Australian Government | Australian Workforce and Productivity Agency

Professional, scientific and technical services

…covers scientific research services, architectural, engineering and technical services, legal and accounting services, advertising services, market research and statistical services, management and consulting services, veterinary services, meteorological services, professional photographic services and computer system design services.

This suite of Industry Snapshots complements *Future Focus*, the 2013 National Workforce Development Strategy. These snapshots provide additional information and analysis on each industry to assist stakeholders in planning for the future of their industry or sector. It should be noted that the longer term data contained in this publication is based on AWPA's four scenarios for Australia to 2025 and is not intended to be compared to other data sources or projections.

Key points

- Professional, scientific and technical services employs approximately 910,900 people, accounting for around 8 per cent of the total Australian workforce.
- Over the past five years, employment in the professional, scientific and technical services industry has increased by 15.2 per cent.
- The majority of the industry workforce (56 per cent) is employed in small-sized enterprises (i.e. those that employ less than 20 workers), with only 22 per cent employed in large enterprises (i.e. those that employ 200 workers or more).
- The professional, scientific and technical services industry has a relatively low proportion of part-time workers, with 22 per cent compared to 30 per cent for all industries.
- Nearly one quarter (24 per cent) of employment occurs in regional and remote areas—considerably less than the all-industry average of 37 per cent.[1]
- More than half (56 per cent) of workers in professional, scientific and technical services hold a Bachelor degree or higher qualification, and only 21 per cent do not hold post-school qualifications compared to 39 per cent for all industries.
- A detailed employment profile for professional, scientific and technical services (including information on its workforce, industry and occupational characteristics) can be found at www.skillsinfo.gov.au.

Industry outlook

The professional, scientific and technical services sector is a large employing industry and an important source of research, development and innovation within the Australian economy. In

[1] Regional and remote areas are defined as those outside state capital cities.

terms of industry value added, professional, scientific and technical services contributed 7.1 per cent ($97.5b) to the national economy in 2011–12.[2]

Short-term growth

The professional, scientific and technical services sector grew by 15.2 per cent over the past five years; more than double the growth rate for all industries (7.4 per cent). The subsector Computer System Design and Related Services grew particularly strongly during this period, increasing its workforce by more than a third.

Table 1 Past, current and future employment in professional, scientific and technical services

Industry	Current employment		Past growth: five years	
	'000	% of total	'000	%
Professional, Scientific and Technical Services	**910.9**	**7.9**	**120.4**	**15.2**
Professional, Scientific and Technical Services (Except Computer System Design and Related Services)	730.4	6.5	66.2	10.0
Computer System Design and Related Services	177.1	1.6	46.2	35.3
All industries	**11,588.7**	**100.0**	**798.1**	**7.4**

Note: Data for industry subsectors may not sum to the industry total because data for each subsector have been separately seasonally adjusted and trended and at the higher levels include 'not further defined' categories.
Source: ABS (2013) *Labour Force Australia*, February, cat. no. 6291.0.55.003 (DEEWR trend).

Long-term growth

Australia needs to position itself in a world where work is rapidly changing. Technological innovation, globalisation, the Asian century and new patterns of work are impacting on the demand for skills and the speed of change is making it hard to predict and plan for the future.

To deal with this uncertainty, AWPA has adopted a scenario planning approach to help us overcome these limitations in making projections about the future. Scenarios are alternative visions of potential futures, and provide a means to make decisions that take account of uncertainty.

AWPA developed four possible, plausible scenarios for Australia to 2025.

- In the **Long Boom** scenario, the high demand for resources traded with China and other countries continues. Industries challenged by the high terms of trade undertake structural adjustment. This results in a scenario of sustained prosperity and a restructured economy.
- In **Smart Recovery**, the challenges facing Europe and the United States affect financial markets. This means low growth for Australia to 2014–15. Growth then improves and Australia benefits from industry and government strategies to implement a knowledge economy.
- In **Terms of Trade Shock**, resource prices fall mainly due to increased supply from other countries, the Australian dollar falls and we move to a broader-based economy.

[2] 'Industry value added' is the measure of the contribution by industry to gross domestic product (GDP) at basic prices. ABS (2012) *Australian System of National Accounts*, cat. no. 5204.0, Table 11.

