

AIRING OUR DIRTY LAUNDRY – AN OPEN ACCOUNT OF OUR INCLUSION AND DIVERSITY JOURNEY

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ABSTRACT (500 WORDS)

The Engineering industry, in fact the STEM (Science, Technology, Engineering and Mathematics) field in general, suffers from a lack of diversity. Women are significantly underrepresented in scientific fields in the world, and engineering in New Zealand is no exception. Data shows women make up approximately 20% of engineering graduates, 14% of engineers, 8% of Chartered Engineers, and only 3% of Fellows (diversityagenda.org).

Perhaps more alarming than this low initial representation is that studies show 29% of women leave engineering, largely due to an inflexible work environment and a lack of recognition (Nayda et al, 2017). There is growing evidence that more diverse organisations are generally more successful and effective. This evidence demonstrates that workplace inclusion is more than just the right thing to do, it is a strategic imperative that increases operational performance (Merelo, 2019).

There is a global shortage of STEM and engineering skills that could be mitigated by addressing the lack of diversity in the field. One obvious way to view this problem is by looking at gender. Women make up 50% of the population, but in Engineering the number of female students and professionals is clearly less than this, often around 10 – 25% in many parts of the world. This underrepresentation of women leads us to think about other groups that are underrepresented in Engineering; these include Maori and Pasifika, Asian and other Minority Ethnicities, particularly those from socially deprived backgrounds.

This paper highlights some reasons for lower levels of interest in STEM by females at an early age, and reasons for almost one-third of women leaving the engineering industry. It highlights opportunities to attract women to STEM and ensure the engineering industry is a place women want to continue their careers. This paper also examines a number of approaches to support diversity and inclusion to encourage a greater uptake of engineering by underrepresented groups and to retain people in the sector. Lastly this paper highlights Jacobs journey towards inclusion and diversity – sharing the lessons learned, our trials and triumphs, and opportunities that can be taken to increase diversity in our industry.

KEYWORDS

Inclusion, Diversity, Gender, Productivity, Sustainability

PRESENTER PROFILE

Kate Simmonds is an engineer with over 20 years' experience in the water industry. Kate leads Jacobs New Zealand Water Engineering team and is passionate about creating an inclusive and diverse working environment, and growing and retaining talent within the engineering industry.

Becky Macdonald is passionate about looking after our environment for future generations and is determined to make a difference to the world we live in. Her career has revolved around the treatment of wastewater so that our environment is better off as a result of actions she has taken.

INTRODUCTION

Diversity and inclusion are two distinct subjects that are often coupled together in the values and aspirations of many engineering organisations and institutions. For Engineering, diversity is connected to attracting students and professionals to the engineering field to ensure that representation within the industry is representative of the wider population, diverse, and inclusive to a variety of social demographics, background, culture and gender. It also extends to supporting through the engineering program and into employment, and beyond this, into remaining within the industry throughout their career.

For this diverse group to work successfully, the different questions and needs of each individual arise and need to be treated appropriately. But without inclusion the few students and professionals that are attracted from the underrepresented groups feel pushed out, and can leave the field. Furthermore, new students and professionals are then less encouraged to enter the field due to feeling unrepresented .

One of the reasons is the lack of role models for these underrepresented groups, and the problem of underrepresentation continues. One of the main underrepresented groups in Engineering is women. They represent around 50% of the population in any country, but their presence in Engineering, as students or professionals, is far less than this in most areas of the world.

There are many studies that have examined the small number of women in Engineering. Balakrishnan and Low (2014) studied the small number of female professionals in Engineering in Japan, and argue that this number could increase, benefiting the society with the country producing more professionals that understand the culture and questions of their country. Lee et al. (2014) explored the perception of inclusion by students from underrepresented groups and found that different ethnic groups may experience inclusiveness differently.

Universities and industry organisations should examine approaches which can make the institutional experience more positive for all, thus increasing the potential for good integration by students and professionals from different backgrounds and cultures. It is also important that we engage with the broader community and students early, as unconscious bias impacts from a very early age and must be addressed to encourage our tamariki into the STEM profession.

