EXPLORING SUCCESS IN TECHNOLOGY LEADERSHIP AND PATHWAYS TO CATALYSE PARTICIPATION OF WOMEN IN LEADERSHIP

A Thesis submitted by

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For the award of

Doctor of Business Administration

2023

ABSTRACT

Australian technology leaders must evolve their leadership context to be relevant now and into the future. At no other time in human history has a near-majority of the world's population been connected with each other digitally, contributing to the accumulation of greater knowledge, yet arguably the Australian Technology Leadership Context remains associated with a discipline skill set borne in a time before the connected machine age (McAfee & Brynjolfsson 2017). Combine this outdated skills context with a male-dominated discipline, where a 2017 global report of 4,498 technology executives confirmed that the overall growth rate for women into technology roles is slow, with only 10% of senior technology leaders being female (Harvey Nash & KPMG 2017); the C-suite and the Technology Leadership Context is positioned for disruption. The objective of the study was to address the Australian Technology Leadership Context, the impact this will have on an organisation's sustainability and address the gender gap in the profession, improving diversity in executive teams. It was determined based on the research problem identified: that a qualitative study would support this research. Constructivism emerged as the most appropriate ontological approach to explore the phenomenological aspects along with epistemology aligned to Interpretivism. Further, it was confirmed during literature review that there is limited Australia-based research into the Technology Leadership Context, and therefore a methodological approach which provides the opportunity for in-depth process of inquiry to better understand the research problem was adopted (Creswell 1998). This study was based on the experiences of a stratified sample of Australia's Awarded Top 50 Technology Leaders (CIO) to provide insights into their leadership, career journey and influences. The findings indicate there is a sequence for the most successful technology leaders as they traverse their careers and, contrary to assumptions, both men and women experience the same sequence for this discipline. However, the unintended consequences of well-intended efforts impact diversity in executive leadership and confirms a woman in leadership self-perpetuating role model deficit cycle. The final section concludes the paper by qualifying the overarching purpose of the research to deliver an examination of the Australian Technology Leadership Context and, by knowing this, improve the gender diversity in executive roles. The findings validate the importance of this study deliver proposed practical frameworks related to improving the participation of women in leadership.

CERTIFICATION OF THESIS

I, Angela Coble, certify that Thesis entitled *Exploring success in Technology Leadership and pathways to catalyse participation of women in leadership* is not more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. The thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Date: 31August 2023

Endorsed by:

Professor Retha Wiesner
Principal Supervisor

Student and supervisors' signatures of endorsement are held at the University.

ACKNOWLEDGEMENTS

I wish to acknowledge the authors before me who inspired me to seek answers to that which I could not find and apply the rigour of a researcher to uncover that which was yet to be discovered.

I wish to acknowledge the support of my supervisory team, Professor Retha Wiesner and Dr Bronte Van der Hoorn – the journey was long, but the rewards are great. Thank you for your years of support and guidance.

I wish to acknowledge the participants without whose time and trust with their stories, this research would not have been delivered.

I wish to acknowledge my colleagues and peers who were long suffering recipients of my journal quotes and theorising. Thank you for your enduring support.

This research has been supported by the Australian Government Research Training Program Scholarship.

COVID-19 Acknowledgement

I wish to acknowledge the unprecedented timing of this research. Commencing in July 2019, with Confirmation of Candidature completed March 2020, it was the same week I lead a multi-national organisation to remote working in response to the COVID-19 pandemic. During the height of COVID-19 and the health crisis in Australia, I conducted my Higher Degree by research, whilst maintaining my fulltime executive technology role and leading the organisation through this unprecedented time in history as their business continuity executive. It is with a sense of accomplishment, through a time of intense pressure, that I sustained good mental health and unwavering focus, to deliver my dissertation.

DEDICATION

This research is dedicated to my family.

To my grandparents who created a life that showed me what dedication and hard work looked like.

To my parents, my life's cheerleaders, you showed me what optimism felt like.

To my brother, who gave me the gift of perspective, carried with me every day.

To my children, who gave me the gift of kindness and the art of living in the moment for all the joy it creates.

To my husband, who flamed my courage to pursue my dreams and gave me the gift of self, clarity of purpose and unwavering love and support throughout my learning and throughout my life.

This thesis is for all of you with my eternal thanks and gratitude for the gifts you have given me, the belief that no matter my gender or place of start, that I could achieve whatever I wanted through discipline, clarity, courage, and kindness.

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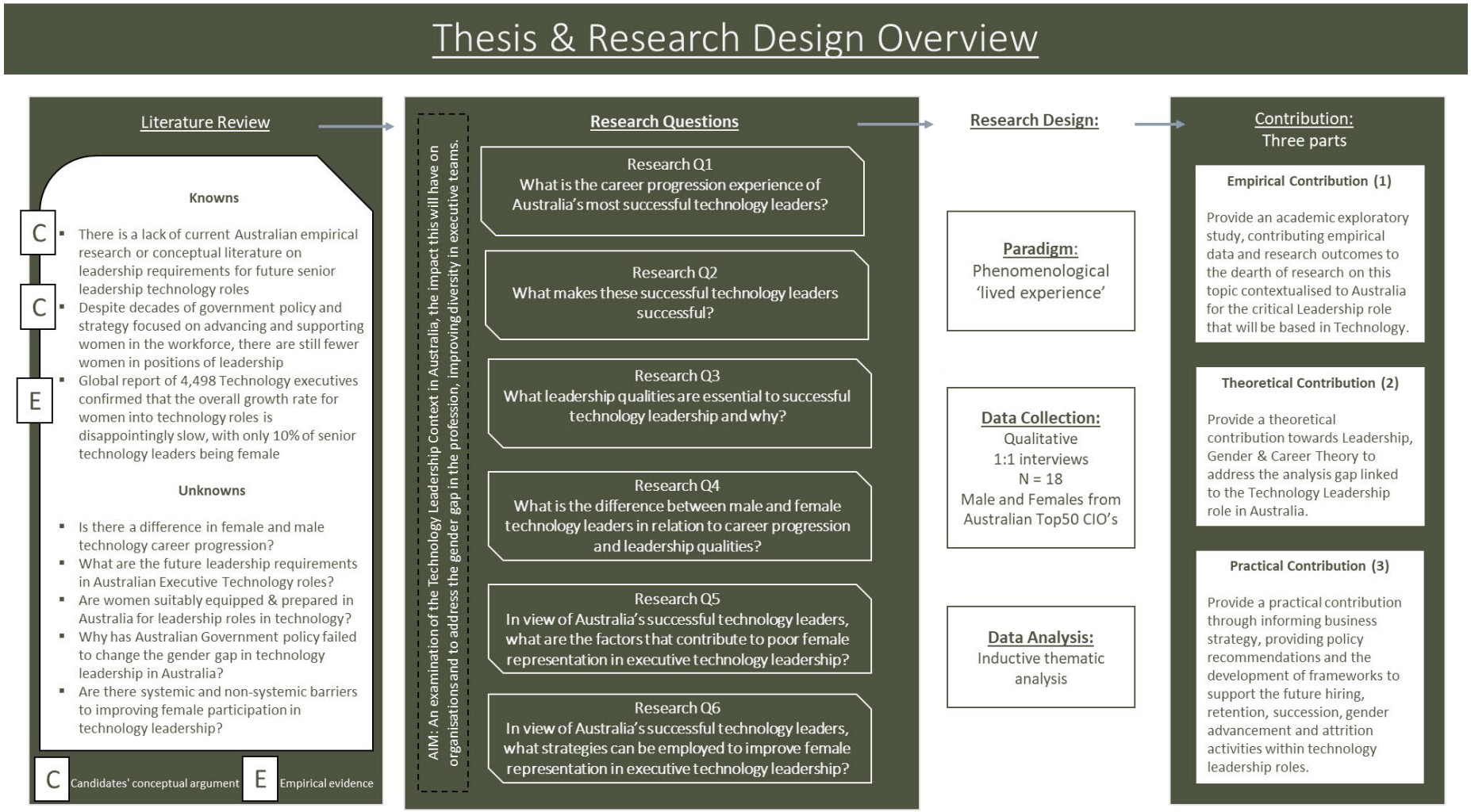
THESIS AND RESEARCH DESIGN OVERVIEW



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CHAPTER 1: INTRODUCTION

The purpose of Chapter 1 is to provide the foundation for the thesis by introducing the research problem, the overall research objective and associated research questions, along with a broad overview of the research methodology. First the background will be set to support the problem statement and a discussion will be developed to outline the main objective of the study before conveying the expected contribution to the field of research. A brief discussion of the research methodology and design will follow before confirming the ethics review and approval granted, and finally the key terms and delimitation will be provided prior to concluding this chapter in summary.

1.1 Background

"When you learn, teach, when you get, give."
Maya Angelou (n.d.), American Poet

There is a lack of current empirical research or conceptual literature on the leadership context and requirements to succeed in future senior leadership technology roles in Australia (Warne et al. 2011). Additionally, despite decades of policy and strategy focused on advancing and supporting women in the workforce, there are still fewer women in positions of leadership as reported by Australian Bureau of Statistics (2018) and Workplace Gender Equality Agency (2018). It is acknowledged that skills in science, technology, engineering and mathematics (STEM) will be the foundation for economic growth in the future (Australian Academy of Science 2019) and regrettably there are far fewer women entering or remaining in STEM-related fields with current statistics in Australia hovering at 16% (Australian Academy of Science 2019). It is probable that this poor rate of participation is contributing to a deficit of women in positions of STEM leadership (Shein 2018) and highlights the need for further research to understand career progression and leadership styles of Australia's successful technology leaders.

Most technology-framed leadership research is from America or India (Divya & Suganthi 2017), however these cultures differ vastly from Australia, where studies reveal we are grouped more with the European countries in our cultural heritage and norms (Stankov 2016). In the literature, there is a broad body of work related to gender equality in STEM, yet it is difficult to extract the technology-relevant research with greater emphases on the science, engineering, and mathematics components (Shein 2018). This situation highlights and strengthens the need for locally focused, globally relevant, research to move Australia away from being reliant on empirical research from other regions for the purpose of providing insight regarding technology leadership and gender parity inputs. Our country requires research from the Australian setting to guide and inform new government policy or dispute our previous attempts to solve parity in technology-related disciplines. A mere 1% shift of Australia's workforce into STEM could contribute $57.4 billion to the nation's Gross Domestic Product over the next 20 years (Australian Academy of Science 2019) and with 47.5% of the Australian workforce women (Australian Bureau of Statistics 2018), a focus on gender specific policy in technology is opportune and compelling.

For this research, technology roles will be defined as the group of executives in an organisation responsible for the technology function, applications, digitisation and infrastructure that enable and drive the overarching business strategy and goals. The top technology leader is most frequently referred to the as the Chief Information Officer or CIO (Rouse & Liftman 2015).

1.2 Research motivation – the problem statement

In 2011, the Australian workforce participation rate among those aged 15 to 64 years for technology roles was 25% women and 75% men, with women also holding a relatively low share of STEM qualifications (Professionals Australia Gender and Diversity 2013). Fast forward to 2020, and the STEM equity data lacks transparency to the Information Technology (IT) field showing only 28% female participation across all STEM fields (Department of Industry Science Energy and Resources 2020). There are continuing conversations and broad statements available, such as that by Professor Lisa Harvey-Smith, the Australian Government Women in STEM Ambassador at the update to a STEM grants process, that fields such as IT are incredibly underrepresented (Rule & Harvey-Smith 2022).

The literature indicates that there is substantial exploration, both empirical and conceptual, of gender and women in leadership. However, there is extremely limited, and where available, decades old research into technology leadership roles, particularly in Australia (Trauth 2002; Trauth et al. 2012). It is evident, that a deeper, research-driven understanding of the Australian Technology Leadership Context is overdue as is the investigation into the gender inequity in technology leadership, to ensure that we are indeed focusing on the correct actions without blindly accepting assumptions. Technologies are demonstrably impacting every part of our traditional businesses, automating, and taking over large amounts of routine tasks, thus creating new opportunities for executives and Boards to reshape their workforce (McAfee & Brynjolfsson 2017). As our organisations change and our workforce becomes more technologically adept, the role and skills complement of the technology leader must drastically alter to ensure the success and sustainability of our organisations (Morgan 2020).

Therefore, the theoretical gap this study will fill is the lack of current Australian empirical research or conceptual literature on leadership requirements for future executive leadership technology roles. For example, apart from the fact that there are still fewer women in positions of technology leadership (Stewart 2021), it is unclear from the literature: whether there is a difference in female and male technology career progression (Medcof 2017; Makarem & Wang 2019); what the future leadership context in Australian senior technology roles is (Velarde 2019); whether women are suitably equipped and prepared in Australia for leadership roles in technology (ACS 2015; Kingsley 2020); and whether there systemic and non-systemic barriers to improving female participation in technology leadership (Kruegar 2020). The why behind discrepancies in these aspects are also a less explored area of research (Buvinic et al. 2008; Loden 2017).

The Technology Leadership Context will be explored and discussed in this research and is the basis by which a person is assessed for their competency and capability to create sustainable growth in an organisation, as a leader. Competency for this research is defined as '… knowledge, skills, abilities, and other characteristics that are valued by current and prospective employers and thus encompasses an individual's career potential' (De Vos et al. 2011, p. 438) and capability refers to the '… capacity to perform a function or activity in a

generally reliable manner when called upon to do so' (Helfat & Peteraf 2015, p. 835). By combining competency and capability, this research will employ this characterisation as the Australian Technology Leadership Context and apply this concept to organisational sustainability and growth.

Australian technology leaders must evolve their leadership context to be relevant now and into the future. At no other time in human history has a near-majority of the world's population been connected with each other digitally, contributing to the accumulation of greater knowledge, yet arguably the Australian Technology Leadership Context remains associated with a discipline skill set borne in a time before the connected machine age (McAfee & Brynjolfsson 2017). Combine this outdated context with a male-dominated discipline, where a 2017 global report of 4,498 technology executives confirmed that the overall growth rate for women into technology roles is slow, with only 10% of senior technology leaders being female (Harvey Nash & KPMG 2017). The C-suite of our organisations and the predominant Australian Technology Leadership Context is therefore positioned for disruption.

There is a plethora of initiatives focused on improving the participation of women in STEM, yet none specifically focused on the career progression of women in IT and no clear mandate to maintain participation into executive roles. At the time of this research, there were 63 initiatives in the Australian Government focused on increasing the participation of women in STEM (Australian Government 2022a). Many of these initiatives in Australia, postulate an input issue and focus on funnelling more girls into STEM to increase the gender participation, whereas others suggest the lack of female representation is life-stages oriented and simple changes in organisations to adopt flexible work arrangements, nurture ambition and remove the stigma associated with alternate work arrangement, would improve this situation (Hewlett & Buck Luce 2005; Warne et al. 2011). Most of these assertions are founded in statistics that are not specific to the technology discipline, leverage career groupings that are not current today and finally, are developed using data from a decade or more ago, in a discipline impacted by a rate of advancement that doubles every 18 months (McAfee & Brynjolfsson 2017).

On 6 September 2022, the Australian Government announced an independent review of its Women in STEM program suite to review what is working and what is not so that the findings can be applied to improving the overall diversity in STEM (Australian Government 2022b). The independent review is limited to their suite of 9 Women in STEM programs with consultation to close on 8 September 2023 and there are limited publicly available reports to inform the Diversity in STEM Review Panel and Taskforce. What is available is only a rapid systemic review and broad in its approach to STEM with no targeted review of the technology discipline (Women in STEM Ambassador Organisation 2023).

As a woman in leadership, the researcher observed repeated phenomena related to the composition of executive leadership teams in various Australian-based organisations, where the majority are significantly dominated by the male gender. As an executive in technology, the researcher noted a similar pattern, yet upon seeking data or theoretical evidence to the causes, it was evident Australia has a lack of current empirical research or conceptual literature on the Technology Leadership Context (Warne et al. 2011). Literature was readily available on women in leadership or women in science, technology, engineering, and mathematics (STEM) yet most technology framed leadership research uncovered, was based on cultures in America or India (Divya & Suganthi 2017). Moreover, in the literature collated, there is a broad body of work related to gender equality in STEM yet it is difficult to extract the technology-relevant research with greater emphases on the science, engineering and mathematics components (Shein 2018).

Fundamentally, the role of the technology leaders has evolved. Historically, the technology leader was grounded in Management Principles rather than Leadership Theory, developing their career and progressing their journey through mastery of information, communication and technology services and solutions, thereby ascending to the leadership role through the ranks of the department to “Manage” others of the same discipline (Parker 2018). The role of the technology leader was to elevate from their previous task-oriented role, to controlling the processes of the collective department in a formal, layered, and hierarchical organisation. The management of the human collective in the non-cognitively demanding, logical-style and repetitive tasks of historical technology departments, required only task-oriented management

in an industrialised working week (Newport 2016). The transition from Shallow Work organisations, as described above, to the Deep Work, flatter structures of technologically advanced and enabled organisations (Newport 2016), demands a reimagine of the Technology Leader's Context, given their role at the forefront of digital transformation.

With the coming of the Fourth Industrial Revolution that creates a fusion of technology, blurring traditional boundaries between the physical, digital, and biological spheres (World Economic Forum 2018), it is critical that research is available to address the requirements to lead in executive technology roles in Australia. This study will explore the career progression and leadership journey, context and role of Australia's awarded top technology leaders. Such data can then be leveraged to investigate opportunities to support parity of women and men in our technology leadership roles, closing the gender gap. The scope of this research is limited to technology leadership roles in organisations represented in the Top 50 CIO list for 2019 (Connolly 2019), containing a mix of cross-industry, public and private sectors and small, medium and large entities.

Focusing on the future needs of the technology context and encouraging women to participate makes logical sense. Vardi's (2018) discussion of the historic role of women in Information Communication Technology (ICT) highlights their continued value in this sector. In America, as ICT firms move from technology services to technology leadership there is a focus on gender balance in their executive teams (McKee et al. 2008). However, such value is not currently being realised in Australia (Yanadori et al. 2016) and hence, this exploratory study is justified as it will identify the opportunity by considering whether leadership context in the Australian technology executive has evolved, and further what this means for the observed gender gap in executive technology roles.

The literature indicates that there is substantial exploration, both empirical and conceptual, of gender and women in leadership. However, there is extremely limited, and where available, decades old research into technology leadership roles, particularly in Australia (Trauth 2002; Trauth et al. 2012; Professionals Australia Gender and Diversity 2013). It is evident that a deeper, research-driven understanding of the Australian technology leadership context is

overdue, as is the investigation into the effect on the gender inequity in technology leadership, to ensure that we are indeed focusing on the correct actions without blindly accepting assumptions.

This study will further fill a practical gap by addressing the lack of awareness as to the Australian Technology Leadership Context, the impact this will have on organisations' sustainability and by addressing the gender gap in the profession, improving diversity in executive teams. Further, the objective of the practical outcome of this study is to aid society and workplace in Australia to adopt an active strategy to change their technology leadership in-line with the leadership themes identified through this research and increase the participation of women in this critical leadership role in their executive team. This contribution will be through conceptual frameworks aligned to the Australian Technology Leadership Context and specific guidelines for improving the representation of women in technology leadership.

1.3 Research objective and questions

In view of the discussion above, the main objective of this study is to examine the Australian Technology Leadership Context by analysing the career progression experience of Australia's most successful technology leaders; the leadership qualities, characteristics and styles that makes these technology leaders successful; the leadership qualities that are essential to successful technology leadership and whether there is a difference between male and females in these roles and their journeys; the factors that contribute to poor female representation in executive technology leadership; and what strategies can be employed to improve female representation in executive technology leadership. The following research questions (RQ) were examined to inform the research objective above:

RQ1: What is the career progression experience of Australia's most successful technology leaders?

RQ1.1: Did they experience career progression enablers and barriers and if yes, what were these?

RQ1.2: What was the impact and why was this important?

RQ2: What makes Australia's most successful technology leaders successful?

RQ2.1: What are these leadership qualities and why are they important?

RQ2.2: What are the personal characteristics and why are these important?

RQ2.3: What are the leadership styles exhibited and why is this important?

RQ3: What leadership qualities are essential to successful technology leadership and why?

RQ3.1: Compared to historical technology leadership, what qualities are different and why is this important?

RQ3.2: What was the impact of COVID-19 on the leadership qualities of technology leaders?

RQ4: What is the difference between male and female technology leaders in relation to career progression and leadership qualities?

RQ4.1: Is there a differing gender experience and why?

RQ4.2: Are there differing gender leadership qualities and why?

RQ5: In view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?

RQ5.1: What are the systemic and non-systemic factors and why does this contribute to these factors?

RQ5.2: Are there perceived or real bias and personally imposed factors?

RQ5.3: Are current programs and policy ineffective and why?

RQ6: In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive technology leadership?

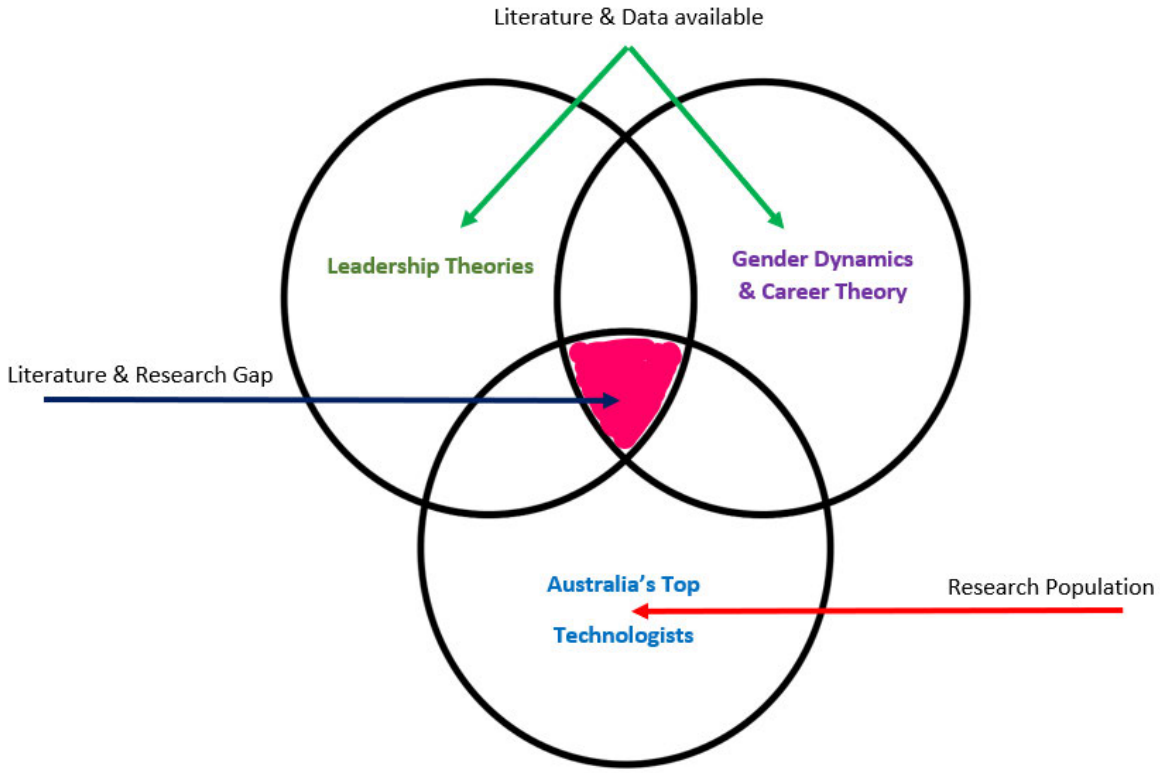
RQ6.1: What are the career strategies that can be employed?

RQ6.2: What are the leadership strategies that can be employed?

RQ6.3: What are potential systemic and non-systemic strategies that can be employed?

This research, informed by the research questions and subsequent enquiry, will contribute to filling the literature and research gap contextualised to Australia, as depicted in Diagram 1 – Literature and Research Contributions.

Diagram 1 – Literature and research contribution



Developed by the author for the purpose of this research.

1.4 Expected contribution to the field of research

This study will provide 3 contributions: firstly it will provide an academic exploratory study, contributing empirical data and research outcomes to the dearth of research on this topic contextualised to Australia for the critical leadership role that will be based in technology; secondly, it provides a theoretical contribution into the areas of Leadership, Career and Unintended Consequences as they relate to gender within the context of technology leadership roles; and thirdly, provide a practical contribution to society and workplaces, through informing business strategy, providing policy recommendations and the development of frameworks to support the future hiring, retention, succession, gender advancement and attrition activities within technology leadership roles.

The first contribution, empirical, is achieved by completing this Australia-based research to fill a gap in empirical data and theoretical analysis linked to technology leadership. Consequently, the second contribution, theoretical, is achieved through discipline-specific analysis of Leadership, Career and Unintended Consequences concepts, to ensure that the gap currently observed in literature as it relates to gender in the Technology Leadership Context in Australia is bridged. The technology Leader is met with a rate of change, referred to as Moore's Law, that is not encountered by any other role in an organisation (McAfee & Brynjolfsson 2014). To compare, the role of a Chief Financial Officer and the generally accepted accounting principles underpinning the discipline, have not materially changed since first recognised as a profession in the late 1890s (Giroux 2017). However, as Gordon Moore explained through mathematical extrapolation in 1965, later 'Moore's Law', technology advancement doubles every 18 months (McAfee & Brynjolfsson 2014), impacting the technology executive's remit as a consequence. As a critical role in any organisation and with a unique rate of change, it is important to make available research exploring the Australian Technology Leadership Context.

The third contribution, practical, is achieved by assimilation of the research findings into practical frameworks developed to assist organisations in Australia to adopt an active strategy to change their technology leadership in-line with the leadership themes explored in this research and develop a career pathway to include more female representation. The outcome of the practical contribution is the availability of frameworks to provide existing technology leaders with assessment of their context in-line with the research findings whilst also providing systems to support their elevation to the required leadership paradigm. Additionally, Chief Executive Officers, with the responsibility to appoint technology executives, will be better informed of the leadership contexts for sustainable business when assessing their technology leader's succession and diversity in their executive team. Further it is envisaged that the investigation into the underrepresentation of women in technology executive and leadership will provide valuable insights, tools, and frameworks to affect a more equitably career progression for females in technology.

These frameworks will deliver a paradigm for individuals and organisations to ensure appropriate Technology Leadership Context for future sustainability and growth whilst advancing more female representation. Likewise, with over half of all Australian businesses reporting to be technology- and innovation-active in the two-year period ending 30 June 2021 (Australian Bureau of Statistics 2021), the Board of Directors of Australian companies must be informed of the Australian Technology Leadership Context to drive their strategic growth. To further support organisations in Australia, it is intended that this research will inform government policy for developing business initiatives focused on increasing female workforce participation in technology as a key input to boosting Australia's productivity and innovation as reported by the Workplace Gender Equality Agency (2018).

1.5 Brief overview research methodology and design

As described by Grix (2002, p. 177)'… Ontology is the starting point of all research, after which one's epistemological and methodological positions flow'; my approach to research paradigm identification was shaped by this observation. Further, Grix (2002) discusses the importance for a research student to be able to defend their ontological position as it is difficult to empirically refute. In 2011, the Australian workforce participation rate among those aged 15 to 64 years for technology roles was 25% women and 75% men, with women also holding a relatively low share of STEM qualifications (Professionals Australia Gender and Diversity 2013). This research topic has a starting position of social actors and agents with a constant state of revision, therefore it is concluded that the ontological position will take a Constructivism path, where a reality is in mind from prior knowledge and experiences, often determined by the social or cultural environment (Peck & Mummery 2018).

In postulating the epistemology to be applied and accepting the ontological path put forth, it was concluded that Interpretivism is best adopted. This paradigm '… is predicated on the view that a strategy is required that respects the differences between people and the objects of the natural sciences' (Grix 2002, p. 178). To support an Interpretivist approach, the research topic proposed will fill a theoretical gap as there is no complete or targeted research in Australia on the leadership behaviours required, preferred or necessary to thrive in technology roles.

In reference to the methodological choice, it was confirmed during literature review that there is limited Australia-based research into what technology leadership requirements are necessary to lead in the future. Considering the aims of this exploratory research, a qualitative strategy which provides the opportunity for in-depth process of inquiry to better understand the research problem was adopted (Creswell 1998). The ontological, epistemological and methodological research design determined was achieved through an interview-based approach on a pre-defined population of Australia's Top 50 CIOs for 2019 (Connolly 2019), using a multiple-case design, by means of a combination of purposive sampling (Serra et al. 2018) and critical case sampling (Lindlof 2002) to include an appropriate gender contingent from within the population (Koerber & McMichael 2008).

A systematic approach was followed to select study participants. First, purposive sampling, best described as selecting a small number of important cases to yield the most information (Patton 2002), has been completed with the group identified as Australia's Top 50 CIOs, n=50 (Connolly 2019). The specific details of the sample will be provided in Chapter 3: Research Methodology. Technology leaders in an organisation who have overall responsibility for the vision and direction of technology in the company are nominated by colleagues or may self-nominate for consideration in the list (Connolly 2019). This group is the C-suite executive at the forefront of decision making and strategy who, responding to a series of questions are then judged through an independent panel of 15 judges (Connolly 2019). The critical case sampling (Lindlof 2002) has been identified in this study as the female awardees (n=9 less the researcher). An equal representative of the male awardees as a stratified random sample, will be included taking the full sample to n=18. The top 50 males will be grouped into industry sectors and an equal number from each industry group randomly selected.

It should be noted that there is an inherent limitation in the sample as the committee has judged the Top 50 based on a response as well as their research on the person through social and business networks. It is prudent to note that this research should be identified as insider research having a '… degree of closeness to the culture they wish to examine' (Taylor 2011, p. 3) given the researcher has performed the role of the technology executive and was previously a Top 50 CIO awardee. Awareness during the interview process to elicit the responses from the participants, rather than an assumption from the group that this insider experience will fill in the gaps, will be required. Strategies such as discussed in Taylor (2011) to manage the dilemmas of intimacy will be utilised, where formal training as a researcher is valued equally with instincts and emotional intelligence to query and explore participant responses.

1.6 Ethics

Ethics review and approval was granted through the USQ Ethics Committee (Ref: H20REA166). Standard protocol for ethics was followed with USQ clearance achieved and then participants were approached with relevant documents, including Participant Information Sheet and consent form. Refer to Appendix A – Participant Pack for details and Appendix B – Participant Contact for samples of communications.

1.7 Definitions of key terms

A brief definition of the terms used in this study is provided below:

- **Technology**: those parts of society and work that leverage connected services such as applications, software, hardware, infrastructure, digital services, artificial intelligence, automation and communication
- **Technology Leadership Context:** discussed in this research, is the proposed basis by which a person is assessed for their competency and capability to create sustainable growth in an organisation, as a leader
- **Technology roles**: the group of executives in an organisation responsible for the technology function, applications, digitisation and infrastructure that enable and drive the overarching business strategy and goals

- **CIO:** The top technology leader is most frequently referred to the as the Chief Information Officer (CIO) but is interchangeable with executive technology leaders and technology leader
- **IT:** The term used to encompass Information Technology, interchangeable with technology, Information Communication Technology (ICT)
- **Gender**: adopted for this research as binary, 2 biological sexes (female and male)
- **STEM**: science, technology, engineering, and mathematics, the broad term to reference these disciplines
- **Leadonera®**: Leadership of a New Era, the registered trademark and intellectual property of this research.
- **Success**: in this study is defined by achieving the leadership role in technology and leaving measurable impact through peer assessed award (CIO Top50).