- **Ring of Fire** is a risky world with multiple economic and environmental shocks resulting in ongoing lower growth.

Economic modelling against each of these four scenarios was undertaken by Deloitte Access Economics (DAE) to determine the skills demand for the economy into the future.[3]

As Table 2 shows, the professional, scientific and technical services industry is forecast to grow at almost twice the rate for all industries to 2025 across all four scenarios. Employment growth is predicted to be particularly high under the Long Boom scenario in the years to 2018, but to be below average under Ring of Fire during this period. Employment is expected to be particularly strong in the Computer System Design and Related Services subsector, at three to four times the average for all industries across all scenarios to 2018 and to 2025.

Table 2 Average annual industry employment growth in three scenarios, 2011–15 and 2011–25 (% per annum)

Industry	Long Boom		Smart Recovery		Terms of Trade Shock		Ring of Fire	
	2018	2025	2018	2025	2018	2025	2018	2025
Professional, Scientific and Technical Services	4.7	3.8	2.0	2.5	2.0	3.0	0.1	1.7
Professional, Scientific and Technical Services (Except Computer System Design and Related Services)[(a)]	3.5	2.7	0.9	1.5	0.8	1.9	-1.1	0.7
Computer System Design and Related Services	9.0	7.1	6.2	5.8	6.2	6.2	4.1	5.0
All industries	**2.1**	**2.0**	**1.5**	**1.5**	**1.7**	**1.6**	**0.8**	**0.7**

Source: Deloitte Access Economics (2012) *Economic modelling of skills demand and supply*, Scenario output—detailed employment results.

Occupation outlook

Key occupations

The largest occupational group in the professional, scientific and technical services industry is Accountants, comprising 8.7 per cent of the industry workforce. Solicitors account for 5.4 per cent of industry employment, followed by Software and Applications Programmers (5.0 per cent and Graphic and Web Designers, and Illustrators (3.3 per cent).

[3] A description of the scenarios and the Deloitte Access Economics modeling of employment in each, with state and territory breakdowns, is available at the AWPA website www.awpa.gov.au.

Table 3 Top ten professional, scientific and technical services occupations

Occupation		People employed	Industry employment
		'000	% of total
2211	Accountants	79.5	8.7
2713	Solicitors	48.9	5.4
2613	Software and Applications Programmers	45.8	5.0
2324	Graphic and Web Designers, and Illustrators	30.3	3.3
5512	Bookkeepers	25.3	2.8
2247	Management and Organisation Analysts	24.5	2.7
5212	Secretaries	22.4	2.5
2321	Architects and Landscape Architects	21.1	2.3
1311	Advertising and Sales Managers	20.8	2.3
2332	Civil Engineering Professionals	20.5	2.2
Total professional, scientific and technical services		**909.5**	**37.3**

Source: ABS (2013) *Labour Force Australia*, detailed quarterly report, 2012 average of four quarters, cat. no. 6291.0.55.003.

Short-term growth

Table 4 shows current employment and past growth for the occupations that feature prominently within the industry. **Note that the figures refer to the expected number of people in these occupations across all industries, not just in professional, scientific and technical services**.

Employment in a number of key occupations has grown strongly over the past five years. These include Solicitors (27.9 per cent); Management and Organisation Analysts (26.4 per cent) Graphic and Web Designers, and Illustrators (25.9 per cent); and Civil Engineering Professionals (10.7 per cent).

Employment has also decreased markedly in a number of occupations over the past five years. Secretaries experienced the largest decline in employment, shedding almost half its workforce during this time. Bookkeepers; Accountants; Software and Applications Programmers; and Architects and Landscape Architects also experienced a decrease in numbers over the past five years.

Table 4 Current and past employment in key occupations

Occupation		Current employment (all industries)		Past growth: five years	
		'000	% of total	'000	%
2211	Accountants	158.4	1.4	-7.9	-4.7
2713	Solicitors	57.4	0.5	12.5	27.9
2613	Software and Applications Programmers	81.9	0.7	-1.6	-2.0
2324	Graphic and Web Designers, and Illustrators	53.9	0.5	11.1	25.9
5512	Bookkeepers	114.8	1.0	-13.2	-10.3
2247	Management and Organisation Analysts	57.6	0.5	12.1	26.4
5212	Secretaries	65.9	0.6	-49.9	-43.1
2321	Architects and Landscape Architects	20.7	0.2	-0.2	-1.2
1311	Advertising and Sales Managers	124.0	1.1	0.9	0.7
2332	Civil Engineering Professionals	39.7	0.4	3.8	10.7
All employed		**11,588.7**	**100.0**	**798.1**	**7.4**

Source: ABS (2013) *Labour Force Australia*, February, cat. no. 6291.0.55.003 (DEEWR trend).

