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.

Key points

- Professional, scientific and technical services employs approximately 853,800 people, accounting for around 8 per cent of the total Australian workforce
- The professional, scientific and technical services industry is expected to grow strongly over the next five years
- The majority of the industry workforce (58 per cent) is employed in small-sized enterprises (i.e. those that employ less than 20 workers), with only 19 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
- Only one-fifth (20 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 (55 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 terms of industry value added, professional, scientific and technical services contributed 7.9 per cent ($86.9b) to the national economy in 2009-10.[2]

[1] Regional and remote areas are defined as those outside state capital cities.
[2] 'Industry value added' is the measure of the contribution by industry to gross domestic product (GDP) at basic prices. ABS (2010) *Australian System of National Accounts* (Cat. no. 5204.0).

Short-term growth

The strong employment growth achieved over the last five years is anticipated to continue steadily over the short-term, with growth to 2014-15 (13 per cent) expected to exceed the national average of 9.2 per cent.

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	853.8	7.7	171.9	25.2
All employed	**11,044.6**	**100.0**	**1,060.1**	**10.6**

Population: Employed people.
Source: DEEWR analysis of ABS trend data, May 2010 (Cat no: 6291.0.55.003).

Long-term growth

Skills Australia used scenario planning and economic modelling undertaken by Access Economics to calculate the skills demand for the economy into the future. The three scenarios are:

- Open Doors – assumes an industry and occupation structure that is driven by greater global openness, high economic growth and high productivity
- Low Trust Globalisation – assumes global competition but with more moderate participation rates, productivity growth and rates of growth of net migration, and accordingly, medium economic growth
- Flags – assumes a more protectionist economy, with a greater move to domestic self-sufficiency, a lower rate of net migration and productivity growth, and accordingly, assumes a low rate of economic growth.

The industry is forecast to grow strongly whatever scenario eventuates, with average employment growth per annum expected to be higher than the Australian average between 2010 and 2025.[3] All subdivisions within the industry are expected to reflect this high-growth trend. Employment in professional, scientific and technical services and computer system design and related services is expected to grow at around 1.5 times the rate of growth of the all-industry average to 2025 across all three scenarios.

[3] A description of the scenarios and the Access Economics modeling of employment in each, with state and territory break-downs, is available at the Skills Australia web-site www.skillsaustralia.gov.au

Table 2 Average annual industry employment growth in three scenarios, 2010-15 and 2010-25 (%pa)

Industry	Open Doors		Low-Trust Globalisation		Flags	
	2015	2025	2015	2025	2015	2025
Professional, scientific and technical services	**3.9**	**3.1**	**3.3**	**2.5**	**2.1**	**1.4**
Professional, scientific and technical services (except computer system design and related services)	3.9	3.1	3.3	2.5	2.0	1.3
Computer system design and related services	4.0	3.1	3.3	2.5	2.1	1.4
All industries	**2.6**	**2.1**	**1.9**	**1.5**	**1.3**	**0.9**

Source: Access Economics (2009) *Economic modelling of skills demand*, Table D1; conversion to ANZSIC by CEET (2010).

Occupation outlook

Key occupations

The largest occupational group in the professional, scientific and technical services industry is accountants, comprising more than one-tenth of the industry workforce. Software and applications programmers account for around 5.3 per cent of industry employment, followed by solicitors (at 5.1 per cent) and bookkeepers (3.6 per cent).

Table 3 Top ten professional, scientific and technical services occupations

Occupation		People employed	Industry employment
ANZSCO		'000	% of total
2211	Accountants	81.6	10.5
2613	Software and applications programmers	40.8	5.3
2713	Solicitors	39.2	5.1
5512	Bookkeepers	27.5	3.6
2324	Graphic and web designers, and illustrators	25.2	3.2
5212	Secretaries	23.5	3.0
1311	Advertising and sales managers	18.2	2.3
2247	Management and organisation analysts	18.1	2.3
2251	Advertising and marketing professionals	16.6	2.1
2321	Architects and landscape architects	16.5	2.1
Total		**775.6**	**39.6**

Source: ABS (2010) *Labour Force Australia*, detailed quarterly report, 2009 average of four quarters (Cat. no. 6291.0.55.003).

