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Building Australia's Capacity and Gender Inclusion in STEM Sectors

The Australian STEM Partnership – Overview

February 2017

In partnership with

CommonwealthBank

ACER
Australian Council for Educational Research

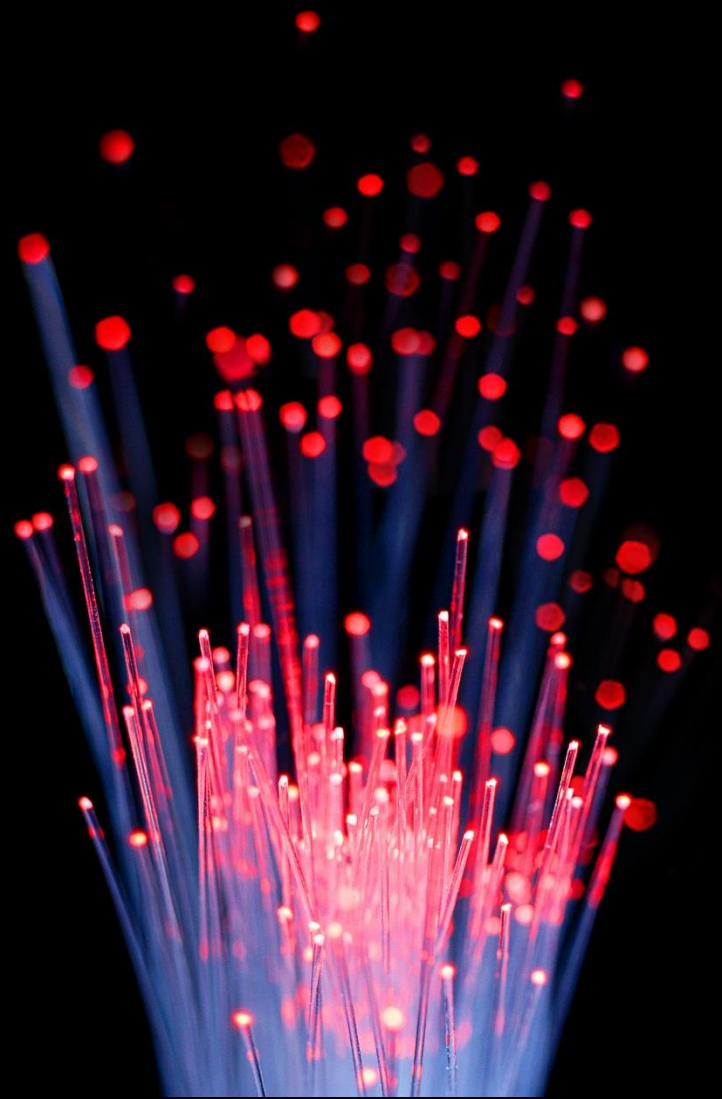
Australia's Future Competitiveness

Levels of science, technology, engineering and mathematics (STEM) will be important determinants of a nation's future productivity and economic competitiveness. Future STEM levels will determine a nation's ability to contribute to, rather than simply consume, scientific and technological breakthroughs and advances. At the same time, a growing percentage of future occupations will require high levels of STEM learning and skill. And beyond this, higher levels of scientific literacy will be required in society if citizens are to make informed decisions about environmental, health, technological and privacy issues that will impact them directly.

In this context, it should be of concern that there has been a steady decline in the mathematical and scientific literacy levels of Australian 15 year olds since at least the turn of the century. The decline in mathematical literacy has been dramatic. Australia has declined from being one of just a handful of very high performing countries in 2000 to performing little better than the OECD average in 2012. An indicator of this decline is the observation that the performance gap between Australia and South Korea increased by the equivalent of a full year of school between 2000 and 2012.

It also should be of concern that there has been a steady decline over several decades in the percentage of Australian Year 12 students choosing to study advanced mathematics and science subjects. This decline has been particularly marked in the subjects Advanced Mathematics and Physics.

Professor Geoff Masters, AO
Chief Executive Officer, Australian Council for Educational Research Foundation Member of the Australian STEM Partnership



Executive Summary

- This document presents **an innovative partnership approach to addressing the national-scale socio-economic development challenge of Australia's Science, Technology, Engineering and Mathematics (STEM) capacity**; this work assembles key findings from primary research conducted by Australia's learned institutions and identifies gaps and overlaps in the current STEM activity in Australia
- **Australian student performance has progressively decreased and gender is a risk factor of lower performance in mathematics**; the distribution of our students' performance is more concerning as **over 60% of Australian secondary students are in the lowest levels of the international PISA results**; in contrast top performer Singapore has 35% of its students in the high performing band compared to only 11% of students in Australia
- A **baseline and benchmarking activity has been completed** to understand the focus of over 250 STEM initiatives operating in Australia, as well as selected benchmark countries that are deemed to be leading the way in development of national STEM talent; from this activity it is clear that there are gaps in Australia's portfolio of interventions
- **The *Australian STEM Partnership* is being developed to enable demand-side employers to take stronger ownership of the issue**; **it will form the backbone for all actors involved in a national-scale solution**; this Partnership must enable interventions that enhance supply, enhance employment environments and minimise talent losses
- The Partnership will fulfil three critical gaps in **establishing an enabling platform for a coordinated and national-scale reform** in both supply and demand for STEM talent; in **establishing a common resource to evaluate and select STEM interventions** in local contexts; and in-turn, to **enable mobilisation of impact investment opportunities** for deployment of private sector and investment capital
- **The next stage of the process seeks government and private sector engagement to establish the partnership**

The Australian STEM Partnership roundtable will discuss new opportunities to improve Australia's STEM capacity

Industry-Government Roundtable (Chatham House Rules)

February 22nd | 11:00-12:30

Level 19, Commonwealth Bank of Australia Head Office Tower One, Darling Park, 201 Sussex Street Sydney NSW 2000

Agenda

11:00 – Welcome

11:05 – The emerging role of private sector actors in socio-economic development programs

11:15 – Roundtable discussion

(i) how can the collective resources of the public and private sectors be optimised to improve the quality and quantity of our national STEM capacity?

(ii) where are the partnership opportunities between the education sector and industry?

12:15 – Wrap-up and Next Steps

12:30 – Close

Attendees

- Ann Sherry AO, Chair
- Dr John Ainley, Australian Council for Educational Research
- Monica Bradley, Purposeful Capital
- Prof Ian Chubb AC
- Hetty Cislowski, Palladium
- Tony Cook PSM, Department of Education and Training
- Cassian Drew, Palladium
- Dr Roslyn Priesley, Department of Education and Training
- Mark Scott AO, NSW Department of Education and Training
- Vittoria Shortt, Commonwealth Bank of Australia
- Helen Steel, Shared Value Project
- Dr Chris Such, Dulux Group

Unable to attend on this occasion:

- Anne-Marie Lansdown, Office of the Chief Scientist
- Prof Geoff Masters AO, ACER
- Prof Suzanne Miller, Queensland Chief Scientist
- Dr Elaine Stead, Blue Sky Alternative Investments
- David Thodey AO, CSIRO

Our understanding of the current situation

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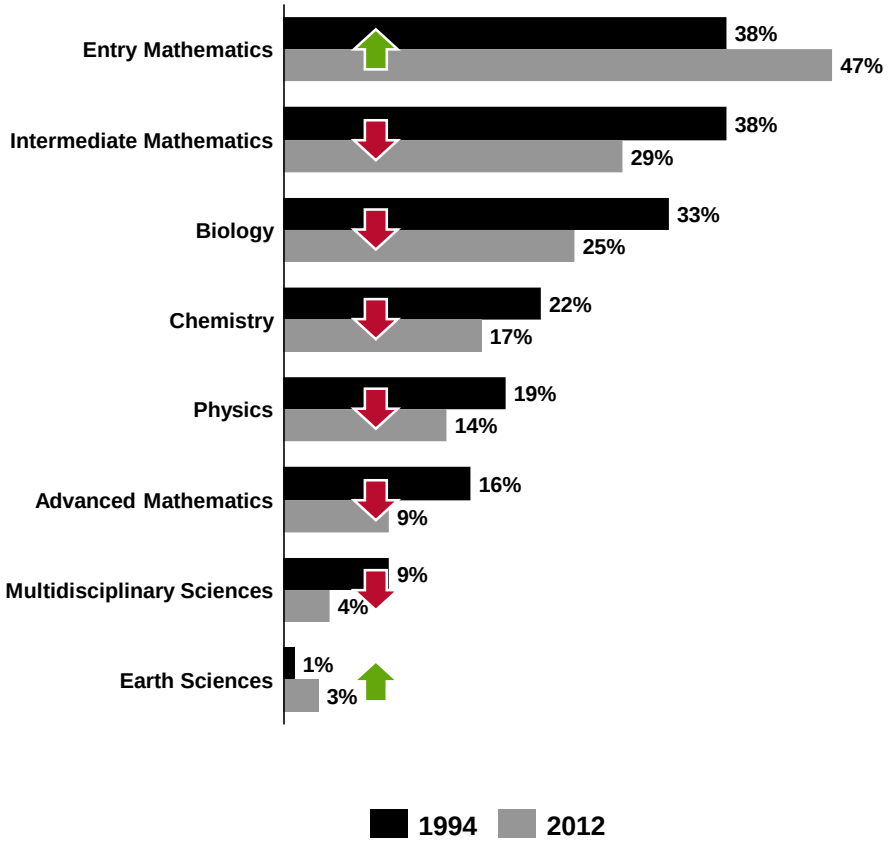
It should be of great concern that there has been a steady decline in the mathematical and scientific literacy levels of Australian 15 year olds since at least the turn of the century and that girls mathematics performance lags behind boys by one-third of a school year…

