

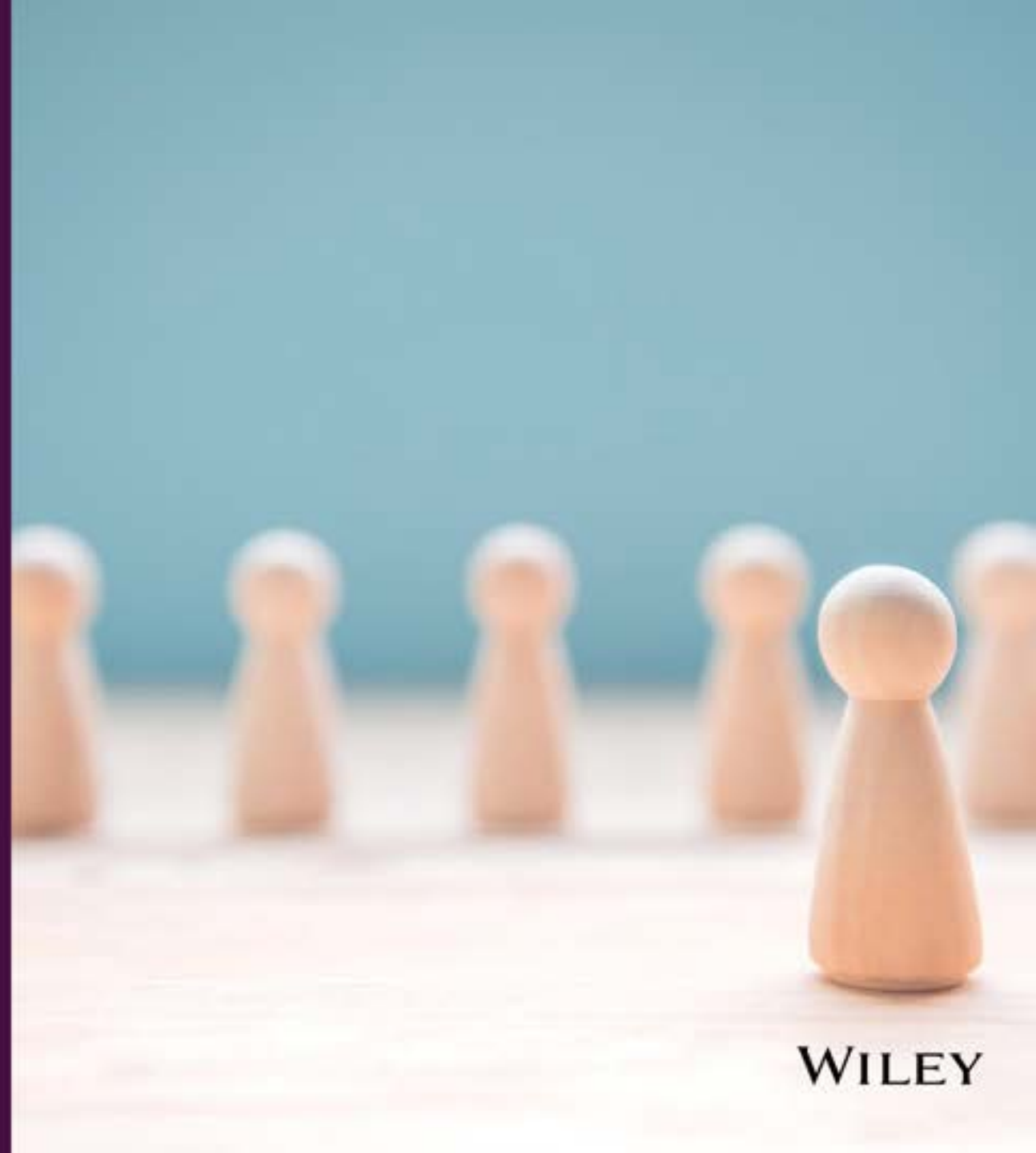
Webinar Series

## **Diversity Drives Innovation: Representation in Research**

23 September | SGT 12PM



Dr. Madhu Bhaskaran  
Professor and Research Leader,  
RMIT University



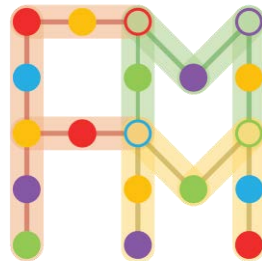
WILEY



# Diversity drives innovation

**Professor Madhu Bhaskaran**

Co-Leader, Functional Materials and Microsystems Research Group

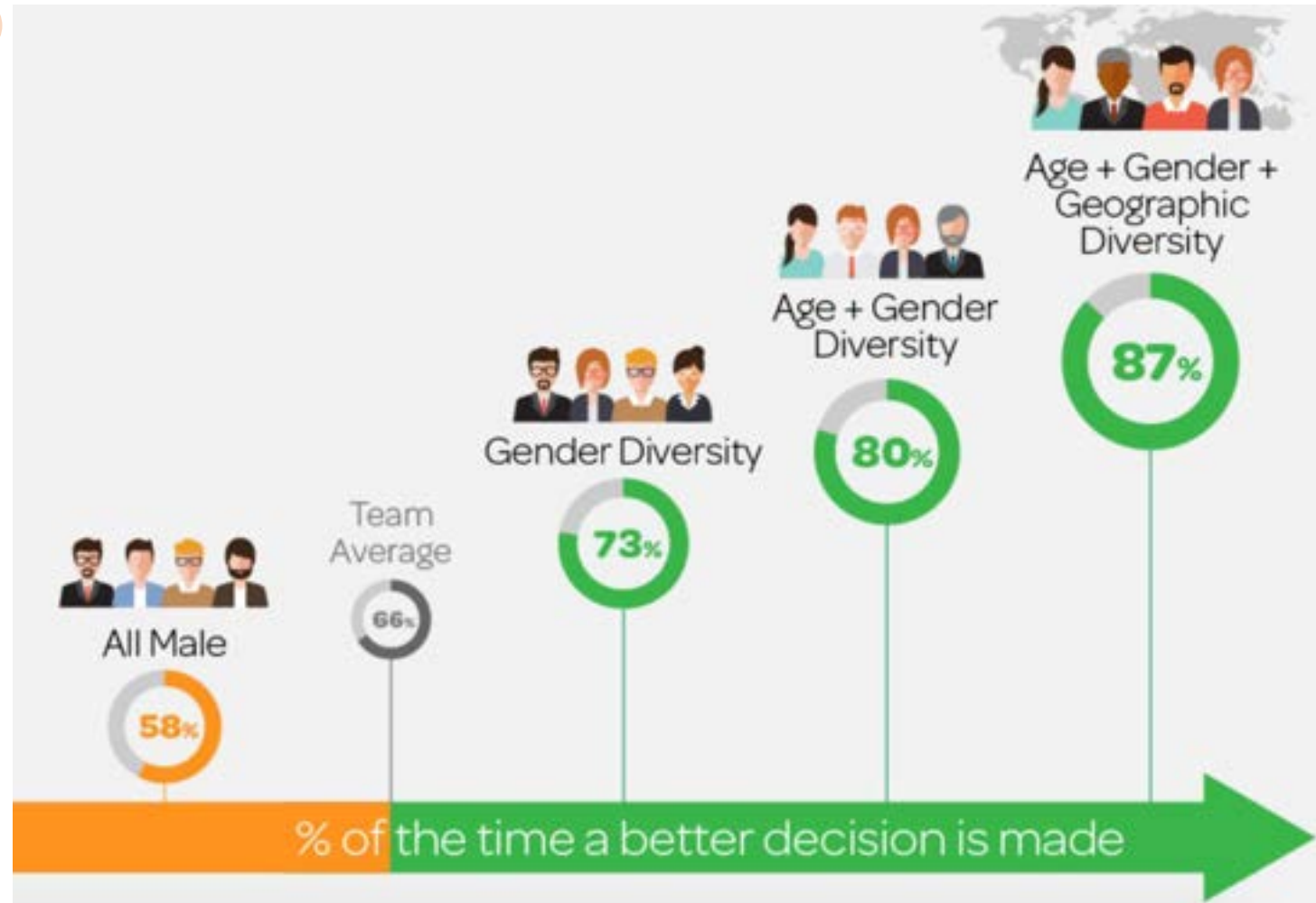


# Presentation Structure



- Diversity and inclusion
- My research – fundamental to applied
  - Collaborations – cross disciplinary
  - Collaborations – cross sector
- Gender diversity
  - Global examples
  - Australian examples
- What can you do?

# Diversity



<https://www.smartcompany.com.au/people-human-resources/diversity-better-decision-making/>

# Diversity & Inclusion



**DIVERSITY**



**INCLUSION**





# Diversity



<https://research.phoenix.edu/research-centers/center-workplace-diversity-and-inclusion-research>



# My research

# FUNCTIONAL MATERIALS & MICROSYSTEMS

WE MANIPULATE MATERIALS...

REMOVE or REPLACE  
ATOMS to CHANGE  
PROPERTIES...



10,000 - 100,000  
TIMES THINNER  
than a HUMAN HAIR!

... AT A NANO SCALE ...

... and HARNESS FINDINGS

MOST of the THINGS WE  
MAKE YOU'LL NEVER SEE!

