

**Compromise and symbolic gestures: The complexity of
implementing a gender equity measure in STEM
organisations in Australia**

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Abstract

The lack of gender diversity in science, technology, engineering, and mathematics (STEM) has been named and evidenced as a problem for decades, despite well-intentioned efforts to address. While there is clear evidence that organisational culture is a contributing factor, research remains largely focused on explorations and descriptions of the reasons why women leave STEM. Recently, academic attention has shifted toward the understudied gender equity programs, which are used by STEM organisations to address gender inequality. The programs are not delivering the expected results, and the complexities of program implementation may be one reason why gender equity programs are failing. Feminist scholars have begun to examine these programs however implementation problems have so far been overlooked, which limits the understanding of why those programs underperform. This study responds to calls from scholars for research to focus on processes and the complexity of gender equity program implementation as a potentially crucial component of sustainable and enduring change.

Adopting a pragmatic research paradigm and drawing on feminist, action research, and grounded theory principles, this thesis conducts a case study of a pilot program currently underway at four STEM organisations that anonymises grant applications for access to large-scale scientific instruments. In addition to providing new insights into the complexity of implementing a gender equity measure in STEM organisations in Australia, the study provides two theoretical contributions to feminist organisational studies. Firstly, through recognising that a theory of implementation is required within the gender equity literature. Secondly, in taking the first step towards developing that theory. Finally, the research provides lessons learned from the pilot which can be integrated into future programs and shine a light on the design of gender equity programs targeting long-lasting structural and cultural change in STEM workplaces in Australia.

Statement of originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself. I have complied with the terms of the Human Research Ethics Committee approval reference number 52021949626302.

Signed

Date: 25 Feb 2022

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Chapter 1: Introduction

The lack of gender diversity in science, technology, engineering, and mathematics (STEM) has been named and evidenced as a problem for decades. As of 2018, only 27% of Australia's STEM workforce were women, falling to 16% of those STEM workers with tertiary qualifications (Professionals Australia 2018; Office of the Chief Scientist 2020). Women hold 28% of STEM management positions, 8% of STEM CEO positions, and the gender wage gap in STEM can be up to 23% (AAS 2019; Office of the Chief Scientist 2020). The Australian Federal Government recognises the importance of increasing women's participation at all levels in STEM. In 2018 it published the Decadal Plan for Women in STEM (AAS 2019) which lays out a vision to attract, retain, and progress girls and women in STEM. More recently, the former Australian Chief Scientist called for women's participation in STEM to be a key component of the COVID-19 recovery (Finkel & Harvey-Smith 2020).

Decades of resources, with limited progress, have gone into reducing gender inequity in STEM through various measures, enacted through programs largely focused on attracting young women to careers in STEM (Kanny, Sax & Riggers-Pieh 2014; McKinnon 2020). Efforts include awareness and educational programs for young girls, engagement programs for young women, and mentoring programs for early career women (Blickenstaff 2005; Heilbrunner 2013; Simard & Gilmartin 2010). These measures have been somewhat successful: women are now more likely to obtain a STEM degree and an entry-level science position than they were a decade ago (Singh et al. 2013; AAS 2016). However, there has been no shift in the participation of women at middle or high-level positions in science, and women are leaving science jobs at higher rates than other equally demanding and male-dominated professions (Australian Government 2021; Office of the Chief Scientist 2020; AAS 2016).

Science organisations themselves recognise the importance of women in STEM and are actively seeking support to retain women in mid-level positions and advance them to senior positions (Harvey-Smith 2020). In 2018 there were 337 programs across Australia which included a measure designed to encourage girls and women's participation in STEM (McKinnon 2020). However, these programs remain drastically understudied; of the 337 programs only seven had any public facing evaluation data, and only one had undergone a formal before-and-after program evaluation (McKinnon 2020). With formal

evaluation data unavailable (McKinnon 2020), the success of these programs in an Australian context is currently measured through overall employment statistics, which have not shifted since 2006 (Office of the Chief Scientist 2020). Gender equity in STEM remains stubbornly unchanged.

Feminist organisational studies in STEM

Feminist organisational theory helps explain why gender inequalities have persisted. Acker's (1990) theory of gendered organisations is foundational to feminist organisational studies and is essential to understanding the problem of gender inequity in workplaces. Acker (1990) argues that gender is a fundamental and normalised contributor to organisational logic which is reproduced through daily interactions within organisations. Scholars who built on Acker's ideas identify that self-sustaining workplace gender equity is only possible when organisations enact cultural change by reforming power structures and questioning how gender is entrenched within everyday workplace practices (Ely & Meyerson 2000; Meyerson & Kolb 2000).

The call for cultural change is echoed by women in STEM themselves, who cite discontent with science in general or their organisation as their most common reasons for leaving their STEM career. Despite clear evidence that organisational culture is a contributing factor to the gender inequity problem (Pollitzer 2019), research remains largely focused on explorations and descriptions of the reasons why women leave STEM, and gender equity programs remain understudied (McKinnon 2020). A handful of scholars have begun to shift their attention to research on gender equity programs, recognising that these programs are currently not delivering the results expected yet are a key mechanism for organisations to realise gender equity. Some of this more recent research attends to measure design and theory of change (van den Brink 2020), while other research focuses on understanding how the programs that operationalise those measures are implemented within organisations (Eriksson-Zetterquist & Renemark 2016). Applying a feminist lens specifically to the process of implementing a gender equity program is an emerging academic approach.

Implementation is important but not well understood

Program implementation may be one of the reasons why gender equity programs are not delivering the results expected. Implementation is important to program efficacy but is not well understood by feminist organisational scholars. Research suggests the process of

implementation is complex, iterative, and incremental, which might impact the effectiveness of the program (Leenders, Bleijenbergh & van den Brink 2020; van den Brink 2020; Eriksson-Zetterquist & Renemark 2016). Nevertheless, scholars have noted that many gender equity programs are described in the literature with an imagined implementation process that is disconnected from context and does not represent actual practice (Leenders, Bleijenbergh & van den Brink 2020; Eriksson-Zetterquist & Renemark 2016). Importantly, much of the current literature tends to conceptualise the implementation of gender equity programs as a simple linear process (van den Brink 2020). As gender equity measures often involve a complex change process that must navigate politicised access to resources, by conceptualising the implementation of these gender equity programs as linear, scholars have overlooked the iterative processes, incremental progress, or challenges encountered ‘on the ground’ (van den Brink 2020). Without a rich, feminist conceptualisation of implementation scholars will be limited in understanding why gender equity programs underperform. Thus, scholars have called for future research to focus on processes and the complexity of gender equity program implementation as a potentially crucial component of sustainable and enduring change (Evans 2014; van den Brink 2020; Eriksson-Zetterquist & Renemark 2016; Bohnet 2016). This study responds to those calls.

The research questions

This thesis examines the *process* of implementing a gender equity measure in an effort to understand whether implementation contributes to the underperformance of these programs. To do this, the study asks two questions:

- *How is a gender equity measure implemented in STEM organisations?*
- *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?*

To explore these questions this research uses a case study of a pilot program currently underway at four STEM organisations which anonymises grant applications for access to large-scale scientific instruments.

The overall aim of the thesis is to build on current academic gender equity literature by providing new insights into the complexity of implementing a gender equity measure. In doing so, the research attempts to make theoretical contributions to feminist

organisational studies through recognising gaps in implementation theory. Finally, the study aims to provide lessons learned from the pilot which can then be integrated into future programs.

Introducing WISA and the pilot

To commence my Masters' research year, I sought out people and organisations already working towards gender equity in STEM within Australia and came to communicate with the Women in STEM Ambassadors (WISA) office, specifically Isabelle Kingsley. Isabelle was excited to hear about my interest, and explained WISA is currently piloting the anonymization of grant applications for access to high-demand research infrastructure such as telescopes or particle colliders at science organisations within Australia (WISA 2020). In the STEM research sector, career progression is linked to the success rate of competitive grant applications, which is higher for men than women (Australian Research Council 2017). Research suggests that this discrepancy is the result of biases within the grant allocation process, rather than a difference in merit between men and women applicants (Witteman et al. 2019). Anonymising grant applications has been suggested as one method to allocate the grants more equitably, and thus help build more gender equitable STEM workplaces (Witteman et al. 2019).

As we talked, Isabelle expressed surprise at how complex the implementation of the pilot was proving to be, and how that implementation was having material impact on the pilot timelines and design. She was interested to explore this further, but it fell outside the scope of her research project. Together, we discussed how a separate research project could specifically investigate the implementation and be combined with her own results to enrich and extend the conclusions and advice of the broader program. That project would sit independently from her work and so be appropriate for a Masters' thesis but be integrally tied into the research goals of her program. Thus, this thesis has two simultaneous goals: the exploration of the gendered nature of implementation and the development of context-specific practical knowledge that could be integrated with other research findings following thesis examination.

Introducing myself

My positionality as both a researcher and a cis gender woman in STEM is important. I am enmeshed in the research and influence the findings as much as any of the participants, rather than standing apart from the process of constructing knowledge as a neutral and

objective observer. My first degree is a Bachelor of Environmental Science, majoring in geology and soil science. I worked for 15 years in various scientific positions in private industry, most recently as a consultant in an engineering firm specialising in the remediation of contaminated land and water. This role was professionally fulfilling, but my career struggled to advance as leadership roles, interesting and challenging projects, and promotions flowed to my male peers. I noticed this happening across the industry, and most markedly to women in mid-career like myself. Eventually deciding to leave consulting and tackle this problem head on, I went back to school. I earned a Bachelor of Social Science majoring in gender studies and am now completing my Master of Research examining gender inequity in STEM organisations, concluding with this thesis.

My positionality as a woman in STEM as well as a social science researcher is important to contextualise the process and findings of this research project, and I return to it repeatedly throughout the thesis. My personal history as a woman in STEM, the discrimination I both faced and saw others experience has led me to this research project. I am a feminist and conceptualise gender not as a personal attribute, but as a system of power that permeates all aspects of our lives. Thus, when referring to ‘gender equity’ I am not referring to ‘equal numbers of men and women’, rather I am invoking a world where gender exists but is no longer an axis of oppression. I am also an activist, so have an intrinsic drive to inform and enact change to achieve gender equity. For me, inherent in questions about gender equity and how it can be achieved is the belief that gender equity is a worthy goal and is fundamentally within reach. This thesis is consciously geared towards aiding the feminist political goal of achieving workplace gender equity.

Study design and contribution

This research employs a feminist epistemology that argues power distributions are not inherent in the world or naturally occurring, rather they are continuously (re)constructed through routine social interactions, including those that occur in organisations (Crasnow 2020; Benschop 2021). Further, the study adopts a pragmatic research paradigm that combines elements of feminist organisational research and action research to conduct a case study (Kelly & Cordeiro 2020). Data was co-created through semi-structured qualitative interviews along with reflexive journaling during data creation and analysis. The interviews were conducted with four participants: the manager of the user office from

each of the four organisations participating in the pilot. Data was analysed using thematic analysis.

The study draws on both Acker's (1990) theory of gendered organisations and May's (2013) general theory of implementation to describe and critically analyse the implementation of a gender equity program. May's (2013) theory describes the implementation components and how they interact, but does not directly address power hierarchies, including gender. Rather, May (2013 p 6) refers to the general category of "social norms" and prefers those utilising the theory to choose those norms which are most relevant in their situation. As such, Acker's (1990) theory of gendered organisations forms the basis of the social norms discussed in this study. Acker's (1990) theory is broader than simply articulating social norms however, it also provides a backdrop and context for the program for which May's (2013) theory describes the implementation. Thus, May's (2013) theory of implementation sits within the gendered organisation that Acker describes, whilst also sharpening the critical reach of May's (2013) theory.

Thesis outline

This chapter has introduced the thesis and provided background and context for the study. Chapter 2 reviews the academic literature on gender equity at work, starting with Acker's foundational theory of gendered organisations and moving to focus on gender in STEM. The current thinking in gender equity interventions is outlined, along with highlighting the call for cultural change as the mechanism to achieve long-lasting gender equity. Chapter 3 presents the study methodology. Commencing with the context of the pilot and the research question, the chapter then moves to the methodology and study design, followed by the procedural aspects such as recruitment, ethics, interviewing, journaling, and analysis. The chapter ends by introducing May's general theory of implementation and outlining how it is operationalised in the study. The study findings are presented in Chapter 4 in two discrete sections. The first section provides a rich description of the implementation which privileges the participants voices. The second section presents implementation as a social process and explores how the different components of implementation work together and mediate each other. A process diagram is included there to aid the reader. The final chapter, Chapter 5, presents the discussion and conclusion. The chapter starts by showing the importance of depicting the complexity of implementing a gender equity program and builds on the process diagram presented in

Chapter 4. The discussion then pivots to the gendered nature of both the measure and the implementation, showing how this forces the pilot program to become symbolic. The symbolic nature of the pilot is then problematised by showing how it works against the cultural change required for long-lasting gender equity in STEM. The penultimate section presents recommendations for shifting future versions of the program towards cultural as well as structural change. The chapter finishes with concluding remarks and recommendations for future research.

Chapter 2: Literature review

In understanding gender inequity in STEM, it is helpful to remember that STEM organisations are workplaces, and ‘women in STEM’ are employees. Thus, research on gender at work in a general sense can assist in understanding gender specifically within a STEM organisation. This chapter presents a review of literature relevant to the research questions:

- *How is a gender equity measure implemented in STEM organisations?*
- *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?*

The literature review commences by introducing Acker’s ideas as foundational to the field of feminist organisational studies. To narrow the focus to gender equity specifically within the STEM field, the review then presents statistics on the extent of gender inequity in STEM and discusses the prevailing explanations for the persistent gender inequity. Then, the chapter turns to literature that foregrounds women’s own voices as they explain the primary reason why they leave their STEM careers: organisational culture. Moving on from problems to solutions, the review outlines the different types of interventions designed to address gender inequity, including anonymising measures such as the pilot program being examined in this study. The penultimate section presents a new frontier of gender equity research, the sustainability of programs and the importance of understanding their implementation. The review concludes by returning to Acker and the need for cultural change by establishing how understanding implementation can assist organisations in working towards that change.

Acker’s theory of gendered organisations

Acker’s (1990) theory of gendered organisations is a foundational theoretical framework for research on gender at work. Acker (1990) argues that gender is a fundamental contributor to organisational logic; the bureaucracy, systems, hierarchies, rules, processes, forms, and expectations that make up a modern workplace. Not only the division of labour, or the tasks that are considered suitable for men and women to perform, but the fabric of the organisation itself; the way decisions are made, who is considered the ideal worker, what behaviours are rewarded and what are punished. For example, taking extended parental leave or prioritising family over work are not considered

attributes of the ideal worker, but are often a necessity of women's lives. Organisational logic is presented as gender-neutral, however there is an underlying gendered substructure that is reproduced through daily interactions with the organisation (Acker 1990).

Ely and Meyerson (2000) build on Acker's (1990) work to propose that organisations need to question and change the norms around how work is defined and measured, how competence is rewarded, and how gender is entrenched within everyday workplace processes and practices. The authors coined the term "transformational" (Ely & Meyerson 2000, p.133) to describe gender equity measures that aim to reveal, challenge, and ultimately change the everyday operations of an organisation that uphold and reinforce unequal access to power and resources, compared to 'traditional' measures that focus on upskilling individual women. Ely and Meyerson (2000) were also among the first to recognise that change will not be self-sustaining unless underlying power structures are reformed.

Meyerson also collaborated with Kolb (Meyerson & Kolb 2000) to render visible the theories of gender that underpin much of the research on gender in organisations. Their foundational work synthesised existing research and interventions into four frames according to the explanatory theory of gender the research employed. These frames are "fix the women", "value the feminine", "create equal opportunities", and "fix the culture" (Meyerson & Kolb 2000, pp.560-563). Meyerson and Kolb (2000) argue that the first three frames are based on theories of gender that essentialise, (re)produce harmful gender stereotypes, or fail to address systems of oppression that exist outside the organisation proper such as lack of childcare. The fourth frame, by contrast, acknowledges that gender is a complex set of social interactions and a system of power, rather than an individual attribute or a vector for discrimination.

Later in 2000 Meyerson built on that work by publishing (with Ely) a "new approach to organisational analysis and change" (Ely & Meyerson 2000). In that paper they laid out the theoretical process of cultural change, drawing heavily on Acker's (1990) work and Meyerson's' collaboration with Kolb (Meyerson & Kolb 2000). The research was complex and time consuming, involving embedding gender experts within the organisation to observe, critique, identify, and dismantle gendered narratives, experiment with changes, and then iterate the process. The authors acknowledged the heavily theoretical approach was not suitable for all sites of study and encouraged fellow

researchers to experiment with and refine the method. Ely and Meyerson's (2000) work is important as it is the first clear articulation of what the transformational change process might look like, and the first to theorise that change requires more than new policies; rather it requires changing the entire conceptualisation of gender within the organisation away from a personal attribute and towards a system of power.

Gender equity in STEM workplaces

In 2005, Blickenstaff (2005) published a systematic review of the last 30 years of literature that examined why women were underrepresented in STEM at both the educational and career levels. The review found that most of the literature was focused on the educational context and was conducted by education researchers (Blickenstaff 2005). Ideologically, these studies were focused on encouraging more girls to continue their STEM education, assuming increasing girls' participation in school would naturally result in more women pursuing a STEM career (Blickenstaff 2005).

By 2013 researchers were noticing that encouraging girls into STEM was not resulting in meaningful changes to women's STEM workforce participation rates, and transformational cultural change was not materialising. Different organisational and institutional theories have been mobilised to explain the stubbornness of participation rates, with contributions from social science, gender studies, business and organisation studies, psychology, and STEM itself. Scholars each typically draw on a single conceptualisation of gender to explain the root of gender inequity (Ely & Meyerson 2000; Wynn 2020), which fall into four broad categories; sex differences are biological, sex differences are socialised, sex differences appear through differential treatment, and gender as a system of oppressive social relations (Meyerson & Kolb 2000; Ely & Meyerson 2000). Research that accepts sex differences are biological assumes that the reason women are less successful than their male peers is due to a shortcoming in women. Studies framing sex differences as biological focus on identifying the special qualities that women who stayed in STEM careers had that their peers did not, whether women's management or working style was 'suitable for STEM', or whether girls had the same aptitude for STEM as boys (Stoet & Geary 2020; Botella et al. 2019; Seddighi & Corneliussen 2020; Buse, Bilimoria & Perelli 2013). This approach is roundly criticised for being reductive, discriminatory, and focusing too much on assimilating women and not enough on gendered norms and work practices (Leenders, Bleijenbergh & van den

Brink 2020; Pollitzer 2019). Despite these criticisms, research framing sex differences as biological continues to be conducted and published, largely in psychology and STEM disciplines that lack meaningful contributions from gender scholars.