THE EARLY YEARS

So why don't more women, māori and Pacifica enter engineering? Research shows it is largely due to perception, and that engineering's reputation is being damaged by the stereotype that engineering is a "white man's world" with a study showing that youngsters believe a typical engineer is white, middle-aged, and male (Wilson, 2017).

As engineers we know that the greatest opportunity to influence the outcomes of a project is in the early stages. It's a similar concept when it comes to attracting diversity into engineering. What kind of program is more likely to lead to an increase of women graduating with engineering degrees: A college or university scholarship for promising high-school students, unconscious bias training for human resource managers, or an intensive math and science education program for girls in elementary school? Research shows that earlier intervention will produce better outcomes, than a scholarship will (Chiose, 2017). A scholarship would come too late for the thousands of women who close the path to careers in science, technology, engineering and math (STEM) as children. Although addressing bias and hiring more women into those fields will help, too, primarily by providing more models of success for younger generations.

This lack of role models of success is demonstrated by simply googling "engineer". The results display images dominated by males (74.4%), whereas googling "scientist" is an almost 50:50 split of male and female imagery. But it starts even earlier than when children know how to google career options. From a young age boys and girls are treated differently. Ask google for gift suggestions for a two year old (Figure 1) and it is evident boys toys are movement, building and science based, whereas girls toys are typically home and care based.



Figure 1 – Google Search for 2 year old "girl" and "boy" gift ideas

Additional early influences are the roles men and women play in stories (girls are princesses, boys are heroes), in the media and in television programmes. Women are often the home-maker or care provider, and the men “go to work”. These differences are significant and form an unconscious bias which remains with us for years, if not our entire life, influencing our perception of the world and our place within it. It is abundantly clear these influences impact a gender propensity towards STEM for boys, and away from STEM for girls, with lower numbers of females entering and graduating from engineering.

To further exacerbate this issue a recent study found that a staggering 93% of parents would not support their daughter in pursuing a career in engineering due to their own outdated perceptions of the job (IET: Engineering a Better World Study, UK, 2015). However, when students were asked which subjects they enjoyed at school 39% of girls said they enjoyed information technology, computing and design technology. Between school and university graduation the numbers decline, with the UK only having 6% of the workforce being female.

The early years are highly influential, and parents play an important part in shaping students decisions and career pathways. It is important that we banish outdated engineering stereotypes and support educating parents, as well as students, on the opportunities within STEM and, in particular, engineering.

UNPICKING UNCONSCIOUS BIAS

So what is unconscious bias? And what can we do about it?

Unconscious biases are social stereotypes about certain groups of people that individuals form outside their own conscious awareness. Everyone holds unconscious beliefs about various social and identity groups, and these biases stem from one's tendency to organize social worlds by categorising. They exist in a “blind spot”, making them challenging to pinpoint.

Unconscious bias presents many risks to our industry. However, it is a part of our nature. The more life experience we have, the more chance there is of inherent biases shaping our perception of the world around us. Overcoming unconscious bias can help to improve diversity and inclusion and develop more effective and objective hiring practices. For a fairer more equal world, we have to do something about unconscious bias and hiring bias. It's the only way that we can create a culture of true inclusion and diversity.

Left unchecked, unconscious bias can have a detrimental impact on our workforce. So how do we navigate this sensitive issue? The first step is acceptance. We've all heard this when talking about other issues such as dealing with grief. Well this rings true for unconscious bias also. We must accept that this is inevitable. We all make judgements based on personal experiences, and these judgements are informed by hidden biases. However often we are unaware of this. We naturally categorise others based on physical qualities and background, from ethnicity to education. This doesn't make us bad, this makes us human. It's important to note that not all biases are discriminatory, however they can still instil a lack of inclusion in that hiring may be impacted by implicit biases we have towards certain candidates, rather than against others. As subjective individuals, we naturally are drawn to what is familiar to us.

