Women in STEM Decadal Plan Submission

Women in STEMM Australia

October 2018

Women in STEMM AUSTRALIA

Introductory Remarks

The biggest threat to Australia's ability to deliver on the promise its innovation potential is not primarily funding, infrastructure, graduates or corporate support – it is tapping the full strength of the innovation workforce. Many women in STEMM (Science, Technology, Engineering, Maths and Medicine) are a significantly underutilised resource and are significantly underrepresented in leadership ranks in Australian research institutions and on company boards and executive teams therefore leaving a vast amount of talent, investment, networks of influence and potential unrealised in Australia's goal to become a leading knowledge economy.

Some STEMM sectors have a healthy supply of graduates, some sectors even have equal representation of men to women, such as life sciences for example. But some STEMM sectors have as few as 8% representation of women graduates. Yet an overwhelming number of studies confirm that all STEMM sectors suffer considerable attrition of talented women mid-career, a phenomenon that Australia can ill afford.

Many STEMM sectors attract few students into tertiary STEMM studies. Some STEMM sectors suffer from poor female networks at the middle management and leadership level, few STEMM women elect to be startup founders in emerging technology companies and many STEMM women, though highly educated, are victims of workplace discrimination, harassment, bias and the persistent pay gap, even though STEMM is often inaccurately viewed as a 'meritocracy'.

Science, technology, engineering, maths and medicine are central to ensuring a safe, secure food and water supply particularly in the context of climate change, fuels, medicine, transport, security, privacy and interconnectivity in an increasingly technology-centric world. Already Australia is at the forefront of creating alternate bioenergy sources, developing and commercialising digital farm-gate technologies, advancing AI and automation integration in high-value, low-volume advanced manufacturing and fighting antibiotic resistant bacteria. Internationally, we must be able to compete on the global stage of research discovery, the development of new technologies and bringing those innovations to market or we will quickly slip behind and lose out foot-hold in the innovation marketplace. It is clear that STEMM industries are central – and essential – to Australia's economic, health, environmental and social success over the next 50 years. Therefore not utilising all of the available skills, realising all of the investment in talent and not tapping every network of influence is ineffective and short-sighted.

As a nation, we must ensure we are prepared and resourced for global challenges and opportunities. Not only do we need the best infrastructure and investment, but we also need a diverse, readily adaptable highly-skilled workforce that is capable of working with, discovering and commercialising emerging technologies. Evidence-based STEM training and critical thinking skills must be taught and embedded within the Australian school curriculum throughout our education system – private and public – to lay a firm foundation for all students to explore the opportunities of a STEMM future either directly after school or at some time in their careers. We must ensure the 'leaky-pipe' of female STEMM talent is addressed to keep as many women from leaving STEMM industries and to create more flexible opportunities and work-place frameworks to fully engage our whole STEMM workforce as the nature of work changes around the world and our expectations from employers,

academic institutions and government shifts from working in a prescribed traditional way to being more responsive, connected and personalised in terms of how we work.

This document provides a range of aspirational goals and practical solutions for the Women in STEM Decadal Plan, in response to the consultation questions. Some require new investment within the sector, some target existing or projected funds to new areas to increase productivity and value, while some can be done with existing resources and personnel.

To realise Australia's full innovation potential, to invest fully in fostering a knowledge economy and to ensure that every person has the same opportunity as another in our STEMM industries, we need to take action to level the playing field and to ensure that all of our researchers, technologists, developers, inventors and entrepreneurs are engaged equally.

About Women in STEMM Australia

Women in STEMM Australia is a non-profit organisation founded in 2014 which has grown into a nationally recognised association for women in science, technology, engineering, mathematics and medicine (STEMM). We are a community of almost 10,000 women and men who are committed to championing change in supporting and enabling greater gender equity in the STEMM sectors.

Women in STEMM AUSTRALIA aims to connect women in STEMM across every professional sector – education, research, industry, academia and government – regardless of their profession. Our philosophy is “Pay It Forward” and social media is the foundation of our engagement strategy. Membership is free and confirmed by signing up on our website, and or following us on various social media platforms.