In contrast, research that accepts sex differences are socialised assumes that women have behaviours and traits such as ‘collaboration’, ‘nurturing’, or ‘intuition’ that are different from men due to complex gendered socialisation (Kanny, Sax & Riggers-Pieh 2014; El-Hout, Garr-Schultz & Cheryan 2021). Research framing sex differences as socialised focuses on what benefits women’s behaviours bring to STEM, which has been criticised for being reductive and reinforcing harmful stereotypes (Blickenstaff 2005). Particularly the stereotype that women universally and uniquely hold those traits and that these traits are not aligned with the ideal STEM worker (Blickenstaff 2005; Hideg I & Ferris D 2016). Alternatively, this research naturalises the gender gap by explaining why women’s different behaviours and traits lead them to careers other than STEM (El-Hout, Garr-Schultz & Cheryan 2021), which ignores the cohort of women who actively choose STEM careers but are forced out by hostile work environments (Cech & Blair-Loy 2010; Blickenstaff 2005; El-Hout, Garr-Schultz & Cheryan 2021). Research framing sex differences as socialised are largely published in technology, business, and management disciplines.

Thirdly, research that claims sex differences appear through differential treatment assumes that the structurally unequal distribution of power and resources systematically limits opportunities for women to commence and continue a STEM career (Cech & Blair-Loy 2010). Research that frames sex differences as due to differential treatment focuses on the factors within the organisation or institution that help or hinder women succeed (Hart 2016; Orser, Riding & Stanley 2012), and includes research focused on the transition of young women from STEM education to STEM careers. This research is praised for shifting the focus from the factors within the individual to factors within the organisation. However, the research ignores the organisational culture that creates the uneven playing field in the first place, such as devaluing feminised ways of working or discrimination against those with caring responsibilities. Without exposing the gendered nature of organisational practices, uneven fields will continue to be (re)produced, requiring a seemingly unending procession of interventions. Research that frames sex

differences as due to differential treatment is most common in work and organisation disciplines.

The fourth frame returns to the work of Acker (1990) and Meyerson (Ely & Meyerson 2010; Meyerson & Kolb 2000) in recognising that workplace culture hostile to women is the root cause of persistent gender inequity in STEM. These studies conceptualise gender not as a personal attribute, but an interlocking system of power that is (re)produced in daily interactions (Acker in Utoft 2020). Scholars focus on how culture manifests and how toxic hegemonic masculinity impacts women's desire and ability to persist at their STEM careers (Nash & Moore 2019; Nash & Nielsen 2020). This research is praised for tackling the wicked problem of culture, and for successfully operationalising a post-structuralist conception of gender (Lansu, Bleijenbergh & Benschop 2019). However, research focusing on workplace culture is also criticised for being too theoretical and difficult to convert into interventions (Eriksson-Zetterquist & Renemark 2016). Research that frames gender as a system of power is most common in gender studies disciplines, along with feminist work and organisation disciplines.

There is almost no consideration of non-binary people in the literature to date, which tends to reduce and essentialise 'gender' to 'women' (Yoder & Mattheis 2016; Office of the Chief Scientist 2020). This gap reflects broader attitudes towards non-binary people; for example, the Australian Census does not collect information on nonbinary people (Australian Bureau of Statistics 2021), nor are non-binary people included in Australia's STEM Workforce report (Office of the Chief Scientist 2020). Participation numbers of non-binary people working in STEM are not available, either for Australia (Office of the Chief Scientist 2020) or elsewhere around the world (Yoder & Mattheis 2016). Similarly, much of the research in organisational studies, psychology, and STEM tends to ignore race, sexuality, or disability status entirely, implying the 'target participant' is a white, straight, cis gender, able-bodied woman (Rasmussen et al. 2019; Bennett 2018). Recently, however, some research into the STEM workforce is starting to specifically include non-binary people, as well as other LGBTQ people, and is encouragingly being led by people from those cohorts (Yoder & Mattheis 2016; Rasmussen et al. 2019).

Women's reasons for leaving their STEM careers

Beginning in 2004, research showed that discontent with their organisation or science in general were the most common reasons for women to leave science (Preston 2004;

Heilbrunner 2013). The discontent continues today, with women citing organisational culture as the biggest impediment to their career progression or desire to stay. Indeed, these reasons were forefront in my own departure from a STEM career. Discontent happens through other's questioning women's credentials or knowledge (Adams 2017; Orser, Riding & Stanley 2012; Professionals Australia 2018), a reduced sense of belonging (Orser, Riding & Stanley 2012), or outright hostility and ostracism from co-workers (Miner et al. 2019). Similarly, several studies found the availability of ongoing training and professional development had the most significant impact on whether women chose to stay in their science careers (Adams 2017; Singh et al. 2013). Recent longitudinal studies found discontent is worsening overall, indicating that science organisations need to rethink their approach to achieving gender equity (Sassler 2018). As such, addressing the cultural origins of the bias, rather than accounting for the bias after the fact, is the preference for many scholars researching workplace gender inequality.

Programs to advance gender equity in STEM

Academic research on gender equity programs in STEM is sparse, particularly in an Australian context (McKinnon 2020). Where these programs are mentioned, it is in the context of recommendations rather than as the subject of the research, and recommendations are usually informed by the frame of gender called upon in the research. Research that supposes sex differences are biological or social, adopt a 'fix the women' approach and advocate for measures that provide mentoring or special training to increase women's aptitude and capability (Orser, Riding & Stanley 2012; Yen et al. 2019). Research that assumes sex differences appear through differential treatment advocate for measures to 'level the playing field' through grants, quotas, anonymisation, or unconscious bias training (Sainsbury & Bergqvist 2009). Lastly, research that accepts sex differences are due to hostile workplace culture advocate for measures that undertake the wholesale transformation of organisational culture through a continual process of feedback, experimentation, and revision of work practices (Ely & Meyerson 2010; Lansu, Bleijenbergh & Benschop 2019).

There is a paucity of program-evaluation style research on gender equity programs in STEM workplaces, from Australia or elsewhere. The little research that does exist tends to focus on individuals and their personal outcomes or enjoyment, rather than long-term changes in the participation or persistence of minorities in their STEM careers, or of

cultural change within STEM organisations (McKinnon 2020; Blickenstaff 2005). Few of the studies that investigate gender equity programs examine the efficacy of such measures. Instead, studies describe the gender gap for different disciplines and passively analyse retrospective data which makes it difficult for the authors to draw vigorous and transferrable conclusions (Witteman et al. 2019).

Anonymous grant applications – one type of gender equity measure

The anonymisation of grant applications is one gender equity measure proposed to resolve gender inequity in STEM. These measures are based on the premise that gender inequalities are the result of biases in hiring and promotion practices, whether conscious or unconscious. It is those biased processes that cause gender disparity in the workplace. Anonymisation can be categorised as ‘create equal opportunity’, or liberal structuralism (Meyerson & Kolb 2000), which scholars critiqued as it ‘adds more women’ but fails to meaningfully address the cultural issues at the root of gender inequity (Ely & Meyerson 2000).

Only three studies have been published that examine data before-and-after implementation of an anonymisation measure (Witteman et al. 2019; Ledin et al. 2007; Kolev, Fuentes-Medel & Murray 2019). In 2007 Ledin et al (2007) found that applying a deliberate anonymising measure did not alter the gender bias in grant awards, and in fact grants awarded to men increased slightly following anonymisation. The authors proposed several explanations, including women’s reduced publications compared to men due to time spent in caring responsibilities. Kolev et al (2019) conducted a review of submissions to the Gates Foundation from 2008-2017. The researchers found that women received significantly fewer grants, which could only be statistically explained by controlling for text-based differences in proposal titles and descriptions. Different communication styles between men and women were suggested as responsible for the low rate of success for women. Witteman et al (2019) conducted an empirical study to investigate whether gender gaps in grant funding came about due to biases in the evaluation of the research proposal or the researcher themselves. They examined a natural experiment with over 7000 applications for research grants from the Canadian Institute of Health, which split the applications into two groups: one with an explicit focus on the calibre of the researcher, and one without. The data showed that the quality of research

proposals was the same between men and women, and gender gaps in grant success were attributable to women being given a lower evaluation than their male peers.

Investigating why gender equity programs lack long-term success

Recently, research is beginning to focus on why gender equity programs are abandoned or lack long-term success, and scholars generally agree that success and sustainability are hampered by two related issues that recall Acker, Ely and Meyerson's work (Eriksson-Zetterquist & Renemark 2016; van den Brink 2020). Firstly, programs employing traditional measures do not produce lasting change and cannot be funded into perpetuity. Secondly, programs employing transformational measures rely on cultural change, which is difficult and takes time, so programs are sometimes abandoned for lack of early progress.

De Vries and van den Brink (2016) argue that while neither traditional nor transformative measures are successful on their own, they may be successful when combined. The authors theorise that while traditional measures have limited ability to activate change, they do serve the important purpose of gender education. That is, by exposing the organisation and individuals to the concept of gender inequity, and how it might manifest, those programs are preparing people for more radical change (de Vries & van den Brink 2016). They propose a program design that starts with a traditional measure and slowly leverages the increasing gender education in the organisation to eventually introduce a transformational measure.

Other research identifies complications that arise at the point where the theoretical aims of gender equity are translated into action (Eriksson-Zetterquist & Renemark 2016). Eriksson-Zetterquist and Renemark (2016) retroactively examined the implementation and progression of two different gender equity programs. The study focused on which aspects of formal and informal processes associated with the programs were integrated into the organisations, and which were not. They concluded that gender equity programs provided benefits, but they were short-lived, and that translating the idea of gender equity into everyday actions undertaken by individuals is important to the effectiveness of gender equity programs (Eriksson-Zetterquist & Renemark 2016).

In 2012 Benschop et al (2012) published an editorial asking gender and organisation scholars to translate knowledge on gender inequities into processes of organisational

change. The authors recognised that organisational cultural change is undertheorized, calling for future research to focus on how the change process is enacted, challenged, or enabled, along with how the change process is complex and iterative (Benschop et al. 2012). Similarly, van den Brink (2020) observes that much of the current literature tends to conceptualise the implementation of gender equity programs as a linear process that does not reflect actual practice. Van den Brink (2020) argues that by conceptualising the implementation of these programs as linear, scholars fail to engage with the iterative processes and incremental progress encountered 'on the ground'. Van den Brink suggests that examining implementation processes is one way to explore organisational culture and the related barriers and enablers to successful change. Thus she, along with multiple others, calls for future research to focus on processes and the complexity of implementation (Evans 2014; van den Brink 2020; Eriksson-Zetterquist & Renemark 2016; Bohnet 2016; Williamson 2020; Benschop et al. 2012).

Working towards cultural change by returning to Acker

In a memorial article following Acker's death, Benschop (2016) summarised Acker's intellectual contributions and reassured readers of the continued relevance of Acker's theories 40 years after publication. According to Benschop (2016), Acker saw organisations as key to the production of cultural norms, and thus organisational culture was crucial to understand. More recently, Williamson (2020) built on Ely and Meyerson (2000), among others, to imagine what a gender equal workplace looks like today. She describes a workplace with non-hierarchical structures where power is reconceptualised to think differently about how work is organised and valued. To combat backlash and resistance Williamson (2020) advocates for adopting short- and long-term goals that gradually work towards transformational change.

Transformational gender equity requires cultural change, and thus understanding how organisational culture (re)produces is vital to designing and implementing effective and sustainable gender equity measures. I agree with both Benschop and Williamson that returning to Acker's original theory of gendered organisations and the foundational work that followed from Ely, Meyerson and Kolb is crucial to achieve the feminist goal of gender equity at work. This research responds to van den Brink and others by returning to Acker to explore the complexity of a gender equity measure and how the

implementation provides insight into organisational culture. The following chapter justifies the research methodology employed in this study.

Chapter 3: Methodology

This chapter presents the methodology and methods adopted to pose and explore the research questions:

- *How is a gender equity measure implemented in STEM organisations?*
- *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?*

The chapter starts by providing context for WISA's pilot, including how the program was designed and how the program is operationalised within the organisations. Second, the chapter discusses the development of the research question, before moving on to frame the study design by presenting my positionality and epistemology as a feminist activist adopting a pragmatic research paradigm and drawing on feminist and action research principles. Next, the chapter outlines the study design, participant information, and the procedural methods including preparation, interviewing, journaling, transcription, and record keeping. The penultimate section justifies the process of data analysis and writing, including coding, data visualisation, and the development of themes. The chapter concludes with a description of the process of theory building undertaken. Whilst Acker's (1990) theory of gendered organisations, introduced in Chapter 2, was foundational for enabling theorisation of the gendered norms of STEM, it did not provide a suitable framework for the implementation of the gender equity program. To provide WISA with information to inform practice, May's (2013) general theory of implementation was operationalised as a specific theory for the implementation. The epistemological and methodological ramifications of bringing these two theories together are discussed at the end of this chapter which introduces May's (2013) theory and how it was mobilised in this study.

Pilot context

The program to implement an anonymisation measure was designed by WISA, based on a program run by NASA. The program is being piloted by four organisations which host large science infrastructure publicly owned in Australia. All the organisations became involved in the pilot in response to an invitation from the Ambassador for Women in STEM, Professor Lisa Harvey-Smith from WISA. Responsibility for the rollout of the pilot was assigned to the manager of the 'user office' in each of the organisations. Formal

pilot evaluation data is being collected by WISA, including historical application and time assignment data, to show before-then-after intervention effects. WISA's work mirrors similar efforts across industries to address unconscious bias through the use of anonymisation techniques in areas such as hiring, promotion, grant award, and access to equipment (Foley & Williamson 2018; Williamson & Foley 2018; Behaghel, Crépon & le Barbanchon 2015; Kolev, Fuentes-Medel & Murray 2019).

Each of the organisations involved in the pilot use a formal application process to access the infrastructure. Calls for applications are typically made once or twice a year, after which a Time Assignment Committee (TAC) assesses the applications and assigns time on the instruments. The applications in all organisations are handled via an online portal where the applicant fills out various mandatory fields and attaches pre-prepared PDFs of technical justification and team makeup. Applications can be made by individuals, although are usually prepared by a team with a Chief Investigator who submits the application.

The TAC in each organisation is comprised of various professionals and subject matter experts, and in some cases previous successful applicants are obliged to sit on the TAC as a mutual obligation. Individual members of the TAC receive a portion of the applications to read and assign a ranking. The TAC then meets to discuss how the finite time on the instruments should be allocated. For some facilities, their specific founding principles dictate how some time is allocated, for example requiring a certain percentage of projects to be headed by scientists from Australia. It is common that most applications receive at least some time allocation.

The anonymisation measure is underpinned by the theory of change that TAC members are unconsciously biased against women applicants when assessing their applications, which leads to women receiving less time on the equipment, thereby damaging their careers (WISA 2020). Thus, removing identifying information should remove bias and equal the playing field. The program required changes to organisations' application systems so TAC members could no longer read identifying information, including names, but also institution, publication record, previous projects, etc.

Research question and methodology

The research question for this study evolved simultaneously from two perspectives. Firstly, from conversations with Isabelle Kingsley from WISA, which inspired a general exploration of program implementation. Secondly, from a preliminary literature review, which suggested implementation was an important component of program success but was under-researched. Thus, my research interest developed to focus on how implementation was conceptualised and described. Consequently, the research questions are:

- *How is a gender equity measure implemented in STEM organisations?*
- *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?*

A rich, feminist conceptualisation of implementation may assist in understanding why gender equity programs in STEM underperform. Further, examining implementation processes is one way to explore organisational culture alongside the related barriers and enablers to successful and enduring cultural change.

This study employs a pragmatic research paradigm, drawing on Creswell's (2009) conceptualisation of a pragmatic worldview. Kelly and Cordeiro (2020) advocate for the use of a pragmatic paradigm for research focusing on organisational processes. They argue adopting a pragmatic approach, rather than focusing on methodological purity, allows the researcher to explore and understand connections between knowledge and action, and places the study emphasis on practical outcomes (Kelly & Cordeiro 2020). Based on the collaborative origin of the research project and the pragmatic research approach, WISA pilot program was adopted as the case study to examine the implementation of a gender equity measure. A case study is a suitable research method for examining an event, such as the pilot, that is currently unfolding and where behaviour can be observed, not manipulated (Yin 2008). Further, a case study is a suitable research method when retaining the context of the phenomena is important (Yin 2008). Retaining the context was important in this study, in particular how the implementation related to the wider context of gendered organisations (Acker 1990).

The case study methodology was informed by feminist organisational research principles and action research. Feminist organisational research critiques existing structures and

power distribution within organisations (Benschop 2021). Feminist research is interdisciplinary, committed to challenging ways of knowing, challenges power structures, and actively working towards a more just world (Benschop 2021). These principles informed the research throughout, including the choice of topic and question, researcher positionality and reflexivity, the selection of research methods, foregrounding of participants, and critical analysis that integrates gender as a system of power. Similarly, while this study was not *participatory* action research (Johnson 2012), in which the people working in the sector also conduct the research, it was influenced by action research principles. Specifically, the research question and direction were directly influenced by people working in the sector, Isabelle and myself, rather than by outsiders (Johnson 2012). WISA agreed to arrange access to the pilot on the basis that the research would have practical implications, which also aligned with my own desire to be part of driving change. Thus, I also gave significant and deliberate attention to practical outcomes and recommendations during data analysis and writing, which is also a principle of action research (Johnson 2012).