One way to understand your own unconscious bias is to put yourself to the test. There are a number of free tests for bias that you can take including Harvard University's Implicit Association Test ([link here](#)). Jacobs has had all staff in leadership roles complete a gender unconscious bias test to better understand our own unconscious bias. This was a great first step in recognising our bias. However, this needs to be taken further to help overcome this bias, including education and learning from people different to us.

Within Jacobs we followed these tests with an "Everyday Respect" campaign (embedding everyday inclusive and respectful language and behaviours) for all of Jacobs as well as:

- Refreshed our progressive flexible working policy and culture – myFlex – offering flexible working for any reason
- Launched the Family & Domestic Abuse policy in support of those experiencing and using abuse
- Significantly enhanced our Parental Leave benefits to support longer term financial security of women and the broader concept of shared care.

As a result of our efforts in this space Jacobs ANZ was awarded the Employer of Choice for Gender Equality (EOCGE) citation by Workplace Gender Equality Agency for the 6th year running earlier this year. As an EOCGE citation holder and a Consult Australia Champions of Change member, we have publicly committed to deliberately transforming the gender equality story in our ANZ workplaces by creating a more inclusive, gender balanced and flexible culture. These actions were also recognised locally and Jacobs were a finalist in the 2021 Diversity Awards in New Zealand.

The most obvious negative consequence of unconscious bias is creating a homogenous workforce. Generally we are biased towards people similar to us. This can cause recruiters and hiring managers to unconsciously replicated the types of people, traits and personalities already within the workforce, rather than adding different types. Diversity is key to creativity and innovation so this outcomes will slow down our industries growth potential.

There are 10 types of unconscious biases that can negatively impact our workforce (Figure 2):

- Affinity bias (or similarity bias) – which is our bias those who are similar to us
- Age bias – ageism is a bias based on assumptions about what people of certain ages can and cannot do
- Attribution bias – where we attribute a specific outcome to external circumstances rather than an individual's own efforts
- Beauty bias – where we favour people we deem to be more attractive
- Colour and culture bias – this is where are biased towards people due to their race, culture or ethnicity
- Confirmation bias – is where we are looking to confirm our pre-existing ideas by looking for anything to support our view
- Conformity bias – is our tendency to be influenced by and conform to the majority, rather than voicing our opinion. This can be particularly detrimental in panel settings where diversity is lacking

- Contrast effect – this is a bias resulting in assigning value to something based on a comparison with something else. For examples you might appraise your team performance against a high performer in your team, instead of using an objective baseline
- Gender bias – is a bias toward or against someone due to their gender
- Halo effect – where we project positive qualities onto people without knowing them or overlook faults due to favouring one particular positive attribute of that person. Conversely, the 'horn effect' is where our initial opinion of someone means we continually associate them with negative characteristics
- Perception bias – where we believe something is typical of a particular group of people based on cultural stereotypes and assumptions.

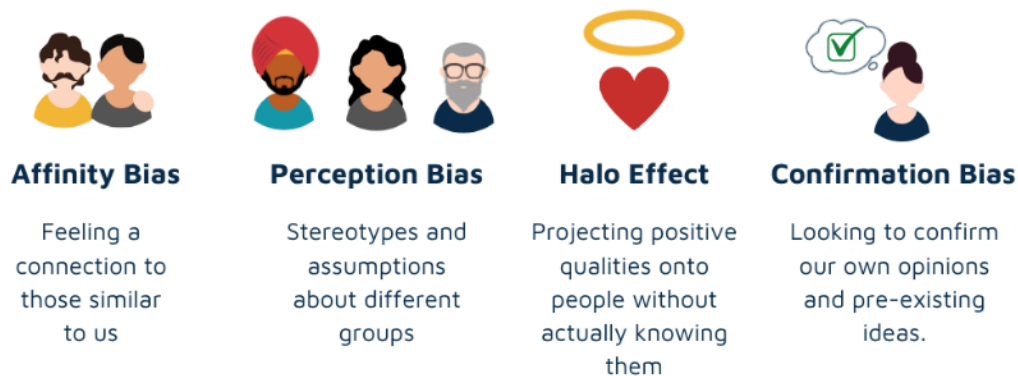


Figure 2 – Some of the key types of unconscious bias that exist in the workplace (Credit: www.beapplied.com)

