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Innovate or bust –
Challenges and
Opportunities for Industry

Overview

- Key Trends in Innovation and Competitiveness
- National Innovation and Science Agenda
- STEM and the Digital Economy
- Some Opportunities

Key Trends in Innovation

1. **Investment in innovation has remained relatively strong.**
2. **The digital economy continues to gain ground.**
3. **Technological changes are not limited to ICT.**
4. **Innovation is a very broad phenomenon with many different features.**
5. **Large and acute environmental challenges affect the demand for innovation.**

The Innovation Imperative, OECD, 2015

A skilled workforce

A key feature of innovation for economic growth.

"A skilled workforce that has the knowledge and skills to generate new ideas and technologies, to bring them to market, and to adapt to technological changes across society. Reforms to education and training systems, and to skills policies more broadly, are therefore of the utmost importance to innovation."

The Innovative Imperative, OECD 2015

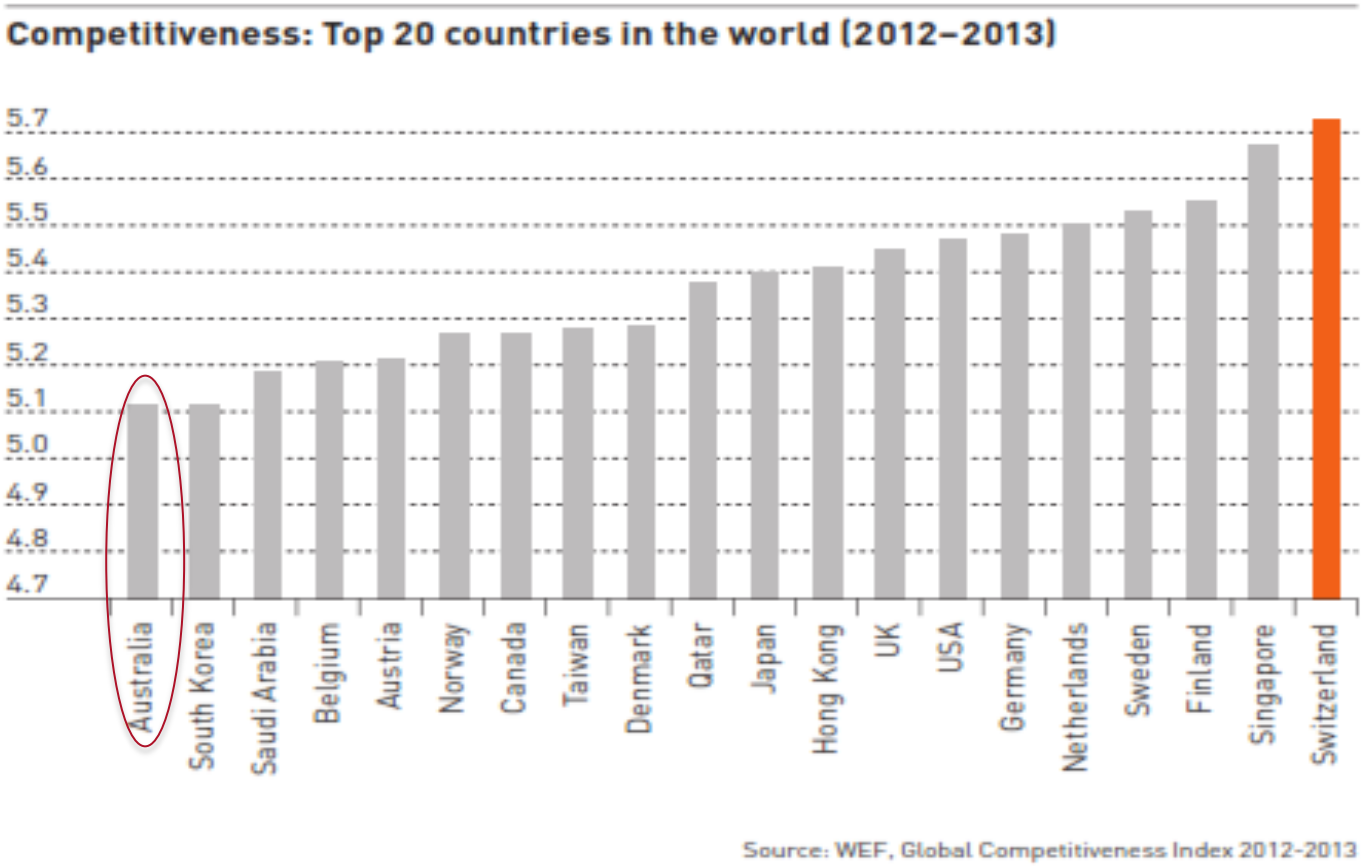
Global Innovation Index

Australia & Global Innovation

Global Innovation Index rankings

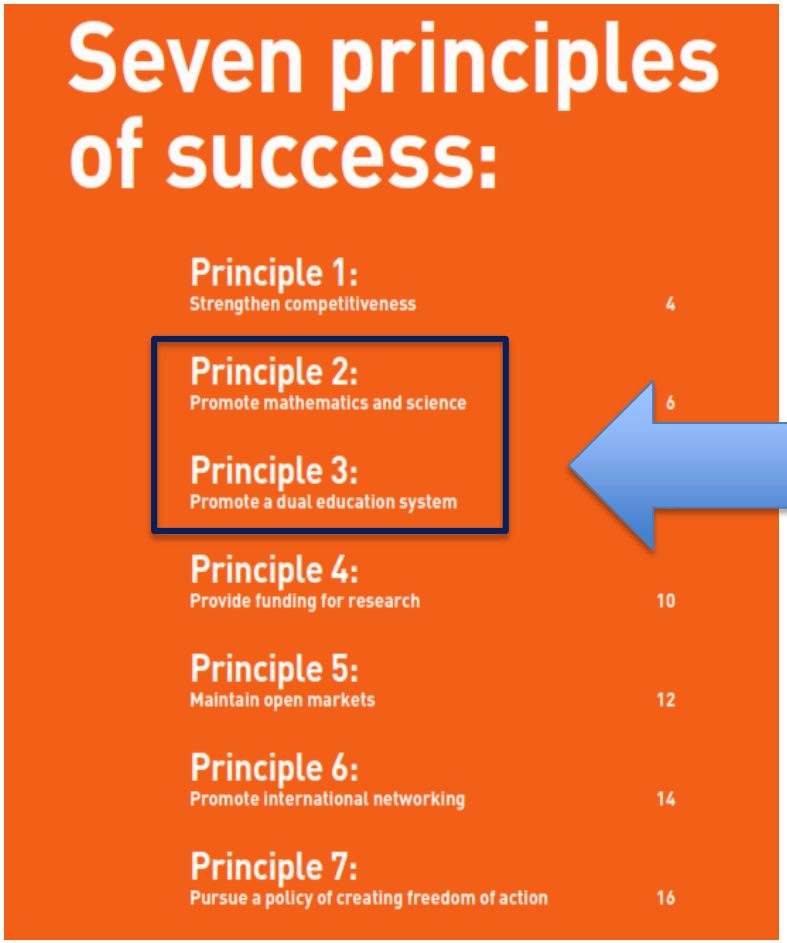
Country/Economy	Score (0–100)	Rank	Income	Rank	Region	Rank	Efficiency Ratio	Rank	Median: 0.74
Switzerland	64.78	1	HI	1	EUR	1	0.95	6	
United Kingdom	62.37	2	HI	2	EUR	2	0.83	29	
Sweden	62.29	3	HI	3	EUR	3	0.85	22	
Finland	60.67	4	HI	4	EUR	4	0.80	41	
Netherlands	60.59	5	HI	5	EUR	5	0.91	12	
United States of America	60.09	6	HI	6	NAC	1	0.77	57	
Singapore	59.24	7	HI	7	SEAO	1	0.61	110	
Denmark	57.52	8	HI	8	EUR	6	0.76	61	
Luxembourg	56.86	9	HI	9	EUR	7	0.93	9	
Hong Kong (China)	56.82	10	HI	10	SEAO	2	0.66	99	
Ireland	56.67	11	HI	11	EUR	8	0.79	47	
Canada	56.13	12	HI	12	NAC	2	0.69	86	
Germany	56.02	13	HI	13	EUR	9	0.86	19	
Norway	55.59	14	HI	14	EUR	10	0.78	51	
Israel	55.46	15	HI	15	NAWA	1	0.79	42	
Korea, Republic of	55.27	16	HI	16	SEAO	3	0.78	54	
