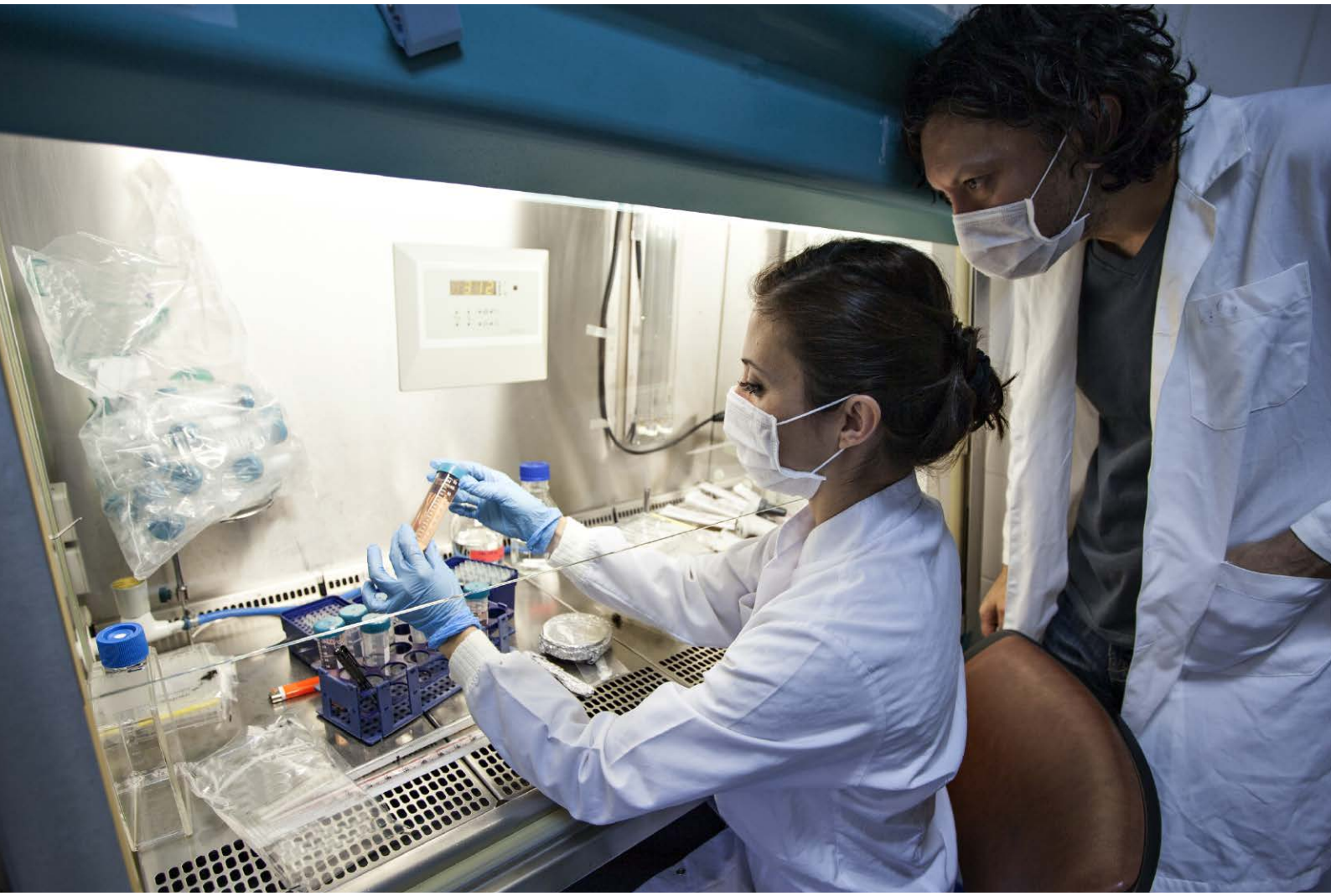
Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee

Skills Forecast and Proposed Schedule of Work 2018-2022



MSL Laboratory Operations Training Package

May 2018

IBSA MANUFACTURING

Administrative Information

Name of Industry Reference Committee (IRC):
Process Manufacturing, Recreational Vehicle and Laboratory (PMRVL)

Name of Skills Service Organisation (SSO):
Innovation and Business Skills Australia (IBSA Manufacturing)

About the Industry Reference Committee

The **Process Manufacturing, Recreational Vehicle and Laboratory** Industry Reference Committee comprises nine members and was constituted in May 2017.

The 2018 Industry Skills Forecast and Proposed Schedule of Work was reviewed and approved by the membership below.

Mr Keith Monaghan (Chair)
Mr Ian Curry
Mr Stuart Lamont
Ms Leah Simmons
Ms Julie Warren
Mr Nigel Haywood
Ms Ceridwen Jones
Mr Han Michel
Mr Grahame Aston

Industry Reference Committee Signoff

The 2018 MSL Laboratory Operations Training Package Skills Forecast and Proposed Schedule of Work was approved as the result of a properly constituted IRC decision.

IRC Chair: Mr Keith Monaghan

Date: May 2018

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This IRC Skills Forecast and Proposed Schedule of Work has been prepared on behalf of the PMRVL Industry Reference Committee for submission to the Australian Industry Skills Committee (AISC).

This document has been produced with the assistance of funding provided by the Commonwealth Government through the Department of Education and Training.

Contents

Executive Summary

The Industry Reference Committee (IRC) Skills Forecast and Proposed Schedule of Work identifies priorities for Training Package development work to meet the needs of industry. This document is based on research, analysis and consultation with IRC members and other stakeholders and provides evidence of current and emerging industry skills needs.

What Does Laboratory Operations Cover?

Laboratory Operations refers to a diverse group of occupations including samplers, testers and laboratory personnel spread across a wide range of enterprises and industries including agriculture, biotechnology, food and beverage, manufacturing, construction, mining, health and environmental management. Typically, these occupations involve non-professional technical and scientific skills.

While the diversity of industries supported by the Laboratory Operations Training Package makes it difficult to quantify the number of enterprises involved in this work, using a narrow definition, the ABS identified there were at least 9,025 in operation in June 2016.[1] Enterprises in other industries which have laboratory staff and facilities as part of their core business are not immediately apparent in industry statistics, however the total number of laboratory operations trained staff can be accurately identified using occupational data.

Laboratory services play a critical role in the safety, quality and compliance of many industry sectors. Consequently, International and Australian standards, as well as Commonwealth and state regulations and legislation cover many aspects of laboratory operations, including testing procedures, use of materials, documentation and the maintenance of equipment.

Critical Workforce Challenges and Opportunities

The key challenges facing the industry arise from the introduction of automation into the laboratory environment. At the same time that automation replaces the need for manual processes and lower level skills, higher order skills are needed to manage new technology and keep it running. Some parts of the industry are employing university graduates, due to an oversupply, rather than Vocational Education and Training (VET) graduates in these new higher-level skill positions – which in turn creates challenges given the lack of applied learning in many university qualifications.

The cross-sectoral impact of automation presents both a challenge in that workers can be lost to the industry as they move to similar roles in other industries, as well as an opportunity for the Laboratory Operations industry to recruit technical experts from other industries who can apply their skills to similar technology in the laboratory.

1 ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

Forecasting Skills Priorities

Despite overall growth in employment in the Laboratory Operations sector (albeit as the number of businesses has declined slightly as the sector consolidates) the number of VET graduates is in decline. As noted above – an oversupply of university graduates are being hired over VET graduates. At the same time – the new capital equipment which is being introduced into the Laboratory Operations sector is extremely costly and beyond the means of many Registered Training Organisations (RTOs). These combined factors pose challenges to the VET sector, also considering equipment manufacturers are playing a leading role in training for new technologies. As a result, rather than developing skills across a range of equipment, training is often specific to a brand of machine or manufacturer.

Training Package Priorities

The PMRVL Industry Reference Committee has identified a number of changes (detailed in this report) which need to be made to enhance the relevance of the Training Package. Priorities for 2018-2019 include:

- **Skill sets for specialised industry sectors** such as accreditation compliance in the laboratory
- Investigate the need for new unit(s) in **Point of Care testing**.

The Proposed Schedule of Work 2018-19 to 2021-22 was developed by the IRC, with support from IBSA Manufacturing, based on identified industry trends. The Schedule lists the priorities over the next four years, the rationale and proposed timeframes for these activities.

Sector Overview

Industry Snapshot

Laboratory Operations is not a stand-alone industry. It covers a diverse group of technical and scientific occupations across a number of industry sectors. Thus, the MSL Laboratory Operations Training Package addresses the training and recognition needs of technical assistants, samplers/testers and laboratory personnel (i.e. assistants, aides and attendants) working in a wide range of enterprises and industry sectors. These include work involving:

- biomedical laboratories
- biotechnology
- construction materials testing
- defence laboratories
- environmental testing/monitoring
- food and beverage testing
- manufacturing testing
- mineral assay
- pathology testing
- process manufacturing
- wine making.