TECHNOLOGY



ARTIFICIAL  
BRAIN/MEMORY  
DEVICES

STRETCHABLE/  
WEARABLE SENSORS



e.g.  
HEALTH and  
PERFORMANCE  
TRACKING

DEVICES to  
TRANSFORM LIGHT



e.g.  
1000x or MORE  
FASTER WIFI



ULTRA-THIN  
NOVEL MATERIALS

e.g.  
THINNER, FASTER,  
LIGHTER GADGETS



# Wearable Technology – A Timeline

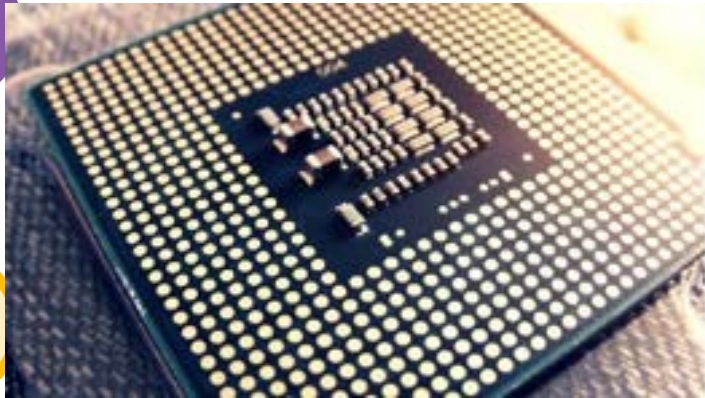


<https://www.raconteur.net/technology/history-of-wearable-technology>

# Wearing the Future | Transparent Unbreakable Electronics



Conventional Electronics



&

High-Performance Oxide Layers

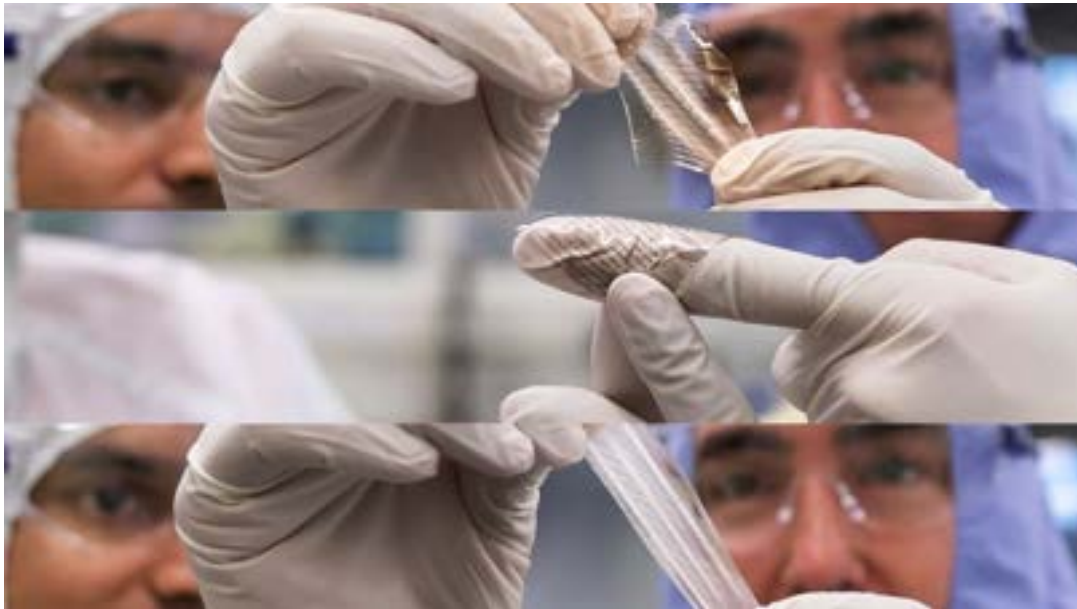


+

Stretchable Polymers



# Wearing the Future | Transparent Unbreakable Electronics



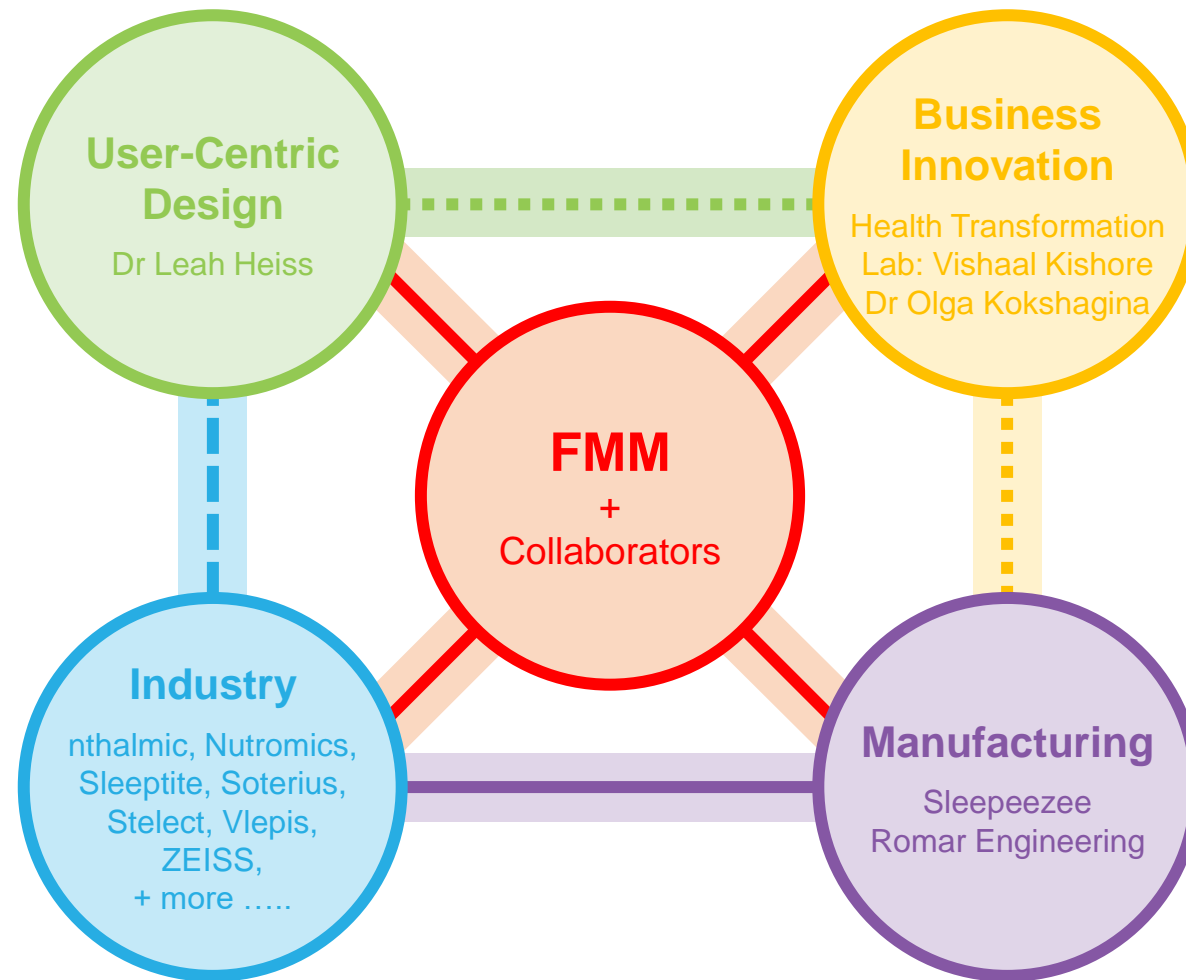


# Wearing the Future | Transparent Unbreakable Electronics





# Cross-Disciplinary & Cross-sector Collaboration





# Cross-sector collaboration

# Industry Linkages | Aged care



 **sleeptite**

**Sleepeeze**



 **Vlepis**

# Aged care - considerations

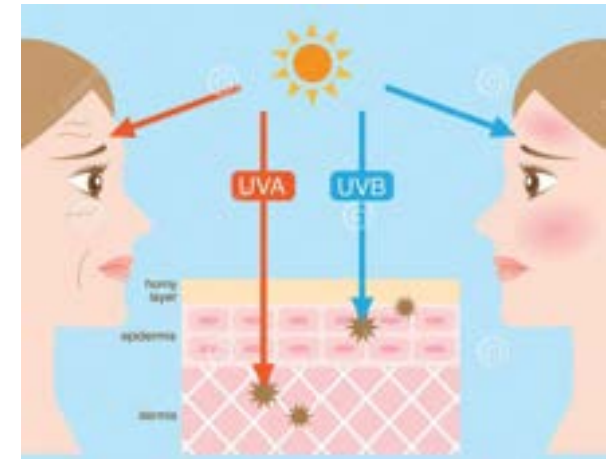


- Borrowed lessons?
  - Cultural differences
- Gender differences?
- Manufacturability
- User interactions?