Australia	55.01	17	HI	17	SEAO	4	0.70	81	

Global Competitive Index



Source: WEF, Global Competitiveness Index 2012-2013

Switzerland & Innovation



Australia is lagging in these areas

Productivity & Innovation

Lifting productivity growth is the key to Australia's prosperity

Productivity is critical for Australia's prosperity, economic growth, and social wellbeing. Lifting productivity growth is a critical priority for Australia. Innovation is a key driver of productivity growth. This report examines how investment in and application of science, research and technology can enhance creativity and innovation to lift productivity in Australia.

This report has three major conclusions:

- Building Australia's future industries will depend on adopting technological innovation to develop high-value products and services for a global market.
- Improving collaboration in Australia, between businesses and between business and publicly funded reseach, will significantly enhance innovation. International collaboration is also critically important. Both domestic and international collaboration improves the productivity and competitiveness of Australian technology-based firms.
- An innovative workforce that combines technical and non-technical disciplines, and enables good business management, is essential to underpin the competitive advantage of Australian industries and realise opportunities to lift productivity.

The role of science, research and technology in lifting Australia's productivity
AUSTRALIAN COUNCIL OF LEARNED ACADEMIES

National Innovation and Science Agenda

Four-year $1.1b agenda comprises 4 interrelated clusters of initiatives:

- culture and capital
- collaboration
- talent and skills
- government as exemplar

Welcome initiative but missed an opportunity.

National Innovation and Science Agenda

Collaboration

- universities and businesses – no mention of the VET sector

Talent and Skills

- a raft of initiatives with heavy focus on schools – no mention of the VET sector