Long-term growth and job openings

Table 5 indicates the long-term net job growth per annum expected in these occupation groups, according to Deloitte Access Economics' economic modelling of the scenarios. In the longer-term, employment growth rates are predicted to be strong for Advertising and Sales Managers; Software and Applications Programmers; Management and Organisation Analysts; and Accountant across all scenarios to 2018 and to 2025. Occupations with weaker projected growth include Secretaries; Bookkeepers; Graphic and Web Designers, and Illustrators; and Civil Engineering Professionals.

Table 5 Average annual occupation growth in four scenarios, 2011–18 and 2011–25 (%pa)

Industry		Long Boom		Smart Recovery		Terms of Trade Shock		Ring of Fire	
		2018	2025	2018	2025	2018	2025	2018	2025
2211	Accountants	3.2	2.5	1.9	1.7	2.0	1.9	0.8	1.0
2713	Solicitors	2.8	2.2	1.1	1.3	1.3	1.6	-0.2	0.6
2613	Software and Applications Programmers	4.4	4.0	2.8	3.1	2.9	3.4	1.5	2.3
2324	Graphic and Web Designers, and Illustrators	0.5	1.7	-0.9	0.8	-0.7	1.2	-1.8	0.4
5512	Bookkeepers	0.8	0.5	-0.1	0.0	0.0	0.0	-0.9	-0.7
2247	Management and Organisation Analysts	3.1	3.0	1.8	2.3	2.1	2.5	0.7	1.4
5212	Secretaries	0.8	0.8	-0.9	-0.1	-0.8	0.0	-2.3	-1.3
2321	Architects and Landscape Architects	2.3	2.6	0.0	1.4	0.0	1.8	-1.9	0.5
1311	Advertising and Sales Managers	3.5	3.1	2.9	2.6	3.0	2.7	2.4	2.1
2332	Civil Engineering Professionals	1.7	2.0	0.2	1.3	0.3	1.4	-1.0	0.4
All occupations		**2.1**	**2.0**	**1.5**	**1.5**	**1.7**	**1.6**	**0.8**	**0.7**

Source: Deloitte Access Economics (2012) *Economic modelling of skills demand and supply*, Scenario output—detailed employment results.

As noted, the data in Table 5 concerns employment growth in an industry. The number of total **job openings** which includes both employment growth and **the replacement resulting from individuals leaving the occupation net of those re-entering** can also be estimated. This replacement requirement is particularly significant in industries where there are high numbers of people retiring or leaving the occupation.

Table 6 shows the average annual job openings projected in key occupations to 2025.

Software and Application Programmers and Advertising and Sales Managers show annual job opening rates above the average for all industries in the years to 2025. Job openings in occupations such as Accountants; Management and Organisation Analysts; and Architects and Landscape Architects are projected to be at a similar rate to the all industry average.

Table 6 Average annual job openings per annum, 2011 to 2025, in four scenarios

Occupation		Long Boom		Smart Recovery		Terms of Trade Shock		Ring of Fire	
		('000)	%	('000)	%	('000)	%	('000)	%
2211	Accountants	7.8	4.1	6.1	3.4	6.5	3.5	4.6	2.6
2713	Solicitors	1.9	2.9	1.4	2.1	1.5	2.4	1.0	1.4
2613	Software and Applications Programmers	7.9	5.8	6.4	4.9	6.8	5.2	5.3	4.1
2324	Graphic and Web Designers, and Illustrators	3.4	3.0	2.9	2.2	3.1	2.5	2.7	1.8
5512	Bookkeepers	2.9	2.2	2.3	1.7	2.3	1.7	1.9	1.0
2247	Management and Organisation Analysts	2.3	4.1	1.9	3.4	2.0	3.5	1.3	2.5
5212	Secretaries	3.4	3.9	2.7	3.0	2.6	3.0	2.0	1.8
2321	Architects and Landscape Architects	1.7	4.3	1.3	3.2	1.4	3.5	1.1	2.2
1311	Advertising and Sales Managers	8.1	5.2	7.2	4.7	7.3	4.8	6.2	4.2
2332	Civil Engineering Professionals	2.3	2.7	1.8	2.0	1.9	2.1	1.4	1.1
All occupations		**576.4**	**4.4**	**500.9**	**3.9**	**513.3**	**4.0**	**391.4**	**3.1**

Source: Deloitte Access Economics (2012) *Economic modelling of skills demand and supply*, Scenario output—detailed employment results. Net replacement demand by AWPA (2013).

