature correlating the learning organisations and successive change management processes hence the research questions 5 and 6 that follows:

2.12 Research Question 5 and 6

5. How is the healthcare leader’s leadership style influenced and reshaped by learned experience in prior change management processes?
6. How do “learning” leaders achieve better outcomes in successive change management processes?

2.13 Critical Success Factors

In change management, critical success factors usually exist, that impact on the success or failure of projects or processes. Javadin, Raei, Iravani, and Safari (2015) defined critical success factors as the limited number of areas in which

satisfactory results will ensure successful competitive performance for the individual or organisational unit. For example, a critical success factor for an information technology change project may be the existence of a support team pre and post implementation to support end users with training and embedding knowledge. These authors also suggested that critical success factors are unique conditions indicating success. Mehregan et al. (2012) and Bhuasiri et al. (2012) viewed critical success factors as something, controllable, measurable and with mandatory implementation if organisations seek to achieve success in specific fields companies want to be successful in a specific field. For example, if consultation could be viewed as a critical success factor within a healthcare setting. As projects impact on several stakeholders, consultation may be viewed as mandatory to ensure that all constituent stakeholders provide feedback prior to project implementation. A lack of consultation would mean that the stakeholders not consulted may not sign off on a project, thereby negatively impacting on the project.

The discussion on critical success factors in this literature review is crucial in that it not only allows the reader to have a background in what they are, but also builds the reader's understanding as these factors are explored in later chapters of this study. As this research seeks to explore and understand those factors that influence project or process success, this discussion is relevant in providing definitions of critical success factors, provide the reader with an understanding of that they are, so that when they are clear to the reader as they read through the thesis.

2.14 Conclusion

This chapter discussed relevant leadership theories that underpin this research as Behavioural; Contingency; Trait, Leader Member Exchange; Path-Goal and Power and influence theories. The chapter further discussed the leadership styles

examined in this research, namely, Authentic; Consultative; Laissez-Faire; Transactional; Transformational; Clinical and Medical Leadership together with the dimensions for these styles. Change management and Learning organisations literature was also explored. In this Chapter, literature review highlighting the gaps in existing literature was undertaken. These gaps were then linked to the research questions which were introduced in section 1.6 and provided justification of this research as discussed in section 1.5. Finally, this chapter outlined the research outcomes which included the contribution to theory and practice.

The next chapter, chapter 3 will review the methodology used for this research.

Chapter 3 - Methodology

3.1 Introduction

Chapter 2 reviewed the leadership theory applicable for this research study and the associated research question. It also explored the various leadership models. This chapter discusses the methodology that was utilised to conduct this study. According to Abdulghani et al. (2014) the methodology comprises of methods, processes and activities used to solve research problems and understand the issues being investigated or test some predetermined hypothesis. Gandhi (2011) suggested that, as such, researchers need to understand the assumptions underlying various research techniques and decide on appropriate techniques to problems.

Initially, an overview of the research methodology is provided in this chapter, briefly outlining how the research was conducted. In this overview, there is a discussion of the mixed methods approach undertaken in this study. Then the justification for the research methodology is provided before a summarised model of the series of steps involved in the study is outlined. Further detailed discussion is then presented, expounding on the step-by-step processes and stages of the research. This chapter also explores the multiple data collection stages undertaken together with the analysis that follows in chapter 4.

Chapter 3 also explores the data collection tools utilised, including the alternatives that were considered. A research methodology matrix is also developed in this chapter, integrating the research steps, data collection methods and research questions addressed. This matrix is presented in section 3.7 (Figure

8) of this chapter. Finally, ethical considerations of the research are discussed, including the ethical challenges faced and how they were managed.

3.2 Overview of Research Model

Kumar (2019), outlines how the research approach provides details and justifies how the research questions are answered and conclusions drawn. This research was designed to identify the nature of leadership and change management in medical imaging departments within the healthcare setting. It examined the leadership styles of medical imaging departments' leaders and their exhibited behaviours. This was undertaken through examination of successive change management processes over time, examining the most successful change management leadership styles and the behaviours leading to successful change management. Tools such as the leadership style inventory, KPIs, interviews and questionnaires were used. Finally, a leadership matrix was produced and the extent to which leadership style impacted on successful change management determined. Further discussion was then undertaken on the findings, as outlined in the next chapter.

A longitudinal research study was used as an exploratory and descriptive tool, utilising a mixed methods approach. The mixed methods approach draws its rigour in corroborating multiple data sources such as interviews, data analysis and quantitative methods such as KPI computations and median turnaround times to provide a robust evidence base for drawing conclusions. Fetters and Molina-Azorin (2017) and Merriam and Grenier (2019) defined a mixed methods approach as one that uses two or more methods in undertaking a research study. Blank (2013) suggested that a mixed methods approach presents an alternative to qualitative and quantitative approaches by using the most appropriate methods to answer the research question.

3.2.1 Quantitative Approach

Kumar (2019) defined a quantitative study as one rooted in the philosophy of rationalisation, following a rigid, predetermined set of procedures to quantify variation in phenomenon, emphasising the measurement of variables and objectivity of the process.

In this study, an initial historical data collection was undertaken (utilising internal data sources) to ascertain baseline performance and service KPIs for the services to be investigated. These service KPIs were utilised to assess the success of processes. These KPIs formed one of a multiple bases from which success was assessed for that project or process.

3.2.2 Qualitative Approach

Kumar (2019) also defined qualitative research as being rooted in empiricism, that follows an open, flexible, unstructured approach to enquiry that aims to explore diversity rather than quantify. It emphasises description and feelings, perceptions, and experiences rather than their measurement.

This study is a longitudinal study that explored the leadership and change management behaviour of leaders over time in multiple change management processes in medical imaging. This research study was undertaken by analysing cycles of change within a three-year period, one retrospectively and two prospectively. Saldana, as cited in Farrall et al. (2015); supported this approach in identifying what makes a study longitudinal as the number of waves of data collected and not the length of time covered. To increase research transparency (Aguinis, Ramani & Alabduljader 2018), the research methodology, tools and rational for their use is included in the next sections.

3.3 Justification for The Paradigm and Methodology Design

The literature review undertaken by this researcher indicated that most previous studies were principally case studies in particular organisation settings. For example, a review of about 75 articles of transformational leadership in healthcare, revealed that the majority were case studies, such as Daly, MP, Cleary and McCormack (2012); Marmor et al. (2013) and Nickel and Schmidt (2009) with scant studies utilising a mixed methods and longitudinal approach and found that these were regularly called for.

Wong and Spence-Laschinger (2013) recognised the limitations of their cross sectional study and suggested a longitudinal study design in how authentic leaders develop their relationship with their staff over time. Farrall et al. (2015) suggested that qualitative longitudinal research focuses on change over time and the participants' relationship with such change. They argued that it is also concerned with the exploration of individual lives as they develop. This view is supported by other authors (Hermanowicz 2013; Morrow & Crivello 2015; Patrick 2014; Thomson & McLeod 2015) who agreed that qualitative longitudinal research identifies and explores change over time.

According to Glinka and Hensel (2018), research design should specify how the researcher intends to ensure the credibility, reliability and transparency of their work (Aguinis, Ramani & Alabduljader 2018). Therefore, the mixed method approach in a longitudinal study methodology was chosen because it was the most appropriate form, to address the research questions. This methodology tracks leaders over time and assesses the success or lack thereof in change processes they lead. Figure 6 below provides a summary of the research methodology, which will now be described in detail.

FIGURE 6: SEQUENCE OF RESEARCH METHODOLOGY STEPS



Source: Developed for this research

3.4 Overall Research Procedures and Steps

Step 1. Ethics Approval

Before the research commenced ethical clearance was sought and granted from the SWSLHD Human Research Ethics Committee (HREC) (Appendix B). Following this consideration and approval by the SWSLHD HREC (HREC/15/LPOOL/360), this project was submitted for reciprocal approval under the Western Sydney University (WSU) HREC in accordance with candidature requirements for PhD thesis. Other ethical considerations were considered and are discussed in section 3.5 of this chapter.

Step 2. Participant Considerations

The research commenced with its population being that of all South Western Sydney LHD healthcare staff. Beaudry and Miller (2016) asserted that a general population is ascertained when the researcher is selecting subjects for the study. From this population, the researcher stratified the population into cardiovascular services; women and health services; cancer services and so on. From these strata, medical imaging was selected as a service, as this was the department of interest for this research. The medical imaging departments were then further stratified into; general staff, administration staff, medical staff, nursing staff, allied health staff and leadership staff. Stratification is the process of identification and separation of people or objects into specific groupings (Etikan & Bala 2017; Taherdoost 2016). It was deemed advantageous for this research in that it allowed the researcher to focus on the relevant participants for the research projects (Robinson 2014) as opposed to all medical imaging service staff, some of whom did not participate in any change processes or projects over the research period and would therefore have minimal contribution. From this stratification, medical imaging leaders were selected as they were the subject of this research.

All 31 medical imaging leaders and managers were invited to participate in the research study out of approximately 350 medical imaging staff across the LHD. These medical imaging leaders were identified utilising the researcher's experience and knowledge in medical imaging and healthcare generally, as those leaders who led other staff and change projects or processes. Of these 31 leaders, 21 agreed to participate in the research project. This purposeful invitation technique was particularly useful in that it allowed the researcher to specifically focus on the medical imaging departments and leaders who could contribute in this research.

Step 3. Population Data Review

The population data for the research project comprised of staff involved in change management projects in medical imaging departments within the LHD. For these projects, an initial identification of historical data from internal sources such as meeting minutes, strategic planning documents, the researcher's knowledge of research projects and document databases was utilised for the retrospective and prospective projects or processes to be researched. This informed the processes for steps 5 and 7 of the research methodology, as reflected in figure 6 above.

Step 4. Identification and Development of Data Collection Tools

Following a literature review, the researcher identified that several tools were required for data collection in this research. The data collection tool in this study included a combined Multifactor Leadership Questionnaire (MLQ)/Authentic Leadership Questionnaire MLO/ALQ as a baseline leadership style inventory, and semi-structured interview questions. These tools are fully discussed in section 2.7, section 3.5 and steps 8, 9 and 10 below.

Step 5. Identification of Change Management Projects

The identification of medical imaging change management projects that occurred in the 18 months preceding the study, along with those to be undertaken throughout the next 24 months. This process was informed by the following:

- The Medical Imaging Services Strategic Plan to 2021 and the LHD's strategic plan to 2021.
- Meetings with the Medical Imaging Stream Director, Stream Clinical Manager and District PACS/RIS⁶ Manager.

⁶ Picture Archive Computer System/Radiology Information System

- Initial discussions with potential research participants to identify change management projects/processes they wanted to discuss.
- Pilot interviews, which highlighted several change management projects possible for this study.
- Review of Medical Imaging’s performance KPIs to identify areas that required improvement and therefore would require a change management process.
- The researcher’s experience and corporate knowledge of medical imaging services within the LHD.

From the defined and identified group of medical imaging projects or processes, stratification as discussed in step 2 above, was undertaken to establish a sample of mini projects or processes to inform the research. The selection criterion for projects was:

- i. These projects or processes took 18 months or less to complete.
- ii. Projects or processes could be either multi-staged or standalone.
- iii. Retrospective projects or processes included in the sample must have been completed within 18 months prior to the study being commenced.

As part of the interview meeting preparations of step 13 described below in this section, participants were asked to identify several projects that met the research brief and could be discussed and measured. These processes allowed participant identification of projects that the researcher was unaware of that were undertaken in the research timeframe.

Step 6. Establish a Participant Cohort

Following the participant selection process described in steps 2 and 3, a participant cohort was established. This process was undertaken through a stratified sampling technique, where health managers were divided into strata according to the service offering provided within the healthcare setting. This

technique was briefly discussed in step 2 above and is further discussed in section 3.4.4.

The actual participant cohort established consisted of 21 clinical, non-clinical and hybrid leaders in medical imaging who had led and undertaken change management processes or projects in the previous 18 months and were likely to undertake further change management projects or processes within 18 months from research commencement. These types of leaders are fully described in chapters 2 and 5 of this study. Of these 21 participants, four did not participate in the entire process and were excluded from the final study. This study followed through this cohort over the research period to answer the research questions.

Step 7. Obtain Informed Consent

Once the participants had expressed their willingness to participate in the research study, a formal consent form was sent to them for signature and return to the researcher (Appendix D). As part of this process and in fulfilment of the ethical requirements, the invitation to participants was sent out by an independent person from the research.

Step 8. Undertake Baseline Leadership Style Inventory (LSI)

A literature review (discussed in section 3.4.6 of this chapter) was undertaken to determine an appropriate leadership style inventory tool for use in this research. The combined MLQ/ALQ tool discussed in section 3.5.6, is also shown in Appendix E and Appendix F, and includes a results interpretation method and this was utilised to interpret the data from the Baseline LSI. This tool also enabled the research as it allowed the assessment or tracking of leadership style changes in participants as they led successive projects.

Upon determination that a leadership style inventory was to be utilised the writer purchased 50 licenses from Mind Garden the licensee of the MLQ/ALQ leadership style inventory tool. Invitations were sent to participants to their preferred email addresses via a website link requesting participants to undertake a registration and sign-up process. Following registrations, the joint tool was available to participants to complete online. During this process, a link was sent to the 17 research participants for a five-week period. The baseline LSI response rate was 10 out of 17 for the initial five-week period, the first due date. When a follow up reminder was sent out a couple of weeks later, a further 2 responses were received making a total of 12 in 17 responses. The remaining 5 respondents were requested to provide their responses prior to the first round of interviews discussing their first change management project. Following this further request for completion for the baseline LSI, no more participants completed the baseline LSI with the researcher deciding to continue with the next phase of data collection, which was the Round 1 interviews.

At the conclusion of the three interview rounds as discussed later in this section, participants were requested via an automated e-mail to complete the final LSI (step 14). The final LSI response rate was 10 out of 17 for the initial five-week period, the first due date. When a follow up reminder was sent out a couple of weeks later, a further four responses were received. At least 50% of the participants had completed their LSI, a decision was made to finalise this data collection round and devise a way to manage missing data. The researcher used average scores for each domain where there was missing data.

Step 9. Design of Interview Tools

Parallel to the baseline LSI process, the researcher designed an interview tool (Appendix J) as the main data collection tool for the initial interview round. For this purpose, a semi-structured interview was chosen as it allowed the

interviewer to obtain more in-depth understanding of the leadership processes employed and further information from participants that may not be evident in any project or process documentation. The researcher undertook face to face semi structured interviews for all the 17 participants of the study. While Steinberg (2015) argued that face to face interviews are more suited to illiterate respondents and the interviewer being able to control and manage the process as complex issues are identified, it is for this reason that face to face interviews were chosen over e-mail for example. Mangal and Mangal (2013) also argued that face to face interviews allow the researcher to clarify questions to participants to enable clarity of responses and reliability.

Semi-structured interviews (DeJonckheere & Vaughn 2019) were chosen as a data collection method for these reasons; they allowed the interviewee to elaborate on topics within a defined scope and allowed obtaining standardised quantifiable and more in-depth qualitative data (Adams 2015; Brown, A & Danaher 2019; DeJonckheere & Vaughn 2019). The design of this tool required to be in a manner that allowed the researcher to group participant responses to each question on a spreadsheet or other data analysis method. Common themes could then be explored and grouped together, and recurring concepts highlighted. This process was identified as necessary for results interpretation presented in chapter 5 and the drawing of conclusions, also in chapter 5.

Step 10. Conduct Pilot Interviews

Following the LSI process and interview tool development, the researcher randomly identified two participants from the cohort to undertake pilot interviews. This was an essential process to assess the interview questionnaire an effective tool for capturing research data to attempt to answer the research questions. Havig et al. (2020) and Hazzi and Maldaon (2015) suggested that a pilot

test enables the researcher to identify any shortcomings in the procedures to be used, to assess questions that might be left unanswered by respondents.

One interview was arranged in the participant's office, by mutual agreement, while the other one was held in the researcher's office, at the request of the participant.

Specific feedback was sought from the pilot participants regarding the interview format, length and question appropriateness and adequacy in answering the research questions. There were minor modifications required to the interview protocol identified during the pilot interviews. These modifications included the addition of some prompts from the researcher to assist in conducting the interviews, such as, "is this your first-time leading projects in medical imaging".

These two pilot interviews allowed the researcher to also assess the time required to complete each interview and adjust, if required, the research tool.

There were no major interview questionnaire adjustments identified from the pilot interviews and consequently, no major changes were required to the interview tools. Both interviews were scheduled for 40 minutes. However, they both concluded in about 25 minutes. It was noted that there was a 5-10 minute period required to explain the process to the participants including record keeping and access to the interview transcript. A 30–40 minute schedule for each subsequent interview was determined as an appropriate timeframe.

Step 11. Participant Interviews

The researcher contacted each participant and developed an interview schedule at mutually convenient times and locations. Each interview was set for 40 minutes as identified in step 10 above. Each interview was transcribed by the researcher and a copy of the transcript provided to each interviewee to verify the accuracy

and content of the interview. The researcher kept three password protected electronic copies of the interview transcripts in typed form. One was on the computer hard drive, another one on NVivo transcription and the final one on a USB drive. In addition, the researcher kept all audio copies of the interview until all interviews were fully transcribed. Initially interviews were undertaken using a voice recording device and a mobile phone device. After comparisons of the recording quality, it was noted during the pilot interviews that the mobile phone recordings had better voice clarity and were utilised for the remaining interviews.

Step 12. Review and Measure Project Success

At the conclusion of each interview, each project or process was evaluated for success or failure based on the pre project KPIs or success measures. Quantitative and qualitative KPIs were measured to determine project success or failure.

Step 13. Thematic Data Analysis

Once data collection had been completed, it required interpretation so that meaningful conclusions can be drawn. According to Clarke, V and Braun (2018) thematic analysis provides an accessible, systematic and rigorous approach to coding of the data and theme development. To obtain an understanding of the data received from the data collection processes, a thematic analysis was conducted through several methods for various data. All interviews were transferred from audio to verbatim written text as described by Kitchin and Lauriault (2015) and laquinto (2018), in the transcription process. This ensured that interview data could be stored and analysed systematically. NVivo 12 was utilised to code the interview data into themes as shown in Appendix M. This approach combines inductive and deductive coding, capturing specific themes while leaving flexibility for new themes to emerge particularly in relation to minority perspectives as suggested by Brooke-Sumner et al. (2019). Queries were

utilised in this electronic software to organise and draw some insights into the data. The data was initially captured on excel spreadsheets and some of it exported to NVivo. Where NVivo grouping and coding could be used, this was utilised, and manual excel analysis where NVivo could not be used. Broad headings were identified that appropriately described the characteristics being measured. These headings are described and discussed in Chapter 5.

Step 14. Undertake Final Leadership Style Inventory

A final leadership style inventory of the leaders at the conclusion of round three interviews or at the conclusion of three change management projects was undertaken to assess whether there were any changes to the baseline leadership style over time. This process was undertaken at the round 3 data collection stage. The ALQ/MLQ leadership questionnaire was utilised for this purpose as discussed in steps 4 and 8 above.

3.4 Research Methodology Further Considerations

3.4.1 Further Ethical Considerations

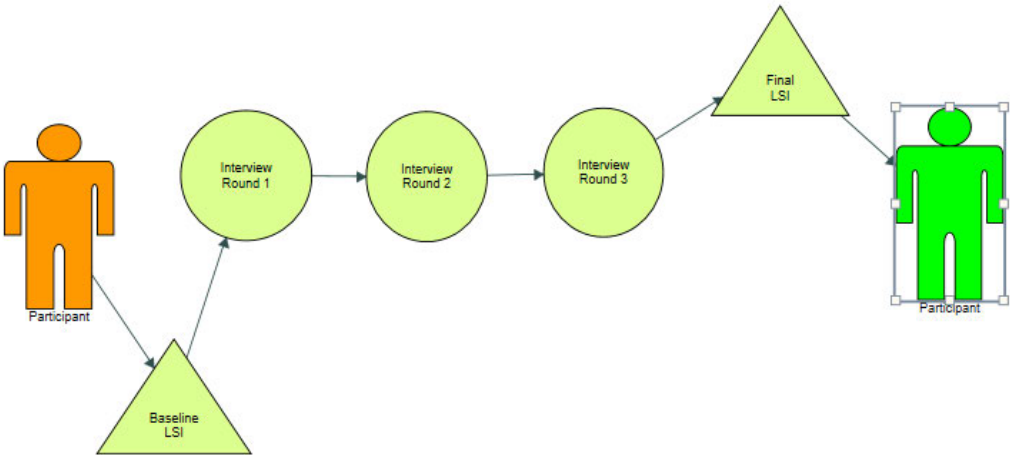
To satisfy the ethics requirements of this research, an independent person was utilised to send out participation invitations to identified potential participants. The establishment of the study cohort as discussed in Section 3.4, step 2, culminated from invitations sent to 31 people identified as suitable participants. A standard email was sent for this purpose with a consent form and participant information sheet attached. Participants were requested to complete and return either to the sender or directly to the researcher. 21 of the 31 potential participants responded directly to the researcher, expressing their willingness to participate in the study. The researcher collated the contact details of all the participants who agreed to participate in the study so that these details could be utilised in undertaking the next steps.

3.4.2 Research Process and Multiple Data Collection Rounds

The research process comprised a series of three successive data collection rounds. According to Cooper (2016), data collection, recording and management commences when the project starts and ideas are conceptualised. Research data therefore had to be collected across a series of data collection rounds. The data collection rounds were approximately between three and five months apart. The steps described above were not applicable for all data collection rounds.

The data collection processes conducted for this research can be summarised as following a series of steps as depicted on Figure 7 below.

FIGURE 7: DATA COLLECTION PROCESSES



Source: Developed for this research

3.4.2.1 Round One Interviews

Participants were contacted via e-mail from the researcher to nominate a time and place for the interviews. These details were documented on a spreadsheet, outlining the contact date for each participant and additional information such as interview schedule times were added as they became available. This also

became the tool utilised by the researcher for follow up with participants. If participants did not respond to the e-mail requesting availability, the researcher sent a follow up e-mail to secure an appointment.

Interviews were scheduled from November 2016 to May 2017, with 16 of the 17 respondents participating in the interview process. One participant was unable to participate in this initial interview round due to personal matters preventing her from attending work. The interview for this participant was scheduled following her return to work. The researcher considered that this did not impact on the research integrity because she could be interviewed at a later stage within the data collection period.

3.4.2.2 Round Two Data Collection

For round two data collection, it was not necessary to consider steps: 1, 2, 4, 6, 7, 8, 9 10 and 14 of Figure 6 above. All other processes were repeated for round 2 and round 3 data collection cycles. During the interviews for this data collection step, it was noted that three participants had role changes. These were participants 6, 7 and 10. Participants 6 and 7 were no longer in leadership roles but maintained their clinical roles. One participant no longer participated in change projects or processes and could not be interviewed for this interview round. The other participant could not be interviewed during round one interviews due to scheduling and workload challenges. However, this participant had already completed a baseline LSI. The researcher decided to conduct both round one and two interviews on the same day. Participant 10 was promoted during the data collection phase, which saw a significant change in responsibility.

It was also noted that participant 13's change project had not been concluded at the time of round 2 interviews. Through mutual agreement with this participant, the researcher agreed to defer round two interviewing for this participant until the third interview round when round 2 and 3 interviews could be completed. The researcher determined that there would not be any limitations to the research due to this accommodation and consequently did not adjust the research processes.

3.4.2.3 Round Three Data Collection

For round three data collection, it was also not necessary to consider steps 1,2,4,6,7,8,9,10 of Figure 6 above as these steps were predominantly relevant to the first round of data collection. However, step 14 was particularly relevant for this data collection round as it involved the use of the LSI to assess the leadership style at the conclusion of the data collection period. The researcher provided the 2 links for the MLQ and ALQ to participants after scheduling their round 3 interviews.

3.4.3 Researcher Ongoing Communication with Participants

The researcher communicated via e-mail and phone at least monthly with research participants informing them of the progress and timing of next steps. Ongoing communication with participants proved to be a useful technique in keeping participant engagement high through the multiple data collection rounds.

3.4.4 Baseline Qualitative and Quantitative Project KPIs

The research project did not set specific KPIs to determine project success or failure. As part of the project/process selection, the researcher and the

participants determined the desired outcomes for each project. This was utilised as baseline KPIs for these projects both from a qualitative and quantitative perspective.

3.4.4.1 Quantitative Measures

Quantitative measures included KPIs utilised in medical imaging in specific processes. These KPIs were based on patient data available in the LHD's clinical information systems and other reporting systems.

Examples of these KPIs included:

- a. Examination Turnaround Times (TAT).
- b. Reporting TAT – this KPI measures the time it took from image availability in PACS/RIS to report availability in eMR (refer to definitions).
- c. Number of examinations performed per hour.
- d. Number of examinations undertaken per annum.
- e. Patient transport TAT.

It was identified that the TAT measures utilised the median times and not average to account for skewness of data. Quantitative KPIs were chosen to corroborate qualitative views obtained from participant interviews on project or process success.

Medical Imaging KPIs were developed from existing data extracted from the PACS/RIS system, the Radiology Information System and Cerner, the patient administration system. The extracted data was de-identified for patient demographics, with only the examination details and other examination metrics excluding personal information utilised. Other activity data was sourced from the Ministry of Health and related agencies such as the Agency for Clinical Innovation and the Bureau for Health Information as required. Access and use of this data

was an ethical consideration of the research undertaken prior to obtaining approval from the organisation and undertaking the ethics approval process.

3.4.4.2 Qualitative Measures

Qualitative factors considered included successful changes in workflows that resulted in streamlined workflows the embracing of these changes by staff. Qualitative KPIs include patient satisfaction surveys and staff surveys pre- and post-change management process completion.

3.4.5 Sampling Techniques Utilised

The healthcare setting and background was discussed in section 1.2. it was noted that there are multiple groupings of workforce sub-specialities. Within this context, a combination of stratified and purposive sampling approaches was adopted.

3.4.5.1 Stratified Sampling

Stratified sampling (Iliyasu & Etikan 2021) is a probability sampling technique wherein the researcher divides the entire population into different subgroups or strata, then randomly selects the final subjects proportionally from the different strata (Etikan & Bala 2017; Robinson 2014).

For this research, the population was the various healthcare groups that were divided into strata, such as Cardiovascular Services; Women and Children Health; Cancer Services; which was within healthcare. In this case leaders from Medical Imaging were identified through a purposive/convenience sampling approach, as described below.

3.4.5.2 Convenience Sampling

Convenience sampling (Campbell et al. 2020) is a non-probability technique utilised to select a sample based on certain practical characteristics such as accessibility or availability at a particular time (Etikan, Musa & Alkassim 2016). This technique was utilised to select the participants for the pilot study due to their and the researcher's availability.

3.4.6 Leadership Style Inventory/Questionnaire

In the research design, consideration was made for leadership style inventory tools to measure the baseline leadership styles utilised by leaders in medical imaging departments. The next paragraphs review these considerations prior to summarising the methodology undertaken for this research.

This research sought to measure the leadership style changes of medical imaging leaders over time. To do that, a baseline leadership style needed to be identified, and then subsequently measured over time. Several approaches to measure leadership styles were available including commercial ones. It was not the intention of this project to review commercially available measures of leadership styles in turn. However, scholarly measures were reviewed in this section including the Multifactor Leadership Questionnaire (MLQ); Transformational Leadership questionnaire (TLQ); Empowering leadership questionnaire (ELO); Authentic Leadership questionnaire.

The sections that follow examined these questionnaires and assessed their fitness of purpose to this research.

3.4.6.1 Multifactor Leadership Questionnaire (MLQ)

This is a tool developed by Bass and Avolio (2004) as cited in Boamah and Tremblay (2019) which measures a full range of leadership styles and behaviours which comprise transformational styles. The transformational styles review attributes such as idealised influence; inspirational motivation; intellectual stimulation; individualised consideration. The other broad domain is transactional styles which measures contingent reward; management by exception (active) and management by exception (passive) and laissez-faire. Some researchers are not entirely convinced as to the best fit of this tool. Studies by Den Hartog et. al 1997 studies as cited by Hamstra (2014); Sarid (2016) and Wang, B et al. (2016) found a structure in MLQ comprising a transformational, transactional and laissez-fairer factors but not separate dimensions of transformational and transactional. Similarly, Berger et al. (2012); Stoller (2012) and Munir and Aboidullah (2018) found little evidence to justify the interpretation of the individual subscale scores. The dimensions of transformational are summarised in table 4 below, with a full example of the MLQ presented in Appendix E - Multifactor Leadership Questionnaire.

TABLE 5 – DIMENSIONS OF TRANSFORMATIONAL LEADERSHIP

Dimension	Discussion
Idealised Influence (Attributed IIA)	This refers to leaders who seek to build trust in their followers by inspiring power and pride in their followers, going beyond their own individual interests and focusing on group member interests, thus becoming role models for their followers.
Idealised Influence (Behaviour IIB)	Idealised Behaviours refers to Leaders who act with Integrity. These leaders manifest positive and highly valued behaviours such as dominance, consciousness, self-control, a high moral judgement, optimism and self-efficiency. Always considering the moral and ethical consequences for their actions, these leaders focus on a commonly shared sense of a vision or mission for the team or group.
Inspirational Motivation (IM)	The Inspirational Motivation scale identifies leaders who inspire others without the need for associates to identify with the leader. Inspirational leaders articulate in simple ways, shared goals and mutual understanding of what is right and important. These leaders provide visions of what is possible and how to attain such vision by enhancing meaning and promoting positive expectations of what needs to be done.
Intellectual Stimulation (IS)	This refers to transformational leaders supporting others to consider old challenges in new ways by encouraging them to question their own beliefs, assumptions, and values and when appropriate, also challenge those of the leader which may be outdated or inappropriate for resolving current challenges. As a result, they develop associates' capacity to resolve future challenges, unforeseen by the leader through creative and innovative means. A key measure of the leader's effectiveness is how capable their associates are, to operate in their leader's absence.
Individual Consideration (IC)	Individual consideration is another aspect of Transformational leadership which means that leaders understand and share in another's concerns and developmental needs and treating everyone uniquely. It also represents an attempt by the leaders to not only recognise their associates' current needs and expand and elevate those needs to maximise and develop their full potential. Transformational leaders also provide learning and growth opportunities for the individual.

Source: Developed for this research

As this tool was found to measure a full range of transformational leadership styles, it was utilised for this study. In this tool, the dimensions of transformational leadership are measured and compared to a comparative tool.

If the scores meet are high, this is reflective of a leader practicing transformational leadership, while a lower score is indicative of its absence.

3.4.6.2 Transformational Leadership Questionnaire (TLQ)

The transformational leadership questionnaire was developed to measure transformational leadership in the UK public sector (Alvesson, Blom & Sveningsson 2017; Dugan 2017). The UK public sector setting appears to be prima facie like the research setting, the NSW public health setting. Further examination of the comparability however, suggested otherwise. The researcher, has a broad understanding of the NSW public system and setting as a result of working in the sector, found; the UK public health system appeared to be quite different from the former. For example, in the UK, the major public hospitals operate under the auspices of the NHS. This can be contrasted to the NSW public health system which is state based in a federal system in Australia. This creates differences across the states and there is no uniformity of policies and practices. Taking the employment conditions in NSW health for example, these are predominantly standardised employment award conditions. These governance arrangements impact practice and the applicability of local processes and measures making comparisons challenging between the two jurisdictions. The TLQ was therefore found not to be applicable to the NSW setting and was not utilised for this research.

3.4.6.3 Empowering Leadership Questionnaire (ELO)

This tool was developed as a scale for measuring empowering leader behaviour in a series of 3 studies, initially consisting of in-depth interviews with external leaders and team members of three organisations, and then grouping these accordingly (Fong & Snape 2015; Foster 2019; Liu, Y 2015). This tool was administered to team members for two organisations leading to five criteria for

measurement being developed. The third study sought to validate the scale in a sample of five organisations. The researchers (Arnold et al. 2000) who developed this tool also acknowledge its limitation as a tool still in development.

Another major criticism of this tool for this research is its specificity as a tool for measuring and assessing leader empowerment behaviours (Fong & Snape 2015). Consequently, this tool does not help in answering the research questions and was therefore not utilised for this research.

3.4.6.4 Authentic Leadership Questionnaire (ALQ)

The authentic leadership questionnaire (ALQ) is a multidimensional theory-based tool that measures the leaders' authentic leadership, measuring four dimensions: Self-awareness; Relational Transparency; Balanced Processing and Internalised Moral Perspective (Agote, Aramburu & Lines 2016; Erkutlu & Chafra 2013; Regan, Laschinger & Wong 2016). While this tool had been widely received in the authentic leadership field, the Neider and Schriesheim (2011) review of this tool raised some concerns with its validity. While acknowledging the comprehensive literature review and scale development of the of ALQ, Neider and Schriesheim (2011) carried out what they termed a more robust Authentic Leadership inventory (ALI) which they suggested used a more rigorous quantitative content validity assessment process.

While the ALQ could be a robust process for measuring or assessing leadership styles in medical imaging services, despite the concerns of the latter authors. The researcher's experience with clinical leaders in medical imaging departments suggests that hybrid managers tend to have strong convictions about their beliefs and strive to persuade others towards a different strategic or operational direction. However, as the leadership styles of medical imaging leaders were yet to be identified, it may not have been appropriate to measure the authentic

leadership style alone if the leader's style is unknown. Therefore, this tool was utilised in conjunction with the MLQ. The ALQ utilised is presented in Appendix F of this thesis.

To conclude section 3.4.6, the LSI utilised in this research were the combined MLQ/ALQ. The TLQ and ELQ were not utilised. The next section discusses the data rationalisation process to ensure that missing data could be managed for this research.

3.4.7 Data Collection Rationalisation

At the conclusion of the five rounds of data collection, the researcher reviewed the participation rates for participants together with meaningful data from the participants that had been collected. As a result, the researcher decided to exclude all participant data for participants that had not been involved in at least three data collection rounds, that is, the preliminary LSI; the three data collection rounds and the final LSI. This reduced the initial study cohort from 21 participants to 17 participants. This exclusion criteria was used to allow the assessment of leadership change over time, whereas had few data points been utilised, this could potentially compromise the conclusions drawn from the data.