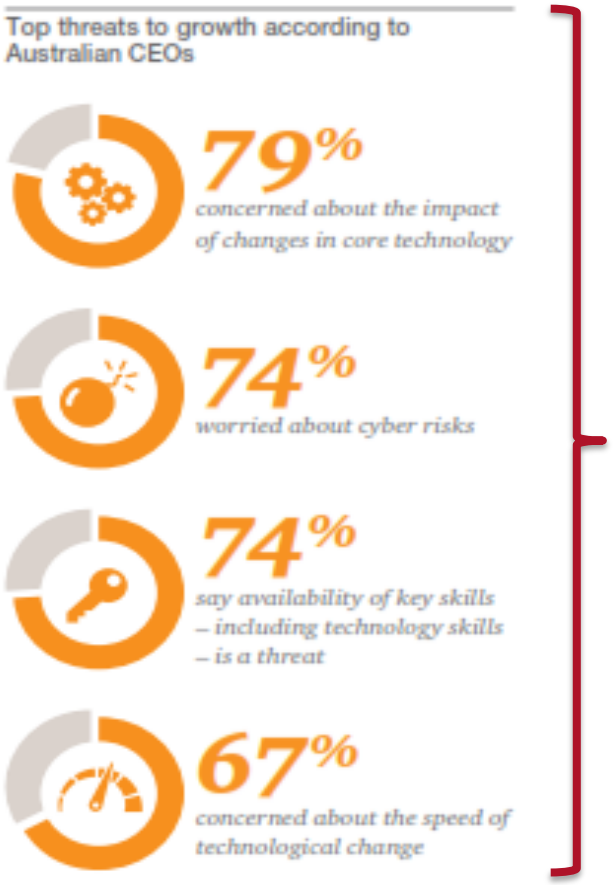
National Innovation and Science Agenda

- does not address the need for improved collaboration between enterprises and the **tertiary sector in general**
- does not capitalise on interaction between professional and **technical learning**
- **no recognition that apprenticeship model** an effective industry-partnered collaboration
- note European experimentation with **'higher apprenticeships'** for mid-tier professionals

"NISA may prove inadequate in skilling for innovation for existing and start up companies." Craig Fowler, NCVER

Ai Group Statements on Innovation

Digital Disruption



VET sector needs to take opportunities to engage in this

STEM Benefit to Industry

Benefit to key industries as a result of increasing the STEM workforce

Industry	Additional output (NPV, $AUD million) over and above baseline by 2035	Cumulative growth over and above baseline percentage
Professional, scientific and technical services	21,070	1.1%
Information media and telecommunications	4,821	0.6%
Financial and insurance services	12,013	0.5%
Construction	6,123	0.4%
Electricity, gas, water and waste services	1,539	0.3%
Manufacturing	4,107	0.2%
Wholesale trade	2,233	0.2%
Rental, hiring and real estate services	1,664	0.2%
Retail trade	1,321	0.2%
Administrative and support services	1,072	0.2%
Transport, postal and warehousing	1,018	0.1%
Public administration and safety	803	0.1%
Arts and recreation services	183	0.1%
Mining	378	0.0%

Source: PwC

STEM and Innovation

A STEM education underpins innovation and plays a critical role in economic and business growth. But Australia is lagging on key indicators of STEM.

A smart move, PwC

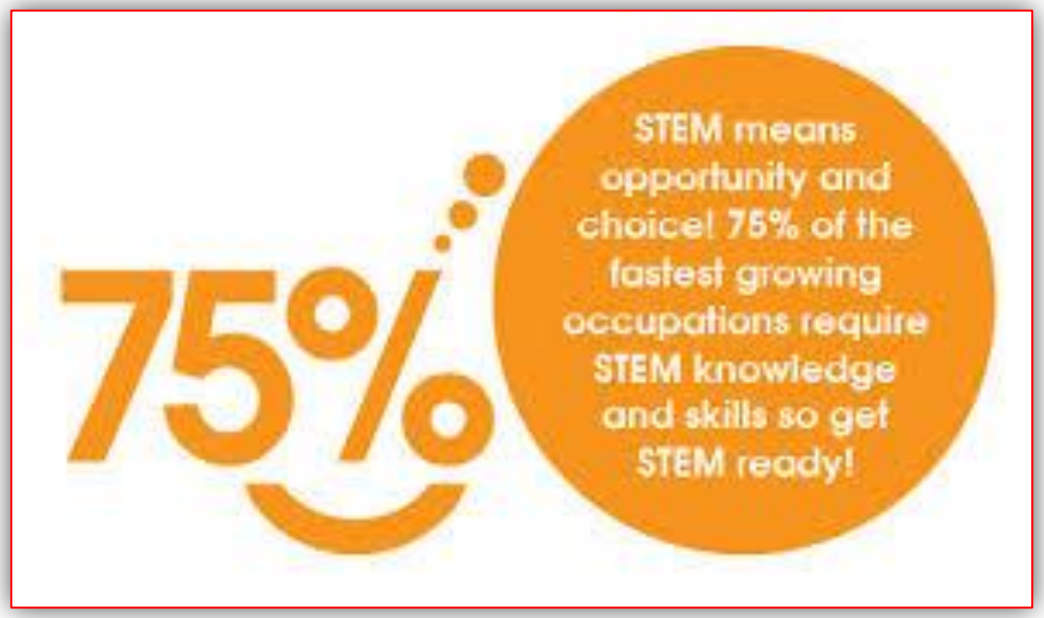
STEM and the Economy

STEM skills jobs fastest growing rate in economy

65% of economic growth per capita

18% of workforce have STEM qualifications

STEM and Jobs



STEM jobs in the US are growing 3 times more than non-STEM jobs …
… expected to grow twice as fast by 2018

Fastest Growing Employment

23% growth:

Design, engineering, science and transport professionals

19% growth:

ICT professionals

STEM and the Workforce

University STEM Qualifications

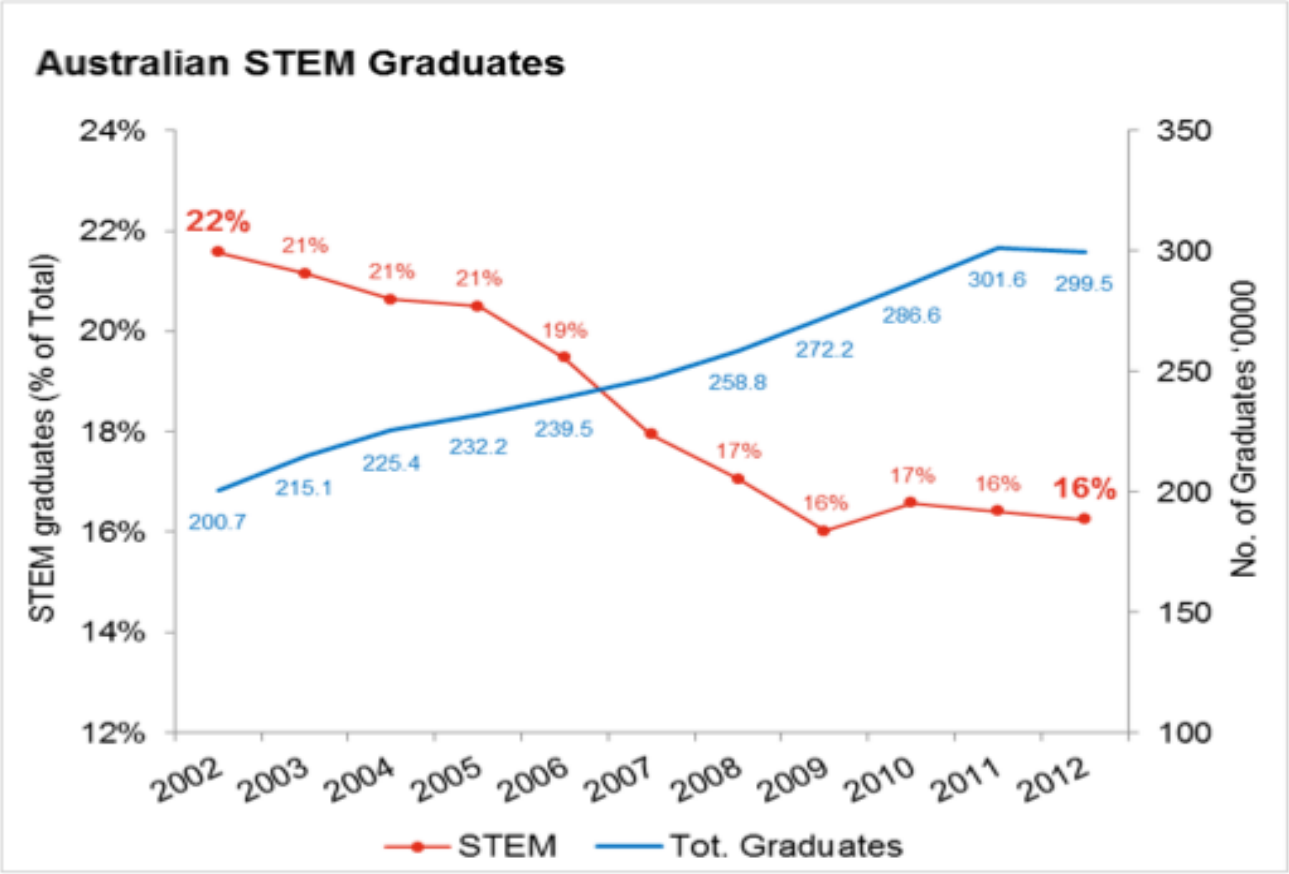
75% professionals, managers

VET STEM Qualifications

41% technicians, trade workers

25% professionals, managers

Australian STEM Graduates



VET Sector STEM

STEM 29.9% of all VET	**16.9%:**	**engineering and related technologies**
	4.8%:	**agriculture, environmental and related technologies**
	2.7%:	**information technology**
	0.7%:	**natural and physical sciences**

Current Workforce

- 82% employers agree STEM skills valuable
- 70% employers consider STEM staff most innovative
- 45% employers expect STEM requirements to increase next 5 – 10 years
- Participation by women in STEM employment only increased by 2.8% since 1992