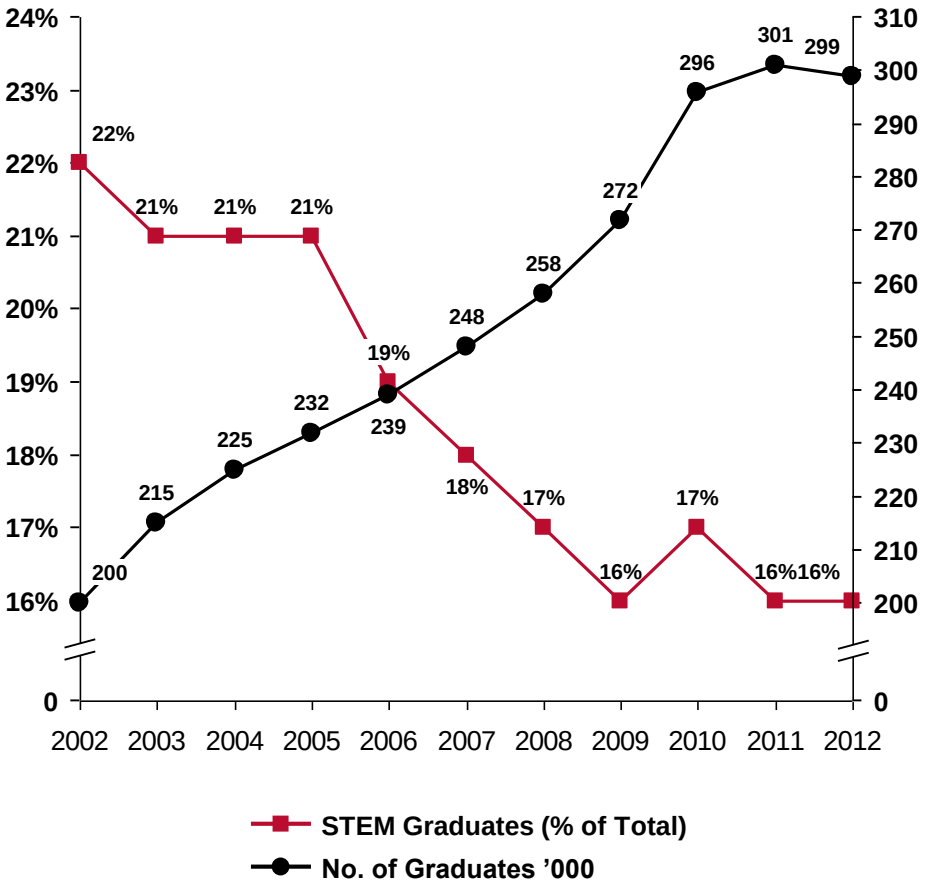
A decline in year-12 STEM participation over the past decade has translated into fewer STEM qualifications at tertiary level

Quantity: Trend in Australian STEM enrolments and graduations

Australian Year 12 Participation Rates (STEM)
1994 vs 2012



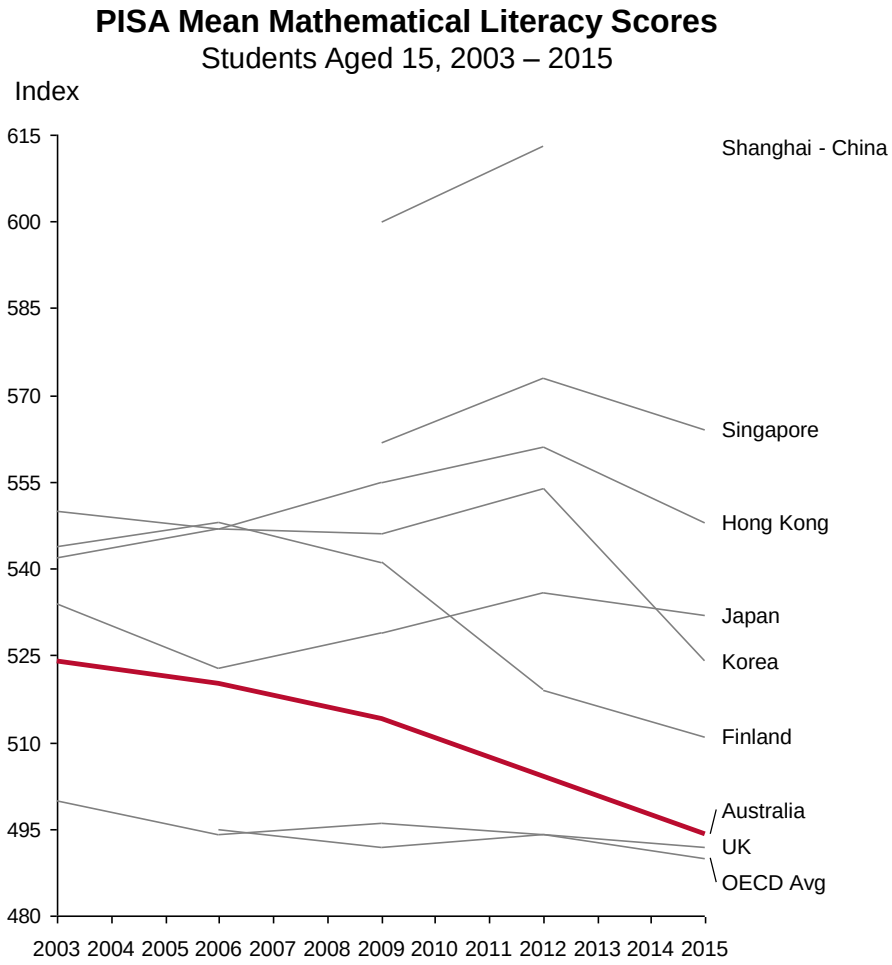
Australian Tertiary Graduates (STEM)
In % of Total (left), in '000 of Graduates (right), 2002-2012