3.4.8 Discussion

While acknowledging the differences between their TLQ-LGV and the MLQ, Foster (2019) and Liu, Y (2015) suggested that there were common elements between these two approaches relating to critical thinking and challenging traditions.

The methods discussed above do not adequately cover emerging leadership styles such as medical leadership. Sebastian et al. (2014) defined medical

leadership as doctors with the ability to set direction, influence others and manage change. They further suggested that these leaders while clinically trained, operate at both strategic and operational levels. In this case they no longer provide clinical care but are in executive positions and; operational leaders, those with no formal management positions but lead operational activities utilising their clinical expertise and credibility, two sources of personal power that French, Raven and Cartwright (1959) and others (Bolman & Deal 2017; Burke 2017; Stewart & Shamdasani 2014; Wodak & Meyer 2015) discussed as expert and referent .

Chapman, Johnson and Kilner (2014); Berghout et al. (2017) and Kippist and Fitzgerald (2014) researched such leaders within the medical workforce. They suggested that contrary to the medical leadership model discussed above, doctor managers operated in a hybrid model as doctor-managers who assumed both clinical and managerial roles to influence at strategic and operational levels. In South Western Sydney LHD both types of leaders exist. MacCarrick (2014) recognised the challenges and complexity in exercising leadership in professional bureaucracies such as healthcare tasked with motivating clinical colleagues to attain organisational goals.

As the sample contains doctors in leadership positions, it was appropriate to utilise a mixed methods approach in the determination of the baseline leadership style inventory. This allowed for participants to self-report their leadership style and this would be corroborated by a leadership style inventory. A combined MLQ/ALQ emerged as the most appropriate tool to use in assessing leadership style and was therefore utilised for this project. Participants were also asked to self-assess their leadership style from a range of descriptors provided, which allowed the standardisation of data collection and responses. It was believed that this would corroborate and support the leadership style identified using the MLQ.

3.5 Summary of Tools Used for Data Collection

Several data collection tools were utilised as discussed in this chapter with a summary of these outlined in Table 6 below:

TABLE 6 - SUMMARY OF TOOLS USED FOR DATA COLLECTION

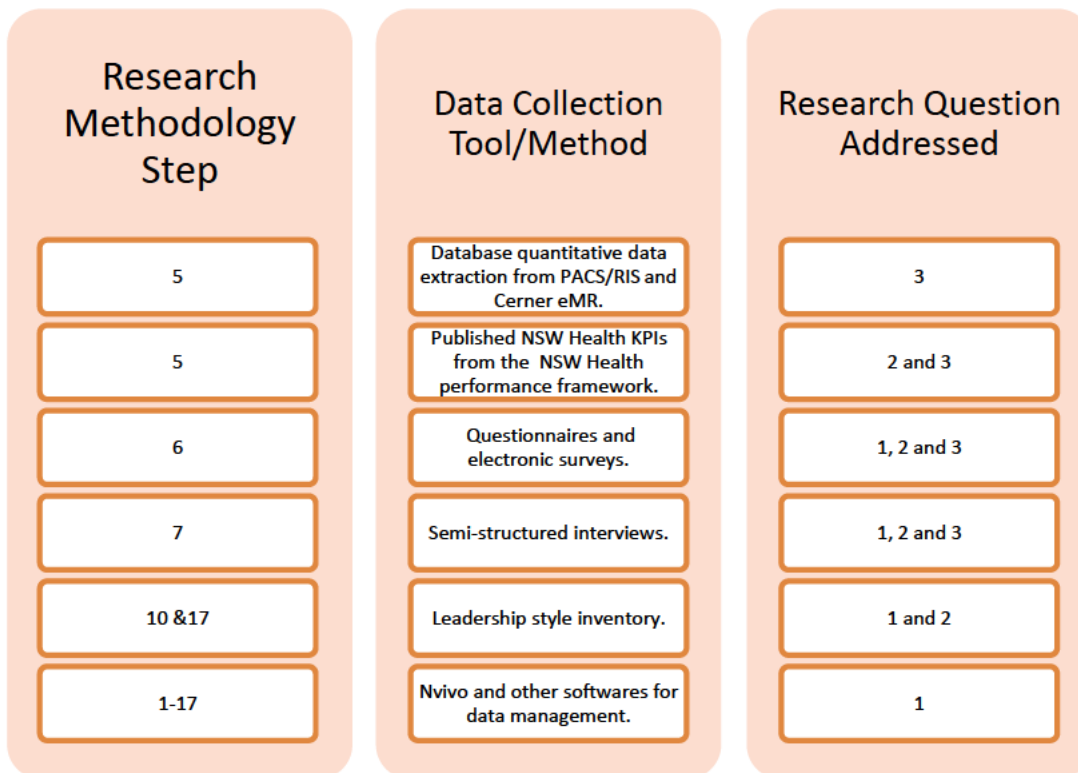
Leadership Style	Tool	Research Method
Transformational	Multifactor Leadership Questionnaire	Quantitative
Transactional	Multifactor Leadership Questionnaire	Quantitative
Laissez Faire	Multifactor Leadership Questionnaire	Quantitative
Authentic	Authentic Leadership Questionnaire	Quantitative
Consultative	Questionnaire	Qualitative
Servant	Questionnaire	Qualitative
Situational	Questionnaire	Qualitative

Source: Developed for this research

3.6 Congruency of Methodology, Data Collection and Research Questions

The matrix below indicates the linkage between the research steps, research questions and the data collection tool in Figure 8 below as follows:

Figure 8: Research Methodology Matrix



Source: Developed for this research

3.7 Ethical considerations

Key ethical considerations for this research included:

3.7.1 The Researcher’s Knowledge of Medical Imaging Departments

The researcher worked as Business Manager for medical imaging departments for SWSLHD for three years. In this time, the researcher was involved in several change management projects. This knowledge of medical imaging departments could potentially have impacted on the researcher’s interpretation of the information provided by the research participants. This ethical risk was managed through the transcription of all interviews and verification by interviewees of each interview to ensure that their response had been captured accurately.

As the researcher was not in a managerial role over participants and had no influence on their remuneration, there was no coercive power involved. Additionally, the researcher's supervisory panel was utilised for advice to manage this perception and the interpretation of data.

3.7.2 Selection Bias

There was the risk that the management team of the medical imaging departments would only select projects that had a successful outcome and not those that were considered unsuccessful. This would impact on the interpretation of the project results. The longitudinal nature of the study meant that through the review of a series of projects, the effect of selection bias would be negated.

3.8 Confounders

Potentially, the research could have been blighted by several confounders which included:

3.8.1 The Element of Luck on Project Success

Had the research not been a longitudinal study, correlation and the drawing of conclusions would have been difficult. The study design (longitudinal) allowed the study to be robust to eliminate the element of luck through a review of successive project cycles.

3.8.2 External Factors Impacting on Project Success

Healthcare is a dynamic environment. Projects commenced and being part of this research could be impacted by external environmental changes within the landscape. This risk was managed by selection of projects that were relatively

short to implement, that is projects with an overall duration of no longer than one year to complete.

3.9 Conclusion

The project methodology implemented for this research project was robust enough to facilitate the research objectives. The choice of the baseline leadership style questionnaire allowed for a thorough assessment of the participants' leadership style. This was then followed up by allowing the participants to provide a self-reported leadership style through the round one interview process described in section 3.4 above. The longitudinal nature of the study also allowed the research participants to reflect on their leadership styles in successive change projects as this was discussed following the completion of each change project cycle. At the conclusion of round three change cycles, all participants were afforded the opportunity to reflect again on their leadership styles and assess whether there had been any changes to their measured and self-reported baselines. Like the baseline measurement process, participants were requested to measure any changes in their leadership styles and a second layer of assessment undertaken through the final leadership style inventory questionnaire.

Data management tools such as Microsoft excel and NVivo were utilised in the classification and sorting of data. The researcher, who had no prior knowledge of NVivo, attended specific training to gain and develop knowledge in the use of this software. The researcher's prior knowledge of the medical imaging operations within the research settings allowed for an in-depth understanding of the processes and projects that were undertaken by the participants of this research project. The researcher could therefore pose follow up questions leading to richer insights into the change management processes described. The next chapter discusses the findings of this research.

Chapter 4 – Results

4.1 Introduction and Overview

Chapter 3 presented the research methodology utilised for this research including the data collection tools. The purpose of this research was to investigate how leadership in healthcare effects the outcomes of the change management process in medical imaging departments. To understand this phenomenon, the research project sought to answer the following research questions as outlined in section 1.3.

1. What are the dominant leadership styles for change management approaches in medical imaging departments?
2. What strategies are used for successful change management in medical imaging?
3. How does the nature of leadership and change management processes in healthcare impact on the success of change management processes?
4. Why do some projects/processes fail or succeed in medical imaging?
5. How is the healthcare leader's leadership style influenced and reshaped by learned experience in prior change management processes?
6. How do "learning" leaders achieve better outcomes in successive change management processes?

As earlier discussed in chapter 3 of this research, three interview rounds were undertaken as part of the research. During this study, a pre- and post-leadership style inventory questionnaire was offered to participants at the commencement and completion of the data collection process to all applicants. The previous chapter of this thesis also outlined how this study was undertaken through a mixed methods approach in a longitudinal study.

In this chapter, results are presented and described using a mixture of quantitative data and qualitative data to clearly illustrate the findings. This chapter begins with a discussion of the sample characteristics. Then the findings from the pilot study are discussed, followed by the findings from the leadership style inventory. The quantitative findings are presented first and then the qualitative findings articulated. Fourthly, findings from the interview rounds are discussed before findings on the dominant leadership styles are presented. Then the reasons for project success or failure are presented prior to the strategies utilised for project success are outlined. Other strategies utilised for project success are then outlined before the results on how learned experiences impact on leadership behaviour. A chapter conclusion is then provided.

The results of this study are grouped into sections and will be presented based on the research questions for completeness and consistency. In the presentation of these results a mixture of formats will be utilised, which include tables, figures, and annotations, for comprehensiveness, to represent the findings of this research. Further analysis will be presented in chapter 5, of this research. However, this chapter's discussion will commence with some preliminary information that includes the following matters: sample selection results; sample and project demographics; pilot study; leadership style inventory; interview rounds and the final leadership style inventory.

4.2 Sample Results

4.2.1 Characteristics

As noted in section 3.4.2, this research had a 67.74% acceptance rate. This sample was a typical and ideal sample for the research study as it was representative of the population, with all leadership roles within medical imaging represented. The roles of the participants were also analysed with the results outlined in Figure 9 below.

FIGURE 9: PARTICIPANT BY ROLE TYPE

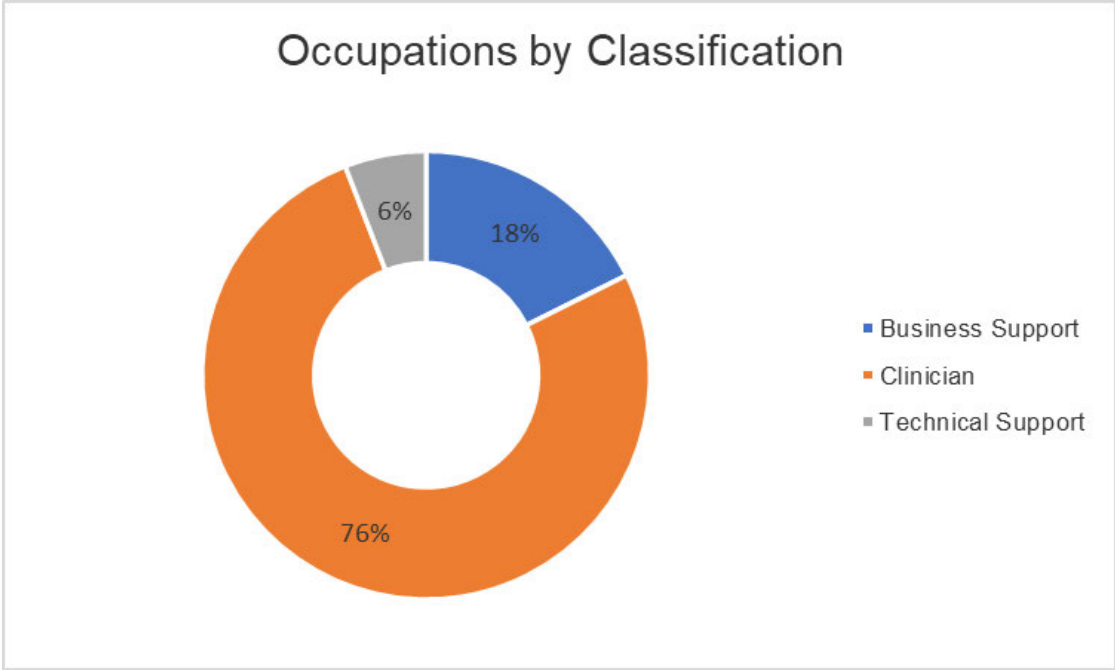
Role Description	Population Size	Sample Size	Role Sample Percentage
Administration Manager	4	2	12%
Chief Radiographer	4	2	12%
Chief Technologist, Nuclear Medicine Dept	2	1	6%
Clinical Stream Manager	1	1	6%
Deputy Chief Radiographer	4	2	12%
Director Diagnostic Radiology	4	1	6%
Director Interventional Radiology	1	1	6%
Director Nuclear Medicine Department	2	1	6%
Director Nuclear Medicine Department/Clinical Stream Director	1	1	6%
Medical Physics Specialist	1	1	6%
PACS RIS Manager	1	1	6%
Senior Radiographer - Interventional Radiology	1	1	6%
Staff Specialist and Director of Training	5	2	12%
Total	31	17	100%

Source: Developed for this research

Of the 17 participants in this research study, 8 (or 44%) were female compared to the 9 (or 56%) which were male. It was also noted that the medical imaging workforce was predominantly full-time staff, with 15 staff (or 83.33%) of staff engaged in full-time work within the service. Most of the participants were based at the largest hospital (Liverpool), with 13 (72%) participants, followed by Fairfield with 3 (17%) participants. Bankstown and Campbelltown hospital had a participant each (6%).

The occupations of the participants were also classified according to the functions they performed, and the results depicted in Figure 10 below.

FIGURE 10: PARTICIPANTS' OCCUPATIONS BY CLASSIFICATION



Source: Developed for this research

Three of the participants were drawn from the Business Support classification, which was administration type staff and non-clinicians, while the majority (13) came from the Clinician group and the remaining person being from Technical Support. Technical staff were those staff that provided technical expertise to the medical imaging departments that were non clinicians or business support staff.

While most of the participants, (10) worked at a single facility, four had a dual District wide role and facility role, one performed in a District wide role while two worked across several facilities within the same District.

4.2.2 Project Demographics

4.2.2.1 Project Duration

43 projects were researched in this study. These were part of the projects completed in medical imaging during the research period as depicted in Table 4 below. From the researcher's experience in medical imaging, most projects range in duration from about a month to less than a year. Additionally,

participants suggested that these projects are representative of the typical projects undertaken in medical imaging within South Western Sydney LHD.

Of these six projects were completed in less than three months, 11 projects took between three to six months to complete. Five projects were in the six to nine months category while seven were projects were completed within a duration of nine to 12 months. Five projects took 12 to 18 months. Nine projects took between 18 months to 24 months to complete. This reflects a divergent range of projects completion time.

TABLE 7 – PROJECT DURATION BY ROUND

Project Round	Project Duration						Grand Total
	> 3 months	3 < 6 months	6 < 9 months	9 < 12 months	12 < 18 months	18 < 24 months	
Round 1	4	3	1	2	2	4	16
Round 2	1	5	1	5	1	2	15
Round 3	1	3	3		2	3	12
Grand Total	6	11	5	7	5	9	43

Source: Developed for this research

4.2.2.2 Stakeholder and Site Involvement

Of the 43 projects researched in this study, 30 projects involved multiple stakeholders with 13 involving internal stakeholders. This is reflected in Table 8 below. 29 projects involved a single hospital or site while 14 projects were undertaken involving multiple sites within the LHD.

TABLE 8 – PROJECTS AND STAKEHOLDERS INVOLVED

Project Types	Location	Stakeholders	
		Internal	Multiple
Business Process Redesign	Multi-site		3
	Single site	2	6
Clinical Procedure Redesign	Multi-site		1
	Single site	1	1
Clinical Process Redesign	Multi-site		1
	Single site	7	
Equipment Replacement	Single site		3
Infrastructure Project	Multi-site		1
	Single site		5
IT Project	Multi-site		3
New Process/System	Multi-site		5
	Single site	3	1
Grand Total		13	30

Source: Developed for this research

4.2.2.3 Project Types and Project Drivers

Table 9 below reflects that there were several key project drivers. The dominant projects were Business Process Redesign with 11 projects completed during the research period, followed by New Processes/Systems and Clinical Process Redesign with nine and eight projects, respectively. Infrastructure projects followed closely with six projects, with the following project types, with three projects each: Clinical procedure redesign; Equipment replacement; IT Projects.

TABLE 9 - PROJECT BY TYPE AND DRIVER

Project Driver	Project Types Undertaken							Grand Total
	Business Process Redesign	Clinical Procedure Redesign	Clinical Process Redesign	Equipment Replacement	Infrastructure Project	IT Project	New Process/System	
Accreditation Requirements							1	1
College Requirements	1						1	2
Customer Feedback	1		2					3
Infrastructure Upgrades	2			2	2	3		9
Ministry requirement							3	3
New Service	1				3		1	5
Patient Safety	1	1						2
Service Improvement	5	2	6	1	1		2	17
Succession Planning							1	1
Grand Total	11	3	8	3	6	3	9	43

Source: Developed for this research

4.3 Pilot Study

Arising from the pilot study as discussed in section 3.3 (step 10), minor modifications were made to the interview tool as depicted in Appendix I. These modifications were prompts to interviewees at various questions, to assist less experienced leaders. For example, where the interviewee provided one-word answers, the researcher would probe further to solicit an explanation and therefore more meaningful information and insights in the change project. The interview tool was adopted for use in subsequent interviews. Accordingly, these interview results were incorporated as part of round 1 interviews.

4.4 Leadership Style Inventory (LSI)

Participants reported that the combined ALQ/MLQ tool took approximately 20 minutes to complete which they also reported as a reasonable length for this task. The researcher deemed this completion time to be appropriate, based on the participants' feedback during round one interviews, and no modifications were made to the tool. These responses were aggregated by participant and separated for results tabulation as shown in Table 10 below. Results of the LSI were separated between the ALQ and MLQ components were tabulated and are discussed separately, below, commencing with the ALQ.

4.4.1 Authentic Leadership Questionnaire

Table 10 below shows the baseline and results of the ALQ. Participants scored an average of 13 points for both the baseline and final leadership style inventories. This reflects a low level of authentic leadership across the LHD. Of all participants, Participant 6 scored the highest score of 15, which is still considered to be a low level of authentic leadership as measured by this self-rating scale.

Between the baseline and final ALQ scores for each participant, there was no discernible difference in their scores with most recording a difference of two points or less. There was also no major difference in the median and modal scores for the participant cohort. Participants 12 and 17 fell outside of these benchmarks gaining three points and losing four points respectively between baseline and final scores. For participant 12, this points gain was because of the use of average scores for the final LSI, as the participant did not participate in this data collection round. For participant 17, a four points loss between the two data collection point was noteworthy. This participant was reasonably new in their role, having spent less than 12 months in this role, at the time of baseline data collection. The ALQ results as presented above are tabulated below and further discussed in chapter 5, section 5.5:

TABLE 10 – PARTICIPANT RESULTS FOR THE ALQ

Participant	Baseline ALQ						Final ALQ						Difference over time
	Transparency	Self Awareness	Ethical/ Moral	Balanced Processing	Total	Overall	Transparency	Self Awareness	Ethical/ Moral	Balanced Processing	Total	Overall	
Participant 1	3.20	3.30	4.00	3.70	14	3.50	3.20	2.50	3.30	4.00	13	3.20	-1
Participant 2	3.20	1.80	3.50	3.00	12	2.90	3.06	3.14	3.27	3.34	13	3.20	1
Participant 3	3.17	3.13	3.25	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0
Participant 4	2.80	4.00	3.30	3.00	13	3.30	3.00	4.00	3.50	3.70	14	3.50	1
Participant 5	3.00	3.30	3.80	3.00	13	3.30	2.40	3.00	3.00	2.70	11	2.80	-2
Participant 6	3.80	3.80	3.50	4.00	15	3.80	3.40	4.00	4.00	4.00	15	3.80	0
Participant 7	3.17	3.13	3.25	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0
Participant 8	2.60	2.30	2.80	3.00	11	2.60	3.20	2.30	3.30	3.30	12	3.00	1
Participant 9	3.80	2.50	3.50	3.30	13	3.30	4.00	2.50	3.80	3.70	14	3.50	1
Participant 10	3.17	3.13	3.25	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0
Participant 11	3.60	4.00	3.50	3.30	14	3.60	3.20	3.80	3.50	4.00	15	3.60	0
Participant 12	3.20	1.80	1.50	3.70	10	2.50	3.06	3.14	3.27	3.34	13	3.20	3
Participant 13	2.60	4.00	2.30	3.30	12	3.00	2.60	4.00	3.00	3.30	13	3.20	1
Participant 14	3.17	3.13	3.25	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0
Participant 15	2.80	3.30	3.80	3.30	13	3.30	3.06	3.14	3.27	3.34	13	3.20	0
Participant 16	3.40	3.50	3.50	2.70	13	3.30	3.40	2.80	3.00	2.70	12	3.00	-1
Participant 17	3.17	3.13	3.25	3.28	13	3.21	2.20	2.50	2.30	2.00	9	2.30	-4
Median	3.17	3.13	3.30	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0
Average	3.17	3.13	3.25	3.28	13	3.20	3.06	3.14	3.27	3.34	13	3.20	0
Mode	3.17	3.13	3.50	3.28	13	3.21	3.06	3.14	3.27	3.34	13	3.20	0

Source: Developed for this research

4.4.2 Multifactor Leadership Questionnaire

The MLQ component of the LSI comprised of 45 questions as shown in Appendix D. To recap the discussion in chapter 3, the MLQ measures three types of leadership namely, Transformational; Transactional and Passive/Avoidant also referred to as Laissez Faire. The results of the completed MLQ were categorised as tabulated in Table 11 and discussed in the paragraphs that follow below, under their respective domains:

TABLE 11 – BASELINE AND FINAL MLQ RESULTS AND DIFFERENCES OVER TIME

	Baseline MLQ					Final MLQ					Differences Over Time				
	Transformational	Transactional		Passive/Avoidant		Transformational	Transactional		Passive/Avoidant		Transformational	Transactional		Passive/Avoidant	
Participant	Five I's of Transformational Leadership	Rewards Achievement (CR)	Monitors Deviations & Mistakes (MBEA)	Fights Fires (MBEP)	Avoids Involvement (LF)	Five I's of Transformational Leadership	Rewards Achievement (CR)	Monitors Deviations & Mistakes (MBEA)	Fights Fires (MBEP)	Avoids Involvement (LF)	Five I's of Transformational Leadership	Rewards Achievement (CR)	Monitors Deviations & Mistakes (MBEA)	Fights Fires (MBEP)	Avoids Involvement (LF)
Participant 1	3.30	3.00	2.80	0.30	-	3.50	3.80	1.80	0.80	1.30	0.20	0.80	1.00	0.50	1.30
Participant 2	3.06	2.87	2.05	0.37	0.17	3.10	3.50	2.80	1.00	0.50	0.04	0.63	0.75	0.63	0.33
Participant 3	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Participant 4	3.30	2.50	2.80	-	-	3.10	3.00	2.30	1.00	0.30	-	0.20	0.50	1.00	0.30
Participant 5	2.90	2.50	0.50	0.30	0.30	2.90	2.80	1.50	0.30	-	-	0.30	1.00	-	0.30
Participant 6	3.50	3.30	3.30	0.50	0.30	3.40	3.30	3.30	0.80	-	-	0.10	-	0.30	0.30
Participant 7	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Participant 8	2.90	2.80	1.80	-	0.30	2.80	3.00	2.30	0.30	0.30	-	0.10	0.20	0.30	-
Participant 9	3.10	2.30	3.00	1.30	-	3.00	1.50	3.30	0.80	-	-	0.10	0.80	0.30	-
Participant 10	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Participant 11	3.50	3.50	3.00	0.30	-	3.80	3.80	2.30	1.00	-	0.30	0.30	0.70	0.70	-
Participant 12	3.06	2.87	2.05	0.37	0.17	3.10	2.00	3.70	0.70	1.50	0.04	0.87	1.65	0.33	1.33
Participant 13	3.00	3.50	1.50	0.30	-	3.10	2.80	1.30	0.30	1.00	0.10	0.70	0.20	-	1.00
Participant 14	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Participant 15	3.06	2.87	2.05	0.37	0.17	3.40	3.50	3.00	-	-	0.34	0.63	0.95	0.37	0.17
Participant 16	2.80	2.50	0.30	-	-	3.20	2.50	2.50	-	-	0.40	-	2.20	-	-
Participant 17	2.30	2.80	1.50	0.70	0.80	3.20	2.96	2.51	0.58	0.41	0.90	0.16	1.01	0.12	0.39
Benchmark	3.05	2.9	1.69	1.08	0.7	3.05	2.90	1.69	1.08	0.70					
Median	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Average	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	0.41	0.14	0.09	0.46	0.21	0.24
Mode	3.06	2.87	2.05	0.37	0.17	3.20	2.96	2.51	0.58	-	0.14	0.09	0.46	0.21	0.17
Median and Benchmark	0.01	0.03	0.36	0.71	0.53	0.15	0.06	0.82	0.50	0.29	0.14	0.09	0.46	0.21	0.24

Source: Developed for this Research

The results reflected in Table 11 above are interpreted using the tool shown in Appendix F and G and are discussed below under those three sub-headings.

4.4.2.1 Transformational Leadership

12 participants or 71% scored higher than the benchmark score of 3.05. The average score for transformational leadership for the cohort, was also 3.13 across the baseline and final MLQ results. This means that 29% of the participants were weaker in their Transformational Leadership on average, compared to the benchmark cohort.

A comparison of the Transformational leadership styles between the baseline MLQ and the final MLQ was undertaken, showing a very small change of 0.14 points overall in the leadership style of participants over time.

4.4.2.2 Transactional Leadership

According to Bass and Avolio (2004), transactional leadership is measured by the attributes of Rewards Achievement (CR) and Monitors Deviations & Mistakes (MBEA). 24% and 71% of participants scored higher than the benchmark score of 2.9 for the baseline and final MLQ for the CR attribute respectively. This means that reward was a motivator in medical imaging leaders. 76% and 88% of participants scored higher than the benchmark for the attribute of MBEA for the baseline and final LSI respectively. The overall average scores for transactional leadership were 2.46 against a 2.3 benchmark at baseline data collection. This score increased to 2.73 against the same benchmark for the final MLQ. Participants 12, 16 and 17 contributed to this increase with increases in scores of 1.65; 2.20 and 1.01 respectively, for the MBEA attribute. This means that these participants were active in monitoring mistakes or managing by exceptions. Participant 1's score on the other hand reduced by a score of 1, from baseline

data collection to final data collection. This corresponds to an increase in this participant in demonstrating a Laissez-Faire style in the later part of the research. Like the comparison of scoring for Transformational leadership above, participants in this research demonstrated stability progressively, for their transactional leadership style over time, with an average scoring difference of 0.27 points.

4.4.2.3 Laissez Faire or Passive/Avoidant

Only 6% of participants scored higher than the benchmark for the MBEP attribute at baseline, with this number reducing to 0% at final MLQ stage. One participant also scored higher than benchmark at baseline for the Avoids Involvement (LF) attribute, with this number increasing to 3 at the end of the research period indicating an increase in participants that tended to exhibit this attribute. The median score for the passive/avoidant leadership style at baseline was 0.27 against a benchmark of 0.89 while the score was almost double at 0.5 but well short of the same benchmark at final MLQ data collection.

These results mean that in general, participants did not exhibit a Passive/Avoidant style at any time during the research period. Of note, participant 4 showed a 1-point score increase for the MBEP attribute during the research period. However, this score was still below the benchmark of 1.08. Participants 1, 12 and 13 indicated an increase of at least 1 point at 1.3;1.33 and 1 respectively.

In conclusion, the quantitative research presented above identifies that there was a discernible difference in the participant leadership styles across the research period with a difference with a range of 0.09 to 0.46 points. For transformational leadership, a median score of 3.06, slightly higher than benchmark indicated that generally participants identified as utilising style. Examining transactional

leadership showed that the median score was 2.73, slightly higher than the 2.3 benchmark. This indicates that participants sometimes used the transactional leadership style. Finally, participants scored generally low scores of 0.5 at the end of the research period indicating that they were not leaders who were inclined towards the passive/avoidant style.

The next section presents the qualitative findings of the interviews, with these findings grouped into coded themes and discussed in chapter 5.

4.5 Round One Interviews

During this round, there was a total of 17 participants who participated in the study. These participants are representative of all the roles within medical imaging and form a typical sample of medical imaging leaders in healthcare. 16 (94%) were involved in the interview process with one participant unavailable for interviews as reflected in Table 12. Of the 16 participants who completed the baseline LSI, 7 (44%) were female and 9 (56%) were males. 13 out of 16 (82%) of the leaders within this setting identified as clinical leaders; 75% as hybrid leaders and 50% as strategic leaders.

Similarly, to the participant characteristics, the number and type of projects undertaken, were typical projects undertaken in medical imaging in public hospitals as reported by participants. The number of projects were variable in length as: under 3 months (2 or 17%); 3 to 6 months (5 or 42%); 6 to 12 months (2 or 17%); and over 12 months (3 or 25%). The projects undertaken were evenly spread between Infrastructure/Equipment commissioning (5 or 42%); introduction of new processes (5 or 42%) and clinical/process redesign (5 or 42%). 58% (8) of the projects or processes involved multiple stakeholders with only 33% projects being completed as internal to the department only. 33% of the projects

were multisite projects and 67% were department specific change projects/ processes.

In undertaking these projects, the communication styles varied from project to project. All projects utilised at least two forms of communication with stakeholders. 100% of the projects required meetings to be held as a form of communication. Additionally, e-mail was the dominant mode of communication with 83 % of leaders utilising this mode of communication. 17% of the projects utilised the top down and bottom-up approaches for messages to get to the intended audiences. 83% of the leaders also utilised a collaborative communication style.

An interview transcript was prepared for each interview in Microsoft word and exported to NVivo where it was stored under the participant's name for further analysis.

4.6 Round Two Interviews

During round 1 interviews, participants were requested to identify future projects to be discussed in round 2 interviewing.

A similar process to the one adopted in round one was utilised to request for interview availabilities as described in section 4.5. Interviews for the second interview round were scheduled from January 2018 to July 2018. A total of 15 (or 88%) out of 17 participants participated in the interview process as indicated on Table 12 below. Participants were contacted through e-mail requesting them to nominate their availabilities for the research project interviews. If responses were not received within a week, a follow up e-mail was sent to the participant. During this interview round, two participants did not respond to requests for interviews,

despite several follow up requests to interview. The final two participants could not be interviewed due to their projects not being completed at the time of the interviews. The researcher and these participants agreed to schedule these interviews concurrently with the third interview round when it was anticipated that the change projects would be complete.

Like the process adopted in round one interviews as described in section 3.4.2.1. An interview transcript was utilised (Appendix K) as a case study in assessing an appropriate method of presentation of results. Categorisation of self-leadership styles was undertaken with the results reflected in Table 13 in section 4.8.

4.7 Round Three Interviews

Like the project/process identification process described in section 4.5 above, participants were requested to identify a change management project for discussion in this interview round.

A process consistent with that utilised in rounds one and two was utilised to request for interview availabilities as described in sections 4.5 and 4.6. Participants were requested to nominate a time for an interview with the researcher in mid-August 2018. The interview schedule considered the commitments and circumstances of the leaders in the LHD.

The interview window was set for August 2018 to October 2018. 12 participants (71%) had their interviews scheduled for August 2018 with the remaining 19% (or five participants) scheduled for the other two months. During round three data collection, the researcher also ascertained whether participants had received the final MLQ/ALQ links as described in section 3.4 prior to the interview commencing. All participants confirmed having received the link to the final MLQ/ALQ and therefore no resending was required.

Following each interview, a transcript was prepared, and this was utilised for the coding in NVivo. Data collection across the five processes was completed with the results summarised in Table 12 below.

TABLE 12 – PARTICIPATION IN DATA COLLECTION PROCESSES

Participant	Participation in Data Collection Processes				
	1st LSI	Round 1	Round 2	Round 3	Final LSI
Participant 1	Yes	Yes	Yes	Yes	Yes
Participant 2	Yes	Yes	Yes	No	No
Participant 3	No	Yes	Yes	Yes	No
Participant 4	Yes	No	Yes	Yes	Yes
Participant 5	Yes	Yes	Yes	Yes	Yes
Participant 6	Yes	Yes	Yes	Yes	Yes
Participant 7	No	Yes	No	Yes	No
Participant 8	Yes	Yes	Yes	Yes	Yes
Participant 9	Yes	Yes	Yes	Yes	Yes
Participant 10	No	Yes	Yes	No	No
Participant 11	Yes	Yes	Yes	Yes	Yes
Participant 12	Yes	Yes	Yes	No	No
Participant 13	Yes	Yes	Yes	No	Yes
Participant 14	No	Yes	Yes	No	No
Participant 15	Yes	Yes	Yes	Yes	No
Participant 16	Yes	Yes	No	Yes	Yes
Participant 17	No	Yes	Yes	Yes	Yes

Source: Developed for this research

4.8 Dominant Leadership Styles in the Local Health District

Across the three interview rounds, 47 interviews were cumulatively conducted via the 17 participants who participated in this study. Of these participant projects/processes, an overwhelming majority of 45 out of 47 (96%) reported that they successfully implemented change, with 2 (4%) projects or processes being unsuccessful. These two projects were identified as projects undertaken by a participant that identified as utilising the consultative leadership style. We will examine the dominant leadership styles practiced by leaders in this research in the succeeding paragraphs.