As the name suggests, unconscious bias is unconscious. Which is why it is so challenging to eliminate. We don't even know we are doing it. So how do we reduce unconscious bias in the workplace? And how do we reduce its impact on recruitment and retention of staff?

The best way to interrupt the effects of bias before they harm the workforce is to create process that leave little or no room for bias to intrude. For example, because name bias can cause recruiters to favour certain candidates applications above others, removing names from applications prevents this bias from taking effect. This forces recruiters to look at skills and abilities, and traits that actually influence future work performance, when shortlisting candidates.

Other unconscious bias in recruitment examples include:

- Assuming a candidate is better than others based on the university they went to
- Ruling out qualified candidates based on our perception of them on the basis they might not be the right "cultural" fit
- Seeing an older candidate as being less "hungry" or "technologically savvy" in comparison to a younger applicant.

Just by glancing a CV these biases can be triggered (Figure 3). A CV contains significant opportunity to display unconscious bias. The same can be said for

LinkedIn profiles. The impact of a CV is significant and a German study investigated the significance (Weichselbaumer, 2016). It found that based on names and photos, the callback rates varied significantly, when all other components of the CV were the same. Research in the UK by Inside Out UK in 2017 further supported this by showing the same CV using the name "Adam" resulted in a 12% callback rate, whereas "Mohamed" only received a 4% callback.

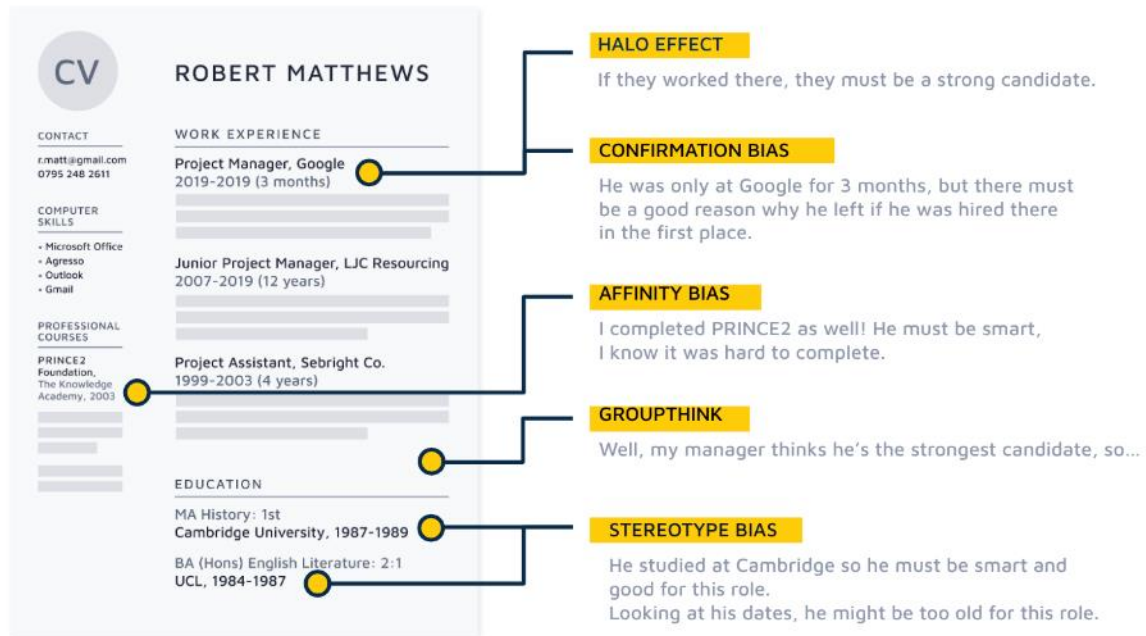


Figure 3 – Opportunities for discrimination based on unconscious bias when reviewing a CV (image source: www.beapplied.com)