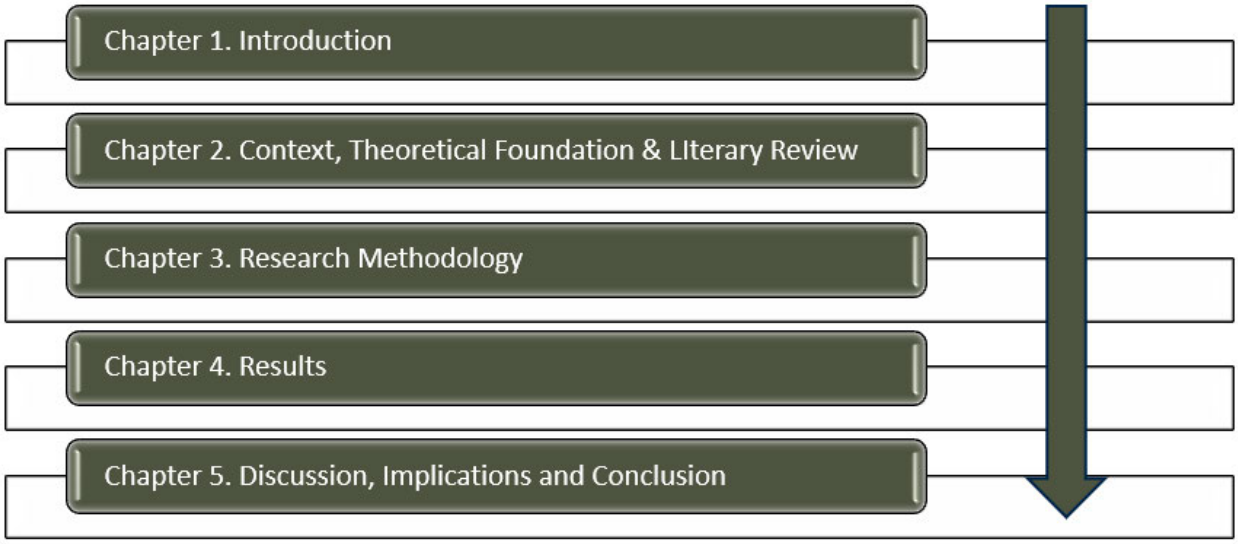
1.8 Delimitations of the scope of the study

The scope of this study is limited by geography to Australian-based technology leaders and to organisations and industry operating within Australia. Industry representation in the research sample is broad with both public and private companies having been included. Purposive sampling of Australian's top technology and digital executives was used from an Australian business nominated and awarded process.

1.9 Summary

This chapter provides the foundation for the thesis by introducing the research problem, the overall research objective and associated research questions, along with a broad overview of the research methodology. The next chapter will critically discuss the context of the study and the relevant literature. Chapter 3 will outline the research methodology adopted for this study. The qualitative results are reported in Chapter 4 and the final chapter will critically discuss the results in view of other literature and outline the implications of the study. Diagram 2, Thesis Map, provides the succession of this thesis.

Diagram 2 - Thesis map



CHAPTER 2: CONTEXT, THEORETICAL FOUNDATION AND LITERARY REVIEW

2.1 Introduction

The context of the study will be explained in this chapter, giving clarity to the reader of the importance of this research in closing a theoretical and practical gap, related to the Australian Technology Leadership Context and improving the representation of women in technology leadership. The theoretical underpinnings of the study which will be explored are associated with the key themes followed by the literary review process, incorporating a collection of scholarly articles, books, reports, and releases to be discussed, broadly based in the fundamental tenants of this study – Leadership, Gender, and Career. Finally, the process of constructing the research questions will be discussed in view of the research problem explored during the introduction of this thesis. In the next chapter, the research methodology will be expanded to provide context, evidence and rigour to the process supporting the subsequent chapters.

2.2 The context of the research

'If one has misdiagnosed a problem, then one is unlikely to prescribe an effective cure.'
Alice H. Eagly and Linda L. Carli (2019)

As a woman in leadership, the researcher observed repeated phenomena related to the composition of executive leadership teams in various Australian-based organisations, where the majority is significantly dominated by the male gender. As an executive in technology, the researcher noted a similar pattern, yet upon seeking data or theoretical evidence to the causes it was evident Australia has a lack of current empirical research or conceptual literature on the Technology Leadership Context (Warne et al. 2011). During the early attempt to overcome this dilemma, the researcher found literature readily available on women in leadership or women in science, technology, engineering, and mathematics (STEM) yet most technology-framed leadership research uncovered was based on cultures in America or India (Divya & Suganthi 2017). Moreover, in the literature collated, there is a broad body of work related to gender equality in STEM, yet it is difficult to extract the technology-relevant research with greater emphases on the science, engineering and mathematics components (Shein 2018).

What is so obvious in hindsight with technological advancement is often overlooked in the moment by leaders who are often the smartest, most experienced people in our organisations – the executive and our Boards (McAfee & Brynjolfsson 2014). Chief Executive Officers (CEOs) and the company Board of Directors make appointment decisions on their executive leaders in their teams frequently using historical reference points. Using historical or outdated information that is misaligned to Australia, coupled with the reality that these incumbents are so proficient and caught in the status quo, they are unable to see the potential disruption of the technology evolution (McAfee & Brynjolfsson 2017). At no more pressing time in history is it imperative that our CEOs and Boards who make executive team selections and promotions are provided with Technology Leadership Context and evidence for immediate action as they place one of the most critical and unique roles in their organisation to shape for future success.

Additionally, despite decades of policy and strategy focused on advancing and supporting women in the Australian workforce, there has been limited material change in female representation in positions of leadership (Australian Bureau of Statistics 2018). Subsequently, deeper context and research-driven empirical understanding of the effect on the gender inequity in technology leadership is required, to ensure that we are indeed focusing on the correct actions without blindly accepting assumptions. It is well documented in the literature that leadership positions and executive roles in most organisations are highly male-dominated with women substantially underrepresented in top management positions (Yanadori et al. 2016). In addition, analysis conducted by various Australian Government and advocacy groups, regularly demonstrates the gender gap in earnings with Australian fulltime females currently earning an average of 17.3% less than male equivalents (Yanadori et al. 2016). It is agreed that gender parity in executive roles is endemic and not isolated to the technology industry (Australia Bureau of Statistics 2015), however empirical research on the causes for a lack of gender parity in technology leadership roles remains antiquated.

In exploring the status of gender equality in the Australian technology sector, it was discovered that a 2008 survey of 678 Australian women in technology conducted by Warne et al. (2011), sought to answer a similar underrepresentation issue of women in technology. Whilst the decade-old survey collected valuable data not available at that time, no recent empirical data relating to the experience of women in the Australian technology sector has been identified. Further, literature published in the last decade highlights that solving the gender gap should be a key business focus for organisations (Baird 2018). Current reports state that companies with greater diversity among their executive and directorships, are less volatile and on average will outperform the market and their peers (KPMG 2019).

As articulated by Schwab (2016), the founder and executive Chairman of the World Economic Forum, the speed of technology breakthroughs has no historical precedent and further to shape the future, we need the best parts of human nature - creativity, empathy and stewardship (Schwab 2016). The way we mobilise our teams and deliver value will change and so will the leadership skills, approach and behaviours required to be successful in technology (McKee et al. 2008). Undeniably, the role of the technology executive and leader is evolving from a delivery executive to a business executive (Gartner 2017) and these Australian leadership requirements will be addressed in this study.

Furthermore, the construct needed for successful leadership is well discussed across scholarly literature and will be explored as it relates to the critical leadership role of the technology executive (McKee et al. 2008; Zhu et al. 2011; Jain & Duggal 2018; Lumpkin & Achen 2018; Maduka et al. 2018). Through work completed by scholars such as Rost (1993), we are able to view the evolution of leadership definitions and the associated theory. In one critical review of Leadership Theory research published between 2000 and 2012, Dinh et al. (2014) analysed 10 top-tier journals and found 752 articles of primary research focused on Leadership Theory. Of these journal articles Dinh et al. (2014) observed significant growth in contribution to certain theoretical categories, capturing the interest of the scholarly field. Notably, Dinh et al. (2014) observed this growing interest and continued research in the fields related to Neo-charismatic Theory and Ethical/Moral Leadership Theory.

2.3 Theoretical foundations of the study

This section critically discusses the theoretical foundations of the study. The main theory domains will be highlighted in an opening dialogue to then expand in subsequent sections, identifying the specific theory. The theoretical underpinnings of this study are based in the intersection of Leadership and Gender Studies, Career Theory and Unintended Consequences disciplines. Leadership Theory attempts to define and contextualise '… a process whereby an individual influences a group of individuals to achieve a common goal' (Northhouse 2021, p. 6). Scholars have debated Leadership Theory since it first appeared in the early 1900s with a body of work growing and evolving to include sub-categories that encompass 'traditional', 'situational', 'inspirational', 'ethical' and 'emerging' techniques, to group the theory by style of the leader approach. Although all Leadership Theory would be beneficial to test in this study, the Leadership Theory specific to the body of work classified as Neo-charismatic and Ethical/Moral Leadership is deemed most appropriate for this research, based on the evolving role of the Australian technology leader and the premise of the literature review.

Gender Studies has a relatively short history in comparison to Leadership Theory, with its emergence dated as recent as the 1960s, triggered by the second wave of feminism (Pilcher & Whelehan 2017e). Women were largely voiceless in pre-1970s, gender-blind sociology, featuring in traditional roles as mother or wife within families. Gender Studies created an academic critique providing context into gender inequalities in relationship and social positioning that further expanded to incorporate position in politics and paid work (Pilcher & Whelehan 2017e). As more women commenced paid work and a notable shift in thinking about gender was observed, academics sought to provide key concepts of a complex, multifaceted topic that remained centred on feminist perspectives. Of the over 50 Gender Studies sub-concepts available for examination, theory related to Feminist Standpoint Theory, gender equality and Consciousness Raising will be explored in this study.

Behavioural scientists spent the most part of the twentieth century attempting to define the theory of Career, first captured by Frank Parson's seminal work *Choosing a Vocation* (1909) authored to assist people with career decision-making, which became foundational to the development of Career Theory. Early scholars described Career Theories as a more structured social form within organisations, stepping the individual through a series of professional events (Young 2019). This structured approach inadvertently made career advancement devoid of any personalised involvement, rather described a course of action taken to obtain a goal with no recognition of the progress through life, the occupation chosen nor the linkage in career of both person and context (Giddens 1993). Similarly, oversimplifying the career approach and applying a lineally organised view, underrepresents the chance events that impact a person's career and the zigzag approach to development (Pryor & Bright 2011). Two emerging trends in Career Theory will be explored in this study: Contextual Action Theory (Young et al. 2014; Young 2019), that is focused on explaining the career process; and Chaos Theory of Careers (Bright & Pryor 2005; Pryor & Bright 2011) that represents a dynamic theory emphasising continual change and the need for individuals to continually adapt as they, their contexts, and society changes (Arulmani et al. 2014).

The Theory of Unintended Consequences first emerged in 1936 when Robert K. Merton, of Harvard University, first wrote an article for the American Sociological Society journal titled, 'The Unanticipated Consequences of purposive social action' (Merton 1936). In his formative work, Merton provided academic, reasoned taxonomy by which society could analyse a common observation: that our actions have unintended effects which are as impactful and probable as the ones that are desired (Garfield 2004). Whilst Merton's original concept was coined as 'Unanticipated' it has been largely replaced in social sciences by the more common synonym, 'Unintended'. Scholars, such as de Zwart (2015), have debated the substitution and the linguistic definition implications, however the inferred meaning, of an outcome that was unintended and not expected, remains. For this study, the Unintended Consequences Theory will be utilised to consider the relationship to the underrepresentation of females in the Technology Leadership Context.

2.3.1 Leadership theory

Leadership has been classified using many different systems since emerging as a critical concept to business performance over 60 years ago (Mumford et al. 2000). In 2011, Bligh et al. (2011) completed a review of the structure of Leadership Theory a quarter of a century after it was first introduced as a theoretical construct. The importance of effective leadership is not lost on an organisation and over the years many theories have described behaviours, traits, styles and capabilities (Mumford et al. 2000). Leaders create opportunities, coach, inspire and motivate people towards long-term goals (Wood et al. 2018).

Through work completed by scholars such as Rost (1993), we are able to view the evolution of leadership definitions and the associated theory. In one critical review of Leadership Theory research published between 2000 and 2012, Dinh et al. (2014) analysed 10 top-tier journals and found 752 articles of primary research focused on Leadership Theory. Of these journal articles Dinh et al. (2014) observed significant growth in contribution to certain theoretical categories, capturing the interest of the scholarly field. Notably, Dinh et al. (2014) observed this growing interest and continued research in the fields related to Neo-charismatic Theory and Ethical/Moral Leadership Theory.

These leadership categories are best described as follows:

- **Neo-charismatic Theory**
  This category often interchangeably uses Charismatic Leadership or Transformational Leadership and includes underlying constructs related to inspirational, visionary, followship, self-sacrificing and ideological/pragmatic (Dinh et al. 2014).
- **Ethical/Moral Leadership Theory**
  This category encompasses theories such as Authentic Leadership and Servant leadership with a focus on altruistic behaviours, moral priorities, ethical orientation and consequences (Dinh et al. 2014).

Table 1 – Established Leadership Category and Applied Theory, provides a summary of the 4 leadership theories contained within the relevant body of work identified to underpin this study.

Table 1 – Established leadership category and applied theory

Theoretical category in Leadership Theory	Applied sub-theory	Summary
Neo-charismatic Theories	Charismatic Leadership	Theory associated with a leader's personality that has extraordinary effect on followers (Sy et al. 2018).
	Transformational Leadership	Theory in which the leader elevates and broadens the interests of followers to excel towards higher contributions by inspiring, guiding, energizing, influencing and intellectually stimulating (Bass 1990).
Ethical/Moral Leadership Theories	Authentic Leadership	Theory based on being oneself consistently unobstructed from the day-to-day and essentially argues that a leader owns their personal experiences and acts in accordance (Gardner et al. 2011).
	Servant Leadership	Theory linked to a leader's awareness, empathy, doing what is morally right and in the service of others (Lumpkin & Achen 2018).

Early Leadership Theory excludes women, contributing to poor leadership examples and exacerbating the deficit of women in leadership (Jogulu & Wood 2006). Further, this historical lack of representation in core theory has contributed to the volume of gender bias in leadership adding to the multifaceted problem of increasing female participation (Hogue, M & Lord, R.G. 2007). Over 35 years ago, Marylin Loden, the management consultant that coined the phrase 'glass ceiling', clearly articulated that organisations must redefine the parameters of successful leadership to become more sustainable and as a result, they need more women in leadership as '… they don't think and act like men' (Loden 1986, p. 472). These new leadership styles, suggests Loden (1986), were based on a more feminine leadership approach which aligned with emerging Transformational Leadership Theory, first introduced by James MacGregor Burns (1978).

Contemporary Leadership Theory emerged in the late 1970s, challenging and building on early work to embrace the new leadership styles. The theory of Charismatic Leadership would see a resurgence with Robert J House (1977) reigniting concepts first suggested by Max Weber in the 1940s (Dow 1969), reframing for contemporary leadership. Over the years, research into Charismatic Leadership Theory has been debated with interpretation and conceptual ambiguities (Sy et al. 2018) and whilst there is inference, the empirical literature on Charismatic leadership demonstrates that '… such leadership has profound effects on followers' (Shamir et al. 1993, p. 577). Over the past 20 years the Neo-charismatic genre of leadership that includes 'Transformational' and 'Charismatic' Leadership Theory has focused on '… exceptional leaders who have extraordinary effect on their followers and eventually on social systems' (Shamir et al. 1993, p. 577). This leadership is seen as giving meaning to work and infusing purpose with research yielding a remarkable set of findings on the positive impact these leaders have on their followers' performance, attitudes and satisfaction (Den Hartog et al. 1999).

As disruption accelerates in our organisations through macro and micro influences, with ethical conduct of today's leaders scrutinised amidst examples of corporate and government malfeasance, a call for a more genuine, trustworthy and values-based 'authentic' leader emerged (Gardner et al. 2011). Authentic Leadership is best described as showing consistency of behaviour and personal values no matter the setting, leading to respect and followship from their teams (Divya & Suganthi 2017). A critical dilemma for researchers is to operationally define the key dimensions of Authentic Leadership and separate the differences between Authentic Leadership Theory and other theories of leadership, such as Transformational Leadership Theory. Neider and Schriesheim (2011) posit 'Authentic Leadership Inventory' as a method to differentiate and produce a quantative method to measure and therefore provide categorically the Authentic Leadership Theory. This inventory incorporated various theory constructs and included metrics comprised from Bass and Steidlmeier (1999) and Avolio and Gardner (2005) whose premise of authentic leaders was one of self-awareness, moral agents, altruistic intentions and balanced processing.

The servant as a leader concept was developed by Robert K. Greenleaf over 30 years ago and generally captured a focus on service in the practice of leadership (Greenleaf & Spears 1998). The concept has continued to grow in influence with variations of name, such as Servant-Leadership, Servant leadership or Servant Leader, with all of the central servant philosophies founded in 10 characteristics that include '… listening, empathy, healing, awareness, persuasion, conceptualisation, foresight, stewardship, commitment to the growth of people, and building community' (Spears 2020, p. 5). Synergies with other theories have been explored to both categorise and differentiate Servant Leadership Theory (Lumpkin & Achen 2018) and validations proposed, such as the Servant Leadership Survey, as a multidimensional measure (van Dierendonck & Nuijten 2011).

In considering Neo-charismatic Theory and the Ethical/Moral Leadership Theory as they apply to the Australian Technology Leadership Context explored, there is merit in levering these theoretical genres to analyse against leadership qualities of successful technology leaders. Further, levering the sub-theories that have gained much momentum in the last 2 decades to determine the application to successful leadership in technology as well as explore any divergence between the genders would be valuable as a theoretical and practical contribution. Developing research questions that will examine the essential qualities of a successful technology leader using Neo-charismatic and Ethical/Moral Leadership Theory to underpin, will be essential to this study.

2.3.2 Gender studies and feminist standpoint theory

In the formative years of the 1960s, Gender Studies was by nature focused on the 2 sexes and specifically referenced as Women Studies in nomenclature (Feitz 2016). As society evolved, the studies matured from the work of generally white women, revered as paving the way for access to a plethora of life choices and opportunities, to broader concepts that were inclusive of colour, race and ethnicity and finally, identity beyond that of the traditional 2 sexes (Feitz 2016). Consequently, Gender Studies replaced Woman Studies as the more inclusive and widely accepted term for a body of work that incorporates the history of women and feminist theory (Pilcher & Whelehan 2017e). For this study, gender is defined as either of the 2 sexes however each participant gender identity is confirmed through the interview process.

This study is not an attempt to pit the 2 sexes against each other but rather research the journey of both sexes in the Technology Leadership Context for commonalities or differences that could impact the lack of gender equality prevalent in the discipline. Scholars have long debated the mobilisation of bias in a patriarchal society and the underlying values, beliefs and institutions that are not intentionally impacting women's ascension, but nevertheless are negatively impacting progression (Mill & Harriet Taylor Mill 1980; Lukes 2004). These underlying societal themes will be explored in this study linked to Gender Studies and further expanded with the reasoning that women have an understanding simply by their position of lived experienced, and have an opportunity to influence the outcome for other women (Hartsock 1998).

These constructs will be explored through Feminist Standpoint Theory as a foundation to the female interpretation of the technology leadership journey along with Consciousness Raising applied as an action of concept rather than a political liberation, as a plausible solution to improving the female participation in technology executive. Table 2 – Gender Studies and Applied Theory, provides a brief overview of each theory deemed most appropriate for this study.

Table 2 – Gender studies and applied theory

Theoretical category Gender Studies	Summary
Feminist Standpoint Theory	Seminal work by Hartsock (1985) that explores the lived experience of women giving depth to research and outcomes. Further categorised '… as advocating research on or about women, which generates knowledge in opposition to dominant (patriarchal) constructions of women's position and experiences, and so is also research for women' (Pilcher & Whelehan 2017d, p. 156).
Consciousness Raising	Conceived as a political activity in liberation movements,'… the idea was that women should regularly collect in small groups over an agreed period of time and give accounts of their own lives and how they 'became' a 'woman … sharing experiences with other women of various backgrounds and ages; that their problems are not unique and individual, but rather all too common and produced by wider social relations and institutions' (Pilcher & Whelehan 2017b, p. 21).

Standpoint Theory endeavours to understand the environment from the view of marginalised groups, with early feminist theorists arguing '… that there was something distinctive about the views of women in virtue of their socially constructed roles' (Intemann 2019, p. 2).
Feminist standpoint approaches were first proposed in the early 1970s and 1980s with many arguing they can be viewed as theory, method and epistemology (Doucet 2018). Standpoint feminists reasoned from the outset that women's narratives be sought and analysed for relationship to social structures, with feminist standpoint remaining an indispensable resource to researchers to uncover situational knowledge and experiences (Doucet 2018). A feminist standpoint approach provides a collective assessment that identifies patterns amongst women's experiences that would not otherwise be individually recognised, uncovering shared journeys and oppressive systems that may be dismissed otherwise as imagined or accidental (Intemann 2019).

During the liberations of the 1970s, Consciousness Raising became a key activity underpinning the second-wave of feminism formed around the premise that women should regularly collect in small groups to recount their lives and experiences as women (Pilcher & Whelehan 2017b). A critical inclusion in theoretical genre related to Gender Studies, Consciousness Raising was historically associated with political assertions and civil rights movements, which frustratingly led to the exclusivity of the action due to the 1970s radicalisation of the women's rights conversation and many feminists distancing themselves from their 'sisters' (Rosenberg 1991). Despite the various debates on how much Consciousness Raising has contributed to Feminist Theory and points of intersection with other Gender Studies theories (Werhane & Painter-Morland 2011), it is evident that the practice prompted academic theorising in the 1980s with its legacy arguably still found in cyberspace and the refunctioning of the title, feminist, in online groups offering a gendered critique of the world (Pilcher & Whelehan 2017a, 2017b).

In considering Gender Studies and specifically Feminist Standpoint Theory as it applies to the Australian Technology Leadership Context explored, there is merit in levering these theoretical perspectives to analyse the lived experience of successful female technology leaders. Further exploration of the woman's experience applied to the poor female representation in executive technology roles is necessary and determining the validity of Consciousness Raising as an

applied action to overcome this deficit should be tested as a practical contribution. Developing research questions that will examine the experience of a successful technology leader using Feminist Standpoint Theory and Consciousness Raising to underpin the construct, is essential to this study.

2.3.3 Career theory

Theories of Career have evolved since Parsons (1909) first articulated the importance of vocation in his seminal work *Choosing a Vocation*, often representative of the culture and contexts to which is it examined (Young 2019). As theory was further expanded, complexity within Career Theory was exacerbated through the lack of consensus of key terms and definitions, with career development, career guidance, vocational psychology and career psychology often used interchangeably (Arulmani et al. 2014). Adding to this conjecture, the historical patriarchal construct within Western society created institutions in their image, where men assumed the paid work and therefore limited the career opportunities for women and positions of leadership as a result (Arthur et al. 1989; Marshall 1989; Smith & Johnson 2020). Further, theorists continue to debate the linear notion of career progression, noting divergent experiences and pathways for men and women, suggesting a more direct career pathway for men, whilst framing the woman's career pathway as a 'labyrinth' (Eagly & Carli 2007; McDonagh & Paris 2012). What can be concluded from this constant evolution, complexity, conjecture and divergence in Career Theory, is that chaos and context are evident and essential concepts to research related to careers.

An inconvenient human truth is that life is uncertain, yet there is a perennial expectation in the field of career development to seek certainty and ultimately a linear, orderly path to career success (Pryor & Bright 2011). Early Career Theory was founded in trait-factor theories where the person-environment were matched to determine the optimal career pathway and potential for success (Betz et al. 1989). This foundational theory isolated the individual from the myriad of influences within their life and attempted to predict their career, yet research conducted by Pryor and Bright (2011) suggests linking Chaos Theory to careers is a more relevant application in a word full of uncertainty.

Chaos Theory of Careers is described as '… understanding a reality in terms of systems that are characterised by complexity, interconnection and susceptibility to change' (Pryor & Bright 2011, p. 31) acknowledging the reality that an individual's career experience is an iterative, non-linear and serendipitous serious of circumstances (Bright & Pryor 2005). Even small disruptions can lead to a different outcome and given the rate of technological disruption occurring (McAfee & Brynjolfsson 2014), Chaos Theory of Careers is more relevant now than when first theorised by Pryor and Bright (2011).

As suggested in the discussion on Chaos Theory, there is a complexity to the construct of careers and the processes are impacted by actions, deliberate or otherwise. Contextual Action Theory accounts for the complexity of human action and is focused on explaining the career process (Young et al. 2014; Young 2019). Contextual Action Theory is oriented toward understanding and framing how actions are organised, and in careers this is behavioural elements, functional steps and goals (Young 2019). In contemporary organisations, job security and lifetime employment are no longer the norm, with predictors of sustainable careers for young professionals unclear as they transition to adulthood (Young 2011; Blokker et al. 2019). Contextual Action Theory highlights that careers are life-enhancing and are based on actions; a manifest behaviour (what we do); an internal process (the decisions we make); and have social meaning of how the actions are interpreted in context (observed by those in our environment) (Young et al. 2014). As a consequence, the interrelationship of an individual's early career actions and their ongoing success in a variable career pathway coupled with the organisational practices implies an association with Contextual Action Theory to analyse career progression (Rosenbaum 1989).

In considering Career Theory, specifically Chaos Theory of Careers and Contextual Action Theory as it applies to how Australian Technology Leadership Context is explored, there is value in levering these theoretical perspectives to analyse the career progression experience of successful technology leaders. Further examination of differences in the male and female technology career pathway and potential divergent experiences is essential to determine actions that adversely impact the representation of women in technology leadership. Developing research questions that examine the career experience and pathway of successful technology

leaders using Chaos Theory of Careers and Contextual Action Theory to underpin the construct, is critical to this study.

2.3.4 Unintended consequences theory

As suggested by de Zwart (2015), Unintended Consequences remains a solid preoccupation for social science research, especially when it can be applied to the undesirable side-effects of policy. Formative work by Merton (1936), based on the author's analytical enquiry of the unwelcome consequences of formally-organised social activity, has systematically been applied to formal policy as an organised action with an intended outcome (de Zwart 2015) and extensively referenced since publication (Garfield 2004). Merton's theory has influenced many scholars, including Peter Senge (1993) who produced Eleven Laws of System Thinking to help reason the impact on organisations and fixes that fail. Likewise, Nobel prize-winning researcher Daniel Kahneman (2011) applied Merton's theory at an individual decision-making level, reasoning a system 1 (Fast) and system 2 (Slow) approach, with the former improving the probability of Unintended Consequences.

Unintended Consequences are apparent in concepts erroneously applied to situations and the generalisations that this elicits. Hogue and Lord (2007) discuss the conceptual errors that occur from inappropriate generalisations and this is evident in the overuse and overrepresentation of negative terms to describe a woman's career experience and progression, such as impostor syndrome (Clance & Imes 1978) and Glass Ceiling (Loden 2017). Similarly, the warranted fixation with improving gender equality though policy and quotas has created a groundswell of backlash, even from women who do not want to be seen to have received special treatment, but want that there is respect for each gender (Seymour 2018). Equality in general terms is to be achieved through gender neutrality or androgyny, reaching parity with men in public sphere (Pilcher & Whelehan 2017c).

In this study, the intent is to apply Merton's underlying theory and associated taxonomy to career concepts and the current society and policy settings. Table 3 – Taxonomy of Unintended Consequences, provides a brief overview of the 5 foundation symptoms prescribed by Merton (1936) in the Theory of Unintended Consequences. In assessing the early premise of Merton

(1936) and his established taxonomy for Unintended Consequences Theory, there is a noticeable link to leadership creating this outcome or conversely producing these outcomes. In the recent paper, Yam et al. (2022) on the leader-follower impact and the unintended consequences of empowerment, the authors do not directly engage with Merton's theory or taxonomy yet leverage the premise that empowerment may decrease motivation for some followers. Similarly, Braun et al. (2019) explore the leaders' dark traits, such as psychopathy and narcissism, for unintended consequences on the leader-follower relationship, however likewise, do not engage directly with Merton (1936).

Table 3 – Taxonomy of unintended consequences

Taxonomy	Summary
Ignorance	Related to the lack of knowledge, experience, expertise and judicious investigation of a problem. Not always negative as most will make the best decision possible with the information available and subject to time and data constraints (Merton 1936).
Error	Erroneous analysis techniques and interpretation of a problem (Merton 1936).
Short-termism	The focus on short-term goals, over long-term and sustainable benefits (Merton 1936).
Dogmatism	Maintaining values, axioms and policies which are out of date, insufficient or out of touch and depth. Consequences here are not considered at all as the only supportive argument is consistency with predominant belief (Merton 1936).
Self-defeating prophecies	Overcompensating and playing it safe as a defence for an expected disaster leading to unintended consequences when not realised (Merton 1936).

In considering Unintended Consequences Theory as it applies to the Australian Technology Leadership Context explored, there is significance in levering this theoretical perspective to analyse the underrepresentation of women in technology leadership. Further examination of leadership qualities and career progression factors, aligned to the Unintended Consequences taxonomy would provide a theoretical and practical contribution. Developing research questions that examine the leadership and career experience of successful technology leaders using Unintended Consequences Theory to underpin the hypothesis, is beneficial to this study.

This section explored the theoretical foundations of the study. The main theory domains were highlighted in an opening dialogue and then analysed in subsequent sections, identifying the specific theory. In combination with the literature review completed and the theoretical exploration, the construction of the research questions will now be discussed.

2.4 Literature review: leadership, gender dynamics and career with a particular focus on women in technology

The collection of scholarly articles, books, reports, and releases presented in this literature review are broadly based on the fundamental tenants of this study – Leadership, Gender Studies and Career. There are examples of technology-specific articles that highlight the intersection of the 3 areas of focus in this study, yet there remains an inexcusable deficit related to Australia. Due to the gap in literature on technology Leadership and the lack of gender parity contextualised to Australia in the discipline, it was essential to explore the general leadership context and the possible reasons for the lack of gender parity to then inform the research questions to address the dearth of literature on the identified problem. Table 4 – Literary review schema provides a view of the schema as it relates to the literature areas in this study and posits the necessity for this research.

Table 4 – Literary review schema

Schema	Schema # value
Women & Leadership	134
STEM Gender	118
Leadership	104
Gender	105
Unintended Consequences | Values | Purpose	38
Career	62
Consciousness Raising	10

N=354

2.4.1 Leadership

The Founder and Executive Chairman of the World Economic Forum Professor Klaus Schwab (2016) wrote, that the speed of technology breakthroughs has no historical precedent. To shape the future, we need the best parts of human nature – creativity, empathy and stewardship (Schwab 2016). The way we mobilise our teams and deliver value will change and so will the leadership behaviours required to be successful in technology (McKee et al. 2008). As a result of this literature review it is plausible to say that leaders are visionaries, navigating the unknown and translating possibilities into realities in collaboration with others (Lumpkin & Achen 2018). Undeniably, the role of the technology executive and leader is evolving from a delivery executive to a business executive (Gartner 2017) and future leadership requirements must be investigated.

In completing this research, a vast array of Leadership Theory has been compared and analysed to ensure a critical examination to then identify the relevant theoretical foundation for pertinent leadership critique in this research. Table 5, Analysis of Leadership Theory, summarises the various leadership theories explored, leading to key theory discussed in this section linked to this research.