Short-term growth

Table 4 shows recent past and forecast growth rates for the occupations that feature prominantly 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**.

Short-term employment growth is expected to be particularly high for architects and landscape architects (at 27.1 per cent) and for advertising and marketing professionals (at 26.2 per cent).

Table 4 Current and past employment in key occupations

Occupation		Current employment (all industries)		Past growth: five years	
ANZSCO		'000	% of total	'000	%
1311	Advertising and sales managers	141.8	1.3	28.4	25.0
2211	Accountants	173.2	1.6	32.5	23.1
2247	Management and organisation analysts	48.6	0.4	15.1	44.9
2251	Advertising and marketing professionals	48.0	0.4	11.7	32.2
2321	Architects and landscape architects	20.8	0.2	2.0	10.9
2324	Graphic and web designers, and illustrators	43.6	0.4	3.7	9.2
2613	Software and applications programmers	77.0	0.7	6.3	8.9
2713	Solicitors	58.3	0.5	21.3	57.5
5212	Secretaries	82.6	0.7	-31.8	-27.8
5512	Bookkeepers	117.8	1.1	-1.0	-0.9
All employed		**11,044.6**	**100.0**	**1,060.1**	**10.6**

Population: Employed people.
Source: DEEWR analysis of ABS trend data, May 2010 (Cat no: 6291.0.55.003).

Long-term growth and job openings

Table 5 indicates the long-term job growth per annum expected in these occupation groups, according to Access Economics' scenario modelling.

In the longer-term, employment growth rates are predicted to be consistently high across all scenarios, with only accounting clerks and bookkeepers; advertising and sales managers; and legal and sales professionals forecast to show below-average growth in the Flags world.

Table 5 Average annual occupation growth in three scenarios, 2010-15 and 2010-25 (%pa)

Industry		Open doors		Low-trust globalisation		Flags	
ANZSCO		2015	2025	2015	2025	2015	2025
131	Advertising and sales managers	2.3	1.7	1.6	1.0	1.4	0.7
221	Accountants, auditors and company secretaries	2.9	2.2	2.2	1.5	1.5	0.8
224	Information and organisation professionals	3.3	2.5	2.6	1.9	1.8	1.1
225	Sales, marketing and public relations professionals	3.0	2.1	2.2	1.4	1.7	0.8
232	Architects, designers, planners and surveyors	2.6	2.0	2.0	1.4	1.6	0.9
261	Business and systems analysts, and programmers	3.2	2.6	2.6	2.0	1.9	1.3
271	Legal professionals	3.4	2.5	2.7	1.9	1.6	0.8
521	Personal assistants and secretaries	2.5	2.5	1.9	1.7	1.2	0.9
551	Accounting clerks and bookkeepers	2.3	1.8	1.7	1.1	1.0	0.4
All occupations		**2.6**	**2.1**	**1.9**	**1.5**	**1.3**	**0.9**

Source: Access Economics (2009) *Economic modelling of skills demand*, Table D4 (ASCO); conversion to ANZSCO by CEET (2009). Three-digit ANZSCO job titles are used in this analysis.

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.

Under all three scenarios, the highest proportion of job openings is forecast for business and systems analysts, and programmers. This occupation is expected to exceed the all-occupation average for job openings each year to 2025, reaching 5.9 per cent per annum under Open Doors and 5.3 per cent under Low Trust Globalisation. In comparison, job openings for most other key occupations remain at a steady rate, reflecting the relatively young age profile of the industry and a modest rate of job turnover.

As Table 7 shows, job openings are generally driven by new growth rather than replacement demands under the Open Doors scenario. The only exception is business and systems analysts, and programmers – for which the majority of job openings (56.5 per cent to 2025) are driven by replacement demand.