Redarc – innovative company

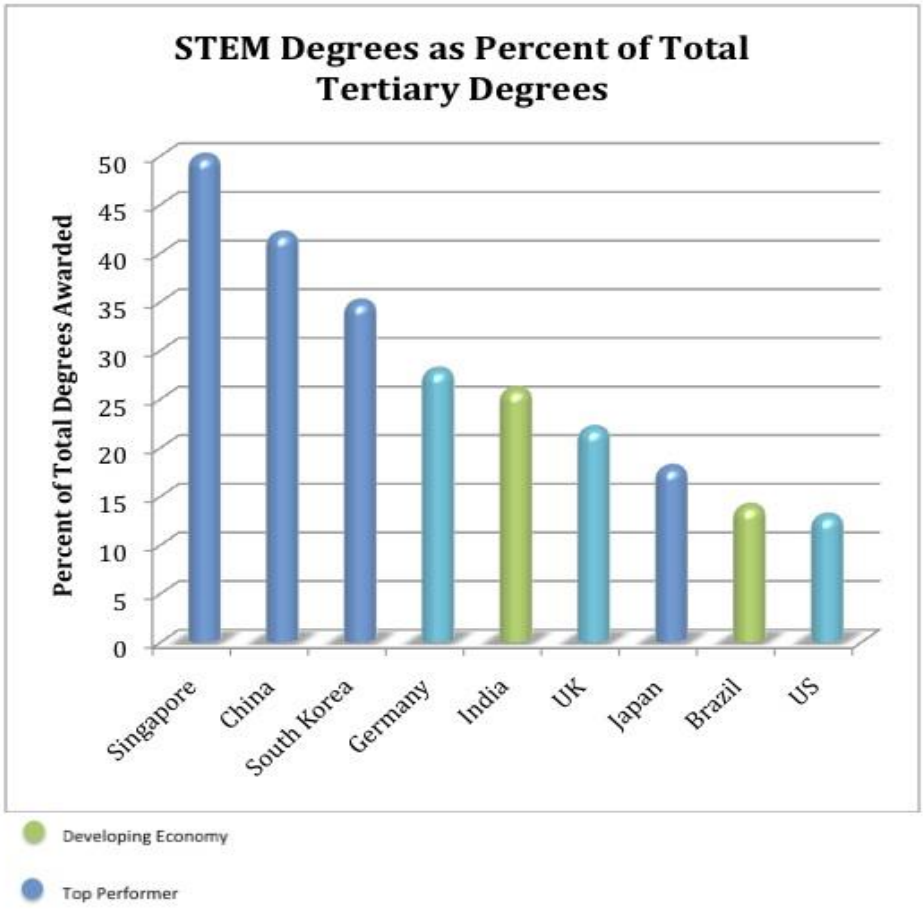
Research

- 15% of sales to R & D ($3.5m p.a.)
- 20 staff full-time R & D
- 5 new products a year

Learning Environment

- Partnerships with TAFE SA and 4 universities
- All employees access training with funding assistance

STEM Degrees Selected Countries



Center on International Education Benchmarking, USA, July 2012

Australia Underperforming

" … the news is good but not great. Australia has travelled fairly well until now, but there are holes in capacity and performance.

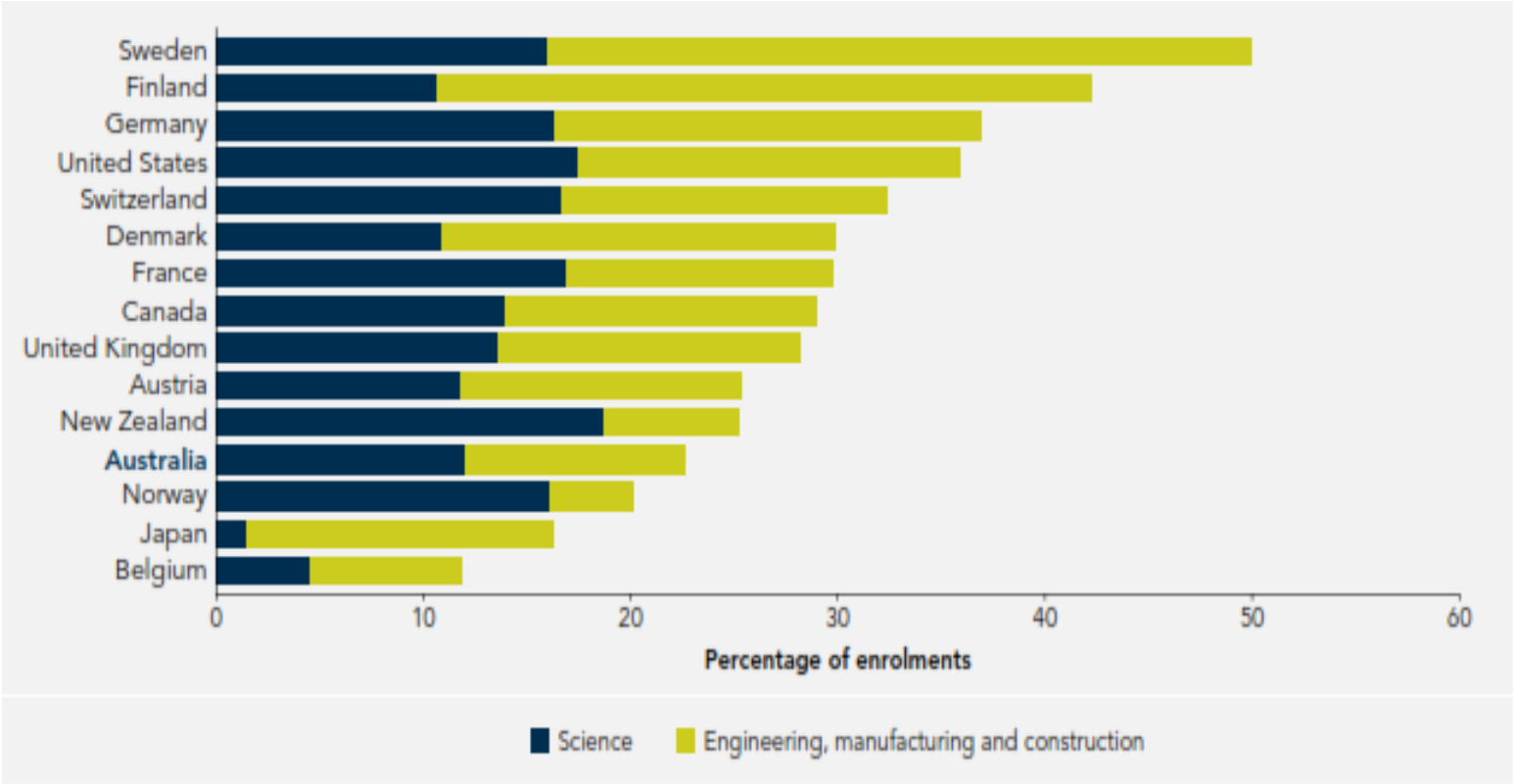
Further, many other countries are improving STEM provision, participation and performance more rapidly than us."