Table 5 – Analysis of leadership theory

Leadership Theory	Body of Work	Summary
Trait Theory	Traditional	Theory that certain traits are related to success and, once identified, could be used to select leaders (Wood et al. 2018).
Behavioural Theory	Traditional	Similar to traits approach however utilises behaviours at core of theory as the measurement of leaders (Mumford et al. 2000).
Contingency Theory	Situational	Theory depends on the effective match of a leaders style to the situation (Fiedler & Garcia 1987).
Cognitive Resource Theory	Situational	Theory relies on the leader assessing follower's ability as an individual or part of the group and applying situation contingencies (Miller et al. 2004).
Path-Goal Theory	Situational	Theory emphasises how a leader influences and uses a follower's work and personal goals linking the 2 sets together (House 1996).
Transactional Leadership	Situational	Theory is based on routine transactions occurring between leaders and followers, linked to performance and achievement goals (Hamstra et al. 2014).
Charismatic Leadership	Neo-charismatic	Theory associated with a leader's personality that has extraordinary effect on followers (Sy et al. 2018).
Transformational Leadership	Neo-charismatic	Theory where the leader elevates and broadens the interests of followers to excel towards higher contributions by inspiring, guiding, energizing, influencing and intellectually stimulating (Bass 1990).
Authentic Leadership	Ethical/Moral	Theory based on being oneself consistently unobstructed from the day-to-day and essentially argues that a leader owns their personal experiences and acts in accordance (Gardner et al. 2011).
Servant/Spiritual Leadership	Ethical/Moral	Theory linked to a leader's awareness, empathy, doing what is morally right and in the service of others (Lumpkin & Achen 2018).
Shared Leadership	Emerging	An emerging theory linked to a group or team's interactive influence to lead one another towards the achievement of group or organisational goals (Bergman et al. 2012).
Strategic Leadership	Emerging	Theory where leadership is concerned with the advancement of the organisation and evolving the capabilities towards the goals (Wang et al. 2012).
Innovation Leadership	Emerging	Theory that proposes leadership in innovation is complex and requires leaders to be ambidextrous in their style to both explore and exploit as the core for innovation (Zacher 2015; Tung 2016; Wood et al. 2018).

The behaviours needed for successful leadership are well discussed across scholarly literature (McKee et al. 2008; Zhu et al. 2011; Jain & Duggal 2018; Lumpkin & Achen 2018; Maduka et al. 2018). Jain and Duggal (2018) completed an empirical analysis on the role of job autonomy in relation to Transformational Leadership, a theory linked to the body of work related to Neo-charismatic leadership (Dinh et al. 2014), and commitment across an organisation. Their findings revealed that Transformational Leadership, which is a process that transforms and changes people through standards, values, emotions, ethics and long-term goals (Zhu et al. 2011) (Bass & Avolio 1994), strengthens the relationship of employees and organisational commitment (Jain & Duggal 2018). In the war on talent, exacerbated recently by the COVID-19 global pandemic, the ability to create organisational commitment, and as a by-product loyalty, will irrefutably be a success factor for any leader ('Winning the talent war' 2015).

New leadership theories are emerging as older theories become obsolete in their ability to adapt to changing organisation and economic trends (Divya & Suganthi 2017). In their study of Authentic-Transformational leadership styles in the Information Technology (IT) sector, Divya and Suganthi (2017) completed a canonical correlational study to determine whether it is possible to combine Authentic and Transformational Leadership to maximise success for an organisation (Divya & Suganthi 2017). At the time of the Divya and Suganthi study, Authentic Leadership was still in the formative stage in theoretical definition, classified in the body of work related to Ethical/Moral Leadership (Gardner et al. 2011; Dinh et al. 2014). Their conclusion was that Authentic Leadership, best described as a consistent behaviour between one's approach to personal life and one's approach to work life (Northhouse 2021), should be supplementary to other leadership styles (Divya & Suganthi 2017). Unfortunately the sample of the respondents used in Divya and Suganthi (2017) study was predominately male (62.8%) versus female (37%) which they postulate is the true representation of the sector – being male-dominated – and was limited to India, so culturally disparate from the Australia context and bias towards male preferences in leadership.

Leinwand et al. (2022) argue that for organisations to be successful in a future obsessed with digital, their leaders must be equipped with skills and style to reimagine the company, and the Chief Executive Officer together with the company Board of Directors, must ensure they have appointed the right people in the critical roles to drive the transformation. Building relationships, identifying opportunities and communicating strategic priorities in an accelerated technology-adoption landscape, will be critical to the future success of a technology leader (Toor 2017). Scholars, such as Zacher (2015), have curated studies that seek to identify the leadership required for this future state with suggestions that a combination of leadership approaches would be beneficial for organisations embracing transformation. Arguably, this concedes that the future leadership context will require a different approach to the past, where a leader could remain in one classification, with the leadership of the new era requiring a different set of capabilities than what helped them and their companies succeed in the past (Harvard Business Review 2021).

Unpacking the elements of Leadership Theory and the valued attributes for success in the future, van Dierendonck and Nuijten (2011) suggest that curiosity and taking a backseat to subordinates, as proposed in Servant Leadership Theory, a component of the Ethical/Moral Leadership theoretical body of work (Dinh et al. 2014), will be a valued attribute in leadership. This concept is evidenced by the success of the Disney Animation Studio and the appointment of a new technology leader over a decade past (Edmondson et al. 2015). In 2010, Andy Hendrickson, the then newly appointment technology executive, introduced a teaming structure built on trust that those individuals interested in a project would engage and teams self-organise around a problem, linked to an emerging concept of Shared Leadership Theory (Bergman et al. 2012; Edmondson et al. 2015). Fundamentally, Shared Leadership is an influence process that is dynamic, simultaneous and ongoing in teams (Bergman et al. 2012) however as validated by the Chief Executive Officer of the Walt Disney Company at the time, Robert (Bob) Iger (2019), it was Hendrickson's own Servant Leadership approach, that facilitated the unified success of the Disney Animation Studio technology team.

Acceleration in technology advancement, discussed by Jacob Morgan (2020), goes so far as to suggest that we are in a leadership crisis and rather than analyse the current, we need to be looking to 2030 and beyond to make the necessary changes now for leaders and organisations to prepare. In a study encompassing 140 global Chief Executive Officers, Morgan (2020) determined through data obtained through interview-style collection, that the success of our future leaders will require a collection of 4 mindsets and 5 skills, coined the Notable Nine (Morgan 2020). These mindsets and skills identified by Morgan for future leaders obscure the borders of digital and futurist skills once isolated to a technologist and captured in Appendix D – Morgan's Notable Nine, for reference.

The seminal work in leadership by Stephen R. Covey (1988), defined 7 habits of highly effective people, fundamentally based on the principles of enduring happiness and success, yet even Covey revisited his ground breaking paradigm in 2005, updating his work to include an 8th habit. This addition of an 8th habit to the existing 7 recognised the changing context and the need of the 'whole' person to be present in leadership, thereby in '… making the choice to expand her influence by inspiring others to find their voice, she increases her freedom and power of choice to solve her greatest challenges and serve human needs; she learns how leadership can eventually become a choice not a position' (Covey 2005, p. 313). On reflection, both authors are leading us to the conclusion that leadership must change in one's self and in the organisation, from previously conceived ideals of an industrialised economy, to those comparatively suggested by McKee et al. (2008) befitting digitally connected teams and technologically advanced organisations. Conceivably, these leadership competencies based in theoretical fields of Neo-charismatic and Ethical/Moral Leadership, are even more critical for the technology Leader at the forefront of transformation, to be prepared for a future with less formal industrialised organisation hierarchical structures, to a flatter and more matrixed organisation, where influencing others will be critical to a leader's success (Caldwell 2013).

The COVID-19 pandemic took the world by surprise, challenging the core of society, our businesses and the function of our work (Hass 2021). Whilst science rightfully took centre stage during the pandemic, the impact on organisations, society and humanities is only now being explored in academia (Akkaya et al. 2021). Arguably the pandemic is a regrettable but rare

opportunity of a mass lived-experience trial, yielding short-term and longitudinal study opportunities for researchers across various fields, including digital adoption in organisations, and technology disruption in businesses and leadership of teams (Saliola & Islam 2020). It was observed that a different leadership approach and style was at the forefront as society navigated the pandemic, and some suggest we maintain these emerged styles that encourage the '… energy and enthusiasm of distributed, team-based, rapid problem solving – when many staff felt they were their best selves – and put it to work on new problems' (Bohmer et al. 2020, p. 2).

During the pandemic, technology solutions was quickly elevated and embraced by organisations, providing powerful tools to the challenges in the crisis, yet it was noted that the technology was only as good as the leader who understood and knew how to use it (James & Perry Wooten 2022). Further, leaders that were prepared and already able to negotiate these new paradigms thrived as the COVID-19 crisis accelerated digital transformations and technology adoption, and CEOs leaned on experts, such as their executive technology leaders, to enable the new business models (McKendrick 2021). James and Perry Wooten (2022) arguably capture the essence of a technology leader of an environment that is in constant flux, where a crisis is never a one-off and the tenants of a resilient, prepared leader who can address people, process and systems can withstand the shock and bounce forward.

As organisations, as well as people, seek new styles of leadership, research will need to enable selection and skills development to support future requirements. Akers (2018) suggests curiosity and belief as future behaviours that will play a significant role in good leadership yet defer from being prescriptive. Rather, as our millennial population grows into middle management, it is suggested an understanding of what motivates and inspires these employees within the organisational confines, and their personal likes, will influence leadership styles (Akers 2018). For organisations to remain competitive, traditional, dominant leadership styles and outdated associated theories will need to be replaced by culturally sensitive and individual-based approaches and contemporary Leadership Theory (Jogulu & Wood 2006; Caldwell 2013; Arulmani et al. 2014).

Congruent with the insight from Caldwell (2013), if leadership is culturally specific, adapting policy inputs from research not based in the Australian context, has limits. Similarly, understanding and applying relevant Technology Leadership Context will be critical as more organisations become reliant on technology leadership for success (Dikkers et al. 2005; Schmidt 2020). Authors have ascertained that whilst the '… urge to solve the leadership mystery and capture the essence of its magic continues to allure' (Bligh et al. 2011, p. 1074), the perspective in leadership makes it well worth the continued study.

In view of the discussion above, the following 2 research questions were examined:

RQ2: What makes Australia's most successful technology leaders successful?
RQ3: What leadership qualities are essential to successful technology leadership and why?

In summary, in considering the Neo-charismatic theory, the Ethical/Moral Leadership Theory and the current literature as it pertains to leadership qualities of successful technology leaders, RQ2 and RQ3 were formulated. Further it was valuable to focus on the sub-theories related to Charismatic, Transformational, Authentic and Servant leadership that have gained much momentum in the last 2 decades, to determine the validity to successful leadership in technology, as well as explore any divergence between the genders.

The following section will review the literature related to Gender Dynamics in technology leadership.

2.4.2 Gender dynamics in technology leadership: impact on executive parity

As examined in the literature review section for leadership, the future leadership context differs from the past and is more aligned to the theoretical body of work related to Neo-charismatic and Ethical/Moral Leadership. Northhouse (2021) argues that women are better prepared to lead in the servant, authentic and transformational social fabric of the future, all leader concepts included within the Neo-charismatic and Ethical/Moral theoretical body of work (Dinh et al. 2014). Northhouse (2021) dedicates a full chapter to gender and leadership in his text, exploring empirical evidence related to gender and leadership and addressing approaches to promoting

women in leadership. Further to the promotion of women, it was found in the literature that the 'glass ceiling', an eminent metaphor first introduced into vernacular by two American Wall Street Journal reporters in 1986, provides context to an invisible barrier, or ceiling, preventing women from ascending to leadership roles (Dowling 2017).

The most recent reported alternative to the 1986 invisible barrier reference offered in Northhouse (2021) was the 'Leadership Labyrinth' discussed by McDonagh and Paris (2012) where women have a labyrinth of challenges throughout their career, and barriers are not just faced at the top of their leadership journey. Correspondingly, Sandberg (2013) in her book titled *Lean In*, used the phrase 'jungle gym' as the metaphor for the leadership journey for women. Dowling (2017), McDonagh and Paris (2012) and Sandberg (2013) discuss the leadership challenges for women in the workplace, not limited to the technology profession. Undoubtedly there are barriers with labels, perceived or evidenced, that require more investigation and debate not just for Australia but a globally relevant consideration.

There is a substantial body of empirical and conceptual literature, both within the Australian context and internationally on gender equality in the workplace (Taylor 1999; ACS 2015; Yanadori et al. 2016; Garcia-Solarte et al. 2018; Torres 2018). Government agencies such as the Australia Bureau of Statistics (2015), advocacy groups like the Workplace Gender Equality Agency (2018) and the scholarly community (McKinney et al. 2008; McGowan 2013; Yanadori et al. 2016; Lee 2017; Nash et al. 2017; Garcia-Solarte et al. 2018), provide valuable insight into current gender parity issues. Social media and globalisation of women's movements also ignite the conversation on gender parity and embrace gender change on a global scale (Taylor 1999).

The #MeToo rising of 2018, a highly publicised effort related to Consciousness Raising (Pilcher & Whelehan 2017g), was sensationally referenced across various media with many leveraging the momentum and emotion of the movement, rather than debating with qualified research, such as in Airey (2018). High-profile firms called it a rare and game-changing inflection point and arguably the movement did produce a valuable outcome of reigniting the gender conversation (Mercer & McLennan Companies 2018). Positively, the #MeToo conversation transcended

Hollywood, forcing organisations and institutions to review their leadership profiles under the #MeToo lens, refreshing the debate on gender parity in organisations and their leadership diversity (Airey 2018). Yet surprisingly, the concept of applying the tenants of Consciousness Raising as a social construct and proactive institutionalised advancement solution to overcome the gender parity issues was not explored further than the traditional political determination of the concept.

Leadership positions and executive roles in most organisations are highly male-dominated with women substantially underrepresented in top management positions (Yanadori et al. 2016). In addition, analysis conducted by various Australian Government and advocacy groups, demonstrates the gender gap in earnings with Australian fulltime females currently earning an average of 17.3% less than male equivalents (Yanadori et al. 2016). It is agreed that gender parity in executive roles is endemic and not isolated to the technology industry (Australia Bureau of Statistics 2015), however research on gender parity in technology leadership roles in the country is particularly lacking.

In exploring the status of gender equality in the Australian technology discipline, there is value in considering the American context which has been subject to several empirical studies. McKinney et al. (2008) suggest that women make up only 26% of the technology workforce and are outnumbered 6 to 1 at leadership level. Whilst there is a clear deficient in current scholarly information aligned to technology and gender globally, the findings of McKinney et al. (2008) is a notable exception. Using primary research dating back to 2003, McKinney et al. (2008) contributed to improving the understanding of the underrepresentation of women in the technology profession in America. Finding few differences in the work experiences of men and women in the technology profession, McKinney et al. (2008) concluded that executive gender disparity may be linked to lower numbers of women entering technology rather than leaving or possible failure to promote women.

In 2008, a survey of 678 Australian women in technology conducted by Warne et al. (2011), sought to answer a similar underrepresentation issue of women in technology. Whilst the decade-old survey collected valuable data not available at that time, no recent empirical data relating to the experience of women in the Australian technology discipline has been identified. Research conducted by Trauth (2002) acknowledged the underrepresentation of women in the technology profession, seeking to reject previous essentialist arguments for this occurrence and rather focus on the social construct arguments. It was previously debated in the literature that the inherent differences between men and women have attributed to the underrepresentation for females in technology, for example, men are just better at computers than women, and thus supports an essentialist argument (Trauth 2002). In her research, Trauth similarly acknowledges the gender parity in technology as being under-studied and under-theorised, offering an alternative to essentialism based on a social construct argument. Trauth theorises that the lack of female participation in technology is a result of different social influences for men and women in society and in the workplace (Trauth 2002).

Within the results of the research, Trauth (2002) introduces a theoretical stance as an outcome of the research, built on and partially informed by previous investigations, referred to as the individual differences perspective on gender and IT. Trauth's theoretical view focused on the '… similarities among men and women as individuals and the variation among members of each gender with respect to IT skills and inclination to participate in the IT sector' (Trauth 2002, p. 103). Through the investigative process, Trauth unexpectedly discovered in the participants a tendency to adopt male-dominated characteristics, suggesting either these women altered their preferred style to 'fit' the male-dominated discipline or they already met this character description. Whilst Trauth uncovers this characteristic, disappointingly this is not explored further with only a reference to the participants' self-perception that they are less social than other women, more competitive, very ambitious and highly mathematical, acknowledging that these traits are masculine and less accepted traits in women.

It is worthwhile noting that Trauth, a Pennsylvania State University Academic of the School of Information Science and Technology who was on sabbatical to the Griffith University in Brisbane at the time of this research, offers an early robust enquiry through the lens of an academic on the perspective of women in the technology profession. This research provides early work on Feminist Standpoint Theory in the profession, but Trauth's research neglects the importance of comparison of the career journey of both men and women in technology leadership, a critical reference point to the gender perspective. Further, the research does not delve more deeply into the Consciousness Raising concept as an option to improving female participation. The purpose of Trauth's research was to better understand the many faces of the gender gap in the IT sector and in doing so, facilitate more proactive responses from government, employers and educators (Trauth 2002). Given this research was completed over 20 years ago with common problem and substantiative debate on what is required to change this underrepresentation of females in technology, why then does gender parity remain an issue in technology leadership?

Governments and organisations have made legitimate attempts to institutionalise equality processes and practices into company culture, so that gender-focused programs become the norm. Murray and Southey (2019) suggest that without formalised workplace structures that support gender equality, women are left to survive in workplaces where do to '… a combination of tokenism, role congruence and gendered stereotypes, women's efforts, next to their male counterparts, are not equal even while they display strong leadership performance' (Murray & Southey 2019, p. 3). The Australian Government released an updated version of their STEM initiatives for girls and women, giving context to the role of government as it relates to the more than 60 different initiatives to boost participation of women, focused on areas such as Leading the Way; Enabling STEM potential through Education; Supporting Women in STEM Careers; and Making Women in STEM visible (Australian Government 2022a). With the earliest initiative commencing in 1992 it is debatable if these are working as intended given the data available.

This section examined the literature related to gender as it would be connected to the technology executive, parity and organisation's success. The following section will review the literature related to career.

2.4.3 Career as it relates to the technology executive and gender dynamics

In this section the literature related to career will be examined as it relates to the technology executive and specific content available, relevant to Gender Dynamics, will be reviewed. Throughout history, as organisations undertook macro-level change influenced by the stages of the Industrial Revolution, so too was seen a transformation of the human orientation to work and career (Arulmani et al. 2014). The reformation of the nature of work, that was no longer defined by time, attendance and specific tasks in order to make a living, gave way to people approaching work as '… a means for achieving growth and personal development, as also for changing their class or position in society' (Arulmani et al. 2014, p. 1). Thus the concept of career was born and as new occupations emerged, a personal engagement developed towards '… the world of work characterised by the exercise of volition and the identification of personal suitability, requiring preparation and specialisation for ongoing, lifelong development' (Arulmani et al. 2014, p. 1).

In the more than 60 years of literature pertaining to career, examination reveals theorising and model building to be largely dominated by Western epistemologies (Arulmani et al. 2014). The historical patriarchal construct within Western society gave way to a similar organisational construct where men assumed the paid work and therefore the career opportunities to senior leadership positions, and women assumed the caregiver role (Smith & Johnson 2020). As the macro-level change discussed previously dramatically transformed organisations, the opening of new work and career opportunities broke down gender stereotypes of male-dominated traits and styles in leadership, paving the way for more women to enter the paid workforce (McDonagh & Paris 2012). The conundrum exists that if the third industrial revolution identified in 1969 founded in electronics, IT and automated production (World Economic Forum 2016), includes vocations suitable for both genders, then 54 years later, how can there remain an underrepresentation of women in leadership?

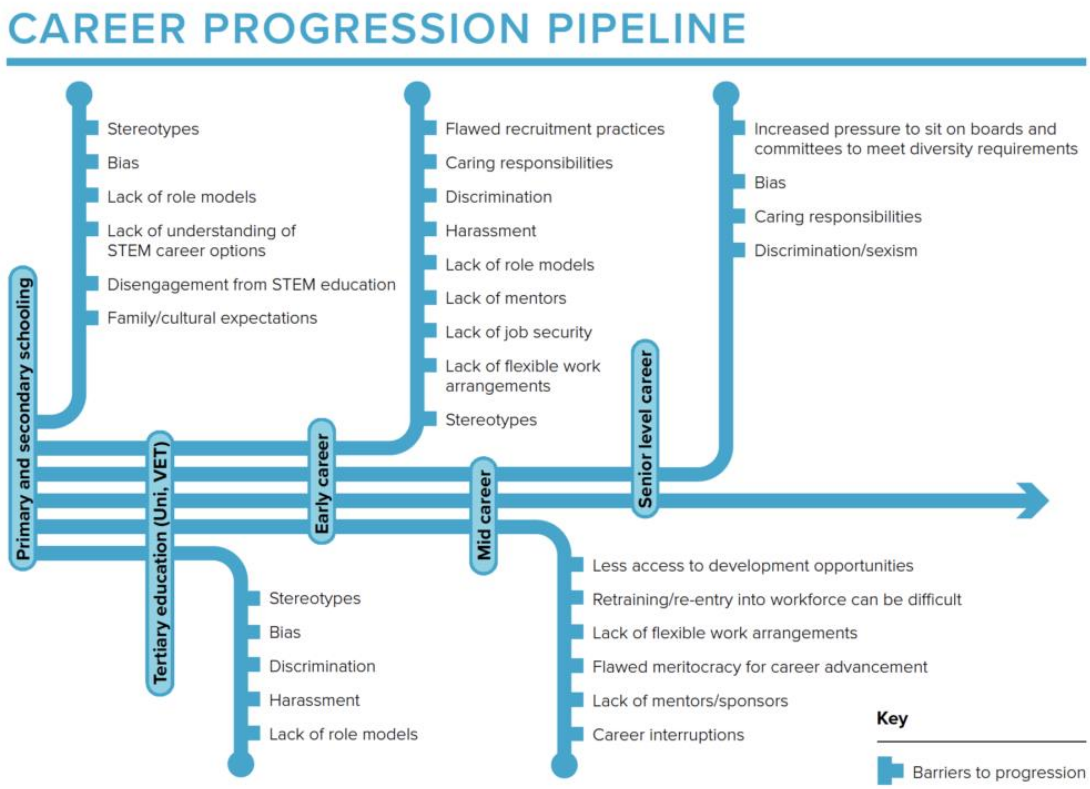
There is a body of work focused on women's inability to advance, with arguments that invisible barriers throughout their career journey and experiencing a labyrinth of dead-end pathways, requiring course correction, slows the advancement, adding to the underrepresentation in leadership (McDonagh & Paris 2012; Kruegar 2020; Anthony & Soontiens 2022). This argument is similarly applied to the deficit of women in STEM. The Office of the Women in STEM Ambassador Organisation (2022) completed an ecosystem review as part of the Decadal Plan (Australian Academy of Science 2019) and suggest that women in Australia experience various barriers throughout their career progression, claiming that '… the pipeline is "leaky" due to stereotypes, bias, discrimination and other factors' (Australian Academy of Science 2019, pp. https://womeninstem.org.au/australias-women-in-stem-decadal-plan/, viewed 21 February).

In an attempt to improve female representation in executive and overcome these assumed barriers, the number of women's leadership development programs has exploded yet, arguably, these are falling short of the intended outcome to accelerate and set women up for career success (Johnson et al. 2023). These programs exclude men and are developed on the premise that by educating women on the barriers to their career success, they will then be better equipped to recognise and therefore overcome these barriers (Smith & Johnson 2020). The perception that women need fixing and the focus on how women themselves should respond, only serves to reinforce the negative narrative that these are women's only issues and that men, often the most influential in an organisation, do not need to be involved in gender equality activities to break down barriers and associated dialogues (Smith & Johnson 2020).

The Women in STEM Ambassador Organisation (2022) provides a succinct diagram of the barriers suggested from their investigations, as it relates to the career progression pipeline and this is provided in Diagram 3 – Career Progression Pipeline, as a representation of their findings. In identifying these barriers, the Office of the Women in STEM Ambassador Organisation (2022) suggests 6 opportunities to improve the ecosystem through an inclusive and diverse approach to help women thrive in a STEM career, along with a National Evaluation Guide (Kingsley 2020) to evaluate the effectiveness of the STEM Gender Equity programs.

These 6 opportunities are listed in Appendix E – Women in STEM Decadal plan opportunities, for reference.

Diagram 3 – Career progression pipeline



Adapted from Women in STEM Ambassador Organisation (2022).

The National Evaluation Guide (Kingsley 2020), published as a component of the Women in STEM Decadal Plan (Australian Academy of Science 2019), provides practical advice to organisations' coordinators of STEM career and gender equity programs, with a toolkit to support the design, Efficiency, Outcomes and Impacts, and Lessons Learned (Kingsley 2020). A very well-organised and thorough guide, it does not provide advice on where to focus, rather suggests that once determined, the guide is then a useful systematic approach to the program. It could be argued that the volume of barriers for women suggested in the Women in STEM Decadal Plan (Australian Academy of Science 2019), may be overwhelming for career and program coordinators, giving many organisations a plethora of issues to focus on thereby not effectively completing any real outcomes.

In a recent study completed in the United States of America, Vogel (2021) explored '… the assumption that ending sexist oppression and eradicating gender discrimination requires strategies for transforming attitudes and behaviours' (p. 14). Domestically, the 2020–21 Australia's Gender Equality Scorecard, published by the Workplace Gender Equality Agency (2022), confirms that leadership positions in Australia-based organisations remain heavily male-dominated. Further to this, the report suggests that the representation of women in leadership declines with seniority and whilst women are continuing to be promoted into managerial positions, with 2 in 5 managers being women, only 1 in 5 are represented at the executive level. The Workplace Gender Equality Agency (2022) goes on to confirm there has been a large increase of employers focusing on gender equality, with 77% of all reporting organisations including policies and practices focused on eliminating gender bias and supporting female career journeys. The report does over-emphasise parental leave policy and processes, provides some limited context into flexible work policy, and gives an overview of items that are already legal requirements found in the Fair Work Act 2009 (Australian Government 2009) related to sexual harassment and domestic violence.

Encouragingly, where the Workplace Gender Equality Agency do provide target suggestions and improvements, it is at the leadership level, which is promising, however there is a noticeable deficit in any reference to women's career advancement policy or suggestions on how to improve the situation (Workplace Gender Equality Agency 2022). Correspondingly, in the Fortune 500 companies, it was found that whilst women are significantly outnumbered at executive leadership level in the organisations, a concerning 2021 statistic reported by Zigarmi et al. (2022) suggests that as a result of the COVID-19 pandemic, the number of years for women to reach leadership parity with men has increased by a third. Zigarmi et al. (2022) recommend embracing politics at work as a method to close the gap, and whilst politics was not explored further in this article, the underlying concept of social influence does have merit as a potential solution, justifying further research as it relates to the Australian Technology Leadership Context. Finally, with the Australia's Gender Equality Scorecard report (2022) noting that only 1 in 4 Australian organisations have a gender-balanced leadership team, it provides a compelling data point that necessitates further investigation into career progression

and the male and female journey concepts, pertinent to the Australian Technology Leadership Context.

In view of the discussion in sections 2.4.2 and 2.4.3, the following research questions were examined:

RQ1: What is the career progression experience of Australia's most successful technology leaders?
RQ4: What is the difference between male and female technology leaders in relation to career progression and leadership qualities?
RQ5: In the view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?

To summarise, the first research question leverages Career Theory, specifically Chaos Theory of Careers and Contextual Action Theory and the literature review in sections 2.4.2 and 2.4.3 above, to analyse the career progression experience of successful technology leaders. Further scrutiny of differences in the male and female technology career pathway (RQ4) and potential divergent experiences (RQ5) will aid in the development of actions that will improve the representation of women in technology leadership. In considering Gender Studies and specifically Feminist Standpoint Theory as it applies to Australian Technology Leadership Context explored, there is merit in levering these theoretical perspectives to analyse the lived experience of successful female technology leaders. Further exploration of the woman's experience applied to the poor female representation in executive technology roles is necessary and determining the validity of Consciousness Raising as an applied action to overcome this deficit should be tested as a practical contribution. Insight of the varied experiences and viewpoints from the genders will inform the research problem.

The following section explores the literature related to interventions and consequences as it relates to the executive technology leader.

2.4.4 Unintended consequences as it relates to the executive technology leader

As examined in the previous literature review sections, the construct of leadership, Gender Dynamics and career is a complex, multifaceted issue with many good intentioned initiatives to improve female representation in leadership through policy and practice in governments and organisations. However, with all these good intentions, there seems to be almost glacial progress towards gender parity in executive leadership in Australia. In a 2021 article in the Asia Pacific Journal of Human Resources, Kulik (2021) concedes that Australian organisation are making slow progress toward gender equality and suggests that academics may be inadvertently creating unrealistic expectations of the benefits and solutions through over emphasis of poor results. Kulik goes further to suggest the potential that academic knowledge is part of the problem even when presenting a solution and argues that persistently emphasising low performance of a single indicator of gender inequality, such as gender pay gap, ironically lowers stakeholders' motivation to act further, overwhelmed by what must be achieved to improve the situation, highlighting the unintended negative consequence of well-intentioned reporting (Kulik 2021).

Similarly, Leslie (2019) theorises that diversity initiatives focused on better outcomes for minority groups in organisations, like women, produced 4 unintended consequence types where they backfire, negatively impact the intended goal, deliver positive or negative spill over to other goals outside of the diversity initiatives, and produce false progress metrics not reflecting the true progress. Further to this argument of Unintended Consequences, Wiener (2016) acknowledges that a number of Silicon Valley companies have implemented extensive diversity initiatives that have failed to produce the desired outcome. Wiener (2016) continues by suggesting that tech companies are metrics-obsessed and analytical towards addressed issues whilst diversity initiatives, such as gender parity and improved female representation in leadership, are more social in their construct. Importantly, Leslie (2019) recognises that leveraging Merton (1936) Theory of Unintended Consequences was crucial to assess the situation in which initiatives are motivated by good intentions, such as improving the participation of women in STEM or representation in executive leadership, yet nevertheless fail to produce the outcomes as intended.

Correspondingly, Pietri et al. (2019) discuss the Unintended Consequences of gender diversity interventions on women in STEM, impacting their sense of belonging and creating a social identity threat. Pietri et al. (2019) argue that well-intentioned initiatives to promote STEM for women suggest that they do not fit the stereotypical norm and are therefore less competent than men in the related disciplines. It can be concluded through the literature in this review, that boosting gender parity and improving gender bias literacy in STEM via gender diversity initiatives in organisations and focused government endorsed advocacy groups like the Women in STEM Ambassador Organisation (2022), as well as promoting women's success in these fields, is critical to improving participation. However, the Unintended Consequences may be that women experience incongruence and dissonance with the discipline, impacting their social identity (Pietri et al. 2019).

Whilst noticeably there is a gap in the narrative as it would relate to the field of technology, researchers, such as Cruickshank (2020), have explored the growing interest in the similarities and differences between male and female leaders to uncover important implications when establishing targeted interventions such as increasing women in leadership. Similarly, Hewlett and Buck Luce (2005) provide compelling commentary around how to reverse the deficit of women in leadership which singularly focuses on concepts linked to flexibility and choice as women pause their career and then restart. The Australian Academy of Science, has delivered a 'Women in STEM Decadal Plan' (Australian Academy of Science 2019) offering a plethora of opportunities to improve participation of women in STEM yet none focus on the female career journey and the subsequent impact of representation in executive leadership (Appendix E). When exploring further the lack of female representation in IT within the United States of America, McKinney et al. (2008) investigated whether the deficit was an input or a throughput issue, with their study more focused on the latter concept, of women leaving the profession more so then men. The McKinney et al. (2008) study concluded that there was no material difference in treatment or experience between male and female IT professionals, however suggested that further research into the career experience may uncover implications not found within their study.

