

Dr Sandra Gardam Project Manager, Women in STEM Decadal Plan Australian Academy of Science

Email: womeninstem@science.org.au

Re: ISA Board submission to the Women in STEM Decadal Plan

Dear Dr Gardam,

The Innovation and Science Australia (ISA) Board thanks you for the opportunity to provide comments in response to the Women in STEM Decadal Plan discussion paper. This response reflects the expertise and experience of ISA Board members as well as ISA's strong advocacy for gender diversity as articulated in the strategic plan for the Australian innovation, science and research system to 2030 - *Australia 2030: prosperity through innovation* [the 2030 Plan]¹.

ISA applauds the Australian Government's leadership in developing a Women in STEM Decadal Plan. The ISA 2030 Plan noted the strategic opportunity of making the most of available talent and recommended that the Australian Government maintain a long-term policy commitment to achieving greater gender diversity in the science, technology, engineering and mathematics (STEM) workforce, including by raising awareness of gender diversity in government programs. We see the Decadal Plan you are developing as a very suitable foundation for such a long-term commitment.

In response to the questions raised in the discussion paper we offer the following comments:

1. What changes need to occur to enable more girls and women to participate in STEM education at any level (primary, secondary, or tertiary)?

In the 2030 Plan, ISA notes that the skills needed to perform jobs are changing, with digital and STEM skills playing an increasingly important role. One estimate suggests that ninety two percent (92%) of future jobs will require some form of digital skills². For this reason, ISA's recommendations include a range of measures designed to improve STEM education for all students, male and female. For girls in particular, however, the current gender-based gap in participation in STEM education³ takes on added urgency because these trends mean that it is

¹ Innovation and Science Australia (2018) *Australia 2030: prosperity through innovation*, <u>www.industry.gov.au/isa</u> ² Stanwick, J, Lu, T, Rittie, T & Circelli, M (2014) *How young people are faring in the transition from school to work*, Foundation for Young Australians, Melbourne, p30.

³ Office of the Chief Scientist 2016, *Women in STEM: a story of attrition*, Datasheet 2, Australian Government, Canberra, <u>http://www.chiefscientist.gov.au/wp-content/uploads/OCS_Women_in_STEM_datasheet.pdf</u>

not simply an issue of education for today, but rather an issue of equitable economic participation for the future.

Strategies to address the gender gap in STEM should start by recognising that the declining participation of girls in STEM is not due to an inherent lack of ability, but due to societal and gender disparities⁴. A recent study of 1.6 million students showed that the distribution of boys' and girls' grades in STEM are more similar than in non-STEM (where girls perform better) and that the top 10% of a STEM classroom would contain equal number of boys and girls⁵. Not only are girls good at STEM, but they are interested in it. Research by Microsoft suggests that many girls are attracted to STEM by 11-12 years of age, but if this interest is not cultivated it declines steeply at ages 15-16, after which it recovers only to a limited extent⁶.

The 2030 Plan includes, under Imperative 1, recommendations to address declining STEM skills for both girls and boys⁷. These include:

- 1. investing in teacher quality; noting around 40% of maths teachers are teaching "out of the field in which they were trained"⁸;
- 2. improving student STEM aspirations; and
- 3. better preparing of students for post-STEM qualifications and careers.

These should be at the heart of any decadal plan for STEM, regardless of gender focus. However, there is evidence that they are particularly important for girls. For example, UNESCO reports that girls' engagement in STEM can be enhanced by curricula that provides opportunities for real-life STEM experiences that appeal to their motives and interests, providing hands-on engaging activities, apprenticeships, and mentoring⁹.

2. What are the most effective things we can do to change inaccurate stereotypes about STEM professionals and the range of STEM careers?