We advocate for more women in leadership roles, contributing towards slowing the tide of women leaving STEMM mid-career and encouraging girls to choose STEMM subjects in their education journey.

CONSULTATION QUESTION NUMBER 1:

WHAT CHANGES NEED TO OCCUR TO ENABLE MORE GIRLS AND WOMEN TO PARTICIPATE IN STEM EDUCATION AT ANY LEVEL (PRIMARY, SECONDARY OR TERTIARY)?

WE MUST CREATE AN INSPIRING LEARNING EXPERIENCE IN SCIENCE

Create inspiring and confident science education 'by doing'.

- Require every science teacher in Secondary school to hold a Bachelor degree in STEM as a minimum base line standard. This would lift both the profile and the quality of the system. International bench-marking indicates this works well in the Netherlands where education qualifications are postgraduate only[1]. A science degree provides better perspective and depth of understanding in science teaching compared to the truncated subjects completed by Education graduates. This foundation in STEM is necessary to ensure every student in every classroom receives a high standard of science teaching;

- Support teacher professional development in STEM (which could be done in-house with a science specialist in schools or through centres such as GTAC);

- Provide access (e.g. via a database) to encourage schools to partner with professional societies and social enterprises in the STEM sector and host visiting researchers and entrepreneurs during National Science Week and Innovation Week. e.g. Prime Minister Prize Winning Townsville science teacher Sarah Chapman has partnered with the Australian Institute of Marine Science and Women in Science AUSTRALIA to promote science to girls and boys in school with a photography competition[2];

- Invigorate science education by fast-tracking STEM PhD graduates into teaching – have the experience and know-how to teach 'by doing' with greater confidence. They can then foster this in all teachers within the school while being mentored in education and teaching both established, experienced teachers[3].

- Looking to our future women in science, we must set concrete targets to increase the level of enrolment of girls in the secondary school subjects of advanced mathematics, physics and information technology and technology/engineering. Girls and boys should be regularly exposed to STEM subjects and learn the scientific process as a foundation approach to all critical thinking in any subject.

- *Messaging:*
- Effective messaging can attract girls to consider STEM and help girls to envision themselves as STEM professionals, as well as help to support their key influencers. This includes the consideration of effective messaging strategies from marketing through to role model interactions.
- *Family involvement:*
- The involvement of family, especially parents, in STEM learning experiences is invaluable in

[1] International benchmarking – Netherlands: http://www.ncee.org/programs-affiliates/center-on-international-education-benchmarking/top-performing-countries/netherlands-overview/netherlands-teacher-and-principal-quality/
[2] Shine a light on science: http://woobox.com/pjgtv2
[3] Inspiring science: https://theconversation.com/inspiring-science-fast-track-phd-graduates-into-teaching-14993

providing support for girls engaging in STEM experiences. Parents are role models and key influencers of a girl's career pathway considerations. Involving family in STEM not only enriches a girl's experiences, it also connects STEM into the home.

- Encouraging more opportunity for citizen science projects in communities to deliver activity-based learning that is directly relevant to communities, encouraging people of all ages to engage in STEM.
- *Authentic connections:*
- Connecting with real world experiences that make an impact and diverse female experts for support and inspiration, can provide girls with authentic STEM connections and opportunities that promote sustained engagement.

Create a creative and inspiring learning environment for STEM in schools and connect the different levels of education (primary, secondary and tertiary) with real-word science by establishing "Learning Corridors".