STEM Country Comparisons, Final Report, ACOLA, 2013

Industry Growth Centres

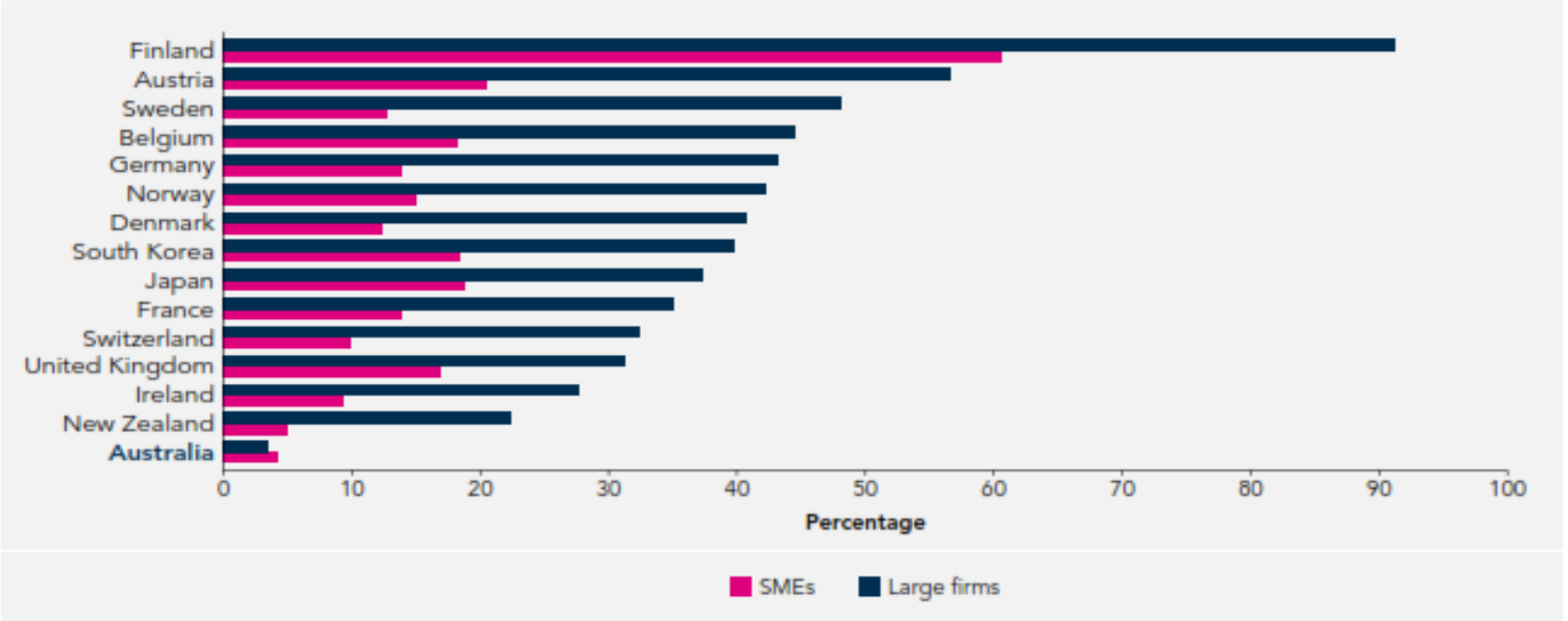
- initiative has significant potential to promote and implement STEM skills
- all six of the Centres announced to date overlap with STEM skill areas
- the centres are tasked with improving the management and workforce skills of key growth areas
- the long-term strategies to be developed by each of these centres needs to focus on the development of workforce STEM skills

Student Tertiary Enrolments in STEM Selected Countries 2009



Source: OECD (2011).

