Name of Project	Fixing the leaky pipeline: An evidence-based policy tool for gender equity in academic careers
Chief Investigator	Assoc. Prof. Martijn van de Pol
College/Institute/Directorate	College of Science & Engineering
Proposed $ Request	$11,790

Relevance of Project to JCU's Gender Equity Priorities

This project addresses two of the Equity Fund's priority areas:

1. Succession planning for leadership positions to ensure equitable leadership pathways
2. Women's promotion journeys and support for navigating promotions

By 2030, JCU aims to achieve at least 50% representation of women in senior academic roles (Levels D & E), particularly within CSE, CMD, and JCU's three Centres, where current imbalances are substantial. By establishing a quantitative, evidence-based foundation for gender equity policy and workforce planning, this project allows JCU to move beyond descriptive reporting toward a dynamic, actionable strategy for institutional change.

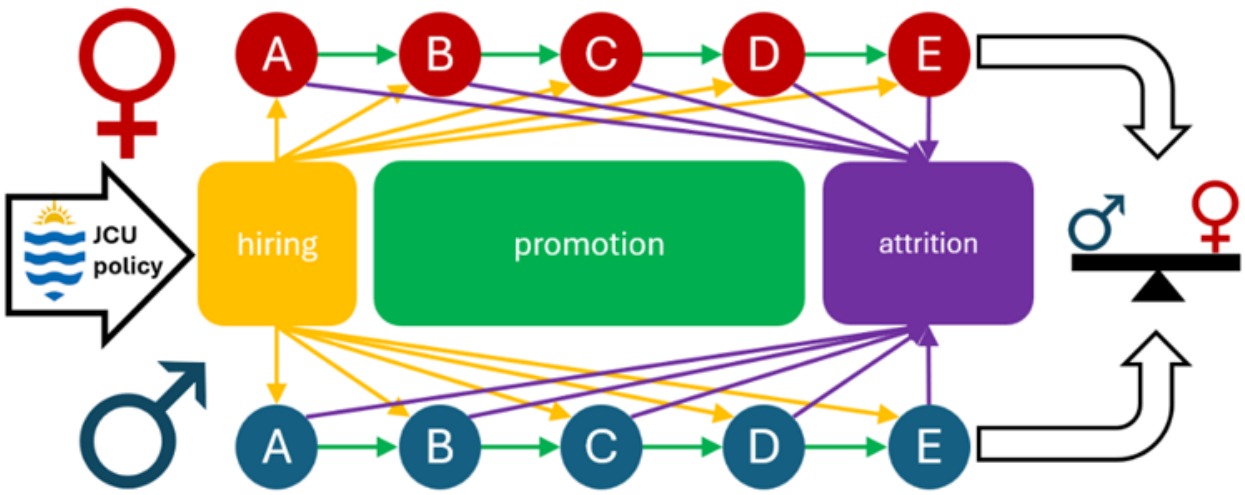
The project aligns with JCU's commitment to improve data use — particularly in monitoring hiring, attrition, and promotion — to identify barriers to career progression and evaluate the effectiveness of interventions. By quantifying gender-specific transition rates across academic levels, work-profiles (Balanced, Teaching-, and Research-specialist), and contract types (fixed-term vs. permanent), the project will identify where inequities arise and provide an evidence base to better support women's promotion journeys and leadership pathways.

The proposed interactive policy tool supports succession planning by enabling managers to test the long-term impacts of policy levers — such as equitable hiring and promotion interventions — and identify the most effective strategies, and their timelines, for achieving gender balance.

Project outline Objectives

JCU's main gender equity challenge

Gender equity in academic career opportunities has not yet been achieved at JCU, with women underrepresented particularly at senior levels (D and E) — a pattern reflected across Australian academia. Achieving gender equity is not straightforward, as many policy levers and existing biases can influence outcomes, including gender equity in hiring, promotion, attrition, and the work environment (Fig. below).



Each of these three levers consists of several sub-components. For example, promotion outcomes depend

both on the rate at which staff apply for promotion and on the success rate of those applications. Currently, some Colleges actively encourage and support women to apply more often for promotion, but when success rates are much lower for women (e.g., Level E 2026 promotion round), this may not be the most effective way to achieve change. Furthermore, promotion rates may depend on the work-profile, with research-specialist more likely to get promoted at senior levels, and most senior research-specialists being men.

At present, two key questions remain unresolved:

1. What are the most effective policies to achieve gender balance at senior academic levels?
2. How long will it take to reach a balanced gender distribution under different policies?

Project aims

1. Quantify and monitor transition rates

Quantify hiring, promotion, and attrition rates across JCU colleges using historical data, and assess how these rates depend on gender, as well as on work-profile (balanced vs. specialists) and contract type (fixed-term vs. permanent), and how they have changed over time.

Deliverable 1: Results will be synthesised into graphical outputs and reported to GEAR and the JCU Executive. We propose that this reporting be implemented within JCU's PowerBI environment using our analytical programming pipeline, allowing the results to be efficiently updated in future years and integrated into routine College and Centre reporting on gender equity KPIs.