During the participant interviews, participants were asked to self-report their leadership style and these responses were aggregated with regards to their self-reported leadership styles and tabulated as shown in Table 13 below. The research study determined that the dominant leadership style found was Consultative across the three interview rounds with 44%; 67% and 56% of participants identified as utilising this style in rounds one; two and three respectively. This differs from that reported in the existing literature, as is discussed in section 5.4.

It can be noted that consistently across the three interview rounds, a consultative leadership style was preferred by medical imaging leaders, followed by a situational leadership style, with other leadership styles featuring as described above. Participant 13 underscored the need for consultation and said:

"I think consultation is very important. From my days as being the Manager here, consultation has been a key thing. I consult my staff. Any changes that I need to do, without consultation, I never do".

For participant 2 consultative leadership means:

"If there is anything new to be introduced, we always talk to Senior (Radiographers) people first or as Seniors meeting with them. If there is something that's urgent, you have to consult, you have to ask them what do you think? That is the normal process".

Participant 15 views his leadership style as consultative. He said,

"I usually consult others. What other things have I missed out on or what other things should be considered before a project takes place? Are we doing it the right way? Is there any loopholes within the system? We look at it and spend at least two weeks to see what other things will come up. What are we going to do if this happens or if that fails?"

Participant 17, highlighted the advantages of consultative leadership when she said,

“I would say I am leader who gets input from staff as well. Sometimes you never know, you get staff who have better ideas. You take that on board, you think about it. I also delegate things and also take on board their ideas as well”.

A further 31% in round 1, 27% in round two and 38% of participants in round three indicated that they were situational leaders.

Participant 12, viewed himself as a situational leader as he said,

“whilst consultation to achieve a milestone or certain deadline, has been a discussion or a strategy when it was organically grown as a group, but now given that we aim to get [x result] then what that means is a achieving deadlines. We need to be checking routinely and then start to tap shoulder required. Maybe consultative becomes slightly more forceful from time to time”.

Participant 16 also viewed herself as a situational leader, when she said,

“When I think of all the things you have said, I think I am a little bit of all of them but I wouldn’t say its my way or the highway, but I would like to think that I communicate with staff and also get their feedback as well”.

Other leadership styles identified in this study included one person as a transformational leader, in round one interviews, two people identifying as practicing servant leadership; one person that utilises a collaborative leadership style in rounds two and three of interviews.

For participant 5 who identified herself as a transformational leader, leadership for her meant;

“You have to get people involved, but you have to get, the whole idea of a leader is not just to lead a team. The whole idea is to get people on board, have a look at their visions and your vision. Keep getting back to them and say, have I missed anything? How can I help you?”

Interestingly, participant 14 who identified as a servant leader in round 1 interviews said,

“A true leader has a servant spirit”. So, you can only lead if you know what it is like to be the person who is being led.”

In subsequent interview rounds, this participant’s style changed to consultative leadership. The self-reported leadership styles are reflected in Table 13 below.

TABLE 13 - SELF REPORTED LEADERSHIP STYLES

		Self Reported Leadership Style Categorisation																										
		Round 1 Interview					Round 2 Interview					Round 3 Interview																
Participant	Gender	Transformational	Situational	Servant	Participative	Democratic	Consultative	Collaborative	Authoritarian	Authentic	Transformational	Situational	Servant	Participative	Democratic	Consultative	Collaborative	Authoritarian	Authentic	Transformational	Situational	Servant	Participative	Democratic	Consultative	Collaborative	Authoritarian	Authentic
		Participant 1	M						✓									✓										✓
Participant 2	F						✓									✓										✓		
Participant 3	M						✓									✓										✓		
Participant 4	F						✓									✓										✓		
Participant 5	F	✓									✓										✓							
Participant 6	M						✓									✓										✓		
Participant 7	F		✓																		✓							
Participant 8	M		✓								✓										✓							
Participant 9	F		✓								✓										✓							
Participant 10	M			✓												✓					✓							
Participant 11	F						✓									✓					✓							
Participant 12	M		✓								✓										✓							
Participant 13	F						✓									✓					✓							
Participant 14	M			✓												✓					✓							
Participant 15	M						✓									✓					✓							
Participant 16	F		✓																		✓							
Participant 17	F						✓									✓					✓							

Source: Developed for this research

Table 13 above outlines that consultative leadership style was progressively prominent in the 3 interview rounds, indicating a general trend in the adoption of this leadership style as a style of choice.

In the 3 interview rounds across the 17 leaders in medical imaging, situational leadership style featured in a third of the participants as the second most dominant from consultative leadership.

4.8.1 Nature of Leadership and Impact on Success

As discussed in section 3.4, step 12, for each project or process, success was measured against pre-determined KPIs or objectives. For example, if the objective was to deliver on the procurement and commissioning of a new CT scanner on budget and on time, that project was deemed to have been a successful project. It was noted that 41 out of 43 projects were successfully carried out and meeting their set objectives. More telling is that across the 3 interview rounds, the most dominant leadership style was consultative leadership style which averaged 56% compared to the other styles practiced by the leaders in this research setting.

Participant 14 lamented;

"I would like to think that I have a consultative type of approach. I don't want it to be a truly dictatorship kind of thing but I do believe that if you are in the leadership world, sometimes you do have to take those difficult decisions".

Participant 14's sentiments suggests that this participant would be a situational leadership in these settings when circumstances permit.

The findings presented in Table 13 above show that the dominant leadership style was consultative leadership for several medical imaging leaders, across

multiple data collection rounds. Figure 11 below also shows the leadership style utilised by the leader.

FIGURE 11 – PROJECT SUCCESS AND LEADERSHIP STYLE UTILISED



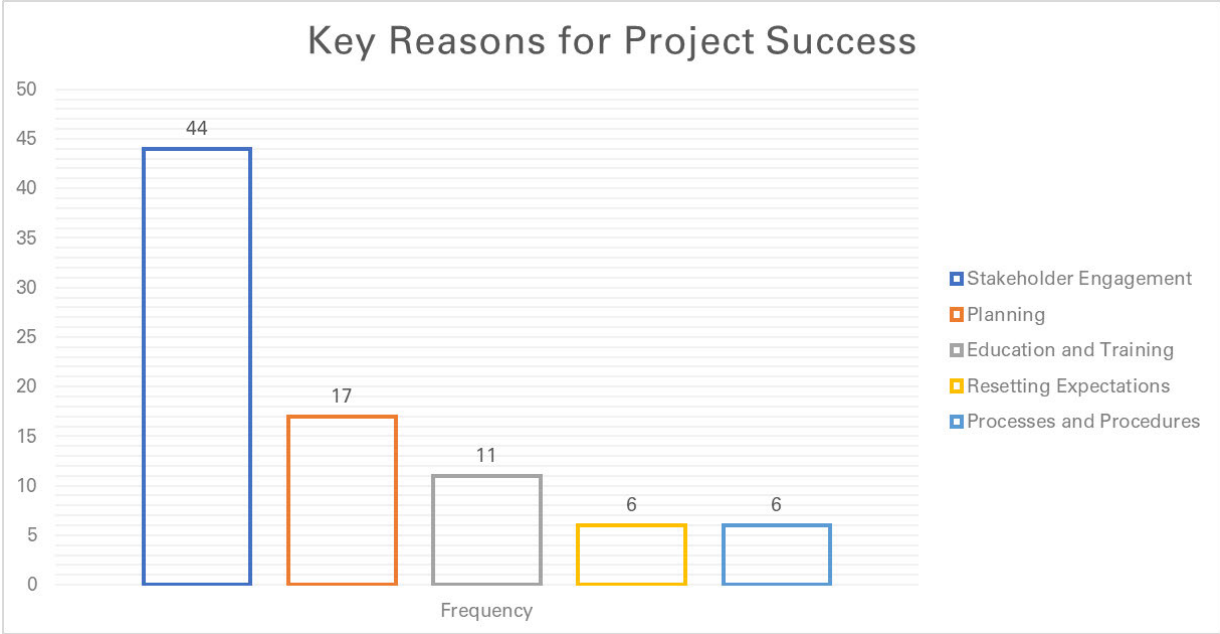
Source: Developed for this research

As shown in Figure 11 above, the dominant style of leadership was consultative leadership. Most leaders successfully undertook change projects utilising this leadership style. This research also showed that situational leadership resulted in failure to achieve the intended project objectives. The next section presents reasons for project success or failure in medical imaging in healthcare.

4.9 Reasons for Project Success Or Failure

Following the coding process, reasons for project success were identified. These reasons for success were stratified with the top five reasons for project success identified as shown in Figure 12 below. These results are explained in the paragraphs that follow in order of their frequency.

FIGURE 12: KEY REASONS FOR PROJECT SUCCESS



Source: Developed for this research

4.9.1 Stakeholder Engagement

Stakeholder engagement appeared 44 times as the most prominent reason for project success. In one project, participant 5 said,

“Definitely engagement and engagement across the board.”

Also, in a different project, when asked about key reasons for project success, she said, “

“Engagement, engagement and engagement. And I think that’s the big thing because you can lead a change process, but if you don’t take the people with you, they don’t own it”.

Participants reported that stakeholder engagement was very crucial in project/process success. To effectively engage stakeholders, participant 8 noted,

“It was established very early on who would be involved. Everyone has worked extremely collaboratively throughout the whole process, so we have got internal experts, various people who are familiar with these

items, that came together and make sure that there was adequate representation across the group.”

They also further articulated that the involvement of stakeholders earlier in the project increased the prospect of project success, when they said,

“So, involving ED earlier on and involving eMR earlier on to say, is this something you would like? We have looked into it, we know we can do this, is this something that you would like and then if they say it’s something that we like, then it is developing that plan, having key milestones to hit.”

This highlighted the need for early stakeholder identification and involvement. In the project setting, stakeholders were identified by participants as both internal and external stakeholders such as staff members from the department. Participant 2 suggested who the internal stakeholders were when they said,

“There was a lot of consultation in the department between the groups involved, specifically between myself, the CT Senior Radiographer and NUM for Imaging as well.”

Internal stakeholders were identified as participant groups as identified above who worked at the hospital or within the LHD, including local departmental staff and those belonging to other departments other than Imaging Departments, such as Registered Nurses or Physicians from the Emergency Department. This was aptly described by participant 8 who said,

“Engineering was heavily involved. Obviously, power issues, transport; delivery. There were quite a few different parties involved.”

Some participants also identified that timely engagement of their key internal stakeholders such as staff was a key enabler to project success, such that whenever they wanted to commence a project, they would engage their staff first, when participant 2 said,

“So basically, in here, if there is anything new to be introduced, we always talk to Senior (Radiographers) people first or as Seniors, meeting with them. If there is something that’s urgent, you have to consult, you have to ask them what do you think? That is the normal process.”

Reflecting on the need to consult the affected stakeholders, participant 11 said,

“I should probably say that before I made the change, I put out the roster templates, showed it to the staff for 4 weeks.”

This research project established that there were several stakeholders as summarised in Table 14 below:

TABLE 14 – STAKEHOLDER TYPES

Internal Stakeholders		External Stakeholders
Radiographers	Radiologists	NSW Ministry of Health
Radiology Registrars	Registered Nurses	Ambulance Service
Radiology Support staff such as wardsman	Other Departments such as Information and Technology Department; Emergency Department)	Sydney Local Health District
Heads of Departments of other Clinical Specialties	Nuclear Medicine Technologists	Equipment Vendors (Companies)
Emergency Department Physicians	Intensive Care Unit Physicians	Royal Australian College of Radiology
Referral Partners (Other Clinical specialists requiring Radiology exams)	Local Health District Executive	Interventional Radiology Society
Hospital Executive		Referral Partners (Other Clinical specialists requiring Radiology exams)

Source: Developed for this research

External stakeholders were identified as participant groups as detailed above that worked outside of the hospital or LHD, that had interactions with the LHD. These stakeholders included NSW Health staff or divisions, specialists training colleges, equipment vendors as outlined above.

The engagement of these stakeholders was identified as being crucial to the success of projects or processes in the LHD. External stakeholders such as equipment vendors provided support to the LHD in the form of innovations in the market evidenced by remarks from participant 2,

“They do have a very nice product and we do buy gowns from them”.

This participant also suggested that equipment vendors value-add in this mutually beneficial relationship, when they said,

“But putting this aside, all other gowns we had in this department were actually screened as well.”

Stakeholders such as the Royal Australian and New Zealand College of Radiology and the Interventional Radiology Society are the custodians of standards of education and practice for both diagnostic and interventional radiology in NSW and Australia, As such, it was important for participants to engage with them in their projects as noted by participant 3, when they said they required,

“...support from our Interventional Society and the College this year, things have actually changed, they have gone on to sort of, the College and the Interventional Society have come together on this project.”

Stakeholder consultation took several forms in these projects such as:

- Phone calls
- Meetings (both face to face and virtual meetings).
- Discussions
- Presentations

- Representations

Participant 6 identified this engagement as,

“... a lot of external consultation, multiple phone calls, meetings.”

For clinical projects, engagement was informed by what was considered clinical best practice. For example, participant 6 also said,

“It was based on what we thought was best practice. And the best practice is that lung scans are preferable in young women and pregnant women, particularly those who have clear x-rays and no other pre-existing conditions.”

4.9.2 Planning

In this research project, planning was defined as the process for the identification of goals to be achieved; creation of interventions to achieve them; the arrangement of these interventions and implementing these interventions and monitoring that they were carried out appropriately to attain the identified goals.

Planning was identified as the second most important reason for project success with a frequency of 17 occurrences. In this project, it took the form of business planning and general planning. Participant 10 recognised planning occurred at several levels when he said,

“...the business or corporate side, we had regular meetings with the Business Manager. We also engaged all the high-level executives, the GM, Corporate, Director of Finance at the highest level, the hospital executives at District level and we had regular business meetings”.

Planning was undertaken initially at the commencement of the project when the project was identified as being required within the medical imaging setting as identified by participant 15. A Project Lead would be identified and given the task of leading the project. This individual, in consultation with other key stakeholders would identify potential key stakeholders and organise meetings with them.

Project participants were then involved in identifying other key stakeholders required to participate in the project.

General planning involved the deliberate process or undertaking initiatives to ensure that projects were conducted successfully. In this research project, ongoing planning was conducted through regular meetings by project leads in consultation with the project key stakeholders for the duration of the project. These meetings had minutes produced and action lists developed. It was also noted that meeting minutes provided most project documentation for projects, with limited to no other formal project documentation. Project documents typically available for projects are: project scope; project plans with milestones; progress tracking tools such as GANNT charts; risk registers change control processes; communications plans; roles and responsibilities (Carstens & Richardson 2019; Fewings & Henjewe 2019).

Some participants identified that it was crucial for them to have sub plans for their projects in addition to the main project plan. Participant 5 identified that a communication plan was crucial to manage project risks by ensuring that all stakeholders were notified of relevant project information in a timely manner, when asked about how they managed risk, the participant said,

“Use your communication plan.”

Participant 8 also identified that the development of project planning tools allowed them to effectively manage their projects. These included:

- i. Action lists to ensure that items were assigned responsibility and were marked off as actions were completed.
- ii. Document templates with concise and clear information.
- iii. Meeting schedules

One of the keyways this participant kept stakeholders informed was through the development of an e-mail template, saying,

“Then we also developed an e-mail template, where every two days, I would give a project update with key milestones to our district and some clinicians that were heavily involved such as the Head of Department for ICU and the Director for ED.”

This process facilitated the clear and concise dissemination of information to key stakeholders.

The planning process of projects involved several stakeholders as identified above as well as the undertaking of certain activities prior at specific intervals prior to the other project stages. For example, participant 15 said,

“I think it was planned day of delivery; booked for the application specialist; equipment; unpacking and everything was done prior to the day of installation, so the machine was unpacked and things were put all together fully configured, software and all those things were upgraded and everything was ready.”

Where projects had a knock-on effect on other hospitals and the Ambulance service, there was another level of planning that required the agreement of those later stakeholders. Participant 15 suggested,

“The main stakeholders were in the hospital, the referrers for CT scans and outside were; Liverpool Hospital where CT scans could be done after hours or in hours for all urgent CTs and Ambulance Service. So, the two main stakeholders were briefed how the project was going to be undertaken and how the project could be run smoothly. There was planning involved, in

consultation with the Hospital Executive so that the project went well ahead.”

Such collaboration was crucial as it resulted in added workload that required the planning and resourcing of these other stakeholders in anticipation of extra patients. Planning also involved the identification of peak activity periods and appropriate downtimes where disruption would not be as significant to the daily operations of the hospital or imaging service. One participant summed this up when they said,

I think, we made sure we allocate a day when there weren't any major studies, how busy the department was and as a result we informed the stakeholders of the project that we were going to do, which impacted less on patient services.”

4.9.3 Education and Training

Education and Training appeared with a frequency of 11 times, as the third most prominent reason for project success. Participants identified that for a project to be implemented successfully, there was a requirement for staff to be educated and trained in the correct use or process, which was the subject of the change. Following the planning process identified above, the project lead was able to identify stakeholders that required education and training for change to be successfully embedded. Participant 8 said,

“We had to meet with all these people for education and information on what the requirements were, how we were going to roll it out and when we needed it completed by. There was a lot of support from the Directors and Chiefs from each department which meant that resources could be allocated, and this could actually be done.

This participant, during a change project to the IT platform used in Imaging, said,

"We also had to ensure that the Radiologists and Nuclear Medicine Physicians were trained on how to use the system once it went live, with the system differences pointed out from the old system and how to navigate the system. Training was also required for Radiographers; Nuclear Medicine Technologists; Administration staff to ensure that they were across the system at crossover time."

The training provided was in the form of group and individual settings as stated by participant 8,

"We set up a training room and ran regular training sessions in both group and one on one sessions over a week period to ensure that we captured everyone."

This training was provided by utilising the subject matter experts within the department or external to the department as noted by participant 13,

"In the beginning, I think it was a training process and getting people into the small groups and getting the PACS Administrator to demonstrate to them how the process works and also the Senior Radiographers reviewing the work being performed to see if processes were being adhered to."

The use of subject matter experts was important in the embedding of change as end users obtained their information from appropriately skilled individuals fit for purpose.

Participant 2 also advised that when training could not be offered to a wider group of people, a train the trainer process was utilised, when she said,

"Key people were trained, that this is what we do, with any new product that comes to the department."

This also suggested that in this setting when there is a change in the workplace, education and training of staff is valued and a routine occurrence.

4.9.4 Resetting Expectations

The joint fifth prominent frequent reason for project success was resetting expectations, with a frequency of six. It was identified that when change was required, participants suggested that there was often need to reset expectations. Resetting expectations is the process of establishing new expected standards or behaviour or performance upon which people would be measured. For example, if people previously had an expected output of 15 units, and the new standards was 20 units, this required communication with key stakeholders. Participant 11 said,

“So, if I was a consultant that was rostered, I would know the work for the day and what is expected of me. If there are enough Radiologists to cover each of the modalities, work should be done. ... And the same applies for Registrars as well.”

In resetting expectations, it was identified that equity was critical in the process. Another participant also said,

“So, everyone has their defined work, no one works more than the other. So I counted the number of sessions and the modalities and made sure that work was distributed equally for all consultants for all modalities and based on how many days they are working, so that one person does not do too many MRI and the other person does too many X-rays.”

The participant further stated,

“The only reason I was able to get the support of my Consultants was because they saw the benefit in it as well, because work was distributed equitably.”

Engagement with the key stakeholders in resetting expectations is critical in ensuring an agreed process would be utilised with minimal resistance. This was suggested by participant 13 who said,

“I should probably say that before I made the change, I put out the roster templates, showed it to the staff for 4 weeks.”

One participant also recognised that when there was a perception of a mutually beneficial outcome for stakeholders, they were more likely to be amenable to change, when they said,

“They were quite happy with that and on a weekly basis, they get a mix of everything. So that’s why there was buy in from the staff as well because they saw the value in that.”

4.9.5 Processes and Procedures

Processes and procedures featured as prominently as resetting expectations. It refers to the presence of processes and procedures in the change management project itself. For example, for a project to be successfully implemented, there is a blueprint to be followed by participants in undertaking the change process. This was particularly important as noted by participant 10 as the key ingredient for project success, when they said,

“We also set up our initial practice in the Cyclotron from day one to be to the TGA standard and so we have documentation of about six hundred and eighty runs with documentation of quality measures as you get process we have been able to establish a track record.”

The use of stringent processes and procedures facilitated the success of this project.

It was also noted that when there was an existing precursor process in place, subsequent processes could be implemented with relatively good prospects of success. This was supported by participant 1 who said,

“The key reasons were that there was a process in place. A policy in place.”

The existence of other support processes was crucial in the success of change management process. For example, during a CT installation project at one hospital, there were no significant concerns as patients could be easily transferred to neighbouring hospitals. The existence of previous similar projects laid out the blueprint for this project to be successfully implemented.

4.9.6 Other Reasons for Project Success

This study also identified other reasons for project success, which are discussed in the following paragraphs.

4.9.6.1 Resourcing

Project resourcing came up as the sixth frequent reason for project success. It refers to the resources made available for the project to implement successfully. Where key infrastructure projects were being carried out, the Capital Works and Infrastructure team was involved in these projects. While it added a layer of complexity to these projects, it also brought an increased level of rigour. This was in the form of a more robust level of documentation and in most cases, the use of external project management specialists. This resourcing tended to impact on change projects undertaken in the medical imaging arena.

When projects undertaken in medical imaging had an impact on key hospital and LHD matrices, there was a willingness of the hospital and LHD executives to provide more resources to these projects. For example, for a change project that would lead to an improvement in timeliness on patient care, for example the ETP, additional resources were made available. Participant 6 suggested,

“We got one Orderly that was actually given to us. So, it was a big plus.”

For this project, this participant noted that there was an additional wardsman (or orderly) that was allocated to improve timeliness of patient care.

It was also noted that most projects conducted during the research period did not have additional human resources to support the projects being conducted. The medical imaging departments were required to undertake projects in addition to the day-to-day role. Participant 3 lamented,

“Everything was done purely from your self-energy; I have relied on the doctors and staff. It’s all because you have got committed and enthusiastic people otherwise you won’t have it.”

The lack of designated time for project related activities was identified as a constraint for effectively undertaking projects within the medical imaging setting.

4.9.6.2 External Support

External support was the seventh most frequent reason for project success with four occurrences, like Governance Arrangements: Negotiation and Subject Matter Expert Engagement. These three will be discussed in the following paragraphs.

External support refers to the support provided by external stakeholders in the carrying on of change management projects. This support may be in the form of additional training, product expertise and implementation guidance. For

example, with the implementation of a new product and process, participant 2 said,

“They provided help. They do have a very nice product and we do buy gowns from them. But putting this aside, all other gowns we had in this department were actually screened as well.”

Within clinical settings such as medical imaging, external bodies that provide oversight for clinical standards, credentialing and accreditation are crucial to change management projects driven by changes in standards. While undertaking a change management project, participant 3 said,

“I had support from our Interventional Society and the College this year, things have actually changed, they have gone on to sort of, the College and the Interventional Society have come together on this project.”

Such support for the accreditation and credentialing body is crucial to some of these change management projects.

4.9.6.3 Governance Arrangements

Governance in this context can be defined as the process of decision making and how the process is implemented. In a clinical setting, the NHS defines Clinical Governance, as a systematic approach to maintaining and improving the quality of patient care within the National Health Service (Smith, A, Latter & Blenkinsopp 2014; Walshe & Chambers 2017).

Within the healthcare setting, projects are usually managed by way of committees. A project committee oversaw each project. Depending on the project complexity and determined importance to the organisation, a steering committee was also established as the apex leadership body for the project. Each project also had an identified project lead who led each project.

For each project, there was a need for a structured approach in undertaking projects, with Participants 10 and 14 suggesting that there was a need defined governance arrangements and an understanding of what these roles entailed.

Where change management projects involved multiple departments; hospitals and departments, formal documents such as memorandum of understanding were identified as being crucial in the change management process. Participant 7 said,

“There is a memorandum of understanding around that. So, there is that constant information sharing.”

4.9.6.4 Negotiation

In the change process there was a requirement for negotiation in achieving project outcomes. For example, if timelines were no longer achievable the Project Lead successfully renegotiated timelines with key stakeholders to ensure that the project came back on track. Participant 5 suggested the following when looking at this,

“And renegotiating those timelines if there are some issues. Having like a definite timeline for the project but also maintaining a bit of flexibility within those.”

Where clinical change management projects were involved, it was also imperative that a level of flexibility was maintained despite a set of clinical criteria being set for this project. Participant 6 said,

“So, it does not all have to fit under that criteria, there is still the added criteria of Consultant to Consultant discussion, so it is up to ourselves to accept outside of these criteria.”

This concept of clinical decision making that is evidence informed, was found to be an important consideration for clinicians whenever there was a change process required. This was the basis upon which senior clinicians would negotiate how clinical care would be provided.

4.9.6.5 Subject Matter Expert Engagement

During the discussion in training and education above, it was identified that the use of subject matter experts was crucial in the provision of education and training. Participants identified that for the implementation of technical projects, the use of appropriately skilled and qualified staff was crucial to the success of the project. This is evidenced by participant 10 who said,

“The key reason I think is that this is a very technical project. So, we have the right facility and equipment and I think in part is because were able to pick the best people, who are capable.”

During the implementation of another project, participant 12 indicated,

“For this process, [the education and training of staff] we also had GE Engineers onsite and applications specialists providing the training, and this ensured that people knew the functionality of the system well before the “Go Live”.

This suggested that the appropriate use and engagement of subject matter experts was crucial to project success. Also, in another project, one participant outlined that they engaged a specific cultural grouping with the expertise in the development of some key project inputs. Participant 6 said,

“The other things that were important were that we had a lot of input from our Indian staff.”

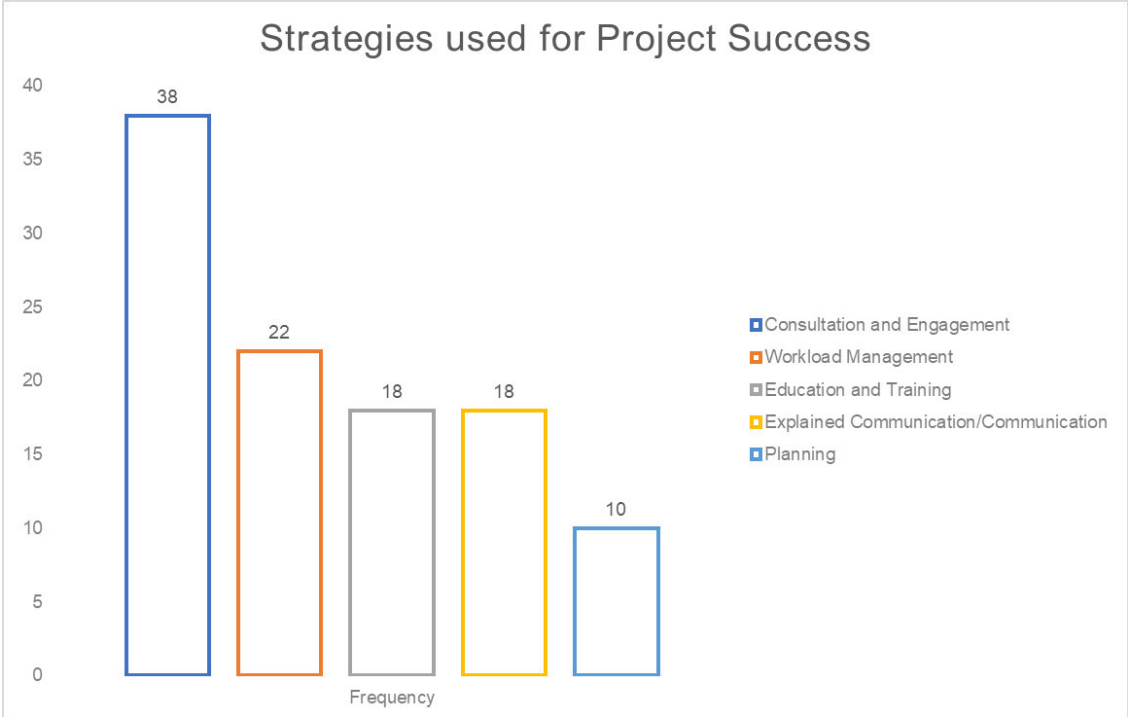
In section 4.9, it was noted that several reasons resulted in change projects or process success. This included: stakeholder engagement; planning; education

and training; resetting expectations; and the prevalence of good processes and procedures. Participants further reported that resourcing; external support; governance arrangements; negotiation and subject matter expert engagement were critical factors that facilitated project success. Section 4.10 presents the strategies utilised by medical imaging leaders to achieve project success.

4.10 Strategies Utilised for Project Success

Several strategies which had not been identified in the literature review in chapter 2 were identified that led to successfully implementing projects within the LHD as shown in Figure 13 below. While it was noted that there was some overlap between the key reasons for project success, it is important to distinguish the two concepts and discuss them separately. For strategies implemented, it was necessary to discuss the top 10 frequently occurring strategies utilised for project success. The researcher decided to highlight the top five strategies and a brief discussion of the other five strategies in the paragraphs that follow.

Figure 13: Strategies Used For Project Success



Source: Developed for this research

4.10.1 Consultation and Engagement

Consultation refers to the degree to which leaders in this research project sought the advice or communicated about the research, with potential stakeholders to improve project success prospects. Engagement, on the other hand entailed the regular involvement of stakeholders throughout the project cycle providing feedback as required. In both cases, stakeholders had the opportunity to participate in the project and provide input aligned with their interests.

Consultation and engagement was the single most prominent strategy utilised in leading change projects successfully in this research with a frequency of 38 times.

Participant 13 clearly outlined,

“I think consultation is very important. From my days as being the Manager here, consultation has been a key thing. If you consult people, they are part of the group, you will have more success because they are part of it, and they will make it a success”

Where projects predominantly involved internal staff, this participant emphasised the need by stating,

“I consult my staff. Any changes that I need to do, without consultation, I never do.”

Participants 1 and 8 said that consultation and engagement involved meeting with many diverse stakeholders as identified in section 4.9.1.

Participant 5 also suggested that consultation and engagement took the form of,

“Lots and lots of meetings with the key stakeholders”,

and meeting consolidation with existing ones being key to managing the ever-increasing meetings required.

Consultation and engagement also require effective leadership. Participant 12 found out that they had to adopt strategies to manage dominant stakeholders there were some strong characters that sought to impose their styles on the meetings, when they said,

“It was but lessons learnt very quickly that all the stakeholders would want to have their authority and their way of managing to be heard, how things are done in their way. So, we have to listen to them, but there are some project managers who just want things to be done their way”.

Consultation and engagement were identified as a key strategy to achieve project success involving the early identification for key stakeholders, engaging and devising effective ways of leading them. The timing and format of the engagement facilitate seamless project implementation in that participants were able to plan project activities at appropriate timepoints, such as downtime.

4.10.2 Workload Management

In the implementation of new change projects, it was imperative that the workload of the staff be defined and appropriately resourced so that the project could be implemented successfully and sustained. Workload management featured as the second most prominent strategy, appearing 22 times.

Participant 11, indicated that they had to manage their resources appropriately and said that they designed,

“...a roster so that each of the modalities were covered for the day. And then once that was done, we created a worklist that was in the RIS for each individual Consultant. For example, if a consultant is on CT, all the CTs that are done for that day will be assigned specifically to that Consultant”.

Workload management also meant staff expectations required to be reset, with staff made aware of these new expectations. Participant 9 suggested,

“So, if I was a consultant that was rostered, I would know the work for the day and what is expected of me. If there are enough Radiologists to cover each of the modalities, work should be done”.

Further to resetting staff expectations, participant 14 suggested equity of workload is key in implementing change, when they said,

“they used a framework of the plan going forward which was to identify the main leader and the leaders at other hospitals and to form division of labour accordingly by dividing the workforce pool into subgroups”.

When a project involved the installation of new equipment, participant 2 indicated that it was imperative to have workload organised and resources allocated so that change could be affected and embedded. The role of these resources was to, start early,

“...make sure everything's set up for everything. Also, in terms of training, with this introduction of extra staff for the equipment, staff has got more time to actually do the work more efficiently”.

Participants 2, 3 and 12 also suggested that workload management including providing additional human resources for new projects was crucial for project success as it allowed for troubleshooting and issue resolution. Participant 2 suggested,

“...minimum staffing levels were required to undertake certain tasks”.

These participants highlighted the importance of managing workload in change management processes or projects. While resources were identified as necessary to manage workload, other key components included the equity considerations in the distribution of workload.

4.10.3 Education and Training

Education and training appeared a joint third prominent strategy utilised, together with communication/explained communication, appearing 18 times.

Education and training in this context is the process of imparting new knowledge to enable participants to achieve the desired results.

When new innovations were implemented within the service, education and training was a key strategy utilised to impart knowledge to staff. Participant 8 noted,

“We also had to ensure that the Radiologists and Nuclear Medicine Physicians were trained on how to use the system once it went live, with the system differences pointed out from the old system and how to navigate the system”

Underlining the important role of education and training and to reinforce new processes or systems, participant 7 also suggested she had to,

“...get back to the staff members and just re-educating them as to this is the correct financial class that we now need to use because when people go through and do it automatically it becomes quite a habit”.

Education and training took various forms which included an assessment of knowledge retention, demonstration and review of staff understanding of new knowledge, through the adherence to the new training methods as taught. For example, participant 13 suggested,

“In the beginning, I think it was a training process and getting people into the small groups and getting the PACS Administrator to demonstrate to them how the process works and also the Senior Radiographers reviewing the work being performed to see if processes were being adhered to”.

Online training was ongoing support was also used by Participant 17 who said,

“We had an online training as well. And then we also had the recruitment team that looks after Radiology. So, again we go back to that person for any help”.

As pointed out by participant 8 in a new system implementation, training scheduling is very important to ensure maximum participation. For example,

sessions were organised in the mornings and afternoons across the week. The participant said,

“We setup up a training room and ran regular training sessions in both group and one on one sessions over a week period to ensure that we captured everyone”.

Participant 15 used a slightly different approach of external training and simulators for training in new equipment rollout. The participant said,

“So initial training was set up elsewhere with a core group of radiographers that was trained outside and then we had the radiographers trained in the hospital with a demo tool for them to use, or a simulator”.