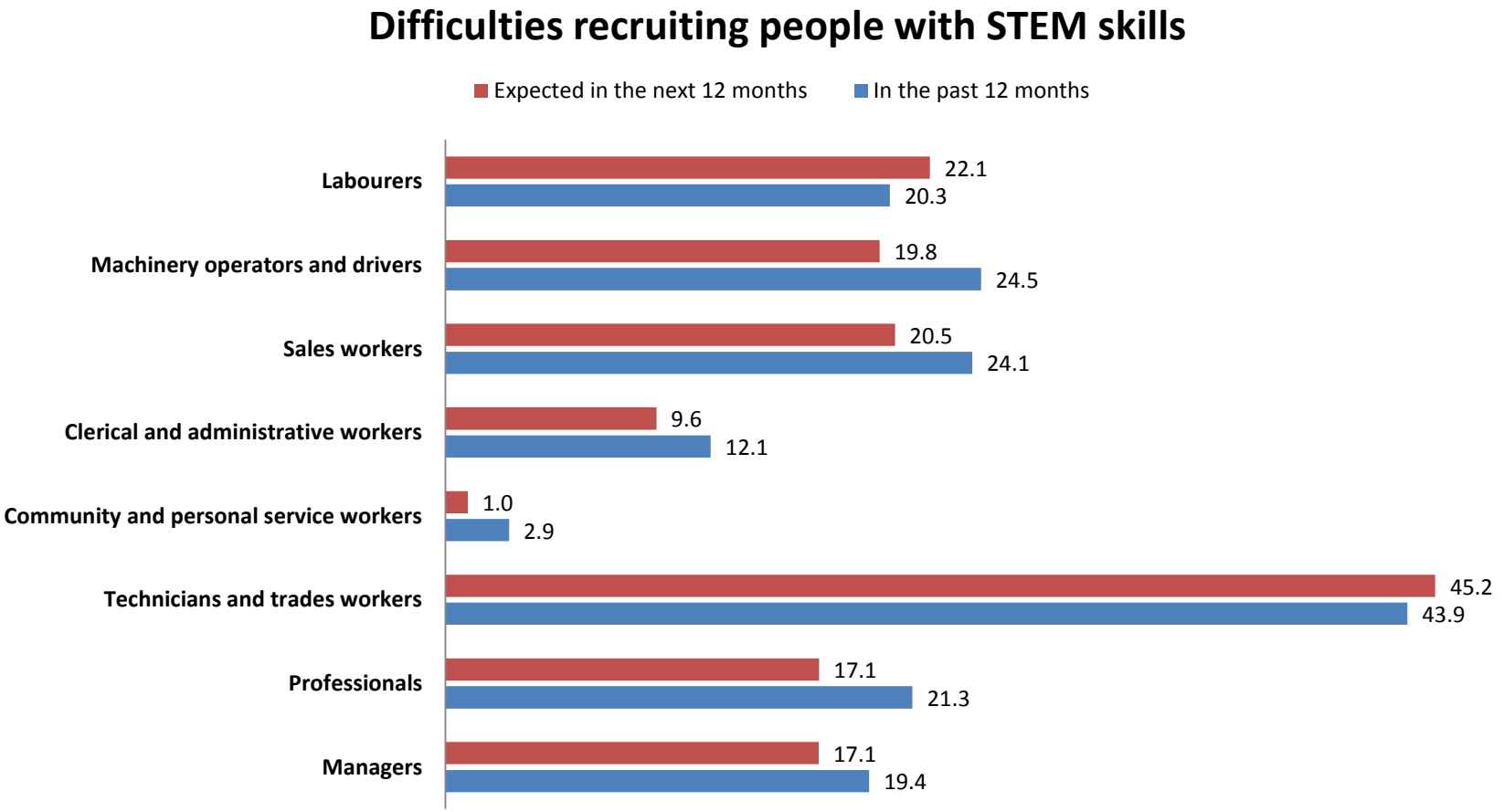
Industry – Higher Education Innovation Collaboration 2008 - 2010



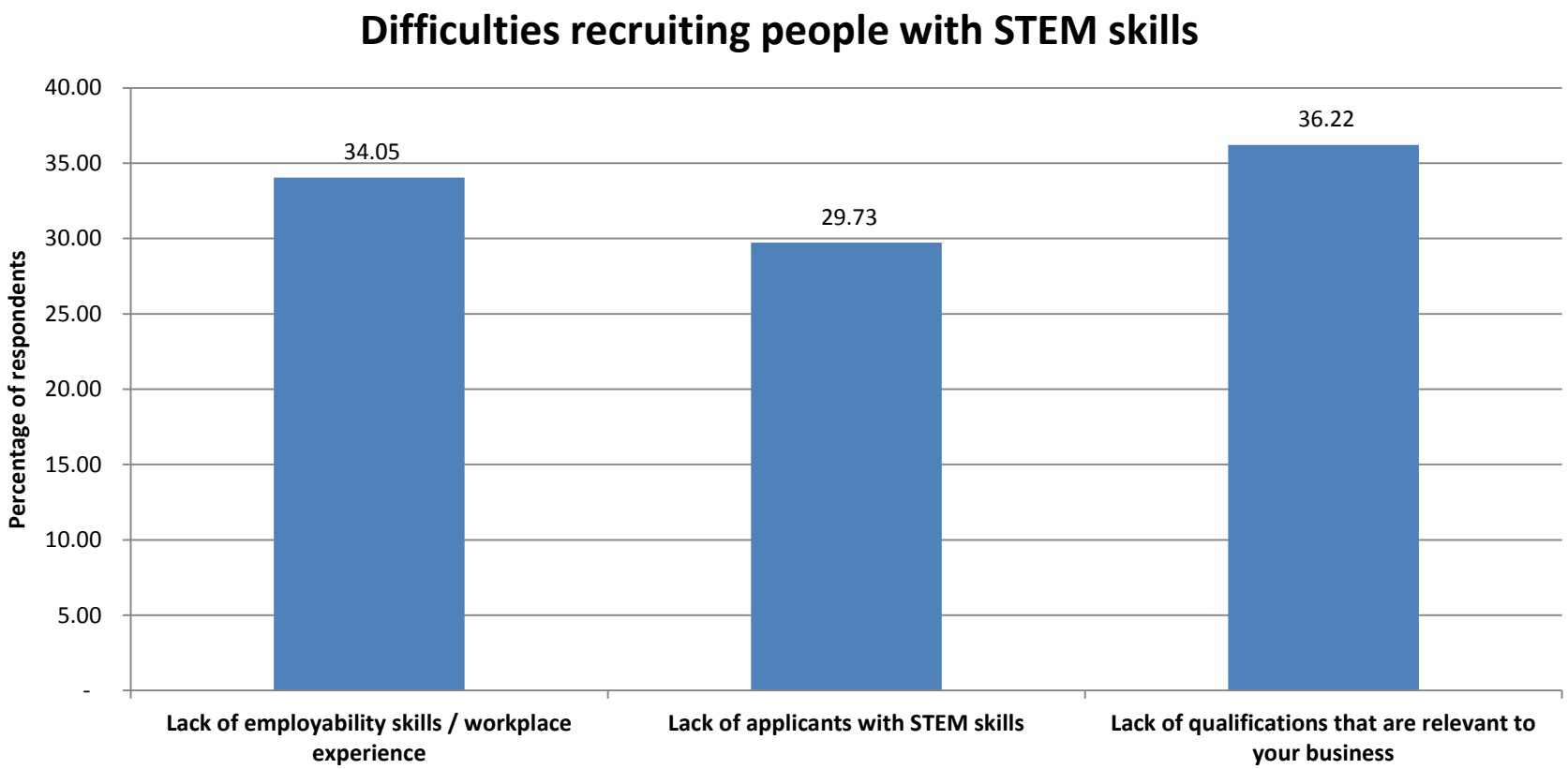
Notes: By OECD classifications, firms with 10–250 employees are considered SMEs, and firms with more than 250 employees are large firms. Where no data were available for 2008–2010, other years are displayed: Australia 2010–2011, New Zealand 2009–2011, Ireland 2006–2008, Switzerland 2009–2011, Japan 2009–2010 and South Korea 2005–2007.