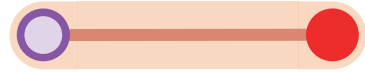


# Industry Linkages | Personalised diet and skin health

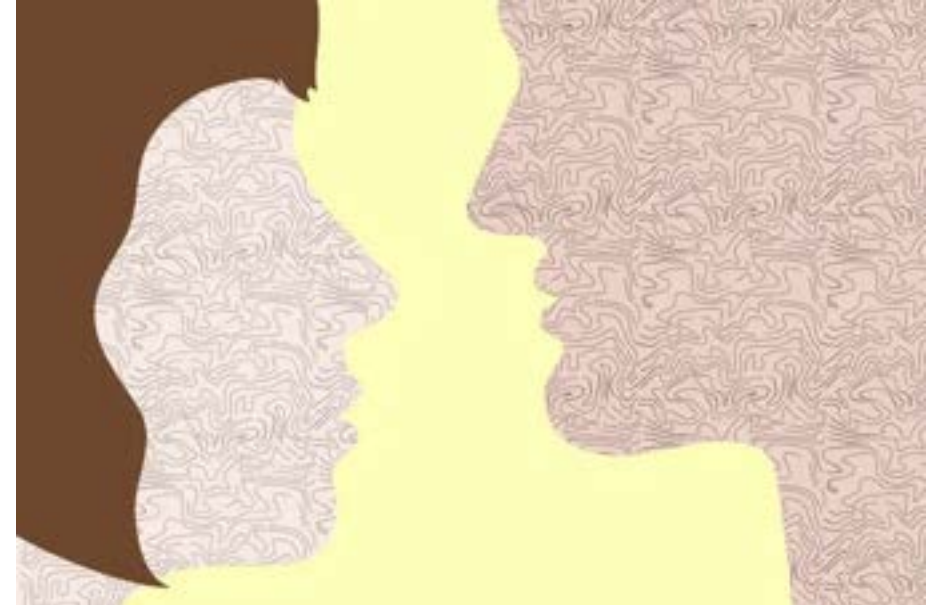
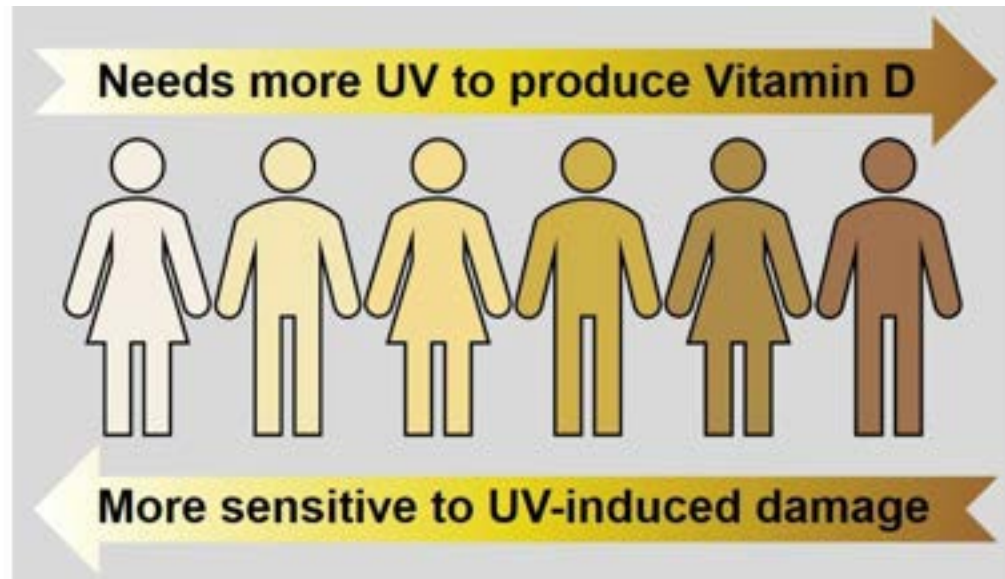


## Nutromics

# Skin care - considerations



- Skin tone
  - UV exposure
- Gender differences?



 Nutromics



# Cross-disciplinary collaboration

# Collaborations with Design



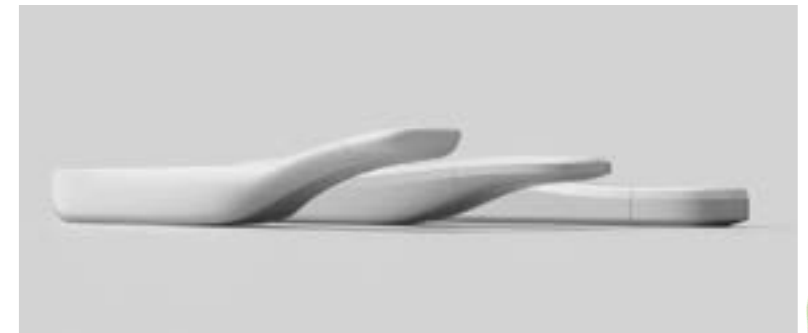
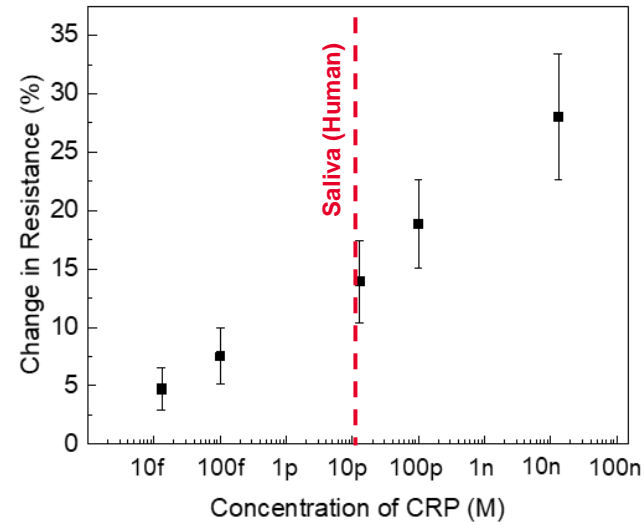
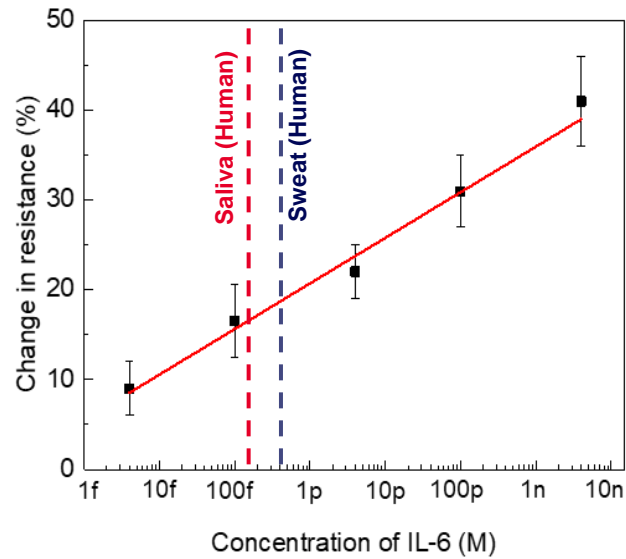
Dr Leah Heiss, Co-Director RMIT Wearables and Sensing Network