This approach was also utilised by Participant 3’s project where the participant, said,

“we had international speakers come talk to us”.

For new systems and processes impacting on several staff groupings the leaders ensured that they received training. This ensured that all staff understood the new system or process. Another participant also suggested,

“Training was also required for Radiographers; Nuclear Medicine Technologists; Administration staff to ensure that they were across the system at crossover time”.

As outlined above, education and training were identified as a key strategy for successfully implementing change in projects. Leaders were successfully able to conduct projects by ensuring that they undertook several considerations for their staff, including mode and delivery of training so that they addressed the diverse staff groupings and requirements.

4.10.4 Explained Communication/Communication

Communication or explained communication in this project was the process used by participants or the project in disseminating and sharing information about the project, in a way that was clear and easy for key stakeholders to understand.

Underlining the importance of communication, four participants discussed why communication was imperative. Participant 8 said,

"I can add that Communication was key in this project. Ensuring that the Hospital was apprised of what was happening, the LHD was updated of the progress; IM&TD were involved in the process as they were part of the tests for various scenarios, Sydney LHD were also consulted as a copy of the PACS was being made".

When asked what strategy they used for project success, participant 3 said,

"Well I think it was a communication and learning the processes".

Responding to the same question, participant 4 said,

"Yeah a lot of communication with staff involved like our booking/clerical staff and sonographers".

When asked about the key learning from their project, participant 16 said,

"Definitely Communication; engaging with different departments and talking with different people about how to set up things"

Participant 5 stated, *"Use your communication plan"*. This was a formal communication plan which outlined the way in which communication would be carried out throughout the project duration. This included mode of communication, duration of communication, frequency of communication and stratification of shareholders according to communication mode.

Communication took different forms such as e-mail, face to face (one on one), general meetings and verbal. Participant 2 said,

“So, I think I send them e-mails (and explained) that this is what we are trying to do and everyone was pretty much happy because it is easier to manage”.

Participant 8 also said,

“So, it was mainly email at the beginning”.

Participant 14 also suggested highlighted the use of a similar communication mode when he said,

“The strategies we used were Strong Communication by verbal means or in writing through e-mail”.

Participant 7 explained that their communication involved a lot of discussion with staff and senior management while participant 17 also found that having a face-to-face meeting with each staff member was an effective method of communication.

Meetings were particularly an important mode of communication with participants 7 and 15 recognising the shortcomings of other communication modes such as e-mail and the ability to allay fears and therefore a transparent platform for effective message delivery.

While meetings were an important tool for communication, Participant 5 also indicated that, regular communication regarding the project was instrumental in its success when they said,

“...bringing it up in every ward meeting and you know local meetings as well”.

It was important for communication to be customised. Where staff could not access e-mail or attend project meetings, participants 7 and 12 adopted different

strategies such as printing documents and innovative ideas such using social media. In conclusion, communication was noted as a key strategy in project success. Different participants utilised this strategy slightly differently. Of note was the use of a formal communication plan to guide the process.

4.10.5 Planning

The strategy of planning appeared with a frequency of 10 times, as the 5th most important strategy in implanting change projects effectively. Planning is the process of undertaking activities in a deliberate, structured and logical approach after considering relevant factors that affect the project. As participant 15 noted,

“I think the planning for the project was more important without impacting on patient flow”.

In the LHD, it was noted that it meant different things for people. For participant 3, planning meant that there was an implementation plan for the project where certain activities would be undertaken prior to other activities being undertaken. Participant 3 said,

“We had a plan. We went and educated ourselves. We had mentors”.

For participant 10, it meant goal setting as they said, *“We had different goals as well”*. The participant underscored the importance of planning when they went on further to say,

“And then we also planned and wrote the right procedures/protocols. So, there’s very careful planning and making sure that it’s implemented correctly. So, from my point of view I think we follow a lot of good production principles, the GMP⁷ principles”.

Where additional financial resources were required, a specific process was required to be followed for projects within the LHD. Participant 15 explained this formalised process of seeking hospital and LHD approval. During the

⁷ Good Manufacturing Practices

implementation of a project, participant 15 highlighted key points on selecting downtime dates when they said,

"I think, we made sure we allocate a day when there weren't any major studies, the busyness of the place and as a result we informed the stakeholders of the project that we were going to do, which less impacted on patient services".

The participant further suggested the completion of prerequisite steps before downtime to facilitate a smooth transition. Even with the best of plans, participants noted that project schedules might have some challenges. Participant 5 suggested that plans could be renegotiated with stakeholders, when she said,

"And renegotiating those timelines if there is some issues. Having like a definite timeline for the project but also maintaining a bit of flexibility within those".

Participant 12 also recognised that planning is not a static process but an iterative one when he said,

"And then the other thing is not necessary every project you can hit a milestone as per schedule. So constantly reviewing, revising a schedule".

In summary, planning played a key role in successful project implementation. While pre-project planning was important for projects to take off, planning during the project implementation was also very important to consider changes that were observed as necessary as projects progressed.

4.10.6 Other Key Strategies Utilised

The following paragraphs briefly discuss the other top 10 strategies utilised in achieving project success.

4.10.6.1 Evidence Informed Practice

Evidence informed practice is a key consideration for clinicians in clinical decision making and was described by participant 6 as clinical best practice. The participant in implementing a new clinical intervention, said,

“It was based on what we thought was best practice.”

As noted in the project demographics section of this chapter, 78% of the participants in this research were clinicians. Unsurprisingly, evidence informed practice emerged as the joint sixth most prominent strategy (together with Governance Arrangements) utilised in effectively managing change processes. Clinicians are more responsive to practice driven by clinical best practice.

Evidence informed practice was evident in several scenarios. Participant 15 utilised it for additional resource requests for senior leaders so that the project could be implemented. She said,

“When the staff actually brought it to our attention that they needed more support in the evenings. So, I spoke to the two PACS Administrators and said can you collect this data for me”.

Participant 7 utilised evidence to assess whether training had been effective and proper practices were being implemented when she said,

“We had staff X go into RIS and build reports so that I could capture the daily hospital billing of what patients were coming through to ensure that the correct financial class was being used”.

Participant 11 used evidence as a two-pronged tool, to support a project justification and drive project traction when using CT activity data to demonstrate the need for change and support a request for resources.

It was noted that the use of evidence informed practice played a pivotal role to the success of a project. Clinicians were noted to be receptive to projects that

referenced clinical best practice. Administration and support services used the strategy to both support education requirements and project justification both to sponsors and on an ongoing basis.

4.10.6.2 Governance Arrangements

Governance arrangements in this LHD referred to how accountability was distributed across the various levels of the project. Participants 8, 11 and 14 noted that for most projects including high-risk projects, more stringent requirements applied to them, including a risk management approach and consultation with all key stakeholders. This consultation included the clarification of roles involved in the project.

The LHD structure was discussed in chapter 1, section 1.1.4. When participants refer to “District” they will be referencing the Senior Leadership team of the SWSLHD, the Chief Executive and her direct reports.

For projects involving external stakeholders a similarly more formal and complex reporting structure including a communication plan was adopted as pointed out by participants 5 and 8.

Participant 10 alluded to having good processes and formalised ways of managing changes within the project. He said,

“So basically, we defined the vision and also the process. So, the process is for example, they need to have good procedures, training and everything with change control”

Participant 14 also suggested,

“There is a memorandum of understanding around that [the delineation of roles and responsibilities]. So, there is that constant information sharing”.

In implementing projects, it was noted that having clearly defined reporting and accountability structures ensured that projects were approved at the appropriate levels of the organisation and could therefore be implemented successfully with minimal challenges. Any challenges faced could be escalated to the appropriate resolution authority as noted by participants 8, 10 and 11 above.

4.10.6.3 Trials

The strategy of using a trial period was the eighth most prominent strategy utilised by participants in this research with a frequency of seven times. A trial period in this research meant that participants undertook a trial period prior to a full-blown implementation of the change.

Participants 4, 11 and 13 were major proponents of the trial strategy which have been used in their departments in several situations. The trial process was utilised when there was no consensus, or the leaders were unsure of whether the change would result in the desired changes. Participant 11, supported this strategy, when she said,

“But if there is not a unanimous decision, and some people are not sure of it then the only thing I do is have a trial period”.

When additional resources were required to embed changes, participant 13 suggested using this trial strategy as it builds the evidence base to support implementation. Trialling thus provides a setting within which evidence can be gathered in a real time setting and assumptions made previously can be approved or disproved.

In conclusion, it was noted that trialling was a strategy that worked for participants in several situations. It was used a strategy to get consensus on a

course of action. When evidence was required to support a decision or a request for additional resources, trialling was also utilised successfully for this purpose. Finally, trialling was utilised effectively as an evidence informed practice tool in real time but temporary settings.

4.10.6.4 Senior Clinician Negotiation

Senior clinician negotiation was the 9th most prominent strategy in this research with a joint frequency of 6 times, with the strategy of Leader Approach as discussed in section 4.10.6.5 below.

Senior clinician negotiation in this research referred to the process by which senior clinicians negotiated on a case-by-case basis for a treatment intervention that fell outside of established protocols as understood by Participant 6, who said,

“So, it does not all have to fit under that criteria, there is still the added criteria of Consultant to Consultant discussion, so it is up to us to accept outside of these criteria”.

As an example, Participant 6 highlighted a patient case when he said,

“That’s the one that XX [Nuclear Medicine Physician] accepted. This patient already had a CTPA and a confused patient. And the CTPA people said that they could not get this patient to breath hold. So, we ended up doing a lung scan for a demented patient”

For senior clinician negotiation to work effectively, there is need to be a robust framework as suggested by participant 6 who said,

“Also, it was on a Consultant-to-Consultant basis and we did set up a lot of criteria and made it very tight”

Participant 6 also said, there is another decision-making tool when they said,

“So, the checklist that we use for our purpose here is this one, the VQ criteria, and now from Dr X [Director Medical services] is happy with this”

When diagnostic testing could be delayed and interim clinical interventions implemented, Participant 6 also outlined that negotiation could occur when he said,

[Physician AF] had another view that most patients can be on anti-coagulants for at least 24hrs. As long as they get a diagnostic test within that timeframe, he was very happy with that”.

The rescheduling of diagnostic testing therefore meant workload could be managed more appropriately and the proposed clinical process changes being sustainably managed.

In conclusion senior clinician negotiation was a key strategy utilised in effectively leading change management approaches. It was used on a case-by-case basis to manage scenarios that fell outside of established clinical protocols. Senior clinician engagement also facilitated the prioritisation of workload if interim clinical interventions could be affected.

4.10.6.5 Leader Approach

The leader’s approach, like senior clinician negotiation was the 9th most prominent strategy in this research with a frequency of 6 times. Leader Approach in this research referred to how the leader’s approach towards both the project and staff influenced the outcome of the change project or process.

Participant 5, 9, 10 and 11 suggested they are hands on leaders and lead by example, from the front. They suggest that, leading by example demonstrated to

the group the importance of the project and how seriously the leader considered it.

Being hands on allowed projects to managed according to the project schedule as outlined by Participant 10 who said,

"We used to meet weekly and don't meet as often now because things are on track. I think this kind of hands on management has to be implemented for a big project".

Participant 9 attempted to be proactive in her leadership approach and said,

"Well because I had had time to think about it and it was a forum for discussion. When you are presented with a case and it's wrong, it's too late or you can't go back or it's too hard to go back and fix it. So, it was trying to be proactive".

Being proactive for procedures was crucial from a patient safety and best practice perspective and the department usually had one opportunity to get the study right the first time.

The leader's approach was crucial as a strategy in effectively implementing change. Some leaders suggest leading from the trenches with a hands-on approach was an effective way of effectively leading change. Other leaders preferred to be more proactive by getting tests completed well the first time every time.

The first part of 4.10 presented the top 5 strategies utilised for project or process change management strategies. These included consultation and engagement; workload management; education and training; explained communication/communication and planning. Through the consultation and engagement process, participants noted that stakeholder engagement throughout the project life cycle was crucial to project success. Similarly,

participants found that robust communication process through fit for purpose or communication modes preferred by participants resulted in project success.

In the second part of 4.10, it was noted that other strategies utilised were also important in successfully leading change within medical imaging. For example, SME engagement allowed the research participants to draw on the skillsets of external experts to the department. Smart goals allowed the leaders to have tangible outcomes in their projects and a meaningful way of measuring such outcomes. It was also discussed that the strategy of having process improvement as an outcome, resulting from the change project was important as it led to traction in project. This was because participants could clearly see where improvements would be made to daily workflows and therefore their work output. For example, where new equipment was being installed, participants identified that choosing the right equipment had a significant impact in that project succeeding as there were compatibility considerations with the existing fleet to be considered.

To effectively lead change, participants identified that there was a need to have regular meetings to discuss project matters and resolve issues that arose. Within the healthcare settings, one department could not operate in a silo and where systemic changes were required a piecemeal approach was adopted. The next section, section 4.11 presents the findings from the learned experience of leaders in successive change projects.

4.11 Leadership Style Influence from Learned Experience

The medical imaging workforce was found to be relatively stable over the research period. All participants that commenced the research project were still employed by the LHD for at least the entire period of data collection. Only one participant retired from the LHD about two months following the completion of

data collection. This finding is crucial in that this stable workforce retained corporate knowledge of leadership of change processes. Over time, it was noted that the leaders would repeat change processes and build on the prior processes and leadership styles they had previously implemented.

It was noted that within SWSLHD, there was limited formal project management documentation. Most leaders relied on their experience in leading projects and processes. Mostly these were not formally documented except for three projects that had the involvement of the external project management support. Table 13 (section 4.8) above identified that 2 participants, participant 5 and participant 14 where the only participants with a change in leadership style over time. Participant 5 identified mostly as a transformational leader earlier in the research. With experience in leadership of change processes, this participant adjusted their leadership style towards a situational style over time with a focus on collaboration. When asked whether their leadership style had changed and in what way, Participant 5 said,

" Collaboration, for sure. And I think that was in one of my earlier projects an issue. I didn't collaborate well, and boy did I learn! Because everybody just went no!"

Participant 5 suggested that not only was collaboration crucial, but also communication and feedback to project participants was important for future project success when they said,

"So, I think it's not only just the collaboration, but it is also the feedback. That continual feedback loop from people, getting their ideas, getting their visions and the taking them with the group and embedding them in the way forward. Making sure everybody is kind of involved."

Participant 14 initially identified as utilising a servant leadership style. Over time, this participant's leadership style was, "enhanced" and adopted a more prominent situation leadership style over time. This participant suggested,

"Yes, consultation is important, but ultimately there are decisions that need to be made at a higher level and that requires stepping aside from the general population and making the hard decision when you have to."

Over time, some leaders therefore recognised that their leadership style required adjustment to meet the leadership needs of the day.

Leaders in medical imaging highlighted that meeting minutes provided the primary documentation basis for most projects conducted. They also held regular meetings with their teams and wider organisation, where project success was shared. The sharing of project successes and processes through these meetings allowed participants to be aware of what projects were being conducted within the LHD and by which leaders. The information sharing among leaders allowed leaders to share techniques around project management. As most projects were duplicable across hospitals, lessons learnt by some hospitals were found to provide a template upon which future projects could be undertaken.

4.12 Conclusion

This chapter presented the quantitative and qualitative results of the research project. In doing so, it answered the 6 research questions. For research question 1, the research found that the dominant leadership style for change management in medical imaging departments was consultative leadership. Other prominent leadership styles were situational; transformational leadership and transactional leadership, in that order, with some participants practicing situational leadership. Most participants highlighted that consultation was crucial in medical imaging due to the amount of interdependencies for projects to be successfully carried

out. Consultative and transformational leadership styles were dominant across both the 78% clinician and 22% non-clinician workforces.

It was noted that the majority, 45 of the 47 reported projects, had the leaders practicing consultative leadership which positively impacted on the change project outcomes. The remaining two projects that were unsuccessful, were also led by a consultative leader.

The second research question also examined the strategies utilised in leading change projects. Consultation and engagement with multiple stakeholders were identified as a key enabler for successfully implementing change projects. When new projects or processes were being implemented, most participants identified that additional interventions such as resetting staff expectations was required to ensure that staff were aware of what output was required from them. Also, ensuring that the staff workload was manageable, meant change could be sustainably implemented. Communication/explained communication was also identified as one of the most important strategies for leading change effectively because changes were able to be articulated prior to them occurring. This led to robust discussions of the process and the merits and demerits of any proposed changes. Face to face and written communication was identified by most participants as the most common modes.

The third research question examined the nature of leadership and change management and the impact on the outcomes of change management processes/projects. Leaders in medical imaging were found to be consultative in their approach which led to successful change management projects. Such an approach was consistently used by medical imaging leaders.

The fourth research question also examined the reasons for project success or failure. It was established that consultative; transformational and transactional leadership styles were adopted by most leaders in medical imaging and resulted in the success of change management projects. Several reasons were proffered for the success of change projects. The three most prominent reasons were stakeholder engagement, planning and education and training. Most participants recognised the need for early identification of key internal and external stakeholders and engagement with them as being crucial to project success. Planning throughout the project life cycle was also recognised by most participants as an important ingredient in project success as it also facilitated clear and concise information to stakeholders. Finally, most participants highlighted education and training as a key requirement for change to be effectively implemented. Thus, training usually run by SMEs ensured that leaders and staff were able to acquire new knowledge which they utilised in effecting and embedding change.

The fifth question was in relation to how the leader's style is influenced by learned experience in prior change management process and whether "learning" leaders achieved better outcomes in successive change management processes. The relative stability of the medical imaging workforce meant that the research did not lose participants during data collection and the research could be successfully conducted with the original participant cohort. This meant that the research questions could be answered. It was noted that in the absence of formal project management documentation, most leaders relied on their experience in leading change management projects. Most leaders' leadership style remained stable over the research period with minor modifications from learned experience. Leaders in medical imaging shared knowledge within their own teams and externally which allowed them to improve of their leadership styles.

Leaders in SWSLHD highlighted that meeting minutes provided the primary documentation basis for most projects conducted. They also held regular meetings with their teams and wider organisation, where project success was shared. The sharing of project successes and processes through these meetings allowed participants to be aware of what projects were being conducted within the LHD and by which leaders. The information sharing among leaders allowed leaders to share techniques around project management. As most projects were duplicable across hospitals, lessons learnt by some hospitals were found to provide a basis upon which future projects could be undertaken.

Chapter 5 - Discussion

5.1 Introduction

Chapter 4 outlined the research findings of this project, from a quantitative and a qualitative perspective. These results will be discussed in this chapter. In the discussion, the researcher uses previous similar comparable studies or relevant articles, which according to Bell, J (2014), will assist with the understanding of the topic because they are either relevant to the study or build on existing scholarship. Firstly, a summary of the general findings is outlined, and then a discussion of the results conducted. This discussion chapter is organised according to the research questions and the discussion is structured on this basis, in part with research questions as sub-headings. Secondly, the discussion that follows will contrast the study findings in this research to existing literature. Where there are discrepancies between findings of this study and existing literature, these will be highlighted.

Finally, this research sought to examine the leadership styles for leadership and change management processes in medical imaging departments. In doing so, it aims to add to the scholarly literature and practice on leadership styles in medical imaging. To introduce the discussion, a framework has been developed for this research summarising the research process and this is discussed first in section 5.2 below.

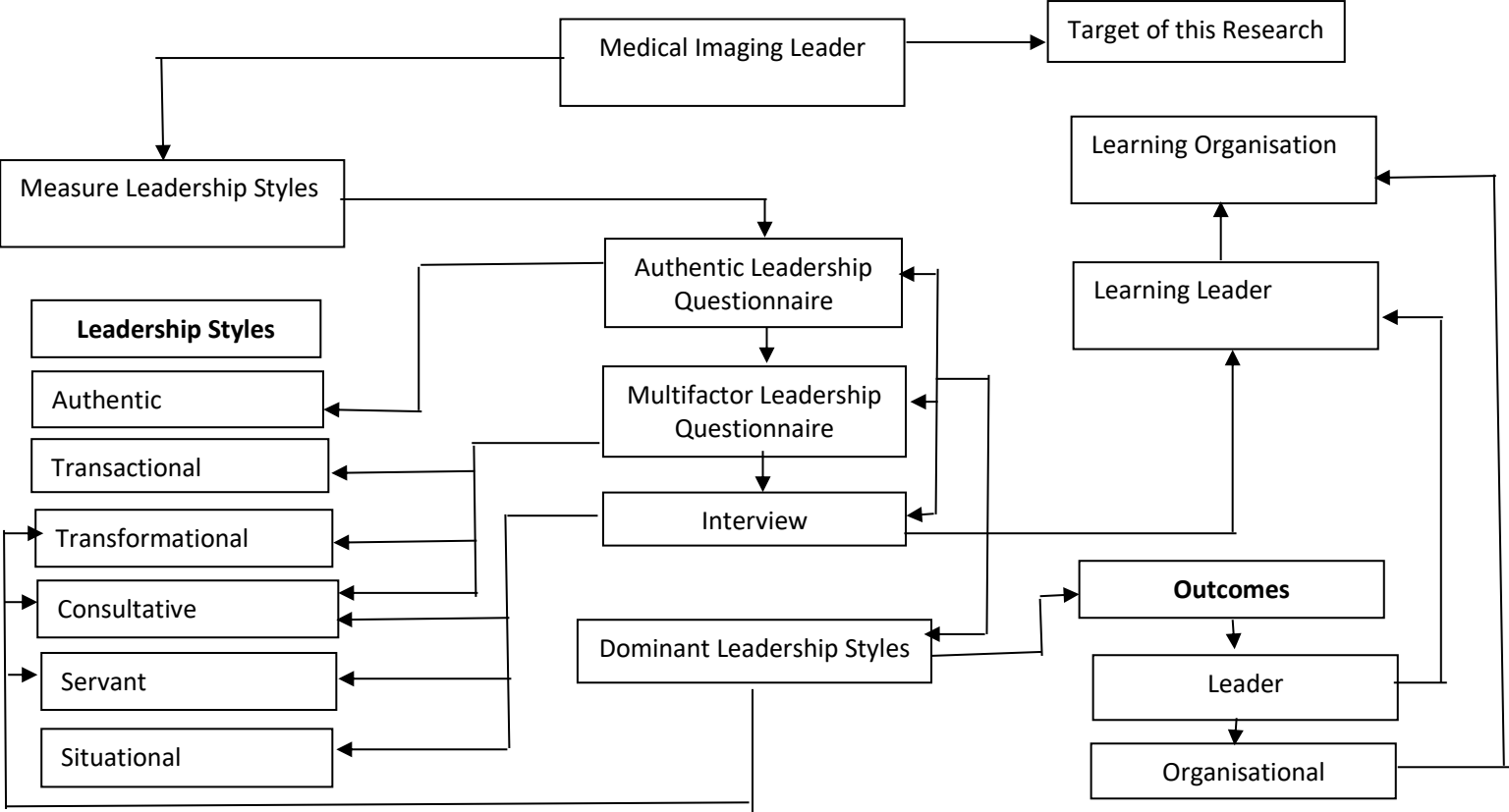
5.2 Research Framework and Recap

According to Msweli (2011), a conceptual framework shows the interrelationships between the concepts in a study. Accordingly, a conceptual

framework has been designed for this study as shown in Figure 14 below. To recap, this research commenced with 31 medical imaging leaders who were the subject of this research. The leadership styles of the medical imaging leaders were measured using the data collection tools as discussed in section 3.4.2.

5.2.1 Research Conceptual Framework

FIGURE 14: CONCEPTUAL/RESEARCH FRAMEWORK



Source: Developed for this research

The data collection tools used were the Authentic Leadership Questionnaire, Multifactor Leadership Questionnaire, and semi structured interviews. The data collection tools were critical in ascertaining the leadership styles utilised in medical imaging including the dominant ones. Ascertaining the dominant leadership styles ensured that the outcomes of the leader and the organisation could be explored. This study showed that leaders who learnt from prior projects improved the outcomes of future projects and shared the knowledge with their colleagues and thereby created and developed the organisation's capacity for undertaking change. In the next section, an overview of the findings is undertaken before a full discussion of the results is presented in subsequent sections.

5.3 Overview of Findings

This research found, while situational, transformational, and transactional leadership were successful styles utilised in medical imaging, consultative leadership was the most dominant style used. This finding contributes to theoretical literature in medical imaging. It appears that most projects undertaken in the medical imaging settings are successful, suggesting that the leadership styles practiced matches the types of projects usually conducted within medical imaging. Findings by Cameron and Green (2019); Latham (2013) and Thomson III et al. (2016) suggested that 70% of projects fail. Burke (2017); Cameron and Green (2019) and Kuipers et al. (2014) found that only 20-25% of change programs actually succeed. While the findings of this research support previous findings by Hornstein (2015); Müller, R (2017) and Serrador and Turner (2015), these are new findings for medical imaging in healthcare as there appears to be little research in this area. The authors listed suggest that matching leadership styles to project types positively influences project outcomes. This is because as identified in this research, medical imaging is hierarchical in nature with medical dominance prevalent. For example, medical practitioners in medical imaging need to develop strong referral networks with other physicians.

As a result of the nature of their roles, they undertake consultation prior to implementing change that affects other clinical disciplines. In project implementation, their leadership approach tends to permeate to other members of their leadership teams such as senior radiographers, administration managers and business managers.

All senior roles were represented in this study, such as clinical, business support and technical support staff somewhat with different perceptions towards change. For example, participant 6 believed that constant change is detrimental to the organisation to the extent that those contemplating retirement might bring it forward. Leaders, experience powerlessness; apathy and exhaustion with constant change (Brown, R, Wey & Foland 2018; Camilleri, Cope & Murray 2019; McMillan & Perron 2020). Medical imaging and healthcare experience constant internally and externally driven change (Braithwaite, Glasziou & Westbrook 2020). Internally, this may be because of clinical practice improvement; new models of care; new equipment procurement and other factors organisational factors such as changes in organisational structure. External drivers of change include the socio-political factors as discussed in section 1.2 such as changes in government and healthcare reform.

This study further found that at least a quarter of the projects were discrete projects with a duration of three to six months. Three to six-month duration were found to be appropriate project lengths for participants to retain learning for the next projects. While there were several projects spanning over 12 months, the modal time for undertaking projects in the research setting was found to be three to six months. This was indicative that the projects in this research were short turnaround projects or processes.

Of the 16 participants who completed the baseline LSI, 7 (44%) were female and 9 (56%) were males. Similarly, 17 (55%) participants of the target population (31) were male compared to 14 (45%) females. This represents a disproportionate representation of participants skewed against females, in leadership roles (Wehner et al. 2015) within the South Western Sydney LHD, which is different from the generalised healthcare setting. The gender gap has been the subject of several studies (Bismark et al. 2015; Cheryan 2012; Holman, Stuart-Fox & Hauser 2018; Kalaitzi et al. 2017; Mann, A & DiPrete 2013; Qamar et al. 2020; Shen 2013), and there appears to be hardly a definitive reason to attribute this disparity. Shen (2013) found that unconscious biases; pay disparity between genders and family values contributed to this gender disparity. Pay disparity between genders would not be an applicable factor in the NSW healthcare context due to the labour laws, which prevent this disparity, particularly, the unionised nature of public healthcare where awards determine the remuneration and other terms and conditions of employment for healthcare workers.

While the skewness in favour of males was prevalent in the UAE, according to Hallward and Bekdash Muellers (2020), and in Pakistan (Sarwar & Imran 2019), this could not be said of the NSW healthcare context. According to Australian data from the Workplace Gender Equality Agency (2019) there is a large female workforce of approximately 79% compared to males, that dominates healthcare and social services industries. This is contrary to representation in the banking sector which is male dominated according to Asrar-ul-Haq and Anjum (2020). Data from Workplace Gender Equality Agency (2019) pointed out that females are underrepresented at manager and above level across the healthcare and social services industries, at approximately 36.3% in 2018. This study, undertaken in medical imaging, was inconsistent with regards to general workforce numbers in healthcare, with the WGEA⁸ data, which is a new finding in medical imaging.

⁸ Workplace Gender Equality Agency

However, the data from this research supports the WGEA data, and studies by Burton (2019); Hempenstall, Tomlinson and Bismark (2019); Mousa et al. (2021); See, Lussier and Jones (2021); and Teede (2019) that also found significant under-representation of women in clinical leadership roles in healthcare. This study found that there was female underrepresentation at the leadership level within medical imaging, an area with scant previous studies. The underrepresentation of women leaders within medical imaging may be down to two main reasons in SWSLHD: family values and lifestyle choices and organisational support. These are discussed in the following sections.

5.3.1 Family Values and Lifestyle Choices

Hempenstall, Tomlinson and Bismark (2019); Ovseiko et al. (2017) and Wang, M-t and Degol (2017) found the number of women in science and engineering are growing, yet men continue to outnumber women, especially at the upper levels of these professions. Family values played a pivotal role with women more willing to make occupational sacrifices than men for family reasons (Botella et al. 2019; Hedley 2021). Leadership roles by their nature have significant responsibilities which are quite demanding in terms of time, that may become challenging for some women who intend to balance family commitments and their professional responsibilities (Mousa et al. 2021; Weale, Wells & Oakman 2019).

Women were more likely to consider more senior roles once their children were older and more independent (Alqahtani 2019; Athanasopoulou et al. 2018). On the other hand, men are able to utilise the support provided by their spouses to further their careers. Kena et al. (2015) and Laver et al. (2018) found that in academia, more women were vacating tenure tracking positions in favour of

flexible part-time position, which contributed to their underrepresentation at more senior levels within the organisation. It may be concluded that these disparities may be addressed by more interventions and support for women to take up leadership roles in medicine (Holliday et al. 2018; Lewiss et al. 2020; Shaikh et al. 2019). The next section discusses the implications of organisation support on women in leadership roles in medical imaging in SWSLHD.

5.3.2 Organisational Support

Some research participants expressed organisational support was crucial to them undertaking leadership roles within SWSLHD. Such support included active encouragement and opportunities targeted at women from the LHD and deliberate actions such as mentoring which increased the capacity of women to take on more leadership roles (Laver et al. 2018; Stephens et al. 2020; Weigel, Kubik-Huch & Gebhard 2020). Other available support within the award structure, for example, parental leave provisions in healthcare with particularly flexible working arrangements until the youngest child turned five years, were helpful in increasing the participation of women at senior organisational levels. Flexible working arrangements such as remote reporting, were particularly valuable for radiologists. However, such flexible working arrangements were not always practical for all workgroups. For example, clinical managers were sometimes required to be hands on to resolve clinical issues in real time and onsite. Similarly, administration managers were also required to manage issues as they emerged, such as daily staffing.

Organisational support can also be in the form of flexible working arrangements such as working from home. More recently, since 2020, during the Covid 19 outbreak SWSLHD has introduced for some workers. Where these are in place, it is crucial in healthcare that adequate backup onsite cover arrangements are in place to manage contingencies. For example, in medical imaging, there are

offsite remote reporting arrangements that accommodated work afterhours or remote health services. However, this is not always practical for some teaching hospitals where clinical leaders may be required to be available onsite for supervision of junior doctors. Where women have chosen to exercise remote reporting options, they may be disadvantaged as they are unable to participate in decision making in real time. This is alluded to, during afterhours or for face-to-face clinical services, which are still dominant. Therefore, the organisational support provided, needs to consider the factors outlined above, such as onsite clinical arrangements through registrars, to ensure that any support offered to women to promote their participation in leadership roles is meaningful. The next sections discuss the types of projects found in medical imaging and the leadership styles found in medical imaging.

5.3.3 Project Types Found in Medical Imaging

While over a quarter of the projects were Business Process Redesign projects, more than 69 % of the projects involved multiple stakeholders. Siegal, Stratchko and DeRoo (2017) found that radiology played a significant part in the diagnosis of disease. This reinforces the researcher's observations that medical imaging affects clinical service delivery in several ways. For such a setting there is a requirement for a robust system for knowledge retention within the department which can then be shared by similar entities within the same district.

This research found that there are consistent leadership styles utilised by medical imaging leaders, which is a new finding in medical imaging. The homogeneity on one hand allows for alignment in the attainment of organisational goals, and on the other hand, fosters a culture where ideas and processes are not challenged. This perpetuates a system where improvements cannot be undertaken, and leaders do not challenge each other or each other's findings. Such findings are unsurprising however, as the department heads in medical

imaging are medical doctors. Given their dominance in the clinical settings, as discussed in section 2.5, it may be expected that this would be the case. This research also found that the leadership styles adopted by medical imaging leaders remained relatively constant over the research period, again a new finding in medical imaging. This finding does not support the study by Goleman (2017) who suggested that successful leaders practice at least four leadership styles.

This research found that 75% of the participants viewed themselves as hybrid leaders. While the concept of hybrid leaders was explored in section 2.3, Frich and Spehar (2018) ; Maile, McKimm and Till (2019) and Shaw, G et al. (2019), noted that hybrid leaders existed in the form of doctor managers. This research extends the work of Mak et al. (2019) and proposes that there are also hybrid leaders for other clinical specialties such as medical imaging and other allied health services, such as social work, physiotherapy or occupational therapy.

5.3.4 Communication Styles That Work

This research found a combination of communication styles were effective for disseminating information to team members with the use of e-mail; meetings; face to face communication and telephone calls being used to good use in projects. Such findings represent new knowledge in project management and change management in medical imaging.

Newer social media techniques such as SMSs, WeChat, WhatsApp and Facebook were not generally employed. Perhaps this is due to the reluctance of healthcare leaders and the industry, to adopt these technologies widely due to confidentiality of medical records and the management of patient data. Meetings emerged as the dominant communication tool during projects, utilised in all

projects undertaken. E-mail was employed as a communication tool by most leaders, to reinforce discussions held in meetings. It also emerged that the leaders interviewed adopted a collaborative communication style to engage their audiences. For example, participants engaged with their audiences and determined their preferred mode of communication. They checked in regularly with their audiences, to determine whether those preferences were still valid during the currency of the project. If communication preferences were no longer valid, other mutually agreed communication modes were utilised such as e-mail or text messaging. This collaborative communication was crucial in maintaining engagement with participants and stakeholders throughout the project.