Within the Australian and New Zealand Standard Industrial Classification (ANZSIC)[2] the sector which can be readily identified is categorised within the Professional, Scientific and Technical Services division[3]:

- Subdivision 69 - Professional, Scientific and Technical Services
    - Class 6910 – Scientific Research Services
    - Class 6925 - Scientific Testing and Analysis Services
    - Class 6999 - Other Professional, Scientific and Technical Services nec.

It must be noted that many graduates with qualifications from the Laboratory Operations Training Package go to

2 ABS publication: 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 2.0)

3 For further details see **Appendix D**

work in industries like manufacturing, construction and food and beverage and thus are not counted as part of official statistics for the Laboratory Operations industry; instead they are counted within the statistics as employees of these other industries.

Data available on the scientific and testing sector of the industry shows an area of the economy which is experiencing modest growth (see Table 1).

Table 1 – Business landscape in key industry sectors/subsectors

Industry Sector/Subsector	Number of Businesses at 30 June 2016	% Change from 30 June 2015	Types of Businesses
Scientific Research Services	3,457	5.2%	61% non-employing 35% small 3% medium <1% large
Scientific Testing and Analysis Services	3,195	+0.3%	50.2% non-employing 46.3% small 3.2% medium 0.3% large
Other Professional, Scientific and Technical Services nec	2,373	-0.6%	66% non-employing 32% small 2% medium 0% large

ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

In addition to the challenges of defining the laboratory operations sector within existing industry classifications, it is also difficult to neatly categorise the occupations within the sector because of its disparate nature. The most appropriate categorisations using the Australia and New Zealand Standard Classification of Occupations (ANZSCO)[4] are:

- Major Group 1 Professionals
    - 1399 Other Specialist Managers
        - 139913: Laboratory Managers
- Major Group 3 Technicians and Trades Workers
    - 3114 Science Technicians
        - 311411: Chemistry Technician
        - 311412: Earth Science Technician
        - 311413: Life Science Technician
        - 311414: School Laboratory Technician
        - 311499: Science Technicians nec
    - 3129 Other Building and Engineering Technicians
        - 312912 Metallurgical or Materials Technician.

Business Landscape

Within the scientific parts of this industry there are cost pressures as governments look to manage expenditure and as large private enterprises move to commercialise their research output. While the largest scientific organisations are mostly public institutions, there are a small number of private institutions (such as CSL) involved in medical and health research. 97% of all scientific institutions involved in this subsector of the industry employ 19 or fewer employees.[5] It should be noted that the subsector referenced here, Class 6925 Scientific Testing and Analysis Services, does not include pathology testing services.

In relation to the many other industries employing workers with laboratory skills there are a variety of organisational types, issues and business conditions they face. For example, some parts of the manufacturing sector are experiencing a decline in employment and are struggling to reposition, while others have pivoted to a more automated future; construction is an industry known for its volatility, whereas many parts of the food and wine industry are experiencing significant growth through consumer preferences for higher quality products and increasing demand for Australian food and beverages from the growing Asian middle class. Details on the employment prospects and business landscapes of these different industries are contained within their respective Industry Skills Outlook reports.

4 Australian Bureau of Statistics, 2013, 1220.0 - ANZSCO - Australian and New Zealand Standard Classification of Occupations, 2013, Version 1.2, http://www.abs.gov.au/ANZSCO accessed January 2018

5 IBISWorld M6910 Scientific Research Services in Australia October 2017

Key Industry Stakeholders

Given the diversity of the Laboratory Operations sector and the difficulty in quantifying it as a single industry in official statistics, it is represented by a large number of peak bodies and professional associations. These are identified at **Appendix A**.

The profile of businesses that operate in the sector is likewise varied and ranges from those that service a regional/ rural town or a few metropolitan suburbs through to state, national and international organisations.

Regulation and Licensing

Organisations such as the Commonwealth Department of the Environment and Energy, the National Association of Testing Authorities, and the National Measurement Institute have regulatory oversight and/or provide services which impact on the Laboratory Operations sector.

Occupations within the Laboratory Operations industry are heavily regulated due to the materials being tested or analysed, the experimental nature of some of the work, and the critical need for safety, quality and compliance requirements. Standards and/or regulations cover many aspects of laboratory operations, including accreditation of laboratories, testing procedures, use of materials, and documentation and maintenance of equipment.

There are no general licensing issues associated with any units of competency in the Laboratory Operations Training Package; however, there may be regulatory requirements in some industries which are dealt with at a local level and which training providers will need to understand. Compliance with the requirements of workplace quality management systems are also common across a range of organisations.

Training Snapshot

Qualifications Available[6]

The following qualifications are contained in the MSL Laboratory Operations training package:

- MSL20116 Certificate II in Sampling and Measurement
- MSL30116 Certificate III in Laboratory Skills
- MSL40116 Certificate IV in Laboratory Techniques [Code to be updated after AISC endorsement]
- MSL50116 Diploma of Laboratory Technology [Code to be updated after AISC endorsement]
- MSL60116 Advanced Diploma of Laboratory Operations.

Learner Training Profile[7]

In 2016, a learner enrolled in a qualification from the MSL Laboratory Operations Training Package was more likely to be:

- Enrolled in a Certificate IV level qualification
- Studying in Queensland
- Aged 19 years or younger
- Female
- Not an apprentice or trainee
- Enrolled at a TAFE Institute.

6 Data accessed from https://training.gov.au/ on 14 February 2018

7 VOCSTATS, VET Provider Collection, extracted September 2017

Over the period 2014-2016.

- The total number of enrolments in MSL Laboratory Operations Training Package qualifications has declined by 10% (from 7,625 down to 6,827).
- Enrolments declined in all jurisdictions except Queensland where they rose by nearly 30% between 2014 and 2016. In comparison, enrolments in Victoria were reasonably stable over the period. Learners aged 19 years and below were not only the largest cohort of learners in MSL Laboratory Operations qualifications, they were also the only age group for which enrolments increased each year from 2014 to 2016. In that period, they rose by 40% up from 1,963 in 2014 to 2,741 enrolments in 2016.
- Enrolments in the Certificate II qualification increased while enrolments at other AQF levels fell.
- Unlike other areas of the manufacturing sector – there are more women than men enrolling in MSL Laboratory Operations qualifications. Females make up over 50% of enrolments and this percentage has been fairly consistent between 2014 and 2016.

Overall apprentice/trainee program enrolments provided in **Appendix B** indicate a decline from over 2,000 enrolments in 2014 to 942 enrolments in 2016.

As with many other industries supported by the VET sector, industry stakeholders report that apprenticeship and traineeship enrolments are heavily impacted by the availability of government funding and assistance.

Appendix B presents a graphical snapshot of enrolment data from the MSL Laboratory Operations training package.

Training Delivery

As illustrated in Table 2 below, delivery by TAFE Institutes accounts for nearly half of all enrolments in MSL Laboratory Operations qualifications. Nearly 65% of all MSL Laboratory Operations enrolments were government funded. The largest decline in enrolments was in NSW. Changes in the funding being provided by some state governments (and the consequent student fees payable) were noted by some industry stakeholders as a factor contributing to the decline in government funded activity.

Table 2 – Program enrolments in MSL Laboratory Operations qualifications by Training Organisation type

Training Organisation Type	Total VET Enrolments	Total VET Enrolments	Proportion of Total VET enrolments that were Government Funded	
	2015	2016	2015	2016
TAFE	3,415	3,209	72%	69%
University	467	449	73%	75%
Enterprise provider	68	97	68%	52%
Private training provider	2,529	2,530	71%	70%
School	392	411	0%	0%
Community education provider	104	125	0%	0%
Totals	**6,975**	**6,821**	**67%**	**64%**

VOCSTATS, VET Provider Collection, extracted September 2017

In February 2018, there were 206 RTOs approved to deliver units or qualifications from the MSL Laboratory Operations training package. A much smaller number were approved to deliver the individual qualifications from the package.[8] All states and territories had a range of providers with scope for the various MSL Laboratory Operations qualifications in their jurisdiction:

- For Certificate III in Laboratory Skills there were over 40 registered providers, of which nearly 30 are TAFE Institutes and public universities. All states and territories had at least 10 providers with scope for this qualification in their jurisdiction.
- For all others, at least half of all registered providers are TAFE Institutes:

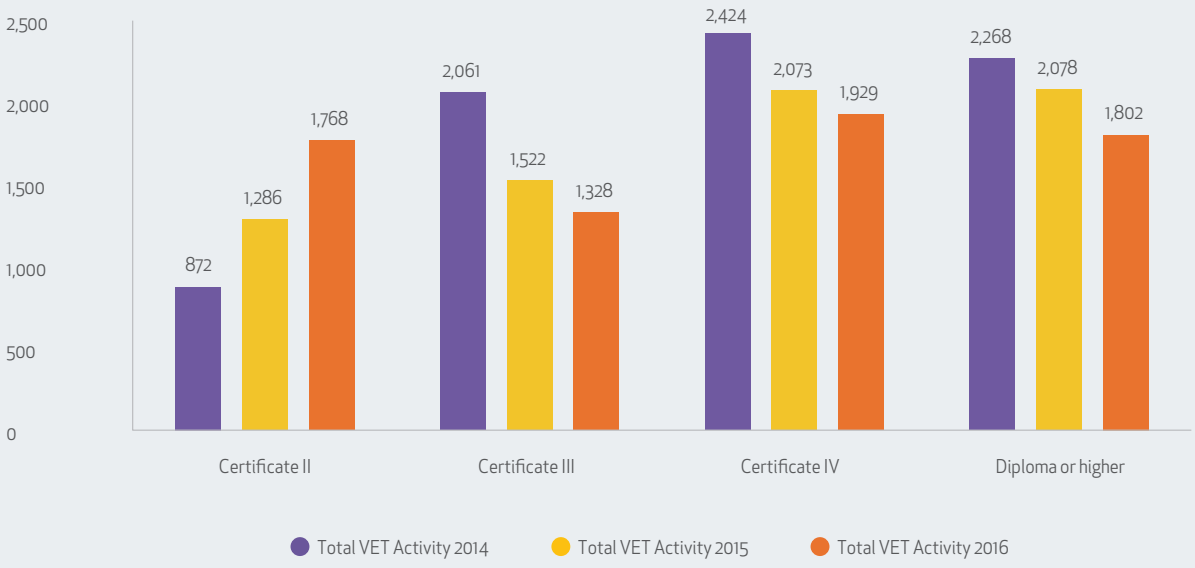
8 Data accessed from https://training.gov.au/ on 14 February 2018

- Certificate II in Sampling and Measurement (25 RTOs approved to deliver)
- Certificate IV in Laboratory Techniques (38 RTOs)
- Diploma of Laboratory Technology (31 RTOs)
- Advanced Diploma of Laboratory Operations (7 RTOs).

Qualification Uptake

The uptake of qualifications in the MSL Laboratory Operations Training Package is illustrated in Figure 1 below. All MSL Laboratory Operations qualifications have significant numbers enrolled. Total enrolments in 2016, in MSL Laboratory Operations qualifications, had decreased by 10% to 6,827. Enrolments in Certificate II in Sampling and Measurement have doubled to 1,768 in 2016.

Figure 1 – Total enrolments in MSL Laboratory Operations qualifications

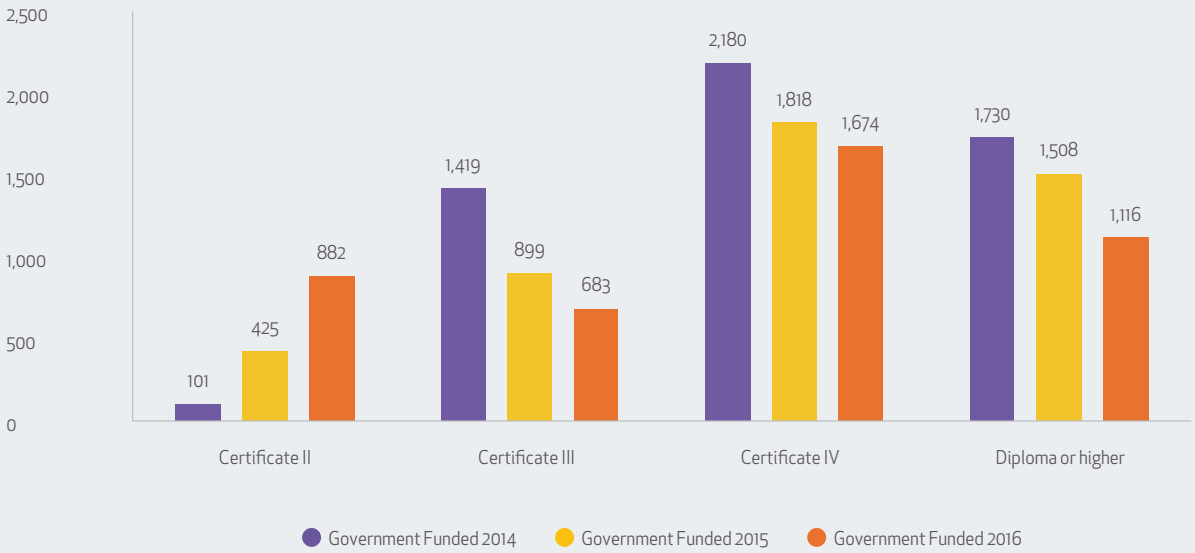


VOCSTATS, VET Provider Collection, extracted September 2017

The majority of enrolments in the MSL Laboratory Operations Training Package are in the Certificate IV and Diploma qualifications, accounting for over half of all enrolments in 2016.

The same trend has seen government funded MSL Laboratory Operations enrolments decrease by 20% between 2014 and 2016 (see Figure 2).

Figure 2 – Government funded enrolments in MSL Laboratory Operations qualifications



VOCSTATS, VET Provider Collection, extracted September 2017

Challenges and Opportunities

Megatrends affecting all of the sectors covered by the PMRVL IRC were identified by IRC members in a future skills workshop conducted in 2017. A summary of the outcomes of this workshop can be found in **Appendix C**.

More specific challenges and opportunities for the sectors related to the MSL Laboratory Operations Training Package are discussed below.

For Industry and Employers

As noted earlier, a range of other industries and sectors use laboratory research and analysis to assist with product development. Increased demand from these 'client' industries benefits the professional and scientific testing sector of the industry. Demand for professional, scientific and technical services is projected to increase in the short-term.

The health sector is also a major user of laboratory services. Higher expenditure on health care is therefore beneficial for the laboratory services industry. Total health expenditure is expected to increase in both the short and longer term.[9]

9 IBISWorld M6910 Scientific Research Services in Australia October 2017

Society and Culture

Australia's increasingly ageing society is driving a higher demand for healthcare services, which in turn is likely to result in higher demand for laboratory services.[10]

Last year's MSL Laboratory Operations Skills Forecast and Proposed Schedule of work identified that the ageing population within Australia would drive an increase in more complex health-related testing services. Despite government funding cuts, there is an increase in demand and revenue growth in pathology testing. There have been rapid advances in genetics in recent years11 and genetic testing is increasingly being used in the health sector and is expected to be an area of strong growth.[12]

In addition, the rise of the Asian middle class is driving increased demand for Australian food, wine, and other beverages – these industries are underpinned by laboratory testing and analysis – and hence are also likely to drive growth in laboratory operations staff.

Food Standards are enforced in Australia at the state and territory level against the nationally agreed Food Standards Code. The Food Standards Australia New Zealand Act was last updated in 2016, with amendments and regulations issued on a regular basis. Changes to Food Standards regulations are recognised by industry stakeholders to have an impact on demand for laboratory testing services.

Although, the industry has a younger workforce than many other manufacturing industries, the percentage of employees aged over 50 years in 2016 was 32%.

Business and Economics

The level of private research investment, the cost and quality of local research and testing, and the level of government support affect the amount business spends on laboratory services. Australia has access to high-quality and comparatively low-cost skilled researchers, which provides a strong foundation for growth in this part of the laboratory operations sector. In addition, scientific research into medical products, particularly vaccines and pharmaceuticals, is expected to increase in the short-term and can provide private firms with large returns if the products are subsequently able to be successfully commercialised.

The Federal Government's National Innovation and Science Agenda is providing funding of $1.1 billion over four years to the end of 2019 for various innovation programs. This includes $250 million in government funding, plus $250 million in private funding, for the Biomedical Translation Fund to assist in commercialising Australian health and medical research. This initiative is likely to increase demand for laboratory services.

Industry stakeholders advise that the continuing growth of the construction sector, (particularly in states like New South Wales with high investment in infrastructure), is driving demand for the testing of construction materials.

10 IBISWorld M6910 Scientific Research Services in Australia October 2017

11 RACGP (2014) Genetic Testing https://www.racgp.org.au/afp/2014/july/genetic-testing/

12 IBIS (2017) Pathology Services in Australia: Market Research Report https://www.ibisworld.com.au/industry-trends/market-research-reports/health-care-social-assistance/pathology-services.html

Resources and Environment

Waste management has been identified as a significant issue for the laboratory operations industry, given the significant costs associated with waste disposal. The sector uses a lot of consumables and must consider environmental impacts and legislated requirements.