Facett is inspired by the mineralogy collection at Museums Victoria, it's crystalline form seeks to destigmatise hearing aids



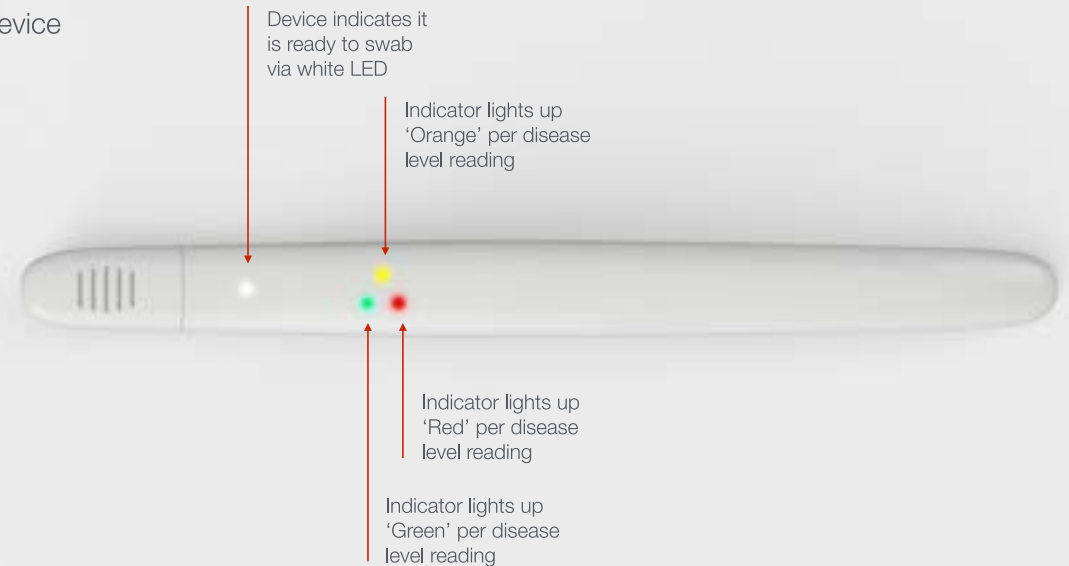
# Biomarker devices



# Biomarker devices | Iterative approaches and natural forms



Location of tricolour LEDs to indicate sensor reading and white LED to indicate device readiness.



Drawing from natural forms and employing an iterative approach this diagnostic stick provides feedback on heart health

# Biomarker devices

 Nutromics



01 Isabel is informed by her GP that her weight is likely to cause her diabetes. This leads her to purchase the Nutromics smart Patch.



02 Isabel receives her package and begins to unbox.



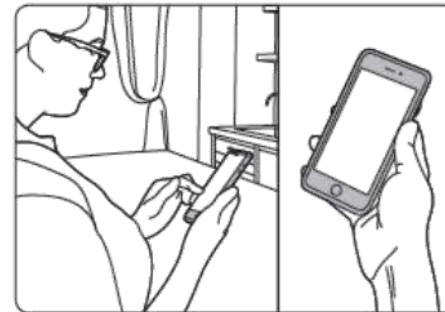
03 Isabel follows instructions to download the Nutromics App and connect patch to phone.



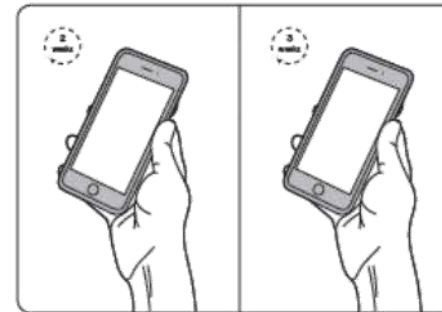
04 Isabel applies patch to skin and waits until App calibrates with sensor for period of time.



05 Isabel is hungry and decides to have something to eat.



06 Isabel checks the meal result in the Nutromics App.



07 After one month, Isabel reviews her results in the Nutromics App.



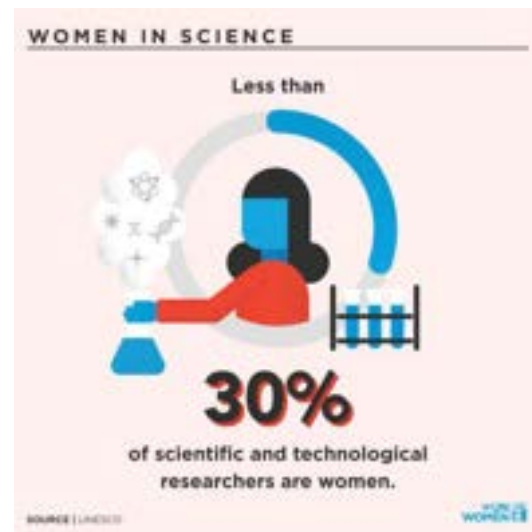
08 Isabel is well and is able to make better nutrition decisions because of the smart patch.