In view of the discussion above the following research question was examined:

RQ6: In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive Technology leadership?

To summarise, levering the theoretical perspective of Unintended Consequences as it applies to the research problem and the existing literature on the underrepresentation of women in technology leadership was critical to inform RQ6. In addition, examining the leadership qualities and career progression factors, aligned to the Unintended Consequences taxonomy provides a theoretical and practical contribution.

2.5 Construct of research questions

In view of the discussion in the previous sections on the study context, the theoretical underpinnings and critical discussion of the literature review foundations, the logic of the development of the research questions is now outlined (Bradford & Cullen 2012). The construction of the research questions followed a typical hierarchical approach that commenced with the researcher's observed deficit in current research. A journey of refinement followed as deeper literary review was completed to then surface succinctly, the gaps to further inform the research problem to be supported by research questions. The research questions were examined through a semi-structured interview process to provide new data to correlate with existing theory and literature towards leadership, gender and career constructs (see Chapter 3). Diagram 4 – Anatomy of a Research Question, shared in this section, provides a graphical representation of the discovery process as it correlates to the hierarchical enquiry approach discussed in this section.

Through the literary review process, a collection of scholarly articles, books, reports, and releases were discussed, broadly based in the fundamental tenants of this study – leadership, gender, and career. What was evident during the literary review, is that technology-specific articles that discuss the intersection of the 3 areas of focus in this study are scarce and worse, there is an inexcusable deficit related to Australia. Due to the gap of literature on technology leadership and the lack of gender and career contextualised to Australia in the discipline, it is essential to design research questions to explore the Australian Technology Leadership

Context, the career journeys of the success technology leaders and the possible reasons for the lack of female representation in technology leadership positions.

In view of the research problem explored during the introduction of this thesis, the research questions were framed to build a position starting with the career journey, leadership qualities and experiences, to better inform what the Technology Leadership Context is in Australia. The research questions then contributed through a differentiated view based on male and female responses, towards a position on whether their journey is different. By knowing this, insights and practical actions can be elicited that can improve the female representation in Australian technology leadership positions, with the method of extracting pertinent information completed through a semi-structured interview process.

The 6 research questions identified in this chapter and summarised below, address the research problem and fill a gap in the literature, applied theory and practical contributions towards understanding the Australian Technology Leadership Context and improving female representation in leadership. Diagram 4 summarises the anatomy of the research questions in this study.

Diagram 4 – Anatomy of a research question

Research Problem

What is the Technology Leadership Context in Australia? By knowing this, how can Australia improve the gender diversity in these roles.

Research Question 6

In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive technology leadership?

Research Question 5

In view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?

Research Question 4

What is the difference between male and female technology leaders in relation to career progression and leadership qualities?

Research Question 3

What leadership qualities are essential to successful technology leadership and why?

Research Question 2

What makes Australia's most successful technology leaders successful?

Research Question 1

What is the career progression experience of Australia's most successful technology leaders?

Research Foundation

Semi-structured interview process to provide new data to correlate with existing theory and literary review building towards leadership, gender, and career constructs in technology.

RQ link:

Career Theory contribution

RQ link:

Gender Studies contribution

RQ link:

Leadership Theory contribution

New Contribution:

Leadership > **Leadonera: Leadership of a new era.**

Gender > **Consciousness Raising.**

Unintended Consequences > **Build.**

Career Progression > **Realisation sequence.**

Developed by the author for the purpose of this research.

2.6 Summary

The context of the study was explained in this chapter, giving clarity to the reader of the importance of this research in closing a theoretical and practical gap, related to the Australian Technology Leadership Context and improving the representation of women in technology leadership. Through the literary review process, a collection of scholarly articles, books, reports, and releases were discussed, broadly based in the fundamental tenants of this study – leadership, gender, and career. What was evident during the literary review, is that technology-specific articles that discuss the intersection of the 3 areas of focus in this study are scarce and worse, there is an inexcusable deficit related to Australia. Due to the gap in literature on technology leadership and the lack of literature on gender and career contextualised to Australia in the discipline, it was essential to design research questions that reflect these issues. It was also essential to explore the Australian Technology Leadership Context, the career journeys of the successful technology leaders and the possible reasons for the lack of female representation in technology leadership positions.

The theoretical underpinnings of the study were explored and associated with the key themes. In considering Neo-charismatic Theory and the Ethical/Moral Leadership Theory as it applies to Australian Technology Leadership Context, it was identified that levering these theoretical genres to analyse against leadership qualities of successful technology leaders would be advantageous to new contribution and addressing the research problem. In considering Gender Studies and specifically Feminist Standpoint Theory, it was determined there is merit in levering these theoretical perspectives to analyse the lived experience of successful female technology leaders. Further exploration of the woman's experience applied to the poor female representation in executive technology roles is necessary and determining the validity of Consciousness Raising as a practical action to overcome this deficit will be tested as a practical contribution.

The chapter identified and explored the concepts of Leadership, Gender Dynamics and Careers in Technology to set the scene for the remainder of the research. A collection of scholarly articles, books, reports, and releases were presented in the literature review and was broadly based on the fundamental tenants of this study. It was found there are examples of technology-specific articles that highlight the intersection of the 3 areas of focus in this study, yet there remains an inexcusable deficit related to Australia.

In considering Career Theory, specifically Chaos Theory of Careers and Contextual Action Theory it was discussed that these theoretical perspectives are important to analyse the career progression experience of successful technology leaders. Further examination of differences in the male and female technology career pathways and potential divergent experiences was determined as an important inform to the research problem. Finally, in considering Unintended Consequences Theory, levering this theoretical perspective to analyse the underrepresentation of women in technology leadership was uncovered as an important theory to explore.

Finally, the process of constructing the research questions was discussed and emerged through a typical hierarchical approach that commenced with the observed deficit in current research. In view of the research problem explored during the introduction of this thesis, the research questions were framed to build a position starting with the career journey, leadership qualities and experiences to better inform, what the Technology Leadership Context is in Australia. The research questions were structured to obtain a differentiated career view based on male and female responses, to determine if their journeys were different. By knowing this, insights and practical actions can be elicited that can improve the female representation in Australian technology leadership positions, with the method of extracting pertinent information completed through a semi-structured interview process.

In the next chapter, the research methodology will be expanded to provide context, evidence and rigour to the process supporting the subsequent chapters.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Chapter 2 explored the context, identified the theoretical foundations of this research and discussed the literature review. This exploration informed the research questions to respond to the research problem. In this chapter, the main objective of this study will be to examine the Australian Technology Leadership Context and, by knowing this, discuss how society and the workplace can improve the gender diversity in these roles. The research methodology will be expanded to provide context, evidence, and rigour to the process including the identification of research paradigm and design. The research procedures will be specified, incorporating the participant sample process, data management and thematic analysis construct. Finally, the ethical considerations will be addressed along with the confidentiality and participant process and concluding with a summary of the chapter.

This research was initiated by observation in the first instance of a lack of female participation at executive leadership level in technology roles, with secondary research available providing no evidence as to the cause. Furthermore, this secondary research review added to this dilemma where it was discovered that governments and organisations had been promoting the inclusion of women in STEM through activities such as Australian Government grants, which were first announced in 2015, for projects and initiatives focused on boosting participation of '… girls and women in STEM and entrepreneurship' (Australian Government 2021). With funding opportunities available over the next 3 years equating to a further A$13 million (Australian Government 2021), this research is critical to provide guidance to where this funding should be allocated, in IT related disciplines, to make a lasting impact to change the trajectory of female participation in technology leadership.

3.2 Research objective and research questions

3.2.1 Research objective

At the time of this research, there were 63 initiatives in Australian Government focused on increasing participation of women in STEM (Australian Government 2022a) yet none specifically focused on technology and career progression, and no clear mandate to maintain participation into senior executive roles was made. The overall intention of this study was to examine the Australian Technology Leadership Context and, by knowing this, improve the gender diversity in these roles. More specifically, the objective of this study was to examine the Australian Technology Leadership Context, by analysing the career progression experience of Australia's most successful technology leaders; the leadership qualities, characteristics and styles that makes these technology leaders successful; the leadership qualities that are essential to successful technology leadership and whether there is a difference between males and females in these roles and on their journeys; the factors that contribute to poor female representation in executive technology leadership; and what strategies can be employed to improve female representation in executive technology leadership.

By completing Australia-based research, a theoretical gap could be filled by linking technology leadership and practical frameworks to the participation of women in technology executive roles. The outcomes will provide an analysis of Leadership Theory, Gender Theory and Unintended Consequences Theory in relation to the technology discipline and deliver practical frameworks to assist organisations in Australia to adopt an active strategy to adapt their technology leadership in-line with the leadership themes explored in this research. Furthermore, it is intended that this research will inform government policy to support business initiatives for increasing female workforce participation in technology as a key input to boosting Australia's productivity and innovation as reported by the Workplace Gender Equality Agency (2018).

3.2.2 Research questions

In the view of the awarded best Australian technology leaders and gender diversity challenges, 6 main research questions were developed and examined through a semi-structured exploratory interview approach to inform the research objective, to examine the Australian Technology Leadership Context and, by knowing this, determine what can be done in society and the workplace to improve the gender diversity in these roles. A comprehensive review of the 6 research questions was undertaken in section 2.5 Construct of the Research Questions, where analysis is provided of research questions construct to identify the link between the literary gap, context and the research problem.

3.3 Research methodology justification

3.3.1 Research paradigm

As described by Grix (2002, p. 177) '… ontology is the starting point of all research, after which one's epistemological and methodological positions flow'; my approach to research paradigm identification has been shaped by this observation. Further, Grix (2002) discusses the importance for a research student to be able to defend their ontological position as it is difficult to empirically refute. In 2011, the Australian workforce participation rate among those aged 15 to 64 years for technology roles was 25% women and 75% men, with women also holding a relatively low share of STEM qualifications (Professionals Australia Gender and Diversity 2013). It was determined based on the research problem identified in Chapter 1, that Constructivism emerged as the most appropriate ontological approach to explore the phenomenological aspects, compared with the alternatives of Subjectivism and Objectivism.

Constructivism views knowledge as socially constructed by the individual through interaction with their environment and how they interpret these experiences (Elkind 2004). In comparison Subjectivism is based on meaning imposed on the subject rather than interpreted (Al-Ababneh 2020) and Objectivism is anchored in a reality that exists apart from the individual's operation of any consciousness (Preissle 2000). In view of the problem statement discussed in Chapter 1, this research topic had a starting position of social actors and agents with a constant state of

revision by the individual, therefore it was concluded that the ontological position took a Constructivism path, where reality is an interaction of prior knowledge and experiences, often determined by the social or cultural environment (Peck & Mummery 2018).

3.3.2 Research design

In reference to the methodological choice, it was confirmed during literature review that there is limited Australia-based research into the Technology Leadership Context. Considering the aims of this exploratory research, a qualitative strategy which provides the opportunity for in-depth process of inquiry to better understand the research problem was adopted through an interview process with each case (Creswell 1998). The ontological, epistemological and methodological research design proposed was achieved through an interview-based approach on a pre-defined population of Australia's Top 50 Technology Leaders (CIO) for 2019 (Connolly 2019), using a multiple-case design, applying a combination of purposive sampling (Serra et al. 2018) and critical case sampling (Lindlof 2002) to include an appropriate gender contingent from within the population (Koerber & McMichael 2008).

3.4 Research procedures

3.4.1 Sample selection

A purposeful, stratified random sampling approach was followed to select study participants for this qualitative study (Patton 2002) (Llewellyn & Wilson 2003) (Koerber & McMichael 2008). First, purposive sampling, best described by Patton (2002) as selecting a small number of important cases to yield the most information, was completed, with the group identified as Australia's Top 50 Technology Leaders (Connolly 2019). Diagram 5 – CIO50 2019 (awarded places 1–25) and Diagram 6 – CIO50 2019 (alphabetised by name 26–50) provide the exact details of the sample population.

The qualitative sampling method was meticulously designed to create a randomised approach within the purposive sampling. Diagram 7 – Sample selection process in this section, provides a graphical representation of the steps taken to ensure the integrity of the sample. In deciding the sampling technique, these three alternatives were explored – Convenience, Purposive and Theoretical (Koerber & McMichael 2008). Convenience sampling, arguably, could apply to any research project as it simply means that a researcher is leveraging a sample that is readily available, however in most cases this is used only when there is no other opportunity for an alternate sample method (Koerber & McMichael 2008).

In comparison, a researcher leveraging theoretical sampling identifies a situation that cannot be explained by existing theories and then initiates the project to build and test new theory (Koerber & McMichael 2008). This method is iterative in so far as the researcher will seek new data when new theoretical trends emerge whilst in contrast, leveraging the purposive sampling technique, a researcher will develop the criteria in advance of the study and the sample does not change throughout (Koerber & McMichael 2008). Therefore, for the purpose of this research, purposive sampling was identified as the most suitable technique as the criteria was identified prior to the study, from a specific population selected to inform the problem statement discussed in Chapter 1 and the sample would remain for the duration of the study.

From this population, a stratified sample was selected which divides the population into smaller groups based on a shared characteristics (Simkus 2022). In this study the subgroups were defined by gender – male and female. Of these stratified subgroups, random selection then took place where all were alphabetised by last name, allocated a number from 1 to 4 and finally sorted by number allocated to produce a select random sample in groups of 9 people. Diagram 7 – Sample selection process, provides an overview of this technique.

Diagram 5 – CIO50 2019 (awarded places 1–25)

1	Chief information and digital officer	Coles Group
2	Chief information officer	Cue Clothing Co.
3	Chief information officer	RACQ
4	Chief information officer and general manager, innovation and technology group	IP Australia
5	Chief information officer	NSW Health
6	Chief information officer	RSL Queensland
7	Chief digital officer	Commonwealth Bank
8	Group chief information officer	Real Pet Food Company
9	Chief information officer	Victorian Department of Health and Human Services
10	Chief digital officer	MinterEllison
11	Chief information officer	Caltex Australia
12	Head of IT and digital	Cbus Super
13	Chief engineer	REA Group
14	Director, operations	NSW Data Analytics Centre (DAC)
15	Chief information officer and co-founder	Judo Bank
16	General manager - technology	Mortgage Choice
17	General manager - digital	The Woolmark Company
18	Director, business technology	Johnson & Johnson
19	General manager for business and digital transformation	Porter Davis
20	Chief information officer	WA Police
21	Chief information officer	MJH Group
22	Chief information officer	Flight Centre Travel Group A/NZ
23	Director of information and technology services	University of Wollongong (UOW)
24	Chief information officer and director, data intelligence	Catholic Education Diocese of Parramatta
25	Chief technology officer	flybuys

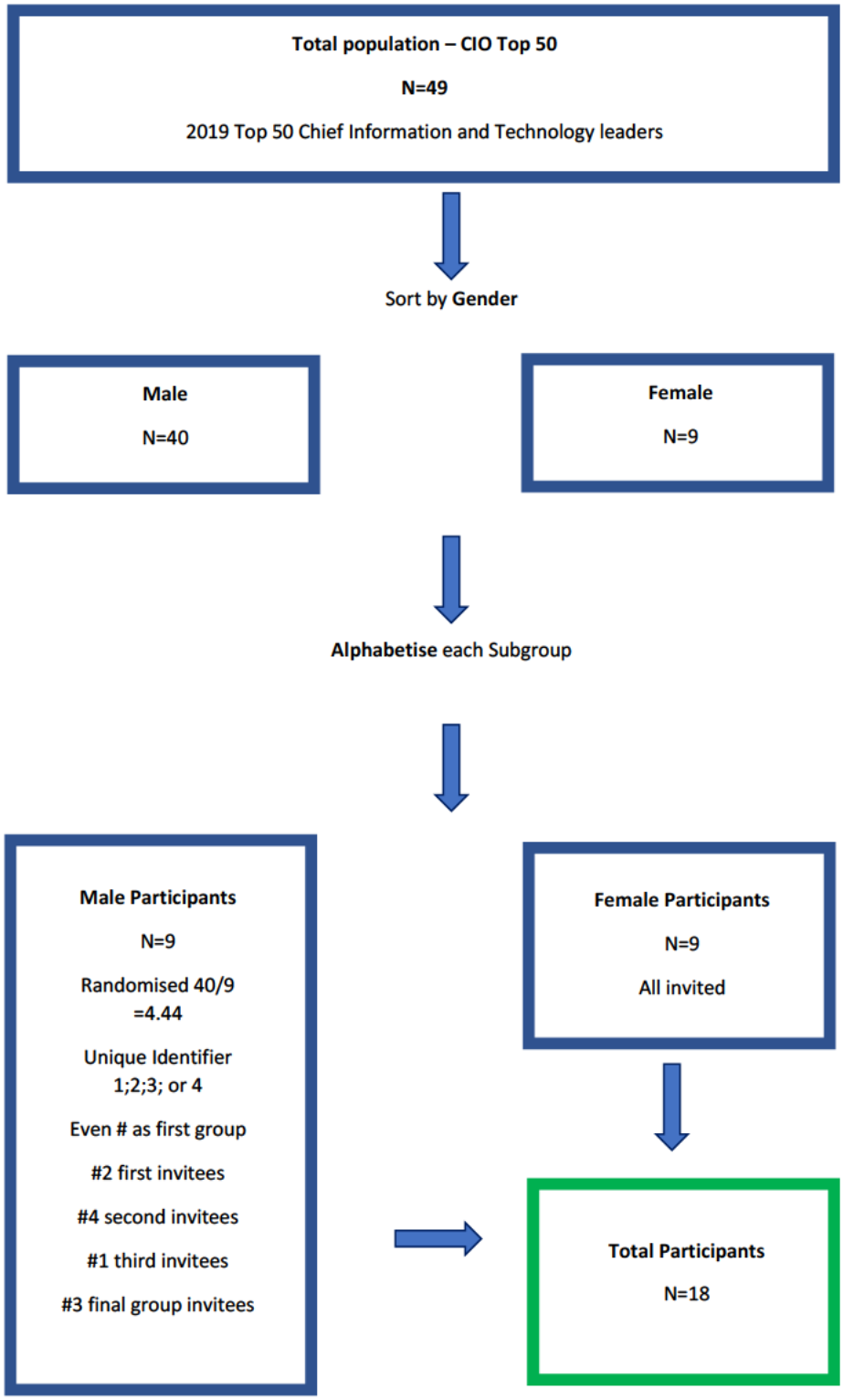
Adapted from Connolly (2019).

Diagram 6 – CIO50 2019 (alphabetised by name 26–50)

Chief information officer	Flinders University
Chief information officer	Cisco A/NZ
Head of IT	STIHL
Head of experience technology	Ogilvy Australia
Chief information officer	Foxtel
Chief information and technology officer	NSW Police Force
Executive vice president of technology and chief customer officer	NextDC
Deputy chief operating officer and director, IT services	Murdoch University
Chief delivery and information officer	UniSuper
Chief information officer	Only About Children
Chief information officer	Racing & Wagering Western Australia
Chief digital officer	Clubs Australia
Chief data officer	Department of Human Services
Chief information officer	University of Newcastle
Chief information officer	Jaxsta
Chief information officer	TransGrid
Chief information officer	Gallagher Bassett Australia
Chief information officer	Defence Health
Chief technology officer and co-founder	SiteMinder
Chief information officer	Mercedes-Benz Australia/Pacific
Service strategy manager	Airservices Australia
Chief technology officer	Iress
Chief technology officer	Cashwerkz
Chief information officer	Department of Education and Training Victoria
Chief information officer	National Library of Australia

Adapted from Connolly (2019).

Diagram 7 – Sample selection process



Developed by the author for the purpose of this research.

3.4.2 Data collection

The data collection comprised of virtual face-to-face interviews over a 6 month period. Standard interview techniques and protocols were adopted through a semi-structured 1:1 interview approach. Preference for the interviews was in person however due to COVID restrictions at the time of the data collection, early 2021, the interviews were conducted over a USQ licensed version of Zoom.

The interviews were scheduled for 60 minutes each and recorded at the permission of the interviewee. The interviews commenced with an unstructured, open-ended grand tour question (Spradley 1979), 'Tell me about your leadership journey', exploring how their leadership journey started, highlights and roles models, followed by a series of questions to inform the main research questions with the option to deviate as needed to probe issues deemed of relevant significance.

The interview process was conducted over a period of 3 months with participants slated at a time that would suit their schedules. The data collection was completed via Zoom with camera on and voice recording enabled and with files saved to the researcher's device, not cloud, for security and ethical management (Australian Research Council et al. 2018) (USQ 2020) to be transcribed later. Handwritten notes were taken for each participant to further add research insights not captured by voice file. Appendix C – Participant Runsheet provides the researchers conversational process for interviews.

3.4.3 Data analysis

It was critical to incorporate systematic procedures for data analysis of a qualitative study that supported the sample size, collection and approach to generate meaning (Clarke & Braun 2017). As such, a thematic analysis was employed for this study, defined as '… a method for identifying, analysing, and interpreting patterns of meaning (themes) within qualitative data' (Clarke & Braun 2017, p. 297) and similarly, to identify reoccurring themes in the data collected from the 2 sub-groups – female and male (Patton 2002). This method of analysis was deemed most appropriate to the research conducted as a thematic analysis does not require the

'… detailed theoretical and technological knowledge approach such as grounded theory and discourse analysis and therefore can offer a more accessible form of analysis' (Braun & Clarke 2006, p. 81). This type of analysis can align to essentialist or realist as well as constructivist method with the latter identified for this exploratory study to examine the events, meanings, experiences and so on that effect a range of discourses operating within society (Braun & Clarke 2006). Recurring themes, at the judgement of the researcher, were captured from the data in relation to the research questions that represents a pattern of response (Braun & Clarke 2006). During the analysis process, 73 codes were allocated to the data to explore the emerging themes. Table 6 – Thematic codes for data analysis, provides the full code list applied to the data along with the explanation of the relevance of the code to the research outcomes.

Table 6 – Thematic codes for data analysis

Theme Code	Theme Explanation
20s	Demographic age
30s	Demographic age
40s	Demographic age
50s	Demographic age
60 & over	Demographic age
Authentic Leadership	Link to Leadership Theory
Awakening	Linked to Consciousness Raising
Barriers	Barriers to overcome; linked to Career Theory
Boys' Club	Concept men helping men; linked to Career Theory
Career intervention early	Linked to Career Theory
Challenges	Linked to Career Theory
Clarity	Clarity of self; Career Theory or purpose
Coach	Did they have an identified coach (informal or formal)
Confidence	Experience confidence
Consciousness Raising	Linked to Consciousness Raising
Courage	Linked to Career Theory
COVID-19 Career Change	Impact of COVID-19 on changing careers (Career Theory)
COVID-19 Leadership thoughts	Impact of COVID-19 on leadership (Leadership Theory)
Current Leadership Context	Linked to Leadership Theory
Eldest	Eldest in their family
Theme Code	Theme Explanation

Emancipation	Point of being set free – linked to Consciousness Raising
Equality	Linked to Gender Studies
Executive Tech Leader or equiv	Level in their organisation at time of research
Female	Gender
Gender gap contributors	Linked to Gender Studies
Gender gap solutions	Linked to Gender Studies
Harassment	Experienced harassment
Impostor Syndrome	Experienced impostor syndrome; linked to Unintended Consequences
Incongruence	Experiences dissolution or incompatibility in environment
Influences on Leadership	Key points that influence their leadership
Leadership approach	Linked to Leadership Theory
Leadership attributes	Linked to Leadership Theory
Leadership behaviours	Linked to Leadership Theory
Leadership Context - important	Linked to Leadership Theory
Leadership Context - success	Linked to Leadership Theory
Leadership Highlights	Linked to Leadership Theory
Leadership progression	Linked to Leadership Theory
Leadership start	Linked to Leadership Theory
Leadership Style	Linked to Leadership Theory
Male	Gender
Manager before 30	Accelerated career pathway; linked to Career Theory
Master's Degree	Education level
Mentors Important	Addressed mentors as being important in their leadership journey
Observation	Observing leadership and roles models in environment
Pay gap	Mention
PhD Degree	Education Level
Private	Organisation they have most operated within
Public	Organisation they have most operated within
Purpose	Identification
Rate of change impact	Linked to Career Theory; how to accommodate
Redundant Leadership Styles	Link to Leadership Theory
Resigned - Break	Resigned from role in last 12mths to take an absence from career
Resigned - new role	Resigned from role in last 12mths to take on a new role
Resigned - Start-up	Resigned from role in last 12mths to start up own company
Theme Code	Theme Explanation

Resilience	Linked to Leadership Theory; Career Theory
Role Model early (20's)	Linked to Career Theory; journey and impact
Role Model late (30's)	Linked to Career Theory; journey and impact
Self-Awareness	Identification in journey
Self-Belief	Identification in journey
Self-Development	Linked to interview questions
Servant leadership	Link to Leadership Theory
Siblings No	No siblings
Siblings Yes	Yes siblings
Sponsor	Identification of a sponsor in their career
Stayed	Did not resign from role in last 12mths
STEM degree	Education type linked to STEM
Survival	Identification of being in a survival state
Tech N	Technology qualifications - No
Tech Y	Technology qualifications - Yes
Tolerance	Identification in journey tolerating the environment
Transformational Leadership	Link to Leadership Theory
Unintended Consequences	Link to Merton Theory
Years spent leading tech	Overall leadership experience in technology
Youngest	Youngest in their family

The use of inductive reasoning was applied as the premise for the observation that, based upon the evidence, the inductive argument may be probable (Ketokivi & Mantere 2010). In completing the interviews, the enquiry commenced with observation of the leadership journey with the data linked to Leadership Theory and Gender Studies and then continued by applying observations of a gender gap in technology leadership to Unintended Consequences. With inductive thematic analysis the data collected from the interviews was thematically linked and explored for themes specific to the data collected (Braun & Clarke 2006). In generating thematic analysis, the qualitative data analysis tool, NVivo, was utilised. To explore the data for greater insights using the coded content, query criteria was developed unique to the research to further understand the experiences in a method not to stymie the interpretations (Köhler et al. 2021). Appendix F – Query Criteria provides the list of criteria applied.

3.5 Responsible research and ethics

Throughout this research, the principles from the Australian code for responsible conduct of research (Australian Research Council et al. 2018) were incorporated to ensure that the outcomes are reliable and valid. The 8 principles identified in the code of conduct were incorporated at inception and continually addressed throughout the research. Diagram 8 – Eight Principles of Responsible Research, is an extract from the code (Australian Research Council et al. 2018, p. 2) and provides an overview.

Diagram 8 - Eight principles of responsible research

P1 Honesty in the development, undertaking and reporting of research

- Present information truthfully and accurately in proposing, conducting, and reporting research.

P2 Rigour in the development, undertaking and reporting of research

- Underpin research by attention to detail and robust methodology, avoiding or acknowledging biases.

P3 Transparency in declaring interests and reporting research methodology, data, and findings

- Share and communicate research methodology, data, and findings openly, responsibly, and accurately.
- Disclose and manage conflicts of interest.

P4 Fairness in the treatment of others

- Treat fellow researchers and others involved in the research fairly and with respect.
- Appropriately reference and cite the work of others.
- Give credit, including authorship where appropriate, to those who have contributed to the research.

P5 Respect for research participants, the wider community, animals, and the environment

- Treat human participants and communities that are affected by the research with care and respect, giving appropriate consideration to the needs of minority groups or vulnerable people.
- Ensure that respect underpins all decisions and actions related to the care and use of animals in research.
- Minimise adverse effects of the research on the environment.

P6 Recognition of the right of Aboriginal and Torres Strait Islander peoples to be engaged in research that affects or is of particular significance to them

- Recognise, value, and respect the diversity, heritage, knowledge, cultural property, and connection to land of Aboriginal and Torres Strait Islander peoples.
- Engage with Aboriginal and Torres Strait Islander peoples prior to research being undertaken, so that they freely make decisions about their involvement.
- Report to Aboriginal and Torres Strait Islander peoples the outcomes of research in which they have engaged.

P7 Accountability for the development, undertaking and reporting of research

- Comply with relevant legislation, policies, and guidelines.
- Ensure good stewardship of public resources used to conduct research.
- Consider the consequences and outcomes of research prior to its communication.

P8 Promotion of responsible research practices

- Promote and foster a research culture and environment that supports the responsible conduct of research.

Adopted from Australian Research Council et al. (2018, p. 2).

3.6 Limitations and acknowledgement

It has been identified that there are several limitations with qualitative research at its foundation that can influence results. The essential human factor of phenomenological, qualitative inquiry and analysis is the greatest strength and the fundamental weakness – a scientific two-edged sword (Patton 2002). The subjective nature of the method relies significantly on the skill level and ability of the researcher to plan the study and then interview effectively as an active listener before carefully curating the results to minimise interpreter bias (Patton 2002; Boyko 2013; Morse 2016; Köhler et al. 2021). Further limitations include the source of primary qualitative research collected from awardees of Australia's Top 50 Technology Leaders (CIO) (Connolly 2019) and acknowledgement that the primary researcher was identified as a Top 50 Technology Leader (CIO) (2020; 2019; 2017).

It is acknowledged that the global pandemic was an unprecedented situation providing limitations on interviewee's time and requiring the method of interview to be via Zoom from the isolation of their homes. This time imposition was overcome through scheduling as appropriate and similarly the participants were very comfortable using virtual meeting services.

To address these issues, a robust interview, collection and analysis protocol was developed after completing a specific literature review into qualitative research techniques and opportunities prior to commencement of the interviews, for strategies to implement to mitigate or overcome these limitations (Patton 2002; Boyko 2013). Likewise, every effort was taken to ensure the interview process balanced the need for intimacy and professionalism, incorporating lessons from a decade of practice in corporate roles prior to the study, and to negate the interpreter bias.

3.7 Ethical considerations

This research has been conducted through ethical procedures approved by USQ research ethics committee (H20RES166). As with all human-based research, ethical conduct is broader than the procedures and involves values and principles that act with positive intent, respect and concern for our fellow humans (Australian Research Council et al. 2018).

3.7.1 Informed consent

A robust and approved process of participant consent was undertaken, with a signed Statement of Consent returned prior to conducting the interview. This Statement of Consent is contained in the Participant Consent Form, provided in Appendix A – Participant Pack for reference. Only those that returned signed consents, along with responding yes to all consent questions, were admitted as a research participant.

3.7.2 Withdraw abilities

At all stages of the research process the participants were provided with the option to withdraw, which was articulated within the Participant Information Sheet, located for reference in Appendix A – Participant Pack. The participation in this research was entirely voluntary. If the participant did not wish to participate, they were not obliged to. If they decided to take part and later changed their mind, they were free to withdraw from the project at any stage prior to commencement of the data analysis. They could also request that any data collected about them be withdrawn and confidentially destroyed at any stage prior to data analysis. If they did wish to withdraw from this research or withdraw data collected about them, they were advised to contact the Research Team, with contact details provided in the information pack.

3.7.3 Confidentiality

The confidentiality of the participants was paramount to the reliability of the data collected. As such, the Privacy and Confidentiality was addressed within the Participant Information Sheet, located for reference in Appendix A – Participant Pack. The participants were advised that:

- All comments and responses would be treated confidentially unless required by law.
- The audio recording from the interview would only be accessed by the Principal Investigator and the data elicited from the interview would be coded with a pseudonym/alias to prevent participant identification in results.
- Any data collected as a part of this project would be stored securely as per University of Southern Queensland's Research Data Management policy.

3.7.4 Communication

Communication with the participants commenced by messaging through LinkedIn Private to obtain their initial agreement to participate and thereafter followed up by email with further details of the research for their consideration. The templated approach is provided in Appendix B – Participant Communication, for reference. All signed Participant Consents were retuned via email for investigators records.

3.7.5 Research findings reported to participants

It was confirmed during the process that each participant would be advised upon submission of the thesis for doctoral consideration. At this time they could request a copy of the final thesis delivered in electronic or printed format for their personal use.

