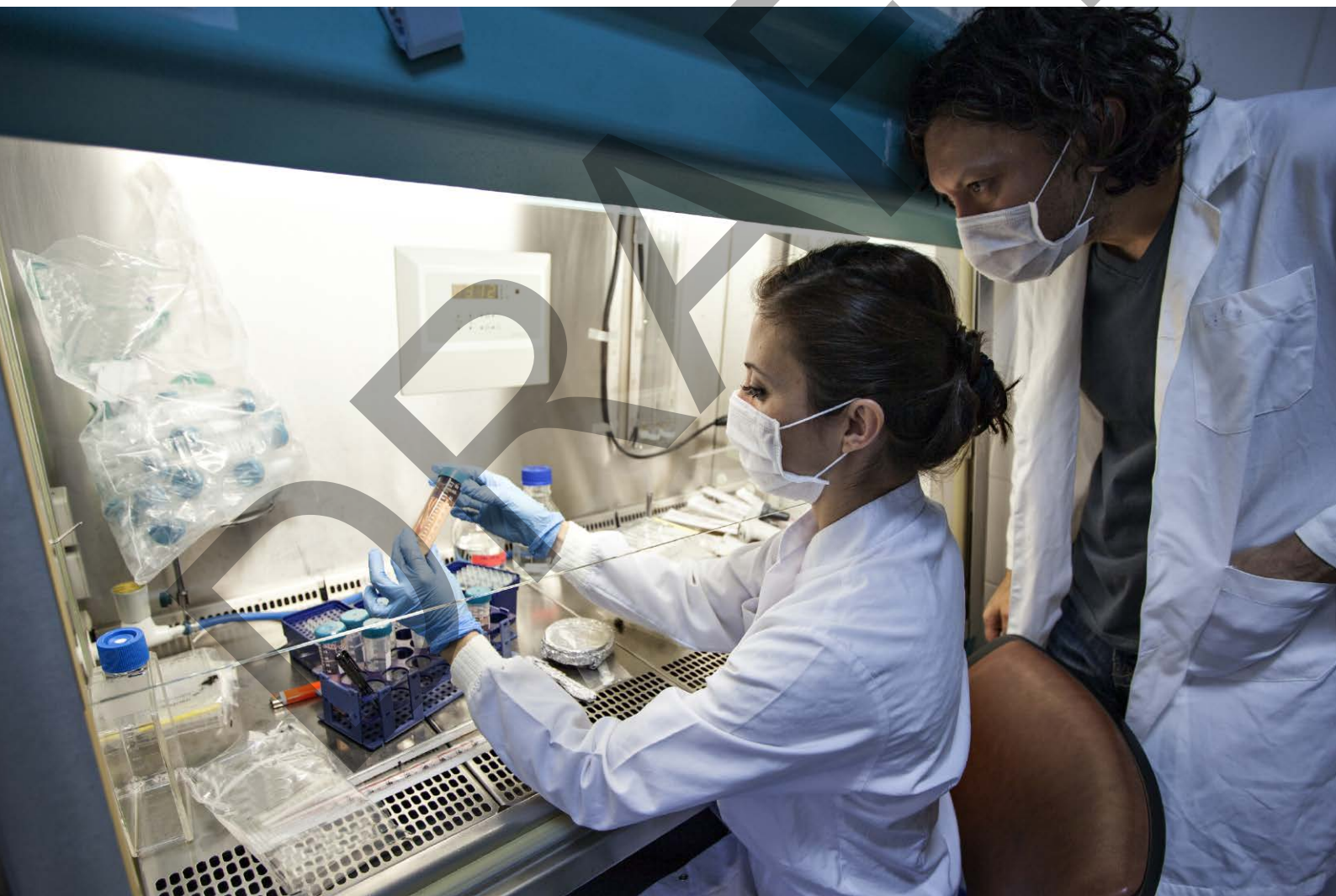


# Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee

## Skills Forecast and Proposed Schedule of Work 2019–2023



# 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 eight members and was constituted in May 2017.

The 2019 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

Mr Nigel Haywood

Mr Han Michel

Mr Grahame Aston

Ms Julie Warren

## About the Skills Forecast

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 consultations with IRC members and industry stakeholders and provides evidence of current and emerging industry skills needs.

# Industry Reference Committee Signoff

This 2019 return of the Process Manufacturing, Recreational Vehicle and Laboratory IRC Skills Forecast and Proposed Schedule of Work was agreed as the result of a properly constituted IRC decision and was approved by:

**IRC Chair:** Keith Monaghan

**Date:** April 2019

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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 and 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

Administrative Information	I
About the Industry Reference Committee	I
About the Skills Forecast	I
Industry Reference Committee Signoff	II
<b>Executive Summary</b>	<b>01</b>
<b>Sector Overview</b>	<b>02</b>
Industry Snapshot	04
Critical Workforce Challenges and Opportunities	09
Forecasting Skills Priorities	12
Training Snapshot	13
Training Delivery	14
Challenges and Opportunities	23
<b>Employment and Skills Outlook</b>	<b>28</b>
Employment Outlook	29
Skills Outlook	32
<b>Key Drivers for Change and Proposed Responses</b>	<b>34</b>
<b>Training Product Review</b>	<b>35</b>
Current Activities	35
Upcoming Activities	37
<b>Consultation Undertaken</b>	<b>38</b>
Issues and Sensitivities Raised	38
<b>Proposed Schedule of Work 2019–2020 to 2022–2023</b>	<b>40</b>
<b>Appendix A: Occupation Classifications</b>	<b>49</b>
<b>Appendix B: Industry Classifications</b>	<b>50</b>
<b>Appendix C: Stakeholders/Key Organisations in the Laboratory Operations Industry</b>	<b>51</b>
<b>Appendix D: Census Snapshot</b>	<b>56</b>
<b>Appendix E: Enrolment Snapshot</b>	<b>60</b>
<b>Appendix F: Consultation List</b>	<b>64</b>

# Executive Summary

Laboratory operations is not a discrete industry. It covers a wide range of industries such as agriculture, biotechnology, construction, educational support laboratories, environmental management, food, health, manufacturing and mining. Laboratory operations occupations include those involved in testing, laboratory work and sampling. These occupations are characterised by their focus on non-professional technical and scientific skills.

Laboratory services are critical in ensuring the safety, quality and compliance of many Australian businesses and industries. As a consequence, this work is heavily regulated and subject to compliance with both international and Australian standards, as well as Commonwealth and State regulations.

This IRC Skills Forecast and [Proposed Schedule of Work 2019–2020 to 2022–2023](#) was developed by the Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee (IRC), with support from IBSA Manufacturing, based on identified industry trends. The [Schedule](#) lists the priorities over the next four years, the rationale and the proposed timeframes for these activities.

In response to current and emerging skills needs, the item identified by the IRC as critical and proposed for inclusion as a priority for the 2019–2020 schedule of work is the creation of a skillset for pathology workers involved in Point of Care Testing (PoCT). PoCT is an area of high growth in the pathology sector and one that continues to evolve. Large public health systems and small community facilities are all seeking the development of a specific skillset for PoCT to improve the availability and timeliness of health services. Further details about the proposed skills set can be found in the [Case for Change](#) section of this report

# Sector Overview

The laboratory operations industry is diverse with a broad range of business sizes and people employed.

The wide variety of industries that employ graduates with qualifications from the MSL Laboratory Operations Training Package make it challenging to accurately determine the number of businesses involved in the sector. The Australian Bureau of Statistics (ABS) uses a very narrow definition for laboratory operations, nevertheless, at June 2017, it identified at least 9,362 organisations that were involved in the sector.<sup>1</sup> It is unclear how many other businesses across Australia, not currently included in industry statistics, have laboratory staff and facilities supporting their core operations. However, an indication of the number of laboratories nationally can be gleaned from the National Association of Testing Authorities, Australia (NATA) data. According to NATA they have accredited 3,973 laboratories in Australia registered across the following two International Standards ISO/IEC 17025:2017 and ISO/IEC 15189,<sup>2</sup> see [Industry Snapshot](#) section below. It is possible to use occupational data from the ABS to gain a more accurate picture of the number of laboratory operations trained staff.

The MSL Laboratory Operations Training Package contains five qualifications, ranging from Certificate II to Advanced Diploma:

- MSL20118 Certificate II in Sampling and Measurement
- MSL30118 Certificate III in Laboratory Skills
- MSL40118 Certificate IV in Laboratory Techniques
- MSL50118 Diploma of Laboratory Technology
- MSL60118 Advanced Diploma of Laboratory Operations.

Within the MSL Laboratory Operations Training Package, there are 106 native units of competency and one skill set.

<sup>1</sup> ABS, 2018, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017.

<sup>2</sup> National Association of Testing authorities (NATA) website <https://www.nata.com.au/>, accessed February 2019.

## Contribution to the Australian economy by the laboratory operations industry



**96,200**

People employed in 2018

Source: ABS 6291.0 55,003 Labour Force, Australia, May 2018.



**9,347**

Number of businesses

Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits.



**Business locations**

NSW	2,940	SA	584
VIC	2,371	TAS	150
QLD	1,741	ACT	203
WA	1,292	NT	66

Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits.

Given the challenges in accurately categorising the laboratory operations industry, it is difficult to calculate its contribution to the Australian economy. Nonetheless, the laboratory technology sector, including medical and science technician occupations, is categorised by the Australian Government within the 'Science and Technology' classification. In total, this classification made a significant contribution to the economy.