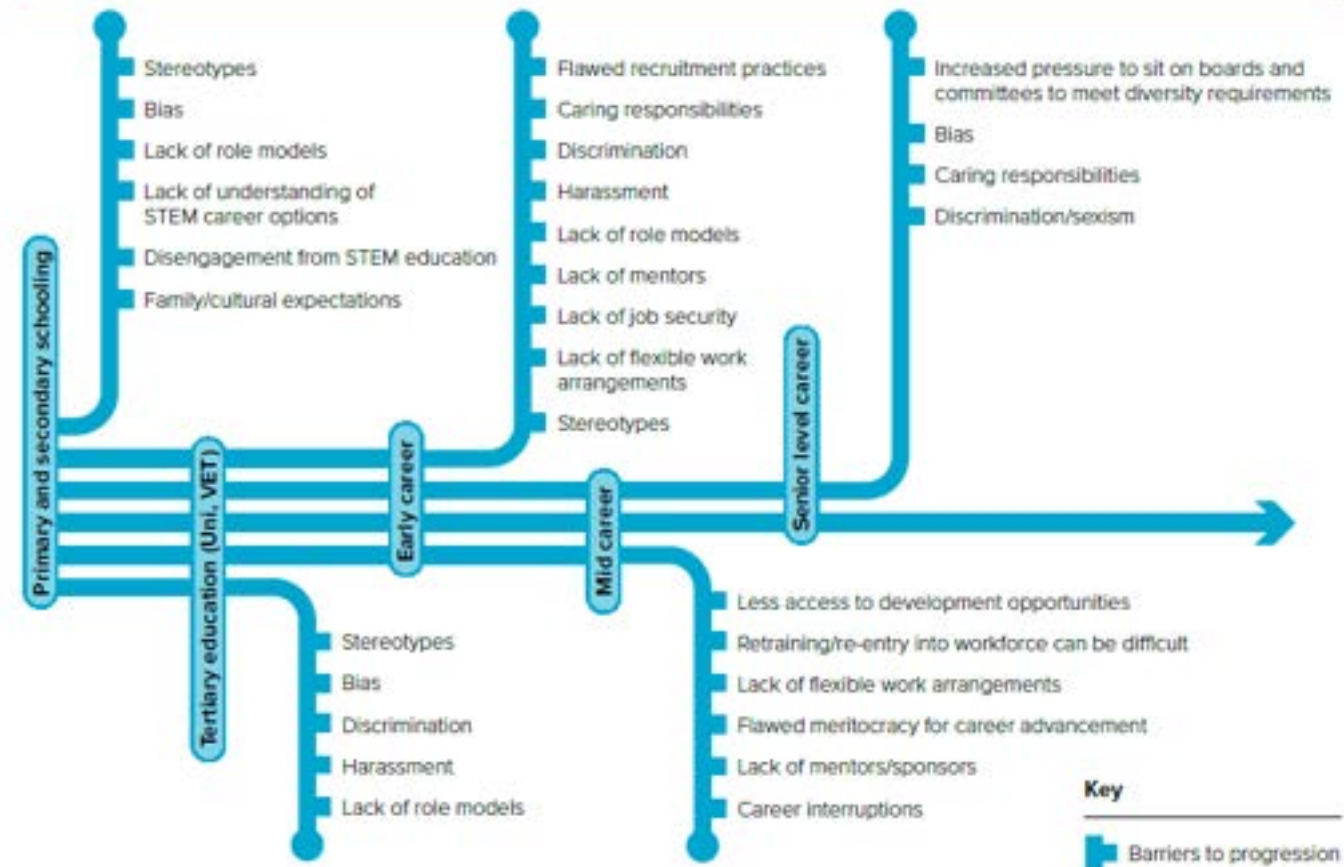
# Gender diversity



# Gender diversity



## CAREER PROGRESSION PIPELINE



UN Women and Women in STEM Decadal Plan

# Athena SWAN UK



**1**

We acknowledge that academia cannot reach its full potential unless it can benefit from the talents of all.

.....

**2**

We commit to advancing gender equality in academia, in particular, addressing the loss of women across the career pipeline and the absence of women from senior academic, professional and support roles.

.....

**3**

We commit to addressing unequal gender representation across academic disciplines and professional and support functions. In this we recognise disciplinary differences including: fda

> the relative underrepresentation of women in senior roles in arts, humanities, social sciences, business and law (AHSSBL)

> the particularly high loss rate of women in science, technology, engineering, mathematics and medicine (STEMM)

.....

**4**

We commit to tackling the gender pay gap.

.....

**5**

We commit to removing the obstacles faced by women, in particular, at major points of career development and progression including the transition from PhD into a sustainable academic career.

<https://www.ecu.ac.uk/equality-charters/athena-swan/2018-statistics/>



# Athena SWAN UK



6

We commit to addressing the negative consequences of using short-term contracts for the retention and progression of staff in academia, particularly women.

.....

7

We commit to tackling the discriminatory treatment often experienced by trans people.

.....

8

We acknowledge that advancing gender equality demands commitment and action from all levels of the organisation and in particular active leadership from those in senior roles.

.....

9

We commit to making and mainstreaming sustainable structural and cultural changes to advance gender equality, recognising that initiatives and actions that support individuals alone will not sufficiently advance equality.

.....