As Table 7 shows, job openings are generally driven by new growth rather than replacement demands under the three higher growth scenarios. The only exceptions are Bookkeepers and Secretaries, for whom the majority of job openings (over 70 per cent to 2025 under the Long Boom) is driven by replacement demand. This may reflect the age profile of these occupations or other workforce dynamics such as the rate of job turnover.

Table 7 Total job openings (growth and net replacement) in three scenarios, 2011 to 2025

7.1 Long Boom

Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
		('000)	%	('000)	%	('000)	%
2211	Accountants	67.6	57.7	49.5	42.3	117.1	100.0
2713	Solicitors	20.4	72.1	7.9	27.9	28.3	100.0
2613	Software and Applications Programmers	83.1	70.4	34.9	29.6	118.0	100.0
2324	Graphic and Web Designers, and Illustrators	39.2	75.9	12.5	24.1	51.7	100.0
5512	Bookkeepers	12.4	28.2	31.5	71.8	43.9	100.0
2247	Management and Organisation Analysts	26.0	74.6	8.9	25.4	34.8	100.0
5212	Secretaries	13.8	27.1	37.0	72.9	50.8	100.0
2321	Architects and Landscape Architects	18.0	70.2	7.6	29.8	25.6	100.0
1311	Advertising and Sales Managers	69.8	57.1	52.4	42.9	122.2	100.0
2332	Civil Engineering Professionals	28.0	81.6	6.3	18.4	34.4	100.0
All occupations		**3,889.7**	**45.0**	**4,755.6**	**55.0**	**8,645.3**	**100.0**

7.2 Smart Recovery

Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
		('000)	%	('000)	%	('000)	%
2211	Accountants	45.9	49.9	46.0	50.1	91.9	100.0
2713	Solicitors	13.3	64.8	7.2	35.2	20.5	100.0
2613	Software and Applications Programmers	64.3	66.9	31.8	33.1	96.2	100.0
2324	Graphic and Web Designers, and Illustrators	31.5	73.2	11.5	26.8	43.0	100.0
5512	Bookkeepers	4.8	13.9	29.9	86.1	34.7	100.0
2247	Management and Organisation Analysts	19.8	70.7	8.2	29.3	28.1	100.0
5212	Secretaries	6.4	15.9	33.6	84.1	40.0	100.0
2321	Architects and Landscape Architects	13.1	66.2	6.7	33.8	19.8	100.0
1311	Advertising and Sales Managers	56.9	53.1	50.3	46.9	107.3	100.0
2332	Civil Engineering Professionals	21.3	78.5	5.8	21.5	27.1	100.0
All occupations		**2,953.2**	**39.3**	**4,559.6**	**60.7**	**7,512.9**	**100.0**

7.3 Terms of Trade Shock

Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
		('000)	%	('000)	%	('000)	%
2211	Accountants	51.0	52.2	46.7	47.8	97.7	100.0
2713	Solicitors	14.8	66.8	7.4	33.2	22.2	100.0
2613	Software and Applications Programmers	70.0	68.3	32.4	31.7	102.5	100.0
2324	Graphic and Web Designers, and Illustrators	34.5	74.5	11.8	25.5	46.3	100.0
5512	Bookkeepers	4.0	11.7	30.0	88.3	34.0	100.0
2247	Management and Organisation Analysts	21.1	71.6	8.4	28.4	29.5	100.0
5212	Secretaries	4.5	11.8	33.9	88.2	38.4	100.0
2321	Architects and Landscape Architects	14.1	67.5	6.8	32.5	21.0	100.0
1311	Advertising and Sales Managers	58.4	53.6	50.5	46.4	108.9	100.0
2332	Civil Engineering Professionals	22.4	79.2	5.9	20.8	28.3	100.0
All occupations		**3,080.4**	**40.0**	**4,619.3**	**60.0**	**7,699.6**	**100.0**