## Industry Snapshot

As noted above, laboratory operations is not a stand-alone industry. It covers a diverse range of technical and scientific occupations, across a variety of industry sectors. The MSL Laboratory Operations Training Package, therefore, aims to address the training needed by technical assistants, samplers/testers and laboratory technicians working in the following industries:

- 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.

Many graduates of the MSL Laboratory Operations Training Package work in industries such as food and beverage, construction, mining and manufacturing and, therefore, are not counted in official statistics as part of the laboratory operations industry. As mentioned above, NATA have accredited 3,973 laboratories nationally across the following two International Standards:

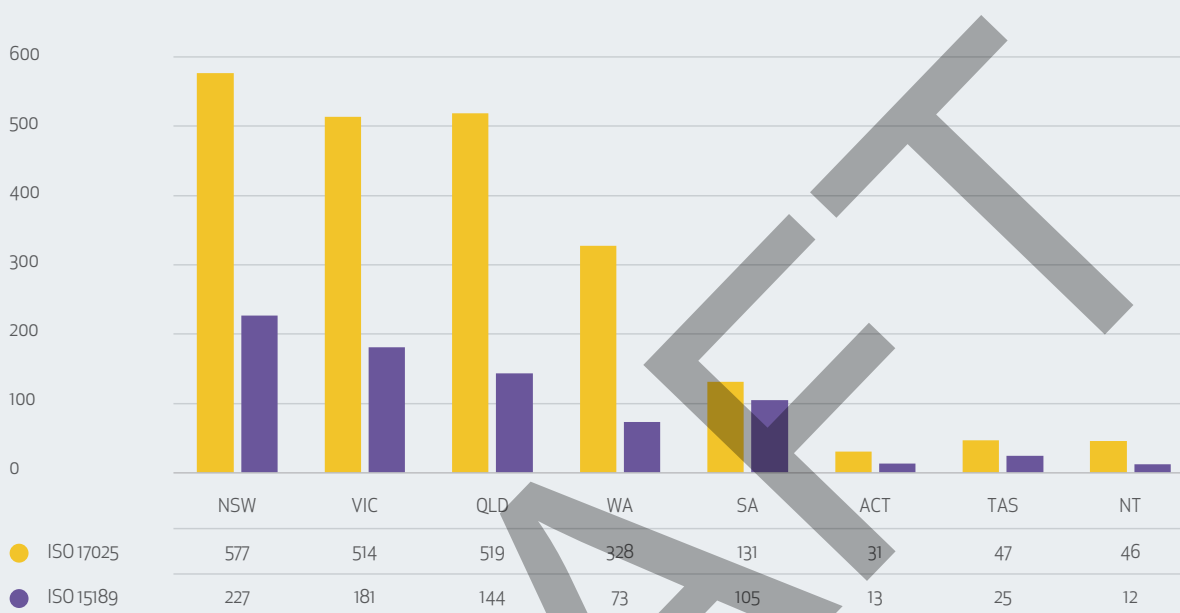
- ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (2,193) or
- ISO/IEC 15189 Medical Laboratories (780).<sup>3</sup>

<sup>3</sup> National Association of Testing Authorities (NATA) website <https://www.nata.com.au/>, accessed February 2019.



It is important to note that some laboratories will be accredited in both ISO standards. Figure 1 illustrates the geographical spread of NATA accredited laboratories.

Figure 1 – Number of NATA accredited laboratories by state/territory



Source: National Association of Testing Authorities, Australia <https://www.nata.com.au/>, accessed February 2019.

The cross industry nature and reach of the laboratory operations sector is provided in Table 1 below. This table identifies the number of NATA accredited laboratory sites by discipline. Note, a laboratory may work across a number of disciplines. People who hold qualifications from the MSL Laboratory Operations Training Package will be working in laboratories across all 10 disciplines identified below.

Table 1 – Number of NATA accredited laboratory sites by state/territory by discipline

Discipline	NSW	VIC	QLD	WA	SA	ACT	TAS	NT	Aus	Standard
Materials	234	158	203	133	50	7	12	17	814	ISO17025
Food and Beverage	75	71	61	33	21	4	8	5	278	ISO17025
Human Pathology	221	176	138	70	102	13	23	11	754	ISO15189
Animal Health	14	13	5	3	3	0	1	1	40	ISO17025
Calibration	84	85	42	42	15	3	3	3	277	ISO17025
Infrastructure and Asset Integrity	275	232	319	218	55	8	19	34	1160	ISO17025
Manufactured goods	136	109	66	36	26	3	5	1	382	ISO17025
Healthcare, Pharmaceutical and Media Products	17	19	18	9	6	5	1	0	75	ISO17025
Environment	160	125	104	59	26	13	18	12	517	ISO17025
Agribusiness	43	32	36	18	12	0	4	0	145	ISO17025

Source: National Association of Testing Authorities, Australia <https://www.nata.com.au/>, accessed February 2019.

Data available on the scientific and testing sector of the industry shows it is experiencing growth – see Table 2. The other industry sub-sectors are static in terms of business numbers.

**Table 2 – Business landscape in key industry sectors/subsectors<sup>4</sup>**

Industry sub-sector	Number of businesses at 30 June 2017	% Change from 30 June 2015	Largest state by businesses	Business type <sup>5</sup>
Scientific Research Services	3,789	+15.4%	NSW – 1,260	62% non-employing 35% small 3% medium 0% large
Scientific Testing and Analysis Services	3,206	+0.6%	NSW – 786	51% non-employing 45% small 3% medium 0% large
Other Professional, Scientific and Technical Services nec	2,367	0%	NSW – 894	66% non-employing 32% small 2% medium 0% large

<sup>4</sup> ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017.

<sup>5</sup> In terms of business type, small is defined as employing 1–19 people, medium employing 20–199 and large > 200 people. Note the component values in tables will not always sum to the total due to a confidentialising process that perturbs the data.

In addition to the challenges of defining the laboratory operations sector within existing industry classifications, it is also difficult to readily categorise the occupations within the sector. The most appropriate categorisations using the Australia and New Zealand Standard Classification of Occupations (ANZSCO)<sup>6</sup> are:

#### Major Group 1 Professionals

- 1399 Other Specialist Managers
- 139913: Laboratory Manager.

#### Major Group 3 Technicians and Trades Workers

- 3111 Agricultural Technicians
- 311111 Agricultural Technician
- 3112 Medical Technicians.

#### 311213 Medical Laboratory Technician

- 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.

Further details on the occupational sub-sectors are at [Appendix A](#).

<sup>6</sup> 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 August 2018.

# Critical Workforce Challenges and Opportunities

Increasingly, employers are describing robotics and automation as imperatives for their businesses. Due to the likelihood that most manual processes will eventually be automated, employers are looking for laboratory services technicians, who are comfortable and practised in their use of automation. These workers will require higher skill levels to maximise the use of new technology.

The current 'upcycle' in the mining industry is resulting in increased workloads within laboratories in the mining sector.<sup>7</sup> A present challenge for these laboratories is providing a high standard of service, while managing the workload, and retaining a sufficient number of skilled workers.

The new Energy/Battery Metals<sup>8</sup> mining industry is also driving demand for extractive metallurgical test work services, according to industry figures who participated in consultations for this Industry Skills Forecast. Within the gold industry, there is an increased demand for onsite laboratories and technicians with wet chemistry and metallurgical assay experience, as reported by industry figures consulted in the development of this Industry Skills Forecast.

As far back as 2010 in Australia, experts were identifying the changes in PoCT and the significant opportunities that lay ahead for clinicians and patients, especially those with chronic conditions and those living in remote and rural areas. The benefits for Aboriginal medical services were specifically highlighted as they allow for a greater proportion of patients to have their medical issues identified and treated in their communities, without having to leave families and support to seek treatment in larger regional areas or capital cities.

The increase of synthetic biology will generate a demand for specialist skills and will be linked to the expansion/investment in biofoundries: an integration of biology with software and hardware systems. Synthetic biology may contribute to advances in a number of areas including healthcare, industrial biotechnology, biosecurity, agriculture and food research, with the potential to support the reinvention and creation of new industries and new jobs for Australia.<sup>9</sup> Further research and consultation is required to determine if the rise of synthetic biologies will impact on the skill and knowledge requirements of those being trained from the VET sector.

7 Creagh, B, 2018, The Top Mining Trends of 2018, <https://www.australianmining.com.au/news/top-mining-trends-2018/>, accessed November 2018.

8 Hastie, H, 2018, Lithium 'buzz' could be worth hundreds of billions to Australia, <https://www.smh.com.au/business/the-economy/lithium-buzz-could-be-worth-hundreds-of-billions-to-australia-20181002-p507cb.html>, accessed November 2018.

9 <https://www.csiro.au/en/Research/LWF/Areas/Synthetic-Biology>, accessed April 2019.

## Business Landscape

Despite the involvement of government organisations in the scientific sub-sector of the laboratory operations industry, only 3% of institutions in this sector have 20 or more employees.<sup>10</sup> The largest scientific organisations involved in the industry are mostly public institutions; however, there are also several large private institutions, such as CSL Limited, a biotechnology company. Businesses involved in laboratory operations are from a variety of different industries, including agriculture, biotechnology, construction, environmental management, food, health, manufacturing and mining. The variety of businesses with laboratory operations means that the changes across the business landscape are diverse. Changes in any of these industries can have an impact on laboratory operations and create drivers for change, including:

- increasing public demand for higher environmental standards
- increasing demand for food testing as a result of a growing incidence of allergies within the general population
- increasing demand for the highest-quality Australian food and beverages in our export markets
- increasing price of gold
- ongoing importance of the broader mining sector (particularly in states like Western Australia)
- ageing population
- ongoing increases in the size of the healthcare sector.