Study design

To explore implementation, that is the process of going from a written plan to human actions, best practice is to consult people with relevant first-hand experience of the implementation (Rubin & Rubin 2014). Thus, semi-structured interviews complemented by field notes and reflexive journaling were chosen as the data collection techniques (Roulston & Choi 2017). Using semi-structured interviews meant data would be co-constructed with the participants regarding their personal experiences and feelings and would thus reconstruct a rich description of the implementation process (Roulston & Choi 2017). That rich description would then facilitate reflection and insights into the program and implementation.

A case study design meant including as broad range of perspectives as possible (Yin 2008), so participants were sought from all four of the organisations involved in the pilot. Based on her knowledge of the organisations participating in the trial, Isabelle suggested the managers of the ‘user office’ in each organisation be the participants for this study, as they had insider knowledge and experience of the implementation.

To enhance the quality and trustworthiness of the findings, secondary data in addition to the participant interviews was needed (Yin 2008). Following Creswell and Poth (2018),

participants were asked to share documents relating to the program, such as implementation plans, work procedures, or policy statements. Unfortunately, no documents from any of the organisations were made available, mainly due to the impact of COVID-19. Participants were followed up via email twice; one participant did not respond, and three participants responded and apologised, citing the COVID-19 lockdowns as drastically impacting their work environments, leaving them no time to consider or escalate my request. Continuing to request the documents was deemed an unfair burden on the participants and their organisations, so the request was withdrawn. In addition to documents, participant observation was also considered. However, the pilot was well advanced at three of the four organisations, and COVID-19 prevented site visits, both of which precluded including participant observation. Both the retrospective nature of the interviews and the lack of observations means that the study has limited ability to comment on day-to-day implementation details. In the interviews, participants were asked to recall an involved process that happened over several months and condense it into tens of minutes, and no observation data was available to supplement the participants' accounts. Participants are assumed to have omitted details that were important at the time but were no longer front of mind, or their recollection may have been filtered by events that occurred subsequently. Consequently, conclusions or generalisations should be limited to program-wide or holistic frames, rather than individual participants or organisations.

Rubin and Rubin (2014) discuss the role of participant believability in the quality and reliability of the research, and several actions were taken to maximise believability. Firstly, interview questions were deliberately structured to build trust and ease into sensitive and difficult topics (Rubin & Rubin 2014). Secondly, participants were reassured they could withdraw at any time without consequence (Rubin & Rubin 2014). Thirdly, interview techniques to set the participants at ease were employed, including starting with small talk and phrasing the questions in a casual and conversational tone (Rubin & Rubin 2014). Fourthly, participants had opportunity to review and edit their transcripts.

Initially, the study was intended as a cross-case analysis of the four participants as representatives of the four organisations conducting the pilot. However, the cross-case style of writing would immediately differentiate participants, and therefore identify them

to readers familiar with the pilot. Consequently, the pilot was considered as a single case with the four interviews providing a variety of perspectives to build a picture of implementation (Rubin & Rubin 2014). Therefore, following Yin (2008), thematic analysis was conducted based on Braun and Clarke (2006), of which more detail is provided in the sections below.

Recruitment

Following ethics approval by Macquarie Ethics Board (see Appendix A) Isabelle personally invited the manager of the user office at each organisation to participate in the study. Isabelle also provided email introductions to all four participants, before stepping away to ensure the research was conducted independently in accordance with Master of Research requirements. Email introductions were sent every person that Isabelle recommended, inviting them to participate, and everyone agreed. Information and consent forms were sent via email once mutually agreeable times were finalised for the interview (see Appendix B).

Navigating participant anonymity

Due to the small number of participants and the public nature of the anonymisation trial, participant anonymity could not be guaranteed in any publications that resulted from the interviews, including this thesis. However, the automatic assumption by academia that anonymisation was best practice clashed with my feminist politics that strives to make the voices of individuals heard (Lahman et al. 2015). Guided by a feminist approach, I wanted to give the participants the choice whether to be identifiable in the research (Lahman et al. 2015). Consequently, several strategies were enacted to help manage the risk of potential identification while retaining participants' power to choose whether to take any of those options. Participants were given the opportunity to review their transcript and adjust their responses, and to choose to be known by a pseudonym in the research publications. Details are presented along with the consent forms in Appendix B. Two participants nominated pseudonyms and one nominated their given name. One participant requested not have quotes attributed to them directly in any publications as they needed to request permission to be quoted and were doubtful their organisation would authorise any quotes in this context. All participants reviewed their transcripts and made small grammatical adjustments that did not affect meaning. One participant removed one paragraph and several sentences all relating to management and resourcing.

In writing the thesis I realised the combination of real name and pseudonyms still made it possible to identify some participants who wished to remain anonymous. Therefore, in consultation with my supervisor and department ethics advisor and following additional permission from participants, I changed the attribution system to use numbers to refer to all participants (see Appendix B). This decision clashed with my feminist politics, and I disliked the depersonalisation of assigning participants numbers rather than names. However, I recognised and respected the need to protect the identities and anonymisation requests of participants.

Participant information

The abovementioned risk of identification means participants cannot be described to the level of detail usually expected when reporting interview data (Rubin & Rubin 2014). Instead, participant descriptions are provided in general terms. Participants included three women and one man. Two participants were responsible for technical programming, and had technical expertise, including having served on TACs themselves for either these facilities or others in the past. The other two participants were administrators responsible for the interface between the applicants and the organisation and did not have technical expertise or experience sitting on TACs, although both had been to TAC meetings in their liaison roles.

Given that the participants were invited due to their professional roles, they participated in the interviews as representatives of their organisations, rather than in a personal capacity. As such, information about the organisations is also important to contextualise the interview data. All the organisations receive funding either from the government or from university consortiums and are operated either as charities or not-for-profit companies. The Australia Telescope National Facility, operated by the Commonwealth Scientific and Industrial Research Organisation, is a collection of radio astronomy observatories across Australia at sites such as Parkes in New South Wales (CSIRO 2022). The Australian Centre for Neutron Scattering, directed by the Australian Nuclear Science and Technology Organisation, operates 15 different neutron beam instruments for conducting neutron science (ANSTO 2022). The National Computational Infrastructure, governed by the Australian National University, hosts the Southern Hemispheres fastest supercomputer (NCI 2022). Finally, the Anglo Australian Telescope, operated by Astronomy Australia Limited, is the largest optical telescope in Australia (Astronomy

Australia 2022). Three of the four organisations had successfully run one round of the pilot program and were actively preparing to run another. The fourth organisation was preparing for their first round of the program with the intention of running at least one more subsequent round.

Interview method

Interview preparation included reviewing relevant literature on conducting quality interviews (Rubin & Rubin 2014; Crasnow 2020; Creswell 2016) and consulting with my primary supervisor to finalise the points of interest or “main questions” (Rubin & Rubin 2014 p 129) for the interview. An interview protocol was prepared (see Appendix C) to help manage time, to prompt questions, and to take notes on my thoughts and impressions during the interviews. Finally, I practiced my interview technique with close friends and colleagues to allay nervousness and build confidence.

On the days prior to each interview, an email was sent to the relevant participant outlining the types of questions that would be asked (see Appendix D). The decision to share the main themes in advance was made for five reasons. Firstly, it was decided the interest in procedures, processes, actions, and decisions was best served by allowing participants time to think about the questions and gather information. Secondly, advance questions gave participants an opportunity to consult with others in their organisation prior to the interview. Thirdly, participants had an opportunity to recall as much as possible about events from months ago. Fourthly, participants had time to reflect critically on processes that are normalised within their organisations. Finally, advance questions maximised the interview time by giving participants background information beforehand.

Interviews were conducted by video conference due to COVID-19 precluding in-person interviews. While best practice for interviews of this nature is to conduct them in person, recent studies have shown that conducting interviews by video does not decrease the quality or reliability of the data produced (Gray et al. 2020; Jenner & Myers 2019). The interviews lasted between 47 and 70 minutes and were recorded with the participants permission obtained both in the written consent form and verbally at the commencement of the interview. Along with recording each interview for later transcription, field notes were taken during and immediately following each interview, which noted participants general demeanour and emotional reactions to questions, for example surprise or discomfort.

Reflexive journaling

I engaged in reflexive journaling throughout the entire study as part of my feminist methodology, and quality research practices. Drawing on Braun and Clarke (2021) I co-constructed knowledge with the participants through journaling regularly where I explored ideas based on the interview data. Journaling provided a space to wrestle with theoretical understandings, questions, tensions, and my own insider-outsider positionality within the research process.

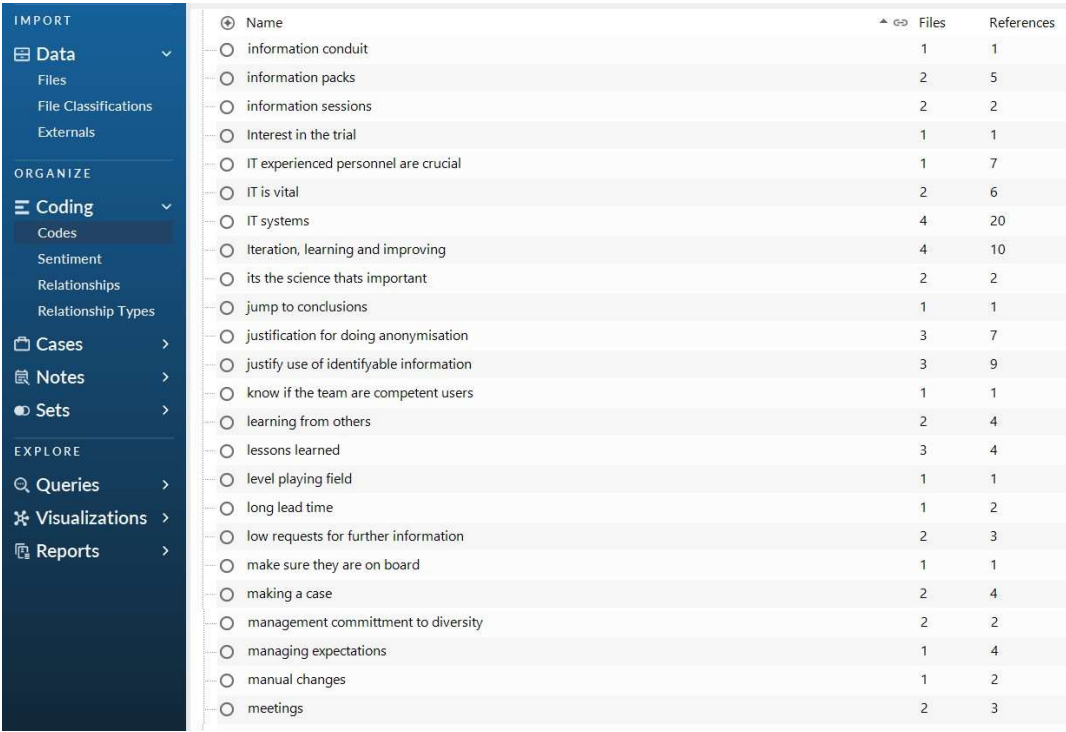
Data management and storage

NVivo 11 managed the data. Data sources uploaded to NVivo included the final interview transcripts, the field notes taken during and following the interviews, and the reflexive journals. Digital records were stored securely on my laptop and backed up to a server in Australia, and hard copies of journals were kept securely at my home office, all in accordance with University Ethics Board approval.

Analysis method

Analysis commenced during transcription of the interviews, which was enhanced because of self-transcription (Kowal & O'Connell 2014). As the reflexive thematic analysis focused on topical content, the transcription included only talk that contributed to the substantive meaning. The transcription did not include conventions from conversation or discourse analysis such as cross talk or timed silences, and quotes were edited for clarity to remove inconsequential speech such as 'um' 'ah' 'you know' and re-starts (Roulston 2014).

Coding was approached inductively, using the research questions as a guide while being led by the data and not imposing any interpretation on the data (Braun & Clarke 2013). Codes were descriptive, and when a thematic or analytic point arose during coding, a memo was made in NVivo tagged to the text that prompted the thought. This coding produced 141 separate codes and a screenshot of the NVivo is presented in Figure 1.



Name	Files	References
information conduit	1	1
information packs	2	5
information sessions	2	2
Interest in the trial	1	1
IT experienced personnel are crucial	1	7
IT is vital	2	6
IT systems	4	20
Iteration, learning and improving	4	10
its the science thats important	2	2
jump to conclusions	1	1
justification for doing anonymisation	3	7
justify use of identifiable information	3	9
know if the team are competent users	1	1
learning from others	2	4
lessons learned	3	4
level playing field	1	1
long lead time	1	2
low requests for further information	2	3
make sure they are on board	1	1
making a case	2	4
management committment to diversity	2	2
managing expectations	1	4
manual changes	1	2
meetings	2	3

Figure 1: NVivo screenshot of initial codes

Following completion of the descriptive coding, thematic analysis commenced by looking for patterns in the data across the participants, where they spoke about the same topics, feelings, or events (Byrne 2021; Braun & Clarke 2021). This process showed that some codes had the same meaning, which were then merged (Byrne 2021). During this process codes were linked together to create initial themes, which was memoed as it occurred (Byrne 2021).

As the analysis progressed in the digital space, I felt limited by the precision required by the digital tool (NVivo). Sensing there were links missing by viewing the data digitally, I craved a spacious and physical process to visualise the data. So, I transferred all 141 codes onto strips of paper, which were laid on the dining room table. Over the course of several days, I sorted the paper into piles that ‘went together’ to create themes. Figure 2, is a photo taken on the first day I tried the process and realised it was working for me. On the edges of the table multiple piles of codes are starting to emerge, with the large pile in the middle of the table yet to be sorted.

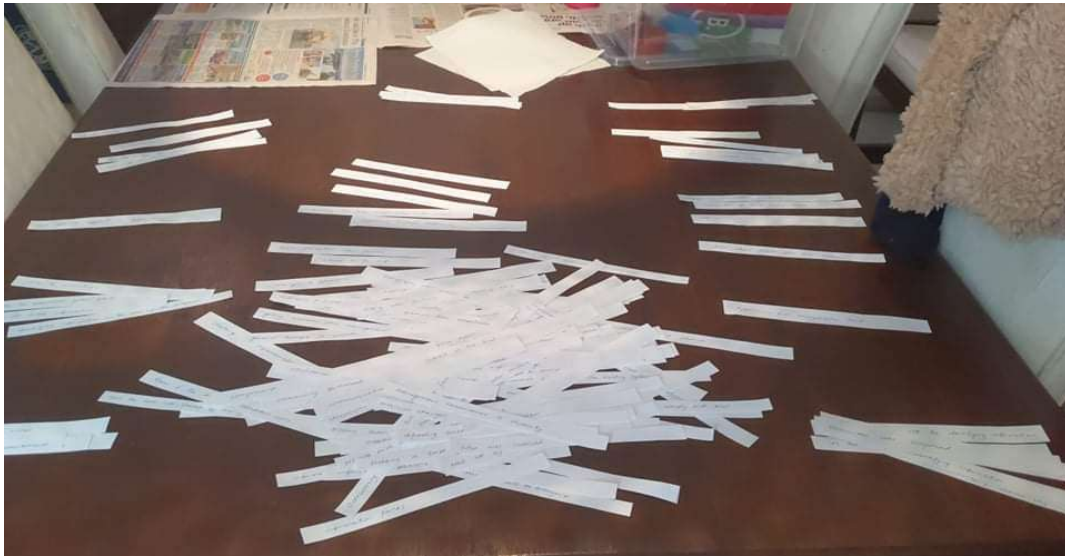


Figure 2: The start of physically sorting the codes on the dining room table

My thinking evolved as I progressed, which often prompted me to refine a code or move strips between piles, or split or merge piles, as necessary (Braun & Clarke 2021). I journaled extensively during this process and present some excerpts below. Journaling was both reflexive practice and used to document the evolution of my thinking regarding the creation and refinement of the themes (Byrne 2021). For example, on the first day, my contemplations lead to the creation of a new theme ‘compromise’ and a refinement of the meanings behind the themes:

Should "compromise" be its own category? Right now, it's in with iteration and I'm not sure it's part of that? I think I mean that as you compromise you change the program, and it flows and iterates.

Similarly, on the second day my contemplation led directly to the development of a descriptive phrase, ‘community sentiment’, that became key to interpreting the data:

Should "peer pressure" now go in this code instead, because it's about community sentiment and opinion on anonymisation? Maybe all of "reasons for doing the program" fall in here now?

Following the coding experience, I also reflected on my broader Masters’ experience, conceptualising it as research training and noticing:

As I went along, I refined what I meant by some (codes), and put some into different categories than I had originally sorted them. This (physically sorting codes) was a brilliant process for refining my thinking. Highly recommended and one of the best lessons of the MRes so far - how to actually do this step of coding.

Figure 3, below, was taken on the final day at the end of the process. On the right-hand side of the table are piles of sorted codes, with a theme label added to every pile on the larger pieces of paper. Coloured pens used to alter codes or themes as the process evolved are visible in the middle of the table, with codes that did not fit a theme lined up on the left-hand side.