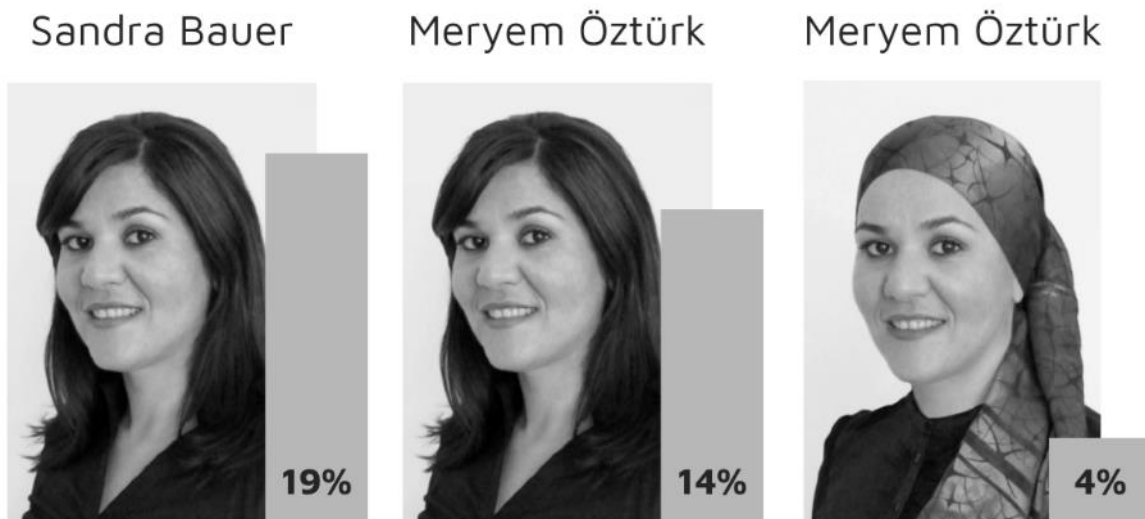


Figure 4 – Callback rates for "different" candidates in 2016 study by IZA (image source: ftp.iza.org/dp10217.pdf)

Unconscious bias in recruitment is also evident when it comes to gender. Another study was conducted where applications were submitted for a "laboratory manager position". The applications were exactly the same except for the names, which

were randomly assigned as male or female. The applications were rated heavily in favour of the males, despite the fact the background, age, university education and experience were the same. The only difference was in the names (Figure 5).