- Support the establishment of programs such as CSIRO's Science in Schools throughout the entire education sector – these could develop into "Learning Corridors" where information, experience and knowledge are shared from primary through to the lab/office. Importantly, this establishes early networks and collaborations that will last into the future;

- Provide funds that allow every Primary school to employ a research-qualified STEM teacher to advise all grade teachers, foster professional development and facilitate specialist programs (e.g. around National Science Week[4] and Innovation Week[5]). Akin to the book/literature specialist – the Librarian;

- Foster ongoing professional development for teachers in STEM. e.g. At the Gene Technology Access Centre[6] (GTAC) in Melbourne and also with the STEM Specialist employed in the school (see above point);

- STEM X Academy professional development for teachers that is cutting edge, relevant and authentic for the classroom. Delivered by the Australian Science Teachers Association

- Support for regional STEM Hubs, an initiative by Inspiring Australia, that provides teacher professional development in regional areas of Australia with a local focus

- Re-instate women in STEM as a higher education equity group. The university programs to recruit and retain female students in non-traditional disciplines (Women in Non-Traditional Areas) were working until funding stopped because the equity group was no longer recognised

- Ensure secure funding for enabling programs to reduce barriers to entry to STEM university courses for those students who have not completed pre-requisite subjects at school and

[4] National Science Week: http://www.scienceweek.net.au/
[5] Innovation Week: http://asiforum.net/
[6] Gene Technology Access Centre: http://www.gtac.edu.au/

ensure there are pathways for mature students to access foundation learning to provide prerequisites for entry into STEM courses.

- Ensure continued support for entry pathways to STEM disciplines including engineering for students without top maths, physics and chemistry.
- Link schools into startup hubs and incubators across Australia. Having a relationship with accelerators or venture catalysts can exposure STEM-centric students to the realities of the commercial marketplace for discoveries and engage them in the business of STEM.

CONSULTATION QUESTION NUMBER 2:

WHAT ARE THE MOST EFFECTIVE THINGS WE CAN DO TO CHANGE INACCURATE STEREOTYPES ABOUT STEM PROFESSIONALS AND THE RANGE OF STEM CAREERS?

MOST EFFECTIVE:

Better inform all STEM-related students about their future options and diversify training to skill them to be job-ready and successful in these roles.

- Students, regardless of gender, are poorly informed of career choices in STEM outside academic research careers. Fields such as advanced manufacturing ICT, digital health, engineering and maths are industry sectors with particularly poor representation of women, specifically senior women as role models and mentors. Too few PhD/ Masters students have meaningful engagement or exposure to industry and entrepreneurship, their professional networks remain deeply under developed, particularly for women. Industry mentorship program such as IMNIS contribute enormously to addressing this imbalance.

- Better educate BSc students on the breadth of career opportunities within the science and research sector, but also beyond it into government, education, business and industry. For example, a pre-PhD mentoring program could be established that includes a wide range of advisors beyond the university sector and outside of the sphere of potential PhD supervisors;

- Diversify PhD/ Masters training to potentially include elective opportunities such as industry placements, finance and business skills, project management and legal skills, to ensure that our best and brightest students are capable of entering a wider range of careers in STEM and have entrepreneurial skills;

- Develop a range of internships for BSc, Masters and PhDs with their key collaborators and affiliated organisations in industry, business, government and education – nationally and internationally. For example, make the CSIRO more accessible to training students and fellows, but also mid-career researchers who are gaining momentum in their research programs. CSIRO could potentially be affiliated to a university/institute (or several) to be an incubator for STEM in collaboration with academia;

- Provide information and resources (e.g. a web portal) to disseminate the latest information and opportunities around careers, scholarships and training.

- Create regular networking opportunities for students to engage with industry leaders, supported by existing peak bodies. This could involve hearing from recruitment agencies, human resources managers in industrial companies and researchers who have made careers in industry.

- *Messaging:*
- Effective messaging can attract girls to consider STEM and help girls to envision themselves as STEM professionals, as well as help to support their key influencers. This includes the consideration of effective messaging strategies from marketing through to role model

interactions.

- Messaging and the way STEM stories are portrayed are vital in breaking through stereotypes. Messaging needs to be front-ended with the portrayal of the difference a person makes or that STEM makes, the last component of the story should be the label or title. There should be a YouTube channel dedicated to stories of real life scientists, telling the humanness of their jobs and reaching the younger demographic that are well engaged on social media and YouTube.