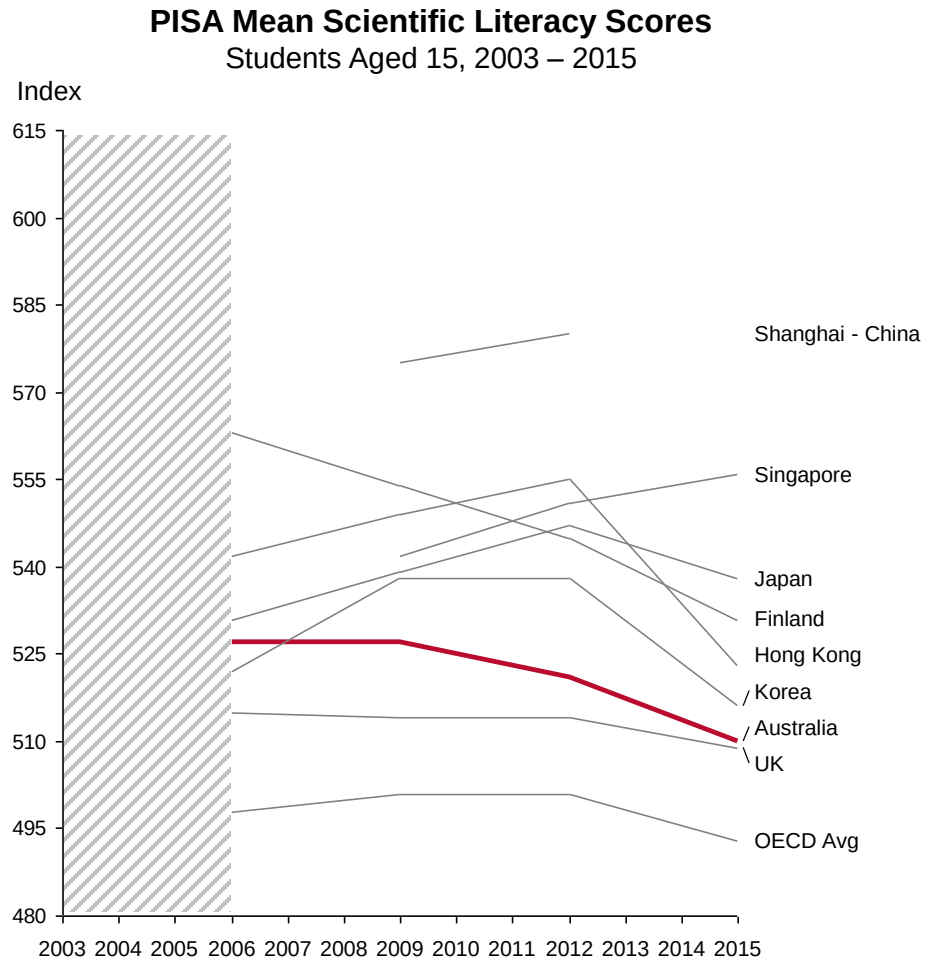


Source: Australian PISA Results 2012; Office of the Chief Scientist

The quality of Australia's STEM talent has decreased over the past decade

Quality: Mathematics and science performance trends



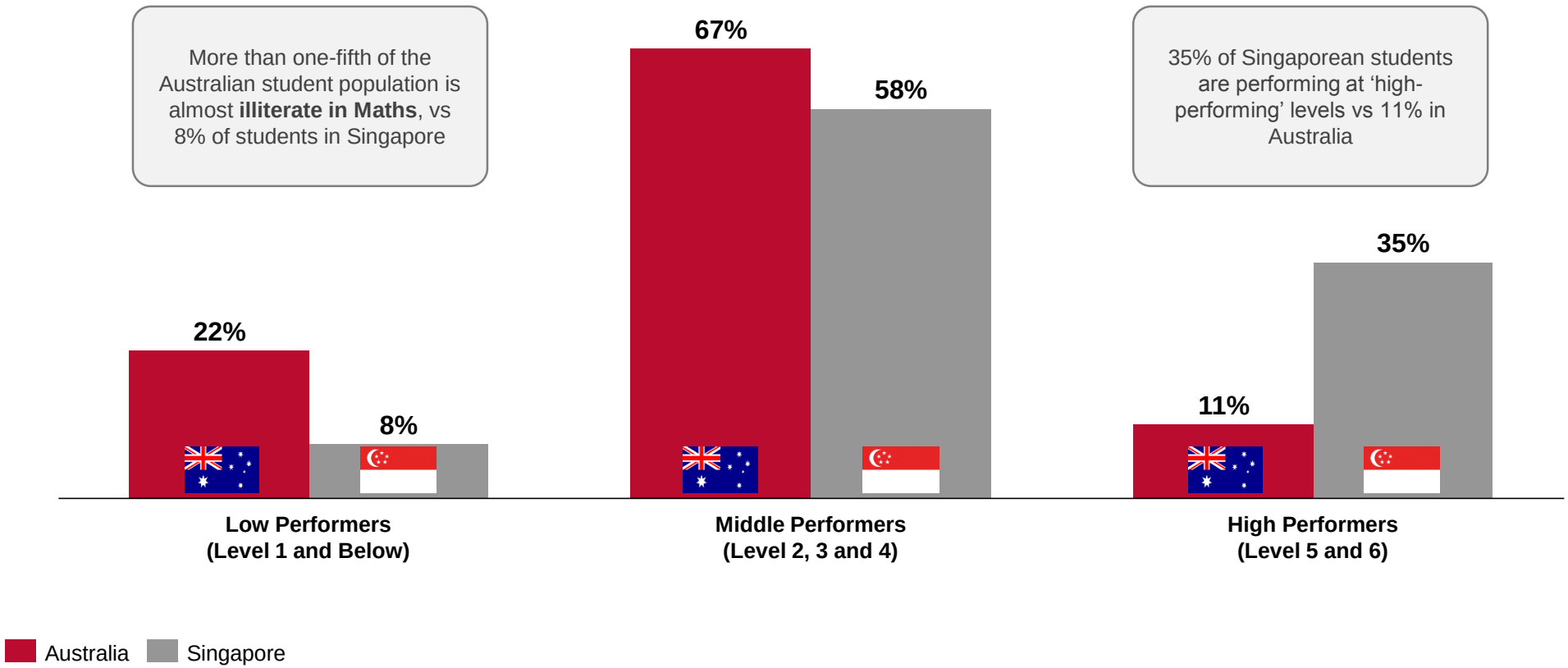


Source: PISA 2012: How Australia Measures-up, PISA 2015: A First Look at Australia's Results, Australian Council for Educational Research

There is a profound contrast in Maths performance distribution between Australia and regional comparator Singapore…

Quality: Mathematics

PISA Mathematics Performance Distribution
Australia vs Singapore by Performance Band in % of Students Aged 15, 2015

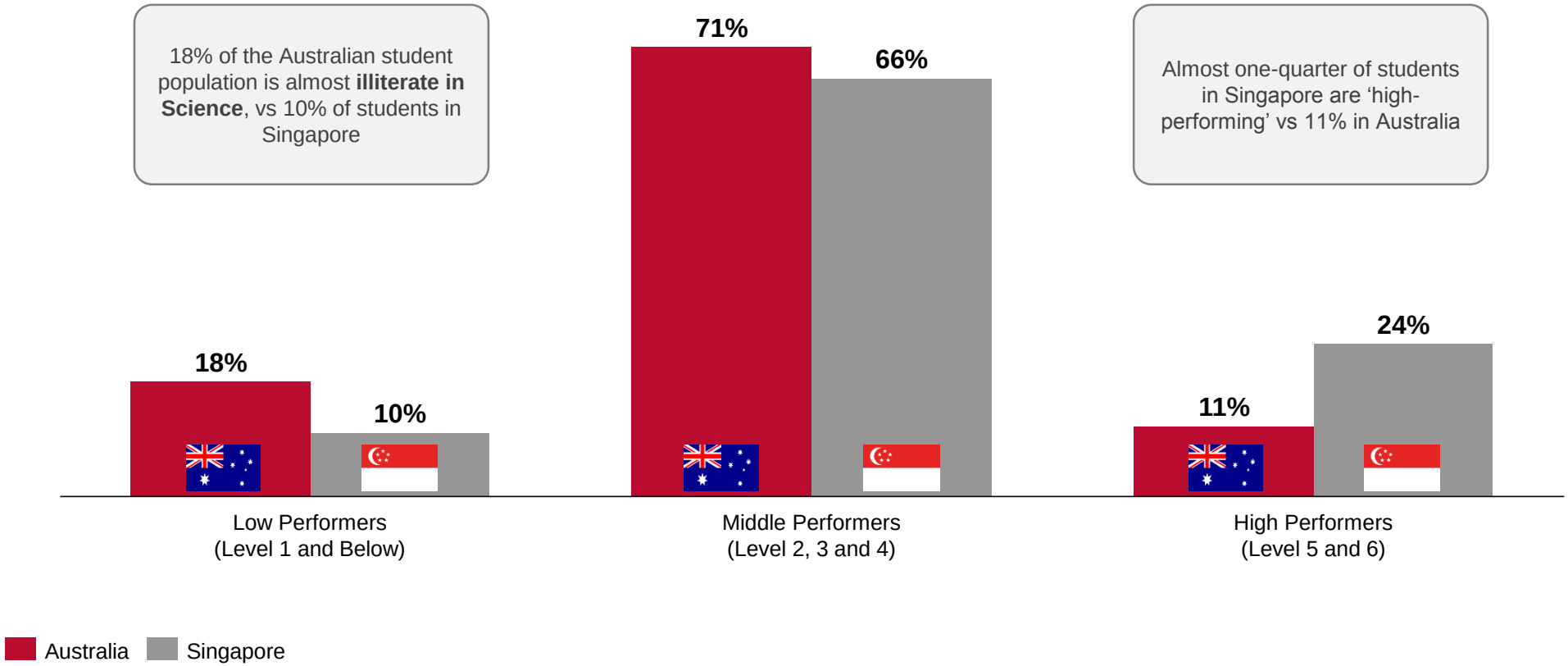


Source: PISA 2015: A First Look at Australia's Results, Australian Council for Educational Research; Palladium analysis

… although performance differences in Science are less pronounced

Quality: Science

PISA Science Performance Distribution
Australia vs Singapore by Performance Band in % of Students Aged 15, 2015