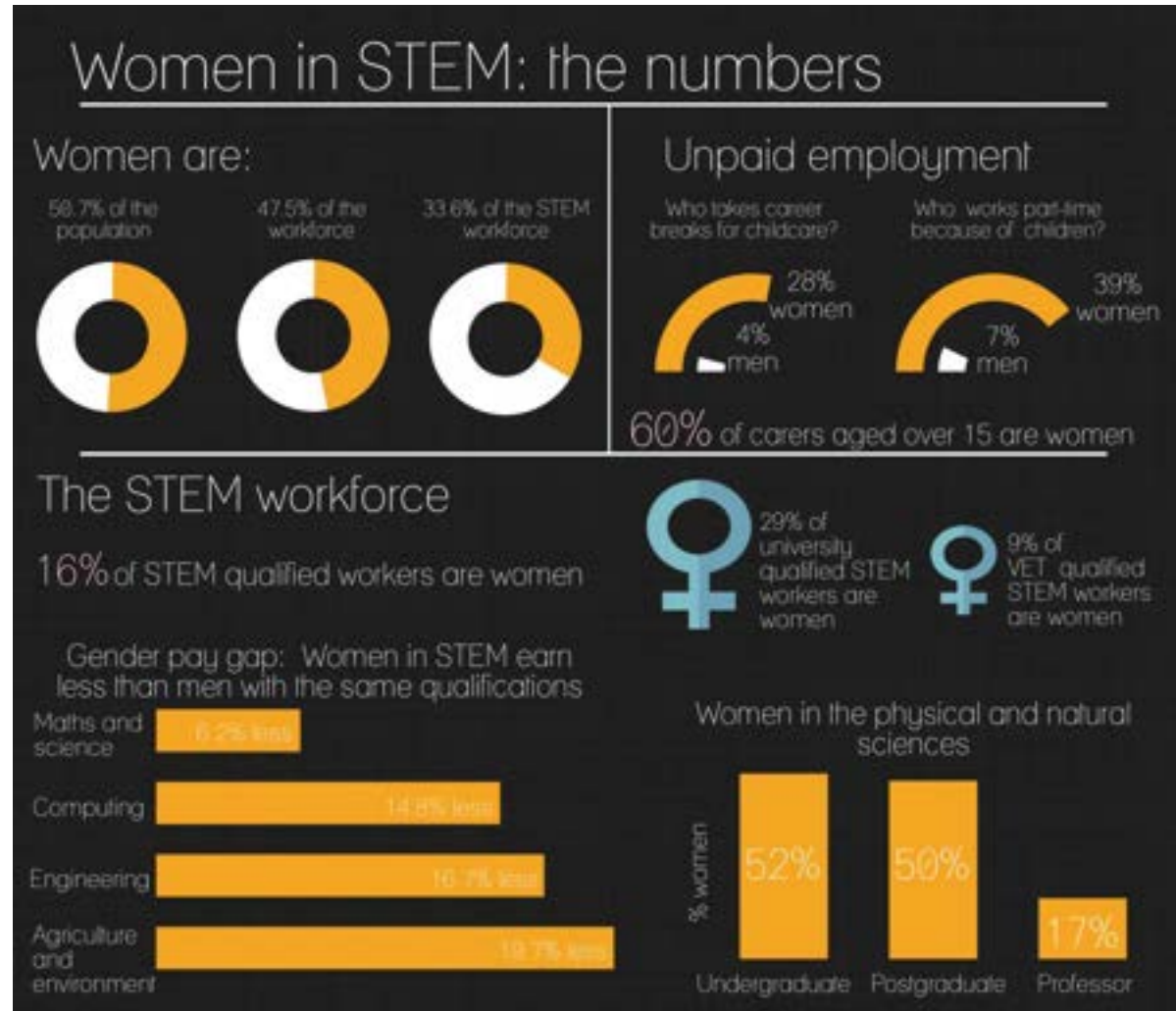
10

All individuals have identities shaped by several different factors. We commit to considering the intersection of gender and other factors wherever possible.

# Athena SWAN UK



# Numbers in Australia



<https://www.atse.org.au/news-and-events/article/women-in-stem-at-a-glance/>

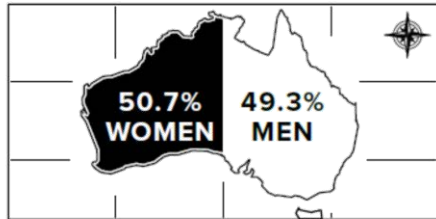


# STEM Workforce – Now and Future



## STEM WORKFORCE

TOTAL AUSTRALIAN POPULATION:



23.4  
MILLION

AUSTRALIA'S WORKFORCE<sup>2</sup>



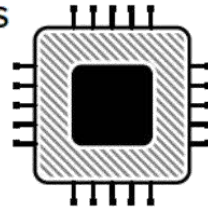
AUSTRALIA'S STEM-SKILLED WORKFORCE<sup>3</sup>



## WORKFORCE NEEDS OF THE FUTURE <sup>35, 36, 37, 38</sup>

DIGITAL SYSTEMS

50%



50% of workers will need to know how to use, build and configure digital systems

JOB LOSS

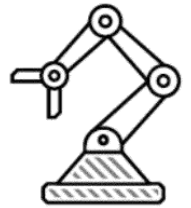
18%



18% of workers have a serious chance of losing their job because of technology

AUTOMATION

70%

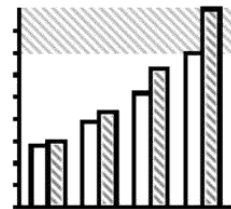


70% are training for a job set to be replaced by automation

77%



Australian workers will spend 77% more time using science and maths skills



1.5  
TIMES  
FASTER

STEM skilled jobs are growing at 1.5 times faster than any other job sector

SKILLS SHORTAGES

In 2018, Australia had skills shortages in geology and geophysics, agricultural science, mechanical, aeronautical and civil engineering, surveying and architecture, some for the first time in over five years