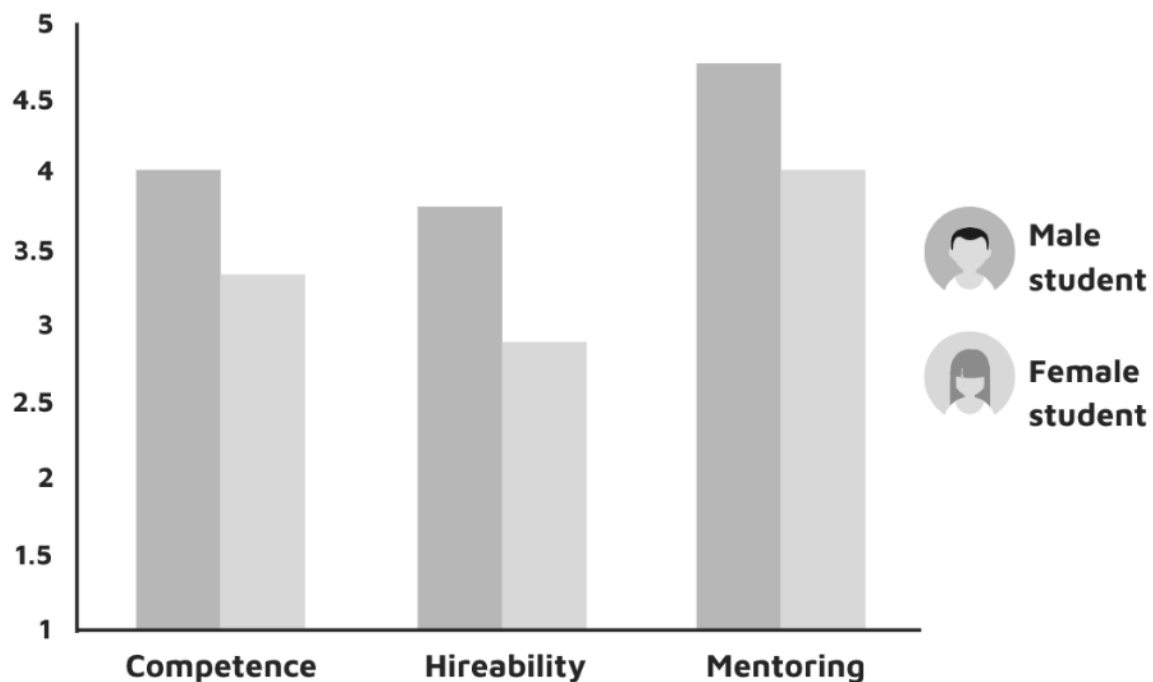


Figure 5 – rating of student applications (image source: Moss-Racusin, Dovidio, Brescoll, Graham & JHandelsman, 2012)

The only way to make truly objective hiring decisions is to remove unconscious bias by design. Unconscious bias training is a useful start, however the impacts of this can taper off if not repeatedly refreshed. As with any good risk abatement, the best mitigation is elimination of the risk. We've already highlighted that the removal of names from applications can be a good step. Other steps that companies can take are to use equitable hiring practices based on skills and merits, where all candidates are subjected to the same aptitude testing and assessment for shortlisting, and the same questions in an interview. The interview panel should be diverse to mitigate unconscious bias as much as possible.

We also need to re-think our advertising for roles, and the evaluation process, and questions, to ensure they attract a diverse pool of talent, and embrace a broad set of skills. A number of studies show that lingual is subtly gender coded and that this can be displayed in job advertisements which can deter women from applying for jobs with gender coding in the advertisements (Barbour, 2021).

NON-REPRESENTATIVE UNIVERSITY ENTRY

As highlighted earlier, women are significantly underrepresented in scientific fields in the world, and engineering is no exception. Data shows women make up approximately 20% of engineering graduates, 14% of engineers, 8% of Chartered Engineers, and only 3% of Fellows (diversityagenda.org).

We are well aware that New Zealand is faced with a skilled labour shortage, and that the demand for engineers, particularly in the water sector in line with the proposed water reforms, will rise exponentially over the coming years. The lack of female engineers is a challenge globally, and our sector cannot afford to be missing on the potential talent on offer within half of our population as a result of this under-representation.

As noted earlier, perception and stereotypes play a significant role in the low numbers of women entering engineering at university. Parents and caregivers also play a critical role in this decision making and can be a barrier to students following an engineering career. Steps to mitigate these issues are needed.

The industry is beginning to tackle this challenge and focus on making engineering more appealing to under-represented groups. The University of Auckland has the South Pacific Indigenous Engineering Students (SPIES) Network, which provides a foundation for Māori and Pacific students studying engineering. The diversity agenda, engineering new Zealand, lead the Wonder Project – engaging with students early in our schools. These are great steps towards progress, however real change starts with each of us as individuals. It is our responsibility to support and promote our industry in schools, to better educate our youth about the opportunities that our sector can provide, and that it is a space where diversity is being increasingly embraced.