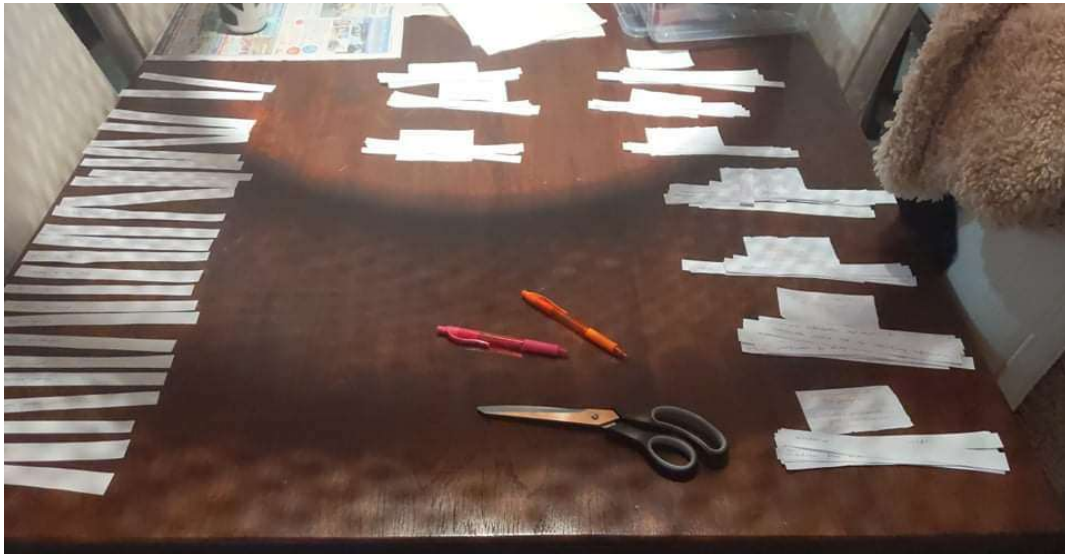


Figure 3: The end of sorting the codes on the dining room table

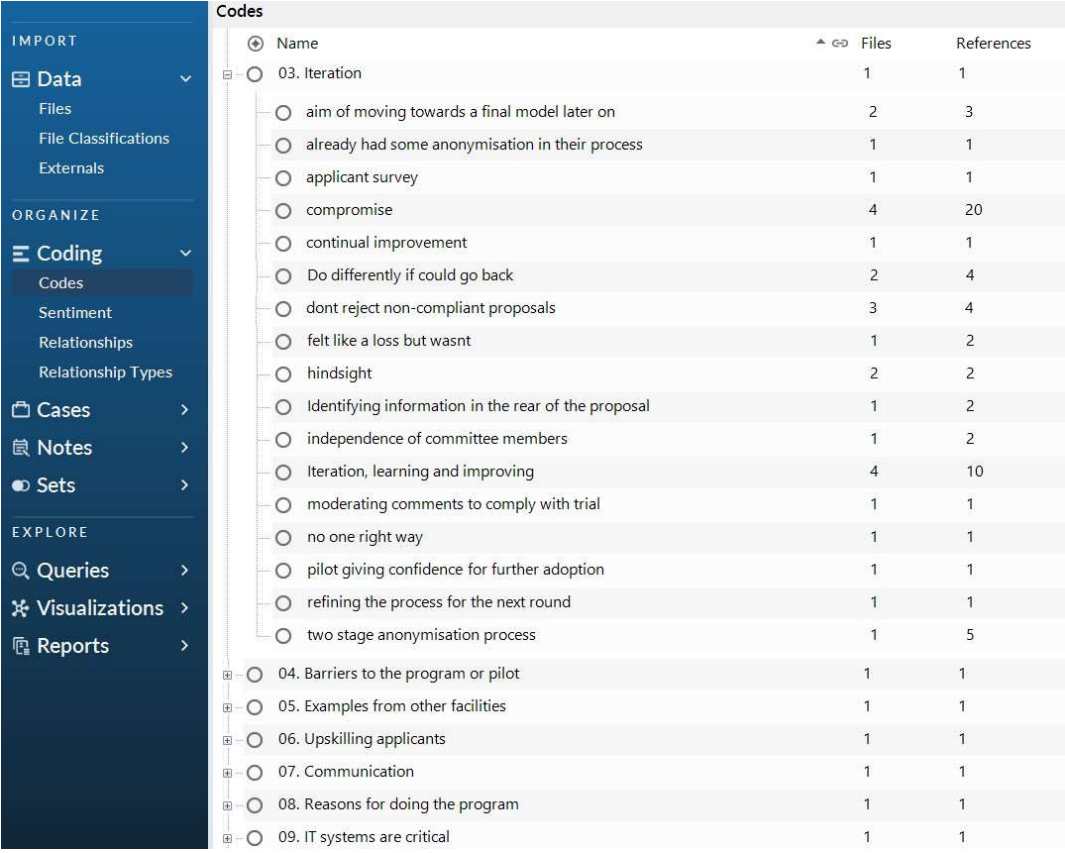
When the physical process was complete the codes were sorted into the initial themes in NVivo to make data retrieval easier during writing. Two screenshots from NVivo are presented below. The first, Figure 4, shows all the themes, including ‘orphan’ which was the name given to all the codes that did not fit a theme.



Name	Files	References
01. Sustainability of the program	1	1
02. Comments on TAC attitude to anonymisation	1	1
03. Iteration	1	1
04. Barriers to the program or pilot	1	1
05. Examples from other facilities	1	1
06. Upskilling applicants	1	1
07. Communication	1	1
08. Reasons for doing the program	1	1
09. IT systems are critical	1	1
10. Orphan	1	1

Figure 4: NVivo screenshot showing the themes

The second screenshot, Figure 5, shows an expanded view of one theme, ‘iteration’, with the individual codes visible nested within the theme.



Name	Files	References
03. Iteration	1	1
aim of moving towards a final model later on	2	3
already had some anonymisation in their process	1	1
applicant survey	1	1
compromise	4	20
continual improvement	1	1
Do differently if could go back	2	4
dont reject non-compliant proposals	3	4
felt like a loss but wasnt	1	2
hindsight	2	2
Identifying information in the rear of the proposal	1	2
independence of committee members	1	2
Iteration, learning and improving	4	10
moderating comments to comply with trial	1	1
no one right way	1	1
pilot giving confidence for further adoption	1	1
refining the process for the next round	1	1
two stage anonymisation process	1	5
04. Barriers to the program or pilot	1	1
05. Examples from other facilities	1	1
06. Upskilling applicants	1	1
07. Communication	1	1
08. Reasons for doing the program	1	1
09. IT systems are critical	1	1

Figure 5: NVivo screenshot showing one theme expanded

Writing method

As described in Braun and Clarke (2021) and Byrne (2021), analysis continued during thesis writing, which commenced as descriptive writing designed to flesh out the initial

themes and prompt questions or show gaps in the analysis. The research questions were revisited at this stage of analysis to ensure thinking evolved in a way that was productive to the research questions. Quotes for inclusion in this thesis were chosen in two ways. Firstly, small quotes that expressed the essence of participants' shared experiences were selected to work into the sentences explaining the phenomena. Secondly, quotes that exemplified or reinforced the larger point were chosen to conclude a paragraph and forefront the participants' voices. Writing then progressed to an analytical style designed to elucidate theoretical connections, including returning to the literature review to compare the study findings to those of other researchers. The analytical writing started to contextualise the data and link to existing theories, particularly Acker's (1990) theory of gendered organisations. During analytical writing, the points that were most important to present within the thesis became apparent and focused my thinking.

Theory building

As analytical writing progressed, I came to realise that while Acker's (1990) theory was foundational for the gendered aspects of the research questions, it was not detailed enough with respect to the operationalisation and implementation aspects. Given my obligation to provide WISA with findings that could be practically operationalised I needed to find an existing mid-range theory dedicated to process implementation. Recalling van den Brink (2020) from Chapter 2, the implementation process is often simplified in the literature to such an extent that it is not helpful for understanding what is involved. Additionally, existing literature approaches theorising implementation from a business and organisation perspective, treating businesses as actors with intent. Drawing on my sociological background I wanted to utilise a theory of implementation that grounded intent and action within individual agents. May's (2013) general theory of implementation is based upon social science and psychological constructs, assuming implementation is a fundamentally social exercise, requiring individual agents to work together to achieve an outcome. May (2013) does, however, fail to mention gender (along with other axes of oppression) when constructing his theory. Thus, both May's (2013) and Acker's (1990) theories are drawn upon within this thesis to develop theoretical insights. While drawing on two theories simultaneously can create tension, it is valid in this case as they are based in similar research traditions; both consider individuals to have agency, and both are concerned with how individuals comprise and create organisations.

Also, this theoretical approach has precedence; Nkomo and Rodriguez (2019) found papers which engage dynamically with Acker's ideas tend to blend her theories with other concepts. Specifically, those that link Acker's (1990) theory of gendered organisations to theoretical frameworks focusing on bureaucracy, as May (2013) does, tended to illustrate "how gender pervades organisational structures, dynamics, and processes", as this study does (Nkomo & Rodriguez 2019 p 1739). Recalling that Acker (1990) was introduced in Chapter 2, May (2013) is introduced in the section below.

May's general theory of implementation

May (2013) separates implementation into two broad arenas that are fundamentally different: context and agency. Context is dependent on the potential of both individuals and the collective to commit to the new practice, along with the capacity of the organisation to commit resources to the program (May 2013). These resources include obvious examples such as funding, equipment, and training, but also includes more subtle forms of resources such as social capital and social norms. Context is dynamic; every organisation will have different context, which constantly changes through time. Agency is dependent on the capability of the program to be workable, as well as the contributions from individual agents in terms of their buy-in, physical and mental labour, teamwork, and dedication to continual improvement. Agency is emergent; individual agents make continual decisions and enact their agency to participate or resist as implementation progresses. Further, individual agents work together to get the program off the ground and normalised into practice (May 2013). Context and agency are broken down into components; context includes potential and capacity, while agency includes capability and contribution. Each of those four components is further broken down into components of their own, which is the lowest level of description in the theory (May 2013). Figure 6, below, demonstrates how the various components nest and work together to build the social system within which the implementation is occurring.

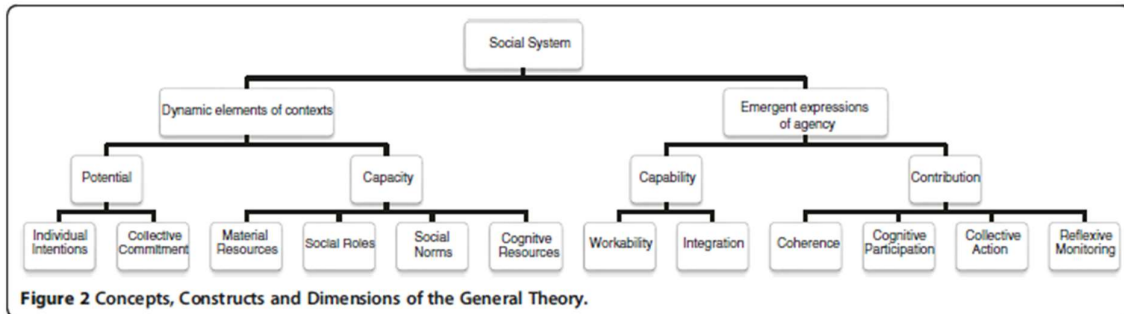


Figure 6: Concepts, constructs, and dimensions of the general theory (Figure from May 2013, p 3)

May (2013) theorises that the three separate components of capacity, capability and potential all come together to determine the contribution that each agent makes to the program implementation. Figure 7 shows how these components relate to each other to build the social system required to implement an intervention.

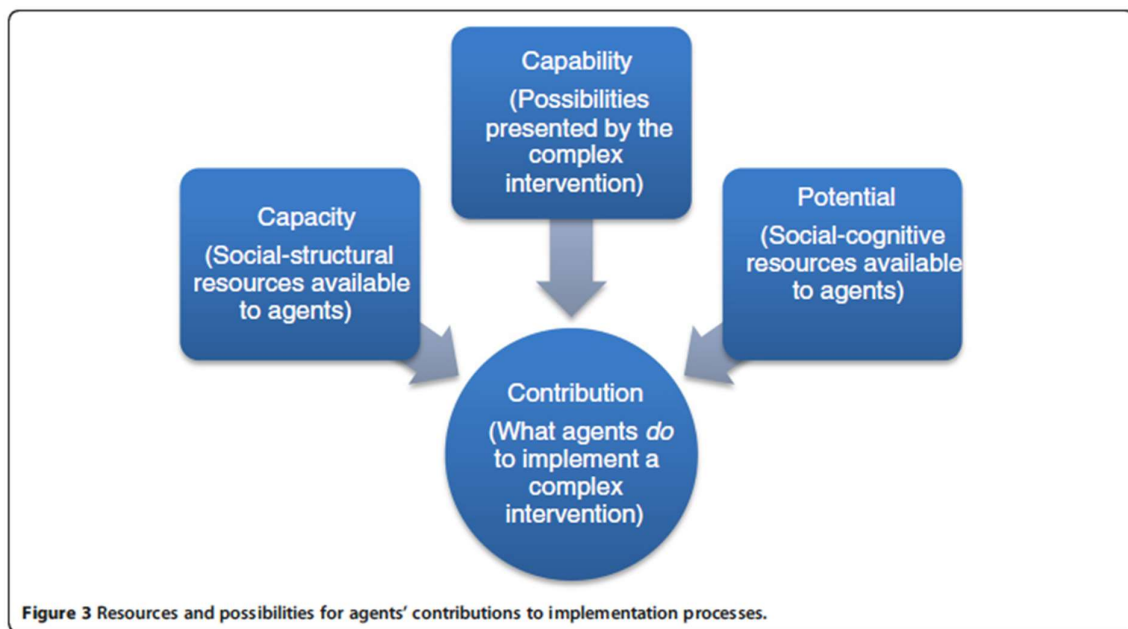


Figure 7: Resources and possibilities for agents' contributions to implementation processes (Figure from May 2013, p 4)

Table 1 provides an explanation of each of the components of May's theory, arranged in the same order as in Figure 6.

Table 1: Explanation of the components of May's (2013) theory

Term	Explanation
Individual intentions	Describes how individuals are disposed towards the program at the outset. Determined by all kinds of contextual factors such as personality, training, experience, and cultural background. These intentions are different for everyone, and can change through time
Collective commitment	Reflects the position of the collective, or the “community sentiment”, which in this data was broadly positive towards anonymisation.
Material resources	The digital and physical things available to individuals to carry out their collective action.
Social roles	Positions within organisations that have socially constructed and sanctioned behaviours that are both expected and allowed.
Social norms	Unspoken rules that govern behaviour in a social setting, which are normalised as to be invisible.
Cognitive resources	The knowledge and skills that individuals hold that can be mobilised to operationalise the program. Includes professional skills and knowledge, as well as social, or ‘soft’, skills
Workability	Describes what individual actors imagine they must do to operationalise the program, along with the skills required to complete those actions.
Integration	Describes the practices and resources required to make the program workable in the current context of the organisation.
Coherence	Also known as sense-making, coherence occurs as individuals place themselves within the social structure of the

Term	Explanation
	program by thinking about what the program means for them and how they would be involved.
Cognitive participation	Actors ‘enrol themselves’ into the program, becoming willing participants who will work independently towards the common goal of implementing the program.
Collective action	Individuals using their skills and resources to make the program happen. This performance of actions is what is normally being invoked when authors say ‘implementation’ or ‘operationalisation’; it is the ‘doing’ of the implementation.
Reflexive monitoring	Individuals collect and examine information about the effects of the program and use the information to reassemble relationships or work practices to better achieve the goals of the program. Reflexivity can apply at both the scale of the whole program or the individual implementation components.

Whether May’s theory would be useful for analysis was considered by relating the study data and May’s (2013) theory to each other. Like the coding process I craved a way to make this relational process visible and active, so I used a wall-sized whiteboard in the university library. Figure 8 shows one portion of the process, about half-way through.

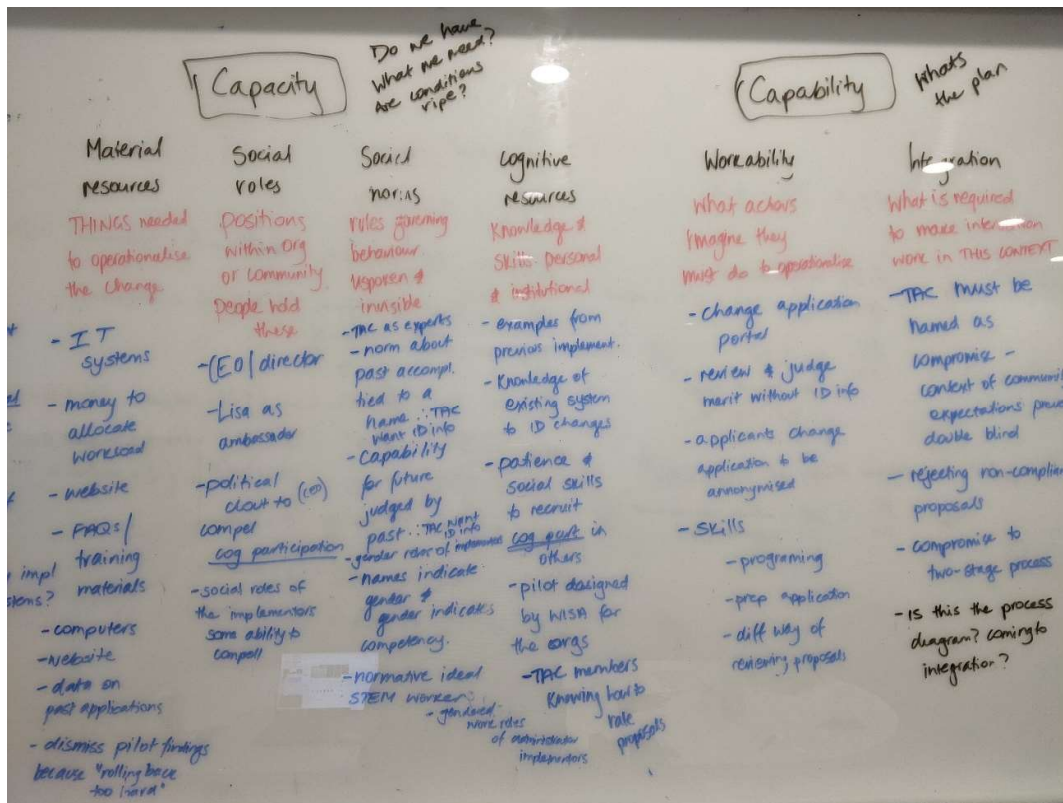


Figure 8: Whiteboard wall showing the process of relating May's (2013) theory to the interview data and vice versa

I started by writing May's (2013) component headings in columns (in black), underneath which I wrote my interpretation of the component (in red). Then, dot points from the data that related to each component were added (in blue). As I continued, I wrote questions to myself (in black, bottom right), drew arrows that connected components, and added points as they occurred to me. Finally, descriptive codes from the interview data were sorted into the components by physically sticking the paper strips to the whiteboard underneath and around the relevant column headers. Unfortunately, I did not take a photograph of this last stage.