Technology

Like many other parts of the manufacturing sector, technology-driven change through automation is a key factor impacting on the Laboratory Operations industry. In the consultations undertaken in the development of this Industry Skills Forecast, industry stakeholders identified a need for workers who can troubleshoot, analyse and interpret data. While automation is considered likely to result in an overall decrease in Laboratory Operations' jobs requiring manual skills, it is important that manual skills are maintained to ensure processes can continue running should a machine break down and need repair. This may also link to a demand for workers with higher level skills able to repair machines and troubleshoot problems. Instability of the NBN was also identified by some industry figures as having implications for organisations which are reliant on technology.

Technology will also impact training as new technology is often highly complex and expensive to use. Given the prohibitive capital costs of the new machines, RTOs are unable to afford them solely for training purposes, and so must rely on industry for access. Industry in turn may be understandably reluctant to allow trainees to practise on new machinery because it is so expensive. In addition, many employers increasingly want workers trained on the specific equipment used within their organisation; as a result, the manufacturer of the equipment increasingly provides the training.

Political and Institutional

As noted previously the government is a keen user of laboratory services and also provides significant funding for some research and testing services, which rely on workers from the laboratory operations sector. While there are concerns in some parts of the scientific research services about a reduction in government funding in some areas, the overall expected trajectory for the sector is for growth in the short-term.

As with other heavily regulated industries, government intervention can substantially change the industry in a short period of time. Industry figures highlighted the impact the National Australian Testing Authority (NATA) has had on the sector. For example, in the construction testing industry NATA changed requirements so that all supervisors in a construction laboratory required a minimum qualification at Certificate IV level. This had a significant impact on smaller operators who did not have staff with these qualifications and were required to upskill them.

Some industry figures noted that the Board of the Australian Institute of Medical Scientists (AIMS) continues in its attempts to introduce certification for medical laboratory scientists. If successful, this would have a significant impact on the sector.

Supply Side Challenges and Opportunities

Declining enrolments in most qualifications in the MSL Laboratory Operations Training Package in recent years, is not due solely to a lack of government funding. Overall the numbers enrolled in training have declined by around 10% between 2014 and 2016 even at a time when key parts of the industry itself are growing.

While there has been growth in Certificate II enrolments, this appears to be at odds with the advice from industry that lower level positions are being increasingly replaced by automated technology. While automation is seen to be impacting on the entry-level employment opportunities available in the industry, the introduction of new technologies is seeing higher level VET graduates being replaced by university graduates in some organisations. Industry stakeholders noted that university graduates have the theoretical knowledge required for the roles but lack the applied skills gained through VET.

For Learners and Training Package Development

During the consultations undertaken in the development of this Industry Skills Forecast, industry stakeholders identified the following issues in relation to the uptake of formal, accredited training, including:

- The availability and consistency of VET funding arrangements
- The availability of trainers and specialist equipment. Older educators are often not up-to-date with the latest equipment, and potential younger educators may be trying to establish careers in industry; this makes it difficult to provide the training industry needs. Furthermore, as job roles become increasingly specialised, as new technology is introduced, employees do not have the broader knowledge required to be able to train people in all aspects of the qualification
- The financial viability of RTOs offering qualifications which cater to a small cohort, especially considering the costs associated with equipment (as above)
- The challenges of delivering training in thin markets in regional and remote areas. While laboratory services are required nationally there are significant challenges for RTOs in providing training in regional and remote areas – in part because of the factors identified above.

Training

While workers in Laboratory Operations have a high commitment to training due to the nature of the work they undertake and the potential hazards, in recent years they have sought less formal VET training to meet their needs.

At face value it does not appear to be a lack of training providers which has caused the decline in training. There is a total of 206 Registered Training Organisations (RTOs) approved to deliver units from the MSL Laboratory Operations training package.[13]

The RTOs delivering the MSL Laboratory Operations qualifications are a mix of public and private providers and are located across Australia, although only one TAFE Institute has the Advanced Diploma on scope.

Cross-industry Challenges and Opportunities

Automation is the biggest challenge facing the Laboratory Operations sector, as it is in other parts of the manufacturing sector. While industry stakeholders noted that automation may make workers more able to move to other industries, familiarity with similar technologies also provides opportunities for workers in other industries to move into a career in Laboratory Operations. For example, an engineer with some experience with the mechanics of a new piece of laboratory equipment would be extremely valuable to the laboratory in terms of their troubleshooting capabilities. The increased use of technology is also driving an increased need for data analysts from sectors such as IT.

13 Data sourced from a count of RTOs listed at http://training.gov.au accessed 16 February 2018

Employment and Skills Outlook

Employment Outlook

Given the nature of this industry, with workers employed across a wide range of client industries, the employment trends and projections in this employment outlook are provided for occupations rather than industries (see Figure 3 and Table 3 below).

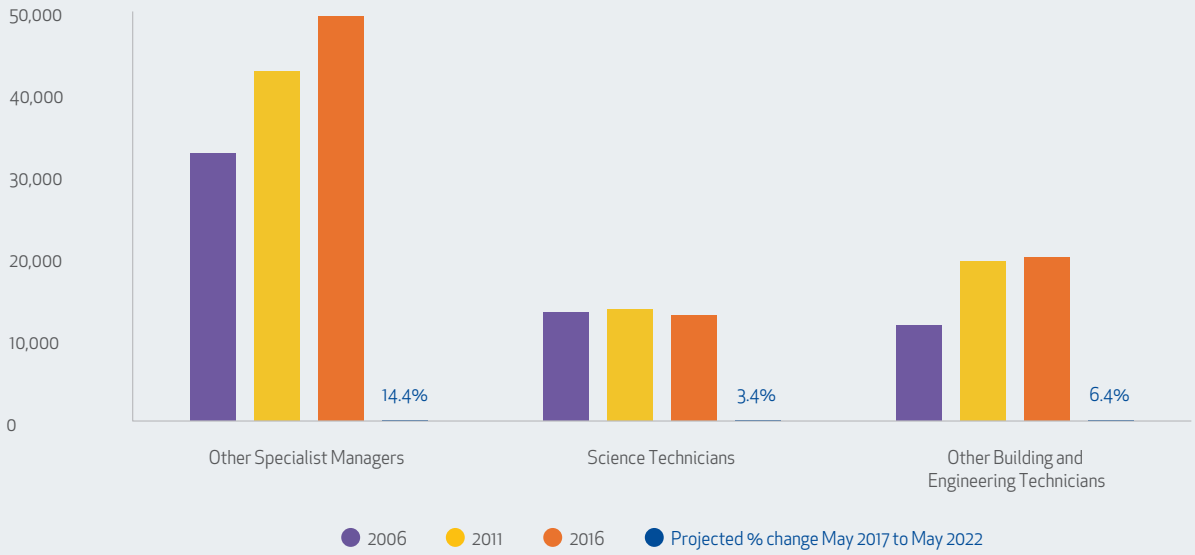
Despite the number of businesses operating in the Laboratory Operations industry reducing (as the sector consolidates) and training numbers declining, the number of people working in the industry is increasing (although it remains male dominated):

- Despite more women enrolling in MSL Laboratory Operations qualifications than men, employment remains male dominated (65% male in 2016)[14]
- In the last decade, employment grew in two of the three identified occupations[15] in the industry:
    - The number of 'other specialist managers' increased by 16% over the period 2011-2016
    - 'Other Building and Engineering Technicians' experienced some growth (5% in the same period)
    - But science technicians decreased by 2% between 2011 and 2016.
- Employment projections for the above occupations (to 2022) are predicted to grow by between 3.4% and 14.4%, delivering an additional 9,600 jobs.

14 Source: ABS Census of Population and Housing; 2006, 2011 and 2016 (across the occupation Unit Groups identified as particularly relevant to MSL Laboratory Operations qualifications)

15 Unfortunately, five-year employment projection data is only available at the 4-digit ANZSCO Unit Group level (rather than the 6-digit Occupation level which maps more accurately to the various Laboratory Operations occupations).

Figure 3 – Employment in ANZSCO occupations related to MSL Laboratory Operations qualifications



ABS 2006, 2011 and 2016 Census employment and Department of Jobs and Small Business Labour Market Information Portal (LMIP) Occupation Employment Projections May 2017 – May 2022

Table 3 – Employment growth and projections

ANZSCO Code	Occupation	Employment level – May 2017	Projected employment growth - five years to May 2022	
		('000)	('000)	(%)
1399	Other Specialist Managers	52.4	7.5	14.4%
3114	Science Technicians	12.6	0.4	3.4%
3129	Other Building and Engineering Technicians	26.9	1.7	6.4%

Department of Jobs and Small Business Labour Market Information Portal (LMIP) Occupation Employment Projections May 2017 – May 2022

Workforce Supply Challenges and Opportunities

There are no known workforce supply challenges for the Laboratory Operations sector as it grows, although higher level vacancies appear to be being filled by an oversupply of university graduates rather than VET graduates. Given industry concerns about the knowledge and skills of university graduates in relation to the demands of the industry, if the number of VET graduates continues to decline it is possible that the industry will face a future skills mismatch.