Table 6 Average annual job openings, pa 2010 to 2025, in three scenarios

Occupation		Open doors		Low trust globalisation		Flags	
ANZSCO		('000)	%	('000)	%	('000)	%
131	Advertising and sales managers	4.4	3.1	3.2	2.3	2.8	2.1
221	Accountants, auditors and company secretaries	7.4	3.2	5.7	2.6	3.9	1.8
224	Information and organisation professionals	4.3	3.2	3.3	2.5	2.2	1.7
225	Sales, marketing and public relations professionals	4.2	3.6	3.1	2.8	2.4	2.2
232	Architects, designers, planners and surveyors	4.0	2.8	3.0	2.2	2.3	1.7
261	Business and systems analysts, and programmers	9.5	5.9	8.1	5.3	6.6	4.6
271	Legal professionals	3.0	3.7	2.4	3.1	1.5	2.0
521	Personal assistants and secretaries	7.0	4.1	5.4	3.4	3.9	2.6
551	Accounting clerks and bookkeepers	11.8	3.6	9.3	3.0	6.9	2.3
All occupations		**579.1**	**4.4**	**465.9**	**3.8**	**373.7**	**3.2**

Source: Access Economics (2009) *Economic modelling of skills demand*, Table D4 (ASCO); conversion to ANZSCO and net replacement demand by CEET (2009). Three-digit ANZSCO job titles are used in this analysis.

Table 7 Total job openings (growth and net replacement) in three scenarios, 2010 to 2025

7.1 Open Doors

Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
ANZSCO		('000)	%	('000)	%	('000)	%
131	Advertising and sales managers	40.1	57.1	30.1	42.9	70.2	100.0
221	Accountants, auditors and company secretaries	79.9	67.4	38.6	32.6	118.5	100.0
224	Information and organisation professionals	55.5	79.7	14.1	20.3	69.6	100.0
225	Sales, marketing and public relations professionals	39.9	59.4	27.2	40.6	67.1	100.0
232	Architects, designers, planners and surveyors	45.2	71.2	18.3	28.8	63.4	100.0
261	Business and systems analysts, and programmers	66.1	43.5	85.9	56.5	152.0	100.0
271	Legal professionals	32.4	67.1	15.9	32.9	48.3	100.0
521	Personal assistants and secretaries	66.1	59.2	45.6	40.8	111.7	100.0
551	Accounting clerks and bookkeepers	91.4	48.3	97.9	51.7	189.4	100.0
All occupations		**4,425.7**	**47.8**	**4,840.1**	**52.2**	**9,265.8**	**100.0**

7.2 Low-Trust Globalisation

Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
ANZSCO		('000)	%	('000)	%	('000)	%
131	Advertising and sales managers	23.0	44.9	28.3	55.1	51.3	100.0
221	Accountants, auditors and company secretaries	54.4	59.9	36.5	40.1	90.9	100.0
224	Information and organisation professionals	39.5	74.8	13.3	25.2	52.8	100.0
225	Sales, marketing and public relations professionals	24.5	49.2	25.4	50.8	49.9	100.0
232	Architects, designers, planners and surveyors	30.4	63.8	17.3	36.2	47.7	100.0
261	Business and systems analysts, and programmers	48.4	37.4	81.0	62.6	129.4	100.0
271	Legal professionals	23.3	60.8	15.0	39.2	38.3	100.0
521	Personal assistants and secretaries	43.6	50.6	42.6	49.4	86.2	100.0
551	Accounting clerks and bookkeepers	56.3	37.8	92.4	62.2	148.7	100.0
All occupations		**2,892.9**	**38.8**	**4,561.3**	**61.2**	**7,454.2**	**100.0**