7.4 Ring of Fire

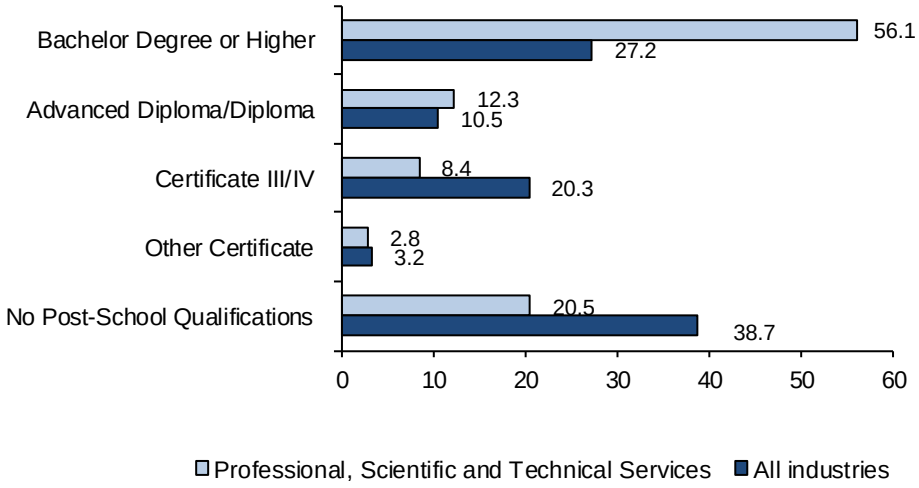
Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
		('000)	%	('000)	%	('000)	%
2211	Accountants	26.1	37.7	43.1	62.3	69.2	100.0
2713	Solicitors	7.8	53.8	6.7	46.2	14.5	100.0
2613	Software and Applications Programmers	50.2	62.9	29.6	37.1	79.8	100.0
2324	Graphic and Web Designers, and Illustrators	28.9	72.4	11.0	27.6	39.9	100.0
5512	Bookkeepers	0.7	2.4	28.4	97.6	29.1	100.0
2247	Management and Organisation Analysts	12.5	62.1	7.6	37.9	20.2	100.0
5212	Secretaries	0.0	0.0	30.6	100.0	30.6	100.0
2321	Architects and Landscape Architects	10.2	62.9	6.0	37.1	16.3	100.0
1311	Advertising and Sales Managers	44.4	47.7	48.6	52.3	92.9	100.0
2332	Civil Engineering Professionals	15.3	73.9	5.4	26.1	20.7	100.0
All occupations		**1,532.9**	**26.1**	**4,338.5**	**73.9**	**5,871.4**	**100.0**

Source: Deloitte Access Economics (2012) *Economic modelling of skills demand and supply*, Scenario output—detailed employment results. Net replacement demand by AWPA (2013).

Education and training profile

The professional, scientific and technical services industry has the second highest proportion of tertiary-educated workers, after education and training, with more than half (56.1 per cent) holding a Bachelor degree or higher qualification. Only 20.5 per cent do not hold post-school qualifications compared to 38.7 per cent for all industries.

Figure 1 Education profile of the professional, scientific and technical services workforce (%)



Note: Excludes 'Level of education not stated' from total.
Source: DEEWR (2012) *Australian Jobs 2012* (ABS 2011 Census data).