Skills Outlook

Reflecting the impact of technological change across the manufacturing sector, the key generic skills for the future as identified by the manufacturing Industry Reference Committees, include the need for design thinking, creativity, systems thinking, problem solving and a raft of related skills required to maximise the use of new technology. Associated with these skills is the need for specific technological skills and the ability to self-manage and communicate effectively (see Table 4). Science, Technology, Engineering and Mathematics (STEM) skills were also identified as important. By contrast, when considering the specific needs of the Laboratory Operations industry, the need for specific technology skills and for STEM skills were rated higher.

IRC members observed that although they would expect that learners would already possess the necessary underpinning Language, Literacy and Numeracy (LLN) and STEM skills when enrolling in qualifications, this is often not the case. As a result, it is important that qualifications specify the required underpinning skills within the standards.

It was also suggested that in future, workplace health and safety should be added to the list of generic skills, as its high level of importance is evident across all of the industry sectors under the remit of this IRC.

IRC members have ranked the importance of key generic workforce skills as indicated in Table 4. In several cases, there were only particular aspects of the generic skill area that were seen as important, and these have been highlighted in bold.

Table 4 - Key Generic Workforce Skills

	Combined Manufacturing IRCs	Process Manufacturing, Recreational Vehicle and Laboratory IRC Laboratory Specific Focus
1	Design mindset/Thinking critically/Systems thinking/Solving problems skills	Technology use and application skills
2	Technology use and application skills	**Learning agility**/Information literacy/**Intellectual autonomy and self-management skills**
3	Learning agility/Information literacy/Intellectual autonomy and self-management skills	Design mindset/Thinking critically/Systems thinking/**Solving problems skills**
4	Communication/Collaborations including virtual collaboration/Social intelligence skills	Data analysis skills
5	Science, Technology, Engineering and Mathematics (STEM) skills	Science, Technology, Engineering and Mathematics (STEM) skills
6	Language, Literacy and Numeracy (LLN) skills	**Communication/Collaborations** including virtual collaboration/**Social intelligence skills**
7	Data analysis skills	Language, Literacy and Numeracy (LLN) skills
8	Managerial/Leadership skills	Managerial/**Leadership skills**
9	Customer service/Marketing skills	Environmental and Sustainability skills
10	Environmental and Sustainability skills	Customer service/Marketing skills
11	Entrepreneurial skills	Entrepreneurial skills
12	Financial skills	Financial skills

Key Drivers for Change and Proposed Responses

The challenges and opportunities and the employment and skills outlook described in this report, indicate the need for skill development solutions in a number of priority areas. These are outlined in Table 5 below.

Table – 5. Priority skills and key drivers for change

Priority Skills	Key Driver for Change	Proposed Response
Regulatory/Legislative		
No specific changes are identified, although any changes to food standards or the introduction of certification for medical laboratory scientists would have an impact on the training needs of the sector.		
Industry Specific		
No additional changes are identified beyond those being pursued by the IRC through its forward workplan.		
Business skills		
No specific changes are identified.		
Technology		
Automation	The introduction of new technologies is changing the level and nature of skills required in the industry.	Consider if generic cross-sector units of competency, or specific units of competency are required to assist the industry to manage the changes arising from increased automation.

Training Product Review - Current Activities

2016-17 Activities

In February 2017 IBSA Manufacturing was commissioned to undertake Training Package development work on behalf of the Process Manufacturing, Recreational Vehicle and Laboratory IRC on the MSL Laboratory Operations Training Package.

A Case for Endorsement and final components for the MSL Laboratory Operations Training Package Release 2.0 were submitted to the Australian Industry and Skills Committee AISC) on 15 December 2017. The components submitted for endorsement included:

- MSL40118 Certificate IV in in Laboratory Techniques
- MSL50118 Diploma of Laboratory Technology
- 101 units of competency, including:
    - two new units of competency:
        - MSL954003 Relate anatomical and physiological features to laboratory samples (covering skills in anatomy and physiology for laboratories)
        - MSL975028 Apply advanced embedding and microtomy skills (covering skills in embedding and microtomy)
    - 99 revised units, including MSL953001 Receive and prepare samples for testing
- one new skill set, MSLSS00001 Histotechnology Skill Set.

The work completed had extensive consultation and strongly supports the CISC-AISC priorities by:

- removing superfluous information from units of competency and deleting (seven) units to reduce duplication and remove obsolete units
- including information about industry's expectations of training delivery (i.e. duration of training, mode of delivery and learner characteristics) in the MSL Laboratory Operations Companion Volume Implementation Guide, Release 2.0
- improving qualification design to clarify the Australian Qualifications Framework (AQF) outcomes and enable individuals to move easily from one related occupation to another
- improving the efficiency of the training system through the creation of units of competency that can be owned and used by multiple industry sectors.

The Training Package components were approved for implementation by the AISC on 20 February 2018. The new components were released on the national register www.training.gov.au.

2017-18 Activities

In February 2018, the Australian Industry Skills Committee (AISC) approved a Case for Change to undertake broader scoping activities, consultation and analysis of the MSL Laboratory Operations Training Package to determine the required skills and knowledge for work in the bio sector, specifically bio-energy. Bio-energy, with subsets of bio-fuels and biomass, is a renewable energy derived from biological sources or waste, and produces gaseous fuels to generate electricity and heat, or liquid fuels.

This project will look at training requirements in the new and emerging areas related to the renewable and sustainable energy sector, in bio-fuels and bio-processing of waste and agricultural products. It supports a number of the CISC-AISC priorities as it builds on existing qualifications to meet the demands of the emerging bio sector. Preliminary consultation suggests that currently there are no specific Training Package products that meet the demands of industry. New components will specify industry's expectation for workers in this sector, with existing components to be reviewed to limit duplication.

The project is due to be submitted to the AISC in April 2019.

AISC Cross-Sector Projects

The AISC identified a number of emerging cross-sectoral themes in previous IRC skills forecasts. The AISC sought to strategically address these common skills issues and commissioned nine cross-sector projects. The aim of the projects is to address changing skills needs across industries in a coordinated and efficient way and, where opportunities exist, to create flexible and transferable Training Package components that will benefit industry, learners and the broader VET sector.

There are a number of cross-sector projects that will potentially directly impact upon the MSL Laboratory Operations package.

- The **Digital Skills** Cross-Sector Project, while initially focused on the need for coding skills in manufacturing and related Training Packages, was expanded to focus on a broader set of skills related to coding and programming, CAD/CAM/CAE, and additive manufacturing/3D printing, as well as the digital analytical/diagnostic skills needed to analyse and respond to data provided by machines in the workplace. Outcomes of the project may result in recommendations for updated content of at least three units of competency in the MSL Laboratory Operations training package.
- The **Automation Skills** Cross-Sector Project focused on current and emerging developments in automated processes to determine the cross-sector skills which are required to use robotics, drones and remote operation systems. Outcomes of the project may result in recommendations for updated content of at least one unit of competency in the MSL Laboratory Operations training package.

- The **Big Data** Cross-Sector Project focused on the increased importance of capturing and interpreting data, and reviewed new and emerging roles and skills required to analyse data and make decisions based on that analysis. Outcomes of the project may result in recommendations that at least two units of competency from the MSL Laboratory Operations Training Package be reviewed, with potential for replacement by a cross-industry unit.
- The **Teamwork and Communication** Cross-Sector Project investigated the similarities in the key themes of teamwork and communication across training packages to develop common units to be used across multiple industry sectors. Outcomes of the project may result in recommendations that at least one unit of competency from the MSL Laboratory Operations Training Package be reviewed, with potential for replacement by a cross-industry unit.

Training Product Review – Priorities 2018-2022

Following consideration and analysis of the industry challenges and opportunities, current and emerging skills needs and the key drivers for change, the Process Manufacturing, Recreational Vehicle and Laboratory IRC has identified a number of areas for training product development. These training priorities are outlined in the IRC Skills Forecast and Proposed Schedule of Work 2018-19 to 2021-2022 table which lists the priorities for the next four years. This table also provides a rationale for the priorities, proposed scope and timeframes for these activities.

As outlined in the Current Activities section above, work has been approved to determine the required skills and knowledge for work in the bio sector, specifically bio-energy.

Items Identified as Important and to be Included in the Priorities for 2018-19

The following priorities have been identified for the 2018-2019 schedule of work:

- **Skill sets for specialised industry sectors** such as accreditation compliance in the laboratory.
- Investigate the need for new unit(s) in **Point of Care testing**.