Throughout the relational process I was conscious that my goal was to *use* May's (2013) theory, not to prove it 'right', or to force the data to fit the theory. Therefore, I stayed open to the idea that the theory might not be fruitful or useful, that the data might not quite match the categories, or that data would be 'left over' that did not sit anywhere within the theory. Surprisingly to me, the relational process flowed well, and I never felt that I was forcing data to fit. Rather, the process of relating data and theory created

connections between data that had not previously occurred to me and prompted fresh perspective and thought. For example, explicitly considering ‘social norms’ in the data led me to see that some objections to the program invoked a normative ideal of the STEM worker, which was previously invisible to me as a woman-in-STEM insider. The relational process also prompted the realisation that a rich description of the implementation process as it was described by the participants was an important part of understanding the complexity of implementation. Thus, the foundation of the next chapter, Findings, was created.

Building a process diagram

During the first stages of data analysis, I drew a process diagram to help me visualise, describe, and explain the implementation processes as described by the participants. The first process diagram, presented in Figure 9, was intended as a writing aid, only for me.

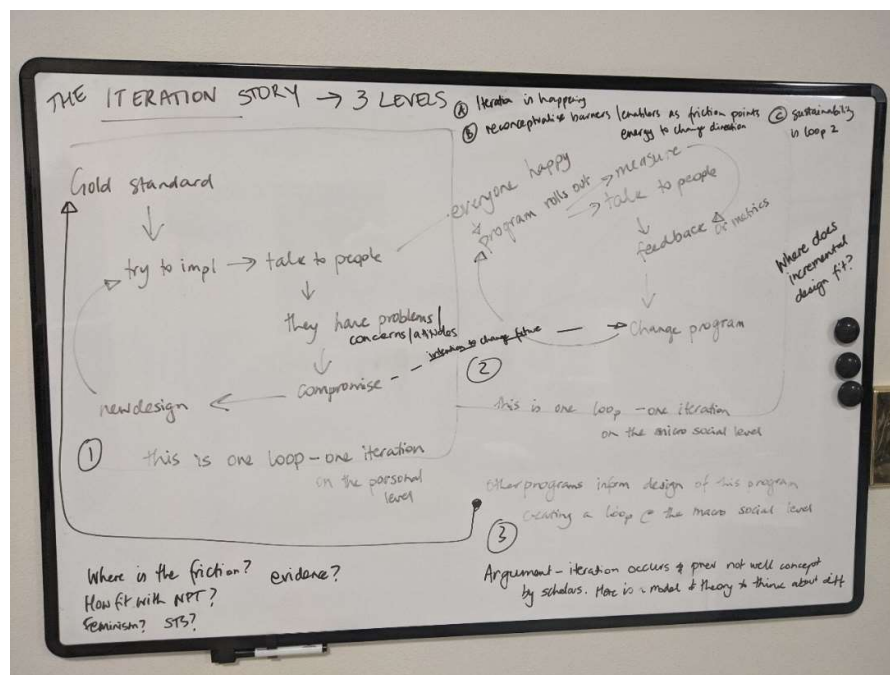


Figure 9: Initial process diagram

During the relational process described above I updated the process diagram, Figure 10, as a tool to assist with conceptualising how the study data fit with May’s (2013) theory. The original diagram is in black, with theoretical points in blue.

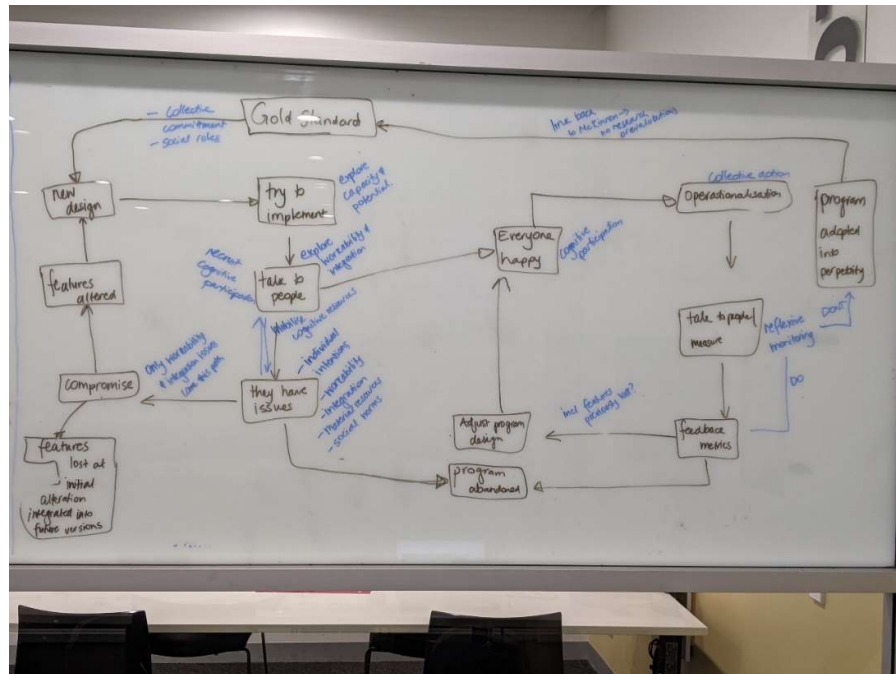


Figure 10: Second version of the process diagram

As the update progressed, I realised the process diagram was fundamental to illustrating how theory was helping explain the data, and it needed to be included in the body of the thesis. Thus, the process diagram was formalised for integration into the text. Figure 11, below, shows the third version of the process diagram.

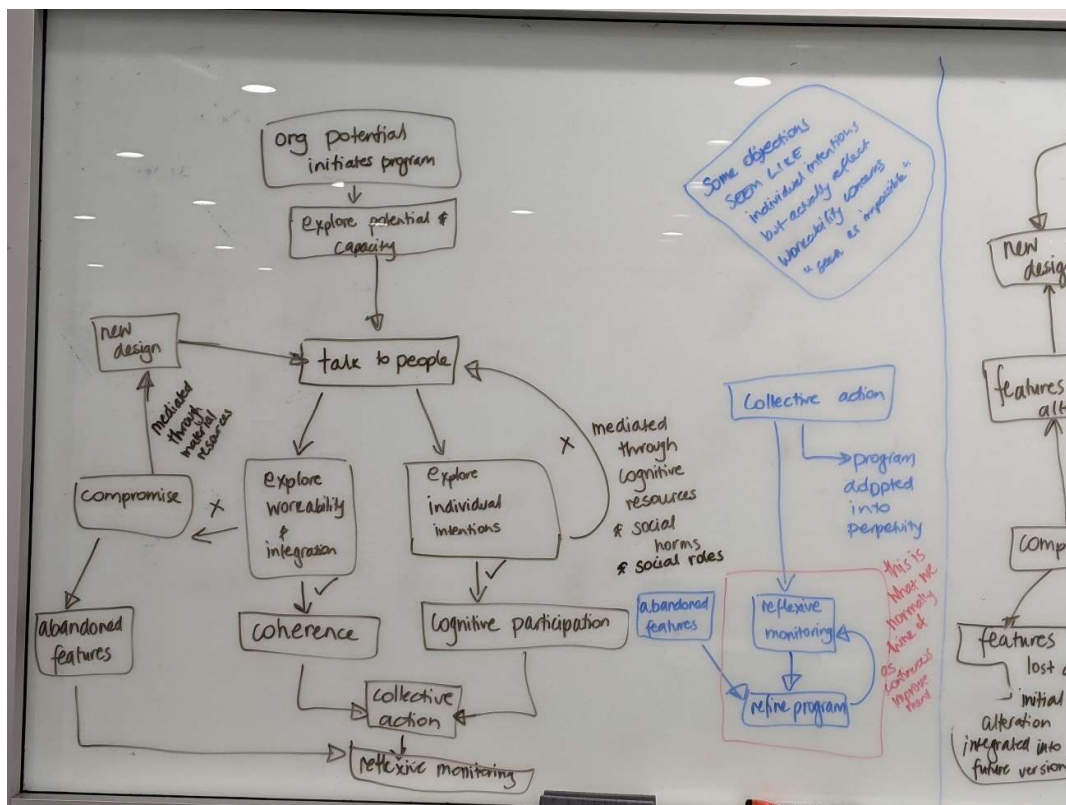


Figure 11: Third version of the process diagram

The process diagram evolved again as writing continued, and the fourth and final version of the process diagram is presented in the next chapter: Findings.

Chapter conclusion

This chapter presented detail on the methodology and methods adopted for this study. The chapter started by providing context for the pilot, before moving on to present the research question, my positionality, epistemology, and approach to the study. The research design was then described, including practical considerations such as recruitment and interview strategies along with navigating participant anonymity. The chapter then moved on to describe the process of data analysis and writing, and how the need for additional theoretical perspectives arose out of reflexive writing practices. The process of theory building is then described, including the decision to draw on two separate theories simultaneously and how the epistemological implications of that decision were navigated. The chapter finished by introducing May's (2013) general theory of implementation, including descriptions of the various components of implementation, and how they related to the data in this study. The following chapter

presents the findings of the study, to explore the first research question: *How is a gender equity measure implemented in a STEM organisation?*

Chapter 4: Findings

This chapter presents the study findings to explore the first research question; *How is a gender equity measure implemented in a STEM organisation?* Then, the following Chapter 5: Discussion, critically analyses the findings in relation to existing contributions in the gender equity field to develop theoretical insights that address the second research question; *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?* To start, this findings chapter presents a rich description of the implementation process as depicted by the participants in their interviews, which shows the complexity of implementation and which components were important. Then, May's (2013) theory of implementation as a social process is used to show how components of the implementation interact and mediate each other.

Rich description of the implementation

This section is structured roughly chronologically and shows the complex, iterative, and circular nature of the implementation process. Recalling Chapter 3, the participants were interviewed as representatives of their respective organisations, and the data presented in this section should be contextualised as such.

Impetus for the program

The four organisations involved in the pilot were recruited to participate by Professor Harvey-Smith in her role as Ambassador for Women in STEM. However, each organisation's participation was not due to that request alone; the collective commitment of the science community to anonymisation also exerted pressure. Peer organisations adopting anonymisation practices was one such source of pressure according to Participant (#1):

The fact that NASA is doing this, and the European Southern Observatory is doing this, and MeerKat's doing this meant that really wasn't tenable to say, 'oh no, we don't think there's a problem here'

Organisational reputation was also "something driving our decision to participate" (Participant #2). Participants expressed that anonymisation was considered "mainstream" (Participant #4) within the science community, and there was a "critical mass around the world" (Participant #1) of community members being "very strongly in favour of complete anonymity" (Participant #1). Some community members "declined to

continue as a reader (in the TAC)” (Participant #1) because the anonymisation process did not, in their opinion, go far enough. Participant #1 said “There is some very strong feeling out there about this”. The strong feelings, particularly from the community, point towards some of the social pressures that influence implementation.

Stakeholder consultation

In their role managing the rollout of the pilot, it was the responsibility of the participants to recruit stakeholders from within their organisations such as upper management, the TAC members, the application reviewers, the application portal experts, and even the applicants themselves. The participants commenced recruitment by having “lots of meetings” (Participant #3) with the stakeholders about the proposed program and the changes that it would entail. These conversations explored the stakeholder’s attitudes towards the program, as well as dimensions of the capacity of the organisation to undertake the proposed changes.

The meetings “took a lot of time” (Participant #2) and were “ongoing through the process” (Participant #3). Excellent communication skills, along with patience and persistence, were vital for the participants. Repetition of the message was important, as Participant (#3) said; “No matter how many times I had that conversation, it was never enough”. Similarly, using different approaches for different stakeholders was a technique used by all participants, including one-on-one conversations with applicants (Participant #2), reframing the potential benefits of the program for applicants (Participant #3), and crafting different messages for different audiences (Participant #3) as some of the approaches described. The time and resources spent on convincing stakeholders of the program merits indicates the importance of group cohesion and cooperation during implementation.

Collecting feedback

Throughout these conversations stakeholders expressed their opinions, both positive and negative, towards the program itself, the implementation plan, or operations. Concerns that participants described stakeholders bringing to these initial meetings can be characterised into two types. The first was based around intentions of individuals towards the program, including resistance to the underlying values of the program, questioning the need for the program, or critiquing the theory of change. The second was based on

concerns about workability and integration, or the logistics of the program and how it applied to the organisation.

Participants themselves were “really enthusiastic about the concept” (Participant #2). One participant thought the existing system placed too much emphasis on whether the research team could complete the work and thought application ratings should be “just about science, it’s just the quality of the projects” (Participant #4). Another felt that the anonymous review system was “safer, more fair” (Participant #4) for applicants, and that “anonymising proposals, if that can address unconscious bias, then it’s a good thing” (Participant #1).

Some participants understood from personal experience how members of the TAC knowing the individual applicants could influence the rating of the application, usually to the benefit of applicants (Participant #3). Participant #1 explained:

...occasionally someone will say, ‘oh, yeah you know this person they’ve been off sick or ill family member or something, there are reasons why they might not have provided their full attention...But you know, they’re a good team, they know what they’re doing’

However, there was a downside to this personal knowledge that, according to Participant #3, may not favour applicants:

...in a public setting, I feel like the identifiable nature of the system could be used to the benefit of applicants. I also thought that in an individual review when you’re sitting on your own, there’s a chance that the bias could go the other way

Participants reported that some TAC members were resistant to the program and argued against participating. Some questioned whether the anonymisation efforts were “worth it” (Participant #4) because they “would be surprised if there’s any gender bias in the proposal review” (Participant #1) or their “baseline data didn’t indicate a bias against female applicants” (Participant #2). Others described the program as “nice to have” (Participant #2) but argued that the program was not required because it was “rare” (Participant #2) that a proposal was rejected, or that applicants from other demographics,

such as “those who don't have English as a first language” (Participant #1) were more needful of an intervention.

One common concern was that anonymisation would disadvantage researchers, particularly “the established users with good reputations” (Participant #1). Participant #3 explained:

A lot of it (resistance to the program) was around the fact that these established researchers have built their careers and they've worked really hard on their metrics

Similarly, participants reported that some applicants were sceptical that anonymisation could be achieved in such a small community as “a lot of people know each other, and we pretty much know what people are doing” (Participant #4). Participant #3 expanded:

If you're getting assigned to reviewers from your field, applicants thought ‘The reviewers are going to know who I am, immediately, from what I write’. I think the resistance was ‘Why do it if they will still know who I am?’

When asked about what tools were helpful for changing people’s minds about the program, participants reported that using examples of the program’s success at other organisations was most effective. In Participant #3’s experience “The Hubble telescope study was one that I used a lot. And a lot of their documentation was super useful”. Unfortunately, many stakeholders wanted to see how the program worked in the Australian context, and “the fact that there wasn't any Australian precedent made it very difficult” (Participant #3).

Personal experience with the process also acted to alleviate some concerns. After participating in one round of anonymised applications approvals, Participant #4 felt more confident about the program, stating “I think...it's very difficult for (the TAC) to actually guess who is behind each of the proposals”. Some stakeholders, though, could not be convinced and remained opposed to the program. As Participant #3 explained: “The people who were resistant kind of remained resistant, but people who were maybe a bit ambivalent about the change by the end of it seemed okay with it”.

Participants reported that receiving feedback on the design of the program and “being critical about the process” (Participant #3) was beneficial, as the questions raised by stakeholders were “difficult to answer but worth answering internally (for the organisation)” (Participant #3). These questions helped find “balance” (Participant #1) with a program that worked at a minimum level for all stakeholders. Some participants thought that discussing exactly what would be involved and “scoping about the practicalities” (Participant #2) was better placed before the organisation agreed to participate, but this was a minority view.

Finding a workable design

Even those stakeholders who agreed with the principles behind the program, including participants, had concerns about how the program would work in practice. As participants worked with stakeholders, the program design shifted from what was originally proposed to one that was agreeable and workable in context. There were three main concerns about the workability of the program as it was initially designed; the ability of the TAC to determine the capability of the research team, the transparency of the TAC members identities, and whether proposals that did not meet the anonymisation standards would be rejected. The details of these concerns are outlined below.

Initially the program was designed so that applications would not include any information about the applicant team. However, participants reported the TAC reviewers felt information such as publication records or previous successful grants that happened to identify the applicants was “important to know whether this particular group has the background and skill to perform the experiment” (Participant #2). Without that information the TAC was concerned they could not provide accurate proposal ratings and “they (the TAC) wanted to trust in their review. And for them to be able to trust in their review, they felt they had to have all the information available to them” (Participant #3).

The TAC felt that a less accurate review may lead to the instrument time being assigned to teams who could not complete the proposed work and thus the instrument not being fully utilised. As a member of the TAC explained to Participant #1:

we (the TAC) want to know who the proposal team is to know if they are competent users of the (instrument), we want to maximize the

science from the (instrument). We want to make sure the teams we are giving time to are going to make full use of it

All the organisations addressed this concern in the same way - by introducing some form of two-stage review process where “if the (TAC member) wants to see the proposal team, after they've decided on the grade, they can have a look” (Participant #1). Some organisations included safeguards on accessing the identifiable information in the next stage, such as to “say whether they (the TAC member) found what they were looking for” (Participant #3) or being “required to put in a reason why” (Participant #3) the TAC member requested access or changed a rating based on the identifiable information. Forcing TAC members to state a reason for additional information was an explicit attempt to challenge bias by prompting the TAC members to “think about what next level of information they're looking for” (Participant #3).

Similarly, the program was initially designed to be double-blind so that neither applicant nor TAC members on the review panel would be named. Participants reported TAC members resisted being anonymous themselves, citing the need for “transparency” (Participant #4) that was only possible if the TAC was publicly named. However, this resistance could also reflect the TAC member’s desire for their position on the TAC, and therefore their status and power, to be recognised. Some TAC members were also concerned that being anonymous would undermine the willingness of applicants to take on feedback. Participant #1 stated “these are experts we have on our committee, so you know if they say your proposal could be written better, well maybe you should take that on board”. This concern was addressed in the same way by all organisations, namely, the initial design of being double-blind was abandoned in favour of the TAC membership remaining publicly available.