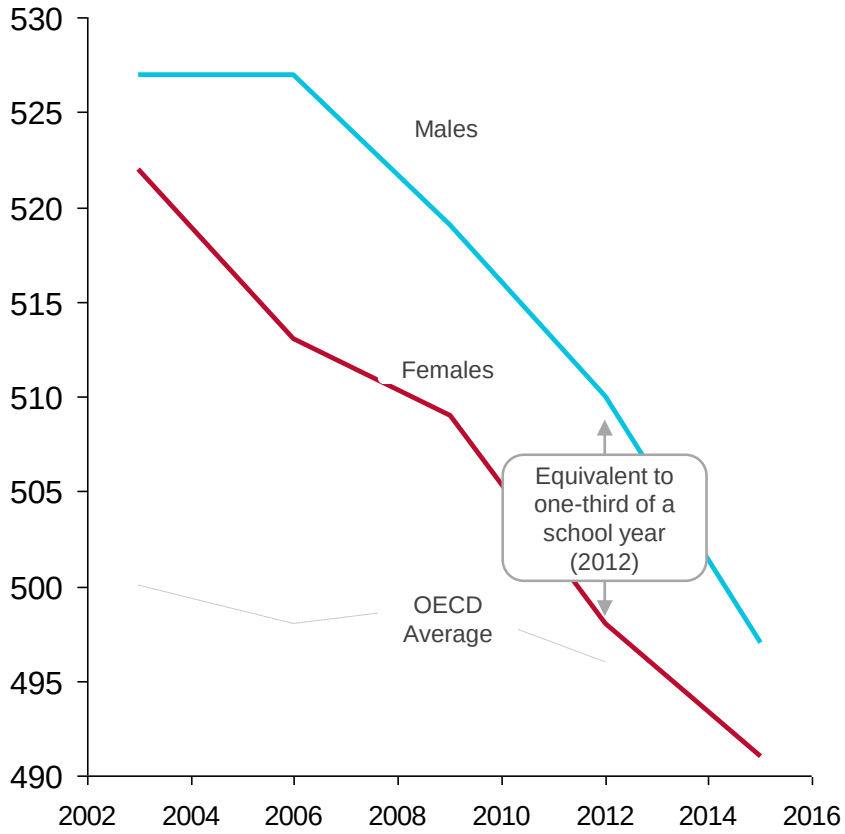


Source: PISA 2015: A First Look at Australia's Results, Australian Council for Educational Research; Palladium analysis

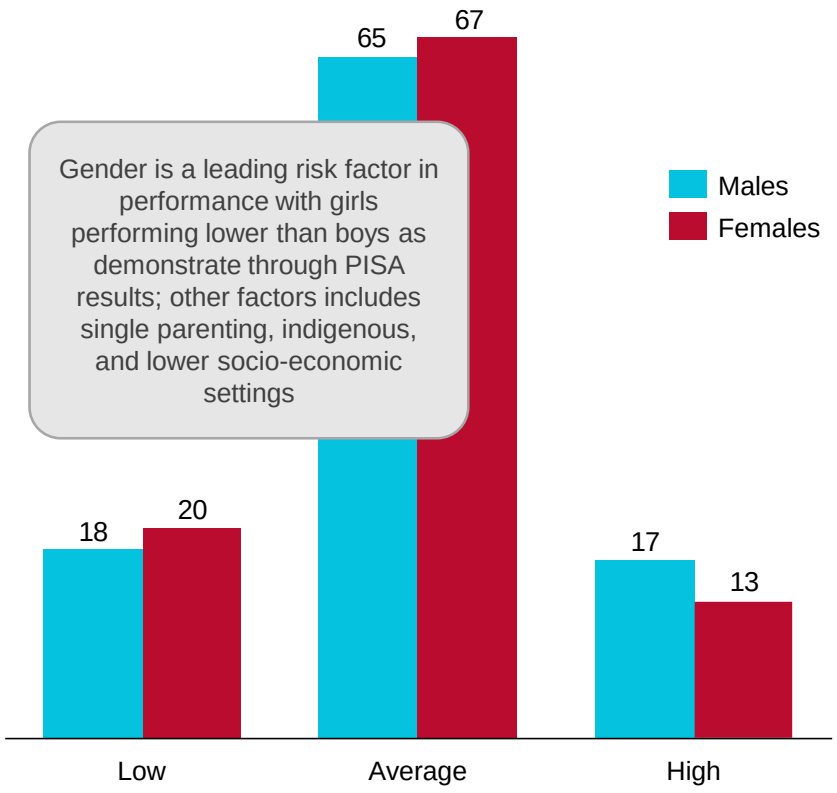
Gender is a risk factor of lower performance in Mathematics with significant differences in performance distribution

Quality: Mathematics performance by gender

Australian Mean Mathematics Literacy Scores
By Gender, PISA Results 2003-2015



Mathematical Performance by Gender
In Percentage (%) of Test Results, 2012



Source: PISA 2012: How Australia Measures-up, PISA 2015: A First Look at Australia's Results, Australian Council for Educational Research

Australian Mathematics performance degrades as early as primary school with a drop between Year 4 and Year 8

Quality: International comparison of Mathematics performance

Mathematics Literacy – Cohort Comparison

TIMSS Mean Results, Year 4 (2007) vs Year 8 (2011)

	Countries	Year 4 Mean Score, 2007 (S.E)	Year 4 Mean Score, 2011 (S.E)	Year 8 Mean Score, 2011 (S.E)
Countries that performed above the scale centrepoint (500) in Year 4 in 2007 and in Year 8 in 2011	**Hong Kong**	607 (3.6)	602 (3.4)	586 (3.8)
	Singapore	599 (3.7)	606 (3.2)	611 (3.8)
	Chinese Taipei	576 (1.7)	591 (2.0)	609 (3.2)
	Japan	568 (2.1)	585 (1.7)	570 (2.6)
	US	529 (2.4)	541 (1.8)	509 (2.6)
Countries that moved from above the centrepoint in Year 4 in 2007 to close to or just below the centrepoint in Year 8 in 2011	**England**	541 (2.9)	542 (3.5)	507 (5.5)
	Australia	516 (3.5)	516 (2.9)	505 (5.1)
	Hungary	510 (3.5)	515 (3.4)	505 (3.5)
	Italy	507 (3.1)	504 (2.6)	498 (2.5)
Countries that retained the same relative positions, performing below the scale centrepoint at both Year 4 and Year 8	**Norway**	473 (2.5)	495 (2.8)	475 (2.4)
	Georgia	438 (4.2)	450 (3.7)	431 (3.8)
	Tunisia	327 (4.5)	359 (3.9)	425 (2.8)

Cohort

TIMSS allows for an examination of changes over time within a cohort of students; the cohort of students that was assessed in Year 4 in 2007 was assessed as the Year 8 cohort in 2011.

England, Hungary, Italy and **Australia had a relative decline in achievement** from Year 4 to Year 8; from well above the TIMSS centreline, to on or below it.

There are many factors affecting performance in Year 8, including increasingly difficult content that draws out a greater range of ability, however other countries have improved over this period.

Source: Monitoring Australian Year 8 student achievement internationally: TIMSS 2011, Australian Council for Educational Research; Palladium analysis

Global benchmarks, interventions and the Australian gap analysis

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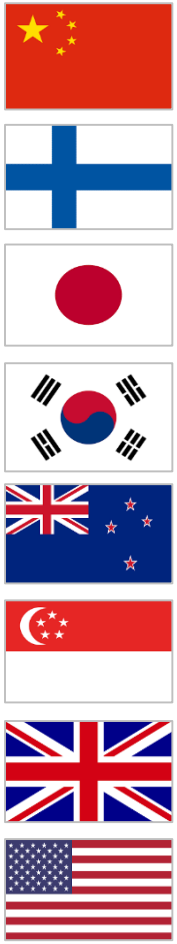
Four key insights have emerged from reviewing policies, practices and interventions across international benchmarks

Key insights from international benchmarks



1. Students must have **teachers of high expertise**; Australian and international research demonstrates the premium in learning effects achieved from teachers who are expert over teachers who are experienced:
   - This will require a focus on the number and quality of entrants to the profession, initial teacher education and ongoing **professional development for existing teachers in STEM**
   - Industry can help to **develop teachers' expertise by bridging between learning Maths at school and the application of knowledge to problem solving in STEM-related careers**
2. The **amount of effective teaching time and the nature of pedagogy** influence student learning; students in high performing countries of our Region have more exposure to Maths instruction and practice in problem solving than students in Australia
3. The multitude of well-intentioned and very diverse **"STEM activities" for students and teachers must be evaluated and harnessed more effectively** to meet both the needs of the Industry and the needs of teachers all over Australia, there needs to be:
   - A **means to bring together industry, student and teacher needs** in ways that students and teachers want to learn and be accessible to every school, every learning community, every individual
   - A rigorous approach to **evaluation** (what works and why)
   - A **dynamic and agile response to Industry needs** such as in rapidly changing fields of cybersecurity, communications, artificial intelligence, robotics etc.
4. Addressing these issues with a sense of urgency will require leadership and **system reform enablers** including; establishing national/state **portfolio coordination** and **common data**, building **partnerships with industry**, **educators and STEM talent**, and **building a backbone national support organisation**