Items Identified as Priorities Over the Next Three Years

The IRC identified the following training priorities to be considered over the next three years:

- Investigate the need for new units, and review existing units of competency, to cover skill requirements for **food testing** to ensure compliance with health and safety standards and quality standards in the food processing industry, as well as to accommodate current and future changes to food labelling.
- Develop new units and review existing units of competency to cover the skill requirements in the area of **genetics and molecular testing and diagnostics**.
- Investigate the need for new higher level qualification (Graduate Certificate) to cover **surgical cut-up skills** needs.

Proposed Schedule of Work 2018-19 to 2021-22

Process Manufacturing, Recreational Vehicle and Laboratory IRC

MSL Laboratory Operations

Contact details: Keith Monaghan, IRC Chair

Date submitted to Department of Education and Training: May 2018

Year	Items to be included in National Schedule of work
2018-2019	**Specialised Laboratory Skill Sets** Development of skill set(s) for accreditation compliance in the laboratory. **Rationale** Industry identifies increased national and global demand for higher quality products and services. Therefore, laboratory accreditation is becoming a higher priority for organisations to be able to assure the quality of their products. Knowledge of quality accreditation requirements are becoming important for staff at all levels. **Training products impacted:** • New skill set to be developed
2018-2019	**Point of Care testing** Investigate the need for new unit(s) in Point of Care testing. **Rationale** Pathology workers are likely to require an increased understanding about what Point of Care services are, what tests are available, what devices are used and potentially skills in device use (as well as blood collection itself). **Training products impacted:** • New unit(s) of competency to be developed

Year	Items to be included in National Schedule of work

2019-2020

Food testing skills

Food testing skills to ensure compliance with health and safety standards and quality standards in the food processing industry.

Rationale

There is an increasing demand for laboratory services such as food testing to ensure compliance with health and safety standards and quality standards in this industry. As further changes are made to food standards, the skills required for work in food testing will need to be reviewed and updated.

Opportunities are also opening up in agribusiness and food as a result of the Free Trade Agreements, as Asian nations look to Australia for agricultural and food products. This will result in increasing demand for laboratory services such as food testing to ensure compliance with health and safety standards and quality standards in this industry. [2017 Skills Forecast].

Training products impacted:

- Certificate IV in Laboratory Techniques
- Diploma of Laboratory Technology

2020-2021

Genetics-Molecular Testing and Diagnostics

Develop new units and review existing units of competency to cover the skill requirements in the area of genetics and molecular testing and diagnostics.

Rationale

The impetus behind current and future investment in the health industry is the public's expectation of early and accurate diagnosis essential in effective treatment, recovery and increased survival from diseases such as cancer. Industry needs and employment opportunities will increase as patient-centred treatment and intervention strategies remain as the underlying care philosophy. The challenge presented to the medical community, however, is further complicated by structural inefficiencies in bringing new techniques and technology into the mainstream of health services. The requirements of more complex health-related services can only be met by the development of stronger foundations in the fundamentals of cell biology, molecular biology, and genetics.

Genetics-Molecular Testing and Diagnostics

These focus areas are central to virtually all biological and biomedical laboratory sciences. Globally, these fields have been advancing at an exponential rate with molecular analysis becoming part of routine testing, not only in the biomedical sector but increasingly in other areas such as food processing as a response to increased quality and labelling requirements. This has resulted in a call by the industry for the inclusion of new units in the training package. [2017 Skills Forecast]

Training products impacted:

- Certificate IV in Laboratory Techniques
- Diploma of Laboratory Technology

Year	Items to be included in National Schedule of work
2021-2022	**Surgical cut-up skills** New higher level qualification (Graduate Certificate) to cover surgical cut-up skills needs. **Rationale** The National Pathology Accreditation Advisory Council (NPACC) Requirements for the performance of anatomical pathology cut-up specifies that Technical Officers are persons permitted to perform cut-up. It also specifies that the person must undergo training and progress through the following stages: • observations of Cut-up being performed by the trainer or supervisor • hands-on Cut-up under supervision • verification of competence for the levels of complexity • unsupervised practice with documented feedback from Pathologists and other Laboratory staff. These changes to the NPACC requirements have created a potential career path exclusively in surgical cut-up. The MSL Laboratory Operations Training Package does not provide the skills required by Technical Officers to progress their skills in this area. **Training products impacted** • New qualification to be developed potentially at a Graduate Certificate level

Appendix A: Stakeholders/Key Organisations in the Laboratory Operations Industry

Organisation	Sector
Adelaide Integrated Bioscience Laboratories	Biomedical Research
Agricultural Biotechnology Council of Australia	Biotechnology/Biomedical Research
Association of Regulatory and Clinical Scientists to the Australian Pharmaceutical Industry	Pharmaceutical
AusBiotech	Biotechnology/Biomedical Research
Austech Medical Laboratories	Biomedical Research/Pathology
Australasian Association of Clinical Biochemists	Biomedical Research/Pathology
Australasian Immunohistochemistry Society	Biomedical Research/Pathology
Australian Red Cross Blood Service	Pathology
Australasian Society for Immunology	Biomedical Research/Pathology
Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists	Pharmaceutical
Australia New Zealand Industrial Gas Association	Construction
Australia's National Digital Health Initiative	Technology/Pathology
Australian and New Zealand Forensic Science Society	Forensics
Australian Clinical Laboratories	Biomedical Research/Pathology
Australian Federal Police	Forensic

Organisation	Sector
Australian Institute of Food Science and Technology	Food
Australian Institute of Geoscientists	Mining/Mineral
Australian Institute of Medical Scientists	Pathology/Biomedical Research
Australian Physiological Society	Several - Biological
Australian Science Teachers Association	Educational Support
Australian Society for Biochemistry and Molecular Biology	Biomedical Research/Pathology
Australian Society for Microbiology	Biomedical Research/Pathology
Australian Society of Cosmetic Chemists	Pharmaceutical
Australian Society of Plant Scientists	Several - Biological
Australian Wine Research Institute	Wine
Boral	Construction
Capital Pathology	Biomedical Research/Pathology
Cement Concrete and Aggregates Australia	Construction
ChemCentre	Chemistry
Chemistry Australia	Chemistry
Clean Air Society of Australia and New Zealand	Environmental
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	All Sectors
CPC Pathology	Pathology
Department of Primary Industries	Agriculture/Pathology
Department of Primary Industries, Parks, Water and Environment	Agriculture/Pathology

Organisation	Sector
Dorevitch Pathology	Pathology
Douglass Hanly Moir Pathology	Pathology
Elizabeth Macarthur Agricultural Institute	Agriculture/Pathology
Forensic Science Service SA	Forensic
Forensic Science Service Tasmania	Forensic
Garvin Institute	Biomedical Research
Hanson	Construction
Healthscope	Pathology
Hin Sci	Biomedical Research/Pathology
Histopath - Diagnostic Specialists	Pathology
Histotechnology Group of Queensland	Biomedical Research/Pathology
Histotechnology Group of South Australia	Biomedical Research/Pathology
Histotechnology Group of Victoria	Biomedical Research/Pathology
Histotechnology Society of NSW	Biomedical Research/Pathology
In Vitro Diagnostics Australia	Biomedical Research/Pathology
Institute of Clinical Pathology and Medical Research (ICPMR)	Biomedical Research/Pathology
John Curtin School of Medical Research	Biomedical Research
Laboratory Operations Australia	Biomedical Research/Pathology/ Pharmaceutical
Laverty Pathology	Pathology

Organisation	Sector
Leica Biosystems	Biomedical Research/Pathology
Medlab Pathology	Pathology
Melanoma Institute Australia	Biomedical Research/Pathology
Metrology Society of Australasia	Calibration
Metropath	Pathology
Microscopy and Microanalysis Society of Australia	Biomedical Research/Pathology/ Biotechnology
MiniFAB	Technology/Biochemistry
MTPConnect - MedTech and Pharma Growth Centre	Biotechnology/Pharmaceutical
Murrumbidgee Pathology	Biomedical Research/Pathology
National Association of Testing Authorities	All Sectors
National Health and Medical Research Council	Biomedical Research
National Measurement Institute	Various
National Pathology Accreditation Advisory Council	Pathology
Neuroscience Research Australia	Biomedical Research
North West Pathology	Biomedical Research/Pathology
Northern NSW Local Health District (NNSWLHD)	Biomedical Research/Pathology
Northern Territory Police	Forensic
NSW Food Authority	Food/Beverage
NSW Health Pathology	Pathology
NSW Police	Forensic