ISA recommends promoting role models to combat inaccurate stereotypes surrounding women in STEM

Genuine and accessible female STEM role models are essential for combatting inaccurate STEM stereotypes which are predominantly portrayed as male. As the rallying cry aptly puts it, "You can't be what you can't see". Visible role models will help to normalise the fact that scientists, technologists, engineers and mathematicians include women.

https://news.microsoft.com/uploads/2017/02/Microsoft girls in STEM final-Whitepaper.pdf

⁴ OECD (2015) *The ABC of Gender Equality in Education: Aptitude, Behaviour, Confidence*. PISA, OECD Publishing. <u>http://dx.doi.org/10.1787/9789264229945-en</u>

 ⁵ O'Dea, RE; Lagisz, M; Jennions, MD; Nakagawa, S. (2018). Gender differences in individual variation in academic grades fail to fit expected patterns for STEM. Nat Commun. 2018 Sep 25;9(1):3777. doi: 10.1038/s41467-018-06292-0.
⁶ Microsoft (2017). Why Europe's girls aren't studying STEM.

⁷ Innovation and Science Australia (2018) *Australia 2030: prosperity through innovation*, <u>www.industry.gov.au/isa</u> (pages 26-37).

⁸ Weldon, P 2016, Out-of-field teaching in Australian secondary schools, Policy Insights, Australian Council for Educational Research, Melbourne, <u>http://research.acer.edu.au/policyinsights/6/</u>

⁹ UNESCO (2017) Cracking the code: Girl's and women's education in science, technology, engineering and mathematics (STEM). United Nations Educational, Scientific and Cultural Organization. http://unesdoc.unesco.org/images/0025/002534/253479E.pdf

A number of programs exist to raise the profile of successful women in STEM careers. ISA supports the Superstars of STEM¹⁰ initiative, which trains women in successful STEM careers to help them share their stories more widely in contemporary media. ISA recommends public and private sector organisations should implement similar initiatives seeking to maximise role models' visibility and reach. Role models' messages should focus on how they reached their position, to help make the career paths of women in STEM transparent and accessible.

ISA recommends role models be presented and made accessible across not only the education system^{11,12}, but in STEM industry sectors and corporate workforce¹³. There is a lack of women role models in both industry and academia. Engineers Australia data shows that out of 100,000 members, there are only 0.025% women Fellows, compared with approximately 6% male Fellows¹⁴.

ISA also believes there is a greater role for mass media and social media in changing STEM stereotypes. Media organisations should be encouraged to represent gender equitably across all STEM content – including in interviews, news stories, images, and case studies. Australian young women are the highest users of social media¹⁵, and women in STEM role models should harness this wide reach to celebrate and amplify their presence in STEM.

ISA notes the importance of debunking common misconceptions about women in STEM

The Office of the Chief Scientist released a 2016 analysis of data which debunks common misconceptions about Women in STEM including that:

- girls are bad at maths;
- most women are disinterested in careers in engineering, physics and ICT;
- the gender pay gap doesn't exist; and
- the battle against sexism in science has been won¹⁶.

ISA believes more could be done by Government to counteract these myths and promote the facts in public debates on women in STEM.

3. What measures should we be using to determine eligibility for career recognition and progression?

¹⁰ <u>https://scienceandtechnologyaustralia.org.au/list/2017-superstars/</u>

¹¹ Microsoft (2017). Why Europe's girls aren't studying STEM.

https://news.microsoft.com/uploads/2017/02/Microsoft_girls_in_STEM_final-Whitepaper.pdf

¹² UNESCO (2017) Cracking the code: Girl's and women's education in science, technology, engineering and mathematics (STEM). United Nations Educational, Scientific and Cultural Organization.

http://unesdoc.unesco.org/images/0025/002534/253479E.pdf

¹³ Professionals Australia (2018). All Talk: Gap between policy and practice a key obstacle to gender equity in STEM. Unconscious gender bias in the STEM professions – 2018 Women in STEM professions survey report <u>http://www.professionalsaustralia.org.au/professional-women/wp-content/uploads/sites/48/2018/08/2018-Women-in-STEM-Survey-Report_web.pdf</u>

¹⁴ Unpublished data provided by Dr. Marlene Kanga Engineers Australia National President from 2013 to 2014 ¹⁵ <u>http://www.roymorgan.com/findings/7584-social-media-minutes-by-gender-age-march-2018-201805110812</u> <u>accessed 4/10/18</u>

¹⁶ Office of the Chief Scientist (2016) *Busting myths about Women in STEM*, Occasional Paper Series No. 13, Australian Government, Canberra, <u>https://www.chiefscientist.gov.au/2016/11/occasional-paper-busting-myths-about-women-in-stem/</u>

ISA's experience is that even when women enter the STEM workforce, attrition and barriers to career progression result in a lack of women in leadership positions. Evidence for this is provided by the Workplace Gender Equality Agency (WGEA), which notes that of companies who report¹⁷, women:

- hold 13.6% of chair positions and 24.9% of directorships; and
- represent 16.5% of CEOs and 29.7% of key management personnel.