Source: Palladium analysis

Conclusions from a longitudinal study show gender factors need to be carefully considered in interventions

Longitudinal study findings of young adults' STEM aspirations and outcomes

- The STEM **shortage in Australia is particularly in advanced mathematics and physical sciences**, and more pronounced in contemporary data
- Students, **especially girls, are opting out of advanced mathematics and sciences** when they perceive a real choice to do so
- **Expectancies and values impact STEM studies and career aspirations**; a one-size fits all approach to positive reinforcement, encouragement and incentives will not work
- Importance value matters, especially for girls; we **need to be making explicit connections between the social uses and purposes of science and mathematics** for a range of careers
- Self-concepts and values decline throughout secondary schooling, with a **robust gender gap; girls perceive themselves to have lower ability level than their achievements warrant which affects subject selection**
- **Aspirations are a modest predictor of actual STEM-related careers**

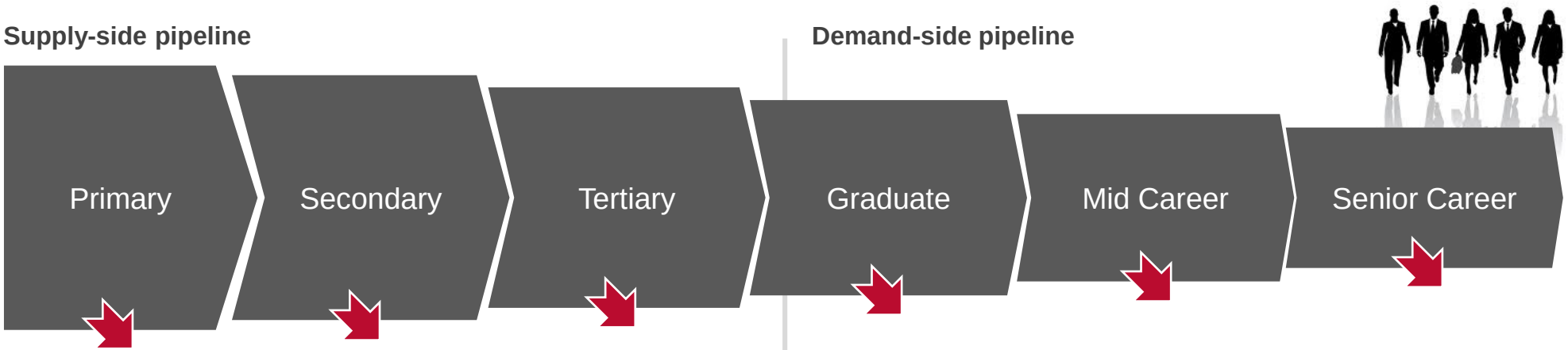
Source: Watt, H. M. G., Jansen, N., & Joukes, G. (2013), 'Gendered pathways towards (and away from) STEM fields'. International Journal of Gender, Science and Technology; Monash University; ACER Research16 Conference Proceedings; Palladium analysis

Compared with Australia, leading countries do not invest in smaller class sizes or streaming and they have a low percentage of private education. The status of teachers is relatively higher than in Australia and this attracts higher quality applicants into the profession whose expertise makes a positive difference to student achievement.

There is a complex array of factors that drive quality and losses across Australia's entire STEM pipeline

Australia's STEM talent Pipeline by development phase

NOT EXHAUSTIVE



Illustrative Factors Driving Supply-side Quality and Losses

- Differences in gender learning styles; significant impact of self-perception of ability and role for girls; socio-economic and indigenous status are risk factors
- Status of teaching as a profession; inadequate incentives to attract and retain the best qualified graduates into STEM teaching
- Number of qualified teachers; out-of-field teaching; low engagement of students, especially girls, in STEM subjects
- Poor alignment between teacher qualifications, STEM education, utility, industry demand and career paths
- Measurement of education performance in terms of job placement and retention

Illustrative Factors Driving Demand-side Quality and Losses

- STEM clusters, visibility and mobility for specialist skills, and portability of intellectual property
- Workplace settings, gender hostile environments and culture
- Demand for qualified STEM graduates greatly exceeds supply
- Risks and likely perverse outcomes from reliance on overseas recruitment e.g. security risks, distortion in salary profiles
- New careers and new ways of working require STEM capability across many career categories not just the obvious ones
- Career choices are still gender biased which translates into lifelong disparities for individuals and productivity costs to enterprise, e.g. lack of women senior executives

Source: Industry interviews; ACER Research Conference Proceedings 2016; Palladium analysis

We have reviewed the focus of over 250 different STEM initiatives being conceived and run across Australia

Examples of Australian STEM Initiatives, Jan 2016

NOT EXHAUSTIVE

Science	Technology	Engineering	Mathematics
Little Scientists	Code Club Australia	Robocup Junior	Australian Mathematics Competition
Primary Connections: Linking Science with Literacy	Open Internet of Things (IoT) Challenge	EngQuest	Choose Maths (AMSI)
Sleek Geeks Science Eureka Prize	Cisco Networking Academy	Solar Car Challenge	Mathematical Engagement and Mathematical Olympiad
CSIRO Indigenous STEM education programme: Science Pathways for Indigenous Communities	Hour of Code	Discover Engineering Day	CSIRO Indigenous STEM Education Programme: Prime Futures
Science Program Exciting Children Through Research Activities	We Speak Code	Engineers Without Borders School Outreach Program	National Financial Literacy Curriculum Resource
Shell Questacon Science Circus	Cisco Women Rock-IT	Robogals	National Mathematics Summer School
Food Production Education Resources	CS Unplugged	BHP Billiton Science and Engineering Awards	BHP Billiton Science and Engineering Awards
Science ASSIST	Start with code	Science and Engineering Challenge	Mathletics
Teacher Earth Science Education Programme (TESEP)	TechPrep	Curious Minds: Girls in science, technology, engineering and mathematics	Australian Statistics Competition
Big Science Competition	CoderDojo	The Australian Innovation Challenge	Mathematics Challenge for Young Australians
Australian Science Olympiads	CSIRO ICT in Schools: Intel Galileo Project	The Australian STEM Video Game Challenge	The Improving Mathematics Education in Schools Project

250+ Initiatives in Total

Source: Office of the Chief Scientist

Australian industry has committed over $200 million to more than 250 interventions (mostly in the education supply-side) that are intended to improve the nation's STEM capacity. The Federal Government has also invested, with $97 million in key programs around gender and enhancing STEM skills. However, despite an evident focus on STEM activity, key gaps and overlaps have been identified and there is now an increased demand for evidence of change.

We have drawn from the research and benchmarks to develop a framework that outlines areas where STEM initiatives can focus

Common factors across successful benchmarks

PRELIMINARY

Areas to be Addressed in Supply Interventions

A

Supply Reform	Student Quality	STEM-specific tracking in secondary education
		Gender-related elements in school STEM curricula and pedagogies
		Broadening STEM engagement and achievement and including inquiry, reasoning, and creativity in curricula
	Student Quantity	Gender-based participation in STEM
		Mentoring and counselling programs to encourage female participation in STEM
		National approach to STEM teaching and learning for indigenous students
	Educators	Career pathways for STEM teachers and minimising 'out of field' teaching
		STEM-specific incentives and professional development in secondary
		Science and mathematics teaching in primary schools

Areas to be Addressed in Demand and System Interventions

B

Demand Reform	Industry Alignment	Building awareness of STEM disciplines and STEM-related occupations among young people
		Broadening the role of engineering degrees in business and other non-traditional fields
	Diversity	Women in the STEM-related workplace
		Programs and activities designed to facilitate indigenous students' learning and work in STEM-related disciplines

C

System Reform	Policy	Policy e.g. compulsory senior secondary STEM education; and STEM-specific prerequisites for higher education
	Enablers	STEM Partnerships between industry and educators
		Forums and activities in relation to national STEM coordination and data
		National coordination structures

Source: Australian Council of Learned Academies; Palladium analysis

We mapped Australia's STEM initiatives against the evaluation framework and identified key gaps and hot-spots of activity…

Incidence of Australia's 250+ current STEM initiatives [1/2]

PRELIMINARY

A — Supply Reform

Initiative Area	Incidence
STEM-specific tracking in secondary education	1%
Gender-related elements in school STEM curricula and pedagogies	6%
Broadening STEM engagement, achievement and curricula	40%
Gender-based participation in STEM	3%
Mentoring and counselling programs to encourage female participation in STEM	3%
National approach to STEM teaching and learning for indigenous students	1%
Career pathways for STEM teachers and minimising 'out of field' teaching	0%
STEM-specific incentives and professional development in secondary education	6%
Science and mathematics teaching in primary schools	11%