MAINTAINING DIVERSITY IN OUR WORKFORCE

Attracting a diverse array of people to the engineering profession is a valuable and important step. However perhaps even more important is that once we build this diversity in our industry, we keep it there. Alarming studies show that nearly one third (29%) of women leave engineering, largely due to an inflexible work environment and a lack of recognition (Nayda et al, 2017) and advancement. Evidence demonstrates that workplace inclusion is more than just the right thing to do, it is a strategic imperative that increases operational performance (Merelo, 2019).

So why do women leave the workforce?

Through our recent Everyday Respect Campaign we ran a number of “listen” sessions. The lived experience of our female colleagues were shared, and the stories were deeply upsetting in many instances. This starts as early as during a woman’s time at university. Engineering students observe and practice engineering principals and practical experience through group projects, where they learn how to think and act like engineers. They quickly discover that collaboration and teamwork constitute a core component of being an engineer.

For many women engineering students, however, their first encounter with collaboration is to be treated in gender stereotypical ways, mostly by their peers. While some initially described working in teams positively, many more reported negative experiences. When working with male classmates, for example, they often spoke of being relegated to doing routine managerial and secretarial jobs, and of being excluded from the “real” engineering work.

Internships and summer jobs provide students additional opportunities to “try on” the role of engineer—and the culture. These opportunities often echo the gender stereotyping experienced in school projects: men were assigned interesting problem-solving tasks where they could develop their analytic and technical skills, while women were often assigned jobs sorting papers, copying, collecting equipment, getting the coffee and taking meeting minutes - tasks they felt did not value or cultivate their skills.

In addition an alarming number of women in engineering have been exposed to sexual harassment in the workplace. One of our staff described an early internship experience on site with a contractor where they were harassed and almost stalked, to the point they had to take out a restraining order.

This second round of gender stereotyping in the workplace following that experienced at university, coupled with unchallenging projects, blatant sexual harassment, and greater isolation from supportive networks, leads many female students to revisit their ambitions. Women begin to question whether engineering is what they really want to do. They often do not enter the profession, or they leave it shortly after commencing. Often to seek alternative careers, to travel, or to have children and then not return.

LEARNINGS FROM OUR INCLUSION AND DIVERSITY JOURNEY

At Jacobs we recognised the number of women leaving engineering as an important issue to address. We also recognise that an inclusive and diverse workforce leads to a more productive business overall where staff feel valued, included and supported.

Jacobs works hard to build an inclusive and diverse workplace that provides our people with the flexibility they need to more easily manage their commitments and responsibilities and achieve a better professional and personal balance. In Australia and New Zealand (ANZ), WORK180 recognized our tangible and meaningful progress in this area by endorsing us as a Flex Able employer for the second year running.

The Flex Able Certification recognizes organizations that walk the talk, demonstrating a clear commitment to flexible working by implementing, promoting and facilitating the uptake of flexible working arrangements for its people.

At Jacobs, we recognize and celebrate working parents. Our ANZ team recently announced its latest flexibility initiative, an additional week of paid parental leave for secondary careers, which allows partners, (same sex or other), to take an additional week of leave at full pay to share the care of their families.

The new initiative is the latest in a steady stream of programs implemented across ANZ during the last few years to promote inclusion in the workplace for all employees, regardless of personal and professional responsibilities. Previous programs include introducing a flexible working policy and toolkit for ease of access, public holiday swaps, flexible hours and workplaces, compressed working weeks, time-in-lieu, part-time work, job shares, and purchased and unpaid leave.

We understand that flexibility isn't solely about parental caregiving responsibilities and can include many other commitments, responsibilities and phases of life including care of a family member or loved one, and sports, cultural and learning commitments as well as working towards significant life changes such as retirement or living with a physical, cognitive, mental health illness or other adaptive challenges.

As part of Flexible Working Week, a WORK180 initiative that encourages people to take the opportunity to discuss how their role might be done more flexibly with their employer, we're driving the conversation around flexibility in our industry.

Jacobs also promote a flexible working culture in ANZ – myFlex. Flexible working is core to our inclusion strategy to consciously include a rich diversity of employees and enable access to equal opportunities, regardless of personal commitments and situation.