Management of applications that did not meet the anonymisation standards was the final source of stakeholder concern regarding the program design. The initial design called for applications that were “non-compliant (to) be excluded from consideration” (Participant #2), a measure which had the benefit of maximising compliance with the program, as “you only need to do that once for teams to sit up and take notice” (Participant #1). However, this approach was rejected by the organisations as too “hardcore” (Participant #1), or because they could not “unilaterally decide to exclude people on the basis of a voluntary (program)” (Participant #2). At the time of writing none of the organisations

“reject proposals which may be straying from the guidelines” (Participant #4). The tolerance for non-compliant proposals demonstrates a resistance to fully commit to the program. For some organisations that liberal approach may change in future though, as Participant #1 explained:

We might have to (reject non-compliant proposals) if the results of this study come back saying, gee the TAC has a real problem with unconscious bias and you need to improve things, then we might need to go that far

Operationalisation

As the design was solidified, the work moved towards operationalisation, updating the application portal, training applicants, and training staff including the TAC members.

Prior to the pilot, applications through the portal were tied to a name, usually of the Chief Investigator for the project. Simply removing a name from an application was not possible, rather it required “retrofitting the anonymity into an existing system” (Participant #1), which was a large and complicated task that required specialised programming expertise. Participants universally listed IT staff as crucial to the operationalisation efforts, with Participant #2 expressing they “would be sunk without them”. Retrofitting anonymity also required constant liaison, which Participant #3 recommended happen “earlier on, and to make sure that they [meetings] happen at a regular interval, as you're moving through [the implementation]”. However, at several organisations, other projects, and not the anonymisation project, was the “focus of their attentions” (Participant #1).

While the need for specialised IT services was anticipated by all participants, the extent to which the project hinged on IT personnel was unexpected by all four participants. The importance of IT staff was highlighted by the difficulties experienced when they were absent, which occurred when several organisations lost key IT staff in the first stages of the program. For one facility, this loss made it impossible to implement the pilot and they had to pull out, with Participant #2 saying:

They (facility) had to withdraw from the trial because they lost their IT expertise and support necessary to put in the portal changes for them in the time frame required to meet project milestones

For another facility, the lack of sufficiently experienced IT staff was actively holding up more advanced versions of the pilot, according to Participant #1:

So, I think it's quite within the realms of possibility that we might go to a more anonymized system, but we will need our proposal system to catch up with that and make that possible before we look at implementing it so it's probably a couple of years

During the stakeholder consultation, participants found that applicants had varying levels of familiarity with submitting anonymised applications. Participant #4 felt that anonymous applications were becoming “more common” and thought that “people are actually quite aware how to write those sorts of proposals”. However, Participant #3 found that “when we asked [applicants] what the hardest thing about the [application] round was, they just said, ‘the anonymization’”. Hence, applicants required training in both the new portal system and in writing the application to obscure the identities of the applicants. Training resources included “user guides” (Participant #2) and FAQs, which Participant #3 found “invaluable”. Participants also ran information sessions “all through the proposal application period” (Participant #2) for applicants to “drop in, ask questions about their proposal or about the study” (Participant #2). Similarly, participants ran “one-on-one consultations with leaders of groups who were particularly worried about how to anonymize” (Participant #3). Finally, some participants provided pre-submission compliance checks, which Participant #3 explained allowed:

any applicant to submit any version of their draft to us to be reviewed for anonymization. We provided feedback on what they'd done well, the bits that they still needed to work on

Further, facility staff themselves required training in the updated application portal. FAQs “really help[ed] as a reference guide” (Participant #3) for those staff responsible for curating and distributing the applications to the TAC reviewers. Similarly, organisations “develop[ed] guidelines for the technical reviewers” (Participant #2) on how to access the new system, and how to conduct the two-tiered assessment process.

Continuous improvement

The participants were all committed to continuous improvement, as “it’s always good to sort of have a stocktake and say, well you know, what can we do better, and how can we do things better?” (Participant #1). Participants intended to use this reflection to make tweaks and changes to future rounds, as “in hindsight you think you can do things faster and easier” (Participant #4). Some participants realised they could use this cycle of continuous improvement to re-add some features they had taken out as a compromise on the first round of the program “with the idea that maybe after a few iterations of this two-stage, maybe we could move towards that final model later on” (Participant #3). This helped them feel more confident in making those compromises in the first place.

As part of continuous improvement, participants sought feedback from the TAC members on what they thought worked well, what needed improvement, and what their overall impressions of the pilot were. Despite the strong resistance during the scoping of the pilot, the feedback indicated that the TAC did not access or use any information that identified the applicant. As Participant #3 explained:

What we actually found, ...the percentage of reviewers that actually went through to the second stage was really low, and even the number of applications that had anyone go through to a second stage was really low

That “they (the TAC) didn't need to review it and they didn't feel like they need to do it” (Participant #4) was “really surprising” (Participant #3) to the participants. However, according to Participant #3, this was not surprising to the TAC:

I think the [TAC] weren't actually that surprised that the numbers were that low. But that's because they were the reviewers who opted not to go to the second stage. They had gone through the process and seen that they didn't need to go through to the second stage most of the time or had made that choice

Embedding the pilot into permanent practice

Participants reported variation in intentions to continue the program following the conclusion of the pilot. All participants eagerly awaited the outcomes of the pilot,

especially the “quantitative outcome” (Participant #4) and indicated they would “make our responses informed by what the (pilot) shows” (Participant #2) to determine if the program became embedded practice. The intention to change and alter the program in the future demonstrates the complexity of implementation.

At the same time, and in contrast to the desire for quantitative results, participants also said the pilot results were not the only factor influencing whether they kept the program after the pilot finished. Some participants said it would be “simpler” (Participant #3) to continue with the program rather than “make too many big changes and switch back” (Participant #3). Participant #4 said:

We sort of went through all these obstacles and now we've got this process implemented, I don't think changing it back to the old one is actually worthwhile

Similarly, there was no “going back to the way things were” (Participant #1) regardless of the outcomes of the pilot as “community sentiment has moved on” (Participant #1). However, other participants were uncertain which metrics would be used to inform the decision to continue the program, as their organisations had not “had those conversations yet” (Participant #2).

Implementation as a social process

Drawing on May’s (2013) theory of implementation, introduced in Chapter 3, the following section renders visible the social process of implementation by showing how the individual components of May’s (2013) theory are visible in the study data, along with how those components work together and mediate each other. As process implementation is fundamentally a social exercise (May 2013), these components rely on and reinforce each other in ways that are dependent on the organisational context. For example, stakeholder’s opinions, or individual intentions, towards the program do not exist in a vacuum. Rather, individual intentions are informed and mediated by a myriad of considerations such as social norms, social roles, time and money, and peer opinions. Using May’s (2013) theory to abstract the data into components helps identify elements that are important. The following Chapter 5 discusses how these elements contribute to (re)producing a gendered STEM organisations and a workplace culture hostile to women and non-binary people.

To complement and enhance the written description, Figure 12 is a diagrammatic representation of the components described. It provides a summary of the main components of implementation and visualises where in the process the components interact. While diagrams are necessarily simplifications of complex phenomena, this diagram endeavours to strike a balance between detail and abstraction to avoid perpetuating the oversimplification criticised by van den Brink (2020) and others. The diagram is included to assist the reader, as it did me, in building a mental picture of implementation as a complex and dynamic process.

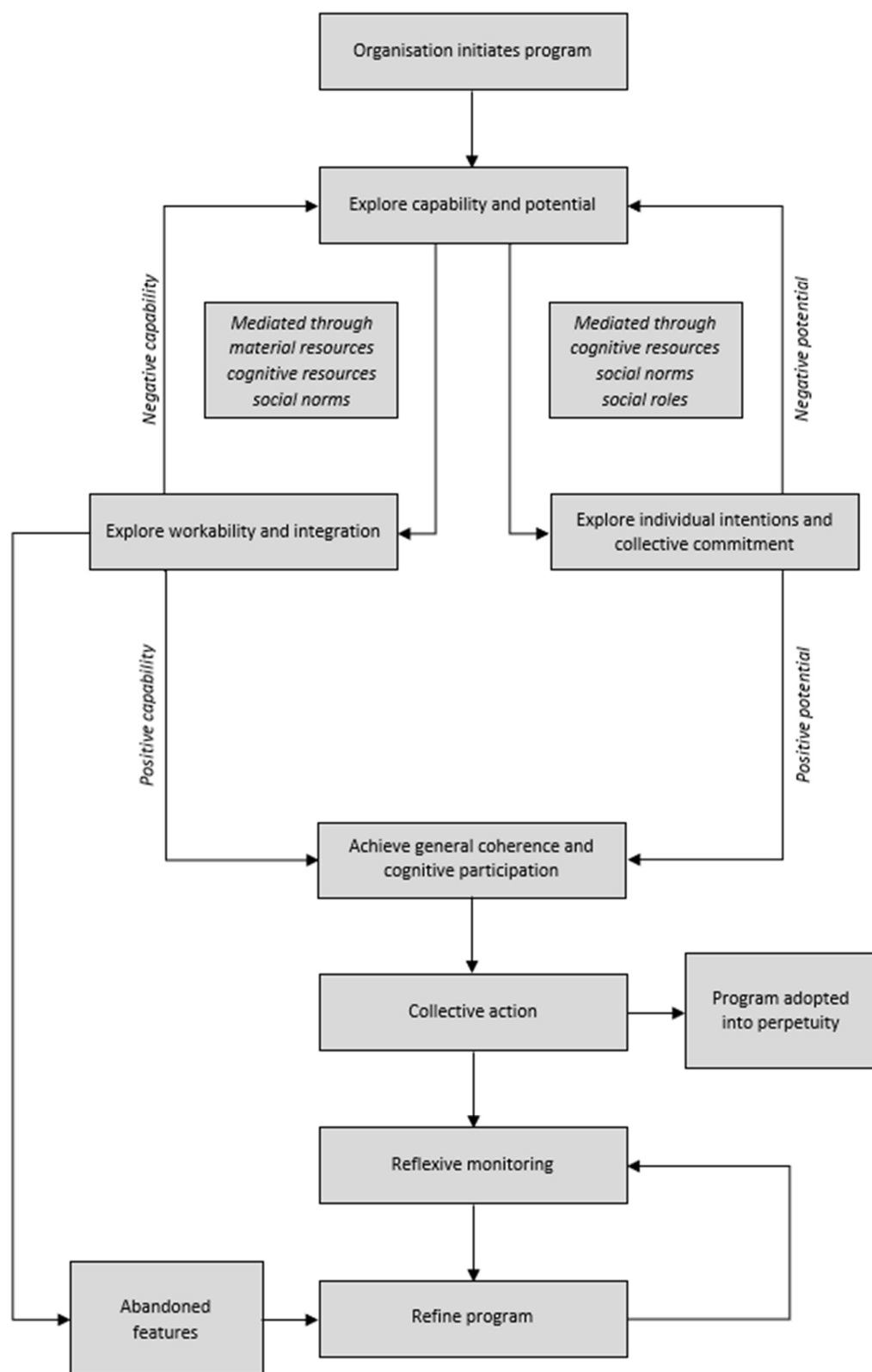


Figure 12: Implementation process diagram

The individual components (grey boxes) of the process diagram are explored in the paragraphs below.

Organisation initiates program

The program was initiated within each of the organisations through the recruitment of their senior managers by Professor Lisa Harvey-Smith in her role as Ambassador for Women in STEM. As well as being the Ambassador, Professor Harvey-Smith is a member of the science community and a former TAC member for one of the organisations, all of which made her well placed to recruit organisations to the pilot. Professor Harvey-Smith was able to approach and convince stakeholders due to holding a singular and special social role as the Ambassador for Women in STEM that grants her social capital to recruit other's cognitive participation in the program. The impetus for initiating the program was also influenced by community sentiment, which strongly favoured anonymisation as action towards gender equality in STEM organisations.

Potential and capacity

Following program initiation, the senior managers allocated staffing resources (the participants) to manage the rollout of the program. Participants recollected that at this initial stage the potential and capacity for the program to be adopted was broadly likely, but by no means guaranteed. This was gauged by participants undertaking stakeholder consultation in the form of meetings and presentations to the TAC, listening to the applicants, and social media feeds on the topic. The participants faced two distinct types of resistance to the program during stakeholder consultation: philosophical opposition and concerns about workability. The process flow chart reflects this by having two distinct pathways to explore potential and capacity that must be navigated simultaneously: individual and collective intentions, and workability and integration.

Individual and collective intentions

Initially, many members of the TAC were hesitant towards the program, expressing philosophical objections, or negative intentions, towards the program. Some of these objections were rooted in social norms. For example, time on the instruments go to 'worthy' applicants, existing metrics were the best way to gauge the worthiness of the applicants, or already successful scientists should have priority access to the instruments.

Members of the TAC were recognised by participants as crucial to the success of the program due to the social role they held, alongside the social norms that surround peer review and expert panels. Participants expended significant cognitive resources in consulting with and convincing those opposed to the program to come on board. Participants enlisted their cognitive and material resources, in the form of knowledge and skills, along with examples of previous successful programs provided by WISA, to educate and win over those individuals. Similarly, the participants were listened to and respected, in part because of the social role they held in being responsible for implementation. In this way, cognitive and material resources, social roles, and social norms all mediated individual intentions.

Participants engaged in cycles of consultation and convincing, sometimes having several conversations with the same person over the course of months that continued until the stakeholder has positive individual intentions. Cycles of consultation illustrates the complexity of the implementation and is reflected in the feedback loop in this portion of the process diagram. The dynamic nature of the ‘potential’ component was visible in the shifting intentions of individuals towards the program as they gained more information, eventually becoming convinced of the merits of the program due to the transfer of cognitive resources from the participants to the stakeholders. However, the effort required to shift the intentions of individuals significantly varied person-by-person, with some individuals, particularly TAC members, unable to be convinced regardless of the effort expended.

Alongside the invitation from Professor Harvey-Smith, community sentiment, or collective commitment, created a social norm that was strongly in favour of anonymisation in general. Participants felt this social norm as a pressure to participate. In this way, much like individual intentions, social norms mediated collective intentions.

Workability and integration

The capability of the organisations to undertake the implementation varied greatly, based on the needs and expectations of each organisation. Many of the concerns raised by stakeholders related to how anonymisation would fit with the requirements of the organisation, in other words concerns related to workability or integration.

One clear concern related to workability was the availability of specialised IT professionals to make changes to the application portal. The required changes necessitated specialist IT skills that only certain staff had, and these staff were often diverted to other projects, indicating the pilot was not always a priority for the organisation. In response, participants actively altered the scope of the program to align the workload with the resources available, rather than the organisation resourcing the workload that was required, showing how material and cognitive resources mediated workability and integration.

Some applicants were concerned that anonymisation was impossible in such a small community because everyone would recognise the author from their application. In imagining how the application would be received by the TAC, the applicant was engaging in an assessment of the workability of the program. As the applicant then integrated the context of a small community where everyone knows everyone else, they became concerned about whether anonymity could be achieved and thus how the program would operate in practice.

As stakeholders explored workability and integration the design of the program was adapted to suit the organisational context. Features of the program were modified, such as whether the TAC were named or anonymous, which in turn changed the outcomes that could be expected. One participant was aware that these changes would affect the potential outcomes and that the measures of success should be adjusted accordingly, however it is unclear whether other participants made the same assessment. Some participants recognised these adjustments were in fact compromises and would reduce the efficacy of the program. Those participants hoped they could integrate those features back into the program during later rounds once stakeholders had some personal experience with the program. While this intention is reflected in the process flow chart, it is not clear from the data whether the future adoption of these 'abandoned' features does occur, which could be one reason programs fail to be effective.

Coherence, cognitive participation, and collective action

Each stakeholder needed to be convinced of the merits of the program before they could engage positive cognitive participation and sign on for collective action. Collective action commenced at different stages for different stakeholders, depending on their social and organisational role. For example, the participants engaged in collective action very early

in the timeline, as they went about recruiting others to the program. Members of the TAC, however, engaged in their collective action later in the timeline as they conducted the application assessments. While members of the TAC performed their actions later in the timeline, their general agreement and willingness were required early in the process for operationalisation to go ahead. The step of ‘attaining positive coherence and cognitive participation’ has been specifically included in the process diagram before collective action takes place to capture that requirement.

Reflexive monitoring

Reflexive monitoring was somewhat present in the accounts provided by the participants, but not to the same extent as other components. All participants expressed that the decision to retain the program past the pilot phase was dependent on numerous considerations. The outcome of the pilot was one consideration, but it was not the only, nor the most influential. Rather, participants were most influenced by the expectations from the community that anonymisation become part of business-as-usual, to the extent that several felt that rolling back the program would jeopardise their community goodwill, regardless of the outcomes of the pilot. The study data suggests the program would be adopted into perpetuity and be resistant to the findings of any kind of monitoring, which is reflected on the process diagram by a pathway to adoption that originates at collective action and does not interact with reflexive monitoring.

Participants expressed an intention to conduct continuous improvement, through stakeholder questionnaires, to direct program improvements in future rounds. However, dedication to the outcomes of the pilot was variable. This monitoring and feedback loop is reflected on the process diagram, but the extent to which the loop happens and continues to happen is unclear.

Chapter conclusion

This chapter presented the study findings to explore the first part of the research question: *How is a gender equity measure implemented in a STEM organisation?* The first half of the chapter described the implementation process as depicted by the participants in their interviews. This description showed *how* the pilot was implemented: a complex, messy and organic network of consultation, convincing, compromise, and continuous improvement. Through showing the *how* of implementation, the description also showed a cyclical nature: conversations occurring again and again, the intention of continuous

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improvement, the negotiation and compromise that sometimes moves the project forward and sometimes sets it back. Finally, the description showed that detail is important in understanding implementation, as only then are the politics, power relations, and social processes, so crucial to program success, visualised. The second half of the chapter used May's (2013) theory of implementation as a social process to show, aided by a process diagram, how components of the implementation interact and mediate each other. For example, how social norms mediate individual's intentions towards the program, and then how individual intentions influence workability, which in turn leads to compromise in the study design. The following chapter examines the second research question: *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?* That chapter draws on Acker (1990) to critically analyse how the program design and implementation are both symbolic and gendered, and how this contributes to the toxic culture in STEM workplaces that women cite as their primary reason for leaving.