B — Demand Reform

Initiative Area	Incidence
Building awareness of STEM disciplines and STEM-related occupations among young people	20%
Broadening the role of engineering degrees in business and other non-traditional fields	0%
Women in the STEM-related workplace	2%
Programs and activities designed to facilitate indigenous students' learning and work in STEM-related disciplines	2%

C — System Reform

Initiative Area	Incidence
Policy e.g. national strategy; compulsory STEM education; STEM-specific prerequisites	0%
STEM Partnerships between industry and educators	3%
Forums and activities in relation to national STEM coordination and data	1%
National coordination structures	1%

Heat map: Density of Initiatives

<2% | 2-4% | 5-9% | 10-19% | 20-39% | >40%

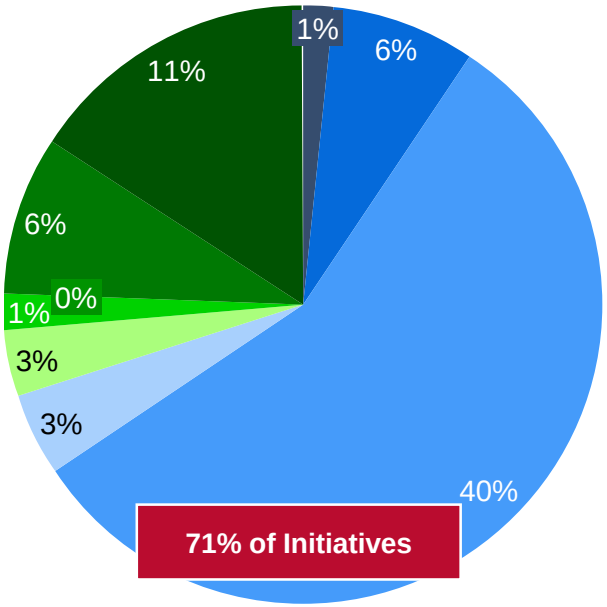
Source: Palladium analysis

… we found that the greatest density of initiatives is in supply-side reforms, with fewer demand and system reform initiatives

Incidence of Australia's 250+ current STEM initiatives [2/2]

PRELIMINARY

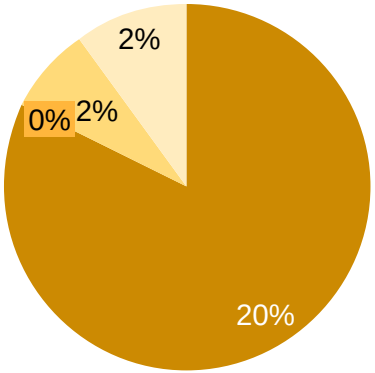
A Supply-side Reforms



71% of Initiatives

- STEM-specific tracks
- Gender-related elements in curricula and pedagogies
- Broadening achievement and STEM curricula
- Gender participation in STEM
- Mentoring and counselling for female participation
- National approach to STEM teaching for indigenous
- Career pathways for STEM teachers
- STEM-specific development and incentives
- STEM teaching in primary schools

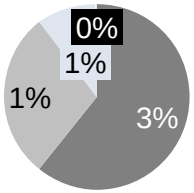
B Demand-side Reforms



24% of Initiatives

- Building awareness of STEM occupations
- Broadening the role of engineering degrees
- Women in the STEM workplace
- Indigenous students' STEM-related work

C System Reforms



5% of Initiatives

- Policy, compulsory STEM and prerequisites
- STEM Partnerships
- National STEM coordination and data
- Possible coordination structures

A much greater focus is required to understand the impact of initiatives on the demand-side and on creation of enabling resources to support national scale reform

Note: Analysis identifies number of programs per area (incidence) and not the scale or impact of the programs

Source: Palladium analysis

Despite much effort and positive intent, we have found several key issues with the current efforts in Australia

Key challenges with current STEM intervention efforts

NOT EXHAUSTIVE

1. There is **little evidence-base that links initiatives with impact**, and education research is poorly integrated into the design, monitoring or evaluation of programs
2. Many of the current **initiatives such as awards and competitions stimulate STEM activity but may not create enough impact** to drive and sustain a structural change
3. **Initiatives are developed and implemented in isolation** of each other, rather than as a portfolio, and tend to **cluster around supply-side** STEM awareness / engagement
4. Even large-scale **investments only target small segments of the system** e.g. $22m commitment targeting 1% of schools (120 out of 9,400)
5. The **focus of activity is primarily supply-side** (primary and secondary school, with little tertiary-level programming) and limited integration across industry, talent pools and educators
6. **Few investments have been made in enabling platforms for systemic reform**

Source: Palladium analysis

A new approach to Industry-Education partnerships

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Collective Impact is an approach premised on the belief that no single policy, government department, organisation or program can solve the increasingly complex social problems we face as a society.

Mark Kramer, Stanford Social Innovation Review

Five key conditions are required to achieve systemic change including the establishment of a backbone support structure

Key pillars for achieving systemic change through collective impact

Creating Systemic Change

- *Enable collective ownership and accountability for community problems*
- *Ensure effective collection, analysis, reporting and use of quality data*
- *Build greater capacity of individual organisations and initiatives through access to shared insights*

Common Agenda	All participants have a shared vision and collective strategy for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions
Shared Measurement	Collecting data and measuring results consistently across all participants ensures efforts remain aligned and participants hold each other accountable to a common balanced scorecard
Mutually Reinforcing Activities	Participant activities must be differentiated while still being coordinated through a mutually reinforcing plan of action against the common balanced scorecard
Continuous Communication	Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and appreciate common motivation
Backbone Support	Backbone identifies issues for the collective, coordinates funding, resources and support for the co-design of a portfolio of collective and individual initiatives to address the challenge

Source: Stanford Social Innovation Review, Winter 2011

The Australian STEM Partnership is designed as a backbone enabler for all actors involved in a national-scale reform

Overview of the Australian STEM Partnership

Features of the Partnership

- Proactive in recognising the issues and the solutions
- Provides the interface between the market and the education systems
- Embeds quality research and evidence as a necessary and ongoing component of investments
- Cost effective way to harness industry inputs into the education systems especially for the transformation of teaching through recognition, awards, grants and industry experience thereby overcoming the significant barriers faced by State systems
- Partnership model that enables collective impact of loosely coupled local-area-partnerships
- Maintains a stable and long-term program investment and delivery platform outside of political cycles

The high-level objectives for the Australian STEM Partnership will be considered over a 5- 10- and 20-year timeframe

Setting the direction

FOR DISCUSSION

Define Common Objectives

- Identify means for the private sector to contribute to the National Strategy
- Optimise the use of public and private sector resources to drive positive outcomes in Australia's STEM capacity

Establish Measurable Targets

- A five year target to drive more industry-aligned short and long courses
- A ten-year target to improve quality, quantity and gender inclusion in Australia's STEM capacity
- A twenty-year target to increase Australia's national competitiveness in key STEM sectors

The immediate agenda of the Partnership has been guided by thought leaders including the Office of the Chief Scientist

Australian competitiveness

Objective:

STEM underpins a differentiated and readily adaptable economy that is globally competitive and will enable all Australians to benefit from the opportunities that follow.

Recommendations:

- Establish an Australian Innovation Board to draw together existing Australian programmes and target research and innovation effort
- Support the translation and commercialisation of STEM discoveries
- Accelerate the integration of STEM experts into industry, business and public sectors
- Promote an entrepreneurial culture

Education and training

Objective:

Australian education, formal and informal, will prepare a skilled and dynamic STEM workforce, and lay the foundations for lifelong STEM literacy in the community.

Recommendations:

- Secure the pipeline of STEM graduates by creating recognition of its public benefits
- Provide high quality and relevant professional development to STEM teachers, while increasing their number
- Provide inspired learning through encompassing inquiry-based learning and critical thinking
- Ensure that the skills and uptake of STEM graduates are aligned with workforce needs
- Facilitate community engagement through increased communication between STEM practitioners and the community

Research

Objective:

Australian STEM research will contribute knowledge to a world that relies on a continuous flow of new ideas and their application.

Recommendations:

- Adopt a long term plan for science and research
- Develop and implement strategic research priorities
- Support research careers, including collaboration with industry and business
- Enhance dissemination of Australian STEM research by expanding open access policies and improving the supporting infrastructure
- Provide support to encourage and enable quality research to respond to problems identified by industry

International engagement

Objective:

STEM will position Australia as a respected, important and able partner in a changing world, for both domestic and global benefit.