# TEN YEARS, SIX OPPORTUNITIES

Why gender equity in STEM can't be  
achieved without you



# SIX OPPORTUNITIES

**1 Leadership and cohesion**

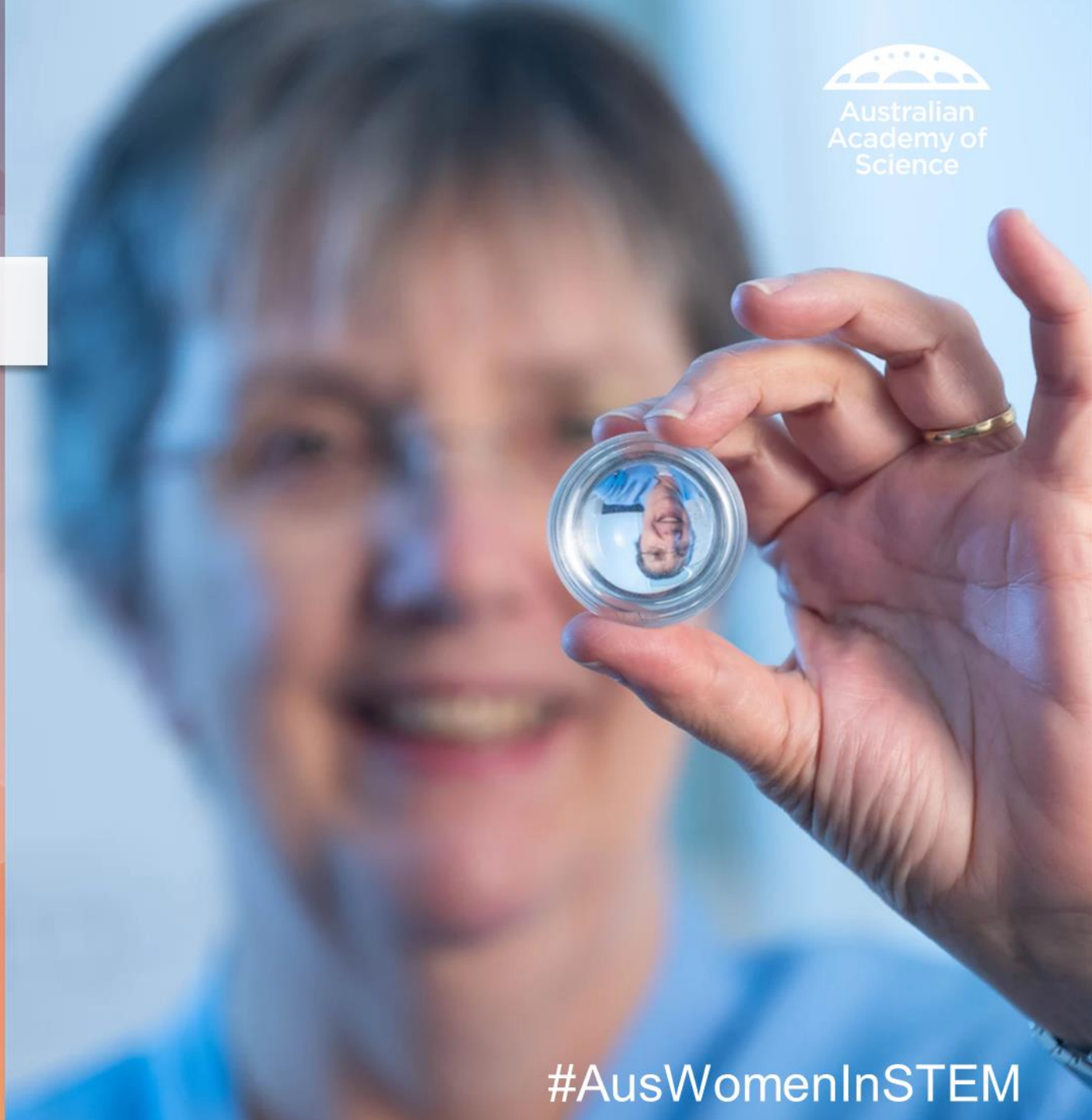
**2 Evaluation**

**3 Workplace culture**

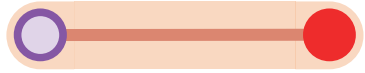
**4 Visibility**

**5 Education**

**6 Industry action**



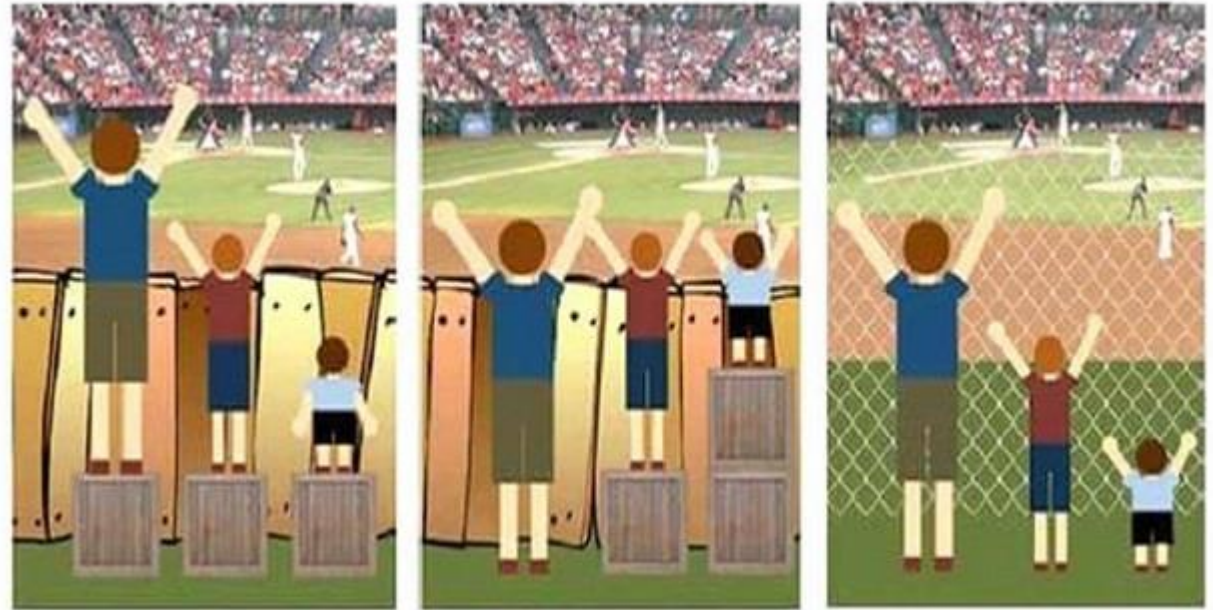
# Australian initiatives



# What can you do?



- Recognise the importance of diversity – champion change
- Inclusive language - *pronouns*
- Team building – Inclusion
  - Meeting timings
- Recruitment
  - Balanced panels
  - Bias training
  - Assessment relative to opportunity