Further details on the changes happening in these industries can be gleaned from their respective Industry Skills Forecasts.

Despite the differentiation in the industries serviced by the laboratory operations sector (including those listed above), automation is a rising challenge.

<sup>10</sup> ABS, 2019, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2014 to Jun 2018.

## Industry Classifications

Laboratory operations covers a diverse group of technical and scientific occupations across a number of industry sectors.

The IRC has selected the following Australian and New Zealand Standard Industrial Classification (ANZSIC) classes as representative of the industry in Australia.

**Table 3 – Industry classifications by ANZSIC classification<sup>11</sup>**

ANZSIC Code	6910	6925	6999
ANZSIC four-digit Class Name	Scientific Research Services	Scientific Testing and Analysis Services	Other Professional, Scientific and Technical Services nec

## Key Industry Stakeholders

The laboratory operations industry involves a large number of peak bodies and professional associations. These are detailed at [Appendix C](#).

<sup>11</sup> ABS, 2018, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017.

## Forecasting Skills Priorities

In the course of the development of the Industry Skills Forecast, research and consultations identified that future skills priorities were emerging in the pathology sector, specifically in relation to surgical cut-up skills, being driven by job role changes and increasing complexity in the workplace, and genetic and molecular testing; an emerging and important field.

Outside the pathology sector, foodtesting skills is an issue that is emerging to ensure compliance with current health and safety standards and quality standards in the food processing industry. This is becoming increasingly important as the “growing middle class in Asia” purchases more Australian produce and demands the highest standards (as well as increased awareness of these issues within the Australian community).<sup>12</sup> Metallurgical skills are also changing, and the need for the development of a skill set focused on gravity separation, flotation, hydrometallurgy (leaching, salt roasting solution refining, solvent extraction, ion exchange resin, precipitation) has been raised by some in the mining industry and warrants further consideration.

<sup>12</sup> IBIS World Industry Report C2469, Food Processing Machinery Manufacturing in Australia September 2017, page 6.



## Training Snapshot

In 2017, a learner enrolled in a qualification from the MSL Laboratory Operations Training Package was most likely to be:



ENROLLED IN CERTIFICATE IV IN  
LABORATORY TECHNIQUES  
27% of all enrolments



STUDYING IN QUEENSLAND  
33% of all enrolments

19 YEARS AND YOUNGER  
44% of all enrolments



NOT IN AN APPRENTICESHIP OR  
TRAINEESHIP  
86% of all enrolments



ENROLLED WITH A TAFE INSTITUTE  
49% of all enrolments.



FEMALE  
54% of all enrolments

## Training Delivery

Table 4 indicates the number of Registered Training Organisations (RTOs) with MSL Laboratory Operations qualifications on scope.

**Table 4 – Number of RTOs by nationally recognised qualifications on scope**

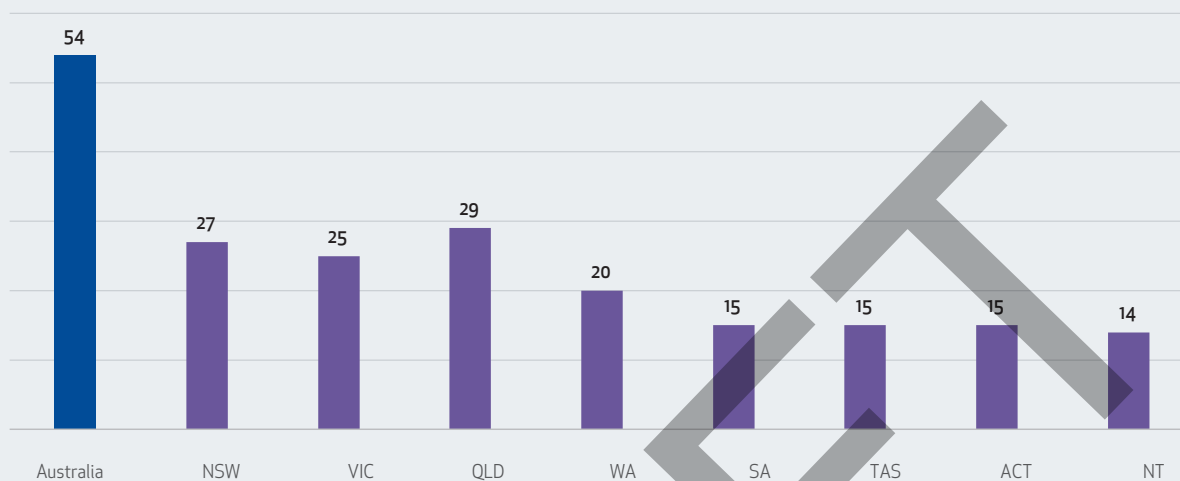
Code	Qualification name	No. of RTOs on scope	RTO types <sup>13</sup>
<b>MSL20118</b>	Certificate II in Sampling and Measurement	23	8 private/community RTOs, 5 TAFEs, 9 schools, 1 university
<b>MSL30118</b>	Certificate III in Laboratory Skills	41	1 enterprise RTO, 12 private/community RTOs, 26 TAFEs, 2 universities
<b>MSL40118</b>	Certificate IV in Laboratory Techniques	38	1 enterprise RTO, 9 private RTOs, 27 TAFEs, 1 university
<b>MSL50118</b>	Diploma of Laboratory Technology	31	9 private RTOs, 20 TAFEs, 2 universities
<b>MSL60118</b>	Advanced Diploma of Laboratory Operations	5	5 private RTOs

Source: Training.gov.au. RTOs approved to deliver this qualification. Accessed 28 August 2018.

In total, there are 54 RTOs with qualifications from the MSL Laboratory Operations Training Package on scope. Of these, only three (all private training providers) offer all given qualifications. All of the schools offering the Certificate II in Sampling and Measurement are based in Queensland.

<sup>13</sup> Note the TAFEs include multiple RTOs registered to TAFE NSW.

Figure 2 – RTOs with MSL Laboratory Operations qualifications on scope



Source: NCVET VOCSTATS, extracted on 15/08/2018.

## Qualifications Available

The MSL Laboratory Operations Training Package contains five qualifications ranging from Certificate II to Advanced Diploma, and one skill set.

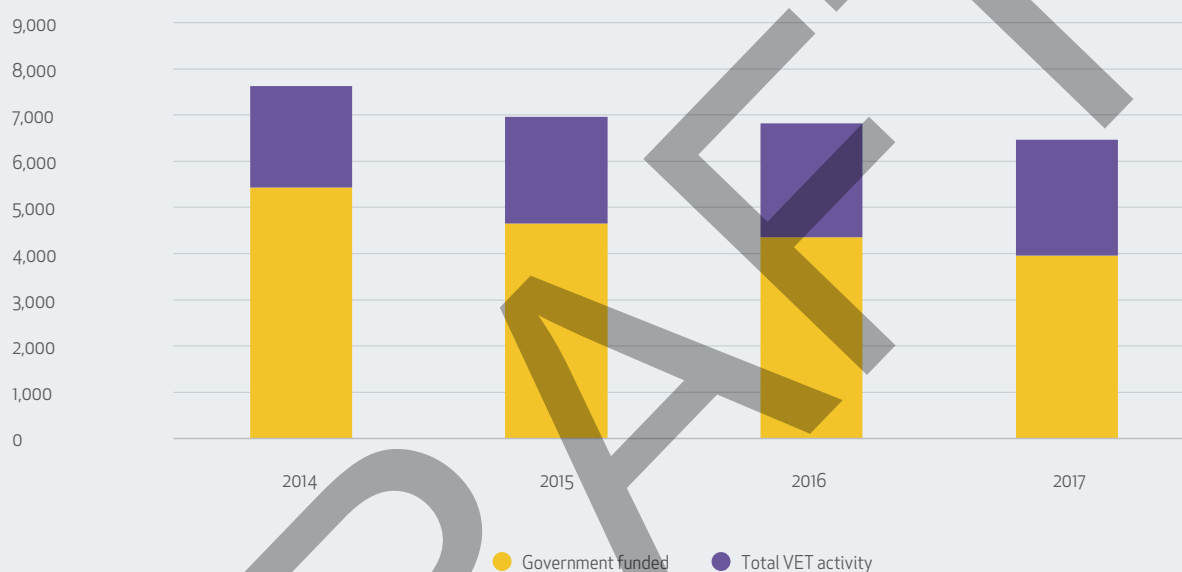
- MSL20118 Certificate II in Sampling and Measurement
- MSL30118 Certificate III in Laboratory Skills
- MSL40118 Certificate IV in Laboratory Techniques
- MSL50118 Diploma of Laboratory Technology
- MSL60118 Advanced Diploma of Laboratory Operations
- MSLSS00001 Histotechnology Skill Set.

## Qualification Uptake

The number of students enrolled in the MSL Laboratory Operations Training Package is in decline. Enrolments peaked in 2014 at 7,631 enrolments<sup>14</sup> and declined to 6,465 in 2017 (a decrease of 15%) on total VET activity; in 2014. The share of government funded activity has also declined, down from 71% in 2014 to 61% in 2017.