3.7.6 Data security and storage

A research data management plan was submitted and accepted as part of the Ethics approval for this research. All data is secured by the Principle Investigator and adopts the Research Data and Primary Materials Management Procedure of USQ (USQ 2020).

3.8 Summary

In this chapter the main objective of this study was discussed, which is to examine the Australian Technology Leadership Context and, by knowing this, consider how society and the workplace can improve the gender diversity in these roles. This research was initiated through observation in the first instance of a lack of female participation at leadership level in technology roles, with the secondary research available providing no evidence as to the cause. Furthermore, this secondary research review further added to this dilemma in which governments and organisations had been promoting the inclusion of women in STEM through activities such as Australian Government grants, first announced in 2015, for projects and initiatives focused on boosting participation of girls and women in STEM.

The research methodology was justified, identifying the research paradigm and design. The research procedures were explored, with the participant sample process, data management and thematic analysis discussed. Finally, the ethical considerations were addressed along with the confidentiality and participant process.

In the following chapter, the results of the research will be shared enabling the final chapter to address the implications and conclusion through a discussion on contribution to theory and practice for society and workplace.

CHAPTER 4: RESULTS

4.1 Introduction

In this chapter, the results of the research are presented and compared to the literature review provided in Chapter 2. The main sections of this chapter are 4.3 Technology Leadership Contexts, 4.4 Career and Gender Dynamics, and 4.5 Unintended Consequences of Well-intended Efforts. Each section will connect directly to the literature review so that a relationship between current literature and the results of this study, is established. Where relevant, qualitative results will be shared, associated with the main themes of the section, in a simple table form for ease of consumption and participants' narrative recognised through use of the participant identifier, listed in the participant demographics section. Finally, the cohesion of Chapters 3 and 4 will then enable the final chapter to address the implications of the results to the fields of Leadership, Gender Studies and Career as it relates to the research problem and elaborate on new contributions from this investigation.

4.2 Participant demographics

As identified in section 3.4 Research Procedures, the participant population consisted of 9 female and 9 male participants with a total of 18 interviews from a purposeful, stratified random sample to inform this qualitative study (Patton 2002) (Llewellyn & Wilson 2003) (Koerber & McMichael 2008). An equal ratio of females to males were invited to participate. Table 7, Participant Profile, provides the overview of the participant identifier, the 5 demographic data points with an emerging theme included of resigning from the role in the 6 months leading or lagging the interviews. This will be explored further in results extrapolation during the Gender Dynamics and Technology Leadership sections. The order of Table 7 represents the order of interviews during data collection.

Table 7 - Participant profile

ID	Gender	Age Range	Technology Qualifications	Years leading Technology	Sector (Public/Private)	Resigned w/rolling 12mths	Sabbatical
PF1	Female	40	N	15	Private	Y	
PF2	Female	40	Y	20	Private	Y	
PM1	Male	40	Y	15	Private	N	
PF3	Female	30	Y	10	Private	Y	Y
PF4	Female	60	Y	10	Public	N	
PM2	Male	40	N	5	Public	N	
PM3	Male	50	Y	30	Public	N	
PF5	Female	50	Y	15	Private	Y	
PM4	Male	40	Y	15	Private	N	
PM5	Male	40	Y	15	Private	N	
PF6	Female	40	Y	5	Public	Y	Y
PF7	Female	50	N	10	Public	Y	Y
PM6	Male	40	Y	10	Public	N	
PF8	Female	60	N	25	Private	N	
PF9	Female	50	Y	20	Public	Y	
PM7	Male	40	Y	20	Private	N	
PM8	Male	50	Y	20	Public	Y	
PM9	Male	50	Y	10	Private	N	

The following section, 4.3 Technology Leadership Contexts, explores the results from this study, providing evidence of the style required for effective leadership in technology within an Australian context. This section of the results is dedicated to leadership and correlated to section 2.4.1 Leadership of the literature review in Chapter 2.

4.3 Technology leadership contexts

I'm not directing people to do tasks, (I am) setting the direction … they will follow and deliver and go the extra mile because (we) believe in what we're trying to achieve together. [PM6]

The participants in this research have been awarded the title of Australia's Top 50 CIOs for 2019 (Connolly 2019) for their leadership and impact on the trajectory of their organisations. In exploring their leadership context, the results form a basis for their success and a platform for discussing the importance of the leadership context. In the literature, it was found that

successful leaders are visionaries, navigating the unknown and translating possibilities into realities in collaboration with others (Lumpkin & Achen 2018). Further, how technology leaders shape the future, will require creativity, empathy and stewardship (Schwab 2016) along with the evolution from a delivery executive to a business executive (Gartner 2017). When exploring the leadership context of the participants, it was consistently found these leaders were big picture oriented in their view, focused on stewardship of people and strategy, and incredibly business oriented. Examples of the current leadership context results are provided in Table 8 – Current Leadership Contexts Results and Participant Examples, with a direct link to answering a component of the research question 2 related to the current leadership context of the participants.

Table 8 – Current leadership contexts results and participant examples

Leadership Context	Participant	Example
Big Picture Oriented	PF6	'[by not being externally relevant] the risk is always that you're just so narrowly focused and so consumed by your day-to-day business that you lose sight of the bigger picture and the things that transform often start outside'
	PM9	'[technology leaders] are business savvy, innovation inclined intelligence or data driven. And are highly social in their perspective. This is my summary of my life'
Stewardship of People	PF4	'You can have influence from anywhere in a hierarchical structure. Depends on the type of person you are.'
	PM1	'you are there to lead the team, protect the team, address their concerns, shield them necessarily from some of the politics and the wider organisational challenges that are going on. If they bring an issue to you, you're willing to assist, you have to give them the time. You're willing to listen.'
Stewardship of Strategy	PM5	'[I] became the sponsor of transforming our organisation and leading strategy and all our programming'
	PF4	'I really lead a fairly large transformation program there. And loved every minute of it and I think we really did make a difference at that time.'
Business Oriented	PF8	'I actually am totally ambivalent about technology. (…) it now is what the technology decisions that we could be taking, how they can help our business be more successful, serve our customers better, deliver and maybe reduce risk for money.'
	PM8	'If the CIO has a seat at the table reporting into the CEO, the CIO has no choice but to be commercial and business thinking and value thinking as opposed to technology thinking'

Additionally, in the literature, there was much debate of the behaviours needed to be a successful leader, suggesting that a connection to a leadership context strengthens the relationship of employees and their organisational commitment (Jain & Duggal 2018). The literature revealed Transformational Leadership facilitates the change in people and subsequent transformation of an organisation, through standards, values, emotions, ethics, and long-term goals (Zhu et al. 2011) (Bass & Avolio 1994). When exploring the data, the participants often pushed their technology acumen to the background to be more focused on the Transformational style with an affinity for the impact that they could have on others through their leadership. Table 9 – Transformational Leadership Results and Participant Examples, provides a sample of the responses as they related to the dominant behaviours in Transformational Leadership identified in the literature.

Table 9 – Transformational leadership results and participant examples

Behaviour	Participant	Example
People-centred	PM3	'You need to be very human. You need to listen, you need to know everybody goes through a change curve when they get told a piece of news.'
	PM4	'And that immediately kind of includes everybody and it kind of disarms the negative conversation.'
Values focused	PF3	'to be there for the team just to serve the team, clear the obstacles out of the way and make sure they get recognised for their efforts.'
	PM8	'if you look at the perspectives in life of all these horrible things that happen in the world, I'm very grateful for either the choices I've made in life and be where (I) have landed with people and family and so on.'
Standards	PF9	'you've got to have my back to what we're here for each other […]. We're all in this together.'
	PF1	I just have an expectation. And I want us both to work towards achieving that.'
Ethics	PF6	'You know, it comes with the gig. You're human, you lead.'
	PM9	'I don't want fear. I want respect. People think leadership is about […] commanding prestige […]. For me, I am looking for commanding respect.'
Long-term goals	PM1	'here's the big picture, here's the strategy, this is where the organisation is going, and you help me decide or you bring the solutions to me or you do the assessment. I like to do all that.'
	PF4	'actually just before this call, I was doing the final detailed proposal for our executive board on changing our operating model […] as I know a digital organisation requires skills right across the organisation, not just technical skills and being able to give up the skills [is important].'

You need to have a curiosity and desire to understand how your organisation works and what it's actually about, much more important than your knowledge about technology. You must be seen as a leader in your organisation, not just the IT person. [PF4]

A consistent argument in the literature was that for organisations to be successful in a future obsessed with digital, their leaders must be equipped with skills and a leadership style to reimagine the company (Leinwand et al. 2022). Building relationships, identifying opportunities and communicating strategic priorities in an accelerated technology-adoption landscape, is critical to the future success of an executive technology leader (Toor 2017). The participants in this study repeatedly disclosed their focus on relationships, and it was important to note in the results that this extended throughout the organisation, building relationships above their position, with peers and below their position – a very 360-degree view of their impact on the ecosystem. This approach provided the leader with the opportunity to build credibility deep throughout the organisation, create a following and remove barriers for their teams that may otherwise impede their progress or even their leadership aspirations.

During the interview and data collection for this research, Australia was amid the COVID-19 global pandemic which undoubtably placed extreme pressure and attention on the technology team and elevated the visibility, if not high already, of the technology leader. Hass (2021) suggested that COVID-19 took the world by surprise, challenging the core of society, our businesses, and the function of our work. Further, Bohmer et al. (2020), argued that a new leadership approach and style was at the forefront as we navigated the pandemic where rapid problem solving and distributed team-based is the norm. The interviews commenced in May 2021, providing almost 12 months of lived experience leading through this initial episode, and the participants were asked to relate the experiences of COVID-19 to the impact on their leadership and the potential change to leading in the future.

The results found the combination of their current leadership context and their existing leadership disposition aligned to Ethical and Inspirational Leadership Theory, creating an infallible dynamic when thrust into the spotlight to support their organisations through isolation and a mass distributed teams' environment most organisations have never experienced. Further, these leaders were already prepared for the impact, aligning to the literature and concepts suggested by James and Perry Wooten (2022). The results not only explained how their teams managed to survive under extreme workload but thrive under pressure. They also identified areas that Australian organisations need to be mindful about when setting the future of work and the purpose of the workplace. Table 10 – COVID-19 Global Pandemic Enquiry, shares examples of the participants' commentary to the main themes extracted during the interview.

Table 10 – COVID-19 global pandemic enquiry

COVID-19 Theme	Participant	Example
Leadership in Crisis – nothing changed	PM7	'this is just what we do. Look, if you're totally surprised and want to give us accolades, then, OK, we'll take them. But why are they surprised? Because this is what we do.'
Leadership in Crisis – elevated nuances	PF6	'What has changed and what COVID has put on the table is that you need to also be deeply political as well. You need to understand the power structures that are surrounding the decisions and the systems you're navigating.'
Leadership in Action – the mindfulness	PM3	'I have a couple of people who have become really hooked on crisis mode. So I'm definitely working on getting them to reconsider how they're going to do this [post-pandemic].'
Organisations - Response in Crisis (less innovative)	PM8	'You look through the whole COVID pandemic and a lot of companies, I would say, regressed back to governance and risk and process.'
Chief Executive Officers – reverting to old ways	PF1	'We need to adapt post-COVID I mean, that's one of my frustrations in that the current MD just said basically from when the government announced that we are all returning to work, they wanted everyone back. And I've had people crying in my office, not just from technology, but from marketing, from sales saying, we're just not sure that we can [or want to] do this [go back to old ways of working].'
Board of Directors – think of IT differently	PF2	'IT is on the agenda of every board, every day. I was waiting for that, but here's where we've got to be really careful. I think we've still got so many propeller heads in CIO roles and even sit on and in board meetings.'
COVID-19 – changed the employee approach	PF5	'having that time [isolated in COVID-19] with my young family just made me realise some of the things that I was missing in some of the things that I was sacrificing'.
COVID-19 – Benefits to IT	PM1	I think it's actually been beneficial in the aspect of for a lot of businesses who may not have fully respected or thought the value that their technology team could bring to the organisation [that] very quickly changed, […] to our IT team is a key leg of our wider enterprise. I think if anything, it's brought IT teams to the table'.

Included in the literature review, Divya and Suganthi (2017) discussed the importance of combining Leadership Theories to create opportunity for new and relevant theory as older theories become obsolete in their ability to adapt to changing organisation and economic trends. During their canonical, correlational study, they investigated merging elements of Authentic and Transformation Leadership Theories as a recommendation to create a future-relevant leadership style. Scholars, such as Zacher (2015), curated studies that seek to identify the leadership required for this future organisation with proposals that concede the future leadership context will require a different approach to the past, when a leader could remain in one theory classification. The leadership of the new era will require a different set of capabilities than what helped them and their companies, succeed in the past (Harvard Business Review 2021). It was found in the data that the participants successfully combined elements of Ethical and Inspirational Leadership Theory, bringing their full, authentic self to work and showing a dedication to serving and transforming their team, at individual and group level, as well as in the growth and direction of their organisation.

Further, the literature indicated that the mindset of leadership and skills required to be successful in the future, such as those Notable Nine identified by Morgan (2020) (Appendix D), combine elements of Neo-charismatic and Ethical/Moral Leadership and go further to obscure the borders of digital and futurist skills once isolated to a technologist. It was discovered that the participants in this study were found to be very aware of their continued self-development, constantly focusing on learning and leveraging a growth mindset (Dweck 2017). Further, it was uncovered that the participants were agile in their synthesising of information. They role modelled the learning behaviours by demonstrating that they are taking themselves out of their comfort zone and are less interested in the core components of technology than developing a better understanding of how it all fits together [PF8]. The results established a premise for what was important as an executive technology leader connected to the changing context in Australia. Table 11 – The Core of Leadership Importance, provides a view of these critical leadership elements identified and examples from the participants.

Table 11 – The core of leadership importance

Important to Technology Leadership & success for organisation of the future	Participant	Example
Visible leader	PF6	'[must] be visible within the organisation, whereas in the past it was acceptable to be technically good and to make the recommendations behind closed doors. The organisation is opening out now so people will want to be able to name you to understand who you are.'
Accountable	PF2	'I am obsessed with accountability. I actually love being held accountable. But the thing that stresses me out the most is unclear accountabilities.'
Business-first leader	PF4	'You go to forums and you can tell straight away, just by the insight that they may have or the questions that they ask, whether they're a business leader or whether they are technology expert.'
Growth mindset	PF6	'If you're not prepared to push yourself to be uncomfortable in your learning and in your understanding of systems, you're not going to be able to take your organisation where it needs to be in 5 years and 10 years from now.'
Multidiscipline career	PM9	'So in a way, they can't say that I'm a CIO who only looks at boxes and wires.'
Autonomous team	PF1	'I don't need to know that you're clocking in and clocking out all day every day.'
People-focused	PM8	'it comes down to those wonderful winning hearts and minds taking people with you.'
Broad career experience	PM1	'if you want more from your career, you want a more sort of intrigue or interest or what you can do, is that sort of going - Well what can you do outside of technology.'
Adaptable	PF4	'I love change. I would be bored out of my brain about the same thing every day.'

Similarly, participants addressed the redundant elements of technology leadership connected to the changing context in Australia. These results are captured in Table 12 – The Redundant Leader.

Table 12 - The redundant leader

Redundant in Technology Leadership & a failure point for organisations of the future	Participant	Example
Behind The Scenes Leader	PF1	'I really remember how different it was back then to sort of where I've come to today. And as I said, it was very much about keeping the lights on, making sure that we were providing support to the business and we were just a back office function.'
Blame Setting	PM7	'I think lots of businesses have silos and they just chuck things over the fence to the next department and claim victory. And I hate that.'
Exerting A Position of Power	PM3	'Leave your ego at the door. Unfortunately, I have noticed there's quite a lot of egos at play in senior roles, more actually here in Australia than overseas.'
Fixed Mindset	PF6	'I've met a lot of people, particularly in those kind of chief technology officer roles, who started in the 70s, 80s, […] you guys, wow, look at you. You're amazing. Like you're doing stuff on your green screen. And then that's really where the learning stopped.'
Controlling Style	PF4	'CIO was more on need to control because nobody knows anything about technology. So [the CIO] needed to control everything.'
Traditional Technology Leader	PF4	'The typical CIO that a lot of people say is that IT manager person, you know, the infrastructure, the person who manages the infrastructure. So does not have interpersonal skills.'
Keeps Technology Mysterious	PM8	'Technology was something that was a bit weird and geeky and somebody knows about it, but not many people in the organisation know about it.'
Technology Focused	PM2	'it's not actually about technology […] anymore and the benefits of having domain expertise. It's about being able to translate that into a business benefit.'
Micro-management	PF2	'My predecessor has been more command and control, and I don't mean that in a negative way. I actually just mean that they tell their team what to do, when to do it and how to do it. So people don't have autonomy, there's no trust.'

As the literature suggests in Chapter 3, organisations, as well as people, will seek new styles of leadership, with Caldwell (2013) recommending, for organisations to remain competitive, traditional dominant leadership styles will need to be replaced. The participant results from this study provide evidence of the style required for effective leadership in technology within an Australian context. This section of the results is dedicated to leadership and correlates to section 2.4.1 Leadership of the literature review in Chapter 2. The following section, 4.4 Career and Gender Dynamics, will explore the career journeys of the participants linked to 2.4.2 Gender Dynamics and 2.3.3 Career Theory component of the literature review completed in Chapter 2.

4.4 Career and gender dynamics

There was a great belief that as a girl, I didn't have any boundaries around me because I was a girl. That only came later [in my career] - that I realised there were boundaries around me, because I was a girl! [PF4]

In the literature review, evidence was explored by Northhouse (2021) related to gender and leadership, discussing approaches to promoting women in leadership. Further to the promotion of women, Dowling (2017), provided context on the 'glass ceiling', a metaphor coined in 1986 explaining the invisible barrier, or ceiling, that is preventing women from ascending to leadership roles. Recently, the literature has deviated to provide a view of the career path, with authors such as McDonagh and Paris (2012) suggesting it is similar to a 'leadership labyrinth' and, as suggested by Sandberg (2013) in her popular book on women in leadership, *Lean In: Women, Work, and the Will to Lead*, a 'jungle gym'. The participant interviews in this study supported the labyrinth approach analogy, where the female participants 'zigzagged' through various roles before 'landing' in the head of technology function, yet this was found to be like the male participants. Of the total population of participants, all had experienced different roles, domains, and industries with none experiencing a linear career path.

Whilst the career pathway was similar in the career variables described for both genders, as also found by McKinney et al. (2008), the results of this study did not suggest that underrepresentation of women in technology leadership was driven by less women entering technology careers.

I've the strange feeling that I've never actually applied for a job in my life. [PM7]

During the interviews, 8 male participants, or 88%, shared a positive career intervention in their 20s that helped nurture and accelerate their career. The results did indicate an acceleration of career where a sponsor was identified in the early career stage, the 20s. Moreover, these sponsors were all male and used their influence overtly, to clear the path for the participant. In one case, the Chief Executive Officer singled out the then 21-year-old, placing them into a technology leadership role [PM7] and for another it was the Chairman of the Board of Directors that overtly sponsored the participant [PM5]. In his own words the Chairman '… *was putting trust within me and also communicating that trust to others that helped me elevate through that leadership journey and build a position where I could influence*' [PM5]. The results found that this early, positive career experience differed from the female participants even when they had identified an early career sponsor. The results likewise indicated that a gender-specific (male) support network, extending past the period the males worked together, was established early in the men's career path whereas the women experienced only singular support and in some cases, acrimonious female networks [PF2]; [PF5].

In those formative years, for me, it was just about getting capability in, you know, project and strategic and operational areas. [PF7]

Overwhelmingly, the literature acknowledges the underrepresentation of women in the technology profession, and research conducted by Trauth (2002) is an important viewpoint, seeking to reject previous essentialist arguments for this occurrence and rather focus on the social construct arguments. Further, Trauth (2002) theorised that the lack of female participation in technology is a result of different social influences for men and women in society and in the workplace. It was found that the results of this study concur with Trauth (2002) theory on different social influences impacting the participation of women in technology. The results in this study indicated 3 stages to career journey and progression experienced by both genders however it was found that 8 of the 9 women respondents or 88% spent on average 10 years in each phase whilst their male participants quickly moved through the phases in half the time. Table 13 – Technology Leadership Realisation Sequence, provides an overview of the phases, the actions of the participant and the behaviours exhibited or internalised.

Table 13 – Technology leadership realisation sequence

	Action	Behaviours
Career Phase 1: Inception	Observation	Self-doubt
Career Phase 2: Management	Tolerance	Self-awareness
Career Phase 3: Executive	Incongruence	Self-belief

The results of this study align with Trauth (2002), suggesting that the gender gap in technology causes are multifactorial and different social experiences, in society and in the workplace, create a different pathway for men and women. For men in this study, the social experiences create a positive, accelerated career pathway, and for women, a negative, decelerated career pathway to ascending to technology leadership roles.

It is so easy to give up when you are faced with the things that we are faced with, and particularly because you do have to be better. You actually can't just be an equal. You have to be better. And so the expectations are higher on us. [PF9]

The literature confirms that governments and organisations in Australia have made legitimate attempts to institutionalise equality processes and practices into company culture, so that gender-focused programs are the norm. Further, Murray and Southey (2019) suggest that without formalised workplace structures that support gender equality, women are left to survive in workplaces where they, next to their male counterparts, are not equal when displaying strong leadership performance. The results of this survey support Murray and Southey's position that when performing equally, women are still not considered equal. Further, that women must outperform to generally accepted standards for their male peers and still bias is a barrier, with one of the female participants [PF4] reflecting an experience of being the only female in a room with a technology vendor and when she asked to get started, the vendor replied, 'we are waiting for the CIO'. To reiterate the gender bias in this experience, the participant was the CIO.

The results indicate that there is a gap in the workplace to support female technology leaders with 7 of the 9 female participants, or 78% having resigned their executive technology role and left their organisation in the 12 months rolling the interviews, compared with 1 of the 9 male or just 11%.

78% of the female participants resigned their executive role within the 6 months preceding or post the interviews compared to only 11% of the male participants.

It is noted in the literature, that the Australian Government (2022a) released an updated version of their STEM initiatives for girls and women positioning the importance in the role of government as it relates to the over 60 different initiatives to boost participation of women. The literature revealed that these initiatives focused on areas such as Leading the Way; Enabling STEM potential through Education; Supporting Women in STEM Careers; and Making Women in STEM visible. Further, the Office of the Women in STEM Ambassador Organisation (2022) has completed an ecosystem review as part of the Women in STEM Decadal Plan and suggest that women in Australia experience various barriers throughout their career progression, adding that this creates a 'leaky' pipeline adversely impacting the representation of women at all levels, most noticeably in leadership. The results of this study indicate similar barriers to that identified in the career progression pipeline discussed in the literature review for early career and mid-career however an observation from the literature suggesting that there are options to support women in their STEM careers, was an absence uncovered of formal workplace or society support for female executive technology leaders.

Additionally, the results of this study suggest that when women finally ascend to leadership in technology, they have not given thought to their potential leader impact for other women nor has a workplace provided gender-specific support for this elevation to ensure retention. One female participant explains it this way from the start of their career journey to their final executive position: '*I was just trying to make a life and make a living really in some respects. So, I think a lot about my generation of women and all that sub-generation and in some respects, how we were a bit too late for 70s feminism and a bit too early for this next wave, I hope, of*

female empowerment. So, it's taken me a while to think about concepts of role models and aspiration and the fact that I could even aspire to a seat at the leadership table' [PF7]. A reoccurring progression barrier represented across the Women in STEM career pipeline is a lack of role models, mentors, and sponsors yet the participants in the study actively give of their time to support early career and mid-career females. The data from this study suggests we are losing women technology leaders once they ascend to executive, the extrapolation of this result will expand this gap and raise the barrier.

I'm going to an [industry] event. This is a Breakfast on International Women's Day to talk about how can we encourage more girls into STEM and [we are] having 3 men on the panel. [PF4]

Gender Equality is widely covered in the literature, with scorecards such as those published by the Workplace Gender Equality Agency (2022) that track gender metrics across organisations readily available. The published Workplace Gender Equality Agency (2022) Gender Index confirms that leadership positions in Australia-based organisations remain heavily male-dominated; however, it reiterates there is a large increase of employers focused on gender equality, with 77% of all reporting organisations having policies and practices focused on eliminating gender bias. The consensus of the literature over-emphasises parental leave policy and processes, and flexible work, as a method to increase female participation. The results of this study support the fundamental focus of flexible work choices, with all of the women taking a career break to focus on children's carer's duties, not just at birth but also mid-career and in executive phases.

Furthermore, the results of this study identify the importance of a female standpoint on issues relating to gender equality and participation, particularly retention of women in the workplace, where a mixed message is sent to an intended female audience if the advocates of the policy and program are not relatable. Finally, whilst there is robust literature on the topic of gender equality, the results of this study indicate that there is much progress yet to be made. As provided by a female participant to this study, '*We've had lots of research into this space. We've had lots of discussions about it. We've got good awareness now. I think Australia is behind the*

pack and talking to my US colleagues and counterparts that they are gobsmacked at our level of gender inequity in Australia' [PF7].

As the literature suggests in Chapter 3, only 1 in 4 Australian organisations have a gender-balanced leadership team, providing compelling data to focus on activities relating to gender equality, pertinent to the Technology Leadership Context. As the results of this study suggest, the Leadership Realisation Sequence is a similar career pathway for the genders however the social experience of the female participants differed vastly to their male peers. These results relate to **Research Questions 1, 4** and **5**. This section of the results is dedicated to Gender Dynamics and career and correlates to the sections 2.4.2 Gender Dynamics and 2.4.3 Career components of the literature review. The following section, 4.5 Unintended Consequences of Well-intended Efforts, will explore the well-intended efforts and generalised labelling as it relates to advancement of women into technology leadership. The results are linked to 2.4.4 Unintended Consequences component of the literature review completed in Chapter 2.

4.5. Unintended consequences of well-intended efforts

I know that a lot of high achievers suffer from impostor syndrome, and I think a lot of high achieving women, particularly acutely, because that's the messaging that comes at us. [PF7]

Merton's (1936) theory of Unintended Consequences was leveraged whilst analysing the results of this study to determine impact of this theory on improving the participation of women in technology leadership. This theoretical analysis of the results of this study is a relevant enquiry as a method to understand the organised activity toward improving female participation in technology and the glacial speed at which this is occurring. The Unintended Consequences Theory provides a taxonomy that can be systematically applied to formal policy as an organised action with an intended outcome (de Zwart 2015). Merton (1936) taxonomy, provides 5 foundation symptoms in the Theory of Unintended Consequences that include:

- ignorance: related to lack of knowledge or experience of the problem
- error: poor analysis techniques and interpretation
- short-termism: a focus on the short-term returns rather than long-term benefits
- dogmatism: maintaining values, axioms and policies that are out of date; and
- self-defeating prophecies: overcompensating and playing safe.

Arguably, the more than 60 Australian Government policies and initiatives designed to improve female participation in STEM with little movement since inception would suggest that there is an argument for Unintended Consequences to be applied. The results indicated examples of the 5 foundation symptoms being prevalent in society and the workplace, transcending leadership and gender in technology. Of the taxonomy of symptoms provided by Merton's work, there was a consistent theme amongst participants of organisations consistently retaining and employing technology leaders based on the leadership context of the past, exhibiting a **dogmatism** to traditional technologists [PM7] [PM3] [PM1] [PF4] [PF6] [PM2] [PF2].

Further, as evidenced in the literature review, Australia has no recent empirical research levering the expertise, experience, and knowledge of the executive Technology Leadership Context to inform decisions. There is a lack of technology discipline insights and gender-specific experience to inform effective policy and guide decision makers. This drives **ignorance** of the situation and produces **error** by policy and program decision makers in society and the workplace, by leveraging information that is not culturally specific and misinterpretation the problem based on outdated studies.

Similarly, **short-termism** is represented in the results of this study where organisations are taking an operating view of less than 12 months of the technology leader's position and often seen as the order taker and domain expert, rather than the optimal context discovered in this research. Society and workplace take a reactive view to the underrepresentation of females in technology, designing programs based on historical progress and with a broad approach, as suggested by one participant, '*my sense of it is it's not a one-size-fits-all pathway, the traditional pathway of coming up and having spent time in the different domains, having that technology*

experience, to be honest with you, I don't think that exists anymore' [PM2]. This short-termism to leadership and gender in technology produces a **self-defeating** prophecy as initiatives and policy creation, to unlock optimal leadership and change the poor female participation, are inadequate for the future yet safe for the current environment.

Surfacing literature on Unintended Consequences as it relates to leadership, gender and career concepts in technology in Australia was challenging however when exploring this theory in relation to the problem, the results of this study do indicate a correlation of the theory to the experiences and actions by the female participants. Kulik (2021) argues in the literature that persistently emphasising low performance of a single indicator of gender inequality ironically lowers stakeholders' motivation to act further, highlighting the unintended negative consequence of well-intentioned action. Paradoxically, the results in this study suggest that labelling a barrier with the negative connotation presents a constant reminder and reinforcement of the negative experience for the female participants. When analysed it was found that 6 of the 9 female participants, or 67%, referenced impostor syndrome as a barrier to their progression, having experienced this feeling of uncomfortable lack of knowledge at various times throughout their career. Further, this label emerged as a justification for a tolerant approach to various behaviours in the female mid-career phase to their peers not wanting to draw attention to their career position.

Interestingly, when this concept was explored further, the male participants all had the same feeling across their careers, but rather found this to be an immersive learning experience. One male participant in the latter stages of their early career, argued that qualifications should be portable as he changed discipline for the benefit of obtaining an international scholarship to explore this concept further [PM9]. At no stage of this uncomfortable lack of knowledge did the male participant suggest he had impostor syndrome, merely that he was learning. It was noted in the results that the female participants did overcome this through building their own courage and self-belief, often not established until the ascension to executive technology leadership. These results provide context to **Research Questions 2, 3** and **4**.

Only 22% of the total female participants were retained at executive leadership in the rolling 12 months of this study.

As indicated in the literature, authors such as Leslie (2019) and Wiener (2016) contend that diversity initiatives focused on better outcomes for minority groups in organisations, like women, produce 4 unintended consequence types where they backfire, deliver positive or negative spill over to other goals outside of the diversity initiatives, and produce false progress metrics not reflecting the true progress. Further to this argument of Unintended Consequences, Wiener (2016) acknowledges that several Silicon Valley companies have implemented extensive diversity initiatives that have failed to produce the desired outcome. The results from this study indicated that the participants followed the Leadership Realisation Sequence consisting of actions and behaviours yet the retention of male participants in executive far exceeded the retention of female participants. Where the total participants (n=18), having reached the echelon of technology leadership and stratified into the population represented for each gender (n=9), the result is 89% male retention to 22% female retention at executive. Further, the results confirmed that the females opted for this outcome by resigning. Table 14 – Female Participant Executive Retention Results, provides a view of this resignation pattern across the female participants. These results relate to **Research Questions 4**, **5** and **6**.