7.3 Flags

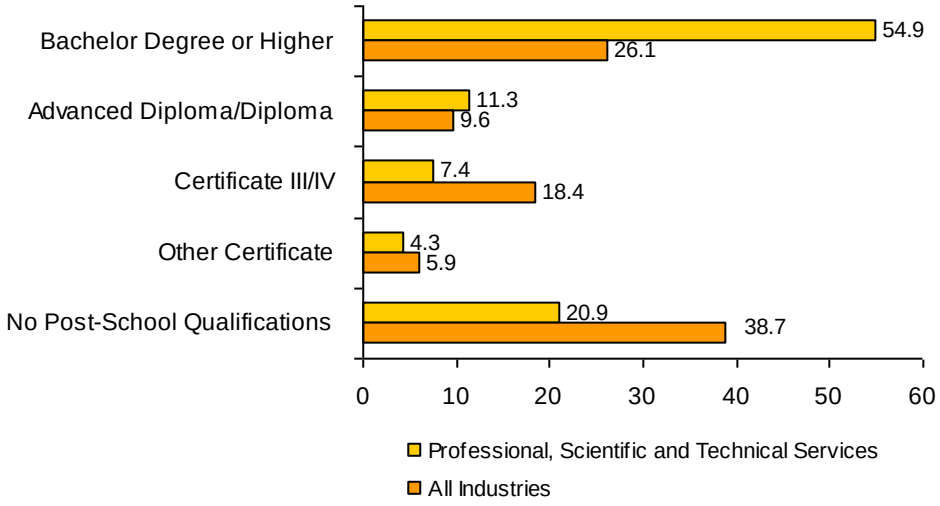
Occupation		Total growth (persons)		Net replacement estimates (persons)		Total job openings (persons)	
ANZSCO		('000)	%	('000)	%	('000)	%
131	Advertising and sales managers	16.9	37.9	27.7	62.1	44.5	100.0
221	Accountants, auditors and company secretaries	28.2	45.2	34.2	54.8	62.3	100.0
224	Information and organisation professionals	22.1	64.0	12.4	36.0	34.5	100.0
225	Sales, marketing and public relations professionals	13.8	36.4	24.1	63.6	37.9	100.0
232	Architects, designers, planners and surveyors	20.4	55.1	16.6	44.9	37.1	100.0
261	Business and systems analysts, and programmers	29.5	28.0	75.9	72.0	105.4	100.0
271	Legal professionals	9.8	41.8	13.6	58.2	23.4	100.0
521	Personal assistants and secretaries	22.4	36.0	39.8	64.0	62.1	100.0
551	Accounting clerks and bookkeepers	23.4	21.1	87.1	78.9	110.5	100.0
All occupations		**1,681.7**	**28.1**	**4,297.2**	**71.9**	**5,978.9**	**100.0**

Source: Access Economics (2009) *Economic modelling of skills demand*, Table D4 (ASCO); conversion to ANZSCO and net replacement demand by CEET (2009). Three-digit ANZSCO job titles are used in this analysis.

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 (54.9 per cent) holding a Bachelor degree or higher qualification. Only 20.9 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 (%)



Source: DEEWR (2010) *Australian Jobs 2010*.

Figure 2 shows 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 2015 and 2025 by each occupation group depending on which of the three scenarios eventuates.