Nearly three quarters (70.9%) of reporting organisations have a male-only team of key management personnel. Recent statistics (July 2018) from the Australian Institute of Company Directors (AICD) reveal that 28.2% of directors in ASX 200 are women, although promisingly the data shows that women comprise 50% of new appointments to ASX 200 boards in 2018¹⁸. Engineers Australia census data shows the higher likelihood of women leaving engineering compared to men¹⁹. This is attributable to several factors, including the pressures of child rearing²⁰, and dissatisfaction with workplace culture²¹.

These statistics are a powerful indicator of the need for improved strategies to enhance career recognition and progression for women in STEM. However, these are high-level, aggregated metrics reported by third parties and do not assist organisations better understand their gender composition to enable organisation-specific actionable plans to be developed. ISA believes that achieving gender equity will be underpinned by robust firm-diversity strategies which include and are guided by firm-level metrics.

ISA recommends organisations regularly collect a standard set of metrics, analyse, and report on gender data and develop actionable and measurable plans to address deficiencies

ISA Board member Dr. Marlene Kanga has developed a strategic approach to addressing diversity in STEM organisations²² entitled *A strategy for inclusiveness, well-being and diversity in engineering workplaces.* This strategy is endorsed by the Workplace Gender Equality Agency and the former Sex Discrimination Commissioner, Elizabeth Broderick. The strategy sets out specific leading and lagging indicators and importantly is a practical approach that has been adopted by engineering organisations.

In keeping with the saying that "what gets measured gets managed", the strategy identifies specific examples of metrics that are useful for organisations to measure, including:

- gender composition of the workforce and of management and leadership roles;
- gender composition of applicants;

 $^{^{17}}$ That reporting companies are those with greater than 100 employees

¹⁸ <u>https://www.wgea.gov.au/sites/default/files/Stats at a Glance.pdf</u>, accessed August 2018.

¹⁹ See: *Engineers Australia: The Engineering Profession in Australia: A Statistical Overview Feb. 2017*, <u>https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-03/The%20Engineering%</u> <u>20Profession%20-%20A%20statistical%20overview,%2013th%20edition%202017.pdf</u>, accessed July 2018

²⁰ See: *Engineers Australia: The Engineering Profession in Australia: A Statistical Overview Feb. 2017*, <u>https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-03/The%20Engineering%</u> 20Profession%20-%20A%20statistical%20overview,%2013th%20edition%202017.pdf, accessed July 2018

²⁰ See: *STEMming the Tide – Why women leave engineering*, <u>http://ucd-advance.ucdavis.edu/post/steming-tide-why-</u> women-leave-engineering, accessed July 2018.

²² Marlene Kanga, "*A strategy for inclusiveness, well-being and diversity in engineering workplaces*", November 2014, <u>https://www.wgea.gov.au/sites/default/files/Inclusiveness Wellbeing Diversity Strategy.pdf</u>, accessed August 2018

- gender composition of staff turnover; and
- workplace incidents of bullying and sexual assault.

ISA recommends that at a minimum organisations seek to collect and analyse the metrics outlined above. ISA suggests that the Australian Academy of Science (AAS) take the lead in promoting the collection of a standard set of gender diversity metrics such as those outlined above. A standard, AAS-endorsed set of metrics would assist smaller organisations (who may not be currently reporting) to determine what to measure.

Greater consistency of metrics and measurement would also aid policy makers and researchers longitudinally track Australia's performance in gender equity in STEM. Organisations should also seek to collect data on other diversity dimensions, such as ethnic and linguistic diversity. This diversity data should be used by organisations to measure and manage practices surrounding recruiting, retaining and promoting staff.

ISA recommends that strong leadership is key to improving the participation of women in STEM careers

Whilst a strong evidence base is critical to understand where gender gaps in organisations exist, there is a critical need for strong leadership. An advanced nation like Australia needs STEM sector leaders to champion a cultural shift in their organisations by setting a strategic vision for an inclusive workforce that values every member and lead the policies that follow to achieve this goal.