In 2017, government funded enrolments declined by a greater margin (-9%) than the decline in total VET enrolments (-5%).

Figure 3 – Enrolments in MSL Laboratory Operations qualifications



Source: NCVER VOCSTATS, extracted on 15/08/2018.

Over the past four years, enrolments in the MSL Laboratory Operations Training Package have been dominated by TAFEs and private RTOs, with a modest but relatively stable number of enrolments in schools and universities. TAFEs have higher levels of enrolment in MSL Laboratory Operations qualifications than private providers, the share of government funded to fee for service enrolments in MSL Laboratory Operations qualifications is approximately the same for both TAFE and private training providers.

<sup>14</sup> This may be an underrepresentation of the 2014 enrolments. 2014 was the first year of collecting data in the VET system and some providers did not report enrolments and others were granted exemptions from reporting.

Figure 4 – Enrolments in MSL Laboratory Operations qualifications by funding source and provider type



Source: NCVET VOCSTATS, extracted on 15/08/2018.

Looked at more closely, 77% of all VET delivered to secondary students (formerly VET in Schools) enrolments are in the Certificate II qualification in the MSL Training Package, and the remaining 23% are in the Certificate III in Laboratory Skills. Queensland dominates the delivery of delivered to secondary students, with enrolments growing yearly.

**Figure 5 – VET delivered to secondary students enrolments in MSL Laboratory Operations qualifications**



Source: NCVET VOCSTATS, extracted on 15/08/2018.

Apprenticeships and traineeships are not a significant feature of training within the MSL Laboratory Operations Training Package. The following trends are evident within the apprenticeships and traineeships within the sector:

- Almost one fifth (19%) of students receiving government funding for an MSL qualification in 2017 were undertaking an apprenticeship.
- The proportion of government funded students undertaking an MSL apprenticeship has decreased by 61% since 2014.
- As a proportion of enrolments, total apprentices and trainees represented only 15% of total training package enrolments in 2017.
- There are differences between jurisdictions in the funding of qualifications linked to apprenticeships and traineeships in the MSL industries, as shown in Table 5.

**Table 5 – Apprenticeships and traineeships by nominal duration, funding source and state or territory**

Linked Qualification	NSW	VIC	QLD	WA	SA	TAS	ACT	NT
Certificate IV in Laboratory Techniques	71	11	91	66	2		1	9
Funded	N	Y	Y	Y	N	Y	Y	Y
Certificate III in Laboratory Skills	21	4	53	11	2	3	2	2
Funded	N	Y	Y	Y	N	Y	Y	Y
Diploma of Laboratory Technology	3	-	5	19	-	-	-	5
Funded	N	Y	N	Y	N	N	Y	Y
Advanced Diploma of Laboratory Operations	-	-	-	4	-	-	-	-
Funded	N	N	N	Y	N	N	N	N
Certificate II in Sampling and Measurement	-	-	-	1	-	-	-	-
Funded	N	N	N	Y	N	N	Y	N

Source: Australian Apprenticeships and Traineeships Information Service (AATIS). This data is sourced from state and territory training authorities and is provided for information only. It must be confirmed with these authorities.

Across all qualification levels in the MSL Laboratory Operations Training Package, the annual NCVER Student Outcomes Survey shows graduates have high levels of post-study employment and/or further training.

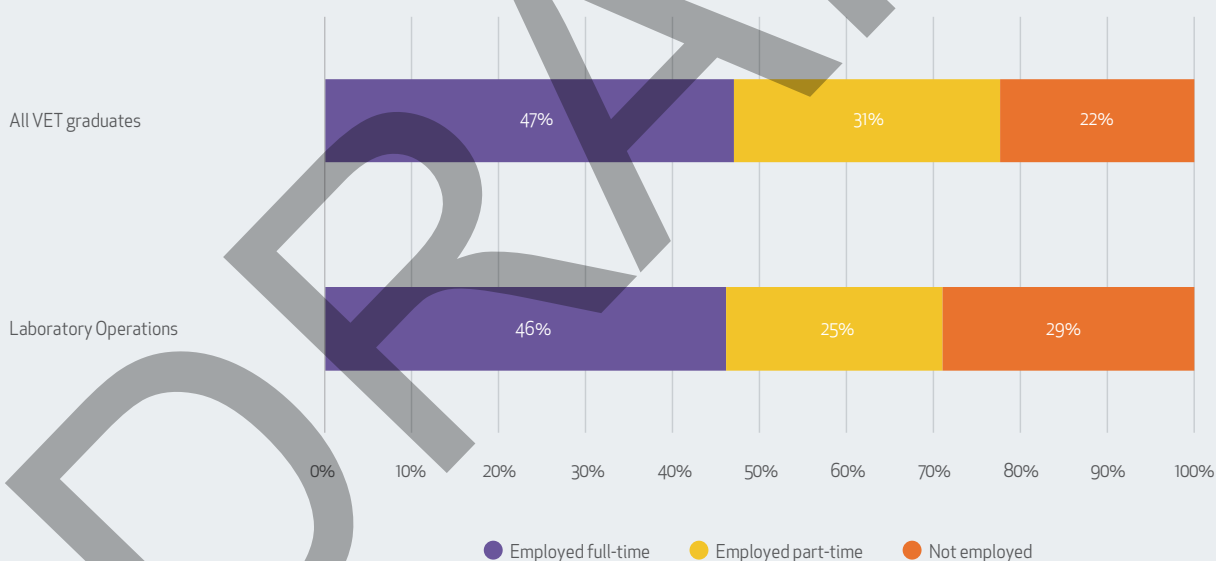
Table 6 – Proportion of surveyed VET graduates in further work or study in 2018

Qualification	% of surveyed graduates in work or further study
Certificate II in Sampling and Measurement	83.5%
Certificate III in Laboratory Skills	80.2%
Certificate IV in Laboratory Techniques	85.9%
Diploma of Laboratory Technology	83.4%
Advanced Diploma of Laboratory Operations	83.4%

Source: [www.myskills.gov.au](http://www.myskills.gov.au) accessed 21 November 2018.

Viewed against the performance of the entire VET sector, graduates from the MSL Laboratory Operations Training Package have less favourable post-study outcomes – see Figure 6.

Figure 6 – VET graduates employment outcomes after training<sup>15</sup>



NCVER VET student outcomes 2017, Data visualisation – VET graduate outcomes, all VET graduates.

<sup>15</sup> Survey findings presented here relate to all VET graduates – i.e. those who completed their training qualification. It should be noted that the survey results may be subject to sampling errors based on the comparison of MSL to the overall VET training sector.



Although employment outcomes for MSL graduates are lower than that for all VET graduates, they are more likely to be employed in the industry sector they trained in. That is, students completing MSL qualifications are more likely to work in the laboratory operations industry than other VET graduates.

Figure 7 – Outcomes for graduates employed after training<sup>16</sup>

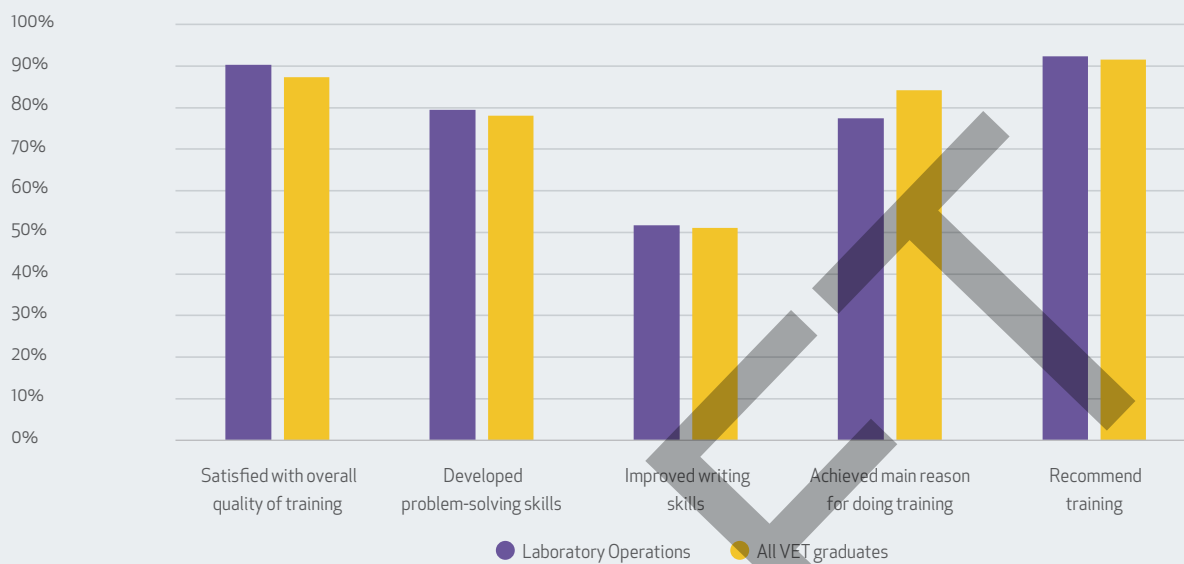


NCVER VET student outcomes 2017, Data visualisation – VET graduate outcomes, all VET graduates.

MSL graduates have similar levels of satisfaction with their training as other VET graduates.

<sup>16</sup> Survey findings presented here relate to all VET graduates – i.e. those who completed their training qualification. It should be noted that the survey results may be subject to sampling errors based on the comparison of MSL to the overall VET training sector.