Source: OECD 2011b.

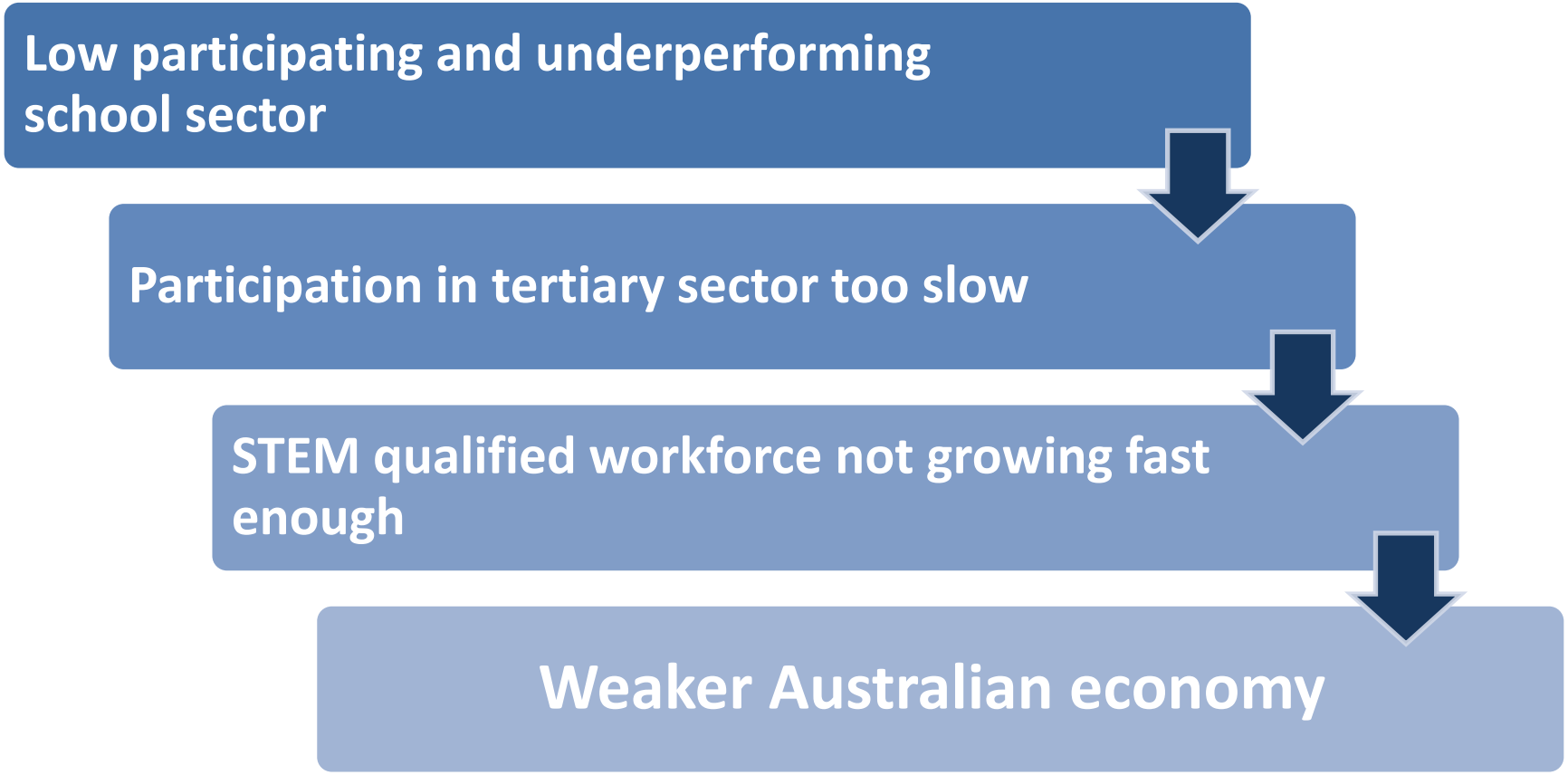
Recruitment Difficulties with STEM Skills



Recruitment Barriers



Impact of STEM Skills Pipeline



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