- Grant assessments



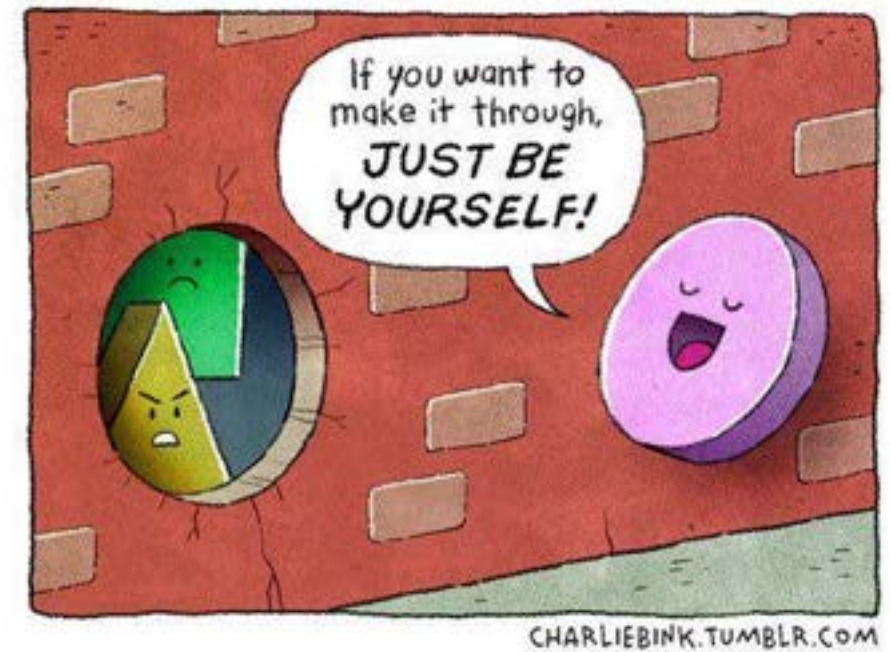
<http://www.theinclusionsolution.me/equity-vs-equality-eliminating-opportunity-gaps-education/>



# What can you do?



- Collaborations – careful and deliberate choices
- Conferences and workshops organisation
  - Balance in speakers
  - Carer support
- Visibility
- Stay authentic



<https://me.me/i/if-you-want-to-mqke-if-through-just-be-yourself-20452924/>

# Team





# Contributors and Acknowledgements



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Delivered by AusIndustry™

**Imcrc**



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