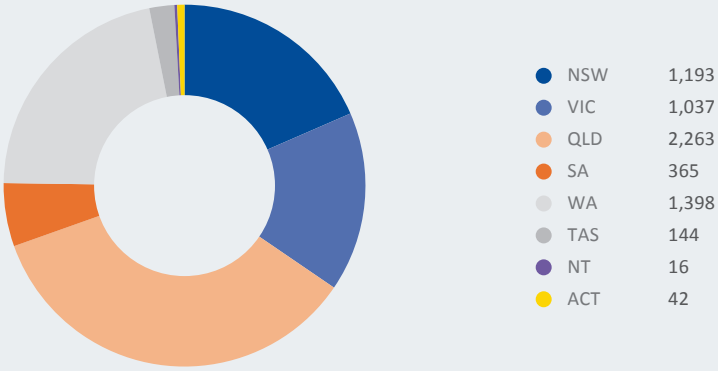
Organisation	Sector
Pathology Australia	Pathology
Pathology North	Biomedical Research/Pathology
PathWest Laboratory Medicine	Biomedical Research/Pathology
Queensland Health - Forensic and Scientific Services	Forensic
Queensland Police	Forensic
Royal College of Pathologists Australia	Pathology
Royal College of Pathologists of Australasia Quality Assurance Programs (RCPAQAP)	Pathology
Science and Technology Australia	All Sectors
Scientific Glassblowing Society of Australia and New Zealand	Glassblowing
SDS Pathology - Specialist Diagnostic Services	Pathology
Skin and Cancer Foundation of Australia	Biomedical Research/Pathology
Soil Science Australia	Environmental
Sonic Healthcare	Pathology
South Australia Police	Forensic
South Eastern Area Laboratory Services (SEALS)	Biomedical Research/Pathology
South Eastern Sydney and Illawarra Area Health Service (SESIAHS)	Biomedical Research/Pathology
Southern IML Pathology	Pathology
Southern Sun Pathology	Pathology
St Vincent's Hospital	Biomedical Research/Pathology

Organisation	Sector
Sydney Adventist Hospital	Biomedical Research/Pathology
Sydney South West Area Health Service (SSWAHS)	Pathology
Symbio Laboratories	Food/Agriculture/Environmental
Taronga Zoo	Agriculture/Pathology
Tasmanian Medical Laboratories	Biomedical Research/Pathology
Tasmania Police	Forensic
The Australian Academy of Technology and Engineering	Construction
The Institution of Chemical Engineers	Chemical
Thermo Fisher Scientific	Biomedical Research/Pathology
Trajan Scientific and Medical	Biomedical Research/Pathology/Chemistry
Victorian Institute of Forensic Medicine	Forensic
Victoria Police	Forensic
WA Police	Forensics
Wine Australia	Wine

Appendix B: Training Package Enrolment Snapshot

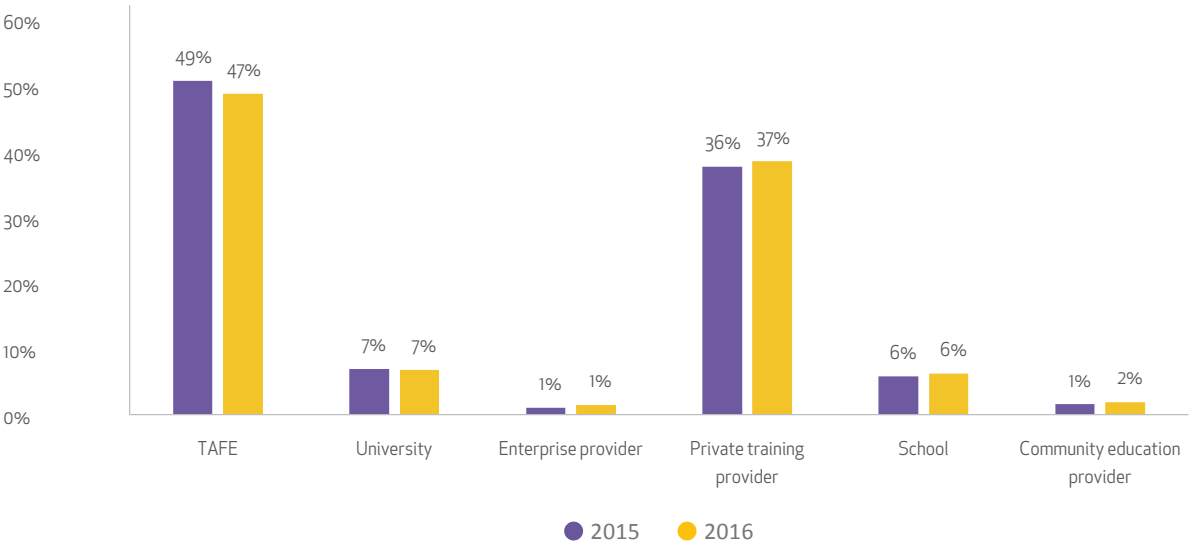
Program enrolments in MSL Laboratory Operations qualifications by State/Territory of student residence

2016 Total VET Activity



Program enrolments in MSL Laboratory Operations qualifications by Training Organisation Type

Percentage of 2015 - 2016 Total VET Activity

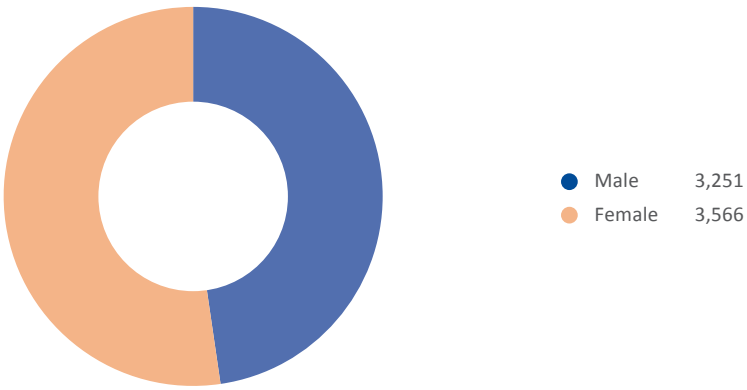


Program enrolments in MSL Laboratory Operations qualifications by Age Group

2014 - 2016 Total VET Activity

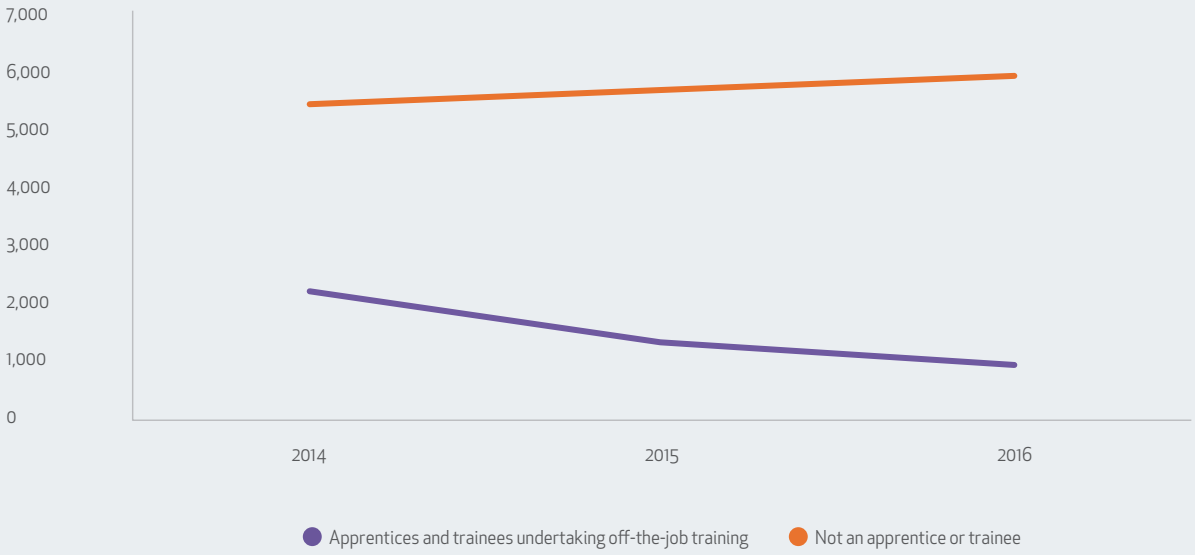
Program enrolments in MSL Laboratory Operations qualifications by Sex