Recommendations:

- Adopt an international strategy for science, research and education
- Establish a fund for strong government-to-government linkages as a basis for international collaboration
- Unlock flows of knowledge and research talent
- Leverage STEM in international diplomacy

Key: Initial partnership focus

Individual actions are aligned to clearly articulated national goals

Individual actions are focused on priority areas where we have comparative advantage or critical need

Individual actions are scaled appropriately to achieve far-reaching and enduring change

Source: Science, Technology, Engineering and Mathematics: Australia's Future, Office of the Chief Scientist, September 2014

The Partnership enables interventions that enhance supply, enhance employment environments and minimise talent losses

Australia's STEM Investment – The Talent Pool

ILLUSTRATIVE

Interventions to Increase

Supply-side

- Global Talent Pool
- New Supply (Education)
- Reskilling & Re-entrants

Interventions to Minimise

Losses

- Global Talent Pool
- Workforce Attrition
- Career Changes

Demand-side

- Public Sector
- Industry
- Academia & Researchers

Talent Custodians

Interventions to Enhance

“For many interventions in complex adaptive systems, the most successful approaches will be based on measurement and data. We cannot predict in detail whether or how interventions will work, but we can (and should) measure effects of what we do, and we should adjust the interventions accordingly”

The initial Partnership design has focused on three enabling services for government, corporations and initiative owners

Australian STEM Partnership: Key enabling services

NOT EXHAUSTIVE

1 Investment Framework

- **Where are the gaps** that require further investment?
- How can **use of public and private sector resources** be optimised?
- Does an initiative investment case sufficiently articulate the relationship between the need and the **evidence for change**?
- What is the **minimum viable scale** of investment required for impact?

2 Scalable Collective Impact Model

- How are **industry specific interests aligned** with the broader systemic change program?
- How can better **industry-education system engagement** be activated?
- What are the **priorities and needs of the education system**?
- **Which initiatives** should be activated in local-area-partnerships?

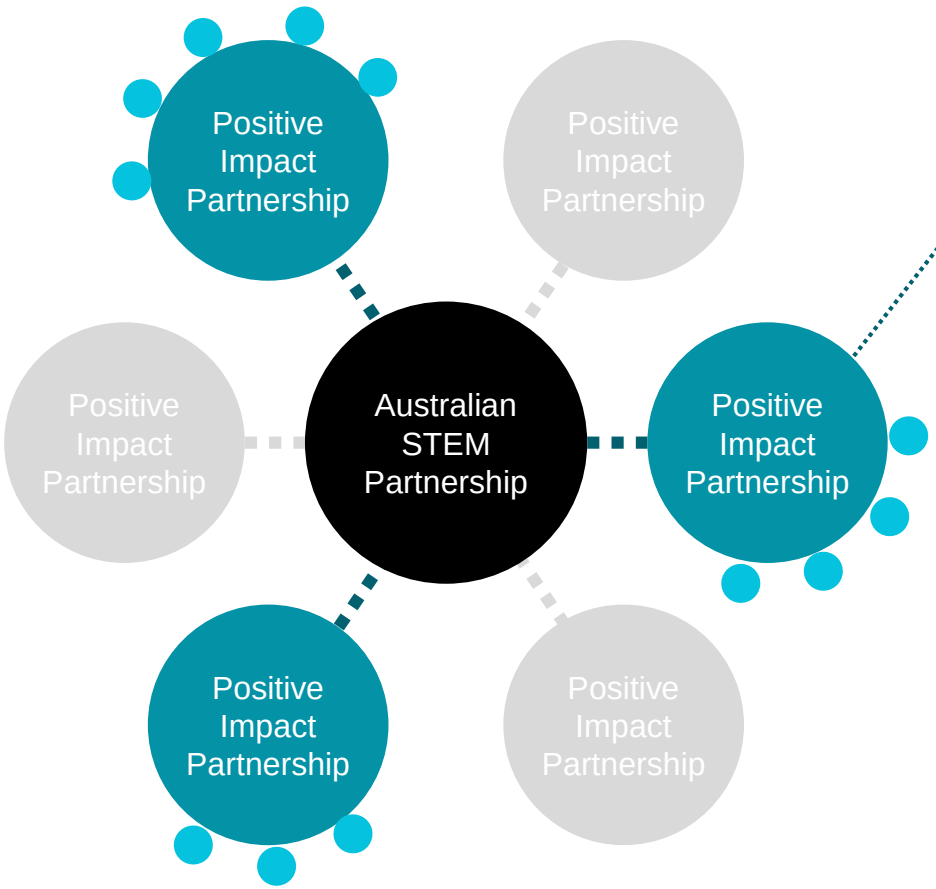
3 Initiative Enablers

- How are initiatives **measured** and **evaluated**?
- How can the **impact of initiatives be improved**?
- How can **insights and learning** be considered in future initiative design and the national strategy?
- How can initiative leaders identify **new forms of funding** and **better scale efforts**?

Our approach creates coalitions for change across initiatives and industry eco-systems, supported by the partnership hub

Building a network of coalitions for change

ILLUSTRATIVE



Positive Impact Partnerships

Supply-side Institutions

STEM Professional Community

Demand-side Value Chains

- Catalysing the formation of a Positive Impact Partnership between cross-sector actors is an important mechanism for achieving impact at national-scale
- Each Positive Impact Partnership is loosely coupled and may adopt a unique form and initiatives to best deliver outcomes in the local context, enabled by the central partnership services and resources
- Members of each Positive Impact Partnership are potentially different across geographies and markets; however all benefit from a common agenda, a common measurement approach and sharing of data and evidence-based leading practices

Current and future STEM initiatives

The Australian STEM Partnership is now seeking to expand beyond the three initial founding members…

Initial partners

Demand-side

The Commonwealth Bank is Australia's leading provider of integrated financial services and one of the largest listed companies on the Australian Securities Exchange and is included in the Morgan Stanley Capital Global Index.

The Commonwealth Bank is committed to education and has invested to enable a culture of evidence in education to improve educational outcomes, to grow our free financial education program Start Smart, the world's largest program of its kind, and celebrate teachers and educators through the Commonwealth Bank Teaching Awards.

Supply-side

The Australian Council of Educational Research (ACER) is one of the world's leading educational research centres. ACER supports learners, learning professionals, learning institutions and the development of a learning society.

ACER has built a strong reputation as a provider of reliable support and expertise to education policymakers and professional practitioners since it was established in 1930.

ACER creates and promotes research-based knowledge, products and services that can be used to improve learning across the life span.

Backbone Enabler

Palladium is a lead socio-economic development partner of the Commonwealth of Australia and manages over $3Bn in socio-economic development programs across 120 countries. Palladium is the largest supplier to DFAT and leads delivery of Australia's overseas development and humanitarian aid programs.

Palladium leads major gender, education and labour market reforms on behalf of Australia, UK and the US Governments. Palladium builds collective impact coalitions between public and private sector actors to address challenges of global significance.

… and we are seeking engagement with Government and Industry to get feedback on the approach

Key next steps

NOT EXHAUSTIVE

- **Establish the initial partnership with investment** from the Commonwealth Bank of Australia, Australia's largest non-traditional STEM employer; ACER, Australia's leading educational research council; and Palladium, one of Australia's leading socio-economic development firms

- **Complete a baseline of current STEM activity in Australia, assess gaps, and design a project to test the application of a proven international development approach** and framework to a developed economy context around STEM

- **Engage with thought leaders across both the education system (supply) and industry (demand) through a roundtable discussion** to explore the opportunities for further engagement, means to align industry and government under a national strategy and opportunities for collective impact

Current Focus

Establish the backbone support structure, design the key services and drive the process of using evidence-based approaches to improve the impact of the current portfolio of initiatives

Expand the partnership to include additional industry, education sector, and initiative owners