Leadership can adopt practical strategic approaches to achieving cultural change, such as those proposed for the engineering sector. Australia is not alone in looking to address this issue, with New Zealand²³ and Canada²⁴ also looking to achieve cultural shifts in their engineering sectors.

ISA recommends that best-practice approaches already being applied in private and public sector organisations be recognised and applied more broadly

There are good examples of organisations, both within and outside of government, that are implementing initiatives to improve equity for women in STEM careers. These initiatives should be celebrated and adopted by organisations more broadly.

For example, ISA commends the gender equity initiatives undertaken by the National Health and Medical Research Council (NHMRC) to improve the retention and progression of women in health and medical research careers. This includes leading by example (by considering and responding to gender-related success rates and reviewing gender composition on peer review panels); challenging bias and ensuring fair and inclusive funding process (including policies on career disruption and part-time awards); and supporting change in Australia's research community²⁵.

²³ <u>https://www.engineeringnz.org/resources/women-engineering/</u>, accessed August 2018.

²⁴ <u>https://engineerscanada.ca/diversity/women-in-engineering/30-by-30</u>, accessed August 2018.

²⁵ <u>https://www.nhmrc.gov.au/research/women-health-science</u>

The NHMRC has also adopted a practice of researcher track record assessment 'relative to opportunity'²⁶, which takes into consideration how career progress may be impacted by career disruption. This addresses the problem that females who take time away from their research careers during pregnancy and carer responsibilities may have been wrongly assumed to have gone through an unproductive period in their career.

The Australian Public Service (APS) could be regarded as an exemplar because it encourages equal pay for equal work. There is transparency in pay scales within and between APS agencies. ISA recommends that employers of STEM graduates in the corporate sector should be required to adhere to best practices recommended by the Fair Work Ombudsman²⁷ which include ensuring that remuneration policies and practices are transparent; that flexible work arrangements are in place to encourage women to return to the workplace after periods of leave; and that audits are conducted to identify issues and areas for improvement in remuneration equity.

Outside of government, the Walter and Eliza Hall Institute (WEHI) demonstrates commendable strategies to improve gender equity for researchers. WEHI Director Professor Doug Hilton has been a long-term advocate of creating a working environment which addresses traditional barriers to female workplace participation in the health and medical research field.

As acknowledged in WEHI's gender equity policy "although women have made up the majority of biology undergraduates for decades, progress towards parity at senior levels has been glacial". WEHI is actively doing more to access the entirety of its talent pool through a variety of initiatives including²⁸:

- Allowing women additional time to renew contracts in the event that their career has been interrupted due to child bearing;
- Offering a number of fellowships and awards specifically for women;
- Offering maternity and paternity leave, as well as flexible working arrangements; and
- Setting equal gender representation targets at institute-sponsored symposia.

ISA notes that the current balance of Government effort favours increasing participation of women and girls in science in schools and in the university and research sector. ISA recommends that Government identify opportunities to work with the private sector to identify initiatives that have been successful and together promote the success stories and consider cross-sector application.

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?

ISA recognises the programs and initiatives that support women in STEM

²⁶ NHMRC Funding Rules 2017, Section 6.2 Relative to Opportunity. <u>https://www.nhmrc.gov.au/book/nhmrc-funding-rules-2017/6-assessment-criteria</u> accessed 27/08/18

 ²⁷ Fair Work Ombudsman (2016) *Gender pay equity* https://www.fairwork.gov.au/how-we-will-help/ templates-and-guides/best-practice-guides/gender-pay-equity#Checklist-for-pay-equity-best-practice
²⁸ https://www.wehi.edu.au/about/institute-life/gender-equity

The 2030 Plan specifically recognises that Australia's Innovation, Science and Research (ISR) system is part of a gender-unequal society, but highlights several encouraging initiatives that support women entrepreneurs²⁹. These include female-focused incubators and accelerators such as Springboard Enterprises and SheStarts; the gender diversity priorities of entrepreneurial industry bodies such as LaunchVic; and the diversity handbook of the Australian Private Equity and Venture Capital Association.