Figure 8 – VET graduates' satisfaction with their training



NCVER VET student outcomes 2017, Data visualisation – VET graduate outcomes, all VET graduates.

# Challenges and Opportunities

## For Industry and Employers

A range of industries and sectors use laboratory research and analysis to test products and to assist with product development. Increased demand from these industries drives employment and demand for services in the professional and scientific testing sector. The health sector is a significant user of laboratory services.

### Technology

As noted throughout this Industry Skills Forecast, technology, particularly automation and robotics, is likely to have a significant impact on the laboratory operations industry. The machines being introduced are highly complex and expensive, which means that RTOs are typically unable to afford them solely for training purposes, and instead are reliant on industry partners for access. Industry feedback suggests that employers and industry need to consider engagement with vendors and the supply chain and encourage partnerships with RTOs in regard to training on new technologies. Use of digital technology and innovative training using digital solutions, such as virtual reality, might be a way to facilitate delivery.

Employers are understandably reluctant to allow new machinery to be made available for training purposes because of the cost of their investment. As a result, the manufacturer of the equipment increasingly provides the training to existing workers. Furthermore, some new learners, when they are training or entering the workforce, may not be exposed to the range of equipment used by industry.

In relation to the pathology sector, new Point of Care Testing (PoCT) new technologies are emerging that are intended to manage critically ill patients in the emergency room, in the hospital, or undergoing surgery, such as complete blood count or tests for drug overdoses. New tests are also being developed for earlier cancer detection, such as cervical cancer.

The Process Manufacturing, Recreational Vehicles and Laboratory IRC identified the following upcoming technology trend:

**Artificial Intelligence (AI) and Machine Learning:** AI technologies are an established trend and are being 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 these technology changes.

## Society and Culture

The society and cultural influences on the laboratory operations industry include an ageing population, with an expected increase in demand for healthcare services. In turn, this is expected to drive higher demand for laboratory services. For example, NSW Health Pathology has trained over 35,000 operators in PoCT. It is the world's largest accredited managed PoCT service and currently has over 500 devices in more than 180 metropolitan, regional and rural hospital locations.<sup>17</sup>

In addition, the growing demand for high quality Australian food and beverages. To ensure our exports meet the highest standards, there is a heavy reliance on laboratory testing and analysis.

The broader process manufacturing, recreational vehicle and laboratory sectors<sup>18</sup> are also likely to be impacted by the following change:

**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 that 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.

The work of General Practitioners (GPs) is changing and to assist doctors to feel more confident in their use of PoCT, the Royal College of Pathologists Australasia recently issued a case based series on the benefits of PoCT for GPs.

## 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.

In 2018, progress has been made on efforts to introduce certification for medical laboratory scientists. The work is being led by the Human Capital Alliance under the guidance of a Project Coordinating Group established and jointly convened by the Australian Institute of Medical Scientists (AIMS) and the Australasian Association of Clinical Biochemists (AACB). The Project is funded by the Australian Government Department of Health through the Quality Use of Pathology Program.<sup>19</sup>

17 NSW Government Health Pathology, <https://www.pathology.health.nsw.gov.au/clinical-services/point-of-care-testing>, accessed February 2019.

18 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 Future Skills Workshop Outcomes report is available at: <https://ibsa.org.au/wp-content/uploads/2018/06/Process-Manufacturing-Recreational-Vehicle-Laboratory-Future-Skills-Outcomes.pdf>, accessed August 2018.

19 Stanford, D., Cowles, C. and Ridoutt, L. (2018) Position Paper: National Certification Scheme for Medical Laboratory Scientists. Australian Institute of Medical Scientists, Brisbane.

## Resources and Environment

The key trend affecting the process manufacturing, recreational vehicle and laboratory sectors has been identified as 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. Testing to ensure Australian businesses meet these standards is a key focus of work within the laboratory operations sector.<sup>20</sup>

Waste management is also a growing issue in the laboratory operations industry, given the significant costs involved in correct disposal of waste products. The industry uses a lot of consumables and, therefore, must deal with a range of legislative requirements.

Common themes emerging across a range of industries reliant on laboratory operations include the need for an understanding of data; quality control; quality assurance processes; interpreting and understanding results; workplace health and safety; and in the health sector, healthy bodies and infection control.

## Business and Economics

Drivers of the use of laboratory services include the increased demand for health care, the strength of the construction sector, the growth in Australia's exports of food and beverages and the upcycling of the mining sector.

In addition, the amount of private investment in research and the level of government support both have an impact on the amount of expenditure on laboratory services. Scientific research into medical products such as vaccines and pharmaceuticals, is increasing and will provide significant returns if the research results can be successfully commercialised.

Ongoing growth in the construction industry means there may be a need for additional workers in construction material testing.

As the mining sector continues its growth, it increasingly needs laboratory technicians who will work remotely. As a consequence of the higher salaries available, trained workers are moving to remote sites and leaving vacancies in capital cities.

<sup>20</sup> The Future Skills Workshop Outcomes report, available at: <https://ibsa.org.au/wp-content/uploads/2018/06/Process-Manufacturing-Recreational-Vehicle-Laboratory-Future-Skills-Outcomes.pdf>, accessed August 2018.

## Supply-side Challenges and Opportunities

As identified in last year's Industry Skills Forecast, government funded enrolments continue to decline at a faster rate (9% decline in the last 12 months) than the general downturn in enrolments (irrespective of funding source, -5%).

The numbers enrolled in training have declined by 15% between 2014 and 2017; even at a time when key parts of the industry are growing. Some employers are turning to the higher education sector to recruit new employees, particularly as the demand for higher level skills increase. Many industry stakeholders have observed, however, that while university graduates have the theoretical knowledge required for employment in the industry, they lack the applied skills learned by VET graduates.

An additional complicating factor is the growing lack of qualified science teachers in schools at a time when governments are trying to enhance and increase Science, Technology, Engineering and Mathematics (STEM) skills in schools. Industry figures identify that some state governments (e.g. Western Australia) have explicitly committed to introducing science laboratories in every primary school but efforts have not been put in place to increase the supply of properly trained laboratory operations staff.

There are no identified skills shortages in national employment data collected and reported by the Australian Government Department of Jobs and Small Business. Industry sources note that this is partly because of the poor fit between ANZSIC and ANZSCO codes and the laboratory operations industry, meaning skills shortage data 'slips through the gaps' in some of the nationally published skills shortage data.<sup>21</sup>

<sup>21</sup> Selected data from the Australian Bureau of Statistics (ABS) included in this report is based on two hierarchical classification systems – the Australian and New Zealand Standard Industrial Classification[1] (ANZSIC) and the Australian and New Zealand Standard Classification of Occupations[2] (ANZSCO). A list of ANZSIC and ANZSCO codes that have been identified by key industry stakeholders as relevant to the MSL Laboratory Operations Training Package are provided at [Appendix A](#) and [Appendix B](#).

Census data, the most recent being 2016, can generally be broken down to the four-digit levels of these classifications. However, annual data is only available at the three-digit levels. Some of the industries or occupations that are included at the available level of aggregation may not be specifically relevant to this training package.

Furthermore, the ANZSIC and ANZSCO classification systems were introduced in 2006, with minor revisions incorporated into the ANZSCO structure in 2009 and 2013. The PMRVL IRC has noted that some ANZSIC and ANZSCO codes are now outdated and do not represent some emerging industries or occupations. In addition, the classification systems may not be sensitive to localised specialisations. Despite these limitations, the data can be useful in highlighting recent trends and, when supplemented with qualitative advice from industry, can help to develop a useful picture of current and prospective industry conditions.

## For Learners and Training Package Development

Industry representatives identified the following issues in relation to the uptake of VET qualifications:

- Specific issues relating to the consistency of VET funding arrangements were raised during consultations for this ISF. These include the educational benefits of having the Certificate IV qualification as a pre-requisite for the Diploma, when government funding rules do not support the Certificate IV qualification.
- The overall continuing decline in government funding, including the restrictions on Diploma funding via the VET Student Loans scheme.
- Lack of availability of trainers and specialist equipment – more mature trainers may not be as familiar with the latest equipment and access to new technology is increasingly difficult.
- The growing lack of trainers in the industry is compounded by the time taken to train specialists to teach laboratory operations. Training for trainers requires at least six months and most RTOs do not have the resources to invest in training, while new trainers are unavailable to deliver training during that period. Additionally, RTOs do not have enough trained trainers to supervise new employees while they are being trained.
- The challenge of delivering training in thin markets in regional and remote areas is also an issue, particularly in the mining and healthcare sectors. While laboratory services are required nationally, there are significant challenges for RTOs in providing training in regional and remote locations.
- PoCT training currently involves only non-accredited options, which includes trained PoCT coordinators, operational staff (who mix training with other responsibilities) and vendor/manufacturer provided training. As a result, training is often undertaken with limited time, resources, and skill sets by trainers, who typically do not have a lot of experience in training and/or assessment themselves.
- In April 2018, NATA issued advice that the ISO Standard 17025 had changed and NATA accredited laboratories would need to make a number of changes to their operations to ensure ongoing NATA compliance. This includes changes to the skills required of laboratory personnel.