Palladium
MAKE IT POSSIBLE

Australian STEM Partnership Operating Model

A

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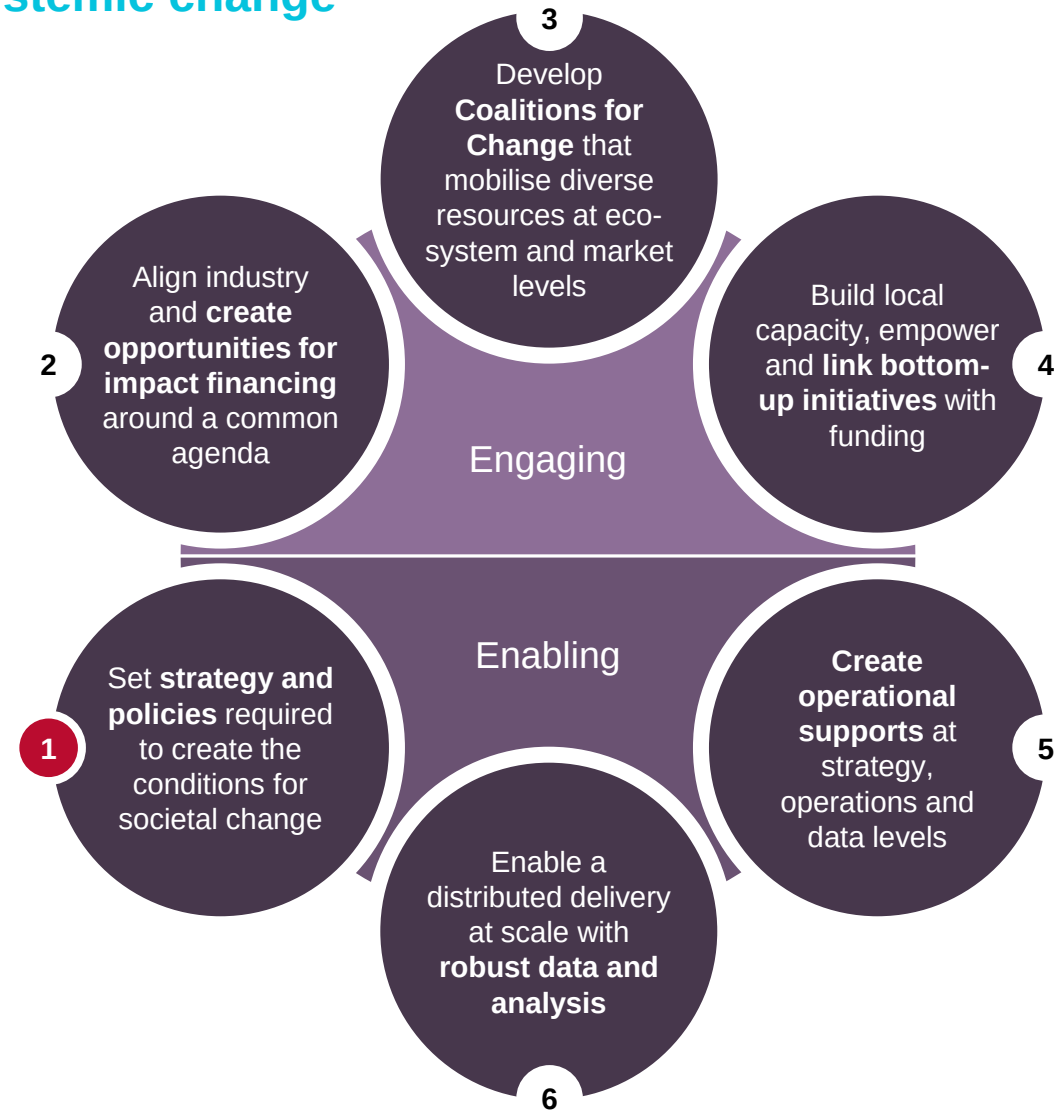
Our framework for delivering large-scale change identifies six required enabling and engaging activities

A new model for systemic change



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We set direction through strategy, create markets for impact investment, and deliver through coalitions for change

Enabling and engaging activities [1/2]

1

Drive **strategy and policies** required to create the conditions for societal change

- Develop strategies at the level of markets, eco-systems and individual organisations (including development of shared value business models)
- Design the portfolio of interventions that address the complex array of societal factors that are driving the current situation
- Drive innovation in business models that mobilise private sector resources for societal outcomes

2

Align industry and impact investor financing as sustainable sources of initiative funding

- Create the environment that enables impact investors to deploy private capital against outcomes as public sector financial resources are insufficient to deliver transformative reform at national scale
- Build the baseline, identify and prioritise impact investment opportunities, mobilise outcomes funders and investors to make the market

3

Develop **Coalitions for Change** that mobilise diverse resources at eco-system and market levels

- No single policy, government department, organisation or program is sufficiently equipped nor accountable to deliver a national-scale change that will reverse the decline in STEM quality and quantity
- Facilitate development of partnerships at the scale of markets and eco-systems; then empower to enable mobilisation of resources at the local-level

We link bottom-up initiatives with market funding, build operational supports and provide data to enable scale

Enabling and engaging activities [2/2]

4

Build local capacity, empower and **link bottom-up initiatives** with funding

- Facilitate development of local capacity to contextualise interventions; one-size does not fit all
- Grass-roots initiatives are embraced against the setting of a robust evidence-base and monitoring and evaluation framework
- Local area partnerships enable prioritisation of initiatives and matching of local initiatives with structural and market funding

5

Create operational supports at the strategy and design, operational and data levels

- Central provision of strategy and portfolio design services that enable integration and mutual reinforcement of initiatives at national and local levels
- Provide operational supports in the form of coordinated communications, a dynamic resourcing facility for specialist skills, and monitoring and evaluation services
- Provide a common data platform, identify gaps and commission research, and link research to practice

6

Enable a distributed delivery model with **robust information and analysis**

- Develop the data architecture, identify key sources and ensure integrity
- Data is open and shared throughout the partnership to maximise potential for distrusted innovation
- Analysis is conducted centrally and throughout the partnership and shared to provide insights at the local level

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About Palladium

B

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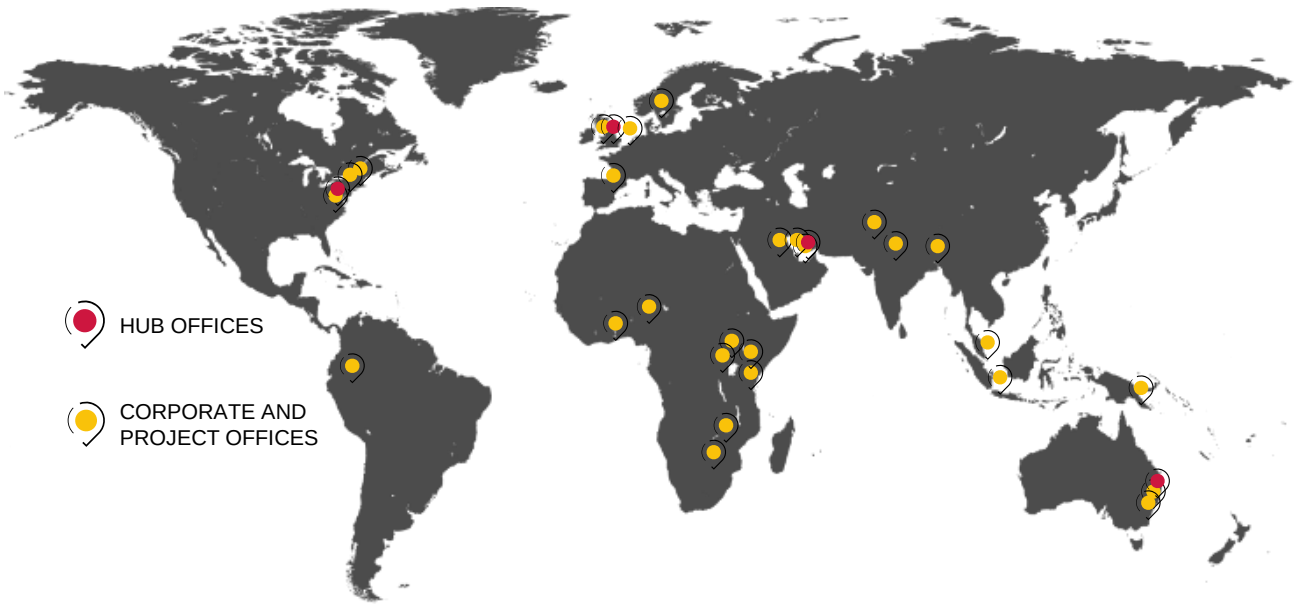
Palladium is an Australian company and global leader in the development and delivery of **Positive Impact** - the point where commercial, social and environmental goals are inextricably linked and social, environmental and financial impacts are equally considered.

We work with governments, corporations, and non-profits to deliver solutions that transform lives and create enduring value for businesses, communities, societies and economies.

Our Global Presence

For the past 50 years, we've been making positive impact possible. With a team of more than 2,500 employees and a global network of over 35,000 technical experts, Palladium is committed to improving people's lives, societies and economies



$3Bn In Current Projects

120 Countries in Operation

30+ Major Offices

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  - Boston, USA
  - Durham, USA
  - Lima, Peru
- **Asia Pacific**
  - **Brisbane, Australia (Hub Office)**
  - Canberra, Australia
  - Sydney, Australia
  - Port Moresby, Papua New Guinea
  - Gurgaon, India
  - Islamabad, Pakistan
  - Dhaka, Bangladesh
  - Jakarta, Indonesia
  - Singapore
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  - Barcelona, Spain
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  - Riyadh, Saudi Arabia
  - Abuja, Nigeria
  - Kigali, Rwanda
  - Kampala, Uganda
  - Pretoria, South Africa
  - Harare, Zimbabwe
  - Accra, Ghana
  - Nairobi, Kenya
  - Dar es Salaam, Tanzania

THANK YOU

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