Table 14 – Female participant executive retention results

Participant	No change stayed in role	Moved to same role in different organisation	Left to become own business owner	Career break
PF1		✓		
PF2			✓	
PF3				✓
PF4	✓			
PF5			✓	
PF6				✓
PF7				✓
PF8	✓			
PF9		✓		

One of the things that I've talked about is influence and learning how to influence and being really strategic about that and understanding how to grow your influence. [PF9]

Through the literature, researchers such as Cruickshank (2020) have explored the growing significance of the similarities and differences between male and female leaders to uncover important implications when establishing targeted interventions such as increasing women in leadership. Options explored to improve retention include flexibility and choice as women pause their career and then restart. The results of this study indicate that equality and development interventions have been experienced by the female participants throughout their career however there is a significant result that their confidence and clarity of career was uncovered in their executive leadership phase of their career. Notably, the results align this career phase to a deficit of formal structure in the workplace and society to support women post ascension to executive level in technology. In the literature, as in the results of this study, the female career journey up to this executive career phase is well supported; however, it then becomes a personal initiative of the female leader to locate a network of support for themselves. The literature evidences the vast number of initiatives available to women throughout their career, from government and in the workplace (Australian Government 2022a), however, as the results of this study indicate, the Unintended Consequences of the well-intended interventions provide the tools, equality awareness and development that proliferates a lack of female representation at executive technology leadership.

4.6 Summary

In this chapter, the results of the research were shared, analysed, and compared to the literature review provided in Chapter 2. Correlation of the results from this study against the literature was a critical process to build on the existing literature and where appropriate, establish alignment or variation. Qualitative results associated with the main themes of the section, as direct quotes or in tables through the participant identifier, were shared. As the literature review in Chapter 2 suggests, organisations as well as people will seek new styles of leadership. For organisations to remain competitive, traditional dominant leadership styles will need to be replaced. The participant results from this study provide evidence of the style required for successful leadership in technology within an Australian context, now and into the future. Further it was noted that only 1 in 4 Australian organisations have a gender-balanced leadership team, providing compelling data to focus on activities relating to gender equality, pertinent to the Technology Leadership Context.

As the results of this study suggest, the Leadership Realisation Sequence is a consistent pathway for the genders; however, the social experience of the female participants differed vastly to their male peers. The literature in Chapter 2 affords a vast number of initiatives available to women throughout their career, from government and in the workplace, however, as the results of this study indicate, the Unintended Consequences of the well-intended interventions provide the tools, equality awareness and development that proliferates a lack of female representation at executive technology leadership. The following and final section, Chapter 5: Discussion, Implications and Conclusion will synthesise the results of this study supported by the existing literature, as the discussion produces new contributions and addresses the implications of the results to the theoretical fields of Leadership, Gender Studies and Career. The practical implications will be discussed for society and workplace completing the contribution of this research.

CHAPTER 5: DISCUSSION, IMPLICATIONS AND CONCLUSION

5.1 Introduction

The situation of the study was explained in Chapter 2, setting the premise for the reader of the underlying assumptions, limitations, and theoretical underpinnings. The literature was critically discussed, and gaps were identified, as it relates to the research questions developed in this study to examine the problem. The research questions were identified to inform the research problem with the anatomy of the research questions shared. Through Chapter 3, the research methodology was justified, identifying the research paradigm, design, and research procedures. As a progression, the results of the study were shared in Chapter 4, with correlation to the existing literature. In this final chapter, existing concepts will be coupled with the new concepts from this study, completing the full picture of the contribution of this research. A robust discussion, exploring the research problem and the results from the research questions will then lead to identification of the implications to theory, society, and workplace, before discussing the limitations and implications for further research. Finally, a conclusion of the study will be provided to complete this dissertation.

5.2 Discussion

The objective of the study was to address lack of awareness as to the Australian Technology Leadership Context and the impact this will have on organisation's sustainability. It was also to address the gender gap in the profession, improving diversity in executive teams. Further, it was a goal of this study to provide Australia-based research, and to fill a gap in empirical data, literature, and theory connected to the technology discipline, with the theoretical contribution designed to address the dearth of discipline-specific analysis in Australia. The objectives of the practical outcome of the study are to aid society and workplace in Australia to adopt an active strategy to change their technology leadership in-line with the leadership themes explored in this research and increase the participation of women in this critical leadership role in their executive team.

5.2.1 Research questions 1, 2 and 3

RQ1: What is the career progression experience of Australia's most successful technology leaders?

RQ2: What makes Australia's most successful technology leaders successful?

RQ3: What leadership qualities are essential to successful technology leadership and why?

Establishing an effective leadership team is a contemporary business issue for most organisations and as our workforce becomes more technologically adept, the role and skills complement of the technology leader must drastically alter to ensure the success and sustainability of our organisations (Morgan 2020). At no other time in human history has a near-majority of the world's population been connected with each other digitally, contributing to the accumulation of greater knowledge, yet our technology leaders and those that would appoint these roles, remain connected to a discipline skill set borne in a time before the connected machine age (McAfee & Brynjolfsson 2017; Morgan 2020). ***Research Question 1: What is the career progression experience of Australia's most successful technology leaders?*** was a critical starting point to form the research to determine the experience of these successful leaders and their comparative careers, as they shape and lead their organisations through digital acceleration and technological adoption. It was important at this stage to be able to identify the female and male journey, to assess similarities and differences as they progressed their careers.

This was completed through the interview process with demographic questions establishing the gender and age bracket as well as confirming their current role. This demographic data set the scene for their current leadership position, gender, and their life stage.

The semi-structured exploratory interviews commenced with an open-ended question supported by prompts from the interviewer to ensure the responses maintained a connection to the research question's progression and inform the problem statement. The interviews were highly personal and conversational with the participants revealing stories of their leadership journeys that helped inform the leadership context. The full interview run sheet is available in Appendix C with the specific subset to support **research question 1** listed here:

> Tell me about your leadership journey.
> *Prompts:* How did it start? How did you progress? What have been the highlights? Did you have a role model? Who was your greatest influence as a leader?
>
> What most significantly impacts your leadership style?
> *Prompts*: Is it impacted by people? The environment? The situation? How do you (or how did you), as a technology leader, lead? Why?

The constant societal variable for the participants was that each had been awarded the title of Australia's Top 50 CIO for 2019 for their leadership and impact on the trajectory and growth of their organisation (Connolly 2019). In exploring their leadership context, the results formed a basis for their success and a platform for discussing the leadership context importance. When exploring the leadership context of the participants, it was consistently found these leaders were big picture oriented in their view, focused on stewardship of people and strategy, and incredibly business oriented. This context was supported by various literature established in the theoretical concepts of Neo-charismatic and Ethical/Moral Leadership, specifically in this context, Servant (ethical) and Transformational (neo-charismatic) Leadership styles. A new paradigm observed in the results was that these technology leaders push their technology acumen to the background to be more business savvy and highly social in their perspective [PM9]. Further, these leaders

actively leverage a values-based approach to be there for the team, to serve and clear obstacles, making sure they are recognised for their efforts [PF3] and in doing so, consistently have a people-centred approach acutely aware of the well-being and health of their team [PM3].

Discussion in the literature by Divya and Suganthi (2017) suggests combining leadership theories is a sound method to create more relevant theory for the future as old theories become obsolete. The author's suggestion is a valuable delineation as it takes existing theory and moulds it into a palatable solution for the future. On this basis, the results of this study have a similar finding to combine existing theories however rather than just cease at combine, the results uncover the need to include new components, thereby creating the potential for a new body of work. This becomes the first new concept from this research.

New concept 1: The participants did not oscillate between Servant and Transformational Leadership but rather combined components to lead simultaneously with Neo-charismatic and Ethical/Moral elements with the addition of clandestine interventions, resilience by default and a focus on health and well-being.

At the time of the interviews, Australia was amid the COVID-19 global pandemic, a time of hyperfocus on the technology function and the executive technology leader. The interviews commenced in May 2021, providing almost 12 months' worth of lived experience leading through this initial COVID-19 response. Whilst leadership context during COVID-19 was not a specific objective of this research, given the interview timing it was opportune to have the participants reflect the experiences of the pandemic, any impact on their leadership and the potential change to leading in the future. Surprisingly, the results informed ***Research Question 2: What makes Australia's most successful technology leaders successful?*** and ***Research Question 3: What leadership qualities are essential to successful technology leadership and why?*** as it was discovered the combination of their current leadership context and their existing leadership disposition aligned to Neo-charismatic and Ethical/Moral Leadership Theory, created an infallible dynamic when thrust into the spotlight to support their organisations.

This leadership approach during COVID towards rapid decision-making, leading in isolation and supporting a mass distributed teams' environment was suggested by Bohmer et al. (2020) as the new leadership style to maintain rather than revert to the old. The results of this study confirmed that these technology leaders were prepared, having encompassed the 'new' leadership style pre-COVID, confirming how they were able to maintain a level of status quo when others struggled. The participants acknowledged their surprise at the accolades from their peers and the business of their leadership during COVID, sharing this is just what they do and how they have always led [PM7].

The importance of the leadership context was explored further to inform **Research Question 2 and Research Question 3** with the participants asked to reflect on their current leadership style and requirements and then how might this differ in the future. The COVID impact was a subcomponent of the prompts, with the main enquiry from Appendix C informing **Research Questions 2** and **3** listed here:

> What are the current leadership requirements of Australian CIOs or senior technology leaders?
> *Prompts:* What are the most important things you do? What do you think are most important attributes or behaviours? Why?
>
> How are these leadership requirements likely to change in the future and why? (10 year window)
> *Prompts:* Why do you think it could change? Has COVID-19 changed your assessment of the future skills? Why?
>
> What are the leadership requirements for Australian CIOs or senior technology leaders to successfully lead in the future?
> *Prompts:* What does success look like? What will be the biggest impact to the leadership requirements of CIO's?

The participants spoke avidly of the current and future mindset, skills and leadership requirements of the technology leader, validating the existing literature from authors such as Morgan (2020) and Dweck (2017). The literature explains that organisations' future leaders are very aware of their continued self-development, constantly focused on learning, and they leverage a growth mindset as the borders of digital and futurist skills, once isolated to a technologist, become obscured (McAfee & Brynjolfsson 2014). The results uncovered that the participants were agile in their synthesising of information, role-modelled learning behaviours by demonstrating that they are taking themselves out of their comfort zone and are less interested in the core components of technology; they are more focused on a better understanding of how it all fits together [PF8]. Crucially, for a Board of Directors and the Chief Executive Officer of an organisation, the results provided a framework for what is important in hiring or placing an executive technology leader to ensure the sustainability and growth of the business. This research finding, linked to **Research Questions 1**, **2** and **3**, asserts the delineation between the redundant Technology Leadership Context of the past, and provides a checklist of the Technology Leadership Context required for a sustainable, growth-oriented organisation whilst providing a career guide for existing and aspiring technology leaders.

New Concept 2 – The Australian Technology Leadership Context for organisational sustainability and growth; a leadership context checklist for existing and aspiring technology leaders and organisations when appointing these roles.

The important Australian Technology Leadership Contexts for organisational sustainability and growth have been extrapolated from the results shared in Chapter 4, Table 11 – The Core of Leadership Importance. These results delivered a checklist of requirements for the pre-eminent Australian Technology Leadership Context paradigm, a critical framework for organisations assessing their succession pipeline and for existing and aspiring technology leaders in futureproofing their careers. These pre-eminent Australian Technology Leadership Context elements are discussed in brief as follows:

- Commercially literate: they know business from the profit and loss statements to growth levers and risks profile. They have a business-first approach as they guide the technology discipline and visibility lead the organisation.
- Technologically astute: they have credibility in a technology domain and know how the ecosystem fits together to benefit the organisation and society. Their technology discipline is a foundation but not at the forefront of their leadership.
- Emotionally aware: they understand their impact on others and the broader environmental impacts, with the ability to deduce the emotional status of an individual, team or group.
- Digital acumen: their digital skills are functional and strategic, to generate positive impact through new business models, technology integration opportunities and customer experiences.
- Tech-savvy humanist: they understand the impact and responsibility that their technology discipline and leadership have to society, now and in the future.
- Accountable: these technology leaders thrive on accountability not just within the technology discipline but as a leader of the organisation, moving the technology function from a cost centre to a growth engine for the organisation.
- Growth mindset: these leaders have a continuous learning approach to themselves and their teams. Learning, unlearning, and relearning as status quo.
- Resilient: the technology leader understands there is never just one crisis, and they are prepared in themselves with a resilient mindset and install this in their teams.
- Multi-disciplined career: technology is in their core however they come from various disciplines adding practitioner skills to their toolkit to ensure currency and credibility.
- Autonomous leadership: the technology leader establishes a trust environment that provides a minimum empowered team. Those that elevate leadership beyond create a unique emancipation of their team and selves.
- People-focused: the technology leader has to shift to incorporate the well-being and health coach into their mainstream leadership. They create psychological safety and actively promote and practice self-care.

The results of this study do highlight the redundant Technology Leadership Context as a counter list to the important context of our executive technology leaders. These results are available in Chapter 4, Table 12 – The Redundant Leader, where a list of undesirable qualities is provided. These qualities portray the technology leader of the past, which proved successful in a pragmatic technology-focused discipline. However, as shared by the participants, Technology Leadership it is not about technology anymore or leveraging the benefits of domain expertise [PM2].

This discussion was related to the Australian Technology Leadership Context results obtained through the interview process and linked to **Research Questions 1**, **2** and **3**. The following section will discuss the female representation and explore results and findings related to **Research Questions 4**, **5**, and **6**. During this discussion, the career journeys captured in Research Question 1 will be compared for male and female participants.

5.2.2 Research questions 4, 5 and 6

RQ4: What is the difference between male and female technology leaders in relation to career progression and leadership qualities?

RQ5: In view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?

RQ6: In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive technology leadership?

A fundamental theme of this study was the observed underrepresentation in Australia of women in technology leadership positions. This study was not an attempt to pit the 2 sexes against each other but rather research the journey of both sexes for commonalities and differences that could impact the lack of gender equality prevalent in the discipline. In the literature, scholars have debated the mobilisation of bias in a patriarchal society and the underlying values, beliefs and institutions that are not intentionally impacting women's ascension, however are negatively affecting progression (Mill & Harriet Taylor Mill 1980; Lukes 2004). ***Research Question 4: What is the difference between male and female technology leaders in relation to career progression and leadership qualities?*** explored the views and experiences of the participants with the results assessed against the career journeys of both genders.

A provoking explanation for poor female participation in executive technology roles has been suggested in the literature. It says that women experience a different career path to men, with the likes of Sandberg (2013), from her female standpoint comparing this to a 'jungle gym', while others refer to it as a 'zigzag' pathway for females to leadership (McDonagh & Paris 2012). The results of this study supported the 'zigzag' career pathway where all female participants (n=9) had various roles across different disciplines, before 'landing' in the head of technology function. When this finding was examined, of the total population of participants (n=18) this was not a complication for the females only; it was found the male participants similarly experienced different roles, domains, and industries, hence the total interview population experienced the same 'zigzag' career path. Therefore, it can be assumed that the 'zigzag' career pathway itself does not explain the underrepresentation of women in executive technology leadership positions and can be excluded from this study as an indicator.

As the interviews progressed, the participants elaborated on their career journey, sharing insights into their experiences as they navigated their career pathway. The conversational tone of the interview was set up-front through an open-ended statement asking the participants to 'Tell me about your leadership journey'. Exploring the participant journey further through prompts like 'How did it start?'; 'How did you progress?'; 'What have been the highlights?'; 'Did you have a role model?'; 'Who was your greatest influence as a leader?', helped guide the interview to ensure qualitative insights were extracted to inform the research problem.

As shared in Chapter 4 - Results, 8 out of 9 male participants, or 88%, experienced a positive career intervention in their 20s that helped nurture and accelerate their career. These early career interventions were often through overt male sponsorship, when men used their more senior status to influence others within their sphere, thus creating a network of supporters, clearing a career path for the participant, and setting them up for further opportunities. Comparatively, the results found that this early, positive career experience differed from the female participants, even when they had identified an early career sponsor, who was also male. The results likewise indicated that a gender-specific (male) support network, extending past the period the males worked together, was established early in the men's career path whereas the women experienced only singular support, limited female networks and in 2 cases severe acrimonious female response to their burgeoning career [PF2] [PF5].

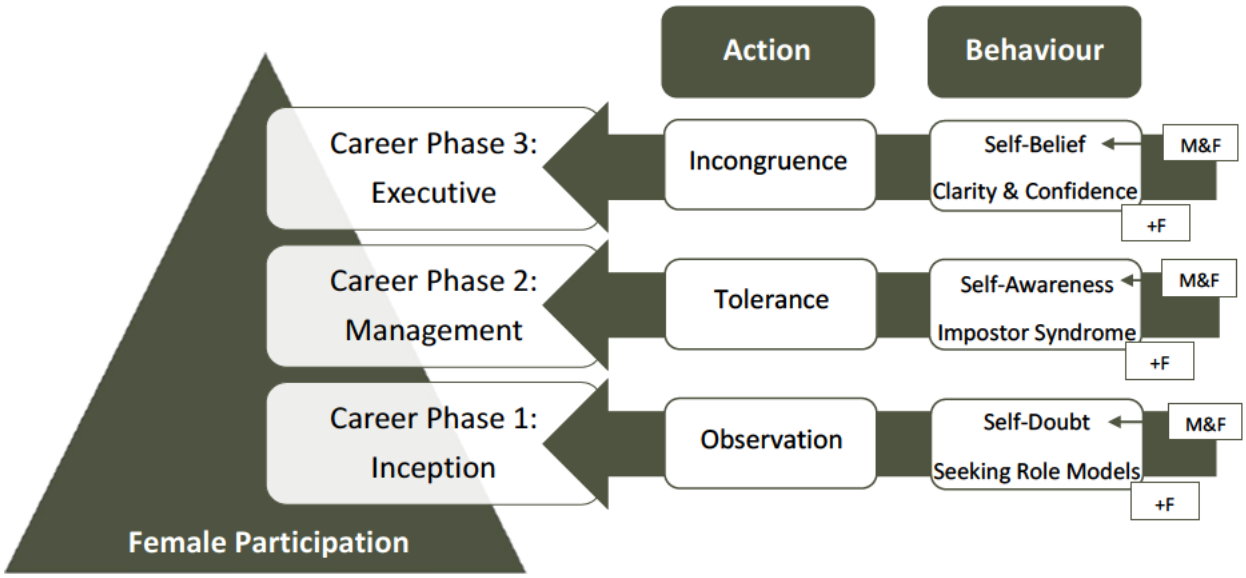
These findings connect to that of a study conducted by Trauth (2002), in which the research sought to reject previous essentialist arguments for the occurrence of an underrepresentation of women in technology and rather focus on the social construct arguments. Trauth (2002) effectively argued that the lack of female participation in technology is a result of different social influences for men and women in society and in the workplace. Overwhelming, the results of this study concur with Trauth (2002). That different social influences impact the participation of women in technology as with this research, it was clear that the male and female career pathways were similar, yet their social experiences differed. As in Trauth (2002), the results identify that the gender gap in technology causes are multifactorial and a consequence of different social experiences in society and in the workplace, yet the pathway findings of this research diverge from Trauth (2002) at this point. Trauth (2002) determined that these different social experiences, in society and in the workplace, create a different pathway whereas the results of this study indicate the female and male career pathways, or sequences, are similar. However, the time and experience is vastly different. For men in this study, the social experiences create a positive, accelerated career pathway, and for women, a negative, decelerated career pathway to ascending to executive technology leadership roles.

It was discovered during this research, there are 3 phases to a technology leader's career journey and progression sequence experienced by both genders. This Leadership Realisation Sequence is a new concept identified to inform this research problem and whilst the phases are established equally in the career pathway of the male and female participants, the experience differs significantly. This finding was shared in Chapter 4 and captured in Table 13 – Technology Leadership Realisation Sequence, and it was found that 8 out of 9 women respondents, or 88%, spent on average 10 years in each phase whilst their male participants quickly moved through the phases in half the time. For men in this study, a critical delineation was the social experiences creating a positive, accelerated career pathway, and for women, the opposite outcome from social experiences producing a negative, decelerated career pathway to ascending to executive technology leadership roles.

New Concept 3 – The Technology Leadership Realisation Sequence is a mutual career pathway for both genders, yet the social influences alter the parity of progression to executive leadership. Men experience positive social experiences that accelerate their career pathway, whilst women experience negative social experiences that decelerate their career pathway.

The Technology Leadership Realisation Sequence steps through 3 career phases, determining a phase-specific behaviour and action. The internalised behaviour produces a career action exhibit that correlates with the phase of the career. Diagram 9 – Technology Leadership Realisation Sequence including Female Behaviour, shares the career phases with action and behaviour detected in the results, with the additional female behaviour identified. Understanding this Technology Leadership Realisation Sequence supports ***Research Question 5: In view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?*** and ***Research Question 6: In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive technology leadership?*** in providing opportunities for targeted interventions and programs that could truncate the pathway for women, aligning to the male experience that has produced a more positive, direct outcome. These practical results and opportunities of this study will be shared in section 5.4 Implications for Society and Workplace.

Diagram 9 – Technology leadership realisation sequence including female behaviour



M= Male | F= Female

Developed by the author for the purpose of this research.

Governments and organisations in Australia have made legitimate attempts to institutionalise equality processes and practices into company culture so that gender-focused programs are available and formally supported. Murray and Southey (2019) suggest that without formalised workplace structures to support gender equality, women are left to survive in workplaces where, next to their male counterparts, they are not considered equal even when displaying strong leadership performance. This observation was replicated in the results of this research when the female participants highlighted the need to outperform the generally accepted standards for their male peers and that once in the executive technology leadership position, bias remains prevalent [PF9] [PF4]. Of concern, it was discovered during the literature analysis that a gap exists in government programs to provide formal support to female executive technology leaders and when tested on the participants, this was found to be the situation in their organisations.

Disturbingly, 7 out of 9 female participants, or 78%, admitted to resigning from their executive technology roles within a 12-month rolling period following the interviews. When compared to the male population this was a significant finding when 1 out of 9, or just 11% of the male participants, had resigned their executive technology role during the same period. Arguably, the lack of formal support for Australian female executive technology leaders once ascending to the leadership position has a direct correlation to the low retention rate.

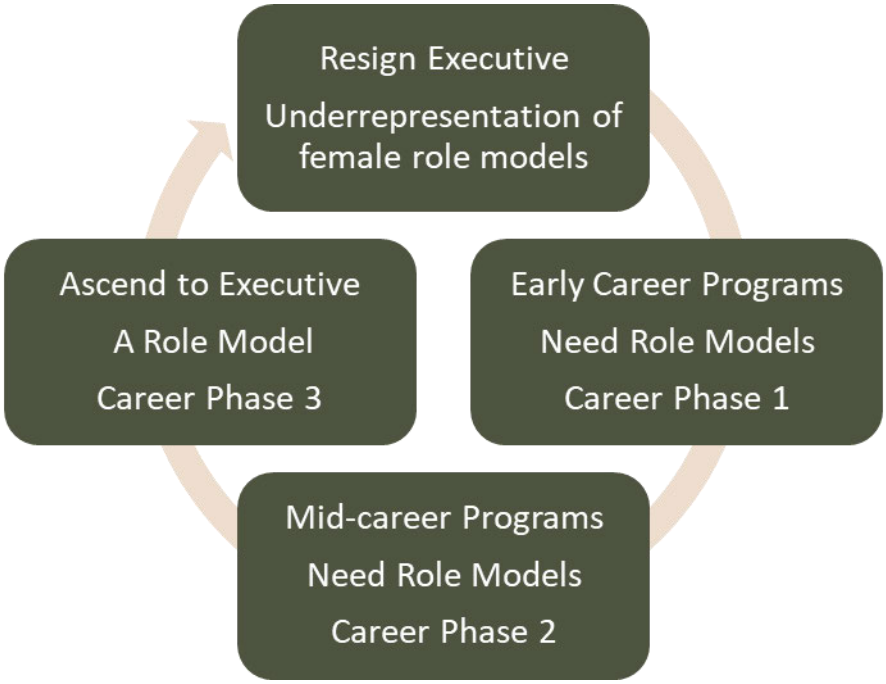
During the interview process, it was necessary to capture any challenges or barriers experienced by the participants during their careers to further inform the research problem. This was done towards the end of the interview process, however, during the career journey there were moments when each participant discussed barriers, challenges, and insights towards achieving executive technology leadership gender parity. The full interview run sheet is available in Appendix C with the specific subset to uncover barriers, challenges, and insights toward career and gender parity, listed over page:

> Tell me about the top 3 to 5 challenges you experienced in reaching the position as CIO.
> *Prompts:* It could be self-imposed; perceived or learned. Why? Would you change the challenges; could you change the challenges? Did you overcome adversity? Need to find your courage?
>
> It is acknowledged in the tech industry that there is a gap in female leadership. In your opinion, what has caused this gap in the technology profession in Australia and what can be done to close the gap?
> *Prompts:* Are they the same type of challenges you experienced? Do you think it could be something else? If so, what?

The results of this study indicated similar barriers to that identified in Diagram 3 – Career Progression Pipeline, discussed in the literature review, for early career and mid-career women. The Women in STEM Ambassador Organisation (2022) completed an ecosystem review as part of the Women in STEM Decadal Plan (Australian Academy of Science 2019) and posit that women in Australia experience various barriers throughout their career progression, adding that this creates a 'leaky' pipeline adversely impacting the representation of women at all levels, most noticeably in leadership. It seems rational that if the 'leaky' pipeline is a common ground known for impacting gender parity at executive level in technology, then governments and organisations would create programs informed by those that have achieved this level and would retrospectively create programs leveraging their insights.

In review of the more than 60 initiatives supported by the Australian Government to boost participation of Women in STEM, none focus on executive women in technology. Further, a troubling insight revealed from this research suggests that when some women finally ascend to leadership in technology, they have not given thought to their leadership impact for other women, peers, or aspiring executives, nor has the workplace provided gender-specific support for this elevation to ensure retention [PF7]. A recurring progression barrier represented across the Women in STEM career pipeline (Women in STEM Ambassador Organisation 2022) is a consistent lack of role models, mentors, and sponsors. The insight from this study indicates we are losing female technology leaders once they ascend to executive, creating a self-perpetuating role model deficit that expands this gap and raises the barrier. Diagram 10 – Self-perpetuating Role Model Deficit Cycle provides a view of this cyclic disorder.

Diagram 10 - Self-perpetuating role model deficit cycle



Developed by the author for the purpose of this research.

New Concept 4 – Self-perpetuating Role Model Deficit Cycle of females in executive technology and the early and mid-career interventions that set them up to leave.

Exploring this Self-perpetuating Role Model Deficit Cycle further, there is a growing body of work from researchers, such as Cruickshank (2020) discussed in Chapter 2, on the significance of the similarities and differences between male and female leaders. This uncovers important implications when establishing targeted interventions, such as increasing women in leadership. The Technology Leadership Realisation Sequence identified from this research addresses the similarities of the genders as well as identifies the female-specific behaviours. Understanding the impact and combination of these new concepts is critical as it assists to identify opportunities to overcome the female technology leader's retention issues experienced by organisations.

The literature signals a vast number of initiatives available to women throughout their career, from government and in the workplace, and the results from this study concur, indicating that equality and development interventions are readily available and experienced by the female participants throughout their career. Significantly, these programs had impact on building the female participants confidence and clarity, yet outcomes not observed in phase 1 and phase 2 of the Technology Leadership Realisation Sequence, only achieving the program outcome once the females ascended their executive leadership, phase 3, of their career sequence. When correlated to the executive technology retention issues experienced in the workplace, the results of this study indicate these well-intended interventions unintentionally provide the tools, equality awareness and self-development that emancipates the female leaders at the time when we need them most, as role models. The consequence, as uncovered in this research, is that the female leaders resign and leave. Notably, the emancipation occurs at the time when there is also a deficit of formal structure in the workplace and society to support women post-ascension to executive level in technology. As explained in the literature and observed in the results of this study, the female career journey up to this executive career phase is well supported, however, it then becomes a personal initiative of the female leader to locate a network of support for themselves.

It is acknowledged there is robust literature on the topic of gender equality, yet the results of this study indicate that there is much progress yet to be made and as provided by a female participant to this study, ‘we've had lots of research into this space. We've had lots of discussions about it. We've got good awareness now. I think Australia is behind the pack’ [PF7]. Further, all female participants provided important data from a female standpoint and acknowledged its importance when framing gender equality issues and similarly, when creating programs. It is disconcerting when designers and advocates of gender equality policy and program are not relatable, as exampled in the data where one participant noted an incident where a panel of men were on the agenda of an International Women’s Day event, to discuss how to improve participation and retention of females in STEM [PF4]. Evidently, we must retain more females in technology as they ascend phase 3 of the Technology Leadership Realisation Sequence by targeting programs at this audience, and overcome the Self-perpetuating Role

Model Deficit Cycle, to then be able to share their experiences, adding the important female standpoint to address the Consciousness Raising of our aspiring female technology leaders.

This discussion relates to the acknowledged underrepresentation in Australia of women in executive technology leadership positions with the results and findings linked to **Research Questions 4**, **5** and **6.** With just 1 in 4 Australian organisations reporting a gender-balanced leadership team, new programs supporting females at executive level in technology is critical to alter the cycle. As the results of this study suggest, the Leadership Realisation Sequence and the Self-perpetuating Role Model Deficit Cycle is an important contraindication of the female social experience that can improve the female participation in executive technology leadership. The following section will provide insight into the consequence of labels in well-intended intervention and programs to improve gender equality.

5.2.3 A Discussion on the consequence of labels

Merton's (1936) theory of Unintended Consequences is a relevant enquiry to leverage as a method to understand the organised activity toward improving female participation in technology and the glacial speed at which this is occurring. The theory provides a taxonomy that can be systematically applied to formal policy, as an organisational action with an intended outcome (de Zwart 2015). Arguably, the more than 60 Australian Government policies and initiatives designed to improve female participation in STEM with little improvement, would suggest that there is an argument for Unintended Consequences to be applied. Similarly, Leslie (2019) theorises that diversity initiatives focused on better outcomes for minority groups in organisations, like women, produce four unintended consequences that backfire and negatively impact the intended goal, deliver positive or negative spill-over to other goals outside of the diversity initiatives, and produce false progress metrics not reflecting the true progress. Merton (1936) theory produced a taxonomy with 5 foundation symptoms in the Theory of Unintended Consequences that include:

- ignorance: related to lack of knowledge or experience of the problem
- error: poor analysis techniques and interpretation
- short-termism: a focus on the short-term returns rather than long-term benefits
- dogmatism: maintaining values, axioms and policies that are out of date; and
- self-defeating prophecies: overcompensating and playing safe.

Whilst exploring the data related to career journey, several variances were observed associated with Unintended Consequences Theory and the experiences and actions by female participants. In the literature, Kulik (2021) provided that persistently emphasising low performance of a single indicator of gender inequality, ironically lowers stakeholders' motivation to act further, highlighting the unintended negative consequence of well-intentioned action. When this concept was analysed against the data, it was found that 6 of the 9 female participants, or 67%, referenced impostor syndrome as a barrier to their progression, having experienced this feeling of uncomfortable lack of knowledge at various times throughout their career progression. Further, this gender-specific label emerged as a justification for a tolerant approach to various behaviours in the female mid-career phase toward their peers, not wanting to draw attention to their career position.

New Concept 5 – The creation and overuse of gender-specific labels are producing negative consequences for females. The labels given to experiences of women, although common to both sexes, are negative in connotation, fulfilling perceived barriers, for example 'impostor' and 'syndrome'.

Interestingly, when this concept was explored in terms of the male participants a correlation was found between their experience of this same feeling across their career journeys and their identification of this being a positive challenge and an immersive learning experience [PM9]. At no stage in the data did the male participants refer to impostor syndrome and that the uncomfortable lack of knowledge experienced in a new role be anything other than learning. This was a reoccurring theme for male participants and aligned to the literature on a growth mindset approach (Zacher 2015), notwithstanding that the female participants exhibited the same growth mindset, yet the labels used in the female narrative for their experience 'impostor'

and ‘syndrome’, is notably negative. It was observed in the results that the female participants did overcome this through building their own courage and self-belief, often not established until the ascension to executive technology leadership in Phase 3 of The Technology Leadership Realisation Sequence. Other examples of gender specific labelling of experiences causing a negative impact on the female technology career pathway were found when discussing the ‘Boys’ Club’.