- Ensure that messaging is informed by experts on women in STEM and communication, who are aware of the issues around stereotypes for the various disciplines of STEM and understand how to speak to this demographic to effect change in behaviour or beliefs.

- The women portrayed should be real women to whom young women can aspire, not only the outstanding women who reinforce the perception that a women must be outstanding intellectually to consider science.

MOST EFFECTIVE: CONNECTING SCIENCE WITH THE PUBLIC

We must strive to foster a community that values scientists, clinicians, researchers, STEM industry and entrepreneurs equally.

- Valuing science and the people who work in the various roles in STEM sectors must be encouraged at the highest level of State and Federal Governments and national leadership – in addition to a 'grass-roots' respect from the public and the STEM sector, we need a 'top-down' approach as well;

- Encourage greater engagement with researchers and developers by hosting public talks and events – meet the scientist, science in the pub, science in public, etc.

- Encourage and recognise institutes and individuals who positively engage with the public and communicate their research and development opportunities broadly (e.g. In person but also via national and social media) reinforcing and consistently negotiating a social licence. This could be done through the introduction of a Prime Minister's / Premier's award for science engagement at the individual, team and institute levels;

- Encourage research and development organisations and industry to employ STEM-qualified science journalists and communicators within their Leadership teams to ensure research findings are accurately communicated and that these organisations listen carefully to community attitudes towards emerging technologies and respond accordingly. A good example is the WEHI in the Parkville Precinct. Many institutes are currently using these teams for marketing and fund-raising, science communication to the public should be a central goal – and this will have flow-on benefits when people are engaged.

- Exposure to science success stories needs to come equally from industry as from academia. Industry is sometimes a silent partner in the public STEM dialogue which means that

younger people see fewer STEM employment opportunities or pathways and the public sometimes becomes suspicious or untrusting of industry's vital role in translating science.

- Entrepreneurship in schools is an emerging trend that is dramatically changing the way young people think about career opportunities. Focussing some of this on STEM entrepreneurship – giving students and the public exposure to the realities of translation and the difficulties STEM sectors face in accessing funding and then succeeding in the commercialisation and translation pathway

We must provide high quality science media to the general public by encouraging greater interaction between journalists, scientists and media channels.

- Media organisations should employ or contract health, science and technology-focussed journalists and communicators with STEM-training and/or qualifications;

- Television programs should host more scientists who are skilled communicators. Many young researchers are excellent communicators such as AstroDuff[7] in Australia and Nanogirl in New Zealand[8];

- Encourage programs like Catalyst and organisations like Science Works and Questacon to further actively engage with scientists and help connect scientists with the public. Internship programs could also be developed to ensure young researchers learn how best to communicate their research. This also provides a resource for media into the future;

- We were proud to partner on the Superstars of STEM initiative. This increases the profile and visibility of women in STEMM, but also provides them the relevant skills to effectively communicate their research and their profession to the public. This initiative must ensure there is diversity within the cohort – diversity of profession, career stage, individual identities and in particular women of colour and Indigenous and Torres Strait Islander women in STEMM;

- Encourage media organisations to feature women in STEMM in popular television and radio culture.

- When STEM professional engage on social media, social media fills up with qualified, authoritative content that improves access for the public, science literacy within a population and dispels pseudoscience that unfortunately floods the internet. Encouraging, empowering and training more scientists to use social media strategically will deliver widespread, crowdsourced benefits.

- Lobby grant funding bodies to include science communication as part of core metrics of success, to incentivise scientists' involvement in communication. In the current system, science communication is seen as a "distraction" and is often actively discouraged.

[7] AstroDuff http://www.alanrduffy.com/public/
[8] Nanogirl http://www.nanogirl.net/Nanogirl.net/Nanogirl.html

- Support STEM scientists and entrepreneurs in telling their ‘failure’ stories publically to shift the negative perception Australian’s have around failure and learning and instead build an understanding that not achieving the desired outcome is still new knowledge and valuable.

- Harnessing new media channels such as podcasts and YouTube are critical in engaging with the wider global community and addressing stereotypes. Seeing (or hearing) is believing and nothing is more compelling that an individual telling their own story or engaging directly on a one-to-one basis.