The researcher also found that there is usually a disconnect in views regarding operations between the different organisational levels that may be caused by the lack of a shared vision or miscommunication. For example, operations staff were clear about the need for additional staff to improve workflow or safety. However, the LHD and hospital executives had too many other competing priorities and budgetary constraints to prioritise the requests. This was found to be frustrating for operations staff who suggested that action could only be taken when an adverse event occurred. This finding is important in medical imaging and healthcare from an organisational alignment perspective. To achieve organisational success, there is a need for organisational goal alignment. When groups of staff perceive that senior leadership teams are apathetic to the issues being raised, then they are likely to disengage in the change processes and other organisation wide initiatives they do not perceive to be value adding to their work or patients.

In summary, section 5.3, presented and discussed an overview of the research findings. It was noted that there was underrepresentation of female medical leaders despite women outnumbering men in other specialist health roles, due to family values and lack of organisational support. It was also found that the

majority of the projects in medical imaging were business process redesign projects which involved multiple stakeholders. Finally, this research found that the use of multiple communication techniques as determined by the stakeholders were crucial to project success. The next section presents and discusses the dominant leadership styles found in medical imaging.

5.4 Dominant Leadership Styles in Medical Imaging Departments

A new finding of this research in medical imaging, was that the dominant leadership style for leading change management was consultative leadership. Situational, transformational, and transactional leadership were the other styles used successfully to implement change in medical imaging.

While this researcher was expecting authentic leadership, to feature as a dominant leadership style, this was interestingly, not the case in medical imaging. Similarly, Perez (2021) found that clinical leaders could succeed in healthcare if they adopted transformational leadership when promoted from clinicians to clinical leaders. Within professions such as healthcare that involve social welfare interventions, it may be argued that people who work within these settings do so from a caring perspective, such that they undertake healthcare professions mostly from a perspective of wanting to make a difference in others' lives. Most participants interviewed expressed through the interviews that their personal values, "to treat people with respect", influenced their interactions with patients and colleagues. Therefore, leaning more on their strong moral compass would lend more leaders to be authentic.

Consultative leadership on the other hand has had little research as an alternative style that could be utilised effectively in a healthcare setting, particularly with medical imaging leaders. Most leaders saw themselves as practicing a

consultative leadership style in leading change as opposed to or in addition to transformational leaders during the semi-structured interviews. They viewed themselves as consultative leaders. Some researchers (Cheng et al. 2016; Perez 2021; Specchia et al. 2021) advocate for transformational leadership which they suggest increased motivation to positively contribute to organisational success and authentic leadership which they argued supported healthcare leaders in developing more confidence in effectively discharging their roles.

The consultation process can be noted as being crucial in medical imaging from several fronts. Firstly, the medical imaging subspecialty is referral driven in both private and public sector settings. When radiologists need to implement changes in their departments, they must consult with their referrers (or referral partners who are other medical doctors or clinicians ordering tests), on the implications of the proposed changes prior to implementation. This then builds a culture of consultation which radiology requires as it has evolved over the past 20 or so years from the days of x-rays to CTs and Interventional Radiology (Brant & CA 2012). The British Society of Interventional Radiology (2020) outlined the advantages of interventional radiology as being minimally invasive, requiring small incisions to provide care; ability to undertake most procedures under local anaesthetic and targeted intervention which positively impact on recovery times and therefore minimal lost work time for recovery. Such prevalence of interventional radiology has seen the cases performed by the LHD grow from approximately 100 cases per annum in 2010 to over 650 cases per year in 2020 (Lin 2021).

Secondly, radiology as a subspecialty is driven by Radiologists and Nuclear Medicine Physicians as experts in their fields. This expertise ensures that they develop power and authority within their work setting and influence the culture and hierarchical nature of their practice, like other medical disciplines (Willis

2020). As the culture of consultation develops, it may be suggested that this influences the organisational culture and consequently the leadership style adopted by leaders within this setting. Darling (2017) described organisational culture as a set of beliefs, shared values and norms affecting the way employees feel, think and behave in the workplace. Within the organisational culture subcultures exist. Bordenave (2017) and Coleman (2017) suggested that an organisational subculture results from groups of organisational members sharing distinct values, beliefs and assumptions that differ from the dominant culture of the organisation yet are compatible. The reason that there are medical imaging staff in SWSLHD's subculture is because of their recognition that certain practices yield results in their settings and utilise these practices unconsciously.

Some participants suggested that their leadership style is impacted by other factors, such as the LMX theory as discussed in section 2.6.5. For example, participant 7 who is a non-clinician manager suggested that her leadership style is predominantly situational. She also suggested that her leadership style is influenced by the senior leadership team within organisation. For example, if the LHD or hospital was led by a directive leader or one with an authoritarian approach, such an approach tended to cascade to other leaders within this participant's team. This, as suggested by participant 7, would have implications on how the rest of the leaders will lead the organisation.

The experience of participant 7 as a middle manager is she is often faced with the dichotomy for middle managers, where they get caught in between the directions of senior staff and the staff they lead, having to balance the needs of their bosses and the staff they lead. Participant 7 suggested that as a middle manager, she manages both the expectations of senior leaders and her team through interpretation of the messaging from the former and delivering this message to the latter in an appropriate manner. While this is common within complex workplaces, particularly matrix organisations, skillsets are required for

this process. A less experienced manager would find it challenging to manage upwards and downwards effectively, a skill that is done better by more experienced leaders. Participant interviews and anecdotal evidence has shown that reasons for the challenges faced by less experienced leaders may include; an inability to have difficult conversations; their inability to grasp the key deliverables and engage with their teams to deliver this, and inexperience in managing difficult team members.

Several studies, (Fletcher, Friedman & Piedimonte 2019; Głód 2018; Zuraik & Kelly 2018) reviewed transformational leadership in healthcare and viewed it as the most appropriate type of leadership. Boutcher (2019); deJong (2018); Krepia et al. (2018) and Mafora (2020) reviewed transformational change in a general health care setting and discussed its importance in improving health care quality and safety. This study supports these research findings, that transformational leadership was a common leadership style in healthcare. Also in partial support of these findings, Emere, Aigbavboa and Thwala (2018) found that democratic, transformational and transactional leadership styles were the leading styles utilised in the construction industry. Key differences between the construction industry and healthcare, are the nature of the service provided and the professionalism in the former sector. In the construction industry professionals such as architects design and plan the service to be provided, building and project managers are tasked with delivering these projects on time and within budget. On the contrary, medical doctors and other clinicians, are primarily concerned with delivering safe and quality healthcare to patients, while cost is a consideration, as discussed in section 1.2, quality and safety of care is considered equally important. The level of professionalism in healthcare, is significantly higher, in healthcare than construction, with healthcare providers belonging to a professional organisation, such as Australian Medical Association, or training colleges such as the Royal Australian and New Zealand College of Radiology (RANZCR).

Asrar-ul-Haq and Kuchinke (2016) also found that transformational leaders help individuals to adopt organisational change. In academia at university libraries, Mayowa-Adebara (2018) and Okere and Olorunfemi (2018) found that transformational leadership was prevalent with some laissez-fairer style evident. Academia and healthcare are somewhat similar in terms of professionalism, with most employees within both professions being highly skilled and professional.

Other confounders to leadership styles were found to exist within this study, for example, participant 15 suggested that the skill level of subordinates has an impact on the leadership style of the leader. An example for this scenario would be where a Chief Radiographer in a radiology department leads recent graduates, who are relatively inexperienced in radiology practices. For this leader, the performance expectations for recent graduates would be far lower than that of more experienced radiographers who require less monitoring, coaching and mentoring. Consequently, the Chief Radiographer's leadership approach will require adjustment, with a skewness towards mentoring, coaching and nurturing staff required. On the other end of the spectrum, the Chief Radiographer would expect a far superior performance level from experienced or knowledgeable staff.

Thus far, a discussion on the dominant leadership styles has been undertaken. One of the questions this research sought to answer was how the leadership styles employed in healthcare impact on change management outcomes in medical imaging departments. A discussion on this, follows.

5.5 Leadership Styles and Change Management Outcomes

Zhao, Hwang and Lee (2016) found that the project managers' leadership style was key success factor for projects. This research found that the leadership style utilised by the leader positively influences the outcome of change management processes. Success was reported by 96% of participants who utilised a consultative leadership style; 82% who used transformational leadership and by 82% who utilised transactional leadership. This research supports Goleman (2017) who suggested that use of multiple styles, at least four leadership styles, resulted in more positive outcomes than the use of a single style. This study also supports Aga, Noorderhaven and Vallejo (2016) and Larsson et al. (2015) who found that leadership style is a critical success factor influencing project performance in a civil engineering setting.

In this research a sizeable number of projects undertaken were business process redesign projects which impacted on multiple stakeholders. Crucially, in this clinical setting it was also identified that consultation was critical, more so in a hierarchical healthcare system with clinicians, higher up in the hierarchy. For example, medical imaging departments have a physician as a department head, as opposed to other clinical specialities. The use of consultation is supported by the General Medical Council (2022) who suggested in its guide that all doctors be willing to work with others to maintain and improve performance and respect the leadership and management roles of others.

It appears change that has not followed an appropriate consultation process can be fraught with failure risk due to apathy. In clinical settings, participant 9 noted that usually the lead clinician dictates the processes/procedures that they would like their patients to receive, even if the lead clinician is not the expert for a procedure. This is problematic where the referral system works. For example, an intensivist may dictate to a radiologist what sort of test a patient may require. If

there is no good communication, or a lack of respect between the specialists, then the treatment provided may not be the appropriate one for that patient as requested by the lead clinician.

While the consultation style was shown to be effective in medical imaging, in clinical practice, radiologists often work with the available information at the time, usually on the paper referral form for some outpatients, or electronic medical systems on the imaging request form for inpatients. As clinicians, they rely on other clinicians to provide an adequate clinical history for them to have a complete understanding of the patient's condition and therefore consider all relevant facts to provide an imaging report. This report and images can then be utilised by the referring specialists or others in the provision of appropriate clinical care. If radiologists are provided with suboptimal information, then they also produce suboptimal reports which impact on the quality of care provided to patients, which may lead to adverse patient outcomes.

The transformational and transactional styles were also found to be effective leadership styles in leading change in medical imaging settings, this research has considered the possibility that the assessment tool used to measure the presence or absence of this style may be limiting the outcomes of the leadership styles. For example, the measurement tools only measure the former styles and not a wider range of leadership styles. The semi structured interviews provided participants with an opportunity to self-nominate a leadership style they believe is the best representation of their leadership style. However, this research supports studies by Aga, Noorderhaven and Vallejo (2016); Breevaart and Zacher (2019); Fletcher, Friedman and Piedimonte (2019) and Perez (2021) and with respect to transformational leadership as a style suitable for leading change in healthcare. Furthermore, this research supports Ghani et al. (2018) who found a correlation between transformational and transactional leadership and

employee engagement and thus effective in leading change within the healthcare setting.

Section 5.5 discussed that leadership styles influenced the outcomes in change management projects in medical imaging, with consultative leadership being dominant, and transformation and transactional leadership styles also positively influencing change projects' outcomes. This is crucial for healthcare leaders particularly in medical imaging because medical imaging leaders seek to optimise change management success. As consultative leadership style was found to be a critical factor in maximising change project success, as found in this research, medical imaging leaders would need to adopt leadership approaches such as consultative leadership, that improves the chances of project change management success. The next section discusses the strategies used for successful change management in medical imaging.

5.6 Strategies Used for Successful Change Management

This research found that several strategies were utilised and led to successful change management. These strategies include consultation and engagement; workload management and explained communication and are discussed in the next sections.

5.6.1 Consultation and Engagement

This research found that consultation and engagement was the most prominent strategy utilised in leading change projects. These findings are consistent with the work of Geerts, Goodall and Agius (2020); Savage et al. (2020) and Spurgeon et al. (2017) that concluded that the engagement of clinicians was necessary to bring about changes within hospitals and primary care practices. This was also supported by participants in this research who stated that, they found consultation being

very important to succeed as their followers felt included in the decision-making process.

Consultation and engagement within the healthcare setting is challenging but important as different specialties have different competing interests. An example of this may be that of an interesting case which can be managed by either a vascular surgeon or interventional radiologist. If there is a lack of consultation between these two specialities, there may be competition between both specialists that may result in negative consequences to patient care, safety and quality.

Also, Specialists; Visiting Medical Officers (VMOs); Fellows and Registrars all have competing interests and priorities, which may impact on meeting organisational goals. In medical imaging for example, Fellows and Registrars who are still undergoing their training, are primarily interested in meeting their curriculum requirements in terms of both the number of cases performed and number of hours in service, among other requirements (Sydney Local Health District 2017).⁹ Visiting Medical Officers and Specialists on the other hand, are qualified and usually experienced, may be interested in perfecting their technique, achieving better outcomes for their patients and consequently building their reputation as experts in this field. VMOs and (Staff) Specialists are also remunerated differently, with the former paid on either a fee for service or sessional basis and the latter on a salary. These interests and priorities impact on perceptions to consultation and engagement. For example, in metropolitan radiology departments, a VMO would typically be assigned a predefined number of cases to report on and is typically not a permanent staff member. A Staff Specialist on the other hand, is usually permanently contracted and available for additional initiatives such as registrar training, multi-disciplinary team meetings and morbidity and mortality meetings. However, these medical roles are critical

⁹ Sydney Local Health District

and collectively play a critical role in the provision of clinical care as they allow medical coverage to be provided in different healthcare settings. Like every other profession, people undertaking these roles need to be managed by appropriate governance structures.

Consultation and engagement is important as even though organisations are not entirely project-based per se, temporary organisations within them exist in the form of assignments, task forces, programs, and so forth (Hassan, Bashir & Abbas 2017). Also, according to Hass (2011), leaders of complex teams require an understanding of the team development dynamics, how teams work so that they develop specialised skills for building and sustaining high performance.

5.6.2 Effective Leadership

Within medical imaging, consultation and engagement meant meeting with diverse stakeholders. This may require effective leadership to manage the divergent views and making compromises where possible to ensure that processes/projects could be implemented. As discussed in section 2.3, effective leadership has been highlighted in the literature as a key requirement for change management. It is therefore important to explore these concepts from this perspective. Effective leadership has had little research to understand what it is and how it is enacted in a medical imaging setting. In this research, effective leadership is a concept that includes several facets or activities that result in the ability to successfully influence the outcomes of change projects or processes. Strong leadership can be encapsulated as a systematic process through which leadership activities are undertaken. Such leadership can influence the attainment of organisational goals through the management of competing demands and divergent views within a complex organisation. These activities include but are not limited to; stakeholder engagement and consultation; conflict resolution; use of simple and concise communication. This process is

underpinned by a consistent, evidence informed, contemporary approach in planning and governance. As an example, this research found that strong leadership is leadership that exhibits the following characteristics.

- i. Is systematic (in considering the planning and governance framework)
- ii. Contemporary in nature and is evidence informed
- iii. Resolves conflict and
- iv. Achieves organisational goals.

Strong leadership as discussed here is different from general leadership, firstly through definition. Strong leadership was viewed by Colla et al. (2014) as being similar to effective leadership. This research found that effective leadership is defined by specific behaviour, such as consultation and engagement of stakeholders to consistently achieve successful outcomes. Secondly, effective leadership is exhibited through specific characteristics or traits such as being systematic, considering the latest evidence informed practice in resolving conflict and or achievement of organisational goals. Some leadership styles, such as laissez faire leadership do not necessarily attempt to resolve conflict. In conclusion, effective leadership was found to be leadership that results in successful change management. This research has identified the description of what strong leadership is and is new knowledge in healthcare generally and medical imaging specifically. It clearly explains that strong leadership is leadership that yields results in successful change management. The next section discusses workload management as another crucial factor in achieving project success.

5.6.3 Workload Management

This research also found that workload management was crucial in ensuring project success. This finding is analogous to Williams, Perillo and Brown (2015) who found that workload was a barrier extensively reported on with regards to the implementation of evidence based practice. This was both on the part of

participants and the followers in these projects. The participants within this research reviewed the workloads of their staff to ensure that any additional activities could be completed within the time constraints. Where output was previously unsatisfactory, either through high workload, high expectations or a combination of factors, participants found that resetting expectations resulted in a new understanding and clarity on the required output.

Workload was cited as a key consideration in the medical imaging setting. If not managed well, it has a detrimental effect on the safety, quality and care provided. Medical imaging directly influences the patient care provided. For example, the pathology from medical imaging studies, will inform the care plan for each patient. Inaccurate studies or reporting therefore has a direct impact on patient care and safety. One of the management functions within the medical imaging department are quality control activities (Siegal, Stratchko & DeRoo 2017). These are conducted through a peer review of a sample of studies reported by the Radiologist or Nuclear Medicine specialist. The error rate is required to be within a certain threshold to satisfy good quality care requirements. Deviant performance such as missed pathology or inaccurate interpretation of studies can thus be managed appropriately. This research found that physicians working within SWSLHD generally agree that a high workload environment exerts pressure on them to produce timely reports. This time constraint therefore negatively affects the report quality, where the reports are found to contain errors, such as missing some pathology. Where reporting errors exist, such as a missed diagnosis, negatively impacting on patient safety and quality possibly including quite catastrophic consequences for patients.

Within an interventional radiology setting, procedures are guided by imaging and conducted in real time, that is, the interventional radiologist will be simultaneously undertaking the procedure. The imaging guides the intervention

to be provided. In this case, errors like those found in diagnostic radiology are less prevalent. However, different risks emerge with interventional radiology, mostly related to equipment, skill level of the personnel involved, workload and the site of the intervention. For example, if the equipment is older or is of inferior quality, the images seen by the interventional radiologist are not ideal for optimal patient outcomes. Similarly, this research also found that less experienced interventional radiologists took longer to perform procedures, and outcomes varied between patients.

In administration or back-office functions, high workload also negatively impacts on revenue or the financial health of the department. While the LHD has an automated billing process, there is also some significant human intervention required. For example, the researcher's observations were that exceptions reporting occurs regularly on the automated interphase. This reporting was a daily automated report outlining discrepancies between Medicare accepted claims and those rejected. Administrators are then required to review and rectify these errors daily to ensure billing can proceed as normal to improve cashflow. If administration staff are time poor to perform these key tasks, then this is at the detriment of the organisation.

Workload management also involved the planning of tasks so that activities could be commenced earlier in the day for example. This could then mean that shift times could be managed differently. During this research, the LHD was addressing challenges to the service delivery model for some modalities. For example, services such as ultrasound, were offered during business hours only by some hospitals. However, the organisation had identified that a more generous service offering round the clock was critical to ensure patient safety and quality as Ultrasound was the only suitable imaging study for some patient cohorts, such as pregnant women. To manage the demand for these services

various models were explored including extended operation hours or an on-call service.

5.6.4 Explained Communication

The research also found that explained communication/communication was another key strategy in leading change projects effectively. This finding parallels literature by Morgan (2020); Ojo (2019) and O'Connor (2013) who discussed the criticality of implementing a good communication strategy for change. Soomro et al. (2017) also found that effective communication improved acceptance levels and reduced resistance to change.

Communication clarity ensured that the diverse stakeholders understood their roles and responsibilities and could effectively discharge their tasks. Effective communication within medical imaging was found to be communication that had clarity; was simple; precise and done regularly ensuring that all parties were kept abreast of developments as they occurred. For example, participant 8 developed an e-mail template that met the criteria discussed above which was regularly dispatched to all key stakeholders to great effect.

Section 5.6 discussed the strategies utilised for successful change management within medical imaging. Consultation and engagement; workload management and explained communication were found to be key strategies that led to successful change management processes. In this section, effective leadership was also defined and discussed as leadership that led to successful change management. Typical characteristics for effective leadership were outlined as; systematic; contemporary; conflict resolution focused and achievement of organisational goals. This definition of strong leadership in medical imaging is

one of the key scholarship contributions to be discussed further in chapter 6. The next section explores the reasons for why some projects succeed and others fail.

5.7 Why Do Some Projects/Processes Fail or Succeed?

Alvarenga et al. (2019); Gharouni Jafari and Noorzai (2021) and Vrchota et al. (2021) postulated that if different leadership styles are appropriate in organisational change projects, then they should also be appropriate for other non-change management projects as well. This research found that there are key reasons for project success or failure, in medical imaging, other than the leadership style employed and this section will discuss the top five reasons found. Participants discussed some of the complexity within the healthcare setting when they highlighted examples such as, the vested interests and egos in healthcare, where if everyone was not provided with an opportunity to provide their input, they would not be engaged with the process.

5.7.1 Stakeholder Engagement

These participants' sentiments are reflective of stakeholder engagement emerging as the prominent reason why change projects fail or succeed in medical imaging. This research supports the General Medical Council (2022) suggesting doctors have a responsibility to engage with their colleagues in undertaking their roles. Engagement involves the consultation of key internal and external stakeholders who could be working within a single site, multiple sites or external to the organisation. An example of this was a business process change involving the Emergency Department. In this project, it was established that another LHD was going to be involved in the change required, together with multiple other stakeholders such as the Information Services Team, Senior Clinicians of other departments, Clinical Leadership Teams of the imaging departments, among others. These are fully discussed in section 4.9.1 in the previous chapter. Seelen et al. (2020) and Weiss and Weissman (2020) supported

early stakeholder engagement in the early planning and decision making by key stakeholders which is correspondent to this research findings in medical imaging. In this project there were multiple confounding factors which increased this project's complexity.

Firstly, there were different levels of hierarchy including the heads of medical imaging across the two LHDs, the two LHD information technology teams and other stakeholders already outlined. Importantly, the two LHDs had different approaches in their IT and clinical strategies on how to manage the proposed change, such as whether to wait for a state-wide PACS/RIS system or to implement a new system now, to address the current challenges. Additionally, from the Area Health Service era, discussed in section 1.2, there were legacy issues regarding the management of services still serving the two new LHDs that needed to be managed. A solution was therefore required that considered the requirements of these two distinct entities. A governance framework was established for this project that included escalation processes for the resolution of matters that were at a stalemate.

Secondly, medical imaging clinicians had significant power and influence in this project and were both keen to accommodate the requests from their peers, who saw the value of the proposed changes as it was evidence informed. The governance arrangements implemented outlined key issues such as the modes and frequency of communications; meeting arrangements; escalation processes; due dates for decisions and consequences of not meeting the due dates. Such a framework made this complexity manageable. During this project, a concept map was drawn up by the medical imaging team outlining the project scope and platform formed for the engagement of these stakeholders to effectively implement change. This project was a complex change project with significant

implications for clinicians across the LHD on how they ordered imaging studies and was implemented successfully.

Participants also highlighted the importance of engagement when asked about key learning from prior projects, with some suggesting change as a journey where one needed to take their followers with them to increase engagement.

While early engagement of key stakeholders was identified in round 1 interviews as a key success factor in project/process change success. Some participants suggested that when dealing with multiple stakeholders, there is often frustration that occurs due to the non-responsiveness of stakeholders. It is important for leaders to develop tools and strategies to manage this as they emerge. Tools that could be used by leaders include e-mail templates with options from which stakeholders can choose from. Strategies could also include the following:

- i. Researching on stakeholders to understand how to engage with them effectively.
- ii. Correspondence with an end date for providing feedback. Stakeholders are advised that should information not be received by that date, the consensus responses provided to date could be used to inform change.

The research also found that stakeholder engagement was not a discrete activity conducted at the commencement of the project but was a regular ongoing process with the stakeholders involved. For example, some participants captured this when they suggested that they developed tools for use, such as document templates like action lists, disseminated regularly throughout the project. Such tools provided progress updates and key milestones to the LHD Executive, Heads of Departments of departments involved, such as Emergency and Intensive Care Unit.

Stakeholder engagement also involved lobbying, a key part in leadership in hospitals, for example, getting many clinicians to agree with one that a project or service was key is crucial. Lobbying resulted in getting projects off the ground. This supported the work by Kelly, Tumblety and Sheron (2016) who found that medical practitioners who sought improvements in public health needed to recruit influential supporters, willing to listen to and weigh up the research available.

5.7.2 Planning

This research also found that planning was another prominent reason for project success in medical imaging. Planning ensures that activities can be undertaken in a systematic approach that leads to consideration of multiple factors in project implementation. This ultimately leads to project activities being undertaken in a structured approach, with potential bottlenecks identified and managed appropriately. This finding parallels Eder and Register (2014); Seelen et al. (2020) and Weiss and Weissman (2020) who found that transitioning to a new model required enough consideration on care improvements and advance planning to ease the transition, identify gaps and enhance workflows.

In this study context, planning spans from strategic planning for projects extending over a more than five years from conceptualisation to implementation; to business planning for pre, intra and post project implementation phases. Pre-project planning involved several activities such as stakeholder identification, development of other sub-project plans like the communications plan; while intra-project planning involved activities such as; the scheduling of meetings, education and training activities; schedule of project facilitation activities. Finally, post-project planning involved activities to embed the change project into clinical practice through activities monitoring this. This research identified that project planning in medical imaging involved the development of tools that would be

used during project implementation, such as weekly e-mail templates for regular information dissemination to all stakeholders.

5.7.3 Education and Training

This research found that education and training was another prominent reason why projects succeeded in medical imaging. The results of this study mirrors the work by Soomro et al. (2017) who found that education training and support of end-users in the implementation of a new system resulted in successful implementation and attainment of project objectives. Education and training in this context referred to the impartation of knowledge to staff as part of the change management process to ensure that staff had detailed knowledge of the proposed change, and implications. The education and training offered in the LHD considered several factors including staff availability; relevance of training for staff groupings; use of subject matter experts to conduct training, both from within and external to the organisation and training scheduling to ensure that those targeted by the training would be captured.

Education and Training offered does not need to be classroom type education and can be undertaken via several pathways including virtually. This study supports the view by Thomson III et al. (2016) that a training course on leadership change management could be offered virtually and was offered over a five-week duration with at least 1,500 participants enrolling from over 40 countries. More recently, others (Chatziralli et al. 2021; De Ponti et al. 2020; Ehrlich, McKenney & Elkbuli 2020; Vigersky et al. 2021) found that virtual training was as effective in delivering training as traditional tools.

5.7.4 Resetting Expectations

This research identified that resetting expectations was a further key reason for project success in medical imaging. A literature review conducted using the terms, “resetting expectations; expectations; resetting”, found no existing literature to support this research finding. This finding is a new finding in medical imaging. When staff had been set in their ways, participants found that it was crucial to draw a line in the sand and outline the new expected standards of behaviour or outcomes. Where the expectations required resetting, participants also found that engagement with those affected was crucial in managing the change process as staff would have an opportunity to be heard and offer other alternatives that could be better than those proposed. Where participants could not find common ground with their stakeholders, participants found they could offer a platform to trial changes before they could be fully implemented. Some participants discussed this as an effective strategy when they suggested that before they made changes to existing processes, they provided staff with an adequate opportunity to offer feedback.

5.7.5 Processes and Procedures

This research found that the presence of processes and procedures to undertake the change process was a further crucial component to ensure success in medical imaging. For example, a communication plan was identified in section 4.9 as a tool used for the management of risk in communicating project related information. It is a document that outlines all the key stakeholders in the project and the mode of communication, type, and frequency of communication with key stakeholders. It augments the project plan itself or can be used as the main project planning document with the addition of further information. The processes and procedures provided a blueprint which could be used to run change projects and provided a template for this process. Scant prior research has been found in similar studies that outline that this is a contributor to project success.

It was noted in section 4.10 that the key formal project documentation was meeting minutes with the absence of other formal documentation. This is a shortcoming in the documentation of projects in the LHD as knowledge retention is by the individual rather than the organisation. The data suggests that there is limited formal project management expertise in SWSLHD, as none of the participants indicated they undertook any formal project management training. This finding supports Aberese-Ako, Agyepong and van Dijk (2018); Brooke-Sumner et al. (2019); Cleary et al. (2018) and Nzinga, McGivern and English (2018) who found that although clinical leaders are experienced clinicians, they appear to have little management training or mentoring to increase their development as managers.

The LHD offers an in-house project management program known as Accelerated Implementation Methodology (AIM), which is a project management methodology adopted for the LHD for public health entities, by the Agency for Clinical Innovation. This short course [3-days] provides a structured and methodical approach in undertaking project management within the public healthcare settings. The LHD, part of NSW Health, has access to the centralised function of the Project Management Office (PMO). According to NSW Health (2018), the PMO supports strategic change and sustainability within the health system by the provision of expertise; connecting NSW Health organisations and sharing scales and enhancement of successful programs throughout NSW Health. SWSLHD could therefore access PMO support in undertaking projects or building capacity to do so. This would facilitate a more consistent approach in project management in the LHD and improve change project outcomes. This is further discussed in section 6.4.

Some entities within the private sector, such as healthcare consumable manufacturers, successfully undertake initiatives to streamline processes such as LEAN (Abuhejleh, Dulaimi & Ellahham 2016; Anderson, NC & Kovach 2014),

Kaizen (Shatrov et al. 2021; Suárez-Barraza & Miguel-Davila 2020) among others. Collaborations can be developed with the private sector in the development and use of other techniques in project management such as LEAN methodology. Synergies would be derived for both participants. For example, the private sector may have superior project delivery principles and techniques, while public healthcare organisations provide a complex platform for these techniques to be refined. Additionally, private sector organisations benefit by obtaining knowledge about the use and function of their products in public healthcare, which provides them with an opportunity to better meet the product needs of consumers.

5.7.6 Project Resourcing

This research found that project resourcing impacted on the successful project change management process in medical imaging. Pohjola et al. (2016) also found that no additional time and resources were afforded to healthcare leaders to undertake projects. Instead, leaders were expected to undertake projects in addition to their daily roles.

In this study, most leaders were not provided with specific designated project management time. They were expected to implement change projects within the existing resources. In this study, the lack of project resourcing did not negatively impact on project outcomes. However, participants reported that they often undertook projects outside work hours, with their passion for the projects being the main drivers. Two opposing views emanate from this. Medical imaging clinicians in the public health settings reported they are inherently busy with clinical work due to the increasing workload. As a result, they are time poor to carry out change projects well. Such change projects include the procurement and installation of major equipment. Where these projects become increasingly complex and time consuming, change projects led by clinicians may become challenging to successfully implement. This may be because of lack of

enthusiasm from the clinical project lead; being time poor or a lack of project management skills among other reasons. This research supports Goldstein et al. (2021) findings that frontline clinicians are increasingly busy to undertake research.

An alternate view is that clinicians are keen to be involved in change management projects or processes that impact on their work. This is particularly important because most change management projects impact on the clinical work carried out by the clinicians and therefore their involvement as key stakeholders would be crucial. Kippist (2012) and Belrhiti, Van Belle and Criel (2021) found that medical doctors maintain their dominance over other clinical professions by excluding them and controlling their work. It is therefore in the interest of medical doctors to control, direct and be involved in change projects that impact on their work environment.

Several participants suggested heavy workloads seem to propose that people's leadership styles are impacted. Leaders tend to be more dictatorial, perhaps as coping mechanism to manage their time. This research showed where change projects were mandated by NSW Health, the leadership approach was more directive. Ghazzawi, Shoughari, and Osta (2017) suggest situational leaders were more directive when there was a lack of commitment or organisational goals were not being met. Anecdotal evidence suggests frontline clinicians are usually aware of the concerns they have with most existing processes, and it would be in their best interests to align change projects to their wants, hence their engagement is easier.

Section 5.7 above discussed the five prominent reasons why projects succeed or fail in medical imaging. Firstly, stakeholder engagement was found to be the most prominent reason for project success. Secondly planning was also found

to be a key reason for project success. Thirdly, education and training were crucial in project success followed by resetting expectations as a key reason for project success. Finally, the presence of processes and procedures in medical imaging departments contributed to project success, negating the effects of lack of formal project documentation. The next section discusses how the leader's leadership style in medical imaging is influenced by prior or learned experience.

5.8 Leadership Style and Learned Experience

This study found that there were no significant changes to the leadership styles of the participants in medical imaging. This research supports work by Allen et al. (2018); Bell, BS et al. (2017); Keiser and Arthur Jr (2021) and Vogel et al. (2020) who suggest individuals do not automatically learn from experiences, and experiences do not automatically improve leader development. Homan et al. (2020); Larson and DeChurch (2020) and Uhl-Bien and Arena (2018); also suggest that learning from experience requires deliberate practice for behavioural reinforcement which has often been overlooked.

As leaders learn, they collaborate with their peers influencing both their individual learning and organisational learning. Barley, Treem and Kuhn (2018); Barros et al. (2020); Edmonstone (2017) and Martínez-Costa, Jiménez-Jiménez and Dine Rabe (2019) found lessons learnt evolve to organisation learning for a far reaching impact in an organisation's capacity. In healthcare the concept of double loop learning is particularly important. Davies and Nutley (2018) and Abdullah et al. (2018) discussed double loop learning as occurring when organisations rethink basic goals, norms and paradigms. While SWSLHD attempts the process of double loop learning, it can maximise learning capacity initially by documenting individual learning and then utilising this to develop double loop and meta learning.

A new and interesting finding in medical imaging in SWSLHD was the research participants concurred the organisation does not document project methodology well. This research found the only form of documentation available was meeting minutes, action lists and e-mail correspondence regarding the project. It is an interesting finding in that, despite the lack of formal project documentation, projects carried out, were usually successful. This seems to suggest the leadership style and leader experience, played a key role in project success in medical imaging.

Project documentation could be added to include documents on project; scope, (what is in and what is out); timelines and implementation methodology. It could also include pre and post project implementation evaluation and improvement opportunities. This can then facilitate organisational learning as discussed in the preceding paragraph. This finding supports those of Day, DV and Thornton (2018) who discussed the 70/20/10 rule that 70% of leader development comes from on-the job experiences, 20% from developmental relationships and 10% from formal programs.

The concept of organisational learning starts with the individual and then cascades to the organisation through collaboration as outlined by David and Golan (2017) and Park and Kim (2018). However, this deficiency of project documentation was partly offset by the stability of the medical imaging workforce. During the research period, only one participant retired from the organisation reflecting the longevity of staff within this organisation. Staff longevity was found to be crucial in the retention of corporate knowledge in medical imaging, particularly with regards to future projects. The importance of documentation is clear, with some participants suggesting that people

remember history differently and will raise the same issues that were previously addressed, when it suits them.