Further, ISA recognises the potential value of the Department of Industry, Innovation and Science's Women in STEM and Entrepreneurship Program. The program aims to increase women's awareness of and participation in STEM and entrepreneurship, and to boost the number of women in senior leadership positions across the ISR system. ISA also recognises the potential for initiatives that bring together leaders to advance women's profile across Australian and global industry, innovation and science, such as that provided by the Industry, Innovation and Science Women's Advisory Roundtable³⁰.

ISA recommends that impact evaluation be built into all women in STEM initiatives

ISA acknowledges the range of initiatives that aim to foster participation of women in STEM. However, ISA believes it is important to look through the program level to understand the number of individuals supported under the 330 programs represented in the Women in STEM Decadal Plan discussion paper attachment³¹, and the longevity of those programs. While these initiatives may be founded on laudable goals, it will be essential to monitor and evaluate these programs to determine whether they are having the intended impact, and to modify or extend them in light of this evidence base.

ISA recommends that, more generally, evaluation be incorporated into all program initiatives to ensure that there is a robust evidence base to understand impact. This will help to ensure that limited resources are directed appropriately. The emphasis should be on backing those programs that demonstrably work, and reallocating resources away from those that do not. Some programs will be effective at large scale, whilst others will have niche impact – but all programs should be supported by data and evaluation.

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 barriers?

ISA recommends developing strategies to contend with implicit and explicit biases

There is a body of evidence that women face unconscious gender bias³² in the workforce and this is not only related to STEM-specific sectors. ISA recommends that workplaces equip employees with training to address unconscious bias. ISA commends the Australian Research

²⁹ Innovation and Science Australia (2018) *Australia 2030: prosperity through innovation*, <u>www.industry.gov.au/isa</u> (pages 55-56)

 ³⁰ <u>https://www.industry.gov.au/strategies-for-the-future/womens-advisory-roundtable</u>, accessed 03/10/18
³¹ Australian Academy of Science (2018) Women in Science, Technology, Engineering and Mathematics (STEM)
Decadal Plan. <u>https://www.science.org.au/support/analysis/decadal-plans-science/decadal-plan-women-stem</u>

³² Unconscious gender bias is defined as unintentional and automatic mental associations based on gender, stemming from traditions, norms, values, culture and/or experience.

https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---act_emp/documents/publication/wcms_601276.pdf

Council (ARC) for introducing unconscious bias training as part of the induction training for all new College of Experts members³³.

ISA recommends broader adoption of concerted strategies for combatting unconscious biases spanning across a number of elements – from recruitment, to career development and advancement, to retention. At the recruitment stage, this should include ensuring job descriptions contain gender-neutral language, including images of women in recruiting material, employing blind candidate screening processes, and implementing training that targets and mitigates unconscious biases^{34,35}.

ISA recommends all workplaces introduce **parental** *leave policies and normalise the take-up of these as well as flexible working arrangements by both male and female employees*

ISA Board members have been vocal in public on issues relating to parental leave over many years^{36 37}. ISA recommends that organisations introduce parental leave that can be accessed by both men and women. Without a workforce that enables men to adopt work practices that enable them to take on carer (including but not limited to paternity leave) roles, women will bear the burden of part-time work and the consequences that this can have on career progression³⁸. A report by the Workplace Gender and Equality Agency (WGEA) shows that countries with flexible parental leave policies and with higher parental leave payments demonstrate much greater uptake of parental leave by men and enable both genders the opportunity to take on carer responsibilities³⁹.

Although many organisations are implementing provisions for paternity leave, it is essential that these formal provisions are accompanied by cultural changes that promote and normalise men taking on carer responsibilities. It is clear that up-take of paternal leave is low in Australia relative to many other OECD countries as outlined in the WGEA report⁴⁰.