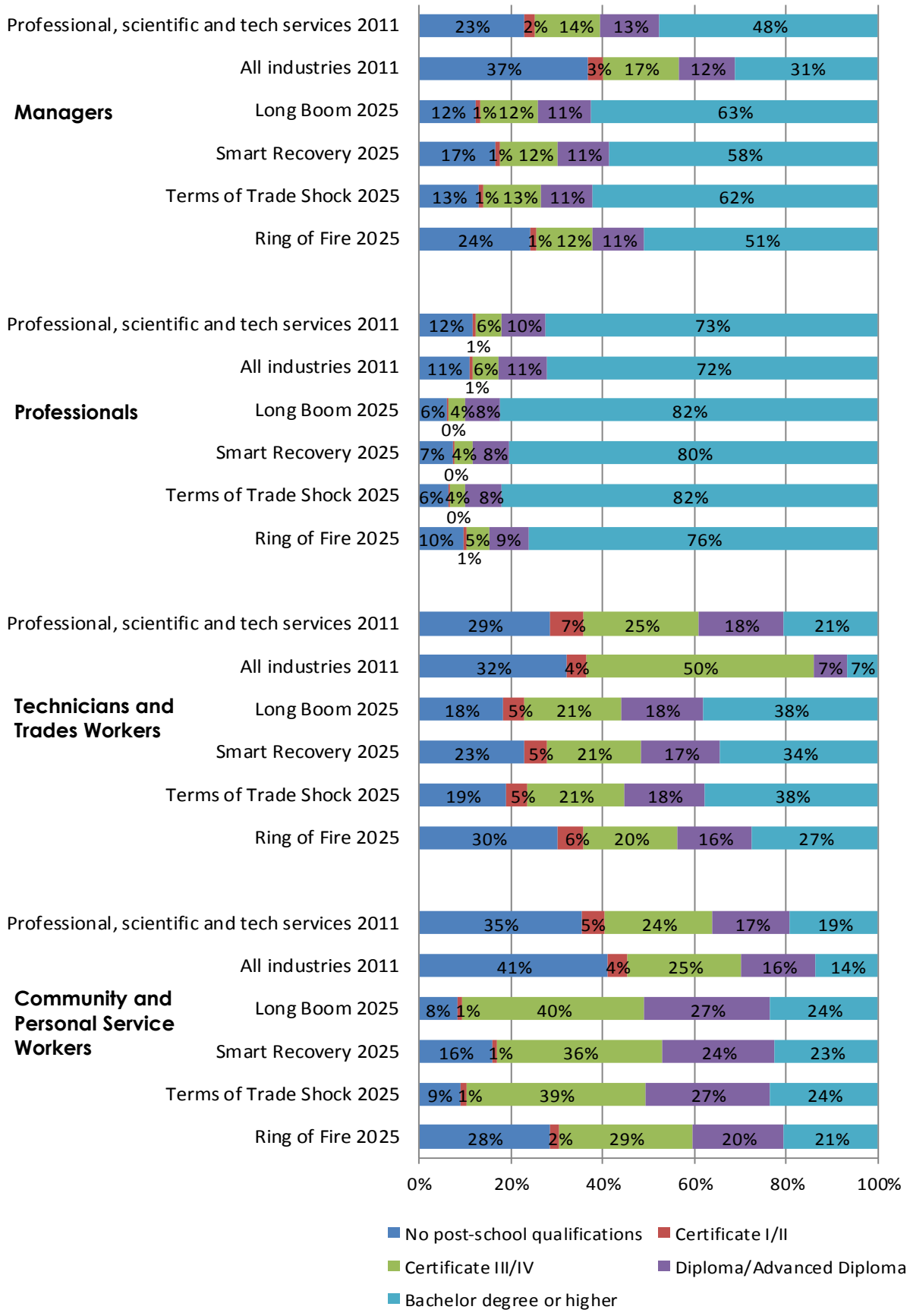
Figure 2 illustrates how demand for qualifications is expected to change over time. It shows the current education profile for each respective occupation: across all industries and within the professional, scientific and technical services industry. It also shows projected levels of educational attainment to 2025 by each occupation group depending on which of the four scenarios eventuates.