This research also found that the nature of projects undertaken was homogenous and knowledge could be shared with practitioners undertaking similar projects in a relatively informal setting. There seems to be scant studies in Australia in medical imaging, on project homogeneity as a contributor to project success. As outlined earlier in section 4.11, medical imaging in SWSLHD enjoyed a relatively stable workforce that individually retained project knowledge. If similar projects were undertaken again in future, leaders would possess the necessary and relevant skillset to successfully lead projects. Medical imaging leaders could share their successes in leading change successfully through a variety of LHD wide mediums such as the newsletter; their intranet pages and other platforms such as hospital wide forums.

This research also found that participants modified their leadership style in a way they referred to as enhancements from previous change projects. This supports Brown, R and Abuatiq (2020) and Li, L et al. (2022) who conclude that leadership development is a continuous process. Participants found it challenging to find the right balance in documentation and suggested future projects could be easier as they now had templates and a formula that worked. This finding is not dissimilar to Abdulla, Alhashimi and Hamdan (2019); Irfan et al. (2021) and Khan et al. (2020) who suggested a project management approach at the beginning of the project and concluded that the right project approach was a critical success factor.

When participants were asked what key insights they had learnt from prior projects, some people highlighted collaboration and pointed out that in prior

projects where they collaborated poorly, it was a steep learning curve for them as they found that projects were challenging to implement. This demonstrates that leaders in medical imaging who modified their style and reshaped their style are more likely going to be effective leaders. For example, those participants that enhanced their leadership style to include more collaboration found that they could successfully undertake change projects in medical imaging.

Some research participants in this project also found being a new leader in a new place presents a good opportunity to lead for change. New leaders have a clean slate to implement new innovations, to which staff were more receptive, compared to an existing leader implementing new processes. For example, a participant pointed out that making roster changes and implementing reporting new workload management techniques was viewed more favourably by staff. This was because staff expected new changes to occur with the commencement of a new leader.

Section 5.8 above discussed how learned experience influences a leader's leadership style in medical imaging. This study found medical imaging leaders adjusted their leadership style because of learned experience. While participants reported that the organisation documented projects poorly, the workforce stability of the department had assisted the department in knowledge retention. The next section discusses how learning leaders fare in future projects.

5.9 How Do “Learning” Leaders Fare in Future Projects?

Buchanan and Badham (2020); Denhardt et al. (2018) and Stouten, Rousseau and De Cremer (2018) found that the emergent approach to change emphasises that change be perceived as a continuous, open-ended process of adaptation to changing circumstances and conditions rather than as a series of linear events

within a given period. This therefore requires individuals and organisations to learn from prior projects. This research found that “learning” leaders achieve better outcomes in successive change management processes. This is a new finding in medical imaging as there is scant literature on the topic of learning leaders and change management in medical imaging. For example, participants 2; 5 and 14 found that experience from prior projects resulted in them modifying aspects of their leadership styles resulting in better outcomes for their projects. These participants highlighted that they found that wide consultation and early engagement were crucial in project success and modified their leadership styles. These findings support studies from Busari et al. (2020); Cameron and Green (2019) ; and Saira, Mansoor and Ali (2020) who wrote that a key determinant of implementation success is learned ability for individuals to navigate change successfully. Haski-Leventhal (2020) and Trivedi (2021) postulated that change is so hard because change is required at an individual behaviour level, organisational structural level, to make transformation successful. Therefore, in medical imaging, learning leaders who embrace improvement opportunities from prior projects are more likely to succeed in subsequent similar projects.

Medical imaging leaders who adjusted their leadership styles from the first project to subsequent projects indicated prior learning was crucial for future projects. When asked what their key learning was, from previously leading a change project, some participants suggested engagement while others suggested collaboration. Such participant sentiments support the view that learning leaders achieve more positive outcomes than their opposite counterparts, as they both successfully led subsequent change projects, following their learning. Helm et al. (2020) and Van Rossum et al. (2016) found that organisational change is vulnerable to numerous mistakes and change managers should use explicit models with all the elements to enable them to succeed.

While the concept of learning leaders was explored in section 5.6, noteworthy was the fact that in medical imaging, change processes in most projects reviewed were not formally documented with project documentation. Corporate knowledge could not be appropriately retained by the organisation as this knowledge was leader based rather institutional knowledge. Experience or learning should occur at any time rather than leaders considering themselves as being set in their ways and not consider making any changes. Smith, RH (2015) postulated that organisational learning could begin at any time so that organisational benefits are realised. Bogers, Chesbrough and Moedas (2018); Müller, JM, Buliga and Voigt (2021) and Papa et al. (2018) found that employees needed to harness external and internal knowledge to improve processes and products, which according to Campanella et al. (2017) and Vrontis et al. (2017) led to competitive advantage to an organisation.

All participants interviewed for this research indicated that they had not undertaken any formal project management or leadership training with the training offered discussed in section 5.4. This finding supports Lexa and Fessell (2019) who recognised that leadership is best learned by a combination of experiential learning (learning by doing) and some formal instruction. However, Lexa and Fessell (2019) suggested that what most Radiologists need was to take on projects or roles during their career where they could do the work of leading, such as opportunities to work on quality and safety projects. This could also be said of non-radiologists as this research found that this group also lacked formal leadership training and acquired their skills through experience.

However, noteworthy is that research participants have been utilising their experience, albeit successfully, in the LHD to conduct projects. The participants in this study were employed by the LHD for the duration of the study. This stability in the medical imaging workforce has contributed to the retention of skills and experience in project management in individuals in medical imaging. The organisation could improve on the current individual-centric skills retention

and put in place mechanisms to retain this corporate knowledge. Skills retention in a stable workforce not only improve project success in the LHD and lead to better patient outcomes through the retention of project management and clinical skills in medical imaging. This reinforces the earlier finding that good communication was critical to project success. The lack of mechanisms for organisation wide knowledge retention becomes even more critical, so that SWSLHD relies on multiple strategies for project success rather than over reliance on communication.

Section 5.3 described the dominant leadership styles in medical imaging and how they are enacted. In this research, it was found that for earlier projects (round 1), participants self-reported a higher level of consultative leadership. However, a small number of participants commented on minor adaptation of their natural leadership styles to be more effective leaders. The next section provides a conclusion to this chapter.

5.10 Conclusion

This chapter discussed the dominant leadership styles of consultative; situational; transformational and transactional as appropriate for leading change in healthcare, particularly in medical imaging services due to it being the focus of this research. The study found that consultation and engagement; workload management; education and training; explained communication and planning were effective strategies in leading change effectively in healthcare.

The study also found that other than the leadership style employed by the leaders, stakeholder engagement; planning; education and training; resetting expectations and the presence of processes and procedures were crucial reasons why change projects were successfully conducted.

This chapter discussed how the leader's leadership style is influenced and reshaped by the leader's learned experience from prior projects. Medical imaging leaders were found to be learning leaders who adopted their leadership style from prior projects. This led to medical imaging leaders achieving more positive outcomes in their change projects compared to their peers, in other disciplines, who did not carry forward learning from prior projects.

The following chapter, Chapter 6, will conclude on the research findings, scholarly contribution, implications for theory and practice, as well as propose further research areas.

Chapter 6 – Contribution, Conclusions, and Implications

6.1 Introduction

Chapter 5 discussed this research study's findings. In this discussion, it highlighted the new findings of this research and outlined comparisons to other studies where appropriate. This study investigated how leadership in healthcare affects the outcomes of the change management process in medical imaging departments. This was conducted through addressing the six research questions as outlined in section 1.3.

Building on chapter 5, this chapter, summarises the key research findings. It also outlines articulates the key contributions to scholarly leadership theory. One of the key aims of this research was to understand and inform policy and practice in medical imaging. A section of this chapter is dedicated for this purpose recommending leadership practices in successfully implementing change management processes.

This chapter will also outline the assumptions, limitations, and weaknesses of this research and offer potential future research areas.

6.2 Research Conclusions

6.2.1 Dominant Leadership Styles

This study found that the dominant leadership style in medical imaging was consultative with situational, transformational, and transactional leadership

styles being other prominent leadership styles leaders displayed. Participant 13 summed this by suggesting that they consult their staff for any changes in their department. Consultative leadership was identified as being a critical success factor in building and maintaining ongoing relationships with various stakeholders. In the LHD studied, the medical imaging departments were found to have a stable workforce, demonstrated by the longevity of staff within their departments and participation throughout the longitudinal project. It could be argued that these relationships fostered the uptake of new ideas, made colleagues more willing to engage in change projects which resulted in a better contextual understanding of the intended change process, making the case for change stronger.

The consultative leadership style was found to be the most dominant style for several reasons. The researcher noted several observations during the research process which include:

- i. Medical imaging is a subset of healthcare where referrers are crucial to the service. Radiologists are legislatively and professionally not permitted to self-refer patients for studies. They rely on other referring partners for ongoing inpatient and outpatient work. As discussed in section 1.1.6, inpatients are funded through the ABF process while outpatient work is funded by Medicare. Radiologists therefore must develop relationships with their referrers and hone their consultation skills, so that they receive referrals from other clinicians, since they cannot self-refer patients. Such relationship building could be in the form of offering education to their referring partners on medical imaging procedures, their common indications and appropriate imaging studies ordering.
- ii. Consultative leadership was found to achieve the most successful outcomes in medical imaging and should be utilised where possible to

optimise change project success. Consultative leaders demonstrated early stakeholder engagement; collaboration and engagement; planning and good communication skills which made them effective leaders of change management projects. The effectiveness of this leadership style in change management, means that change projects can be successfully implemented in a healthcare setting, with the aim of reducing the 70% failure rate of general change management projects, (as was identified in chapter 2). As consultative leadership is a key leadership style for successful change management, it is suggested that core training for medical imaging healthcare professionals such as radiographers and radiologists include leadership training, particularly training in consultative leadership. This training could be included in their basic profession training.

This study also found how consultative leadership was enacted by medical imaging leaders to influence the outcomes of change management processes. The next section discusses how leadership was undertaken in change management projects in medical imaging.

6.2.2 Strategies Used for Successful Change Management

Medical imaging leaders used several key strategies to successfully lead change in their departments. The top three strategies were: consultation and engagement; workload management; and education and training, which are now discussed.

6.2.2.1 Consultation and Engagement

Consultation and engagement were a deliberate process undertaken by medical imaging leaders in the change process. This was out of necessity, as discussed

in section 6.2.1, or as a key tool in successfully leading change due to the self-referral prohibition. As identified in section 4.2.2.2, there were several stakeholders directly and indirectly involved in the provision of patient care, such as wardsman: paramedics and information technology teams. The involvement of such stakeholders was crucial to project success hence consultation became a prerequisite for project success.

To effectively succeed in change management, medical imaging leaders adopted robust communication strategies as fully discussed in section 5.6.4. Not only did they send e-mails, but they also took time to provide detailed explanations, which informed the communication with their key stakeholders. For example, in a project involving the replacement of a hospital's only CT machine, there was a great deal of planning required upfront and a communications plan outlining the nature and preference of communication to the various stakeholders was implemented. Some internal stakeholders required regular short, sharp e-mails, SMS and huddles. One participant developed an e-mail template that was utilised for regular stakeholder updates. This was both effective and satisfied the information exchange process requirements with these key stakeholders.

6.2.2.2 Workload Management

As identified in sections 1.1 and 1.2.7, medical imaging plays an increasingly important role in the diagnosis of diseases and meeting key performance metrics because it facilitates faster clinician decision making. Downtime of services is to be avoided or kept to an absolute minimum as it negatively impacts safe patient care, as patients cannot access imaging in a timely manner. For this to occur, medical imaging leaders utilised robust planning processes to ensure that minimum service disruptions were encountered ensuring that patients could continue accessing the healthcare they needed. For example, these planning processes included a risk-based assessment framework for effecting downtime

in the installation of key infrastructure such as CT machines. This process included the timing and duration of work and alternative imaging solutions for hospital patients when equipment was being installed.

Medical imaging leaders highlighted a few key reasons why they were successful in their change management projects and processes. The researcher will now discuss the three main reasons of: stakeholder engagement, planning and education and training, in the following paragraphs.

Stakeholder engagement was found to be the single most important reason for change project success in medical imaging. It was recognised that key stakeholders, such as referring clinicians and other subject matter experts, were crucial to the change process. These key stakeholders were value adding to the change process because their participation impacted on project success and keeping them engaged and were crucial in achieving success in change projects.

To ensure that medical imaging services had very little interruptions meticulous planning was required. This ensured that processes were thought through including the change methodology along with a risk assessment of potential challenges and solutions. An example of this planning was seen in the implementation of IT type projects in medical imaging, such as the implementation of a new PACS/RIS system for the district. In IT projects, stakeholder engagement was one component. Another aspect was the end-to-end testing of possible scenarios, as a proof of concept in a training environment. Following success in a dummy environment, further tests were conducted in the production environment and finally in the full deployment process. Similar actions need to be undertaken for non-IT projects, as potential scenarios can be explored and potential outcomes evaluated prior to full project implementation.

6.2.2.3 Education and Training

Finally, the research found that education and training played an integral part in the success of change management projects in the LHD. Where new services were introduced in medical imaging in the LHD, all staff impacted by the change would undergo education and training in the use of the new products or in the implementation of the new process. For example, in a project involving the identification of ED CTs and their prioritisation in the PACS/RIS, stakeholders such as ED physicians; radiologists, radiographers and nursing staff had to undergo training in the CT ordering process and how to escalate studies to ensure that key performance benchmarks were met. This education process ensured the successful change management of projects within medical imaging.

Having investigated the strategies and reasons for project success, the next section discusses the nature of leadership and change management, the reasons why some projects fail and the learned behaviour of medical imaging leaders in successive change management processes.

6.2.3 Nature of Leadership and Change Management Processes

As discussed in sections 5.4 and 6.2, this research found that the dominant leadership style practiced in medical imaging was a consultative leadership style. Leaders who practiced a consultative leadership style tended to achieve success in their change projects because they identified and engaged with their key stakeholders early and did so well throughout their projects. This style was characterised using 3 key strategies as outlined in section 6.2.2 above of consultation and engagement; workload management; and education and training. This study also explored the reasons why projects failed or succeed in sections 5.7 and 6.2.4 below. Utilising these key strategies and incorporating key

reasons for project success may result in project success in medical imaging and other healthcare settings.

6.2.4 Why Do Some Projects/Processes Fail or Succeed?

Section 5.7 discussed this research question and summarised the key reasons for 3 key reasons project success as stakeholder engagement: planning and education and training in medical imaging. Project practitioners in medical imaging or healthcare, who adopt these enablers to project success are likely to achieve project success.

6.2.5 Learning Leaders, Organisations, and Project Outcomes

The stability of the medical imaging workforce over the research period allowed for the retention of corporate knowledge of change management within the LHD, despite the lack of formal documentation of project processes. As identified in section 3.2, this study was a longitudinal study which tracked leadership style changes over time. During this period, there were no significant changes to the workforce, with only a single retirement noted within the leadership ranks. This meant that the same leaders remained within the organisation during the research period and had the benefit of having participated in previous change projects or having access to others willing and available to share their knowledge in change management.

Such stability suggests knowledge retention among the medical imaging leaders and within the LHD was crucial to project success. It led to learning departments and a learning organisation as leaders could leverage off each other. Staff retention in medical imaging can be attributed to several reasons including the highly specialised nature of the various areas of radiology, nuclear medicine, and interventional radiology. Staff who work in these areas undergo specialist

qualifications to practise in these areas. Following years of study, pathways exist for experienced employees and/or further education, to navigate the corporate ladder.

Section 5.3 of this study also discussed the demographic nature of there being more males than females in leadership ranks, consistent with Weigel, Kubik-Huch and Gebhard (2020); Kubik-Huch et al. (2020) and Qamar et al. (2020). Based on South Western Sydney Local Health District (2019), the region is multicultural with a third of the population speaking a language other than English at home. From the researcher's knowledge of the region, these demographics are represented in the general healthcare workforce, and it suggests working close to home may be a key factor in employee stability in the absence of a stressful work environment. As identified in chapter 1, wages and conditions of service are generally uniform across the NSW public health system. Working from home could therefore be an attractive proposition for this cohort of employees, which is becoming more prevalent in most work settings where onsite training or supervision requirements prevent this from occurring.

On the one hand the stability of the workforce is an asset to knowledge retention. However, on the other hand it may be viewed as a handicap to the medical imaging department. This is so as the leaders in medical imaging lack a heterogeneity in leadership styles, which may not promote divergent views and leadership approaches in the management of issues, processes, and projects.

The homogeneity of projects undertaken also allowed different leaders across different departments to share and transfer change management knowledge to their peers leading to successful change management in medical imaging. For example, section 1.2.8 identified that medical imaging is a capital and

technological intensive service. This means that high value equipment is required to be maintained and replaced regularly to retain attractive Medicare rebates. For this reason, leaders must regularly undertake complex equipment procurement and replacement change projects. The stable workforce means leaders can call on their colleagues to assist and support them in change processes. The research data shows that leaders share learnings in change projects implementation.

Workforce stability and homogeneity of projects are key enablers of project success. Leaders who learnt from prior change management projects found that they achieved better outcomes in subsequent projects. Paradoxically, the workforce stability can be an inhibitor to knowledge and leadership renewal, which may be required by medical imaging to develop new ways of leading change projects. This is discussed further in section 6.4 below.

6.3 Scholarly Contribution

This study contributes to literature in a several areas. Firstly, according to the literature search conducted in chapter 2, for change management within the healthcare sector and medical imaging specifically, there appears to be scant literature, that explores the leadership styles in medical imaging departments in the public healthcare domain in Australia. Section 2.7 provided a discussion of leadership styles utilised in healthcare while section 5.4 outlines the dominant leadership styles in medical imaging and illustrating this contribution. This is unique in extending the leadership practices in healthcare generally to a more specific setting, medical imaging, which faces challenges in being a capital-intensive service and dependent on a multitude of stakeholders to effect change successfully. This study found that the dominant leadership style in medical imaging was consultative with situational, transformation and transactional leadership being the other prominent styles. Where these styles are utilised

consistently, they resulted in successful change management in healthcare settings in medical imaging.

While Boaz et al. (2015); Spurgeon et al. (2017); Tsai et al. (2015) and Denis and Van Gestel (2016) found that clinical engagement promotes a greater connection between the medical profession and the organisational environment. However, it may be argued that the consultative leadership in medical imaging leaders helps facilitate this engagement. It does so through the engagement process that occurs between senior healthcare leaders and medical leaders. For example, medical leaders often require executive project sponsorship for certain projects. As part of obtaining this approval, medical leaders need to canvas support from their colleagues through a consultative process before seeking executive approval.

Extending Spurgeon et al. (2017) who focused on medical leaders overall, this research suggests that medical imaging leaders can be viewed from the organisational environment context. As part of this organisational environment, medical imaging leaders are building stronger relationships with other clinicians through consultative leadership as a preferred leadership style in successful change management processes.

Secondly, previous literature has not adequately discussed how such effective leadership is enacted in medical imaging. The International Institute of Directors and Managers (2020) referred to strong leadership in terms of their five main results of higher employee retention; higher percentage of top performers; higher productivity; consistent growth and results. This research extends this knowledge by defining strong leadership by characterisation within medical imaging and how it is enacted.

This research defines strong leadership as the ability to successfully implement change within an organisation. Such leaders achieve this through the mechanism of a systematic process through which leadership activities are undertaken. They influence the attainment of organisational goals through the management of competing demands and divergent views within a complex organisation. These activities included but were not limited to; stakeholder engagement and consultation; conflict resolution; use of concise and simple communication. This process is underpinned by a consistent, evidence informed, contemporary approach in planning and governance. Consistency is required in the leadership approach as it demonstrates that a process is repeatable, while evidence informed practice is crucial in clinical practice (Lavoie-Tremblay et al. 2012; Peirson et al. 2012; Strauss 2011; West et al. 2015). This appears to be because of clinicians preferring the “show and tell” approach which could be by way of case presentation in multidisciplinary team meetings, morbidity and mortality meetings or other teaching platforms.

Contemporary practices require the most current interventions. Effective leadership for example, can be demonstrated, in an equipment procurement and installation project, by the successful purchase of a piece of equipment, that satisfies the requirements of the project brief, and has been procured within budget. It is installed with minimal service delays and disruptions to end users and the equipment has been tested, its use and fitness for purpose verified by the relevant project stakeholders. Following deployment, the equipment is functioning as expected. Leading such a project successfully requires leaders to demonstrate effective leadership skills such as planning and navigating potential conflict and therefore successfully effecting change.

Thirdly, the methodology and its application in this study was effective particularly the longitudinal nature of the study as it allowed the assessment of leadership in medical imaging of participants over a period, rather than at one

point in time. There is scant literature demonstrating that this had been done in previous studies in medical imaging in NSW and Australia. The answers generated were more complete as participants had the opportunity to reflect upon the findings of data collection tools used. Following these reflections, participants appeared to be more prepared in successive data collection rounds.

Fourthly sections 5.5; 5.6 and 5.7 of this study extended change management literature by exploring the critical success factors for leading change in medical imaging departments. Practitioner literature such as Kruskal et al. (2012); Itri and Lawson (2016); Matalon et al. (2018); Phalak, Gerlach and Parikh (2020) & Shah et al. (2013) has not previously discussed management or leadership theories or critical success factors for change management in medical imaging departments. Thomson III et al. (2016) pointed out that medical imaging managers lack the skills to undertake change management. This study explored the critical success factors for leading change within medical imaging. These critical success factors include the strategies for change management, as discussed in section 5.6 and utilising the consultative leadership style as identified and discussed earlier in this chapter. If practitioners understand these factors and implement strategies suggested by this research, such as consultation and engagement; workload management and explained communication; they may be able to successfully implement change. This study has extended leadership knowledge by other researchers (Berghout et al. 2017; Lexa & Fessell 2019; Matalon et al. 2018; Phalak, Gerlach & Parikh 2020) by including healthcare, specifically medical imaging, an area with scant literature despite the significant regular change that occurs in Australia and New South Wales specifically.

Fifthly, this research extended the theory on learning leaders and organisations. Studies by Ayres (2012) and Kumaraswamy and Chitale (2012) in non-healthcare settings suggested that organisations and leaders must be learning organisations and leaders to successfully manage change. This study extends

their work by defining their work within healthcare, specifically medical imaging as those that create or acquire knowledge from past change management processes and apply such learning to future settings, to improve the outcomes of later change management processes. As this study found medical imaging leaders who modified their leadership styles from learned experience at an organisational and individual level, leaders were likely to achieve greater success than those that did not learn from their experience.

Finally, this research provides new, practical applications for medical imaging leaders to successfully lead change within their settings. While previous studies have discussed leadership styles in other healthcare disciplines such as nursing and medical doctors, there is scant previous research that has discussed this for medical imaging leaders in Australia.

This study therefore advances leadership knowledge for a healthcare focused area of medical imaging which is important for practitioners which they may utilise to successfully lead change processes and projects.

6.4 Implications for Policy and Practice in Medical Imaging

6.4.1 Stakeholder Mapping

This research identified one of the key strategies for project success was stakeholder mapping, a critical planning process for leading projects as it facilitates the subsequent processes of consultation and engagement. It is therefore crucial for change managers to undertake a stakeholder mapping process as part of their project planning, so that early stakeholder consultation and engagement could be undertaken to optimise project outcomes. This stakeholder mapping process could be undertaken by engaging subject matter experts in the area where change is required. Discussions with such subject matter experts about intended projects will assist in the identification of those stakeholders that may require consultation for the project in question.

6.4.2 Project Documentation

The LHD and similar organisations who develop a standardised process for documenting projects will ensure that corporate knowledge is stored in a repository where others within the organisation can access and utilise it. This process could be done through the preparation of a suite of “exemplar” project documents to be maintained for specific projects. Additionally, as part of the project approval process, the approving executive can request for information on the project documentation to be kept, with those projects not conforming to those requirements not approved. Another way this could be achieved is the identification of project champions within departments who are trained in project documentation to support departments in undertaking projects. It is therefore suggested that leaders develop formal documentation processes for knowledge retention in healthcare rather than relying on informal processes of knowledge transfer by attrition from one leader to another.

The LHD utilises an electronic system called HPRM or Trim for corporate record keeping. As this system is NSW Government wide, its use could be harnessed to encourage system wide information sharing, akin to other NSW wide electronic systems. This system could be extended initially to project champions as discussed above and this could be extended to other users as appropriate.

While there is retention of knowledge within medical imaging, this is not necessarily shared with people outside of medical imaging who may want to adopt similar strategies as those utilised in medical imaging. A more formalised knowledge exchange process would allow medical imaging to have a more meaningful contribution and influence practices in other departments or specialties. The target audiences of medical imaging’s knowledge could be the rest of the hospital or within healthcare generally, on how to effectively lead change.

6.4.3 Change Management and Project Management Training

This research found there was a high change project success rate within medical imaging utilising the dominant consultative leadership style. This style could be utilised in organisational change in healthcare to improve the success outcomes lifting it from 30% as discussed in chapters 2; 4 and 5.

Formal change management and project management training modules relevant to medical imaging could be developed and offered at intervals to ensure uptake by medical imaging practitioners who are already time poor. Because of this, clinicians tend to prioritise treating patients than spending significant time in what they may term as non-core activities.

While the organisation offers a Ministry of Health endorsed AIM course for project and change management, none of the leaders interviewed had attended this course despite being aware of its existence. There is apathy in undertaking this course perhaps due to its length (3 days at the time of research project); the perceived lack of value in the course; feedback from prior participants or participants' perception that project management is not a core function of their roles. The findings of this study suggest that organisations could undertake a study to establish the reasons for such apathy and take appropriate remedial action to increase engagement in training. Another alternative to this would be to bring in an external change agent to support clinicians to undertake change management projects.

6.4.4 Private Sector Managers

Most medical imaging practices are generally transferable between private and public sector establishments. The complexity of cases seen in smaller medical imaging practices will be clearly different from those seen in NSW public

facilities. NSW public hospitals cater for sicker and more complex patients such as trauma or stroke patients (Royal Australia and New Zealand College of Radiology 2019). With this process, NSW public hospitals sometimes outsource certain types of studies to private providers under contractual arrangements, achieving successful change management outcomes utilising the leadership approaches suggested in this research becomes quite important for the sustainability reasons. Leaders who are or work for private providers, are encouraged to employ a consultative leadership style to successfully lead change. The finding from this research as discussed in Chapter 5 could therefore be applicable not only to private sector imaging departments, but also to other service departments such as pathology or other private sector departments operating in a similar manner to NSW Imaging practices. Leaders in private practice could adopt the leadership styles found in this research to be effective in successfully leading change.

6.4.5 Public Sector Policy Analysts and Managers

Public sector policy analysts and managers play a critical role in charting healthcare policy. This is so as they generally discuss with various stakeholders, including LHDs, academia, practitioners, equipment manufacturers as part of their consultation process before drafting health policy. An understanding of leadership styles that positively impact change management in healthcare will assist them in the design of public policy so that practitioners can implement it. These implications for the public sector have been subdivided into subtopics to allow for focused discussion topics in the following paragraphs.

6.4.5.1 Capital and Infrastructure Procurement

Participants reported that capital procurement processes within the LHD and within NSW Health appear disjointed at best or haphazard at worst. Research

participants in this study suggest decision making is not timely and the process quite convoluted. There is a need for investigation of the efficacy of an actionable Capital Planning Program within NSW Health rather than lists of equipment held centrally by the NSW Health Ministry of Health with no meaningful feedback to department managers. Participants lamented that often, managers are advised by the Ministry of Health just before the financial year end, that they need to procure usually large pieces of equipment such as CT scanners or MRI machines under very tight turnaround times, without a proper due diligence process having occurred.

6.4.5.2 Enhanced Role of the Project Management Office (PMO)

It was noted that the LHD had a limited number of project officers, particularly in the capital works and infrastructure. Projects in this domain are facilitated and led by the capital works and infrastructure team which have more clearly defined processes and documentation in project management. The NSW Ministry of Health does have a Project Management Office (PMO). However, there appears to be very little collaboration between this centralised office and the LHD. It is recommended that the PMO undertakes a review of its collaboration with LHDs, particularly services that conduct change projects regularly. This may build and enhance capacity in these services to ensure that projects undertaken within the health system are value for money services. This may also provide an opportunity for information sharing on the key project management documentation required by medical imaging leaders. In SWSLHD, strategic projects may be managed by the Clinical Innovation and Business Unit or similar service such as the Procurement Service.

6.4.5.3 Organisational Learning for Different Staffing Groups

This research noted that organisational learning was reactive in some instances in medical imaging. While operations staff were aware that the lack of a second scanner at one hospital would exacerbate CT scanning demand, the executive appeared not to have on a higher priority, the replacement of this machine. A more responsive equipment procurement process as suggested in section 6.4.5.2 such as consultative processes in designing equipment specifications with end-users and the procurement function would assist in managing this process. One could also argue that there was a lack of alignment of performance KPIs against which executive performance was measured. This could be achieved by a closer alignment of clinical performance indicators, imaging performance and executive performance indicators.

6.4.5.4 Human Resources and Staff Development

While the leadership styles employed by medical imaging leaders may lead to successful change management within medical imaging, it raises the concern of a lack of alternative views and skills in leading change as evidenced by 92% of leaders using a consultative leadership style (section 5.5). These divergent views strengthen the decision-making processes as different scenarios are considered prior to any decisions being made. Medical imaging departments may need to consider the implications of this finding in the development of alternative skills or hiring practices to ensure a balance in the staff member competencies and skills within the departments. This could be done through personality testing or psychometric testing of aspiring leaders in medical imaging. Alternatively, the curricula for medical imaging educational programs could include leadership tuition to assist in the leadership skill development of future medical imaging leaders.

6.4.5.5 Innovations in Hard Built Greenfield and Brownfield Buildings

This research found that configurations or building layout impacted on the quality of care provided to patients. New innovations such as the integration of diagnostic testing at the point of care, i.e., in emergency departments are critical considerations for greenfield sites or those seeking to achieve efficiencies in workflows. This is so because it eliminates the porter, reducing patient transport challenges faced by hospitals with large footprints and which are lacking in contemporary patient transport models. The same can also be said of brownfield sites. From time to time, public hospitals undergo renewal. As suggested in section 6.4.5 policy analysts may promote the co-location or integration of EDs and medical imaging departments.

6.4.5.6 Financial Considerations in Decision Making

The increasing healthcare costs identified in section 1.2.5 and the misalignment of KPIs discussed in section 6.4.5.3 make it a challenging proposition to manage healthcare budgets. The researcher's experience has shown that there may not be a willingness to invest in some human capital-intensive initiatives. Participants reported that well-known problems appear not to be resolved for extended periods of time due to other financial constraints. For example, this research found that in larger hospitals the issue of porters (wardsman) is widely recognised as a challenge in internal transport of patients between wards or for studies. Patient transport turnaround time as identified in section 3.5.4.1 was the basis upon which leaders assessed the effectiveness of patient transport processes. Perhaps innovative solutions need to be considered, such as including relatives as partners in care. They can be partners through assisting in the transportation of appropriate patients for imaging studies, which would free up porters to those patients who require their assistance.

All research is not without limitations. The next section discusses the limitations of this research.

6.5 Limitations

The researcher worked as Business Manager for medical imaging services for SWSLHD for three years. In this time, the researcher was involved in several change management projects. This knowledge of medical imaging services could potentially have impacted on the researcher's interpretation of the information provided by the research participants. The potential bias was managed through the transcription of all interviews and verification by interviewees of each interview to ensure that their response had been captured accurately. Additionally, these results were discussed with the supervisory panel.

Prior to ethics approval, the researcher transferred to another role outside of the medical imaging service to an arm's length service, though still within the same LHD. As a result, the influence held by the researcher was deemed to be sufficiently managed to pose any ethical risk.

6.6 Further Research

Undertaking this research project has answered the questions that motivated the research, such as the causes of change project or process failure. As a previous leader within medical imaging this understanding will enable present leaders to take active steps to address knowledge or skills deficits so that they can lead projects successfully in the future and contribute to the scant scholarly literature in the area. The findings have indicated potential areas to explore for future research.

This study found that there is limited structured planning for equipment procurement within healthcare. Studies investigating the planning models

utilised within the public healthcare sector settings in Australia could be completed, with the findings also adding to this research. There is also a need for further research into newer equipment acquisition models that consider the capital sensitivity rules for medical imaging equipment as well as the sustainability of such models. This could be in the form of equipment funding products or schemes.

There is generally limited leadership research within medical imaging in healthcare, indicating that there is scope for further research in this area. Personal observations have led to the understanding that there are competing interests between the private practice arrangements of physicians in medical imaging and their employment arrangements within LHDs. Anecdotal reports not covered in this thesis include the four-day working week for medical imaging physicians, its impact on patient care and workload management within public medical imaging departments. These could be further investigated.

During this research, there was a major critical incident resulting in the death of an infant in the LHD. There were significant implications for the way that projects were generally conducted within the LHD, particularly governance concerns to manage risks. A future research area could be in the areas of governance and risk management and how they affect the leadership style employed. Such a study would add to this research and literature on leadership generally.

6.7 Conclusion

In conclusion, this study found consultative leadership as the dominant leadership style in leading change management in medical imaging in healthcare. Leaders should therefore utilise this leadership style in change

management projects to achieve superior outcomes to those expected from other leadership styles.

The definition of effective leadership as leadership that follows several characteristics and results in successful change management projects is a key contribution of this research. Previous literature had not adequately discussed the concept of strong leadership, which other scholars should now adopt.

The study also defined and extended literature on learning organisations by identifying that medical imaging leaders who learnt from prior change processes; achieved more positive outcomes in change management projects than non-learning leaders. This scholarly contribution is crucial for the modern-day medical imaging leader who is required to embrace emerging challenges in healthcare provision.

Finally, this research's findings, methodology, extensions to existing healthcare literature and recommendations to practice, have thus made a scholarly contribution to the area of medical imaging in healthcare.