ISA recommends normalising fathers'/partners' utilisation of parental leave and flexible working arrangements to meet caring requirements. This requires leadership, a supportive workplace culture and senior male role models to champion and encourage the use and uptake of parental policies by men. To improve utilisation of paternity leave, Australia should consider looking to

https://goodlifepodcast.podbean.com/e/21-maile-carnegie-on-managing-people-and-coping-with-email/

³⁷ ISA Board member Daniel Petre also advocates for the importance of work life balance for men in his book titled *"Father Time"* on how men can make time for their families. (Daniel Petre, *Father Time*, Ventura Press Australia, second edition 2016. <u>https://www.booktopia.com.au/father-time-daniel-petre/prod9781925183405.html</u>) He has spoken of the important role for women in venture capital (Women in VC Forum, Feb 2018).<u>https://www.afr.com/news/special-reports/businesses-of-tomorrow/the-rise-of-femaleled-businesses-and-entrepreneurs-20180304-h0wyzg</u>

³³ <u>http://www.arc.gov.au/news-media/news/promoting-and-improving-gender-equality-research-work-progress</u>

³⁴ https://www.catalyst.org/blog/catalyzing/closing-stem-gender-gap 4/1/2018

³⁵ <u>http://www.professionalsaustralia.org.au/professional-women/wp-content/uploads/sites/48/2018/08/2018-</u> Women-in-STEM-Survey-Report web.pdf

³⁶ ISA Board member Maile Carnegie's Good Life interview explores how she is able to balance the demands of corporate senior executive roles with her parenting responsibilities at home.

³⁸ Annabel Crabb, *The Wife Drought: Why women need wives and men need lives*, Ebury Australia, 2015.

³⁹ https://www.wgea.gov.au/sites/default/files/Parental-leave-and-gender-equality.pdf

⁴⁰ https://www.wgea.gov.au/sites/default/files/Parental-leave-and-gender-equality.pdf

other countries – such as Iceland, Sweden, and Norway⁴¹ – to identify best-practices and how they may be applied here.

6. Progress towards gender equity in STEM will require changes. How do we address the challenge of backlash and resistance to these changes?

ISA recommends gender equity be positioned as a national competitive advantage

There is compelling evidence that gender diversity improves innovation in organisations⁴². Providing practical support to improve female participation in currently under-represented STEM fields is vital to a high-performing science and innovation system – particularly as the future of work and Australia's economy is increasingly impacted by digital transformation.

Achieving gender equity will also have wider societal benefits for all including:

- Inspiring the next generation of the STEM workforce to believe that both girls and boys can participate in STEM careers to ensure a pipeline of role models is available; and
- Creating harmonious, productive workplaces for not only women but for all participants of the workforce.

In order for Australia to continue to prosper and grow, it is vital that we leverage the talent pool from both genders. The Women in STEM Decadal Plan discussion paper rightly acknowledges that gender diversity stimulates productivity, and it is well documented that closing the gender gap has a powerful effect on driving GDP growth⁴³.

ISA recommends the Decadal Plan explicitly call out the multiple benefits from greater female participation in STEM. Diffusing the message that diversity and gender equity underpin strong economies and more successful organisations is a powerful way to minimise any backlash that may arise in response to changes that are implemented to improve gender equity.

7. If Australia is to take a strategic approach to improving the participation of girls and women in STEM, where would the effort be best placed?

ISA recommends an evidence-based approach is utilised to determine where to prioritise efforts

Where resources are limited, prioritisation of future support should focus on where:

• the need is greatest (for example, where significant under-representation of girls and women remains);

⁴¹ <u>https://www.wgea.gov.au/sites/default/files/Parental-leave-and-gender-equality.pdf</u>

⁴² Diaz-Garcia C, Gonzalez-Moreno A and Saez-Martinez FJ (2013) *Gender diversity within teams: Its impact on radicalness of innovation.* Innovation: Management, policy and practice. vol. 15. no. 2. pg. 149–160; McKinsey & Company (2016) *Women matter.* Accessed at http://www.mckinsey.com/global-themes/women-matter; Ruiz-Jimenez JM and Furentes-Fuentes MdM (2016) *Knowledge combination capability and innovation: the effects of gender diversity on top management teams in technology-based firms.* Journal of Business Ethics. vol. 135. no. 1. pg. 503–515; Ruiz-Jimenez JM and Furentes-Fuentes MdM (2015) *Management capabilities, innovation, and gender diversity in the top management team: an empirical analysis in technology-based SMEs.* Business Research Quarterly. vol. 19. no. 1. pg. 107–121.