At Jacobs, we understand that "inclusion" is a verb, not a noun. It means being transparent and taking action on our statements, commitments and initiatives that drives meaningful, measurable change both in our company and in the communities that we serve. It means creating a workplace where our differences are accepted, celebrated and harnessed to bring the innovative, extraordinary solutions clients demand from us. It means creating a culture of belonging where everyone can thrive — a culture that we call TogetherBeyondSM.

Gender balance is a significant focus at Jacobs. We have a culture of zero tolerance and leadership accountability around harassment and bullying. We are taking deliberate, systemic and progressive action to make our business more inclusive as we redefine our future of work environments. Our Everyday Respect campaign has embedded awareness and accountability in ANZ around respectful behaviour and language and is framed around the Champions of Change Coalition 'Listen, Learn and Lead' approach to driving cultural change. It includes unconscious bias training, and has included confronting, open and raw discussions around lived experiences from our female staff throughout their career histories. Jacobs are soon going to be moving to a cultural balance focus following the success of our gender balance campaign.

OPPORTUNITIES TO IMPROVE DIVERSITY IN OUR INDUSTRY

While there are a number of reasons for the currently limited diversity in our engineering industry, there are also a number of opportunities, or responsibilities, that we can take to improve and promote inclusion and diversity. We have highlighted those around limiting recruitment bias through removing "masculine" or exclusive terminology in job advertisements, and hiding names in applications when assessing.

There are cultural changes organisations can take to further improve the working environment better support diversity in our organisations. Applying a flexible working policy and improved parental leave opportunities which are equal to both parents is another simple but effective action that helps support diversity, health and wellbeing in our staff.

Another action Jacobs has taken is to allow public holiday swaps. We recognise that our staff are culturally diverse and not all of our staff celebrate Christmas and Easter. The opportunity is provided to transfer these public holidays to a date that is more culturally significant to the individual, for examples Hannukah or Eid.

Leading by example is also important, and ensuring that diverse leadership is present within the organisation. People of diverse backgrounds will be more attracted to companies where they feel represented in that companies leadership. A review of your leadership model and a targeted plan of action for it to better represent our diverse peoples of Aotearoa is a great, although potentially confronting, first step.

Jacobs are also looking to embed maori cultural practices within our organisation as part of our cultural journey. Our Maori Inclusion team are looking to instil welcome powhiri for new team members incorporating whanaungtanga, and to include poroaki (farewells) in recognition of their contribution which will be tikanga led.

CONCLUSIONS

The Engineering industry suffers from a lack of diversity. Women are significantly underrepresented with only 14% of engineers being female in New Zealand. In addition almost one third of women leave engineering, largely due to an inflexible work environment and a lack of recognition.

Evidence shows more diverse organisations are generally more successful and effective. Workplace inclusion is therefore a strategic imperative that increases operational performance.

It is important that STEM is attractive to younger children to increase the uptake as a whole, but even more so for under-represented groups in engineering such as females, Māori and Pacifica. Perception and stereotypes play a significant role in the low numbers of women, Māori and Pacifica entering engineering at university. Parents and caregivers play a critical role and can be a barrier to students following an engineering career. Steps to mitigate these issues are needed and there is an onus on all engineers to help better promote STEM careers.

Unconscious bias is a significant contributors to the lack of diversity in engineering and must be removed by design. Additionally we need to ensure advertising for roles uses inclusive language, and that interview panels are diverse, to help improve the diversity of our workforce.

Additional steps that can be taken are embracing flexibility in the workplace and better support for those on parental leave. But perhaps one of the key things that can be done is to improve the diversity at the top of our organisations, to lead by example, and to commit to improve diversity in our industry as a whole. This is a conversation we should be having more and not be afraid to speak up about. A more diverse and inclusive industry will help ensure that the engineering profession remains a productive, exciting, well-resourced and sustainable industry into the future.

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