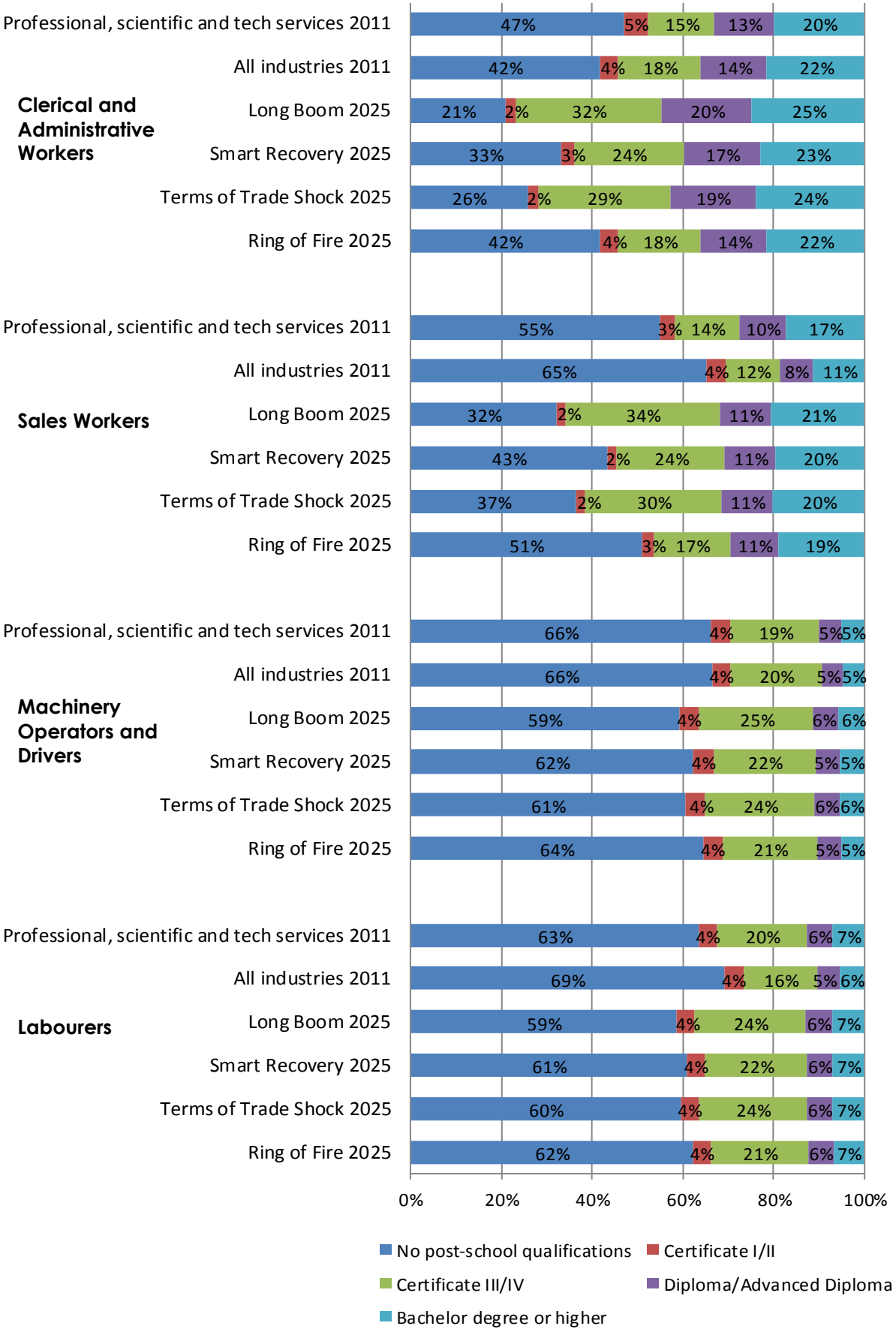
As Figure 2 illustrates, managerial occupations overwhelmingly hold a Bachelor degree or higher qualification, and this level of educational attainment is expected to increase by at least 10 percentage points under the three higher growth scenarios.

The qualification profile for Technicians and Trades Workers within the professional, scientific and technical services industry is markedly different from that of workers in other sectors. More than a fifth of Technicians and Trades Workers in professional, scientific and technical services currently hold a Bachelor degree, with a further 18 per cent holding a Diploma or Advanced Diploma. The proportion of workers with advanced qualification is expected to increase in the years to 2025, with more than a third projected to hold a Bachelor degree or higher qualification under the three higher growth scenarios, and more than a quarter under Ring of Fire.

This trend towards upskilling is also expected among Community and Personal Service Workers, with much of the growth in qualifications to 2025 forecast at the Certificate III/IV level. A similar pattern of upskilling can be observed for Clerical and Administrative Workers, albeit to a lesser extent, with the proportion of workers with a Certificate III/IV expected to grow from 15 per cent in 2011 to between 18 and 32 per cent, depending on the scenario.

Figure 2 Educational attainment in the professional, scientific and technical services industry by occupation, 2011 and projections to 2025 (%)





Source: ABS (2012) *Survey of Education and Work 2012*, cat. no. 6227.0; and DAE (2012) Unpublished data.