- Bias training is essential in STEM to address stereotypes and to realise the closed messaging that is coming from institutions, industry and government around STEM. There appears to be considerable talk about stereotypes and bias across STEM sectors in Australia, but everyday photographs of all male panels or opening ceremonies feature on social media and mainstream media sending a clear message about STEM.

CONSULTATION QUESTION NUMBER 3:

WHAT MEASURES SHOULD WE BE USING TO DETERMINE ELIGIBILITY FOR CAREER RECOGNITION AND PROGRESSION?

CURRENT SYSTEM:

- Merit is subjective and prone to unconscious bias
- Track record is a faulty measure of merit as it incentivises a competitive and callous work environment and a system that disproportionately disadvantages women, especially women from culturally diverse backgrounds
- Peer review is skewed to advantage large, well-resourced research groups that have a single thought leader – an outdated model which under-values the role of the senior postdoctoral researchers within these groups – many of these roles are occupied by women who work part-time due to carer commitments or who are returning to work or on a slower trajectory with respect to their track record (which is impacted by unconscious bias, cultural issues and career disruptions)

A BETTER ALTERNATIVE:

- A new holistic approach is required which looks at the performance and contributions made by an individual in the context of their circumstances and ability. It is not clear what metrics are best used to measure scientific excellence. We recommend a taskforce to develop this holistic metrics framework.
- Greater mobility between industry and academia is required to enable more flexible, diverse careers
- Longer funding cycles and a greater diversity of funding options are required to support a more varied range of careers in STEM
- One of the key performance metrics for researchers should be their mentorship and sponsorship of more junior researchers, particularly women and researchers from culturally diverse backgrounds
- Organisations and the peer-reviewers must shift the out-dated mindset that research excellence is only about publications and grants. Highly successful researchers can engage broadly with the public, extensively collaborate and carry out a diverse range of different types of research
- Peer review needs an overhaul to ensure that collaborations – and the roles within these collaborations – have greater value
- Mentoring of early-stage researchers must become a tracked metric as this is a value-add to the development and training of students and junior researchers – the best and brightest in Australia

CONSULTATION QUESTION NUMBER 4:

AUSTRALIA HAS MORE THAN 330 DIFFERENT INITIATIVES TO FOSTER THE PARTICIPATION OF GIRLS AND WOMEN IN STEM. WHAT TYPE OF INITIATIVES ARE DEMONSTRATING THE MOST IMPACT IN YOUR AREA OF INTEREST?

MOST IMPACT:

Encouraging national funding bodies for STEM to set minimum requirements for gender equity policies and practices to receive and administer government funding.

- The Science in Australia Gender Equity (SAGE) initiative recognises research organisations and universities that are supporting women in science through a number of different practices and policies, across the different key areas of family/childcare, metrics and culture – importantly, this support is measured over time to determine the impact of implemented policies and practices. Organisations will receive a Gold, Silver or Bronze award following rigorous assessment (per the Athena SWAN charter and guidelines).

- Importantly, the SAGE initiative is a consultative partnership with key stake holders across the sector (including the Academy of Technological Sciences and Engineering, Universities Australia, the Australian Association of Medical Research Institutes, CSIRO, DSTO, ANSTO, National Health and Medical Research Council and the Australian Research Council) and has piloted the UK's Athena SWAN[9] program in Australia[10]. With bipartisan, cross-sector support, the SAGE initiative has the potential to change the gender landscape of Australian science[11];

- The Government could link a research organisation's funding eligibility to its commitment to gender equity. For example, the Government could encourage the National Health and Medical Research Council and the Australian Research Council to adopt a minimum standard of Silver for all administering institutions. Such a landmark announcement by the UK Chief Medical Officer in 2011, Dame Sally Davis, led to direct and immediate action from multiple research organisations within a short period of time[12].

- Grant application criteria should include:
  - a measure of the diversity of the research team;
  - the representation of women at various levels in the research institution, and;
  - budget items for scholarships, postdocs, and travel grants for women.