Chapter 5: Discussion and conclusion

Recall the previous chapter explored the first research question: *How is a gender equity measure implemented in a STEM organisation?* This chapter critically analyses the findings in relation to existing contributions in the gender equity field to develop theoretical insights that address the second research question; *Why is understanding the complexity of implementation important in explaining the underperformance of gender equity measures?* The chapter starts with an exploration of the importance of describing and engaging with the complex nature of program implementation. Then, the chapter moves to the gendered nature of both the measure and the program implementation, noting how the program may be simultaneously undermining and reinforcing gender norms. Penultimately, the chapter explores shifting perspective from sustainability to effectiveness, before presenting suggestions on improving future versions of the program to move towards cultural change. The chapter finishes with a discussion of my theoretical contribution to gender equity literature along with a conclusion and recommendations for future research.

Symbolic gestures and cultural change

Throughout the data analysis and writing stages of the study, it became increasingly clear that the gender equity program was, at least in part, a symbolic gesture rather than a meaningful engagement with changing workplace culture towards greater gender equity. Gestures must point towards something, in this case that gender equity is not a high priority in the organisation. I agree with Swidler (1986 p 273), that culture consists of “symbolic vehicles”, among other things, and these symbols are integral to the social process of sharing acceptable behaviours and attitudes within a community. Thus, a STEM organisation gesturing that gender equity is not a high priority telegraphs to members of the STEM community that gender equity need not be a high priority for them, either. Organisations tell each other they do not have responsibility for disrupting the status quo, and therefore the disruption never occurs. The consistent deprioritisation of gender equity contributes to ‘the culture’ in STEM organisations that women cite as primary reasons for leaving their STEM professions (Orser, Riding & Stanley 2012; Miner et al. 2019; Adams 2017). By perpetuating a program as a symbolic gesture, organisations are falling short in two ways. Firstly, they are directly contributing to the culture in STEM that devalues women’s careers and fulfilment. Secondly, they are not

engaging in the cultural change required to retain mid-career women and thus affect lasting gender equity in STEM (Ely & Meyerson 2010; Lansu, Bleijenbergh & Benschop 2019). While no one aspect of the program or implementation indicates the program is deliberately symbolic, taken together the findings suggest the program may be a symbolic gesture for the organisations participating in the pilot, perhaps more symbolic than the organisations' management realise.

Symbolism regarding gender equity is not, in my opinion, deliberate or malicious. Indeed, everyone that I met as part of this study were dedicated and enthusiastic champions of gender equity who were willing to go above and beyond to see equity happen. Rather, I argue that the symbolic nature of the program has arisen because the gendered nature of both the organisations and the program has been obscured. Only by rendering visible how the gendered organisation is perpetuated is it possible to design programs and implementations that actively work to dismantle the status quo.

The importance of depicting the complex nature of implementation

Recalling Chapter 2, previous studies conceptualised implementation as a simple linear process, without feedback loops or incremental progress, and largely devoid of contextual considerations (Benschop et al. 2012; van den Brink 2020). However, by conceptualising implementation as a social process I argue that implementation of a gender equity measure in a STEM organisation is complex, inherently cyclical, repetitive, and incremental.

A comparison between simplified and complex situated approaches shows the importance of a detailed and nuanced conceptualisation of implementation. This comparison is visualised in the process diagram below (Figure 13), which builds on Figure 12 from Chapter 3. The dark grey boxes and thick black connection lines represent the linear path that is most often represented by existing literature on implementation. The light grey boxes and connection lines represent the components rendered visible by utilising May's (2013) theory of implementation, introduced in Chapter 3. The components of the process that are missing from current descriptions in the literature are the messy in-between stages, such as the exploration of individual intentions, that are the sites of important work that have material impacts on the outcomes of the program.

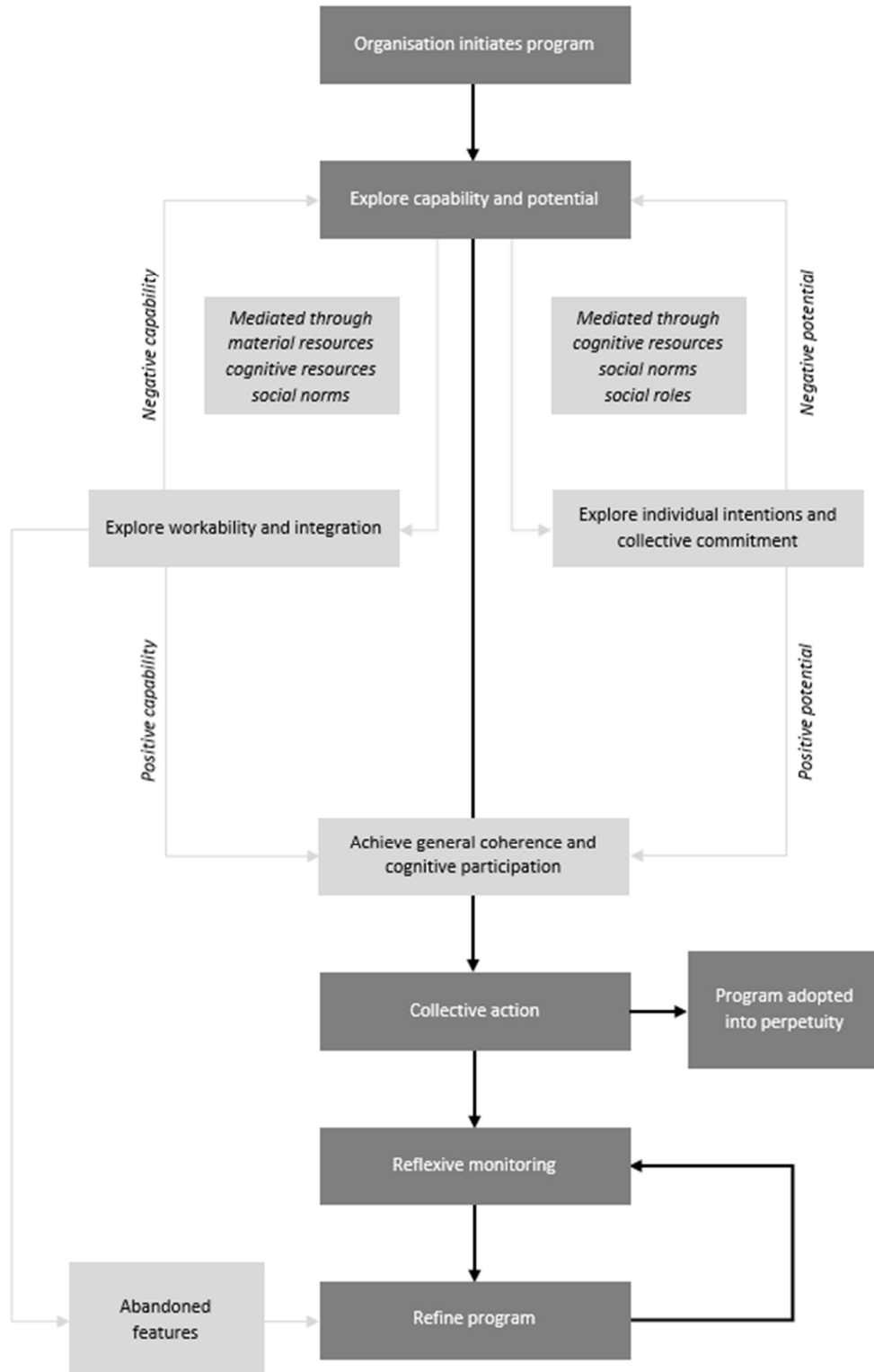


Figure 13: Implementation process diagram comparing simplified linear (dark) and complex (light) implementations

How the measure design is gendered

Gender equity programs, including the pilot, are ultimately aiming to reduce the gender inequity present in the organisation. However, it is difficult to achieve this goal when the implementation is occurring within a gendered organisation, as the institution itself is fighting against the theory of change the measure is predicated upon. The task is made doubly difficult if the programs are, at least in part, symbolic gestures. Thus, understanding exactly how gendered ideas within the organisation manifest within the measure design and program implementation process can assist in resisting the pull back to the status quo, provide specific areas for awareness building, and push back against symbolic gestures.

Acker (1990 p 149) refers to “disembodiment” – the act of removing the body from view – as one way that organisations pretend to reach equality. Rather than organisations being accepting of bodily difference and allowing different forms of being and doing to be legitimated within the organisation, the body is detached, excised, to remove the sticking point and render all bodies fictitiously the same (Acker 1990). This disembodiment serves to reinforce the gendered organisation, as it re-legitimises the status quo as the ‘right’ way of being and doing. The anonymising gender equity measure can be conceptualised as one such disembodiment. It is literally excising identity from an individual, removing anything that could suggest a body, or an existence, outside of the masculine standards that science has established for the ideal researcher. In fact, anonymisation may actively prevent alternatives to conventionally masculine ways of working, such as compassion and tolerance. Participants described how when the applicants name was known, the TAC sometimes considered extenuating circumstances when assessing applications, such as illness or career breaks. Under the anonymised application system this informal way of working will no longer be possible, and the program does not offer an alternative mechanism to account for those circumstances. Therefore, anonymisation could act to reinforce masculinised ways of working and the gendered nature of the organisation that it is seeking to overcome.

Similarly, while this program is a ‘gender equity’ program, the term ‘gender’ appears limited to the binary of men and women. All the participants referred only to men and women in their interviews, with non-binary folk left out of the conversation (Yoder & Mattheis 2016; Australian Bureau of Statistics 2021; Office of the Chief Scientist 2020).

A delimiting view of gender is not unusual; as mentioned in Chapter 2 non-binary people are not counted in the census or employment statistics and therefore, don't count (Rasmussen et al. 2019). However, it is important for the term 'gender' to move beyond a binary for several reasons. Firstly, for true gender equity to be achieved non-binary folk need to be accounted for in evaluations and metrics (Rasmussen et al. 2019). Secondly, non-binary folk experience workplaces in fundamentally different ways from men and women (Bennett 2018; Cech & Pham 2017; Yoder & Mattheis 2016), which can be a source of inspiration for what a STEM organisation with inclusive gender equity looks like. Each new program is an opportunity to change the social norms around who is included in 'gender', to truly dismantle gendered narratives.

How the program implementation is gendered

One of the most common concerns raised by stakeholders was that the anonymisation of grant applications would disadvantage established researchers by devaluing the existing metrics system. The existing metrics are acknowledged as highly gendered, rewarding the ideal STEM worker, and failing to provide ways to adjust for gendered behaviours such as career breaks or part time work. Thus, refusing to relinquish these metrics is a refusal to relinquish the uneven rewards granted by an unequal gendered system. Similarly, complaints that the anonymisation project was 'too hard' or 'not worth it' demonstrate that equity across the gender spectrum is not a high priority for many stakeholders, including those holding leadership positions with influence over the community standards. These attitudes devalue the lived experience of women and demonstrate what Ely and Meyerson (2000) described as a lack of genuine effort to dismantle gendered narratives, further contributing to a workplace culture toxic to women.

Some stakeholders questioned the need for the program, arguing how women were not the most disadvantaged cohort of applicants compared to other cohorts such as those with English as an additional language. These complaints are an astute observation that merit further contemplation, particularly when addressed in an intersectional manner. However, when asked to elaborate, the participants concern for other cohorts was not matched by dedication of resources or assistance, indicating that this concern may be a strawman argument rather than a genuine interest in equitable allocation of resources. In short, making progress towards gender equity was only permissible to some if the program was

symbolic. That is, if the program did not disrupt the status quo, did not extract a cost in time or resources, or did not require personal sacrifices such as relinquishing some rewards granted by a biased system.

The willingness of stakeholders to critique or oppose the program is further evidence of the gendered nature of the program and the implementation (Bustelo, Ferguson & Forest 2019). In general, individual intentions towards the program shifted towards positivity as stakeholders gained more information. However, some individuals, particularly TAC members, were unable to be convinced regardless of the messaging or effort expended. Furthermore, in an example of passive resistance (Williamson 2020; Johnson et al. 2015), some stakeholders described the program as nice-to-have, rather than essential to doing business, indicating they found it acceptable for inequality to persist in their workplace (Bustelo, Ferguson & Forest 2019). I suggest, reminiscent of Williamson's "backlash" (2020 p 5), the gendered nature of the program gave stakeholders social permission to resist in a way that would be unacceptable for programs without a gender focus. Those stakeholders that could not be convinced were not sanctioned in any way, such as being removed from the TAC. Rather, significant resources were expended to try and win them over. Tolerance of this level of questioning and resistance to the program again indicates the symbolic nature of the program; individual enthusiasm could vary, regardless of the consequences, so long as the program was running and visible. Additionally, it is not difficult to imagine how the backlash to the program along with the ongoing tolerance of passively resistant behaviours actively creates a workplace culture that is toxic and hostile to women. Certainly, this has been my experience.

The selective use of evidence is another way the implementation was gendered. The TAC members demanded evidence of the applicant's skills, through metrics, publications, or grant approvals, and were sceptical they could provide a trustworthy review without access to that information. Simultaneously, the organisations were ambivalent about the outcomes of the pilot and were not committed to using the pilot as justification for keeping, ceasing, or modifying the program. This selective commitment to evidence at both the individual and organisation level produces a contradiction, which can be viewed as gendered. The resistance to anonymisation could be viewed as an artefact of the scientific method, reflecting the deep cultural values held by scientific organisations around evidence, proof, and repeatability. However, I argue the organisations

simultaneous ambivalence to the outcomes of the pilot for guiding future action shows that, in the case of gender equity, the call for evidence is a not cultural commitment. Rather, evidence is being used strategically to protect the status quo. Resistance to anonymisation is an example of the daily interactions that (re)produce gender as a system of power within organisations (Acker cited in Utoft 2020), and calls to mind the hostile workplace culture that some scholars identify as the root cause of persistent gender inequity in STEM (Ely & Meyerson 2000; Nash & Nielsen 2020).

Participants felt pressure from the community to be ‘doing something’ towards gender equity. Regardless of the lack of evidence of efficacy (in either direction) of anonymisation, some stakeholders were convinced that anonymisation was the right thing to do, some so much that they refused their roles as reviewers when the program did not anonymise enough for their sensibilities. Given the community sentiment, participants expressed it would be impossible to roll back the program regardless of the outcomes of the pilot. This resistance is further evidence the pilot was, to some degree, a symbolic gesture to the community that they were taking gender equity seriously, rather than an internal effort to combat gender inequity.

Shifting focus from sustainability to effectiveness

One prominent area of academic research is the sustainability of gender equity programs, specifically concerns for the continued operation of those programs. May’s (2013 p 5) theory addresses sustainability by referring to a program being “normalised into practice”; wherein the program becomes the new standard way of doing things. For a program to be normalised into practice, conditions of each of the components of “potential, capacity, capability, and contribution” must be satisfied (May 2013 p 5). This framing emphasises that the sustainability of a program is not dependent on any one thing, rather all components are required to be operating well for the program to become standard practice. If some of the components are under-theorised or under-described, it is difficult to attain a full picture of the implementation and thus to truly understand the influences on sustainability.

In general, the participants did not describe reflexive monitoring as much as they did other components of the implementation. Participants expected the pilot to generate some data they could use to think about whether the program was successful or suitable for their organisation, but no participants had a structured program review process in place.

Surprisingly, participants indicated they would not base their decision on whether to continue with the program solely on the results of the pilot. However, when asked directly, participants were unclear which specific considerations would influence the decision to continue the program besides the pilot outcomes. Some participants expressed a strong desire for quantitative results, but it was unclear what metric, for example number of women applicants or amount of time allocated to women applicants, was to be measured. This lack of clarity suggests that participants did not set criteria at the outset of the pilot, or if they did it was not known or communicated well.

In all cases, the decision to continue with the program following the pilot was not solidly linked to the outcomes of the pilot, presenting a disconnect to reflexive monitoring. Rather, participants referred to collective commitment through community sentiment as being the primary determinant of whether to keep the program, regardless of the pilot outcomes. Participants were aware that the pilot outcomes may be ‘neutral’, that is show no change in women’s time allocation. However, no consideration was given to if the pilot outcomes were ‘negative’, such as if the pilot showed a decrease in women’s time allocation or some other negative effect on women applicants. The ambivalence to the outcomes of the pilot, coupled with community sentiment being a large driver for participation, further indicates the symbolic nature of the program.

Rather than being concerned with sustainability, or that the program would fall away and not be renewed, data in this thesis suggests a different problem – that the program may be adopted into perpetuity without any real regard for its effectiveness, which poses two related risks to gender equity. Firstly, it risks embedding a symbolic gesture as standard practice, thereby endorsing that a program being “just there” (Ahmed 2017 p 95) is sufficient. The implication is that when participation statistics fail to change, and women once again call for action, organisations will point to these programs as evidence they are doing something and reject responsibility for taking further action (Ahmed 2017). If the programs that are implemented are not effective or reflexively monitored to maintain their efficacy, we risk handing organisations a tool to perform lip service into the foreseeable future (Ahmed 2017; McKinnon 2020). Secondly, it risks programs being adopted by other organisations, regardless of their efficacy. As evidenced by WISA’s use of the NASA example, and the participants wanting an Australian example, organisations look towards their peers and adopt or adapt those programs. This approach to program

adoption assumes that programs that are currently running must be effective, and those that have been running for a long time even more so. However, the data from this study suggests that assumption may be false; programs are unlikely to be disestablished regardless of efficacy, and thus the presence or longevity of a program is not a good measure of effectiveness. Indeed, McKinnon (2020) found that most gender equity programs are not evaluated at all, making efficacy impossible to judge. If the programs are not effective and not reflexively monitored to maintain their efficacy, we risk those programs being handed down from one organisation to another and being modified to fit organisational contexts in a chain that slowly erodes the theory of change until it is ineffective. I suggest the uncritical adoption of existing programs coupled with a lack of evaluation is one possible explanation for why gender equity programs are, in general, struggling to produce the expected results.