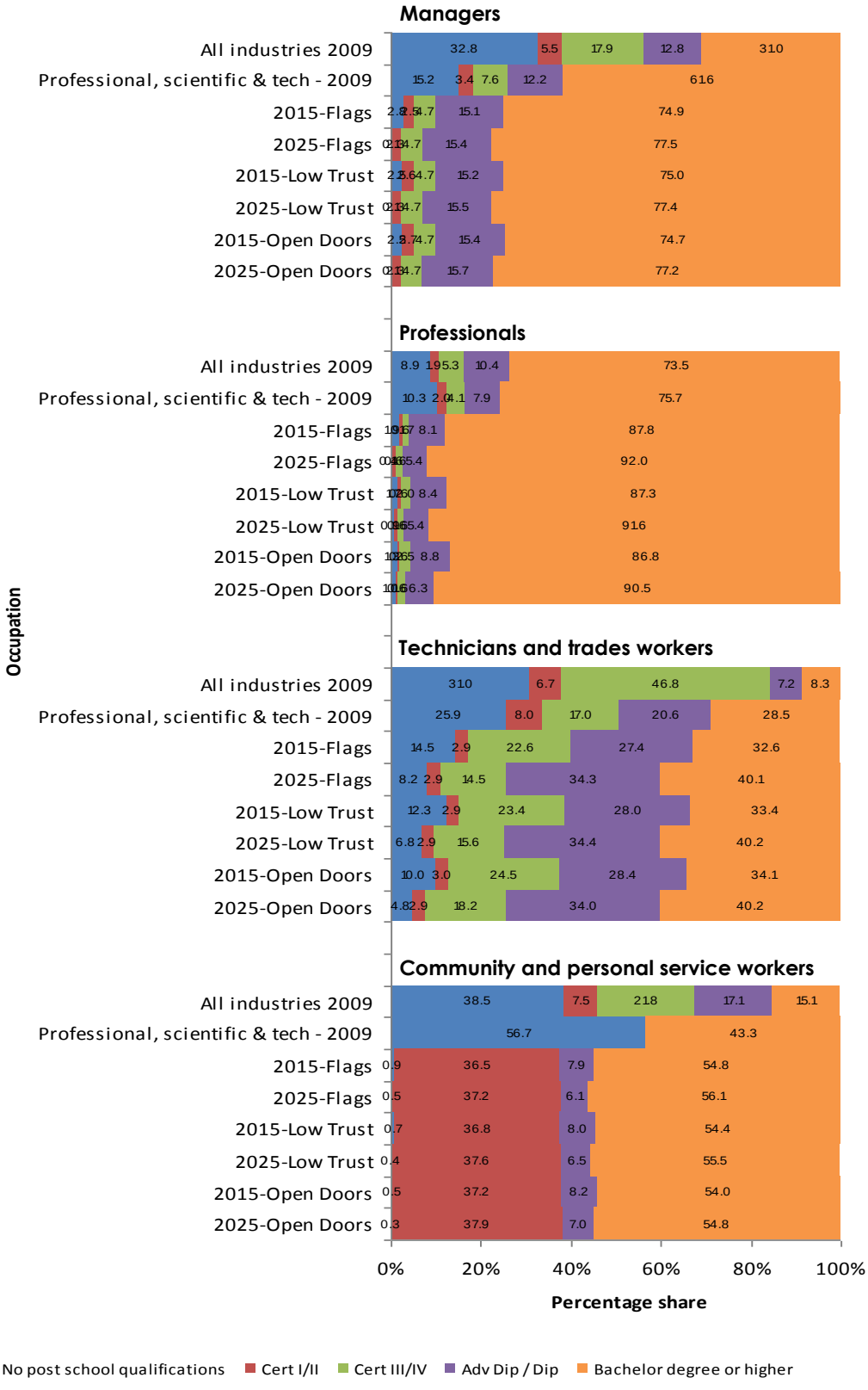
As Figure 2 illustrates, managerial and professional occupations overwhelmingly hold a Bachelor degree or higher qualification, and this level of educational attainment is expected to increase irrespective of which scenario eventuates.