## Cross-industry Challenges and Opportunities

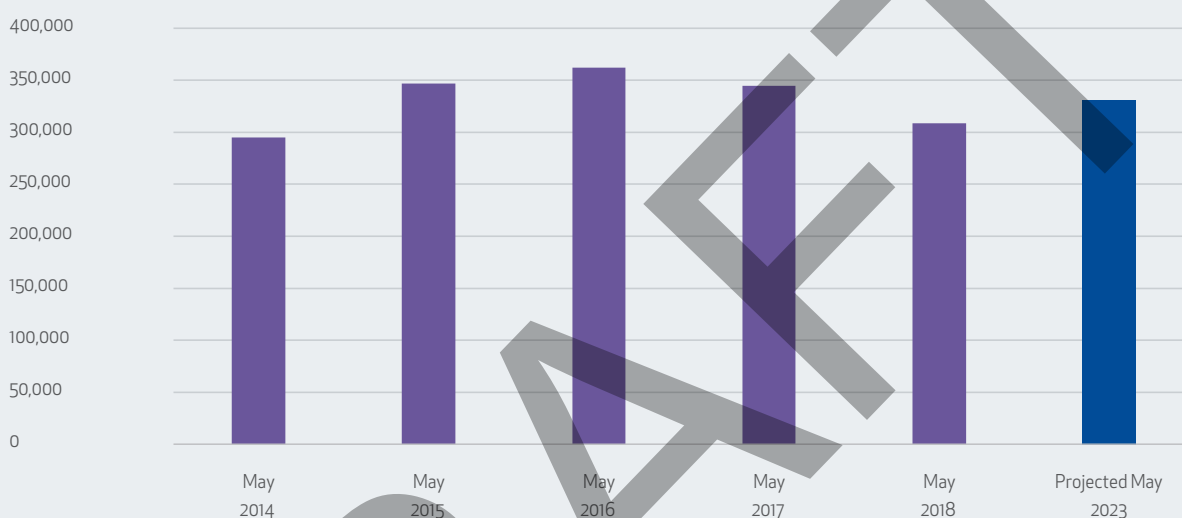
Automation and robotics are the biggest challenge facing the laboratory operations industry. It is also an emerging issue in other parts of the manufacturing sector and in other industry areas. Industry stakeholders noted that automation may provide opportunities for workers in other industries to move into a career in laboratory operations, as well as for those trained in the laboratory operations sector to work outside their industry. The increased use of technology in the laboratory operations industry is also driving increased demand for data analysis skills.

Opportunities may also exist through existing cross sector projects (e.g. Big Data and Teamwork and Communication). The IRC will engage with cross sector projects to provide input on the skill needs and experiences of the manufacturing industry. See [Cross Sector Projects](#) section for more details.

# Employment and Skills Outlook

Noting the challenges involved in accurately determining employment levels within the laboratory operations sector due to the construct of statistical collections, employment in the industry has increased in the last five years by 5%. In the next five years, it is predicted that employment will increase by a further 7.2%.

Figure 9 – Employment estimates and projections across the laboratory operations industry<sup>22</sup>



Department of Jobs and Small Business, Labour Market Information Portal.

<sup>22</sup> These figures are based on the relevant sub-sectors of the Professional, Scientific and Technical Services sector. The 2018 employment projections are based on the forecasted and projected total employment growth rates published in the 2018–2019 Budget, the Labour Force Survey (LFS) data (June 2018) for total employment, and the quarterly detailed LFS data (May 2018) for industry employment.



# Employment Outlook

Although it is difficult to categorise the occupations within the laboratory operations industry, the occupations with the most appropriate skills have a positive future outlook.

## Agricultural Technicians

Agricultural Technicians perform tests and experiments, and provide technical support to assist Agricultural Scientists in areas such as research, production, servicing and marketing.



**Unavailable**  
Weekly Pay



**Moderate**  
Future Growth



**High Skill**  
Skill Level

## Other Natural and Physical Science Professionals

Other Natural and Physical Science Professionals includes occupations such as Conservators, Metallurgists, Meteorologists and Physicists.



**\$1,765**  
Weekly Pay



**Moderate**  
Future Growth



**Very High Skill**  
Skill Level

## Science Technicians

Science Technicians perform tests and experiments, and provide technical support functions to assist with research, design, production and teaching in chemistry, earth sciences, life sciences, and physical sciences.



**\$1,013**  
Weekly Pay



**Moderate**  
Future Growth



**High Skill**  
Skill Level

Source: <https://joboutlook.gov.au/> accessed on 7/01/2019.

Given the nature of the laboratory operations industry, with workers employed across a wide range of other industries, employment trends and projections in this employment outlook are provided for occupations rather than industries.

In the last decade, employment grew in two of the three identified occupations<sup>23</sup> in the industry:

the number of 'other specialist managers' increased by 16% over the period 2012–2017

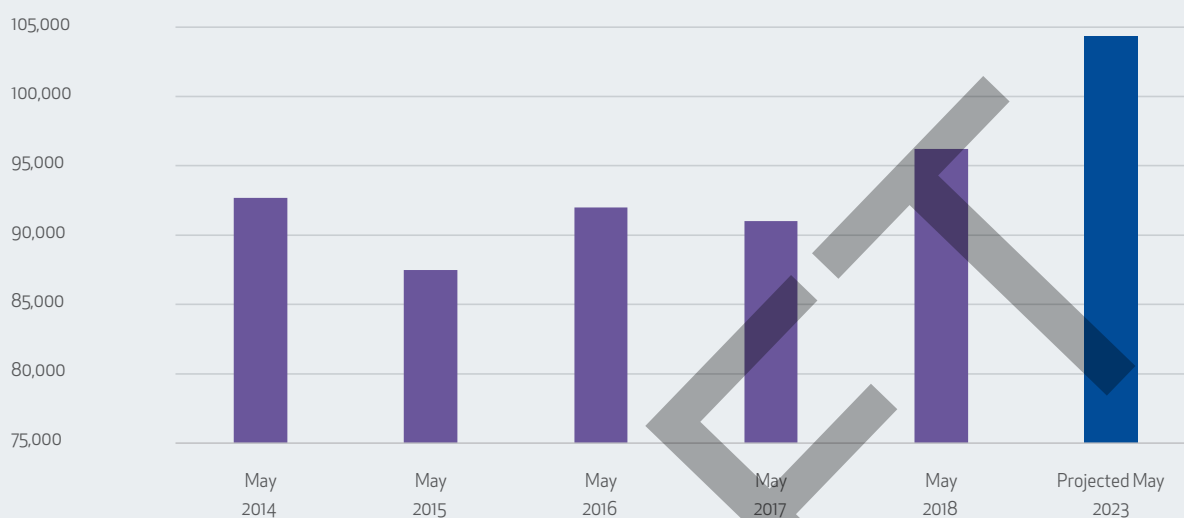
'Science Technicians' have increased by 69% between 2012 and 2017

'Other Building and Engineering Technicians' declined during the same period (-23%).

Employment projections for the above occupations (to 2023) are predicted to grow between 2.9% and 10.9%, delivering an additional 8,100 jobs. Stakeholder feedback indicates that this may be due to the infrastructure work, particularly in the eastern states, resulting in an increase in construction material testing.

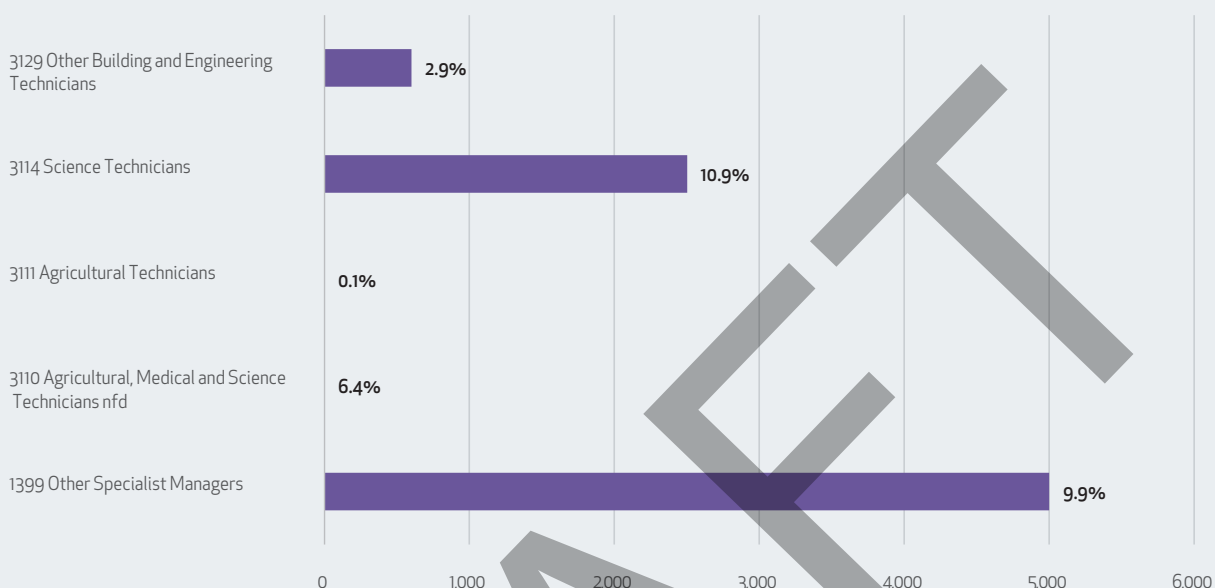
<sup>23</sup> Five-year employment projection data is only available at the four-digit ANZSCO Unit Group level (rather than the six-digit Occupation level which maps more accurately to the various Laboratory Operations occupations).