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List of Appendices

Appendix A – Functions of the NSW Entities.....	276
Appendix B - Ethics Approval.....	279
Appendix C - Ethics Approval – Site Specific Authorisation.....	282
Appendix D – Participant Consent Form	284
Appendix E - Multifactor Leadership Questionnaire	286
Appendix F - Authentic Leadership Questionnaire.....	291
Appendix G – MLQ Sample Results Interpretation	292
Appendix H – MLQ International Normative Samples – Oceania.....	304
Appendix I - Categorisation Of Results From The Completed MLQ	305
Appendix J - Interview Questionnaire Round 1.....	306
Appendix K - Interview Questionnaire Round 2	307
Appendix L - Interview Questionnaire Round 3.....	308
Appendix M – Interview Transcript Coding.....	310
Appendix N - Round 1 – Sample Interview Transcript	311

Appendix A – Functions of the NSW Entities

State-wide Health Services

Entity	Functions
NSW Ambulance	is responsible for providing responsive, high quality clinical care in emergency situations, including pre-hospital care, rescue, retrieval and patient transport services
Health Infrastructure	is responsible for the delivery of the NSW Government's major works hospital building program, under the auspices of a Board appointed by the Secretary. The Board Members each offer specialised expertise in areas of health and infrastructure delivery.
HealthShare NSW	provides corporate services and information technology services to public health organisations across NSW under the auspices of a Board appointed by the Secretary. The mission of HealthShare NSW is to provide common shared services across corporate, technology and disability services to NSW Health customers in an innovative, efficient, and cost-effective manner. HealthShare NSW extensive state-wide services include implementing the latest IT health information systems, providing payroll and accounts payable functions, supporting patient care through food and linen services, and assisting people with a disability to live and participate in the community.
NSW Health Pathology	<p>is a state-wide clinical and scientific service that provides quality, reliable public pathology, forensic and analytical science services across NSW through four pathology networks.</p> <p>Our pathologists are medically trained clinicians who work in public hospitals and modern laboratories, providing critical testing for NSW Health, the NSW Food Authority and local government bodies. It also supports the state's judicial system by providing independent, objective analysis to law enforcement bodies including the police, local coroners and public prosecutors.</p>
eHealth NSW	is a distinct organisation within the NSW Ministry of Health providing state-wide leadership on the

	<p>shape, delivery and management of Information Communication Technology (ICT) led healthcare.</p> <p>eHealth NSW is responsible for setting eHealth strategy, policy and standards, and works with Local Health Districts (LHDs) and Health Agencies to implement state-wide core systems and ensure compliance with state-wide standards.</p>
Health Protection NSW	<p>Reporting to the Chief Health Officer, Health Protection NSW is responsible for surveillance and public health response in NSW including monitoring the incidence of notifiable infectious diseases and taking appropriate action to control the spread of diseases. It also provides public health advice and response to environmental issues affecting human health.</p>

Source: Developed for this research from information on the NSW Health Website as viewed on 04/08/2021

Pillar Organisations

Entity	Function
Agency for Clinical Innovation (ACI)	<p>is a board-governed statutory health corporation responsible for reviewing clinical variation and supporting clinical networks in clinical guideline/pathway development with encouragement toward standardised clinical approaches based on best evidence. The Agency for Clinical Innovation works with clinicians, consumers and managers to design and promote better healthcare for NSW.</p>
Bureau of Health Information (BHI)	<p>is a board-governed organisation that provides independent reports to government, the community and healthcare professionals about the performance of the NSW public healthcare system, including safety and quality, effectiveness, efficiency, cost and responsiveness of the system to the health needs of the people of NSW.</p>
Cancer Institute NSW	<p>is Australia's first statewide government cancer agency. Established under the Cancer Institute (NSW) Act 2003 to lessen the impact of cancer across the State, its statutory objectives are to reduce the incidence of cancer in the community, increase survival from cancer, and improve the quality of life for people with cancer and their</p>

	<p>carers and provide a source of expertise on cancer control for the government, health service providers, medical researchers and the general community. The Cancer Institute NSW leads the development and delivery of the state-wide NSW Cancer Plan, which sets out a coordinated and collaborative approach to cancer control, involving people affected by cancer, government and non-government organisations, health professionals and researchers. The Cancer Institute drives initiatives to reduce unwarranted variations in outcomes cross diverse cultural and geographic communities, report on the performance of cancer services and enhance cancer research capabilities across NSW.</p>
Clinical Excellence Commission (CEC)	<p>is a board-governed statutory health corporation, responsible for leading safety and quality improvement in the NSW public health system. It was established in 2004 to reduce adverse events in public hospitals, support improvements in transparency and review of these events in the health system and promote improved clinical care, safety and quality in health services across NSW.</p>
Health Education and Training Institute (HETI)	<p>is a Chief Executive-governed statutory health corporation which coordinates education and training for NSW Health staff. The Institute works closely with local health districts, specialty health networks, other public health organisations and health education and training providers to ensure that world-class education and training resources are available to support the full range of roles across the public health system including patient care, administration and support services.</p>

Source: Developed for this research from information on the NSW Health Website as viewed on 04/08/2021

Appendix B - Ethics Approval



Health
South Western Sydney
Local Health District

Research and Ethics Office
Leadership · Quality · Governance
Locked Bag 7103, LIVERPOOL BC, NSW, 1871
Phone: 02 8738 8304
Facsimile: 02 8738 8310
<http://www.sswahs.nsw.gov.au/swslhd/ethics/default.html>

12 May 2016

A/Professor Terry Sloan
Human Resources Department
University of Western Sydney
Locked Bag 1797
PENRITH NSW 2751
CC: Munyaradzi Gwede

*****THIS LETTER CONSTITUTES ETHICAL APPROVAL ONLY. THIS RESEARCH PROJECT MUST NOT COMMENCE AT A SITE UNTIL SEPARATE AUTHORISATION FROM THE CHIEF EXECUTIVE OR DELEGATE OF THAT SITE HAS BEEN OBTAINED.*****

Dear A/Professor Sloan,

Project Title: Leadership for change management; critical success factors in medical imaging departments in major teaching hospitals in NSW.
HREC Reference: HREC/15/LPOOL/360
Local Project Number: 15/201

Thank you for meeting with the Human Research Ethics Committee on 21 March 2016. This Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Research Involving Humans* and the *CPMP/ICH Note for Guidance on Good Clinical Practice*.

I am pleased to advise that the Committee has granted ethical approval of the above project.

The following documentation has been reviewed and approved:

Document	Version	Date
Cover Letter	N/A	21.07.2015
National Ethics Application Form	AU/1/B140217	23.07.2015
Protocol	1.1	23.06.2015
MASTER Participant Information Sheet	2.0	08.09.2015
MASTER Consent Form	1.0	13.07.2015
Bulundidi Gundaga – 3 Year survey	1.0	Undated
Questionnaire – 3.5 years of age	Not Provided	June 2009
Questionnaire – 4 years of age	2.0	October 2009
Questionnaire – 4.5 years of age	2.0	October 2009
Support Letter from Tharawal Aboriginal Corporation	N/A	09.06.2015
Ethics Further Information Letter 1	N/A	17.08.2015
Researchers response	N/A	06.09.2015
Protocol (Tracked and clean)	2.0	08.09.2015
Ethics Further Information letter 2		11.09.2015

Page 1 of 3

Please ensure for all future documents submitted for review include a document version number, document date and page numbering.

Monitoring Requirements:
(National Statement Chapters 2.1 and 5.5)

- The Committee has classified this project as:

Low Risk

- Monitoring required for this study will be:
 - Submission of Annual Progress Reports with the first report due **12 May 2017 and annually thereafter for the duration of the approval period. Please note that ongoing approval for this study will be granted pending review and approval of the first Annual Progress Report.**
 - **The first progress report is to include further information on the methodology and analysis which is to be reviewed the HREC before ongoing approval is granted.**

Approval has been granted for the following site(s):

- Liverpool Hospital
- Bankstown Lidcombe Hospital
- Fairfield Hospital
- Campbelltown Hospital

Please note the following conditions of approval:

1. The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
 - any serious or unexpected adverse events; and
 - unforeseen events that might affect continued ethical acceptability of the project.
2. The Principal Investigator will report proposed changes to the research protocol, conduct of the research, or length of HREC approval to the HREC in the specified format, for review. For multi-centre studies, the Chief Investigator should submit to the Lead HREC and then send the amendment approval letter to the investigators at each sites so that they can notify their Research Governance Officer.
3. The Principal Investigator will inform the HREC, giving reasons, if the project is discontinued before the expected date of completion.
4. The Principal Investigator will provide an annual report to the HREC and at completion of the study in the specified format.
5. The Principal Investigator must reassure participants about confidentiality of the data.
6. Proposed changes to the personnel involved in the study are submitted to the HREC accompanied by a CV where applicable.
7. The Principal Investigator is responsible for ensuring the research project is conducted in line with relevant NSW Health, South Western Sydney Local Health District and Hospital policies available from:
<http://www.sswahs.nsw.gov.au/swslhd/ethics/policies.html>

HREC approval is valid for one year, subject to review Annual Progress Reports. If the study is ongoing at the conclusion of the five year approval period, a full resubmission may be required. Ethics approval will continue during the re-approval process.

The South Western Sydney Local Health District Human Research Ethics Committee has been accredited by the NSW Ministry of Health to provide single ethical and scientific review of research proposals conducted within the NSW public health system and Victorian and Queensland Public Health Organisations participating in the Mutual Acceptance Scheme.

You are reminded that this letter constitutes ethical approval only. This research project must not commence at a site until separate authorisation from the Chief Executive or delegate of that site has been obtained. It is your responsibility to forward a copy of this letter together with any approved documents as enumerated above, to all site investigators for submission to the site's Research Governance Officer.

Should you have any queries about your project please contact Annamarie D'Souza on the telephone number listed above. The HREC Terms of Reference, Standard Operating Procedures, membership and standard forms are available from the SWSLHD website: <http://www.sswahs.nsw.gov.au/swslhd/ethics/default.htm>

Please quote the Local HREC reference 15/201 in all correspondence. The HREC wishes you every success in your research

Yours faithfully



Annamarie D'Souza
on behalf of
Professor Jeremy Wilson
Chairperson, SWSLHD Human Research Ethics Committee

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007)*. The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council.

Appendix C - Ethics Approval – Site Specific Authorisation



Health
South Western Sydney
Local Health District

Research and Ethics Office
Leadership · Quality · Governance
Locked Bag 7 103, LIVERPOOL BC, NSW, 1871
Phone: 02 8738 8304
Facsimile: 02 8738 8310
<http://www.sswahs.nsw.gov.au/swslhd/ethics/default.html>

12 May 2016

A/Professor Terry Sloan
Human Resources Department
University of Western Sydney
Locked Bag 1797
PENRITH NSW 2751
CC: Munyaradzi Gwede

Dear A/Professor Sloan,

Project Title: Leadership for change management; critical success factors in medical imaging departments in major teaching hospitals in NSW.
HREC Reference: HREC/15/LPOOL/360
SSA Reference: SSA/15/LPOOL/362 – Bankstown
SSA/15/LPOOL/363 – Campbelltown
SSA/15/LPOOL/364 – Fairfield
SSA/15/LPOOL/363 – Liverpool
Local Project Number: 15/201

SITE SPECIFIC AUTHORISATION

Thank you for your correspondence received 12 May 2016 in response to our request for further information dated 8 April 2016.

I am pleased to inform you that the Chief Executive has granted authorisation for this study to take place at the following site(s):

- Liverpool Hospital
- Campbelltown Hospital
- Bankstown-Lidcombe Hospital
- Fairfield Hospital

The following are authorised for use at the Liverpool Hospital, Campbelltown Hospital, Bankstown-Lidcombe Hospital and Fairfield Hospital sites:

Document	Master		Site Specific	
	Version	Date	Version	Date
MASTER Participant Information Sheet	2.0	08.09.2015	1.0	15/04/2016
MASTER Consent Form	1.0	13.07.2015	1.0	12/05/2016

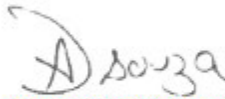
The following conditions apply to this research project. These are additional to those conditions imposed by the Human Research Ethics Committee that granted ethical approval:

1. Proposed amendments to the research protocol or conduct of the research which may affect the ethical acceptability of the project, and which are submitted to the lead HREC for review, are copied to this office.
2. Proposed amendments to the research protocol or conduct of the research which may affect the ongoing site acceptability of the project, are to be submitted to this office.

Page 1 of 2

3. Please note that you are responsible for making the necessary arrangements (e.g. identity pass and vaccine compliance as per NSW Health Policy Directive PD2011_005) for any researcher who is not employed by the South Western Sydney Local Health District and is conducting the research on-site.
4. The Principal Investigator is responsible for ensuring the research project is conducted in line with relevant NSW Health, South Western Sydney Local Health District and Hospital policies available from: <http://www.sswahs.nsw.gov.au/swslhd/ethics/policies.html>
5. Proposed changes to the personnel involved in the study at South Western Sydney Local Health District sites are submitted to the South Western Sydney Local Health District Research and Ethics Office accompanied by the required supporting documents. A list of the documentation required to add an Investigator to a study is located on the South Western Sydney Local Health District Research and Ethics Office website: <http://www.swslhd.nsw.gov.au/ethics/forms.html>

Yours sincerely,



Annamarie D'Souza

Manager, Research and Ethics Office

South Western Sydney Local Health District (SWSLHD)

Appendix D – Participant Consent Form

CONSENT FORM

[To be used in conjunction with a Participant Information Sheet]

Leadership for change management; critical success factors in medical imaging departments in major teaching hospitals in NSW.

I,.....
of.....

agree to participate in the study described in the participant information statement attached to this form.

I acknowledge that I have read the participant information statement, which explains why I have been selected, the aims of the study and the nature and the possible risks of the investigation, and the statement has been explained to me to my satisfaction.

Before signing this consent form, I have been given the opportunity of asking any questions relating to any possible physical and mental harm I might suffer as a result of my participation and I have received satisfactory answers.

I understand that I can withdraw from the study at any time without prejudice to my relationship with the South Western Sydney Hospital Local Health District.

I agree that research data gathered from the results of the study may be published, provided that I cannot be identified.

I understand that if I have any questions relating to my participation in this research, I may contact Munyaradzi Gwede on telephone 040 657 8752, who will be happy to answer them.

I acknowledge receipt of a copy of this Consent Form and the Participant Information Statement.

Signature of participant Please PRINT name Date

Signature of witness Please PRINT name Date

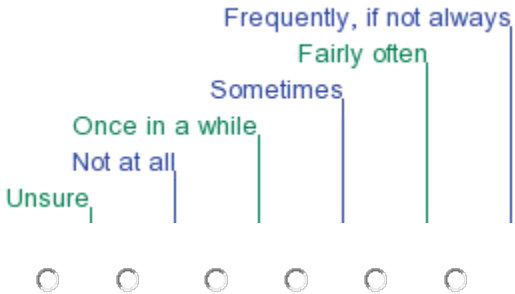
_____/____/____

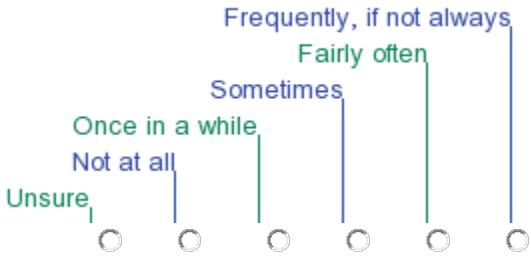
Signature of investigator (if applicable) Please PRINT name Date

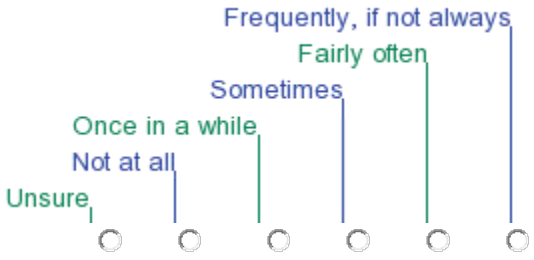
Appendix E - Multifactor Leadership Questionnaire

As a Leader...	<p style="text-align: center;"> Frequently, if not always Fairly often Sometimes Once in a while Not at all Unsure </p> <p style="text-align: center;"> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> </p>
1. I provide others with assistance in exchange for their efforts.*	
2. I re-examine critical assumptions to question whether they are appropriate.*	
3. I fail to interfere until problems become serious.*	
4. I focus attention on irregularities, mistakes, exceptions, and deviations from standards.*	
5. I avoid getting involved when important issues arise.*	
6. 6I talk about my most important values and beliefs.*	
7. 7I am absent when needed.*	
8. 8I seek differing perspectives when solving problems.*	
9. 9I talk optimistically about the future.*	
10. 10I instill pride in others for being associated with me.	

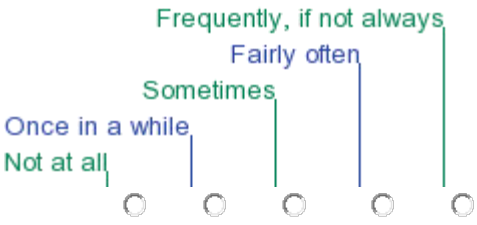
As a Leader...	<p style="text-align: center;"> Frequently, if not always Fairly often Sometimes Once in a while Not at all Unsure </p> <p style="text-align: center;"> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> </p>
11. I discuss in specific terms who is responsible for achieving performance targets.*	
12. I wait for things to go wrong before taking action.*	
13. I talk enthusiastically about what needs to be accomplished.*	
14. I specify the importance of having a strong sense of purpose.*	
15. I spend time teaching and coaching.*	
16. I make clear what one can expect to receive when performance goals are achieved.*	
17. I show that I am a firm believer in "If it ain't broke, don't fix it."*	
18. I go beyond self-interest for the good of the group.*	
19. I treat others as individuals rather than just as members of the group.*	
20. I demonstrate that problems must become chronic before I take action.	

<p>Items marked by * are required.</p>	
<p>As a Leader...</p>	
<p>21. I act in ways that build others' respect for me.*</p>	
<p>22. I concentrate my full attention on dealing with mistakes, complaints, and failures.*</p>	
<p>23. I consider the moral and ethical consequences of decisions.*</p>	
<p>24. I keep track of all mistakes.*</p>	
<p>25. I display a sense of power and confidence.*</p>	
<p>26. I articulate a compelling vision of the future.*</p>	
<p>27. I direct my attention toward failures to meet standards.*</p>	
<p>28. I avoid making decisions.*</p>	
<p>29. I consider each individual as having different needs, abilities, and aspirations from others.*</p>	
<p>30. I get others to look at problems from many different angles.*</p>	

Items marked by * are required.	
As a Leader...	
31. I help others to develop their strengths.*	
32. I suggest new ways of looking at how to complete assignments.*	
33. I delay responding to urgent questions.*	
34. I emphasize the importance of having a collective sense of mission.*	
35. I express satisfaction when others meet expectations.*	
36. I express confidence that goals will be achieved.*	
37. I am effective in meeting others' job-related needs.*	
38. I use methods of leadership that are satisfying.*	
39. I get others to do more than they expected to do.*	
40. I am effective in representing my group to higher authority.	

Items marked by * are required.	
As a Leader...	
41. I work with others in a satisfactory way.*	
42. I heighten others' desire to succeed.*	
43. I am effective in meeting organizational requirements.*	
44. I increase others' willingness to try harder.*	
45. I lead a group that is effective.*	
Items marked by * are required.	

Appendix F - Authentic Leadership Questionnaire

As a Leader I...	
	
1. say exactly what I mean*	
2. admit mistakes when they are made*	
3. encourage everyone to speak their mind*	
4. tell others the hard truth*	
5. display emotions exactly in line with feelings*	
6. demonstrate beliefs that are consistent with actions*	
7. make decisions based on my core values*	
8. ask others to take positions that support their core values*	
9. make difficult decisions based on high standards of ethical conduct*	
10. solicit views that challenge my deeply held positions*	
11. analyze relevant data before coming to a decision*	
12. listen carefully to different points of view before coming to conclusions*	
13. seek feedback to improve interactions with others*	
14. accurately describe how others view my capabilities*	
15. know when it is time to re-evaluate my position on important issues*	
16. show I understand how specific actions impact others*	
Items marked by * are required.	

Appendix G – MLQ Sample Results Interpretation

MLQTM

Multifactor Leadership Questionnaire

SELF-EVALUATION

DEVELOPED BY BRUCE AVOLIO & BERNARD BASS

REPORT PREPARED FOR:
JANE SAMPLE

Gender: FEMALE

Age: 22

QUESTIONNAIRE USED UNDER LICENSE BY:
Specialist: DRAGOS ILIESCU
Administered on: 25/05/2007
Report generated on date/hour: 30.05.2007 / 11:14:38
Identifier/serial number: 00067175



INTRODUCTION TO UNDERSTANDING THIS REPORT

This report will help in the better understanding of the preferences, attitudes, and behaviors characteristic for the evaluated person in key dimensions of his/her leadership style.

This report is intended for the use of psychologists, consultants or other specialised professionals in their work with clients.

These results should only be considered in conjunction with professional judgment, after a careful and detailed analysis, and only after corroborating these data with the results of an interview and of possible other psychometric instruments. Results contained in this report may be subject to alterations and special highlights as a function of such corroborations made by a specialised professional.

This report is based on the MLQ (Multifactor Leadership Questionnaire, Form 5X), a psychometric instrument that has been validated in a wide variety of research programs, including extensive studies in Romania.

The Multifactor Leadership Questionnaire (MLQ) is a structured, verbal, omnibus measure of leadership styles. The questionnaire consists of 45 items, covering what is known as the "full-range" leadership model.

GETTING THE MOST OF THIS REPORT

In order to get the most of this report, one should first understand the principles of the Full Range Leadership model and the distinctions between transformational leadership, transactional management, and passive/avoidant leader behavior, as well as the outcomes of leadership. All these are explained in the section labeled "Full Range Leadership Model".

The section labeled "Snapshot of the Leadership Profile" visualizes an overview of the concepts of the Full Range Leadership model. These concepts include Transformational Leadership, Transactional Leadership and Passive / Avoidant Leadership. The Snapshot also visualizes the passive vs. active forms of leadership, as well as the more effective vs. rather ineffective forms. The Snapshot is a good place to start in interpreting the results of this report.

Then, the scores for all leadership scales and their subscales should be considered, as reported to the selected norm. Raw scores are in this matter of little importance, so norm-referenced scores should be considered. All these are pictured in the section labeled "Drilldown of the Leadership Profile".

Finally, the "Norm-Referenced MLQ Profile" is intended for the use of researchers or specialists who want to build on an indepth norm-referenced image of the profile. The profile is represented in standardised T scores.

Also, this report has at the end a section labeled "Modus Operandi", where individual responses to the items of the questionnaire may be viewed and compared, as well as statistics about general response style, missing items etc.

THE FULL RANGE LEADERSHIP MODEL

Over the past 20 years, there has been considerable interest in the new paradigm of transformational and transactional leadership (Avolio, 1999; Bass, 1998).

Previous leadership models have fallen short in explaining a "full range" of leadership styles, ranging from the charismatic and inspirational leaders to avoidant laissez-faire leaders.

The full range model of leadership was developed to broaden the range of leadership styles typically investigated in the field. The model was labeled "full range" to challenge the leadership field to broaden its thinking about what constitutes a much broader range of leadership styles than the paradigms of initiation of structure and consideration.

The full range model of leadership assumes the existence of differences in the effectiveness of leadership styles, based on the active/passive distinction. Broad categories of leadership range thus from Passive / Avoidant Leadership (Laissez-Faire), through the classical model of Transactional Leadership and up to Transformational Leadership.

THE MLQ AS PART OF THE FULL-RANGE LEADERSHIP MODEL

The Multifactor Leadership Questionnaire is closely linked to the concepts of Transformational Leadership and of Full-Range Leadership.

The MLQ and MLQ Report have evolved over the last 25 years based on numerous investigations of leaders in public and private organizations, from CEOs of major corporations to non-supervisory project leaders. The major leadership constructs – transformational leadership, transactional leadership, and passive/avoidant leadership – form a new paradigm for understanding both the lower and higher order effects of leadership style. This paradigm builds on earlier leadership paradigms—such as those of autocratic versus democratic leadership, directive versus participative leadership, and task- versus relationship oriented leadership—which have dominated selection, training, development, and research in this field for the past half century.

The MLQ and MLQ Report were developed to expand the dimensions of leadership measured by previous leadership surveys and to provide a concise computerized feedback form that can be used for individual, team, and organizational development as well as individual counseling. Other leadership measures had generally ignored key factors, such as Inspirational Motivation, typically ascribed to successful leaders. Prior leadership research and training had concentrated on identifying and measuring behaviors that fell into a limited range that we have labeled Transactional leadership.

PASSIVE / AVOIDANT LEADERSHIP

Passive leaders avoid to identify and clarify potential problem areas, avoid to get involved, to set standards and to monitor for results. This leadership style has most of the time a negative effect on leadership results.

TRANSACTIONAL LEADERSHIP

In its more constructive form, transactional leadership is supplemented by working with individuals and/or groups, setting up and defining agreements or contracts to achieve specific work objectives, discovering individuals' capabilities, and specifying the compensation and rewards that can be expected upon successful completion of the tasks.

In its corrective form, it focuses on actively setting standards. In its passive form, it involves waiting for mistakes to occur before taking action. In its active form, there is closely monitoring for the occurrence of mistakes. In either its passive or active form, it focuses on identifying mistakes. Many consultants using the MLQ have found it useful to label Contingent Reward (CR) and Management-by-Exception: Active (MBEA) as Transactional Leadership and Management-by-Exception: Passive (MBEP) and Laissez Faire as Passive/Avoidant Leadership.

TRANSFORMATIONAL LEADERSHIP

Interestingly, when all levels of managers, students, and project leaders around the world were asked to describe the characteristics and behaviors of the most effective leaders they had worked with in their past, their descriptions encompassed much more than the reward for effort exchange behavior and corrective orientation that typifies transactional leadership. Specifically, they described leaders who had the greatest influence on them as transformational: inspirational, intellectually stimulating, challenging, visionary, development oriented, and determined to maximize performance. In many cases, the term "charisma" was used.

OUTCOMES OF LEADERSHIP

Transformational and Transactional leadership are both related to the success of the group. Success is measured with the MLQ by how often the raters perceive their leader to be motivating, how effective raters perceive their leader to be at different levels of the organization, and how satisfied raters are with their leader's methods of working with others.

SOME RESEARCH FINDINGS

Transformational leaders created greater alignment around strategic visions and missions.

Transformational leadership behaviour factors are associated with organisational sales increases, market share, earnings and ROI.

Scores on transformational leadership predict individual and group performance.

Transformational leadership has been found to explain between 45% and 60% of organisational performance.

Transformational leaders created greater unit cohesion, commitment, and lower turnover.

Transformational leadership predicted higher levels of product innovation in R & D teams.

Transformational leaders created safer work environments.

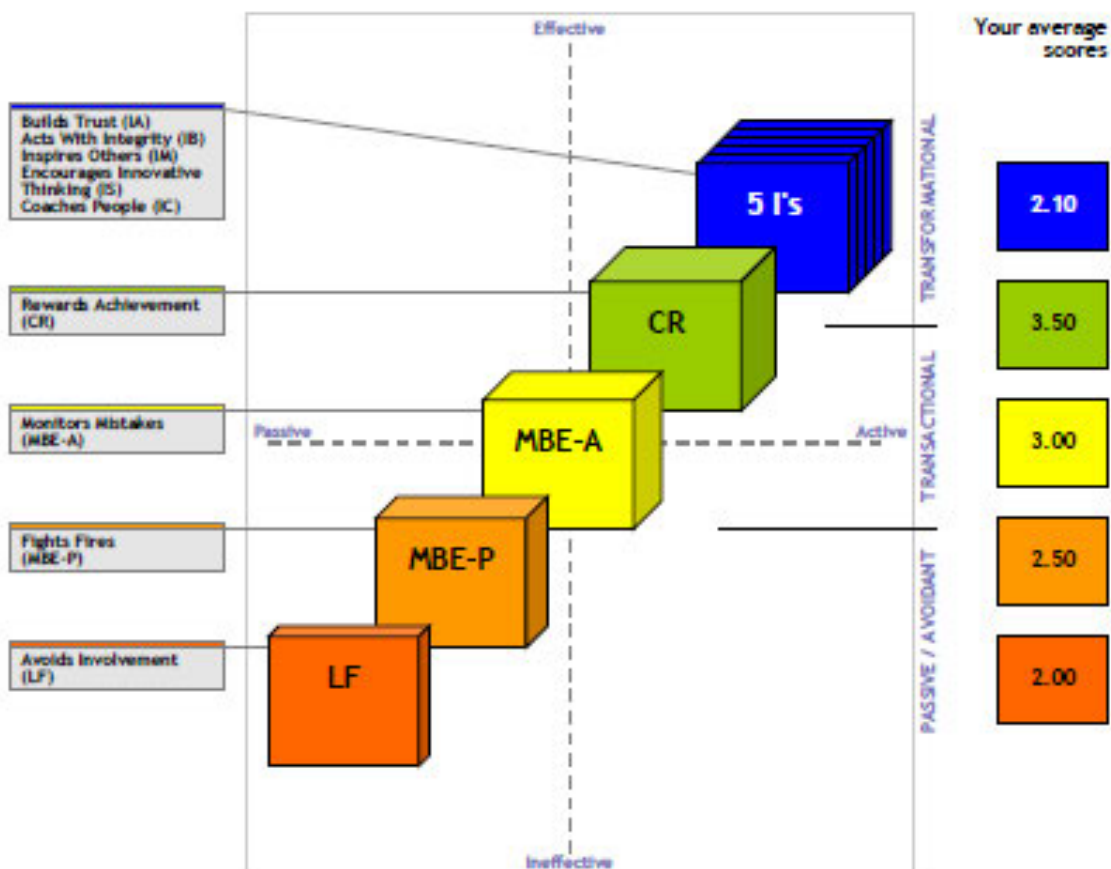
Transformational leadership training has been shown to improve leadership and associated performance over time.

The nine factor Full Range Leadership Model has been shown to best represent the data collected by the MLQ when sample characteristics and situation factors are statistically controlled.

SNAPSHOT OF THE LEADERSHIP PROFILE (Profiled against a full range of leadership styles)

The Snapshot of the leadership profile visualizes an overview of the concepts of the Full Range Leadership model. These concepts include Transformational Leadership, Transactional Leadership and Passive / Avoidant Leadership. The Snapshot also visualises the passive vs. active forms of leadership, as well as the more effective vs. rather ineffective forms.

Laissez-Faire Leadership (LF) is typical for managers who avoid involvement. It is passive, avoidant and ineffective. Transactional Leadership, in its passive form involves waiting for mistakes to occur before taking action - it is called Management-by-Exception Passive (MBE-P) and is regarded as part of the Passive/Avoidant leadership style. In its active form, of either Management-by-Exception Active (MBE-A) or Contingent Reward (CR), it involves a close monitoring of behaviors and actively setting standards. Transformational leadership encompasses much more than the reward for effort exchange behavior and corrective orientation mentioned above. Transformational leadership is inspirational, intellectually stimulating, challenging, visionary, development oriented. It is regarded as the most active and effective form of leadership.



0 = Never / 1 = Once in a while / 2 = Sometimes / 3 = Fairly often / 4 = Frequently, if not always

DRILLDOWN OF THE LEADERSHIP PROFILE

TRANSFORMATIONAL LEADERSHIP

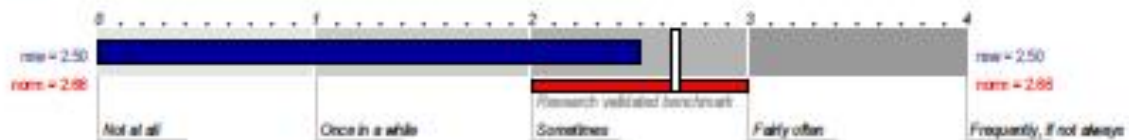


Transformational leaders have associates who view them in an idealized way, and as such, these leaders wield much power and influence over their followers. They want to identify with the leaders and their mission. They develop strong feelings about such leaders, in whom they invest much trust and confidence. Transformational leaders arouse and inspire others with whom they work with a vision of what can be accomplished through extra personal effort.

IA: IDEALIZED INFLUENCE, IDEALIZED ATTRIBUTES
RAW SCORE = 2.50

BUILDS TRUST

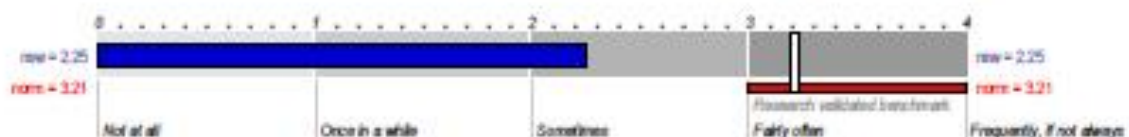
The IDEALIZED ATTRIBUTES scale identifies leaders who are able to BUILD TRUST in their followers. They inspire power and pride in their followers, by going beyond their own individual interests and focusing on the interests of the group and of its members. Thus, they become reference models for their followers. High scores on this scale identify leaders whom their followers attribute these special qualities. At no moment the scale suggests the objective presence of such qualities.



IB: IDEALIZED INFLUENCE, IDEALIZED BEHAVIORS
RAW SCORE = 2.25

ACTS WITH INTEGRITY

The IDEALIZED BEHAVIORS scale identifies leaders who ACT WITH INTEGRITY. High scores on this scale are typical for leaders who manifest positive and highly valued behaviors, like dominance, consciousness, self-control, a high moral judgment, optimism and self-efficiency. They talk about their most important values and beliefs; they focus on a desirable vision and almost always consider the moral and ethical consequences of their actions. They also zero in on building a commonly shared sense of a vision or mission for the team or group.



IM: INSPIRATIONAL MOTIVATION
RAW SCORE = 1.50

INSPIRES OTHERS

The INSPIRATIONAL MOTIVATION scale identifies leaders who INSPIRE OTHERS. Often, inspiration can occur without the need for identification of associates with the leader. Inspirational leaders articulate, in simple ways, shared goals and mutual understanding of what is right and important. They provide visions of what is possible and how to attain them. They enhance meaning and promote positive expectations about what needs to be done. The question one must ask is, "Whom are they inspiring - themselves or the greater good of their group, unit, organization, and/or community?"