- The SAGE program and other groups/initiatives that aim to support women in science, develop their professional skills and influence policies to increase gender equity in science, are also supported by the national social enterprise Women in STEMM Australia Incorporated[13].

[9] Athena SWAN UK: http://www.ecu.ac.uk/equality-charters/athena-swan/about-athena-swan/
[10] SAGE Pilot of Athena SWAN: https://www.science.org.au/SAGE/Pilot
[11] Changing the gender landscape of Australian science: http://www.womanthology.co.uk/changing-the-gender-landscape-of-australian-science-dr-marguerite-evans-galea-science-in-australia-gender-equity-initiative/
[12] Athena SWAN Charter: https://www.ucl.ac.uk/ich/athena-swan
[13] A transformational year for women in science: http://womeninscienceaust.org/2014/12/24/a-transformational-year-for-women-in-science/

Supporting women in STEM at the local, state and national level.

- In the Parkville Precinct, the Women in Science Parkville Precinct (WiSPP[14]) initiative and the Women in Science and Engineering (WiSE) group[15] at the University of Melbourne have increased awareness, provided targeted training and contributed to the development of best policy/practices and professional networking. They have identified four core areas that require attention – family/childcare areas, metrics, organisational culture and the hyper-competition and pressure that is now inherent to the process of research funding;

- Such women in science groups can target specific issues and needs within the context of an institute/precinct while collaborating with national groups and being informed about policies at all levels. This should be encouraged and supported sector-wide;

- The Victorian State Government provided funding to develop an Inspiring Women in Science program in partnership with veski and provide Inspiring Women in Science Fellowships[16] that target women who are experiencing a career break due to carer's responsibilities or health issues. Such targeted funds allow women in science to remain more competitive in their research career by providing assistance for travelling with children, ongoing research needs and technical assistance. Veski workshops facilitate state-wide networking across sectors and such programs should be encouraged and supported in every state;

- Looking to our future women in science, we must set concrete targets to increase the level of enrolment of girls in the secondary school subjects of advanced mathematics, physics and information technology and technology/engineering. Girls and boys should be regularly exposed to STEM subjects and learn the scientific process. Connection and collaboration with educators to help elevate STEM and best work with educators.

- Support for regional STEM Hubs, an initiative by Inspiring Australia, that provides STEM experiences in regional areas of Australia with a local focus

- Unconscious bias training for all students, educators, employers and employees. Process for ensuring diversity on selection committees and interview panels, gender-neutral wording of calls to apply to encourage equal numbers of applicants, and gender equity observers on committees/panels to ensure unconscious bias is not a factor in outcomes.

[14] WiSPP www.wispp.org.au
[15] WiSE http://www.wiseunimelb.com/
[16] Inspiring women in science: http://www.veski.org.au/inspiring-women

CONSULTATION QUESTION NUMBER 5:

WHAT SOCIETAL AND REGULATORY ISSUES (I.E. NOT STEM-SPECIFIC) WILL HAVE THE GREATEST IMPACT ON WOMEN IN STEM, AND HOW SHOULD WE ADDRESS THOSE THAT ARE BARRIERS?

GREATEST IMPACT:

Career breaks, especially those taken for family reasons, disproportionately affect women more than men.

- Career breaks, especially those taken for family reasons, appear to have the greatest impact on the careers of working women. Having a young family in the formative years of a career in science affects men and women yes, but appears to disproportionately affect women more. Australia's STEM workforce has the greatest attrition rates between the ages of 35-45 years. Most who leave are women. Furthermore this is a pattern that is mirrored in many sectors beyond STEM.
- Family-friendly policies, such as the provision of affordable and accessible childcare, flexible working and equitable parental leave policies, are important for enabling parents to share the load of caregiving. The biggest shift in this area will happen with a shift in societal attitudes and a fairer, more equitable distribution of caregiving and responsibility in the home.
- Lack of positive communication and popularisation of STEM. Families lack understanding around the career pathways in STEM and as key influencers in girls lives, this can become a barrier to sustained engagement in STEM. Need for a shared vision, priorities and common language around STEM to develop a collaborative, positive and inclusive STEM culture within and outside of education and industry contexts.