Figure 10 – Employment in ANZSCO occupations related to MSL Laboratory Operations qualifications



Occupation time series data (May 2014 to May 2017) has been sourced from the ABS 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, May 2018. Figures are average of preceding 4 quarters, whereas May 2018 and projection to May 2023 figures are seasonally adjusted and trended as sourced from LMIP.

Figure 11 – Projected five-year employment growth to 2023 by occupation (ANZSCO four-digit)<sup>24</sup>



Occupation time series data (May 2014 to May 2017) has been sourced from the ABS 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, May 2018. Figures are average of preceding 4 quarters, whereas May 2018 and projection to May 2023 figures are seasonally adjusted and trended as sourced from LMIP.

## Workforce Supply Challenges

There are growing workforce supply challenges in the laboratory operations industry and it is increasingly likely that, as the sector continues to grow, there will be more shortages. Some of this activity is masked in official statistics due to the nature of the industry and how it cuts across categories in traditional industry statistical collections. In addition, as noted elsewhere in this report, higher level vacancies are increasingly being filled by university graduates rather than VET graduates, and lower level vacancies in some sub-sections of the industry are being filled by lower skilled workers, many of whom have Language, Literacy and Numeracy (LLN) difficulties. Given employer concerns about the knowledge and skills of some university graduates, it is possible that if this trend continues, the industry may face a future skills mismatch.

<sup>24</sup> The 2018 employment projections are based on the forecasted and projected total employment growth rates published in the 2018–2019 Budget, the Labour Force Survey (LFS) data (June 2018) for total employment, and the quarterly detailed LFS data (May 2018) for industry employment data.

# Skills Outlook

## Key Generic Skills

In developing their Industry Skills Forecasts and Proposed Schedules of Work, Manufacturing IRC members have ranked the importance of key generic workforce skills in the table below.

Table 7 – Key generic workforce skills

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

Demand for Generic Skills may vary considerably between industry sectors, regions and individual businesses. Employers may prioritise some Generic Skills over others depending on their particular context, workforce and business imperative. All of the identified Generic Skills are important throughout the workforce. This ranking represents the importance of Generic Skills across an industry but should not be expected to reflect the specific experience of every business and employer within that industry.

## Priority Areas for Training Package Development

Through the research and consultation processes for the development of this Industry Skills Forecast, the Process Manufacturing, Recreational Vehicle and Laboratory IRC has identified the priority areas for training package development, listed in Table 8 below.

**Table 8 – Priority areas for training package development**

Rank	Skill	How identified
1	PoCT skillset	Research and industry feedback
2	Skill requirements for surgical cut-up	Research and industry feedback
3	Skill requirements in genetics and molecular testing and diagnostics	Research and industry feedback

# Key Drivers for Change and Proposed Responses

Table 9 – Priority skills and key drivers for change

Priority skills	Key driver for change	Proposed response
<b>Industry Specific</b>		
PoCT	Pathology workers are likely to require an increased understanding about what PoCT services are, what tests are available, what devices are used and potentially skills in device use (as well as blood collection itself).	Develop new PoCT skill set including the development of new units.
Surgical cut-ups	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 specific training.	New higher-level qualification (Graduate Certificate) to cover surgical cut-up skills needs
Genetic and molecular testing	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.	Develop new unit/s for the Certificate IV qualification and review existing Diploma unit.

# Training Product Review

## Current Activities

### Analysis of Biofuels

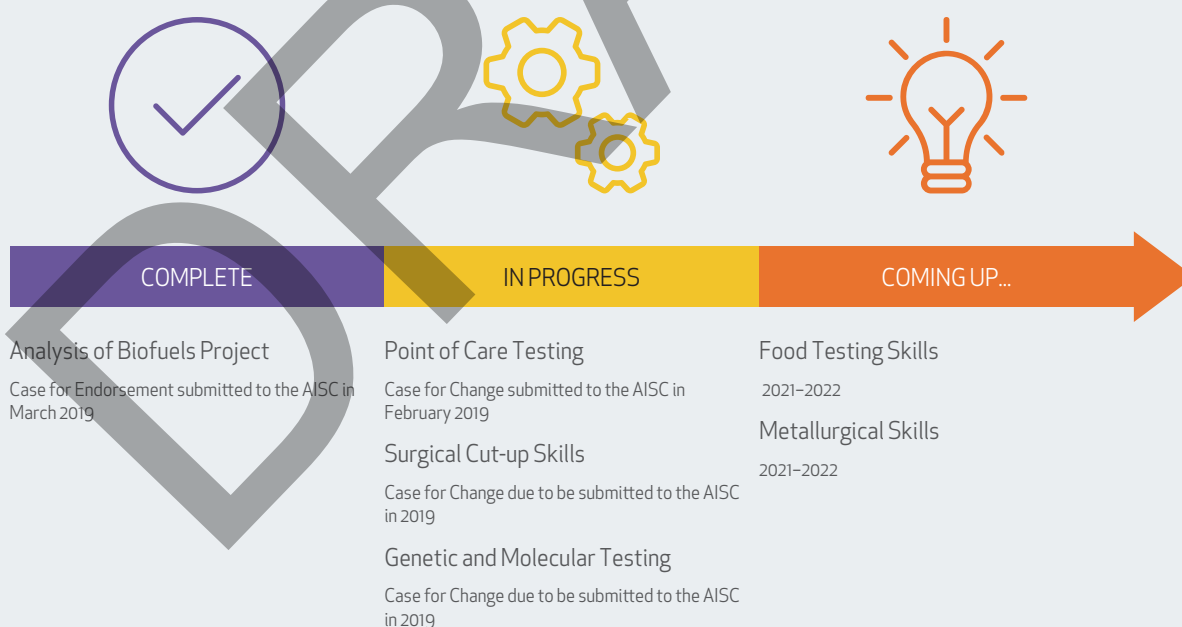
In February 2018, the AISC approved a Case for Change to undertake broader scoping activities, consultation and analysis of the MSL Laboratory Operations Training Package to determine the required skills and knowledge for work in the bio sector, specifically bio-energy.

IBSA Manufacturing undertook extensive research and consultation with industry which identified some gaps in relation to the laboratory operations 'operator' job role that has oversight of processing biomass for biofuel, using pyrolysis and fermentation.

This project is developing and updating training package products to address the identified operator skill gaps in consultation with industry stakeholders.

The training package development work is due to be completed and submitted for AISC consideration in April 2019.

### Training Product Review – Activities Timeline



## AISC Cross Sector Projects

In 2017 the AISC established nine cross sector projects in the common skill areas of: automation, big data, digital skills, consumer engagement through social media, cybersecurity, environmental sustainability, inclusion of people with disability in VET, supply chain, and team work and participation. This signalled a new approach to training package development that aims to simplify VET and improve mobility through recognition of qualifications between occupations.

To ensure cross sector units are relevant to multiple occupations and industry sectors, each project includes representation across multiple industries. Cross sector units of competency will be housed in the most relevant training package and marked with a cross sector identifier. Once available on training.gov.au, the units can be adopted across all industry training packages as qualifications and skill are reviewed or developed.

The following cross sector projects have been identified as potentially impacting the MSL Laboratory Operations Training Package:

- The **Big Data** cross sector project will focus on the development of a new basic unit to introduce learners to Big Data and data-driven decision-making, a new Skill Set to boost skills in data analysis, three new common units to reduce duplication and identification of Big Data related Units of Competency that already exist and could be imported into other training packages as electives to improve portability.
- The **Teamwork and Communication** cross sector project aims to develop common 'teamwork' and 'communication' units that can be used across multiple industries. The project includes the development of five new units to be included in the BSB Business Services Training Package.

There are a further two cross sector projects that may also impact the MSL Laboratory Operations Training Package, Automation Skills and Digital Skills. The next phase of work on these projects is being determined and the Process Manufacturing, Recreational Vehicle and Laboratory IRC will continue monitoring their progress for consideration in future training package development work.

The Process Manufacturing, Recreational Vehicle and Laboratory IRC will consider recommendations to integrate the new units developed under the above cross sector projects into qualifications in the MSL Laboratory Operations Training Package once components are available.



## Upcoming Activities

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 have identified a number of areas for training product development. These training priorities are outlined in the IRC's [Proposed Schedule of Work 2019–2020 to 2022–2023](#) 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.

### Priorities with a Case for Change in 2019–2020

The IRC identified the following training priority as critical and request that the AISC consider this as a priority for the 2019–2020 schedule of work.

- **Point of Care Testing:** Develop new unit(s) and a skill set to support PoCT.

A Case for Change has been prepared and is included within this document. The [2019–2020 Case for Change](#) provides further information on the industry imperatives, consultation plan and proposed scope of the project.

### Important Priorities for 2020–2021

The IRC identified the following training priorities as important and propose their inclusion as a priority for the 2019–2020 schedule of work.

- **Surgical Cut-up Skills:** Develop a Graduate Certificate to reflect job role changes and increasing complexity in the work undertaken.

Separate Cases for Change will be prepared and submitted to the AISC for consideration.

### Priorities Over the Next Three Years

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

- **Genetic and molecular testing:** Develop new unit/s for the Certificate IV qualification and review existing Diploma unit.
- **Food Testing Skills:** Food testing skills to ensure compliance with health and safety standards and quality standards in the food processing industry.
- **Metallurgical Skills:** Development of a skill set focused on gravity separation, flotation, hydrometallurgy (leaching, salt roasting solution refining, solvent extraction, ion exchange resin, precipitation).