In the data, the ‘Boys’ Club’ was referenced by female participants as a barrier to navigating their career pathways and a continued negative impact on their ability to grow their careers. Arguably, this ‘Boys’ Club’ reference could be deemed as nothing more than an example of male Consciousness Raising and an active male support network to assist their ascension to leadership. Undoubtably a controversial view, it should not undermine episodes experienced by the female participants during whose career path this ‘Boys’ Club’ was leveraged to cover up poor behaviour, such as overt harassment and under performance [PF1] [PF7] [PF8] [PF9]. Rather, the view is just merely to take the positive and well-intended elements of the mechanism of the ‘Boys’ Club’ and apply that to the female career path as a counter to the negative experience produced by the label. In no situation, be they male or female, should there be dismissal of harassment and acceptance of poor performance, no matter the ‘Club’. Merely it is construed that should the narrative be reversed, and organisations take the positive elements of the ‘Boys’ Club’ and leverage that for programs for female Consciousness Raising, with an active network of support, this equivalent may overcome the negative narrative associated with another gender-specific label.

When applying the Theory of Unintended Consequences to policy, as is the foundation of Merton (1936) paper, the overall policy landscape in Australia provides substantive content to compare the results from this research. Utilising Merton’s taxonomy and definitions, Table 15 – Applied Taxonomy of Unintended Consequences provides a brief statement of the implication and relationship to the Australian Leadership Context and the underrepresentation of females in technology leadership.

This discussion relates to the consequences of gender-specific labels applied to behaviours and experiences, which could otherwise be common to both sexes. The analysis explores the negative consequences these labels produce on the female career experience and the potential to change the narrative to a more positive influence. Further, Merton (1936) taxonomy of the symptoms for Unintended Consequences is discussed as it relates to the Australian Technology Leadership Context, and to the policy landscape in Australia addressing female participation in STEM. The next section will identify the research result implications to Leadership, Gender, Career and Unintended Consequences Theory.

Table 15 - Applied taxonomy of unintended consequences

Taxonomy	Australian Technology Leadership Context	Policy landscape in Australia to address female participation in STEM
Ignorance	Australia had no recent empirical research leveraging the expertise, experience, and knowledge of the Executive Technology Leadership Context to inform decisions.	Lack of technology discipline insights and experience to inform effective policy and guide decision makers.
Error	Decision makers leveraged information that was not culturally specific and interpreted the problem based on outdated studies.	
Short-termism	Organisations taking a short-term view of the technology leaders' position often seen as the order taker rather than the optimal context discovered in this research.	Society and workplace take a reactive view to the underrepresentation of females in technology, designing programs off current pain points.
Dogmatism	Maintaining an outdated view of the technology leader that is inconsistent with the needs of a sustainable and growth-oriented organisation.	Maintaining an outdated, assumptions-based view of the underrepresentation of female in technology which is inconsistent with the causes.
Self-defeating prophecies	Retaining technology leaders and teams that are inadequate for the future needs of the organisation.	Maintaining a play-it-safe perpetual approach to initiatives and policy where popularity of programs and historical benefits take precedence.

5.3 Implications for theory

The previous section provides a discussion on the results and themes observed in the research and the impact on the research problem. During the discussion, 5 new concepts were identified and explored. They are as follows:

- **New Concept 1**: The participants did not oscillate between Servant and Transformational Leadership but rather combined components to lead simultaneously with Ethical and Inspirational elements with the addition of clandestine interventions, resilience by default and a focus on health and well-being.

- **New Concept 2:** The Australian Technology Leadership Context for organisational sustainability and growth; a leadership context checklist for existing and aspiring technology leaders and organisations when appointing these roles.

- **New Concept 3:** The Technology Leadership Realisation Sequence is a common career pathway for both genders, yet the social influences alter the parity of progression to executive leadership. Men experience positive social experiences that accelerate their career pathway, whilst women experience negative social experiences that decelerate their career pathway.

- **New Concept 4:** The Self-perpetuating Role Model Deficit Cycle of females in executive technology and the early and mid-career interventions that set them up to leave.

- **New Concept 5:** The creation and overuse of gender-specific labels producing negative consequences for females. The labels given to experiences of women, although common to both sexes, are negative in connotation, fulfilling perceived barriers, for example ‘impostor’ and ‘syndrome’.

These new concepts will be the basis for the implications and subsequent contribution to Theory and will culminate with the practical implications of these contributions to society and the workplace.

5.3.1 Contribution to leadership theory

The theoretical goal of this research was to provide an academic contribution to further the concepts of Leadership Theory as it would relate to technology leadership in Australia. As a tenured executive in technology, the researcher noted a lack of data or theoretical evidence contextualised to Australia and whilst literature was readily available on women in STEM, most technology-framed leadership research was based on cultures in America or India (Warne et al. 2011; Divya & Suganthi 2017). Further, the speed of technology breakthroughs has no historical precedent and to shape the future, the construct needed for successful leadership will require the best parts of human nature – creativity, empathy and stewardship (Schwab 2016). The contribution to Leadership Theory is three-fold: **first**, providing an analysis of existing theory against the Australian Technology Leadership Context; **second**, building on earlier work undertaken by Divya and Suganthi (2017) where they suggest combining leadership theories is a sound method to create more relevant Leadership Theory for the future, as old theories become obsolete; and **third**, providing a new theory of Technology Leadership Realisation Sequence, a common career pathway in technology with the implications of this theory on parity of progression to be explored further in the contribution to Gender Theory in the next section.

The **first contribution** to Leadership Theory from this research is the analysis of the Australian Technology Leadership Context against existing theories for similarities and differences. The literature explains that organisations' future leaders are very aware of their continued self-development, are constantly focused on learning, and leverage a growth mindset as the borders of digital and futurist skills, once isolated to a technologist, become obscured (McAfee & Brynjolfsson 2014). It was determined through this research that the Australian Technology Leadership Context aligned to the theory of Neo-charismatic and Ethical/Moral Leadership, where these successful and accomplished technology executives exhibited empathy, awareness of self and others, were in the service of others, acted with integrity, were inspiring, guiding,

energising, influencing and intellectually stimulating (Bass 1990; Lumpkin & Achen 2018). A new paradigm observed was that these technology leaders pushed their technology acumen to the background to be more business savvy, highly social in their perspective, and to actively leverage a values-based approach to be there for the team, to serve and clear obstacles. Further, executives exhibiting the Australia Technology Leadership Context consistently have a people-centred approach, are acutely aware of the well-being and health of their team with a focus on resilience, and lead in an autonomous, trust-based environment, holding self and others accountable to outcomes.

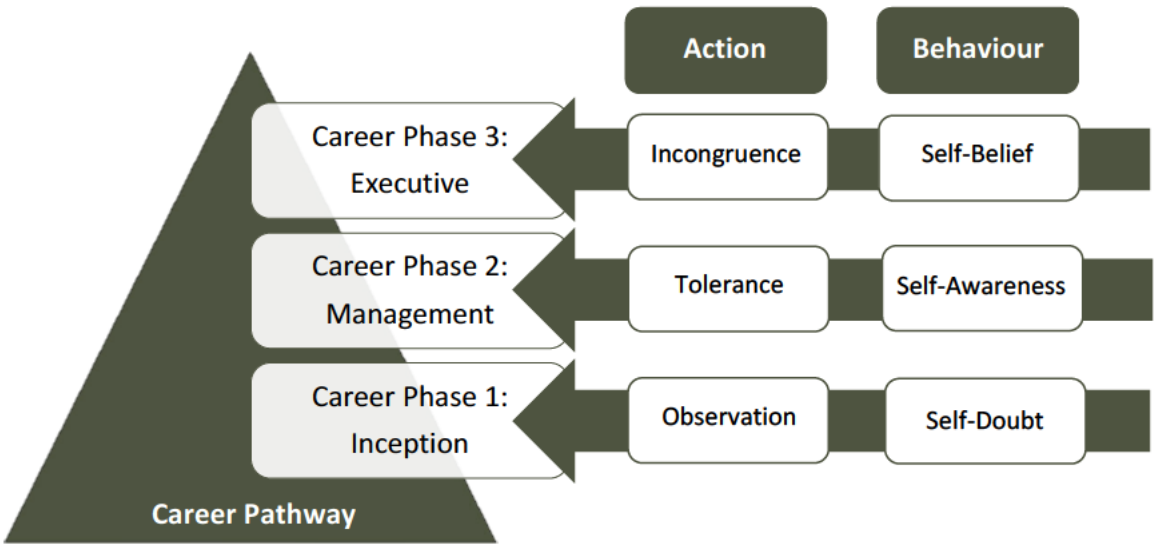
The **second contribution** to Leadership Theory from this research builds on earlier research and the outcomes determined by Divya and Suganthi (2017) to combine leadership theories as a sound method to create more relevant Leadership Theory for the future. The Australian Leadership Context supports this outcome suggested by Divya and Suganthi with a similar finding, however rather than just combine elements of existing theory, the results of this study uncover the need to include new components, thereby building on the body of work. As new combined theory emerges, the implication to existing theory renders older theory obsolete. However, the new emerged theory should be assessed for the predominant components and ensure alignment to the correct body of work. When combining theories from different bodies of work, such as in the Australian Technology Leadership Context, the researcher should assess the dominant components to ensure the emergent theory is categorised correctly. In the situation where new components are added, as in the finding from this research, the construct may produce a new body of work in the theory if the elements are unable to be categorised under existing frameworks. The Australian Technology Leadership Context produces previously uncategorised components in Leadership Theory and when combining the elements established in existing theoretical fields related to Neo-charismatic and Ethical/Moral leadership, the following emerge as new components that:

- align with neuroscience to include well-being and health
- transcend inclusivity & empowerment
- embrace emancipated leadership
- have a delicate or light way to guide high-performing connected teams
- concurrently guides to an outcome that orchestrates from within and behind the team
- have a public relations focus to promote team and technology
- are a leadership existence that embraces intangible concepts.

These new components provide a Paradoxical Leadership contribution as the less visible, physical presence of the leader, assessed against older theory, may be viewed as distant, unapproachable leadership. However, in the Australian Leadership Context, this is an elevated leadership approach that facilitates a healthy, autonomous, high-performing, and value-aligned team.

The **third** and unique contribution to Leadership Theory from this research is the Technology Leadership Realisation Sequence, a previously undiscovered phenomenon which identifies the common career path experienced by both genders as they traverse their technology career. This theory provides an overview of the phases, the actions of the person and the behaviours exhibited or internalised as they occupy each phase of their career. This new theory categorises the internalised behaviour linked to the career action exhibit, that correlates with the phase of the career the person inhabits. Understanding the Technology Leadership Realisation Sequence supports practical society and workplace activities designed to accelerate and retain technology talent. Diagram 11 – The Theory of Technology Leadership Realisation Sequence provides a diagrammatic view of this theory.

Diagram 11 – The theory of technology leadership realisation sequence



Developed by the author for the purpose of this research.

The Technology Leadership Realisation Sequence Theory suggests through this research that there is a common pathway in the technology discipline when persons are navigating their career, identifying a repeatable process experienced in the technology discipline through the career sequence. The 3 definitive phases categorise the stages of the sequence, with the actions and behaviour experienced adding purchase to the realisation of the leadership goal. This theory is a significant contribution to the leadership genre and navigation of the technology career and valuable to leverage when addressing the gender parity issues and women in technology leadership construct to be further explored in section 5.4.3 Proposed Leadonera® Frameworks.

5.3.2 Contribution to gender dynamics

A fundamental theme of this study is the observed underrepresentation in Australia of women in executive technology leadership positions. This Gender Dynamics contribution was constructed through a progressive enquiry, by first establishing the pre-eminent Australian Technology Leadership Context and then applying this outcome to the career journey of both genders for commonalities and differences that could impact the lack of gender equality prevalent in the discipline. In the literature, scholars have debated the mobilisation of bias in a

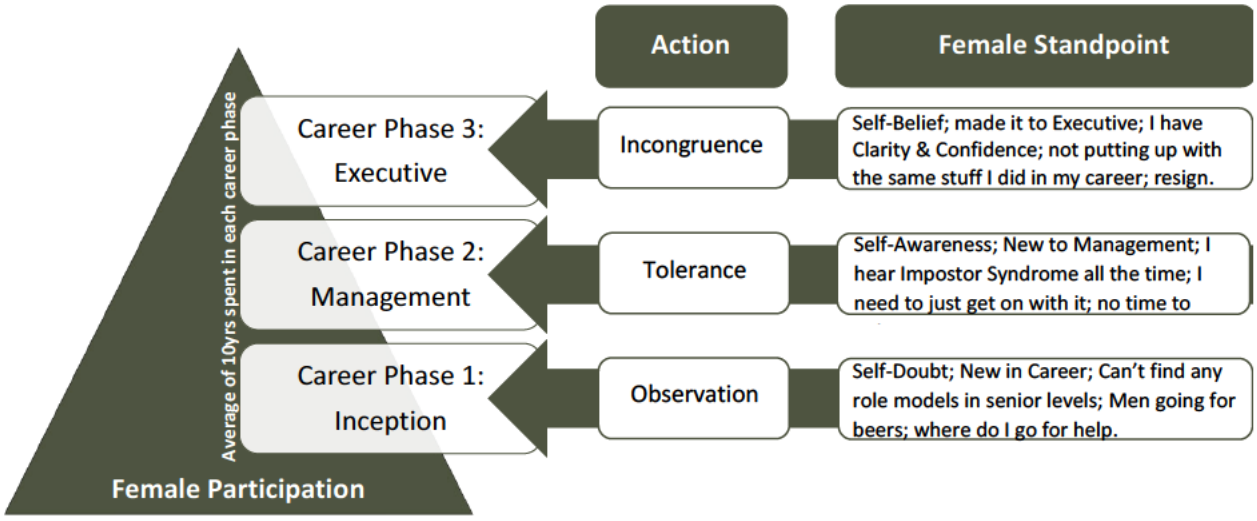
patriarchal society and the underlying values, beliefs and institutions that are not intentionally impacting women's ascension however are negatively affecting progression (Mill & Harriet Taylor Mill 1980; Lukes 2004). These underlying societal themes explored in this study are linked to Gender Equality Theory and further expanded with the reasoning that women have an understanding simply by their position of lived experienced and thus have an opportunity to influence the outcome for other women.

The contribution to Gender Dynamics commences by providing an analysis of existing theory to the Australian Technology Leadership Context, specifically the importance of Feminist Standpoint Theory and Consciousness Raising to female participation in technology. Thus, it contributes to the body of work on the Feminist Standpoint Theory applied as a foundation to the female interpretation of the technology leadership journey, along with Consciousness Raising, applied as an action of concept rather than a political liberation, as a plausible solution to improving the female participation in technology executive. The contribution of the analysis of the Gender Theory will assess the impact of the emergent theory of Technology Leadership Realisation Sequence, on the female's career progression. The Self-perpetuating Role Model Deficit Cycle, discussed earlier, will be addressed in the next section on Unintended Consequences Effect.

The influential work on Feminist Standpoint Theory by Hartsock (1985), suggests the importance of the lived experience of women giving depth to research and outcomes. Whilst Hartsock positioned the paper for advocation of women leading research to generate knowledge in opposition to the more dominant patriarchal constructs in academia (Pilcher & Whelehan 2017d), the notion of Feminist Standpoint Theory applied to the lived experience of the career in technology was a critical perspective in this research. Whilst this research aligns to Hartsock (1985) intent – a female researcher delivering female-specific outcomes – the application of Feminist Standpoint Theory to the research problem was designed to uncover the social actors and the adverse impact realised on the female career progression. This application of theory delivered an important build on the existing theoretical body of work and if this theory was left unexplored, this study would merely have supported the literature on common career pathways for both genders in the technology discipline, such as reported by McKinney et al. (2008).

This concept of social actors as an influence on the participation of women in technology was deeply explored by Trauth (2002), and the results of this study align with Trauth's theory, which shows that there are different social influences for men and women in society and in the workplace, creating different outcomes. It was discovered through this research, that for men, the social experiences create a positive, accelerated career pathway, and for women, a negative, decelerated career pathway. Utilising the Feminist Standpoint Theory approach enabled a critical examination of the common career pathway of both genders in technology, revealing the progression adversity experienced by women in technology. The correlation of the technology leader's pathway with woman experience through this research has uncovered a systemic issue of designing programs without a feminine standpoint and therefore adversely impacting the rate of career progression. Diagram 12 – The Theory of Technology Leadership Realisation Sequence (TLRS) examined through Feminist Standpoint Theory, shares this examination of the Feminist Standpoint Theory applied to the Theory of TLRS including the elongated decadal career pathway. The use of the Feminist Standpoint Theory was determined to be a critical examination and this unique, lived experience invaluable when establishing a female participation deficit.

Diagram 12 - The theory of TLRS examined through feminist standpoint theory



Developed by the author for the purpose of this research.

Analysing the Australian Technology Leadership Context through Gender Studies was an important inclusion of theory given the research problem and goal to further understand the gender parity implications in technology. The findings supported the generalised theory that equality is to be attained through gender neutrality or androgyny achieving parity with men in public sphere (Pilcher & Whelehan 2017c). They also add importance to a growing body of work, under Gender Equality, aligned with the concept of equity rather than equality. Murray and Southey (2019) suggest women are left to survive in workplaces where, next to their male counterparts, they are not equal when displaying strong leadership performance. The results of this research support the position that when performing equally, women are still not considered equal.

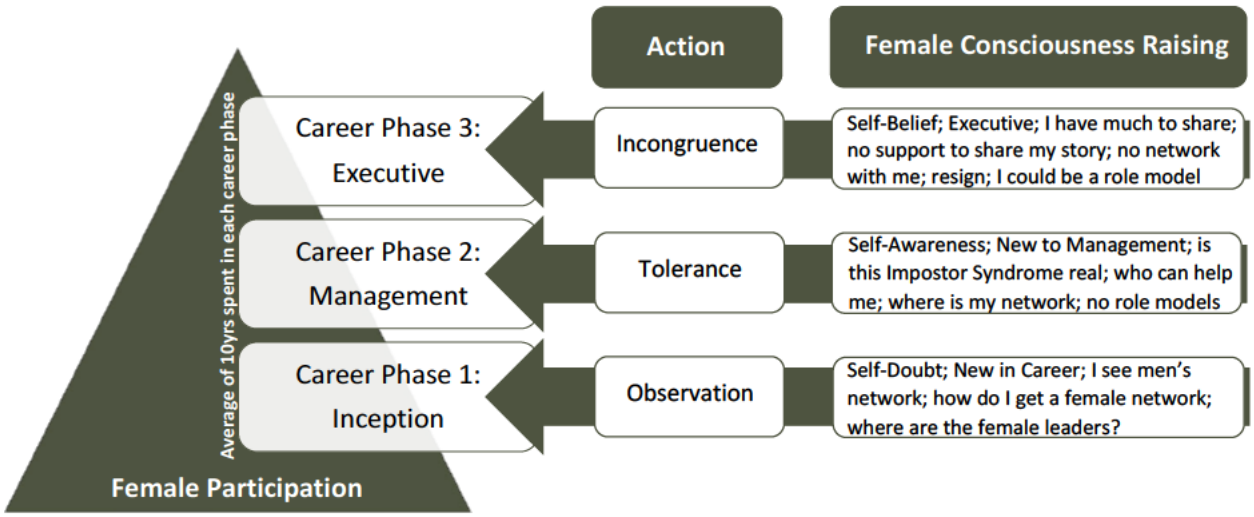
Further, that women must outperform compared to the generally accepted standards for their male peers. The contribution of this analysis confirms elements of the Gender Equality Theory relating to parity – women are achieving executive technology leadership roles, albeit not at the volume of male colleagues – yet goes further to incorporate the need to produce an equality of outcome, requiring a gender equity approach. This theoretical gender debate of equality of outcome rather than equality of treatment, where all women are treated the same as all men irrespective of differences (Pilcher & Whelehan 2017c), when applied to the Australian Technology Leadership Context, is an important juncture. The research confirms equality in leadership approach and career pathways of the genders, yet an extreme inequity of outcome, where women are leaving executive technology positions at a rate 7 times greater than their male colleagues. This concedes that if we remain anchored on the premise of applying only parity outcomes under equality approaches, organisations will continue to observe female participation erosion.

Consciousness Raising became a key activity underpinning the politicised second-wave of feminism, where women would regularly connect to share experiences and accounts of their lives to create a commonality of gender (Pilcher & Whelehan 2017f, 2017g). The intent of the politicised approach, as was the basis of Consciousness Raising, was to awaken women to the prejudices of their social position and encourage them to reassess their lives, often through a public display of anarchy to the patriarchal society. The theory of Consciousness Raising was

analysed against the social actors revealed in the female-specific components of the theory of Technology Leadership Realisation Sequence to determine the relevance to improving the participation of woman in technology. An early convergence of social networks positively impacting the male career and accelerating their journey suggested the importance of applying the construct of Consciousness Raising Theory to the female participation dilemma. Remarkably, when the elements of this theory are applied to the male pathway, it was discovered a version of Consciousness Raising was informally adopted at the early stages of the male technology career. These informal groups of men and their extended male networks were often instigated by a senior male champion with significant influence who would identify participants and include them in a lunch conversation or allow them to observe a meeting. The benefits to the male participants of this informal Consciousness Raising extended well into their career, breaking down barriers, providing opportunities and a perpetual 'Boys' Club' into their career future.

Conversely, there is little evidence of Consciousness Raising, formal or informal, in the female technology leader's career pathway with many attending events hosted by male champions seeking access to roles models. Further, the literature revealed over 60 Australian Government and workplace initiatives focused on improving female participation in STEM, with the Office of the Women in STEM Ambassador Organisation (2022) completing an important ecosystem review suggesting that women in Australia experience various barriers throughout their career progression. Furthermore, this creates a 'leaky' pipeline adversely impacting the representation of women at all levels, most noticeably in leadership. The importance of the theory of Consciousness Raising outside the political mechanism continued as a theme, where this study found when women ascend to leadership in technology, they have not given thought to their potential leader impact for other women nor has a workplace provided gender-specific support for this elevation to ensure retention. This retention is critical to providing opportunity for Consciousness Raising, defined in the scope of the Australian Technology Leadership Context and through the important female standpoint. Diagram 13 – The Theory of TLRS examined through Female Consciousness Raising provides a build on the phases of the career pathway.

Diagram 13 – The theory of TLRS examined through female consciousness raising



Developed by the author for the purpose of this research.

This theoretical contribution to Gender Studies confirmed the importance of Feminist Standpoint Theory within the Australian Technology Leadership Context and applied the concepts of equality, specifically highlighting the relevance of the equity body of work to the research problem and finally, analysed the existing political theory of Consciousness Raising to the experiences of men and women in technology as a mechanism to improve the female participation in technology. The following section will contribute to the theoretical body of work related to Career.

5.3.3 Contribution to career theory

Literature suggests that researchers have successfully combined theories to produce a correlational contribution to the theoretical field (Divya & Suganthi 2017). In this study, it was found that combining Chaos Theory of Careers (Pryor & Bright 2011) with Contextual Action Theory (Young 2019) enabled the characteristics to coexist, affecting the careers of men and women. These results build a compelling position that a linear career path does not contribute to successful technology leadership and, moreover, the research conducted by Pryor and Bright (2011) suggested linking Chaos Theory to careers is evident in the Australian Technology Leadership Context as it relates to successful leaders. Similarly, whilst the chaos characteristics

were evident, so too were the contextualised actions, facilitating breakthrough, changes, and improved outcomes in career. Both theoretical concepts were necessary, acting concurrently, and at times simultaneously within the career journey, to produce a successful career outcome.

Life is uncertain and yet it was evident during the literary review for this study that there remained a historical expectation in the field of career development to seek certainty and ultimately a linear, orderly path to career success (Pryor & Bright 2011). In considering Chaos Theory of Careers, the literature provided an explanation for poor female representation in leadership suggesting that women experience a differed career path to men, with the likes of Sandberg (2013) suggesting this is like a 'jungle gym' and others referring to it as a 'zigzag' and a 'labyrinth' journey for females to reach leadership (McDonagh & Paris 2012). This chaotic career journey has been repeatedly associated with preventing women to attain executive career success and whilst the results of this study support the zigzag and labyrinth career pathway for women, it establishes this was not a complication for females only; it was found that men equally experienced the zigzag and labyrinth with different roles, pathway interventions, career shocks (Blokker et al. 2019) and multi-industry experiences. This generalised view that a non-linear approach to career is female-specific is rebuked and rather, for successful technology leadership in Australia, this is a prerequisite no matter the gender.

Pryor and Bright (2011) acknowledge the reality that an individual's career experience is an iterative, non-linear and serendipitous serious of circumstances. Careers are best described as an interconnecting system characterised by complexity and highly susceptible to change (Bright & Pryor 2005). In an interesting duality, the Technology Leadership Realisation Sequence discovered in this study provides a linear view of the phases of the career, yet within each phase the Chaos Theory of Careers is experienced. It was observed that the Chaos Theory of Careers characteristics are experienced within the linear phases of the Technology Leadership Sequence noting the serendipitous and iterative chaos effect occurring whilst also sequencing and contextualising actions in this career pathway.

Contextual Action Theory accounts for the complexity of human action and is focused on explaining the career process (Young et al. 2014; Young 2019). Contextual Action Theory is oriented toward understanding and framing how actions are organised and in careers this is behavioural elements, functional steps and goals (Young 2019). There is a consistent theme of chaos in the Technology Leadership Realisation Sequence phases for both genders, however the system and interconnectedness relevant to Chaos Theory of Careers, produced a divergent action and experience for genders. This finding was shared in Chapter 4 and captured in Table 13 – Technology Leadership Realisation Sequence, where it was found women spent on average 10 years in each phase whilst their male participants quickly moved through the phases in half the time. For men in this study, the contextual action occurred simultaneously with the chaos characteristics and even though the Technology Leadership Realisation Sequence is a mutual career pathway for both genders, the system influences alter the parity of progression to executive leadership and men experience early-in-career positive social action that accelerates their career pathways. Conversely, women experience negative social experiences that decelerate their career pathways.

Enabling Contextual Action Theory as an individual and systematic approach, the literature signals a vast number of initiatives available to women throughout their career, from government and in the workplace. The results from this study concur, indicating that equality and development interventions are readily available and experienced by the female participants throughout their career. Significantly, these female-specific programs build confidence and clarity, yet outcomes are not observed in phase 1 and phase 2 of the Technology Leadership Realisation Sequence, only achieving actualisation when the females ascend their executive leadership, phase 3, of their career sequence. When correlated to the executive technology retention issues experienced in the workplace, the results of this study indicate these well-intended interventions unintentionally provide the tools, equality awareness and self-development that emancipates the female leaders at the time when we need them most, as role models. The consequence, as uncovered in this research, is that the female leaders resign and leave. Notably, the emancipation occurs at the time when there is also a deficit of formal structure in the workplace and society to support women post-ascension to executive level in technology. As explained in the literature and observed in the results of this study, the female

career journey up to this executive career phase is well supported however it then becomes a personal initiative of the female leader to locate a network of support for themselves.

Finally, whilst the correlation of Chaos Theory of Careers and Contextual Action Theory was established as a contribution to the theoretical field and evidenced by the discussion, the outcome of combining the theories does not necessarily produce career pathway success. Actions may very well be taken in the chaos of careers, at individual or system level, however, caution, as unintended consequences must be addressed. Such as the situation explored in this section of actions to improve representation of females in executive leadership roles in technology that inadvertently create a self-perpetuating role model deficit. This concept will be explored in the next section which will provide contribution to theory in the body of work related to Unintended Consequences (Merton 1936).

5.3.4 Unintended consequences effect

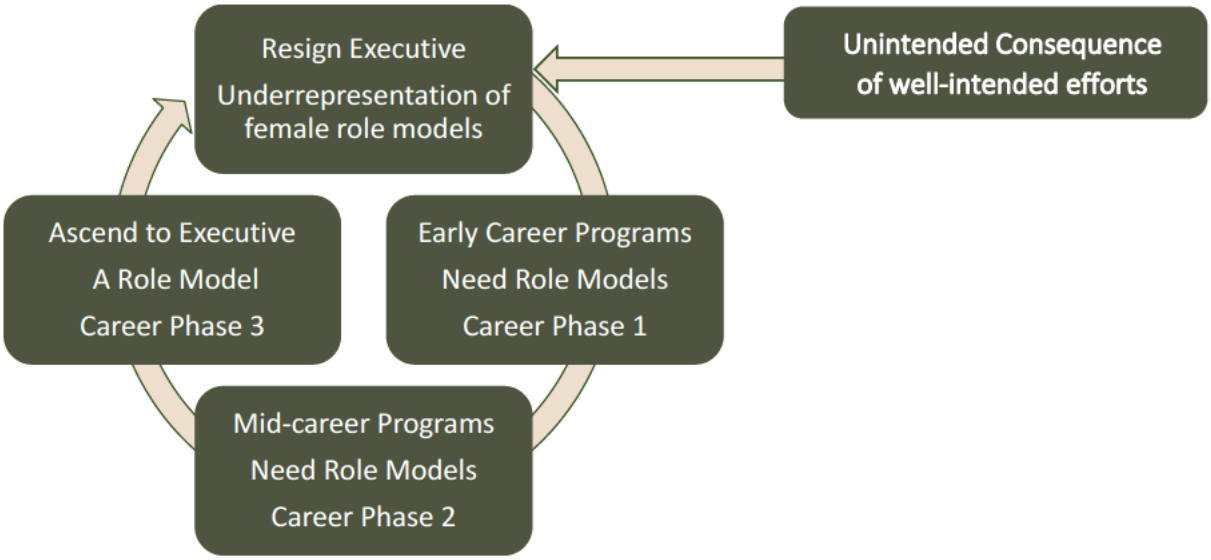
Unintended Consequences remains a solid preoccupation for social science research and formative work by Merton (1936) provides a theory that can be systematically applied to formal policy and organised activity. The contribution of this research to Merton's Theory of Unintended Consequences (Merton 1936) commences by incorporating the previous implications and findings in this study, analysed against existing Unintended Consequences Theory. The analysis contributes to existing theoretical literature and forms a relationship with the Australian Technology Leadership Context while correlating with the experiences and actions of female leaders.

The results of this study align with Merton (1936) theory that organised programs have Unintended Consequences, and it correspondingly aligns with the literature that suggests diversity initiatives focused on better outcomes for minority groups in organisations, like women, similarly produce Unintended Consequences (Leslie 2019). An important finding from this research is the identification of the Technology Leadership Realisation Sequence and the commonality of the career pathway for men and women in technology. This provides valuable perspective on the factors that may impact the progression of women as it was noted there remains underrepresentation of women in technology leadership. Why is this the case when the

phases of the career pathway are the same for both genders? The crucial breakthrough came when the pathway was framed using Gender Studies, specifically Feminist Standpoint Theory, as it provided a gender nuance across the phases of the Technology Leadership Realisation Sequence that was symptomatic of Unintended Consequences Theory.

The literature signals a vast number of initiatives available to women in STEM throughout their career, from government and in the workplace, and the results from this study concur, indicating that equality and development interventions are readily available and experienced by the female participants throughout their career. Surprisingly, the significant impact these programs had on building the female participants' confidence and clarity was achieved only as the females ascended their executive leadership, phase 3, of the Technology Leadership Realisation Sequence. When correlated to the executive technology retention issues experienced in the workplace, these well-intended interventions unintentionally provide the tools, equality awareness and self-development that emancipate the female leaders at the time when we need them most as role models. The consequence, uncovered in this research, is that the female leaders resign and leave – society and workplace build them up and give them the tools only to have them leave right when they can make a difference – rather than remain as a role model at executive level in technology and inspire females to follow. This Unintended Consequences of career interventions have perpetuated a leadership deficit and through this research a systemic cycle has been identified that can now be addressed through the appropriate workplace changes for women in technology. Diagram 14 – The Self-perpetuating Role Model Deficit Cycle on Unintended Consequences provides a visual of the self-perpetuating cycle in operation. This research contribution supports Merton (1936) theory of organised policy creating Unintended Consequences and similarly, Leslie (2019) position on diversity programs.