Rapid and sustained progress in closing the gender gap in STEM is jeopardized by the persistence of sexual harassment and its adverse impact on women's careers in Australian universities, schools, medical research institutes and in the industry sector.

- National Report on Sexual Assault and Sexual Harassment at Australian Universities survey reports 1:5 students suffer from sexual harassment.[17] There is no information about incidence of sexual harassment in STEM workforce (academic and industry). Nationwide enquiry into sexual harassment in STEM, to complement recently released Australian Human Rights Commission's survey on Australian workforce.[18]
- Improve transparency and accountability by developing, sharing best-practise policies on sexual harassment and ensure institutions adhere to disciplinary action. Lobby national funding bodies to make compliance a minimum standard prior to receiving funding and ensure accountability.
- Foster initiatives that support improvements in culture, not just compliance (eg inclusive leadership training, unconscious bias training, awareness campaigns).

[17] https://www.humanrights.gov.au/our-work/sex-discrimination/publications/change-course-national-report-sexual-assault-and-sexual
[18] https://www.news.com.au/national/breaking-news/two-in-five-women-harassed-at-work/news-story/7d6fe9546f95b5b3d2bdb03b21d1bd72

CONSULTATION QUESTION NUMBER 6:

PROGRESS TOWARDS GENDER EQUITY IN STEM WILL REQUIRE CHANGES. HOW DO WE ADDRESS THE CHALLENGE OF BACKLASH AND RESISTANCE TO THESE CHANGES?

LEADERSHIP, CONSULTATION AND EDUCATION ARE KEY:

- Resistance can come from a range of stakeholders and consultation is important to understand the various reasons for this resistance.
- Education is the greatest weapon in persuading people that change is necessary and about the many potential benefits that a diverse workforce can bring. The arguments made by those who resist are consistent with a lack of understanding about the systematic disadvantages faced by women and misperception that current systems are merit-based. Collaboration with education bodies and more collaboration between organisations within the STEM ecosystem.
- Leaders must articulate the imperative. The potential economic benefits of including women equally in STEM provide a powerful argument. Recent research by McKinsey has shown that if women equally participated in the global economy, they could generate additional GDP worth $28 trillion by 2025.[19] Many of those jobs will be in STEM-related fields.

[19] Still looking for room at the top: Ten years of research on women in the workplace, McKinsey: https://www.mckinsey.com/featured-insights/gender-equality/still-looking-for-room-at-the-top-ten-years-of-research-on-women-in-the-workplace

CONSULTATION QUESTION NUMBER 7:

IF AUSTRALIA IS TO TAKE A STRATEGIC APPROACH TO IMPROVING THE PARTICIPATION OF GIRLS AND WOMEN IN STEM, WHERE WOULD EFFORT BEST BE PLACED?

STRATEGIC EFFORTS:

Encouraging, inspiring and supporting girls in STEM

- A confident and inspiring STEM education is required to encourage young people, especially young women, to choose to pursue STEM subjects. Girls and boys should be regularly exposed to STEM subjects and learn the scientific process.
- Sustainable inclusive education and engagement for all STEM fields, from early childhood through to professional leadership.
-
- Curriculum implementation (both in school classrooms and outreach) that empowers students through choice, skill development and allows students to realise real world applications of STEM.
- Develop, in collaboration with industry, a national student STEM mentorship program.
- This will require better funding and support for science teachers to allow them to deliver exciting and interesting science lessons 'by doing'. Sustained professional development, capacity and engagement of teachers.
- Looking to our future women in science, we must set concrete targets to increase the level of enrolment of girls in the secondary school subjects of advanced mathematics, physics and information technology and technology/engineering.