Specialised occupations

In *Future Focus*, the 2013 National Workforce Development Strategy, AWPA has proposed that national planning for skills and industry workforce development should focus on **specialised occupations**. Specialised occupations are defined as those 'where specialised skills, learned in formal education and training, are needed at entry level and where the impact of market failure is potentially significant for the economy and/or the community.'

Specialised occupations demonstrate these characteristics:

- long lead time—skills are highly specialised and require extended learning and preparation time over several years;
- high use—skills are deployed for the uses intended (i.e. good occupational 'fit');
- high risk—the disruption caused by the skills being in short supply is great, resulting either in bottlenecks in supply chains or imposing significant economic or community costs because an organisation cannot operate; and
- high information—the quality of information about the occupation is adequate to the task of assessing future demand and evaluating the first three criteria.

Monitoring skills supply, especially for specialised occupations, will remain a critical element in meeting our workforce needs.

A large number of specialised occupations are featured within the professional, scientific and technical services industry. These include:

Accountants
Architects and Landscape Architects
Surveyors and Spatial Scientists
Urban and Regional Planners
Agricultural and Forestry Scientists
Chemists
Medical Laboratory Scientists
Veterinarians
Metallurgists
Meteorologists
Physicists [Specifically Medical Physicists]
Medical Imaging Professionals
Occupational and Environmental Health Professionals
ICT Business and Systems Analysts
Software and Applications Programmers
Computer Network and Systems Engineers
Telecommunications Engineering Professionals
Barristers
Judicial and Other Legal Professionals
Solicitors
Psychologists
Social Workers

In addition, a wide range of specialised occupations are also included among medical professionals (e.g. doctors, allied health professionals); in the financial sector (e.g. financial brokers); in engineering; and in education. These occupations are listed under each of their respective industry snapshots. For example, engineering professionals are included in the mining and construction snapshots in this series.

More detailed information about specialised occupations is available in *Future Focus, 2013 National Workforce Development Strategy* at http://www.awpa.gov.au.

Example workforce development initiatives

Investment in workforce development has been shown to maximise people's capabilities, lift productivity and increase workforce participation. Employee satisfaction levels and engagement also increase when enterprises make better use of their employees' skills.[4] Current workforce development initiatives in professional, scientific and technical services include the following examples:

- **Experienced Engineers Program**: 'Skills on Hand, Career in View' is a structured, detailed and practical program specifically for engineers with five or more years of experience who are seeking Chartered Status, Registration and career consolidation. It is delivered over a six month period, and includes supporting online resources and the opportunity for participants to complete their application for Chartered Status and/or Registration by the end of the program. The program is delivered by Engineering Education Australia on behalf of Engineers Australia (EA) and is recognised for Continuing Professional Development (CPD) in accordance with EA CPD Guidelines. Further information can be found at http://www.eeaust.com.au/experienced-engineer-program-course.html.

- The **'Refuel' National Seminar Series** is a selection of professional development seminars that have been developed by the Australian Institute of Architects. The seminars are delivered in all capital cities and are developed and delivered by leading industry practitioners who are selected for their expertise in each topic. This year's seminar topics include: climate change adaptation and integrating solar technology. The seminars meet state registration board professional development accreditation requirements. Further information can be found at http://www.architecture.com.au.

- The **Professional Development Scholarship Fund** is managed by the Veterinary Nurses Council of Australia (VNCA) Inc. The scholarship fund enables nurses to pursue their veterinary nursing related studies and may cover the costs incurred for education and associated travel. The fund contains $5,000 that may be distributed between a number of applicants annually. Applications for scholarships from VNCA full members can be made to the VNCA and are considered by a selection panel appointed by the VNCA Inc. Further information can be found at http://www.vnca.asn.au.

- Innovation and Business Skills Australia's **Management and Leadership Applied Research** project brings together three aspects of workforce development in the cross-industry research of management practices in Australia. These include the Karpin literature review and evaluation on national and international management and leadership; the Australian Cultural Imprint for Leadership report; and the Corporate Social Responsibility (CSR) reference paper.
- http://www.ibsa.org.au/Leadership&Mangement.

[4] Skills Australia (2012) *Better use of skills, better outcomes: A research report on skills utilisation in Australia.*