2016 Total VET Activity



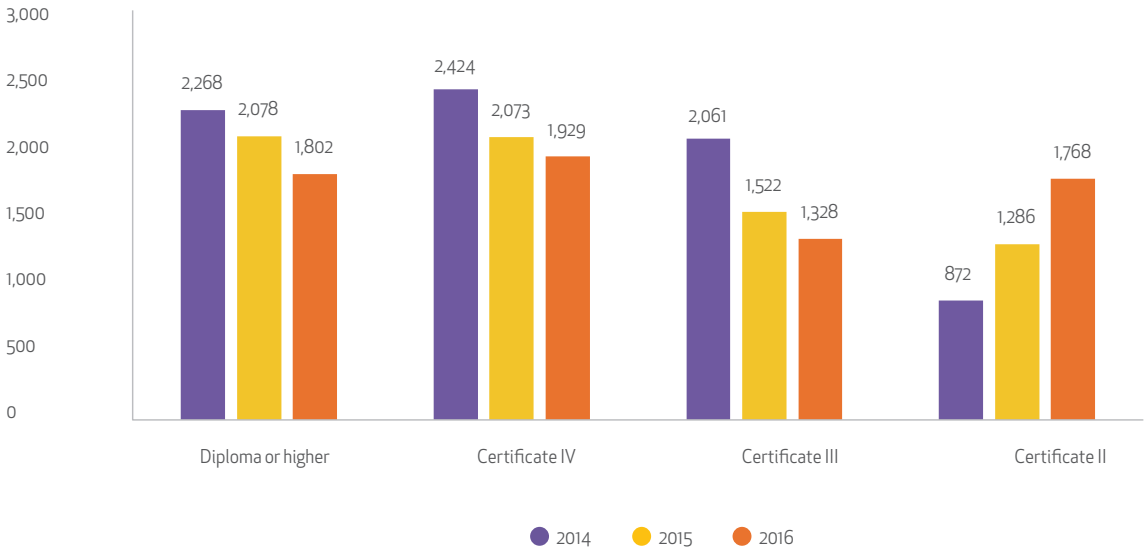
Program enrolments in MSL Laboratory Operations qualifications by Apprentice/Trainee undertaking off-the-job training

Total VET Activity 2014-2016



Program enrolments by qualification level in MSL Laboratory Operations qualifications

2014 - 2016 Total VET Activity



All data in this Appendix is sourced from the VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017

VOCSATATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers.

Appendix C: Future Skills Outcomes

The Australian Industry and Skills Committee (AISC) commissioned the Future Skills and Training Resource which summarises data on current and future Australian and international megatrends, to support Industry Reference Committees (IRCs) in developing their Industry Skills Forecasts and Proposed Schedules of Work.

The following trends and considerations are based on Process Manufacturing, Recreational Vehicle and Laboratory IRC discussions. This appendix presents the preliminary thinking of IRC members in order to stimulate broad discussion in industry.

Trends

Technology

Technology will have an extreme impact on the Process Manufacturing, Recreational Vehicle and Laboratory sectors and will change the industry sectors as they're currently known, as well as have an effect on learning and creating knowledge.

The key trends affecting the sectors are:

Artificial Intelligence (AI) and Machine Learning: AI technologies are an established trend and have been implemented across the sectors in various ways. A significant challenge is for policy and regulation to keep up with the pace of change and implementation. Industry also needs to be better at promoting the employment and skilling opportunities of technology adoption.

Cross-Disciplinary Science: This is an emerging trend requiring people and teams to have a functional knowledge across a number of disciplines.

Society and Culture

The key trends affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors are:

Changing Work and Career Values: This is an emerging trend which will become more prevalent in workplaces, particularly with technology expansion and the acceptance of automation. Workers will have the flexibility to undertake roles which interest them, and employers can also benefit from the broader perspectives gained from employees' experience in other areas. However, if workplace changes are imposed on workers, the benefits for individuals are not always positive.

Global (and Social) Mobility: Higher level skills and industry knowledge are leaving Australia to follow industry jobs moving offshore. Lower level, technical skills are required and increasingly filled by migrants, and this poses language, literacy and numeracy challenges to workplaces. Social mobility, fuelled by social media and the internet, is having a significant impact on the industry, particularly on how people are learning, and on their career and work choices.

Political and Institutional

The Process Manufacturing, Recreational Vehicle and Laboratory sectors operate in highly regulated environments, with workplaces required to adhere to stringent workplace, health and safety requirements and many workers requiring licences to undertake their job roles.

The key trends affecting the sectors are:

Political Instability and Polarisation/Political Appetite for Reform: Frequent changes in governments impact the implementation of reform agendas that are important for industry sustainability.

Governments also need to ensure funding for training is funnelled to the right skill areas so that workers can access training, particularly to meet regulatory requirements.

Resources and Environment

The key trend affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors is:

International Sustainability Action: International regulations are emerging as a key driver of change, with Australia looking to harmonise to international standards, such as those around emission targets.

More generally, resources are more widely understood and accepted as finite challenges faced by the industry, related to disposal of process waste, cost of energy use and access to ICT-related infrastructure. Younger generations are also more concerned about environmental issues, leading business and society to give more value to sustainability and the environment.

Business and Economics

The key trends affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors are:

Empowered (Informed and Demanding) Customers: Business is guided by social and cultural dynamics. Changes in consumer demands are being driven by social media movements, which will impact not only product design, but also job design.

Changing Workplace Dynamics: There is an emerging trend with teams becoming increasingly fluid in terms of sizes, interactions and tasks. The relational aspect of working together will matter more than technical aspects. A tension exists between the drive toward innovation and the need for standardisation in the manufacturing environment. 'Structured flexibility' will become prevalent in the industry.

Start Up Thinking: Australian manufacturers have a 'can do' attitude and are innovators, often requiring 'outside the box' solutions, but current systems do not always support this. Hyper-competition is driving faster product development and business cycles. Innovation is sometimes hampered by bureaucracy as well as management within organisations. Employees need to be provided with conscious opportunities to innovate, generate ideas and test designs in supportive environments.

Access to Quality Internet: This is an important requirement for every business, particularly as workforces are increasingly spread across different geographical locations.

Financial Viability: While impacted by access to and cost of resources, the key challenge for businesses in the industry sectors is to remain financially viable in order to stay competitive and continue to employ and train people.

Considerations for Training

Employers / Industry

Skills mismatch is a huge problem, and industries are running their own workshops and campaigns to attract industry entrants. However, the gap is too large for industry to address alone.

SMEs' engagement with workforce development and training remains a challenge due to market pressures.

The VET system must become more flexible to respond to industry needs; otherwise industry will go around the system.

Learners / Workers

The flexibility that now exists in mobility, social media, and connectivity needs to translate to new training models and approaches. Flexibility and higher order 'soft skills' are essential attributes now and in the future.

Learners and workers will seek to demonstrate to employers their capacity to think, try new things, and take risks. These abilities will need to be part of the training approach.

Learners and workers will combine VET and higher education alongside independent learning to gain employment or pursue entrepreneurial paths.

Government

Regulation will be a pivotal challenge to technology adoption and filling of skills gaps. Ways of evaluating progress, impact and achievement need to be reviewed.

Government involvement in all areas and aspects of the VET system will need to continue. The barriers in relation to industry having and accessing appropriate training to meet their needs requires management. This includes ensuring national and state funding skills lists accurately represent industry demand and that appropriate funding mechanisms, which reduce the cost burden on learners, are in place to enable training for these key skills.

Industry needs an active role in VET to ensure system-wide engagement.

Education and Training

Inflexibility in cross-industry training is a key issue to be addressed. Society and industry expect the VET system to focus more on industry value chains and lifecycles, and align training with new/expanding industries.

Educators' and trainers' roles are under pressure to be reconceptualised. Greater industry demand for skill sets and 'just in time' learning means these are increasingly used instead of the traditional training package model. Full qualifications as we know them have reduced relevance for employers and employees; continued support for a skills-driven training model is evident.

Registered training organisations are also impacted by financial viability and are grappling with how to deliver flexible, customised training at competitive rates to industry.

Appendix D: Defining the Scientific and Testing sector of the Laboratory Operations Industry

The Scientific and Testing sector of the Laboratory Operations industry includes the following industrial classifications:

6910: Scientific Research Services

- Aeronautical research service
- Agricultural research service
- Biological research service
- Biotechnology research service
- Economic research service
- Food research service
- Industrial research service
- Medical research service
- Observatory research service
- Research farm operation
- Scientific research service
- Social science research service
- Space tracking research station operation

6925: Scientific Testing and Analysis Services

- Chemical analysis service nec.
- Forensic science service (except pathology service)
- Geology and geophysical testing service
- Laboratory operation (providing chemical, food, electrical engineering or other technical services)
- Materials strength testing service
- Non-destructive testing service
- Pollution monitoring service
- Seismic survey data analysis service
- Testing or assay service on fee or contract
- Wine testing
- Wool testing service

6999: Other Professional, Scientific and Technical Services nec

- Interpretation service
- Meteorological service
- Non-financial asset broking service
- Professional, scientific and technical services nec.
- Translation service
- Weather station operation