⁴³ World Economic Forum (2017). The global gender gap report. World Economic Forum, Switzerland. <u>http://www3.weforum.org/docs/WEF_GGGR_2017.pdf</u>

- there is a growing level of gender disparity (for example, based on analysis of predicted future workforce skills profiles); and
- current support is showing demonstrated positive outcomes (via evaluation).

ISA believes sufficient evidence exists to focus efforts as a first priority on education and engaging girls in STEM from an early age

ISA recommends that engaging girls from an early age through education is critical in improving participation of girls in STEM. As discussed in the response to question 1, girls first develop an interest in STEM from a young age, but if this interest is not cultivated it wanes by their late teens⁴⁴. The most valuable strategies are likely to include providing girls with access to role models; delivering education through inspirational, supportive and engaging teaching practices; providing STEM education that includes practical experiences; promoting initiatives that build confidence; and including both girls and boys in the dialogue surrounding equity in general, and STEM in particular.

ISA recommends the greatest area of need is within the information and communication technology (ICT) and engineering domains

Women represent only 12% of the whole engineering workforce⁴⁵, and 28% of the ICT workforce (compared to an average of 45% in all other professional industries)⁴⁶. Women represent under 15% of graduates at the bachelor level in both information technology and engineering⁴⁷, which obviously has a flow on effect on the number of women entering careers in these fields.

ISA recommends the Decadal Plan acknowledge the urgent need for increasing women's participation in ICT and engineering and ensure that strategies are tuned to addressing the specific barriers in these domains.

8. Is there anything else you have not yet covered in your response which could improve gender equity in STEM?

The supporting discussion paper correctly identifies many of the relevant issues. Additional areas of focus that ISA views as particularly important are described below.

ISA believes that industry must have an integral role in the roadmap developed by the Decadal Plan

The discussion paper states that the roadmap provided by the Decadal Plan will help sustain increased STEM participation across a woman's lifespan and career path, from school through to retirement. ISA commends the discussion paper for broadening the consideration of women in

⁴⁴ Microsoft (2017). Why Europe's girls aren't studying STEM.

https://news.microsoft.com/uploads/2017/02/Microsoft girls in STEM final-Whitepaper.pdf

 ⁴⁵ <u>https://www.engineersaustralia.org.au/News/diversity-engineering-12-women-not-enough</u> Accessed 12/10/18
⁴⁶ Deloitte Access Economics. (2018). ACS Australia's Digital Pulse: Driving Australia's international ICT

competitiveness and digital growth. <u>https://www.acs.org.au/content/dam/acs/acs-publications/aadp2018.pdf</u> ⁴⁷ Office of the Chief Scientist 2016, *Women in STEM: a story of attrition*, Datasheet 2, Australian Government, Carbon et al. (2015) Warnen in STEM attack and a story of attrition attribute at a story of attrition attribute at a story of attribute at a st

Canberra, http://www.chiefscientist.gov.au/wp-content/uploads/OCS Women in STEM datasheet.pdf

STEM beyond the education and research systems to include the STEM workforce and industry. Further, ISA highly recommends that the road map be developed in consultation with industry.

ISA recommends that the Decadal Plan commits to better understanding the barriers to culturally and linguistically diverse women in STEM

ISA recognises that women in STEM are not a homogeneous group, and that culturally and linguistically diverse (CALD) women in STEM may face additional or different barriers. While rigorous analyses of CALD women in STEM is lacking (which would be resolved if this metric formed part of standard diversity reporting), it is known that CALD women in Australia are under-represented in leadership roles⁴⁸. For example, only 2% of ASX directors are CALD women. ISA commends the Women in STEM Decadal Plan discussion paper for recognising this issue, and encourages further analysis of this issue as a priority.

The opportunity in developing the Decadal Plan is not merely to right a historical wrong, but to seize a powerful source of future advantage. ISA welcomes and will continue to actively promote initiatives that enhance greater participation of women and girls in STEM-related education and jobs. You can count on us to remain passionate advocates for greater diversity throughout the life of this Decadal Plan.

Thank you for the opportunity to contribute to this important piece of work.

Yours sincerely

Charles Day CEO

On behalf of Mr Bill Ferris AC, Chair

15 October 2018

⁴⁸ Diversity Council Australia (2017) Cracking the Glass-Cultural Ceiling: Future Proofing Your Business in the 21st Century, Sydney, Diversity Council Australia.