Diagram 14 - The self-perpetuating role model deficit cycle on unintended consequences



Developed by the author for the purpose of this research.

A juxtaposition encountered, when analysing the occurrence of impostor syndrome in the data, suggests that labels used to identify a commonality in a female career pathway for ease of reference produce an overemphasised narrative. Kulik (2021) theorised that emphasising low performance of a single indicator of gender inequality ironically lowers stakeholders' motivation to act further, thus highlighting the unintended negative consequence of well-intentioned action. Taking a similar approach to Kulik, analysis was conducted on the impact of overemphasising an identified experience. When this concept was further explored, the creation and overuse of gender-specific labels produced negative consequences for females. The labels given to experiences of women, although common to both genders, contain negative connotation, for example 'impostor' and 'syndrome'. It was found that the gender-specific labels used to identify an experiential episode in a female mid-career (phase 2) emerged as a justification for a tolerant approach to various behaviours, decelerating their career.

The Unintended Consequences of gender-specific labels is a recurring theme in the research, producing various examples of labelling experiences causing a negative impact and creating barriers to the female technology career pathway. It was discussed during the Gender Studies component related to Consciousness Raising, that a male career network exists from early in a career and has been labelled the 'Boys' Club'. As was theorised from this research, this 'Boys' Club' reference could be deemed as nothing more than an example of male Consciousness Raising and an active male support network to assist their ascension to leadership. The gender-specific labelling and female narrative formed as a result produces a tragedy of learned labels and self-doubt within the female leaders, culminating in a decelerated career pathway across Phases 1 and 2 of the Technology Leadership Realisation Sequence and contributing to resignation in phase 3.

The contribution of this research provides a build to the body of work, Theory of Unintended Consequences (Merton 1936) by incorporating implications and findings of Australian Leadership Context, analysed against existing Unintended Consequences Theory. This contribution delivers a new theoretical relationship, between gender-specific labels in experiential episodes in the female career pathway and the correlation to Unintended Consequences, as a build to existing theoretical literature.

5.4 Implications for society and workplace

In the previous section the implications to theory from this study were explored, and they provided a new contribution to literature and theoretical construct. In this section, these concepts will be explored for the practical implications to society and the workplace.

5.4.1 Society, gender dynamics and careers

Society and the environments that regulate our organisations have a practical role to play in developing technology leaders and supporting their career pathways. Further, the policies and programs that enable gender diversity must support the career lifecycle, ensuring the impacts of unintended consequences are neutralised, thus enabling Australian organisations to realise a greater portion of women ascending and remaining in technology leadership. The following

will address the new concepts discovered through this research and apply the practical implications for society.

Research Concept – The Technology Leadership Realisation Sequence as a common career pathway, highlighting the importance of social influences to alter the parity of progression to executive leadership.

The practical implication of the Technology Leadership Realisation Sequence is giving clarity to governments and society so that the pathway experienced by technology leaders does not differ based on gender. The opportunity for government and society is to recognise the importance of the social experiences in early career and enable effective policy and programs to support this activity. The proposals must address each phase of the Technology Leadership Realisation Sequence to ensure that support is provided throughout the pathway and the current circumstance of no initiative and policy support for executive female leaders in technology is rectified. Over-indexing grants and initiatives to organisations and advocacy groups that focus on this critical career juncture would provide greater impact of public funding and link to better outcomes. The overall implication to society is a significant increase in retention of females in technology and a counteractive approach to the 'leaky' pipeline already identified in the literature.

Research Concept – The Self-perpetuating Role Model Deficit Cycle of females in executive technology and the early and mid-career interventions that set them up to leave.

The practical implication to society of understanding the Self-perpetuating Role Model Deficit Cycle is to ensure the diversity interventions incorporated throughout the career pathway acknowledge and address the adverse impact of these interventions in the later career phase for women in technology leadership. The exclusive female participant focus on women's leadership development programs and the premise to which these are developed, to fix the problem by fixing women, needs a complete realignment to societal norms and contemporary organisations. The opportunity for government and society is to create earlier career programs that accelerate the female development outcomes associated with the career interventions and

truncate the Technology Leadership Realisation Sequence for women. By knowing and acting on this Unintended Consequences of historical intervention, the role model deficit cycle is overcome, and the lack of role models experienced by females in technology expunged. The implication to society is profound as this retains more women in technology leadership providing more opportunity for Consciousness Raising, as suggested in this study, and creates positive social experiences for early career females.

Research Concept – The creation and overuse of gender-specific labels producing negative consequences for females.

The practical implication to society of understanding the consequence of gender-specific labels facilitates a conscious reframing of existing narrative in established female experience labels and a more cognisant labelling approach in the future. Inevitably, coined phrases and catch-all's will not be undone nor overcome in the future, as researchers and academics we will continue to find labels for our work; however, acknowledging that the use once written can be overemphasised in a negative manner, is pause for consideration when constructing labels. The opportunity is not to control gender-specific labels but to ensure our female technology leaders are equipped to interpret and limit the negative career impact that occurs, as found in this study, as an unintended consequence.

This section discusses the practical implications and opportunities of this study to society. The next section will discuss the practical implications and opportunities of the concepts, for the workplace.

5.4.2 Workplace, leadership and career

Organisations and the workplace have a critical role in the Australian Technology Leadership Context, as recipients of technology leaders and enablers of development, in supporting their career pathways. Further, the strategy and governance set by the Board of Directors and the culture established by the Chief Executive and context of the leadership team, are practical examples of the impact on sustainability and growth of the organisation. In the workplace, organisational policy and employee development programs must adapt to the changing

Australian Technology Leadership Context. The following will discuss the concepts identified in this research and apply the practical implications for the workplace.

Research Concept – The Australian Technology Leadership Context for organisational sustainability and growth; a leadership context checklist.

The practical implication to the workplace of understanding the Australian Technology Leadership Context is profound, impacting the future sustainability and growth of an organisation. The leadership context informed by this research provides a checklist of optimal leadership skills, approaches and experience that will be necessary for technology leaders. Further, as Australian organisations and workplaces adapt to new structures and digitally enabled services, this checklist provides opportunity to create succession plans for the executive technology roles. Fundamentally, the Australian Technology Leadership Context provides an optimal leader's blueprint, by nature excluding redundant Technology Leadership Context, for the Board of Directors and the Chief Executive Officer when selecting and appointing executive technology leaders. For existing or aspiring technology leaders, the Australian Technology Leadership Context is an opportunity to assess their current leadership and configure their development to meet the context. The overall implication for the workplace of the practical application of the Australian Technology Leadership Context, is an executive technology leader that exhibits these leadership contexts, supporting the retention and high performance of a technology team and creating a broader, positive organisational impact.

Research Concept – The Technology Leadership Realisation Sequence as a common career pathway, highlighting the importance of social influences to alter the parity of progression to executive leadership.

The practical implication to the workplace correlates to the early discussion on the impact to society, whereby understanding the importance of social influences on the parity of outcomes mapped through the Technology Leadership Realisation Sequence. Whilst there is clarity for governments and society that the pathway experienced by technology leaders does not differ based on gender, the opportunity in the workplace is to create early career learning and develop

social network programs. These programs must facilitate meaningful longer-term networks and connections, that encourage elements of Consciousness Raising and are not workplace exclusive. Where society supports broader Consciousness Raising through government policy and advocacy group programs, this would provide an effective method to create these positive social influences beyond the workplace. As discovered in this research, enduring positive, social influences are crucial to accelerating the male technology leader's career pathway and is notably absent from the female career pathway. The overall implication to the workplace of introducing these social networks is a significant increase in retention of females in technology, that produces a counteractive approach to the 'leaky' pipeline already identified in the literature, and a robust succession plan.

Research Concept – The Self-perpetuating Role Model Deficit Cycle of females in executive technology and the early and mid-career interventions that set them up to leave.

The practical implication to the workplace of understanding the Self-perpetuating Role Model Deficit Cycle, has a similar practical application as discussed in the society section, however applied at the organisation's micro level. The opportunity for the workplace is to support and therefore retain executive technology leaders at critical junctures in their ascension, recognising the potential consequence of these interventions on the executive career phase. The practical application is delivering accelerated development outcomes associated with the career interventions and truncating the Technology Leadership Realisation Sequence for women. This should overcome the resignation consequence of historical intervention, rendering the role model deficit cycle a reminder of consequence, not an example of reality. The implication to workplace is considerable, as this retains more women in technology leadership, providing more opportunity for Consciousness Raising to take place, and as suggested in this study, creating enduring positive social experiences for females in technology. This section discusses the practical implications and opportunities of this study to the workplace. The next section will discuss the emerging composite framework developed through this research.

5.4.3 Proposed Leadonera® frameworks

Leadonera® is the registered trademark and protected intellectual property of this research formed into career programs and services. The program ensures individuals and organisations are equipped with the necessary empirical guidance to adopt the Paradoxical Leadership approach to achieve their technology leadership vision whilst addressing the Australian Technology Leadership Context. Leadonera® establishes the individual's leadership program to support advancement towards C-suite whilst ensuring that organisations can integrate the appropriate policy and executive roles at the board table to address the inclusion of a leader that adopts and exhibits the Australian Technology Leadership Context identified through this research.

Leadonera® has a sub-component specifically addressing the diversity gap that is evident at the executive leadership level in technology. The Leadonera® Diversity Acceleration Framework, rewrites the unintended consequences of best intentions to develop women towards executive levels only to have them leave. The Leadonera® Diversity Acceleration Framework reduces a multi-decade decline through an organisational and individual agenda, developed from empirical research, to accelerate and improve female participation and improve executive diversity.

5.5 Limitations

The limitations are provided in the research methodology outline in section 3.6 Limitations and Acknowledgement. However, during the study, other limitations were identified and are discussed here. The sample size of 18 highly awarded participants from the technology sector in Australia is sufficient for this qualitative study, however there is a limitation on the results given the geographical constraint of the sample set. As the research was limited to technology, the findings of leadership context and contributions to theory are fundamentally limited to

Australia and the technology discipline. Whilst it is an emerged limitation that produced further data, it does not detract from the significant contribution and findings of this research. Indeed, this study provides distinct evidence for theory building as well as new contributions specifically related to the research problem, with the outcomes providing practical implications for society in policy, and in programs for the workplace. The validity of the study remains, even with these limitations, and suggests opportunities for further research which will be discussed in the next section.

5.6 Implications for further research

This study was designed to address the specific research problem, to examine the changing Technology Leadership Context in Australia and, by knowing this, improve the gender diversity in these roles. As the scope of this research was limited to Australia and the technology discipline, significant opportunity exists to test and apply these findings in other disciplines and outside of the Australian scope.

5.6.1 Further research regarding the technology leadership realisation sequence

There is a potential application of the Technology Leadership Realisation Sequence to other disciplines outside of the technology scope and likewise, not limited to science, engineering and mathematics, the other components of STEM. The 3 phases and associated actions and behaviours identified, provide a basis for further conceptual research. Similarly, the findings associated with the importance of social influence would be pertinent to explore in other disciplines where similar characteristics to this research, related to underrepresentation of women, are observed.

5.6.2 Further research regarding the self-perpetuating role model deficit cycle

As with the opportunity explored in the previous section, there is a potential to apply the concepts of Self-perpetuating Role Model Deficit Cycle to other disciplines. The significance of the similarities and differences between male and female leaders in their career experiences has important implications when establishing targeted interventions, such as increasing women in leadership. The Technology Leadership Realisation Sequence identified from this research,

addresses the similarities of the genders as well as identifying the female-specific behaviours. Understanding the impact and combination of these new concepts applied to other disciplines may assist to identify opportunities to overcome the retention risk of women who have ascended the executive.

5.7 Conclusions

This study was based on the experiences of a stratified sample of Australia's Awarded Top 50 Technology Leaders (CIO) to provide insights into their leadership, career journey and influences. By completing this research, the Australian Technology Leadership Context was identified and can now be used to improve gender diversity in executive. In completing this Australia-based research, the objective to fill a gap in empirical data was achieved, contributing to Leadership, Gender Studies, Career Theory and Unintended Consequences analysis, which linked to the technology leadership role and developed practical frameworks relating to participation of women in technology leadership.

Research Question 1: What is the career progression experience of Australia's most successful technology leaders? was a critical starting point to shape the research to determine the experience of these successful leaders and their comparative careers, as they shape and lead their organisations through digital acceleration and technological adoption. It was important to identify the female and male journey to assess similarities and differences as they progressed their careers. The enquiry through Research Question 1 led to a new concept that built on Leadership Theory, combining theoretical components to lead simultaneously with Neo-charismatic and Ethical/Moral elements with the addition of clandestine interventions, resilience by default and a focus on health and well-being.

At the time of the interviews, Australia was amid the COVID-19 global pandemic, a period of hyperfocus on the technology function and the executive technology leader. The interviews commenced in May 2021, providing almost 12 months' worth of lived experience leading through this initial COVID-19 response. Whilst leadership context during COVID-19 was not a specific objective of this research, given the interview timing it was opportune to have the

participants reflect the experiences of the pandemic, any impact on their leadership and the potential change to leading in the future.

Surprisingly, the results informed ***Research Question 2: What makes Australia's most successful technology leaders successful?*** and ***Research Question 3: What leadership qualities are essential to successful technology leadership and why?*** as it was discovered the combination of their current leadership context and their existing leadership disposition aligned to Neo-charismatic and Ethical/Moral Leadership Theory, creating an infallible dynamic when thrust into the spotlight to support their organisations. The importance of the leadership context was explored further to inform Research Question 2 and Research Question 3 with the participants asked to reflect on their current leadership style and requirements and then how might this differ in the future.

Crucially, for a Board of Directors and the Chief Executive Officer of an organisation, the results produced a framework for what is important in hiring or placing an executive technology leader to ensure the sustainability and growth of the business. This research finding, linked to **Research Questions 1** to **3**, asserts the delineation between the redundant Technology Leadership Context of the past, and provides a checklist of the Technology Leadership Context required for a sustainable, growth-oriented organisation. It also provides a career guide for existing and aspiring technology leaders. These finds contributed to the new concept of the Australian Technology Leadership Context with these critical contexts a checklist of requirements for organisations assessing their succession pipeline and for existing and aspiring technology leaders in futureproofing their careers. The results of this study highlight the redundant Technology Leadership Context as a counter list to the important context of our executive technology leaders.

A fundamental theme of this study was the observed underrepresentation in Australia of women in executive technology leadership positions. This study was not an attempt to pit the 2 sexes against each other but rather research the career journeys of male and female for commonalities and differences that could impact the lack of gender parity prevalent in the discipline. ***Research Question 4: What is the difference between male and female technology leaders in relation to career progression and leadership qualities?*** explored the views and experiences of the

participants with the results assessed against the career journeys of both genders. It was discovered during this research, there are 3 phases to a technology leader's career journey and the progression sequence experienced by both genders. This Leadership Realisation Sequence is a new concept identified to inform this research problem and whilst the phases are instituted equally in the career pathway of the male and female participants, the experience differs significantly.

This new concept, the Technology Leadership Realisation Sequence, uncovers the mutual career pathway experienced by both genders, yet the social influences alter the parity of progression to executive leadership. Men experience positive social experiences that accelerate their career pathway, whilst women experience negative social experiences that decelerate their career pathway. Understanding this Technology Leadership Realisation provides opportunities for targeted interventions and programs that truncate the pathway for women, aligning to the male experience that has produced a more positive, direct outcome.

Understanding this Technology Leadership Realisation Sequence supports ***Research Question 5: In view of Australia's successful technology leaders, what are the factors that contribute to poor female representation in executive technology leadership?*** and ***Research Question 6: In view of Australia's successful technology leaders, what strategies can be employed to improve female representation in executive technology leadership?***, providing opportunities to develop targeted interventions and programs that will truncate the pathway for women, aligning to the male experience that has produced a more positive, direct outcome. Contribution to Leadership, Gender Studies, Career Theory and Unintended Consequences, and implications to society and workplace were discussed.

The contribution to Leadership Theory is three-fold: first, providing an analysis of existing theory against the Australian Technology Leadership Context; second, building on earlier work undertaken by Divya and Suganthi (2017) where they suggest combining leadership theories is a sound method to create more relevant Leadership Theory for the future; and third, providing a new theory of Technology Leadership Realisation Sequence, a common career pathway in technology with the implications of this theory on improving gender parity declared.

The contribution to Gender Studies provides an analysis of existing theory to the Australian Technology Leadership Context, specifically the importance of Feminist Standpoint Theory and Consciousness Raising. It first establishes the pre-eminent Australian Technology Leadership Context then applies this outcome to the career journeys of both sexes, for commonalities and differences, that could impact the lack of gender equality prevalent in the discipline. This contribution is a build on the body of work related to the Feminist Standpoint Theory, applied as a foundation to the female interpretation of the technology leadership journey, along with Consciousness Raising applied as an action of concept rather than a political liberation.

The contribution to Career Theory extends the concept of combining leadership theories by Divya and Suganthi (Divya & Suganthi 2017). It also correlates to Chaos Theory of Careers (Pryor & Bright 2011) with Contextual Action Theory (Young 2019), acknowledging the characteristics of these theories coexist and produce. The results built a compelling position that a linear career path does not contribute to successful technology leadership and, moreover, linked Chaos Theory of Careers in the Australian Technology Leadership Context to the most successful leaders. Similarly, whilst the chaos characteristics were evident, so too were the contextual actions, facilitating breakthrough, changes, and improved outcomes in career. Both theoretical concepts were necessary, acting concurrently, and at times simultaneously within the career journey, to produce a successful career outcome.

The contribution to Merton's Theory of Unintended Consequences (1936) incorporates the previous implications and findings discussed through the study, and analyses against existing Unintended Consequences Theory. The contribution of this research provides a build to the body of work by incorporating implications and findings of Australian Leadership Context and delivers new theoretical relationships between gender-specific labels in experiential episodes in the female career pathway and the correlation to Unintended Consequences.

The practical implications to society, and workplace were discussed, and a brief overview of the emerging Leadonera® models and frameworks provided. Society and the environments that regulate our organisations were confirmed to have a critical role for developing technology leaders and supporting their career pathways. Organisations and the workplace have an invested role in the Australian Technology Leadership Context, as a recipient of technology leaders and an enabler of development, supporting their career pathways.

Leadonera® was briefly highlighted as the registered trademark and protected intellectual property of the research as a program and service. The program ensures individuals and organisations are equipped with the necessary empirical guidance to adopt the Paradoxical Leadership approach to achieve their technology leadership vision whilst addressing the Australian Technology Leadership Context. Finally, the limitations were explored as they relate to geographical constraint and scope of technology discipline, which informed the implications for further research. Finally, the value of this research is explicit in the implications to theory, society and workplace identified throughout this chapter.

5.8 Summary

The discussions and implications explored in this chapter validate the importance of this study. The research questions were answered and implications for theory, society, workplace, and future research were all discussed. The final section concluded the paper by providing the overarching purpose of the research to deliver an examination of the Australian Technology Leadership Context and, by knowing this, improve the gender diversity in executive roles. By completing Australia-based research, fill a gap in empirical data, theoretical analysis linked to technology leadership and practical frameworks relating to participation of women in technology executive roles.

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APPENDICES

APPENDIX A – PARTICIPANT PACK

University of Southern Queensland

Participant Information for USQ Doctoral Research Interview

Research Details

Title of Research:	**An examination of the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.**
Human Research Ethics Approval number:	H20REA166

Research Team Contact Details

Principal Investigator Details	**Principal Supervisor Details**
Angela Coble	Prof Retha Wiesner
[redacted]	[redacted]

Statement of Consent

By signing below, you are indicating that you:

• Have read and understood the information document regarding this research.	☐Yes / ☐No
• Have had any questions answered to your satisfaction.	☐Yes / ☐No
• Understand that if you have any additional questions you can contact the research team.	☐Yes / ☐No
• Understand that the interview will be audio recorded.	☐Yes / ☐No
• Are over 18 years of age.	☐Yes / ☐No
• Agree to participate in the research.	☐Yes / ☐No

Participant Name:	
Participant Signature:	
Date:	

Please return this sheet to the Principal Investigator prior to undertaking the interview.

University of Southern Queensland

Participant Information for USQ Doctoral Research Interview

Research Details

Title of Research:	**An examination of the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.**
Human Research Ethics Approval number:	H20REA166

Research Team Contact Details

Principal Investigator Details

Angela Coble
[redacted]

Principal Supervisor Details

Prof Retha Wiesner
[redacted]

Description

This study will explore the Chief Information Officer (CIO) leadership journey and role. There is a lack of current empirical research or conceptual literature on leadership context and requirements to succeed in future senior leadership technology roles in Australia. Additionally, despite decades of policy and strategy focused on advancing and supporting women in the workforce, there are still fewer women in positions of leadership.

The main objective of this study is to examine the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.

The outcomes will provide practical frameworks to assist organisations in Australia to adopt an active strategy to change their technology leadership in-line with the leadership themes explored in this research and develop a pathway to include more female representation in their succession bench for their technology leadership roles. Furthermore, it is intended that this research will inform government policy to support business initiatives for increasing female workforce participation in technology as a key input to boosting Australia's productivity and innovation.

Participation

Participation is selective and by invitation only as this research is limited to technology leadership roles in organisations represented in the Top 50 CIO list for 2019. The study requires your involvement in a single interview of no more than 60-mins with an option of a 30-mins follow up phone call if required. The interview will take place virtually, through an USQ licensed version of Zoom hosted by the Principal Investigator. The interviews will take place at a day/time convenient to you. The interview questions will be focused on your experience and leadership journey as a technology leader. Questions will include:

- Tell me about your leadership journey
- What are the current leadership contexts and requirements of Australian CIOs?
- How are these leadership contexts likely to change in the future and why? (10year window)
- How do you, as a CIO, currently lead in these different leadership contexts and why?
- What are the leadership requirements for CIO's to successfully lead in the future?
- Tell me about the top 3 or 5 challenges you experienced in reaching your position as CIO.
- In your opinion, have these challenges caused a gap in female leadership in the profession, what can be done to close the gap?

Baseline demographics will also be collected, and the interviews will be audio recorded.

Your participation in this project is entirely voluntary. If you do not wish to participate you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage prior to commencement of the data analysis. You may also request that any data collected about you be withdrawn and confidentially destroyed at any stage prior to data analysis. If you do wish to withdraw from this project or withdraw data collected about you, please contact the Research Team (contact details at the top of this form).

Your decision whether you take part, do not take part, or to take part and then withdraw, will in no way impact your current or future relationship with the University of Southern Queensland.

Expected Benefits of Your Participation in this Research

This research is likely to benefit Australian businesses and technology community by introducing current data to influence a future workforce. This research will provide two beneficial contributions; firstly, an academic exploratory study, contributing empirical data and research outcomes to the dearth of research on this topic contextualised to Australia for the critical leadership role that will be based in technology (CIO); and secondly, a practical contribution through informing business strategy, providing policy recommendations and the development of frameworks to support the future hiring, retention, succession, gender advancement and attrition activities within technology leadership roles.

Risks Involved in Your Participation in this Project

In participating in the interview, there are no anticipated risks beyond the time inconvenience outlined above and a small social risk associated with the participants being known through professional networks by the principal investigator.

Privacy and Confidentiality

All comments and responses will be treated confidentially unless required by law.

The audio recording from the interview will only be accessed by the Principal Investigator and the data elicited from the interview will be coded with a pseudonym/alias to prevent your identification in results.

Any data collected as a part of this project will be stored securely as per University of Southern Queensland's Research Data Management policy.

Consent to Participate

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate in this project. Please return your signed consent form to a member of the Research Team prior to participating in your interview.

Questions or Further Information about the Project

Please refer to the Research Team Contact Details at the top of the form to have any questions answered or to request further information about this research.

Concerns or Complaints Regarding the Conduct of the Project

If you have any concerns or complaints about the ethical conduct of the project you may contact the University of Southern Queensland Manager of Research Integrity and Ethics on +61 7 4631 2214 or email researchintegrity@usq.edu.au. The Manager of Research Integrity and Ethics is not connected with the research project and can facilitate a resolution to your concern in an unbiased manner.

Thank you for taking the time to help with this research project. Please keep this sheet for your information.

APPENDIX B – PARTICIPANT COMMUNICATION

LINKEDIN PRIVATE MESSAGE

As part of my doctoral studies with the University of Southern Queensland, I am completing research into the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.

Participation is selective and by invitation only as this research is limited to technology leaders from organisations represented in the Top 50 CIO list for 2019. You were one of these recipients – congratulations! The study requires your involvement in a single interview of no more than 60-mins with an option of a 30-mins follow up phone call if required.

I would appreciate your insights into this research - please PM me with your best email address and I will forward you more details for your participant consideration. Of course, there is absolutely no obligation to participate once you receive further details.

Ange
Mb: 0418611590

EMAIL
Dear (Insert name)

As part of my doctoral studies with the University of Southern Queensland, I am completing research into the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.

Participation is selective and by invitation only as this research is limited to technology leaders from organisations represented in the Top 50 CIO list for 2019. You were one of these recipients – congratulations! The study requires your involvement in a single interview of no more than 60 mins. The interview will take place virtually, at a day/time convenient to you,

through a USQ licensed version of Zoom hosted by the Principal Investigator. The interview questions will be focused on your experience and leadership journey as a technology leader.

Questions will include:

- Tell me about your leadership journey.
- What are the current leadership contexts and requirements of Australian CIOs?
- How are these leadership contexts likely to change in the future and why? (10 year window)
- How do you, as a CIO, currently lead in these different leadership contexts and why?
- What are the leadership requirements for CIO's to successfully lead in the future?
- Tell me about the top 3 or 5 challenges you experienced in reaching your position as CIO.
- In your opinion, have these challenges caused a gap in female leadership in the profession, what can be done to close the gap?

Baseline demographics will also be collected to support analysis of the interview data and interviews will be audio recorded.

Of course, there is absolutely no obligation to participate. Please reply to this email and let me know if you would be willing to participate and I can work with you to lock in a time. Alternatively, if you do not wish to participate, please also reply and let me know so I don't send an unnecessary follow-up email.

Ange
Mb: 0418 611 590

APPENDIX C – PARTICIPANT RUNSHEET (RESEARCHERS GUIDE)

Run sheet for interviews.

Welcome and thank you for agreeing to participate in my research – an examination of the current and future leadership requirements of senior leadership technology roles in Australia and its relevance to closing the leadership gender gap in the profession.

You have been sent the participant pack and that included an information sheet informing you of the intent and purpose of this research. It is assumed you have taken the time to read prior to forwarding me your consent to participate. Do you have any questions on the research or today before we get started?

Today's interview is within the 60 minutes and will have approximately 45 minutes of recorded session. I will let you know when I start – you will also receive a notification on your Zoom screen advising as such. We will then start with some demographics and then continue into the research questions.

Semi-Structured Interview Questions

Demographic questions

About you
What gender do you identify as?
Age bracket (20s) (30s) (40s) (50s) (60 & over)?
Do you have any siblings? How many? Where are you in the line up? Brothers? Sisters?
What is your favourite well-being ritual?

Education
Do you have a STEM degree? What is it? Completed fulltime or part-time?
Highest level of education achieved.

Do you have any technology qualifications?

Your current role

Are you currently a CIO or leading a technology function?

How many years have you spent leading technology?

Private or Public Sector?

Leadership & Experience questions

1. Tell me about your leadership journey?
    - *Prompts:* How did it start? How did you progress? What have been the highlights? Did you have a role model? Who was your greatest influence as a leader?

2. What most significantly impacts your leadership style?
    - *Prompts*: Is it impacted by people? The environment? The situation? How do you (or how did you), as a technology leader, lead? Why?

3. What are the current leadership requirements of Australian CIOs or senior technology leaders?
    - *Prompts:* What are the most important things you do? What do you think are the most important attributes or behaviours? Why?

4. How are these leadership requirements likely to change in the future and why? (10 year window)
    - *Prompts:* Why do you think it could change? Has COVID-19 changed your assessment of the future skills? Why?

5. What are the leadership requirements for Australian CIOs or senior technology leaders to successfully lead in the future?
    - *Prompts:* What does success look like? What will be the biggest impact to the leadership requirements of CIOs?

6. Change is more recognised in the tech industry – just think Moore's Law. How does that impact leadership requirements of Australian CIOs or senior technology leaders?
    - *Prompts:* Has the rate of change meant technology leaders do something different in their leadership of people? Of how they develop themselves?

7. Tell me about the top 3 to 5 challenges you experienced in reaching the position of CIO.
    - *Prompts:* It could be self-imposed; perceived or learned. Why? Would you change the challenges; could you change the challenges? Did you overcome adversity? Need to find your courage?

8. It is acknowledged in the tech industry that there is a gap in female leadership. In your opinion, what has caused this gap in the technology profession in Australia and what can be done to close the gap?
    - *Prompts:* Are they the same types of challenges you experienced? Do you think it could be something else? If so, what?

APPENDIX D – MORGAN'S NOTABLE NINE

Mindset: refers to how the leader thinks, which in turn influences and shapes how they act.

Skills: refers to the things the leaders need to know how to do.

(Morgan 2020)

APPENDIX E – WOMEN IN STEM DECADAL PLAN OPPORTUNITIES

Striving towards our shared vision for gender equity in the Australian STEM ecosystem will deliver many benefits, including greater preparedness for the future, greater workforce participation, better economic performance, greater scientific impacts, and greater creativity and entrepreneurial activities.

Australia will be better able to create and inspire cutting edge science, technology and innovations.

A fair playing field will generate opportunities for all.

Achieving this will necessitate significant reform, and stakeholders in the Australian STEM ecosystem will need to adapt. Leadership, accountability, robust governance structures, funding and cultural shifts will all be required to achieve the step change that an increasingly technologically enabled environment demands.

Six key opportunities will drive that change over the next decade and equip Australia's STEM workforce for the future.

The way in which these opportunities are adopted and refined by stakeholders—government, academia, industry, the education sector and the community—will differ and will be customised. To maximise the opportunities, the decadal plan offers implementation guidance that emerged as a result of its development and the consultations.

All the strategic recommendations are designed to facilitate change that is systemic and sustained and that will bring about the step change needed to achieve gender equity in STEM in Australia.

1 LEADERSHIP AND COHESION

Stronger cohesion and leadership across the Australian STEM ecosystem will amplify and strengthen diversity outcomes.

2 EVALUATION

Establishing a national evaluation framework will guide decision making and drive investment and effort into measures that work.

3 WORKPLACE CULTURE

A significant cultural shift in workplaces is necessary to create gender equity for women in STEM. A culture that is inclusive and respectful, challenges traditional stereotypes, is free of discrimination and bias, enables flexibility and accommodates career interruptions and changes will maximise women's participation in the workforce.

4 VISIBILITY

Seeing women in diverse STEM careers, and equally represented in the media, in public events, and in other forums like boardrooms and classrooms will provide role models for girls and women and inspire a nation.

5 EDUCATION

Strengthening the education system to support teaching and learning on a national scale will enable and encourage all girls and women at all levels to study STEM courses and equip them with the skills and knowledge to participate in diverse STEM careers.

6 INDUSTRY ACTION

Establishing a national framework that guides and provides tools to address gender equity amongst SMEs will impact the vast majority of businesses not reached by existing programs.

(Source:Australian Academy of Science 2019, p. 19)

APPENDIX F – QUERY CRITERIA APPLIED