The erosion of the theory of change occurs primarily through compromise during implementation. Compromise was cited by the participants as a crucial mechanism for enabling the implementation to go ahead. Most of the workability and integration concerns raised by stakeholders were addressed through compromise. For example, the concern that TAC members needed access to potentially identifying information was addressed through a compromised two-stage system. Similarly, the concern that uncompliant proposals would be rejected outright was addressed through a compromise to a more lenient model aimed at upskilling the applicants even after submission. These compromises were described by the participants as a positive thing; each compromise brought the program closer to operationalisation and brought another stakeholder on board. Certainly, without compromise some of the organisations would not have proceeded with the pilot. However, compromise is not a neutral process, and can be a mechanism that erodes previous gains or dilutes progress. Participants wanted to bring the abandoned features into later editions of the program – the compromises were conducted with that intent in mind. Given the organisational ambivalence toward reflexive monitoring, however, it is unclear whether reintegration will ever happen. This is how the erosion occurs; it is not deliberate or intentional, rather it is part of ‘getting it done’. The aim of ‘getting it done’ is one of the problems with symbolic programs – simply having a program is seen as enough, the efficacy of the program can come ‘later’ or is unimportant altogether, and that later never arrives. This critique does not suggest

that compromise is always a bad thing, indeed compromise is crucial to all social endeavours including program implementation. However, the compromises must be measured and considered, with long-term plans for a staged approach that actively captures the features that are compromised away so the reintegration has a chance of occurring.

The findings from this study show that organisations and individuals are willing to put considerable effort into implementing a gender equity program. May's (2013) theory tells us that the sustainability of a program is reliant on several components of implementation, each as important as the other. Broadening our view to a community level, reflexive monitoring and intentionally considered and communicated measures of success are important for programs to remain effective as they are passed from organisation to organisation and modified along the way. Current organisational culture around evidence of efficacy is insufficient. I propose that rather than focus on the sustainability of the programs we should shift our focus to effectiveness, to make sure the programs that are being implemented and passed on are doing the intended work.

Improving future versions of the program

An important component of this research project is to provide WISA with findings to improve future versions of the program, through thinking about the barriers described by the participants and exploring how the program can move beyond symbolic gestures to contribute to cultural change.

It is well understood that individuals can and do resist gender equity programs, in a spectrum from passive gender fatigue to outright backlash (Williamson 2020). Individual intentions that are negative or hostile can present significant challenges to the smooth implementation and success of the program. Indeed, resistance from individuals directly impacted both the design of the pilot and the speed at which it was implemented, with work to convince individuals taking up a large portion of the resources allocated to the project. Significant effort went into preparing for and responding to arguments against participating, including one-on-one conversations, providing easily accessible examples from other facilities, and WISA attending meetings with hesitant individuals. Participants reported feeling broadly confident that they had the skills and resources to undertake these components of implementation. Indeed, the approach seemed to be effective when it came to changing the minds of people who were previously 'on the fence'.

The necessity of dedicating a large time commitment to the implementation strained the workload of the participants, and all participants felt that the program was more work than they had anticipated at the start of the project. However, none of the participating organisations arranged for dedicated resources to implement the pilot, instead participants were required to ‘find time’ to integrate that work into their business-as-usual workload. This lack of dedicated time allocation is further evidence for the pilot being a symbolic gesture; if it were a priority of the organisation, then dedicated resources would have been allocated. While this lack of direct resourcing is a common practice for special projects of all kinds, it demonstrates the limit of organisations’ commitment to the pilot. Resourcing is essential to enact change, and the projects that are resourced act as a “symbolic vehicle” (Swidler 1986 p 273) to signal what is important to management. Thus, I argue that inadequate funding for the administration of gender equity programs directly contributes to the toxic culture women name as a primary reason for leaving their STEM careers (Orser, Riding & Stanley 2012; Miner et al. 2019; Adams 2017).

Related to time and resourcing, the information technology resources required to operationalise the anonymisation was not anticipated but presented a large barrier. Every organisation used an online portal for applicants to upload their applications. These portal systems were linked to a login, usually for the chief investigator. With the introduction of the anonymous system, names were required to be decoupled from the application, which was difficult to achieve from a technical standpoint. Significant amounts of specialised computer programming were required to retool the application portals to be suitable for the anonymisation program. Neither WISA or the participating organisations appeared to anticipate the programming resources required, and all participants nominated “IT” as a resource they would allocate funds to if they were available. Thus, one recommendation of this study is that organisations are informed early of the sometimes-substantial specialty IT expertise required to implement the program.

The realisation that specialised programming resources are a crucial part of program implementation is an important one, as it is largely absent from the current academic literature. There exists an unstated assumption that once stakeholders are ‘convinced’ a program is worthwhile, that it will ‘find a way’. However, this study shows that is not necessarily true; convincing people and getting buy-in is important, but specialised skills are vital to operationalisation, and require material resources to acquire. It may be that by

turning attention to resistant individuals we have lost sight of the fact that material resources are required to implement programs of this kind. In fact, participants found the material barriers more difficult to resolve than resistant individuals. Participants felt that individuals could be convinced with good communication, work, and time. Further, while participants' time was short, they had the commitment and the autonomy to prioritise that work. However, the participants were unable to personally solve the programming barriers, so no heroic efforts on their part could get the work done. Material resources, in the form of money to hire and train specialist programming staff, were required to alleviate the barrier of the application portal. With management commitment largely symbolic, these resources were not available, which dramatically hindered the implementation of the program. In fact, two participants said they adopted a staged approach to operationalisation purely due to the lack of programming resources.

Conversely, all the participants expressed that management was enthusiastic and supportive of the program; one participant was personally thanked for their contribution to the important project. This support suggests that rather than a wilful oversight or lack of substantive commitment by management, the lack of appropriate material resources could be a manifestation of what van den Brink (2020) is referring to when she talks about implementation being simplified to the point of obscurity. Without a detailed understanding of what individuals actually do to operationalise a program, the need for dedicated IT resources has been overlooked. Therefore, another recommendation of this study is to prepare organisations to commence the implementation journey by articulating those financial resources required for their commitment to be more than symbolic.

The grant application anonymisation measure takes the 'add more women' approach, aiming to "level the playing field" (Ely & Meyerson 2000 p 106) by addressing structural issues that make it difficult for women to compete with men in the workplace. Measures of this nature improve working conditions for individual women, yet they do little to address the cultural issues at the root of gender equity in the workplace. While the measure is not specifically designed to bring about cultural change, it can still have a material impact on workplace culture, as this study shows. Thus, the program can also work towards cultural change, as discussed below.

One recommendation from this study is for every organisation involved with this program now and in the future to explicitly include non-binary folks in the program and in their

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daily work towards gender equality. As with all equity work this effort should be informed by non-binary people, such as Rasmussen et al (2019) who produced a whitepaper outlining the current best practice for the inclusion of non-binary people in STEM organisations.

Another recommendation is to carefully consider the role of compromise in the program implementation. As illustrated by this study, compromise can be a powerful tool for bringing stakeholders on board and moving a project forward. However, compromise is not a neutral process and careful consideration should be given to the program features that are being ‘compromised away’. Specifically, organisations should consider whether the discarded features of the program could be returned in future rounds. Indeed, incremental progress can be an important step towards cultural change (de Vries & van den Brink 2016). However, if an incremental approach is adopted it should be planned and resourced appropriately as a staged implementation, to ensure the reintegration occurs and incremental progress is not mistaken for lip service.

A further recommendation is to integrate embodied reflexive monitoring into every component of the implementation. Reflexivity should include preparing information to counter arguments based in backlash, careful consideration of the metrics being monitored, and what ‘success’ looks like for different phases of the program. For monitoring to be effective, organisations need clear and well communicated goals, decision making rules, and measures of success.

Concluding remarks and recommendations for future research

This study has built on current academic gender equity literature by providing new insights into the complexity of implementing a gender equity measure in STEM organisations in Australia. In doing so, the study provides two theoretical contributions to feminist organisational studies through recognising gaps in implementation theory. The first is recognising that a theory of implementation is required within the gender equity literature. The second is taking the first step towards developing that theory by using Acker’s (1990) and May’s (2013) theories together. Finally, the research provides lessons learned from the pilot which can be integrated into future programs. Combined with WISA’s research to enrich and extend the conclusions and advice of the broader program, these lessons may shine a light on the design of gender equity programs targeting long-lasting structural and cultural change in STEM workplaces in Australia.

I encourage others working in gender equity to adopt an interdisciplinary approach; gender inequity is a wicked problem and so requires sophisticated methods. This study presents a first attempt at bringing implementation theory to feminist organisational studies through mobilising Acker's (1990) and May's (2013) theories simultaneously. I encourage other scholars to continue interdisciplinary work by integrating Acker's (1990) theory of gendered organisations with a well-developed theory of implementation, either by May, or someone else. Alternatively, a grounded theory approach could be employed to develop novel theory specifically targeted at the implementation of gender equity programs. Using May's (2013) theory as a lens prompted explicit contemplation of the social norms at play, which facilitated deep thinking and theorising beyond what feminist organisational studies theories had prompted. As a scientist insider, requirements that applicants have sufficient experience, or that time is allocated to 'more worthy' individuals were normalised and thus invisible to me at the start of this study. Only by using May's (2013) theory as a lens and spending time deeply considering these behaviours were these norms rendered visible to me, denaturalised, and thus available for critique. These are the types of norms that must be challenged to 'change the culture'. Using theories such as May's (2013) together with Acker's ideas prompts discussion about deeply embedded social norms which is crucial to the larger goal of 'changing the culture' of STEM to be more gender accepting.

In conclusion, I return to my insider status and reflect on my feelings towards the gender equity measure. As a woman in STEM, I feel a deep sense of dissatisfaction in the current performance of gender equity programs. I am disappointed that this program, which did not ask for much, was, for many, still asking too much. I am disappointed that meagre gains are being made at such a high cost. I am, in short, disappointed that this is the best we can do. I am also, however, left with a fire in my belly, convinced that we cannot give up but neither can we continue to fight only in this way. Rather, I believe we need to fight differently, considering the power structures we fight against. So, I finish by echoing Ahmed's (2017) call to disrupt institutions, for without disruption, gender equity will evade us.

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Appendix A

Ethics approval

Arts Subcommittee
Macquarie University, North Ryde
NSW 2109, Australia



29/03/2021

Dear Dr Mackaway,

Reference No: 52021949626302

Project ID: 9496

Title: When planning meets reality: Examining the implementation of a transformative gender equity program

Thank you for submitting the above application for ethical review. The Arts Subcommittee has considered your application.

I am pleased to advise that ethical approval has been granted for this project to be conducted by Ms Susan Barnes, and other personnel: Professor Alison Pullen, Ms Susan Barnes.

This research meets the requirements set out in the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018).

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the National Statement, available from the following website:
<https://nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018>.
2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol. You will be sent an automatic reminder email one week from the due date to remind you of your reporting responsibilities.
3. All adverse events, including unforeseen events, which might affect the continued ethical acceptability of the project, must be reported to the subcommittee within 72 hours.
4. All proposed changes to the project and associated documents must be submitted to the subcommittee for review and approval before implementation. Changes can be made via the [Human Research Ethics Management System](#).

The HREC Terms of Reference and Standard Operating Procedures are available from the Research Services website:
<https://www.mq.edu.au/research/ethics-integrity-and-policies/ethics/human-ethics>.

It is the responsibility of the Chief Investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the [Faculty Ethics Officer](#).

The Arts Subcommittee wishes you every success in your research.

Yours sincerely,

Dr Mianna Lotz

Chair, Arts Subcommittee

The Faculty Ethics Subcommittees at Macquarie University operate in accordance with the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018), [Section 5.2.22].

Appendix B

Participant information and consent form



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Phone +61 (0)2 9850 8078
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Chief investigator: Dr Jacqueline Mackaway

When planning meets reality: Examining the process of implementing a gender equity measure

Thank you for expressing an interest in being involved in this study examining workplace gender equity. As you are aware, the lack of gender diversity in science and technology is an enduring problem. There are many programs that seek to bring about long-lasting cultural change, but the success of these programs has been sporadic and unpredictable. Previous research suggests the process of implementing a program or measure is a key factor in the sustainability and long-term success of the initiative. However, most current research imagines implementation as a linear and largely invisible process, without engaging with the complex and iterative progress encountered "on the ground". This study is designed to focus on the complex and iterative process of implementing a gender equity measure as it is experienced by those responsible for administering the measure.

This study is examining the anonymisation of research grants currently being piloted by the Ambassador for Women in STEM as a case study. You are being invited to participate in this study based on your participation in that pilot. The study both responds to previous literature and provides a unique Australian perspective into the problem and potentially sustainable ways it can be addressed. Further, the study will contribute to the lessons learned from the pilot which can then be integrated into future programs. The outcomes of this study will also benefit the wider community by enhancing the understanding of how to implement complex and iterative transformational gender equity change measures in STEM organisations.

If you decide to be interviewed you will be invited to participate at a time and place convenient to you, which could involve Skype or Zoom. Approximately 60 minutes of your time will be required. The aim of the interview is to gain an understanding of the process your organisation went through to put the anonymisation of grant applications into action. This includes what went well, what went poorly, if you would do anything differently next time, or have any advice for other organisations instigating a similar measure. The interview will be audio or video recorded. The research findings will be published as part of a Master of Research thesis, and as a component of publications by the Ambassador for Women in STEM. They may also be used as part of a Doctor of Philosophy thesis.

Participation in the study is entirely voluntary: you are not obliged to participate in the interview or provide documents from your organisation. If you decide to participate you can withdraw at any time without having to give a reason and without consequence. If you do choose to withdraw, any information that you have supplied will be securely destroyed or deleted.

Any information or personal details gathered during this study are confidential, and only the lead researcher and their supervisors will have access to the data. However, due to the small size of the pilot program and the public nature of the organisations, anonymity for the participants cannot be guaranteed in this study. You should be aware that individuals, organisations or institutions may be identified in any of the publications of the findings. Therefore, if you choose to be interviewed you will have the opportunity to choose a pseudonym, and to review your transcript and provide corrections or clarifications.

Human Ethics approval has been granted for this study: 52021949626302

This study is being conducted by Susan Barnes from the School of Social Science at Macquarie University as part of their Master of Research degree. If you have any queries Susan can be contacted by email or by phone

I, _____ have read (or, where appropriate, have had read to me) and understand the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this research, knowing that I can withdraw from further participation in the research at any time without consequence. I have been given a copy of this form to keep.

Participant's Name: _____
(Block letters)

Participant's Signature: _____ Date: _____

Investigator's Name: _____
(Block letters)

Investigator's Signature: _____ Date: _____

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics & Integrity (telephone (02) 9850 7854 or email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

(INVESTIGATOR'S [OR PARTICIPANT'S] COPY)

Participant pseudonym form



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Chief investigator: Dr Jacqueline Mackaway

When planning meets reality:
Examining the process of implementing a gender equity measure

Anonymisation and pseudonym information form

Thank you for agreeing to participate in an interview for this research project.

Due to the small number of participants and the public nature of the anonymisation trial, we cannot guarantee your anonymity in publications that result from this interview.

We have several strategies in place to help you manage the risk of the potential for identification:

- You can withdraw from further participation in the research at any time without consequence, even if the interview is already completed.
- You may review a copy of the transcript of your interview and adjust your responses. Only the reviewed transcript will be kept and referred to in publications.
- You may choose to be known by a pseudonym in the research publications.

☐ Please tick if you would like to be known by a pseudonym.

Please state the pseudonym you would like to be known by:

Human Ethics approval has been granted for this study: 52021949626302

This study is being conducted by Susan Barnes from the School of Social Science at Macquarie University as part of their Master of Research degree. If you have any queries Susan can be contacted by email on or by phone

Participant's Name: _____
(Block letters)

Participant's Signature: _____ Date: _____

Investigator's Name: _____
(Block letters)

Investigator's Signature: _____ Date: _____

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics & Integrity (telephone (02) 9850 7854 or email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

(INVESTIGATOR'S [OR PARTICIPANT'S] COPY)

Request to use numbers instead of names as participant identifiers

As described in Chapter 3: Methodology participants were initially offered to nominate pseudonyms if they wished to protect their identity, which two did. However, the combination of real name and pseudonym was insufficient to protect the identities of those who wished to remain anonymous. Thus, participants were asked if they could be referred to by numbers within the thesis. Below is a portion of the email sent to all participants on 21 January 2022 to ask their permission to use a number instead of their name or pseudonym.

Secondly, Initially I intended to use pseudonyms or real names when I referred to a participant in the text, depending on their preference. However, as I have been writing it's become clear that using any names will make it easy to identify who the participants are, and some people don't want that. So, to protect everyone's privacy just a little more I would like to refer to participants by a number, for example Participant #6.

Is it ok with you if I allocate you a number instead of using your name?

Responses were received from three of the four participants giving permission to use a number instead of their name or pseudonym. Numbers were then allocated randomly to all participants and used exclusively throughout the thesis.

Appendix C

Interview protocol

Question	Time elapsed at end	Notes/comments
What is your role at the organisation?	0	
Can you tell me how people access the equipment? How does that system work?	2	
What is your role in the anonymisation trial	4	
How did you come to be involved in the trial	6	
Can you tell me about how the organisation came to be involved in the pilot?	8	
Who were the important people in the trial? Why were they important? Were they supportive or combative?	10	

Can you describe for me the journey of implementing the trial? Break the journey into sections, talk about barriers and aids at each step. How the org navigated each step.	12	○ Processes and procedures ○ People ○ Systems (computers etc) ○ Time ○ Money/resources ○ Politics ○ Informal practices/culture
Did the process depart from the original structure? If so, how, or why? If not, why?	25	
What surprised you?	30	
What compromises did you make and why?	35	

What would you do differently if you could implement the program again knowing what you know now?	40	
What do you see as the biggest risk to the initiatives sustainability?	45	
What would your ideal program look like? Why?	50	
Can I have a copy of internal documents related to the pilot?	55	
Would you be willing to do a short follow up interview if I have additional questions?	56	

Appendix D

Questions sent to participants in advance of the interview

Below is a screenshot of part of the email with one participant showing the questions that were sent to all participants in advance of the interview. All participants were sent the same questions with only the organisation name changed to personalise the request.

As I mentioned previously, I wanted to let you know the kinds of questions I will be asking so you can have a think before we chat.

So, broadly I would like to know about:

- Your role at CSIRO and how you came to be involved in the anonymisation trial
 - How CSIRO came to be involved in the trial, and who is important to the trial
 - The nuts and bolts of implementing the trial, thinking about timeline, people, systems, processes and procedures, money/resources
 - What barriers and aids you encountered during implementation
 - What surprised you during implementation
 - What compromises you made
 - What you see as the biggest risk to the sustainability of the program
-