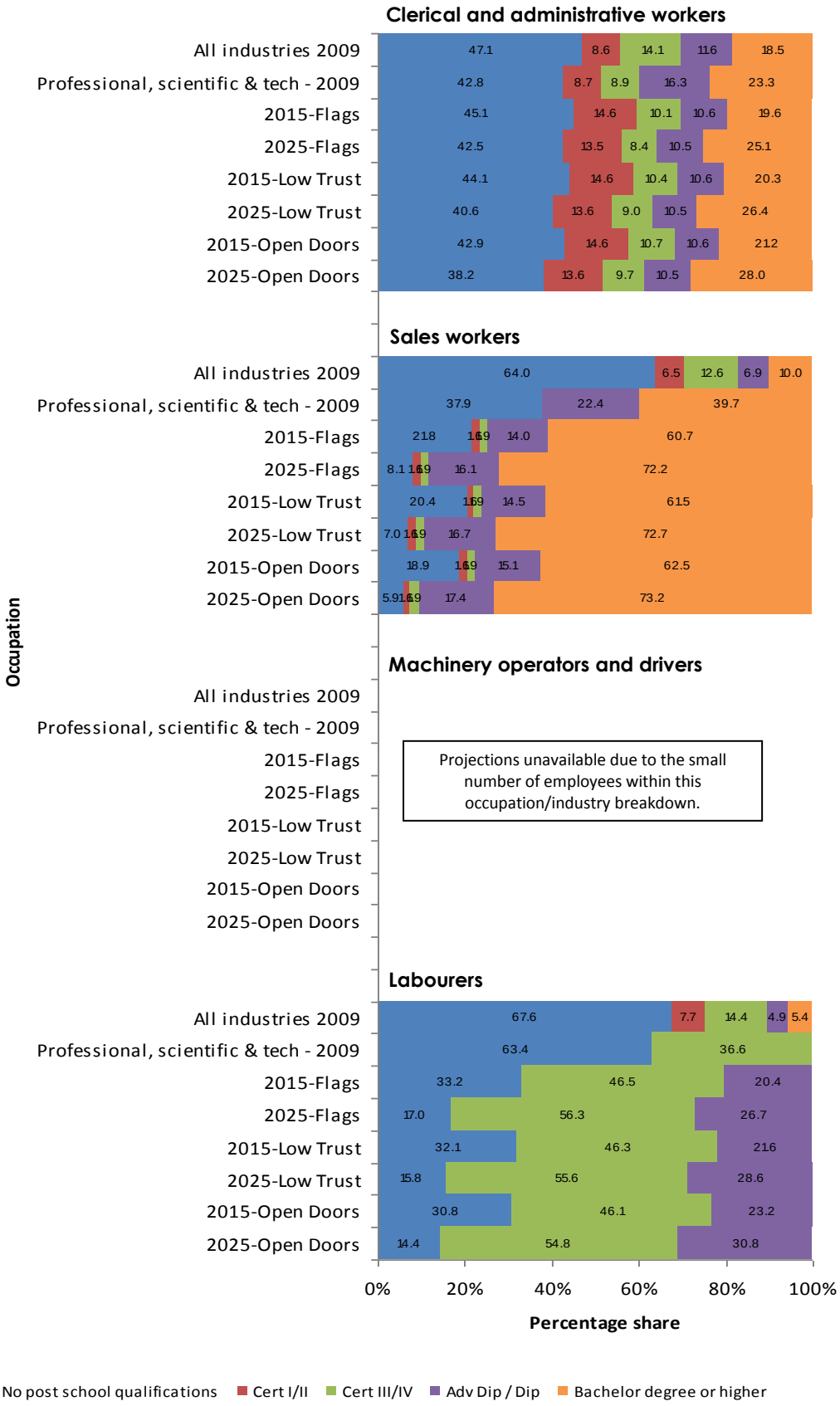
Technicians and trades workers progressively upskill over time. The proportion of workers with no post school qualifications is expected to decrease in the years to 2025, while the share of workers with a Diploma level qualification or higher is forecast to increase to above 70 per cent under all three scenarios.

The educational attainment levels for clerical and administrative workers remain relatively stable over time under all three scenarios. The employment of sales workers in this industry is projected to significantly increase, with Open Doors suggesting that employment will increase from 4,352 in 2009 to 24,853 in 2025.

Smaller relative employment numbers for community and personal service workers and labourers are expected to continue, although some upskilling will occur.

Figure 2 Level of educational attainment in the professional, scientific and technical services industry by occupation: 2009 and projections to 2015 and 2025 (%)





Source: ABS (2009) *Survey of Education and Work 2009* (Cat. no. 6227.0).

Specialised occupations

In *Workforce Futures*, Skills Australia has proposed that national skills and workforce planning 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.

Specialised occupations associated with the professional, scientific and technical services industry include:

Accountants
Advertising and marketing professionals
Architects and landscape architects
ICT and systems analysts
Software and applications programmers
Barristers
Judicial and other legal professionals
Solicitors

In addition, a wide range of specialised occupations are also included among medical professionals (e.g. doctors, psychologists); in the financial sector (e.g. financial brokers); in engineering and the sciences; 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, and a full list of inclusions, is available from *Australian Workforce Futures: A National Workforce Development Strategy* at http://www.skillsaustralia.gov.au/PDFs_RTFs/WWF_strategy.pdf.

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 (2010) *Australian Workforce Futures: A National Workforce Development Strategy.*