2. Build a demographic transition model and tool that guides policy decisions

Construct a demographic model of academic career progression (Fig. above). This model will be parameterised with JCU data on gender-specific hiring, promotion, and attrition rates, and reflect institutional constraints (e.g., academy size of 550fte). The model tracks transitions between academic levels and projects key outcomes such as the gender ratio at senior levels (D&E). Outcomes will incorporate uncertainty in estimated rates and stochasticity in workforce dynamics. Furthermore, we will use this model to develop an interactive policy tool (Shiny app), allowing users to manipulate key levers (e.g. equalising gender differences in promotion success, work profiles, or hiring at specific levels) and evaluate:

- the effectiveness of different policy interventions
- the time required to achieve gender balance under each scenario for different Colleges, Centres, and domains (STEMM, HASS).

Deliverable 2: An interactive policy tool that managers can use. We will also report to GEAR and JCU executive on what the most effective policy would be for JCU based on our analysis.

This framework provides a **quantitative, evidence-based foundation** for tracking whether JCU's 2030 gender equity targets are achievable under current trajectories and **prioritising tailored policy interventions**.

Sector Review

Evidence from initiatives such as Athena SWAN and SAGE suggests that institutional gender-equity frameworks can improve accountability and increase women's representation in leadership roles (Armstrong & Sullivan 2025). However, reviews also highlight important limitations: many initiatives rely heavily on descriptive monitoring and broad action plans, with limited evidence about which interventions are most effective in practice. As such, these programs risk becoming 'box-ticking' exercises that improve reporting more than the lived experiences and career outcomes of staff (Armstrong & Sullivan 2025).

In contrast, the proposed project will use **evidence-based** demographic modelling to quantitatively **compare policy interventions**, project future gender distributions, and estimate the time required to achieve gender equity. This **addresses an important gap between descriptive monitoring frameworks and evidence-based policy optimisation tools**.

Previous studies demonstrate the feasibility and value of demographic workforce modelling for gender equity.

Thomas et al. (2015) showed that modelling hiring, attrition, and promotion can assess whether universities are on track to achieve equity goals, while James et al. (2022) demonstrated the value of scenario-based modelling for identifying effective pathways to gender balance. Prof. Lisa Kewley used similar workforce modelling based on JCU-CSE HR data from 2015–2020 to project that, under status quo conditions, women would remain below 30% representation at Levels C–E indefinitely in CSE (Kewley 2021). However, Kewley's commercially exploited model is not publicly accessible, limiting transparency, independent scientific evaluation, and its further adaptation within JCU.

The current project extends this foundation by updating the models with more recent JCU data (i.e. also measuring progress), incorporating work-profile, contract-type and academy size as additional variables, and producing an interactive policy tool for ongoing use by managers — advancing the field from descriptive monitoring toward dynamic, evidence-based institutional strategy.

References

Armstrong & Sullivan. 2025. A critical analysis of Athena Swan as a policy-scoring scheme. British Educational Research Journal, 51, 225–243. https://doi.org/10.1002/berj.4071

James & Brower. 2022. Levers of change: using mathematical models to compare gender equity interventions in universities. R. Soc. Open Sci. 9: 220785. https://doi.org/10.1098/rsos.220785

Kewley. 2021. Report: workforce modelling of academic staff for the JCU College of Science & Engineering. Kewley & Co. Commissioned by CSE.

Thomas, Poole & Herbers 2015. Gender in Science and Engineering Faculties: Demographic Inertia Revisited. PLoS ONE 10: e0139767. https://doi.org/10.1371/journal.pone.0139767

Project Team: The project team will focus on the statistical analyses, demographic modelling, development of the interactive policy tool, and translating the outcomes of scenario analysis to policy recommendations to the Colleges, Centres, and JCU Executive:

Assoc. Prof. Martijn van de Pol brings expertise in **demographic modelling, statistical analysis, and tool development**. His research uses long-term ecological datasets to project how climate change influences population composition and size in wildlife. The underlying mathematical framework of these demographic models is directly transferable to modelling career progression and workforce dynamics in academic populations. He also has substantial experience in statistical data analysis and quantitative tool development, having developed three widely-used R software packages. He has repeatedly been recognised among the top 2% most-cited researchers worldwide in Stanford University's rankings.

Assoc. Prof. Megan Higgie brings expertise in **gender equity, institutional barriers, and equity policy development.** She has detailed knowledge of the challenges and priorities relating to gender equity within JCU, including those identified through GEAR and by CSE leadership. She is the inaugural (co-)Associate Dean of Equity, Diversity, Inclusion and Belonging (EDIB) in CSE, a member of GEAR, and a strong advocate for equitable career progression and leadership opportunities for women in academia. She is thus well placed to provide guidance on the project's analysis and modelling choices and identify the key questions and policy options to focus on within the JCU context. Her time commitment will be covered in-kind via her service role as CSE Associate Dean of EDIB.

Gaps: At the project start, we will seek input from **College Deans and Centre Directors** on the interventions they consider feasible within JCU's management environment and policy framework. This early engagement will help ensure that the project produces realistic and actionable recommendations, while also **building shared commitment to using the outcomes to support institutional change**. The **JCU data analytics team** will be required to support **data extraction** from JCU databases and help **implement the reporting within JCU's PowerBI environment**.