IS: INTELLECTUAL STIMULATION
RAW SCORE = 3.00

ENCOURAGES INNOVATIVE THINKING

The INTELLECTUAL STIMULATION scale identifies leaders who are able to ENCOURAGE INNOVATIVE THINKING. In addition to idealized Influence and Inspirational Motivation, transformational leadership also involves the intellectual stimulation of associates' ideas and values. Through Intellectual Stimulation, transformational leaders help others to think about old problems in new ways. They are encouraged to question their own beliefs, assumptions, and values, and, when appropriate, those of the leader, which may be outdated or inappropriate for solving current problems. As a consequence, associates develop the capacity to solve future problems unforeseen by the leader. Associates learn to tackle and solve problems on their own by being creative and innovative. A key measure of a leader's effectiveness is how capable their associates are when operating without the leader's presence or direct involvement. An intellectually stimulating leader arouses in others a greater cognizance of problems, awareness of their own thoughts and imagination, and recognition of their beliefs and values.



IC: INDIVIDUAL CONSIDERATION
RAW SCORE = 1.25

COACHES PEOPLE

The INDIVIDUAL CONSIDERATION scale identifies leaders who are able to COACH PEOPLE. Individualized Consideration is another aspect of transformational leadership. It means understanding and sharing in others' concerns and developmental needs and treating each individual uniquely. In addition, Individualized Consideration represents an attempt on the part of leaders to not only recognize and satisfy their associates' current needs, but also to expand and elevate those needs in an attempt to maximize and develop their full potential. This is one reason why transformational leaders set examples and assign tasks on an individual basis. Transformational leaders also provide opportunities and develop organizational cultures supportive of individual growth.



TRANSACTIONAL LEADERSHIP



Transactional leaders work toward recognizing the roles and tasks required for associates to reach desired outcomes; they also clarify these requirements for associates, thus creating the confidence they need to exert the necessary effort. Transactional leaders also recognize what associates need and desire, clarifying how those needs and desires will be satisfied if the associate expends the effort required by the task. Such motivation to perform will provide a sense of direction and help to energize others. This approach, currently stressed in most popular leadership training programs, is helpful but limited to first-order exchanges.

Note that the transactional process, in which the leader clarifies what the associates need to do for a reward, is nevertheless viewed here as an essential component of the full range of effective leadership. The newer paradigm adds transformational leadership to previous transactional leadership models. It is likely to have direct relevance particularly to the volunteer sector where the rewards are more personal and social and are based on commitment to ideals. In introducing the concept of transformational leadership, Burns (1978) pointed out that the moral movers and shakers of the world don't cater to their self-interest as much as they enable others to transcend their own self interest for the good of their group, organization, community, or society.

Transformational leadership does not replace transactional leadership, it augments transactional leadership in achieving the goals of the leader, associate, group, and organization. Although transformational leaders can be transactional when appropriate, transactional leadership is often a prescription for lower levels of performance or non-significant change.

CR: CONTINGENT REWARD
RAW SCORE = 3.50

REWARDS ACHIEVEMENT

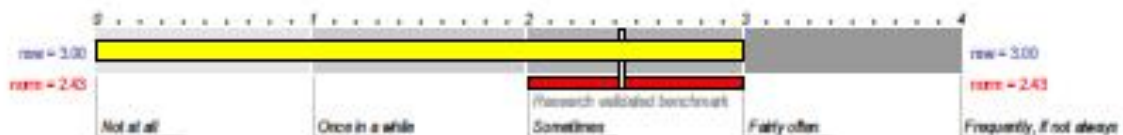
The CONTINGENT REWARD scale identifies leaders who are able to REWARD ACHIEVEMENT. Leaders scoring high on this scale tend to discuss in clear terms responsibilities for specific tasks and projects, state performance objectives, clarify rewards and punishments and express satisfaction when they get the correct output. Contingent rewards are an important leadership instrument in the transactional area, they result in bringing followers and groups to perform up to standard.



MBE-A: MANAGEMENT-BY-EXCEPTION: ACTIVE
RAW SCORE = 3.00

MONITORS MISTAKES

The MANAGEMENT-BY-EXCEPTION: ACTIVE scale identifies leaders who focus on MONITORING MISTAKES. High scoring leaders tend to specify with clarity compliance standards, as well as vividly describe inefficient performance. Following these descriptions, they focus on sanctions for not respecting the set standards. This leadership style focuses on a careful monitoring of deviations, mistakes and errors and on quick and thorough corrective measures, if appropriate. Leaders practicing an active management by exception use to keep track of mistakes, concentrate on errors and exceptions from the rule and on the treatment of these oversteps.



PASSIVE / AVOIDANT LEADERSHIP



Passive / avoidant leadership is typical for managers who do not react systematically to situations and problems which arise. Passive leaders do not clarify misunderstandings, do not make their expectations clear, do not set clear objectives and performance standards for their followers. This style has very often a serious negative effect upon individual, group and organizational results. Outcomes are most of the time exactly opposed to the intended consequences. This is why this outlook on leadership is often called "no leadership".

The MLQ discusses to special types of passive / avoidant leadership: Management by Exception: Passive (MBE-P) and Laissez-Faire Leadership (LF). Behaviors typical for Management by Exception: Passive are those behaviors where the leader takes corrective measure, but only after the fire has started. His behavior is thus not proactive, but reactive and focused on punishment. Behaviors typical for Laissez-Faire leadership are those behaviors where the leader avoids involvement completely, and does not even react to threats and problems arising. Most of the time this behavior states that a problem will disappear or solve itself in time.

Both passive / avoidant leadership styles (MBE-P and LF) have a negative impact on the performance of individuals, groups and organizations, as well as a strong emotional impact on followers and colleagues of leaders adopting these leadership styles.

MBE-P: MANAGEMENT-BY-EXCEPTION: PASSIVE
RAW SCORE = 2.50

FIGHTS FIRES

The MANAGEMENT-BY-EXCEPTION: PASSIVE scale identifies leaders who are able to FIGHT FIRES in their team or organization. If active management by exception focuses on continuously monitoring mistakes and deviations from the expected norm and taking corrective measures against the apparition of errors and mistakes, before these errors appear, passive management by exception waits for problems to appear before taking corrective actions. Managers using this leadership style adhere to the opinion that "if it isn't broken, don't fix it" and wait for problems to become severe before taking corrective action. Corrective actions are most of the time punitive.



LF: LAISSEZ-FAIRE
RAW SCORE = 2.00

AVOIDS INVOLVEMENT

The LAISSEZ-FAIRE scale identifies leaders who tend to AVOID INVOLVEMENT. This leadership style could be easily defined as "non-leadership" and is the exact opposite of an efficient transformational leadership style. Permissive leaders refuse to assume the responsibilities that are part of their position as leaders: they do not offer enough information to their followers, do not offer feedback, do not acknowledge or work towards their followers' satisfaction. High scorers in this scale avoid approaching important problems, are absent when needed, avoid making decisions and have late reactions to urgent problems.



OUTCOMES OF LEADERSHIP

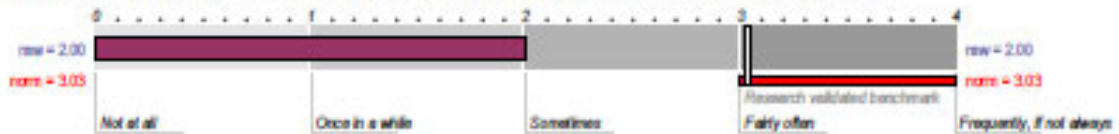


Both transformational and transactional leadership are closely related to individual, group and organizational success. Leadership efficiency is evaluated by the MLQ based on perceptions of followers, who should see their leaders as being good motivators, as having efficient interaction skills with different organizational levels and as generating satisfaction with work methods.

EE: EXTRA EFFORT
RAW SCORE = 2.00

GENERATES EXTRA EFFORT

The EXTRA EFFORT scale identifies leaders who are able to BE GENERATE EXTRA EFFORT in their followers. Extra effort, as one of the direct effects of an efficient leadership style, is defined as the wish of followers to strive for superior performance by deploying supplementary efforts, positively exceeding legitimate behavioral expectations of their leaders, their group or their organization. High scorers in this scale amplify the wish of their followers to succeed and to overstep objectives and induce positive supplementary behaviors.



EFF: EFFECTIVENESS
RAW SCORE = 2.25

IS EFFICIENT

The EFFECTIVENESS scale identifies leaders who are able to BE EFFICIENT. Efficient leaders satisfy the professional of their followers. They also efficiently represent the group in front of the higher organizational authority, are efficient in meeting organizational objectives and generally generate a higher efficiency in all the structures they are involved with.



SAT: SATISFACTION WITH THE LEADERSHIP
RAW SCORE = 4.00

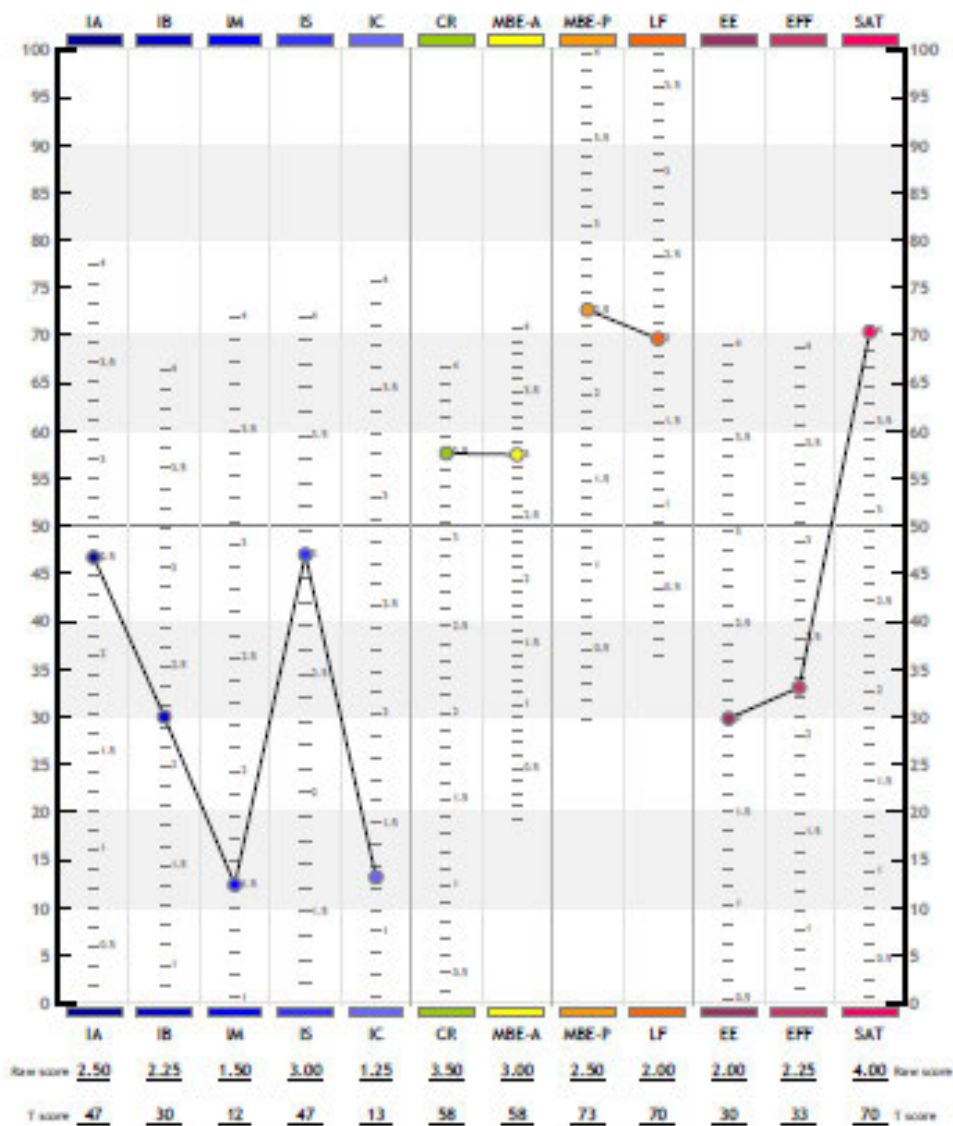
GENERATES SATISFACTION

The SATISFACTION WITH LEADERSHIP scale identifies leaders who are able to GENERATE SATISFACTION in their followers. Satisfaction with leadership is measured in the MLQ with only two items and identifies with its higher scores leaders who generate interpersonal satisfaction in their followers and colleagues. These leaders are warm, nurturing, open, authentic, honest persons, with good interpersonal and social skills, capable of developing feelings of satisfaction in their followers.



NORM-REFERENCED MLQ PROFILE (T SCORES)

Scoring based on: THE ROMANIAN NORMS FOR LEADERS, SELF-ASSESSMENT (N=785ss)



MODUS OPERANDI

ANSWERS TO THE ITEMS

(1): '4	(11): '4	(21): '3	(31): '2	(41): '4
(2): '1	(12): '1	(22): '2	(32): '4	(42): '3
(3): '2	(13): '3	(23): '1	(33): '1	(43): '2
(4): '4	(14): '2	(24): '4	(34): '3	(44): '1
(5): '1	(15): '1	(25): '3	(35): '2	(45): '2
(6): '3	(16): '4	(26): '1	(36): '1	
(7): '2	(17): '3	(27): '2	(37): '3	
(8): '4	(18): '2	(28): '4	(38): '4	
(9): '1	(19): '1	(29): '1	(39): '2	
(10): '2	(20): '4	(30): '3	(40): '1	

GENERAL ITEM STATISTICS

'0' answers: 0 out of 45 (0.00%)
 # '1' answers: 13 out of 45 (28.89%)
 # '2' answers: 12 out of 45 (26.67%)
 # '3' answers: 9 out of 45 (20.00%)
 # '4' answers: 11 out of 45 (24.44%)
 # missing answers: 0 out of 45 (0.00%)



MISSING ITEMS

Scale	IA	IB	IM	IS	IC	CR	MBE-A	MBE-P	LF	EE	EFF	SAT
Total number of items	4	4	4	4	4	4	4	4	4	3	4	2
Missing answers	0	0	0	0	0	0	0	0	0	0	0	0

Appendix H – MLQ International Normative Samples – Oceania

Table 10c Oceania (Australia, New Zealand and Pacific Islands)
Descriptive Statistics for MLQ 5X 2004 Normative Sample

Scale	Total Sample (N=13488)			(Self, N=1112)			(Higher Level, N=1860)			(Same Level, N=2341)			(Lower Level, N=4376)			(Other Level, N=2061)		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Idealized Influence: Attributed	2.94	0.76	4.00	2.86	0.54	3.25	3.05	0.78	4.00	2.88	0.76	4.00	2.94	0.77	4.00	3.00	0.77	4.00
Idealized Influence: Behaviors	2.89	0.75	4.00	3.05	0.61	3.75	2.99	0.79	4.00	2.84	0.72	4.00	2.86	0.77	4.00	2.83	0.73	4.00
Inspirational Motivation	2.99	0.77	4.00	3.07	0.59	3.50	3.02	0.83	4.00	2.87	0.77	4.00	3.05	0.77	4.00	3.00	0.75	4.00
Intellectual Stimulation	2.88	0.72	4.00	3.08	0.51	2.50	2.96	0.73	4.00	2.81	0.73	4.00	2.88	0.72	4.00	2.86	0.72	4.00
Individualized Consideration	2.89	0.78	4.00	3.20	0.49	2.75	2.98	0.74	4.00	2.80	0.75	4.00	2.85	0.83	4.00	2.87	0.75	4.00
Contingent Reward	2.90	0.74	4.00	2.90	0.54	3.50	3.03	0.72	4.00	2.84	0.71	4.00	2.88	0.80	4.00	2.94	0.71	4.00
Management by Exception: Active	1.79	0.92	4.00	1.69	0.83	4.00	1.87	0.97	4.00	1.77	0.89	4.00	1.78	0.92	4.00	1.85	0.88	4.00
Management by Exception: Passive	1.09	0.78	4.00	1.08	0.63	4.00	1.11	0.85	4.00	1.12	0.76	4.00	1.07	0.78	4.00	1.07	0.74	4.00
Laissez Faire	0.70	0.73	4.00	0.70	0.57	4.00	0.69	0.81	4.00	0.70	0.72	4.00	0.70	0.70	4.00	0.67	0.70	4.00
Extra Effectivenessort	2.63	0.90	4.00	2.68	0.61	3.67	2.76	0.86	4.00	2.47	0.92	4.00	2.69	0.91	4.00	2.63	0.87	4.00
Effectiveness	3.11	0.73	4.00	3.12	0.50	3.00	3.20	0.74	4.00	3.01	0.73	4.00	3.16	0.73	4.00	3.12	0.73	4.00
Satisfaction	3.14	0.83	4.00	3.12	0.53	3.00	3.20	0.84	4.00	3.07	0.81	4.00	3.14	0.87	4.00	3.18	0.82	4.00

Appendix I - Categorisation Of Results From The Completed MLQ

Characteristic	Scale Name	Scale Abbreviation	Items (questions measuring attribute)
Transformational	Idealised Attributes (IA) or Idealised Influence (Attributes) (II(A))	IA or II(A)	10,18,21,25
Transformational	Idealised Behaviours (IB) or Idealised Influence (Behaviour) (II(B))	IB or II(B)	6, 14, 23, 24
Transformational	Inspirational Motivation	IM	9, 13, 26, 36
Transformational	Intellectual Stimulation	IS	2, 8, 30, 32
Transformational	Individual Consideration	IC	15, 19, 29, 31
Transactional	Contigent Reward	CR	1, 11, 16, 35
Transactional	Management by Exception (Active)	MBEA	4, 22, 24, 27
Passive Avoidant	Management by Exception (Passive)	MBEP	3, 12, 17, 20
Passive Avoidant	Laissez -Faire	LF	5, 7, 28, 33

Characteristic	Scale Name	Scale Abbreviation	Items (questions measuring attribute)
Outcomes of Leadership	Extra Effort	EE	39, 42, 44
Outcomes of Leadership	Effectiveness	EFF	37, 40, 43, 45
Outcomes of Leadership	Satisfaction	SAT	38, 41

Appendix J - Interview Questionnaire Round 1

1. What change management projects have you undertaken?
2. Which staff occupations do you lead?
3. How long was your change management project process?
What were the key success measures?
Do you consider this project was successfully implemented?
What were your key considerations for the change management project?
4. What strategies did you use for your change management project/process?
5. How are these strategies different from those you use daily to manage your staff?
6. What do you consider as your leadership style?
7. How long have you used this leadership style? Does this leadership style work for you in most of the situations?
8. Has your leadership style changed from the last project you lead? In what way has it changed?

Appendix K - Interview Questionnaire Round 2

1. What change management projects would you like to discuss for this interview round?
2. How long was your change management project process?
 - a. How was the key success criteria measured?
 - b. Do you consider this project was successfully implemented?
 - c. What were the key reasons for success/failure?
 - d. What were your key considerations for the change management project?
3. What strategies did you use for your change management project/process?
4. What key learning did you take from your previous project into this project? Are these key learning points documented somewhere where they are accessed by other staff that relieve your position?
5. Do you share your project successes or failures with others within your team or wider organisation? If not why? If so, how do you share them?
6. How are these strategies different from those that you used in your previous project? How are they also different from strategies you use daily to manage your staff?
7. Your self-reported leadership style was previouslyDo you consider that this leadership style has changed? In what way has it changed?
8. Have there been major changes or events that have affected your work environment? What are they?

Appendix L - Interview Questionnaire Round 3

1. What change management projects would you like to discuss for this interview round?
2. How long was your change management project process?
 - a. How was the key success criteria measured?
 - b. Do you consider this project was successfully implemented?
 - c. What were the key reasons for success/failure?
 - d. What were your key considerations for the change management project?
3. What strategies did you use for your change management project/process?
4. How have these strategies changed from those that you used in your previous project? How are they also different from strategies you use daily to manage your staff?
5. Have you undertaken any change management training over the past 12 months to 2 years?
Have you undertaken any in your working life?
6. Has your team changed over the change process?
7. What key learning did you take from your previous project into this project? Are these key learning points documented somewhere where they are accessed by other staff that relieve your position?
8. Do you share your project successes or failures with others within your team or wider organisation? If not, why? If so, how do you share them?
9. Your self-reported leadership style was previouslyDo you consider that this leadership style has changed? In what way has it changed?

10. Have there been major changes or events that have affected your work environment? What are they?
11. Have you completed the Final LSI questionnaires I send to you?

Appendix M – Interview Transcript Coding

Node Name
Attitude to change
Change affecting multiple stakeholders or systems
Change leadership vs daily leadership
Consultation
Demographics
Expected Outcomes
Extra Comments
Key Lessons Learnt
Key Project considerations
Leadership Style
Management Responsibility
Organisational Learning
Process
Projects
Reason for project success
Reasons for project failure
Stakeholders involved
Strategies used
Trial before implementation
Was Project Successful

Appendix N - Round 1 – Sample Interview Transcript

Interviewer: Alright. Thank you, Participant 2, for meeting me and allowing me the time to interview you for my PhD. As you are aware, my PhD topic is, “Leadership for Change Management, Critical success factors for managing change in Medical Imaging Departments in the public hospital system”. And as you are aware also, we are using this study for the hospitals within the South Western Sydney LHD, with such as Campbelltown, Liverpool, Fairfield and Bankstown.

Participant 2: and Camden

Interviewer: no not Camden, Camden/Campbelltown is the same

Participant 2: and Bowral?

Interviewer: No, not Bowral. We don’t manage the imaging.

So, I will give you the questions that we will walk through.

Participant 2: Ok

Interviewer: The purpose of this one is that it is a pilot study. And also it depends whether I get enough responses or not, I might add the pilot to the final data collection.

So for the record, please describe your role in imaging?

Participant 2: So I am the [position title] for South Western Sydney LHD. So I manage the [service type] aspects and [identifying word] manage.

Interviewer: In terms of Change management, what projects have undertaken recently?

Participant 2: Just for imaging?

Interviewer: Yes just for Imaging.

Participant 2: Uhh, I think we got the [...Manager]. That was quite hairy. What else have we done? Ahh we are currently doing the [a system name].

Interviewer: Yes.

Participant 2: And also we have done a lot of work on the back end of [a system] with notifications.

Interviewer: Yes: Yes

Participant 2: [clear project description].

Interviewer: Right, thanks for that. So on those projects that you have led, perhaps we can discuss one for this interview.

Participant 2: Yep.

Interviewer: Perhaps we will leave the [a project name] for our second round of interviews.

Participant 2: Yep that would be great.

Interviewer: So which one do you want to talk about?

Participant 2: I don't know, you can choose. You were there. Do you want to talk about the back end of [a system]? We can do that one or do [a project name]?

Interviewer: Let's do [a project name].

Participant 2: Ok. Done

Interviewer: Ok. So what sort of Project was it? Can you please describe the Priority Ordering project.

Participant 2: So when we were having a look at our workflows in imaging, they all came in under the same, under basically where the patient was. Basically due to location. Round about 70% of all our ordering comes from ED and of course

we are getting busier especially at Liverpool, especially with one CT scanner.

Interviewer: Yes

Participant 2: That we were unable to look at getting these patients through especially within the 2 hour period, because that what they wanted us to do for all patients.

Interviewer: Yes.

Participant 2: There was no way for us to see which patients were more urgent than others or required a faster CT or any type of images from ED.

Interviewer: Uh humn.

Participant 2: So we had a look at changing the whole system to be based on priority rather than location based ordering.

Interviewer: Ok. So how long did was that change management process over?

Participant 2: It's still going on.

Interviewer: so you would say 1 to 2 years.

Participant 2: Yes.

Interviewer: So what were the key considerations for this project? I know you talked about the fact that you couldn't clearly identify ED patients, which ones were more urgent than the others

Participant 2: Yes

Interviewer: What are the key considerations therefore, for this project?

Participant 2: Umm the Interphase with [patient information system] was particularly important.

Involving all the key stakeholders especially ED and those requiring imaging such as ICU for MET calls etcetera.

Involving Clinicians outside of that.

So you had buy in by those Medical and Surgical Clinicians and as I said, eMR was a big thing.

Interviewer: Yes

Participant 2: And looking at our PACS/RIS system to see if it could actually do it.

Interviewer: That's good. What sort of strategies did you use for this change management?

Participant 2: We had a Communication Plan.

Interviewer: Yes.

Participant 2: And the Communication Plan basically outlined our steps to get to the ending.

Interviewer: Yes

Participant 2: Lots and lots of meetings with the key stakeholders. Now that is also creating meetings ourselves, and involving people but also interphasing with existing meetings but also District meetings such as the [meeting name] meeting.

Interviewer: Yes

Participant 2: Because we had to have a change management strategy with Sydney [LHD]. So we had to divorce from Sydney's eMR for ours. So tabling it with them and making them aware that this what we were going to do. Having a look at how we were going to do it first and then engaging.

Interviewer: Ok. So from a governance perspective what would you think were the key considerations or the governance process for that project?

Participant 2: I think the first thing is to work out if you can do it, like what's going to happen? Can we do it? How is it going to look? Will it actually work? And I think that even when you are setting up the governance and structures. It's talking to the key stakeholders to begin with.

Interviewer: Yes

Participant 2: Looking for those Champions. Seeing if you come up with an idea, seeing if it's actually going to benefit the other people. Because what you think may not actually benefit people at some stages.

Interviewer: Yes

Participant 2: So involving ED earlier on and involving eMR earlier on to say is this something you would like. Umm you know, we have looked into it, we know we can do this, is this something that you would like and then if they say it's something that we like then its developing that plan, having key milestones to hit.

Interviewer: Yes

Participant 2: Putting timelines around it.

Interviewer: Yes

Participant 2: And renegotiating those timelines if there is some issues. Having like a definite timeline for the project but also maintaining a bit of flexibility within those.

Interviewer: Ok great. Thanks for that. In terms of your say from your management of staff. Are there strategies that you use to manage staff that are different to those you use to manage staff in projects?

Participant 2: Umm, I think there is overlap.

Interviewer: Yes

Participant 2: There is definitely an overlap.

Interviewer: Yes

Participant 2: With managing staff on a day to day basis, I try to let them see the outcomes.

Interviewer: Yaah

Participant 2: So how are you going to get there. That's what you are doing in project management as well but you know, if they come across a problem then they should be able to see the outcomes or talking them through it so they can see it. How to get there. Looking at the barriers, looking at what options there are. Accountabilities, all those types of things.

Interviewer: Yes

Participant 2: But I think with a project of this size, you do tend to take the higher level stuff on yourself or involve your colleagues at that level to ensure that you are on the same page, to make sure that you have ticked all the really really big ones.

Interviewer: Yes

Participant 2: And then involve those key staff members to champion the rest to work simultaneously with the other people with what they doing every day.

Interviewer: In terms of the staff occupations, what sort of occupations do you manage or do you lead?

Participant 2: Who do I manage, I don't manage anybody! Professionally manage?

Interviewer: Professionally manage and lead as well.

Participant 2: [profession], definitely of course, [another profession] including [another profession] of course. [different

profession] as far as more of that background work, teaching and how to kind of get there.

Interviewer: Yes

Participant 2: Primarily [profession], because you are kind of writing things for them and showing them the way to do things. [Profession], I think that's about it.

Interviewer: Ok, great. Thank You. Now we will talk a little bit about your leadership style.

So Leadership style in the context of this project, I am looking at, I know you have undertaken some management studies. I am looking at whether your leadership style is perhaps; Laissez-fairer – you let things go or you are a participative leader who let staff and yourself participates as part of the leadership team or you are a democratic leader who allows you staff to give you their views before you make your final decision. Or you are an autocratic leader or a transformative leader?

Participant 2: Yeah yeah.

Interviewer: You want to come from one perspective and then arrive at a different perspective and take people through a journey and transform or whether we are looking in terms of authentic leadership where your views or moral campus sort of defines how you make your decisions subconsciously? You are thinking if it's me, having this, how would I like a decision being made this way and that way, it drives your decision making.

Could you please describe your leadership style in sort of that context?

Participant 2: I think that you stop and change depending on where you are.

Interviewer: Yes

Participant 2: And what you do. I think I have written lots of assignments on this. I don't think you are one type of leader all the times. I think there is a place for all of those styles. But there's more places for some than others.

Interviewer: Yes

Participant 2: If I had to pick one, probably transformational.

Interviewer: Transformational

Participant 2: Transformational or what's the other one?

Interviewer: Transformation, Authentic, Democratic, Participative

Participant 2: Participative

Interviewer: ok

Participant 2: Yeah, because you do, you have to get people involved, but you have to get, the whole idea of a leader is not just to lead a team. The whole idea is to get people on board, have a look at their visions and your vision. Keep getting back to them and say, have I missed anything? How can I help you?

Interviewer: Yes

Participant 2: Because one day you want people to take your job.

Interviewer: Absolutely

Participant 2: You want to push them as far as they can go and support them.

Interviewer: Great, thanks for that.

So if we are talking transformational leadership and participative leadership, out of 100, what or where would

you scores be? Would you say you are 50% a transformational leader or you are 20% one or what would you say?

Participant 2: Probably 70/30.

Interviewer: 70% transformational and the other 30% more participative?

Participant 2: Yeah

Interviewer: ok

Participant 2: They kind of go hand in hand. Sometimes

Interviewer: So do you consider that this leadership style works for you in most situations?

Participant 2: Yeah in most situations. Sometimes it does not work.

Interviewer: Ok, in the cases that it has not worked, what have you tended to do? What sort of style have you adopted?

Participant 2: I think when you come across people who do not want to go with you, who can't see vision, who are kind of trapped, like they don't want to be there.

Interviewer: Yes

Participant 2: In all seriousness it is easier to say maybe this is not the project for you to be involved in. but sometimes as you know in health, you are told, you are on the working party, that is it! You are there.

Interviewer: Yes

Participant 2: and you can't kind of swap and change. Then I think it becomes more autocratic. Not that you ever wanted to.

Interviewer: ok, fair enough

Participant 2: But that would be very very rare. You can normally find something that would engage that person, that would be

their passion. If you can find that person's passion and then you push them forward and kind of go, how are we going to do this? I think this is great if you can take on that role.

Interviewer: Yes, ok, that's good. So from the project that we were talking about, before the [project name], do you consider your leadership style as having changed in that project, say from prior projects that you have led? Or did you try a certain style of leadership and then you decided after leading those projects that well, this style has not worked as well as it should. And for this new project, I will probably use this new tact?

Participant 2: No, Not really. But then again I have done a few projects before in my time. So it's kind of not the first. But I think if it was earlier in down the track then I might swap and change. I think when I started doing projects, because you did not want to step on anyone's toes, you were very very laissez-faire.

Interviewer: Yes

Participant 2: But as time got on, you learnt how to engage better and not lead, but be a part of.

Interviewer: Oh Ok, that's good.
so in leading projects, what do you think are the key considerations that you have embedded in your leadership for change management?

Participant 2: In what sense?

Interviewer: In the sense that perhaps that you collaborate more or you consult more or what key ingredients do you think contribute to the success or failure of your projects?

Participant 2: Collaboration, for sure. And I think that was in one of my earlier projects an issue. I didn't collaborate well and boy did I learn! Because everybody just went no!

Interviewer: Ok

Participant 2: So I think it's not only just the collaboration but it's also the feedback. That continual feedback loop from people, getting their ideas, getting their visions and the taking them with the group and embedding them in the way forward. Making sure everybody is kind of involved.

Interviewer: ok that's fine

So from you leading projects within this District, what's your experience from learning from past projects that we have done?

Participant 2: Definitely engagement and engagement across the board.

Interviewer: No. I mean in terms of the organisation. Is the organisation an environment where perhaps we have a similar sort of project 2 years earlier and those learnings are carried forward to the next project? What's your experience with that?

Participant 2: Yeah, I think they are embedded in life. So your projects that have been successful in uptake by people, are now part of the experience of Health really.

Interviewer: Ok, that's good.

Participant 2: I hope so.

Interviewer: Alright, the other thing that I will probably want to talk about is more around the interview itself. Is there anything that you were expecting to be asked that you were not asked?

Participant 2: No.

Interviewer: What would you like to see in next interview rounds?

Participant 2: I think it would be good to, I know you are talking about Medical Imaging Leadership. I think it would be good to involve multi-disciplinary projects or multi stream projects. There is lots and lots of such projects that cross over and its really really hard [Interviewer] to say what type of leader you are.

Interviewer: Ok

Participant 2: With your style. So like put yourself into a box, because all the literature says this is the way to go. Somebody will come up with a new model of care and say this is the type of leader you are and this is this box.

Interviewer: Absolutely, I agree entirely. So, I have done Myers Briggs and you tend to find that you are EJP or whatever, but there is times that I find myself that my leadership style changes just depending on the situation and what you have to lead and what you have to manage. It just changes all the time.

Participant 2: It's hard to say which one you are but I think the bottom line is how you manage difficulties.

Interviewer: Yes

Participant 2: How you get through what you need to get through?

Interviewer: So talking difficulties, what sort of experience do you have managing challenging situations. I know in health you get a lot of headstrong people?

Participant 2: I think there is a thing that you need to do ask questions. What's the issue? What's the problem? What is it? And I think you will drill down to the bottom of it. Sometimes, there is a lot of fluff around it.

Interviewer: Yes

Participant 2: Sometime people just want to cry. And you need to look at what are the barriers to something, like think of why is this a problem? Tell me about the barriers you have got. What are the options that we have to get out of this, what can you see happening and then say ok, if you can see this happening, would you like to lead this?

Interviewer: Yes

Participant 2: How can I help you to get there and then kind of sum everything up. I think that way they feel empowered because, they have heard their gripe, you have worked out their gripe, taken out all the fluff and emotion and worked out the options. Worked out how they are going to do it. So, they are engaged in their problem solving.

Interviewer: Yes

Participant 2: And it's taken me years and years to work that out.

Interviewer: That's good!

Participant 2: Rather than just here is the problem, here is the solution! And I think that new leaders in particular, doesn't matter what project, it doesn't matter how many times you write a Gantt chart. If that person is not engaged or that person or area of specialty is not engaged, then they are just going to put up walls, walls and walls.

Interviewer: Alright, thank you very much. That concludes our formal interview.

Participant 2: Thanks [Interviewer].