STRATEGIC EFFORTS:

Support women in STEM throughout their careers

- As already discussed, more Australia's STEM workforce has the greatest attrition rates between the ages of 35-45 years. Most who leave are women. While some choose to leave, many do not want to, but feel they must for a variety of reasons, including the hypercompetitive culture of STEM research, an inability to maintain the elite-level Track Record required to obtain funding, the limited metrics by which we measure success in STEM, unconscious bias and the impact of career interruptions.
- Policies that support working parents such as the provision of affordable and accessible childcare, flexible working and equitable parental leave policies, are important for enabling parents to share the load of caregiving. Additionally, policies which address the hyper-competition and pressure that is now inherent to the process of research funding and maintaining a track record would also help ease the attrition.
- Beyond this, policies which encourage equitable and fair organisational culture, such as the SAGE Program and workplace gender equity initiatives are essential to support women throughout their careers.

CONSULTATION QUESTION NUMBER 8:

IS THERE ANYTHING ELSE YOU HAVE NOT YET COVERED IN YOUR RESPONSE WHICH COULD IMPROVE GENDER EQUITY IN STEM?

AN INCLUSIVE APPROACH

- As noted in the Discussion Paper, the barriers experienced by white, middle-class, cisgender women may be very different to those of women of another gender identity, sexuality, age, religion, ethnicity, socio-economic status or disability.
- An inclusive approach will listen to a diverse range of stakeholders and take the views of the whole community into account. We agree with the importance of an intersectional approach to issues which have to be considered for the Decadal Plan. We encourage all professionals, particularly leaders, to consider participating in a workshop on intersectionality.
- Measures of gender equity in STEMM must be collected and transparently reported within organizations, disciplines, industries, and nationally. To best improve gender equity in STEM a STEM framework needs to be developed, to provide a unified system for reporting and data collection. Having a unified framework enables progress to be tracked, reporting and championing of achievements and identification of gaps that become areas to target.
- A STEM Framework provides guidance for STEM stakeholders around reporting of key targets that incorporate the benchmarks for quality STEM programs. The benchmarks should include:
    - Tailored and accessible
    - Open
    - Evidence-based
    - Evaluated Research-based
    - Diverse
    - Scalable
    - Provides support
    - Engages partners
    - Relevant

Closing Statement

Globally, the STEM workforce is undergoing a transformation. Young researchers are demonstrating their passion and energy for how science is done. Around the world, governments know that science is central to every aspect of our lives. Educators know that students are walking away from this rewarding career. Innovators know they play a key role in translating discovery to beneficial outcomes. Futurists see a more cohesive society which works together for the common good. Though it sounds idealistic, this is how young people see the future too.

It has only been over the past 2-3 years that a real wave of change has been rapidly growing in force and momentum that is breaking the destructive stasis for Women in STEM at this time in Australia.

With the relatively recent development of Women in STEM Australia, SAGE and other similar initiatives across the country, that we feel like there is real change afoot and we are now impatient to see it happen.

There is a very large community of women in STEM in Australia who are champions of change and ready to act when asked to do so. Now we need to create opportunities to use this grassroots support to ensure our efforts have impact.

We need the Government to walk with us to ensure the playing field is levelled and that girls in Australia choosing STEM studies have an equal chance of being leaders in a knowledge-fuelled economy, just as the women mid-career contemplating flexibility to keep careers on track and more senior women who want to ensure that pathway is clear for others to walk in her footsteps.

We need to move beyond the way things have been done for the past 50 years. We need to look forward, embrace this shift and help it gather momentum. We need support from all parties and across all sectors, to position Australia at the leading edge of the wave and develop an innovative science sector with a diverse research workforce that is to be revered world-wide.

When women win – everyone wins in scientific discovery and development.

This submission is authored by the Executive and Board of Women in STEMM Australia following broad consultation.

Contact:

Dr Marguerite Evans-Galea
Co-Chair & C-Founder Women in STEMM Australia
✉ exec@womeninscienceaust.org
☎ 0488438001

Website: www.womeninscienceaust.org
Twitter: @WomenSciAust
Facebook: Women in STEMM Australia
LinkedIn: Women in STEMM Australia (Company Page)