# Consultation Undertaken

The 2019 Skills Forecast and Proposed Schedule of Work 2019–2023 builds on the consultations undertaken as part of the 2018 return. Feedback on industry imperatives were also captured as part of training package development projects undertaken throughout 2018.

More specifically, key individual industry and group stakeholders, identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC, were consulted during the development of the Industry Skills Forecast. See [Appendix F](#) for the consultation list.

Feedback was gathered via the following methods:

- conducted interviews
- one-on-one consultation – attended via phone/teleconference and/or face-to-face

## Issues and Sensitivities Raised

Industry consultation identified a number of issues and sensitivities, relating to particular areas within the industry, which have been outlined in the table below. The [Proposed Schedule of Work](#) section provides further information on the action to be taken to address these issues/sensitivities.

**Table 10 – Issues and sensitivities raised by stakeholders during consultation**

Area	Issue and/or sensitivity	Action to be taken
<b>Point of Care Testing</b>	<ul style="list-style-type: none"> <li>• Some parts of the industry have been calling for new units to be developed and a skillset made available for some time, others in the health sector were satisfied with older ways of testing and saw less need for the change. In the last 12 months the sector has coalesced and reached agreement that new skills are needed.</li> <li>• The health of regional communities will be impacted if this skill development is delayed – the more testing that can take place in a GP's office or community health centre the quicker the patient can be diagnosed and treated.</li> </ul>	2019–2020 Case for Change
<b>Surgical cut-up skills</b>	<ul style="list-style-type: none"> <li>• Surgical cut-up has evolved over many years, however the last five has been the most significant with ongoing contention about who should undertake this function – technical, scientific or both.</li> <li>• There is provision in the National Pathology Accreditation Advisory Council (NPAAC) requirements for Technical Officers to surgically dissect specimens, with the Pathologist having ultimate responsibility for the handling of a Specimen.</li> <li>• With an increasing number of Technical Officers performing this role there should be training in place to ensure the anatomical pathology workforce has the appropriate level of competency required to perform this role.</li> </ul>	Proposed activity 2020-2021

Area	Issue and/or sensitivity	Action to be taken
<b>Genetic and molecular testing</b>	<ul style="list-style-type: none"> <li>There has been rapid advances in genetics in recent years with genetic testing increasingly being used in the health sector, and is expected to grow in demand. Testing of patients and their families for genetic conditions is involving a wider range of techniques and technologies. Modern genetic technology makes testing more feasible as it requires a very small amount of DNA, it has become cheaper and produces results quickly.</li> <li>Molecular diagnostics offers the ability to have personalised medicine, which has driven an increase in analysing the specifics of the patient and their disease.</li> </ul>	Proposed activity 2020-2021
<b>Food testing skills</b>	<ul style="list-style-type: none"> <li>Stringent food labelling requirements, demanded by regulators, provide a wide range of information to help consumers make food choices. Food labels also help to protect public health and safety by displaying information such as use by dates, ingredients, certain allergens, instructions for storage and preparation, and advisory and warning statements.</li> <li>With the rate of food allergies, intolerances and lifestyle choices, such as only to choose organic, on the rise, organisations are increasingly requiring their food product to be tested to provide the consumer with reliable labelling information.</li> </ul>	Proposed activity 2021-2022
<b>Metallurgical skills</b>	<ul style="list-style-type: none"> <li>The emerging "Energy/Battery Metals" industry requires the provision of extractive metallurgical testing services focussed on engineering process flowsheet development.</li> <li>Discussions are occurring across the industry about how automated machines may take the place of 10 employees, but then the maintenance of the instruments becomes a key priority (in terms of both software related and/or mechanical troubleshooting and maintenance. Multi-skilled staff who can operate and perform maintenance will be in higher demand.</li> <li>STEM and LLN skillsets are vital to lab operations and there is also a growing need for people who have skills in root cause analysis. This critical thinking mindset applies to many aspects of lab life and has application in method development, equipment repair and general quality improvements. Workers also increasingly need to understand new and emerging techniques towards process flowsheet design for extraction plants for lower grade ores and emerging mining sectors such as Energy and Battery Metals.</li> </ul>	Proposed activity 2021-2022

# Proposed Schedule of Work 2019–2020 to 2022–2023

## Process Manufacturing, Recreational Vehicle and Laboratory IRC

### MSL Laboratory Operations Training Package

Contact details: Keith Monaghan

**Date submitted to Department of Education and Training:** April, 2019

Year	Items to be Included in the <a href="#">National Schedule</a>
2019–2020	<p><b>Point of Care Testing</b></p> <p>Further information on the industry imperatives, consultation plan and proposed scope of this project is provided in the <a href="#">2019–2020 Case for Change</a> section that follows.</p>
2020–2021	<p><b>Surgical Cut-up Skills</b></p> <p>New higher-level skills to cover surgical cut-up to reflect job role changes and increasing complexity in the work undertaken.</p> <p><b>Rationale:</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>• observations of Cut-up being performed by the trainer or supervisor</li> <li>• hands-on Cut-up under supervision</li> <li>• verification of competence for the levels of complexity</li> <li>• unsupervised practice with documented feedback from Pathologists and other Laboratory staff.</li> </ul> <p>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.</p> <p>Further consultation needs to be undertaken to validate this activity.</p> <p><b>Training products potentially impacted:</b></p> <p>New qualification to be developed potentially at a Graduate Certificate level</p>

Year	Items to be Included in the <a href="#">National Schedule</a>
2021-2022	<p data-bbox="343 347 1377 392"><b>Genetic and molecular testing</b></p> <p data-bbox="343 392 1377 470">Develop new units and redevelopment of existing units of competency to cover the skill requirements in genetics and molecular testing and diagnostics.</p> <p data-bbox="343 492 1377 526"><b>Rationale:</b></p> <p data-bbox="343 537 1377 772">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.</p> <p data-bbox="343 784 1377 907">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.</p> <p data-bbox="343 918 1377 952">Further consultation needs to be undertaken to validate this activity.</p> <p data-bbox="343 985 1377 1019"><b>Training products potentially impacted:</b></p> <ul data-bbox="343 1030 1377 1120" style="list-style-type: none"> <li>• Certificate IV in Laboratory Techniques</li> <li>• Diploma of Laboratory Technology</li> </ul> <hr/> <p data-bbox="193 1142 343 1187">2021-2022</p> <p data-bbox="343 1142 1377 1187"><b>Food Testing Skills</b></p> <p data-bbox="343 1187 1377 1265">Food testing skills to ensure compliance with health and safety standards and quality standards in the food processing industry.</p> <p data-bbox="343 1288 1377 1321"><b>Rationale:</b></p> <p data-bbox="343 1332 1377 1433">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.</p> <p data-bbox="343 1444 1377 1579">Opportunities are also opening in agribusiness and food because 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].</p> <p data-bbox="343 1590 1377 1624">Further consultation needs to be undertaken to validate this activity.</p> <p data-bbox="343 1657 1377 1691"><b>Training products impacted:</b></p> <ul data-bbox="343 1702 1377 1792" style="list-style-type: none"> <li>• Certificate IV in Laboratory Techniques</li> <li>• Diploma of Laboratory Technology</li> </ul> <p data-bbox="343 1803 1377 1836">Further analysis is required to identify qualifications within the laboratory stream</p>

Year Items to be Included in the [National Schedule](#)

2022–2023 **Metallurgical Skills**

Development of a skill set focused on gravity separation, flotation, hydrometallurgy (leaching, salt roasting solution refining, solvent extraction, ion exchange resin, precipitation).

**Rationale:**

The emerging “Energy/Battery Metals” industry requires the provision of extractive metallurgical testing services focussed on engineering process flowsheet development.

Although automated machine technologies are taking the place of some job roles, there are new employment opportunities in the maintenance of the instruments (in terms of both software related and/or mechanical troubleshooting and maintenance. Multi-skilled staff who can operate and perform maintenance will be in higher demand.

Workers also increasingly need to understand new and emerging techniques towards process flowsheet design for extraction plants for lower grade ores and emerging mining sectors such as Energy and Battery Metals

Further consultation needs to be undertaken to validate this activity.

**Training products potentially impacted:**

Further analysis is required to identify qualifications within the laboratory stream.

# 2019–2020 Case for Change

PMRVL IRC

## MSL Laboratory Operations Training Package

**Contact details:** Keith Monaghan

**Date submitted to Department of Education and Training:** April, 2019

Description	The project will develop a Point of Care Testing (POCT) Skill Set to meet increased demand in this area and to provide Pathology and other workers an opportunity to gain the skills required to provide accurate and timely test results.
Rationale	<p>Testing of pathology samples has traditionally been a multi-step process as samples were required to be sent to a laboratory for testing before a clinician could access results. This process is time consuming and can delay diagnosis, prevention and treatment of disease. The development of Point of Care (POC) technology has allowed some pathology testing to be performed at the time of the consultation i.e. 'the point of care'. A properly trained Point of Care Testing (POCT) operator could perform a test and access results that can be used to make immediate informed decisions about individual care.</p> <p>The volume of POCT has been steadily increasing since its introduction over 40 years ago. NSW Health Pathology manages the world's largest accredited POCT service, with over 35,000 staff informally trained in POCT, operating over 500 devices in more than 180 metropolitan, regional and rural hospital locations. New devices are emerging rapidly, with NSW Health Pathology predicting the number of devices will increase to around 15,000 in five years.</p> <p>POCT ultimately improves the safety of patients and supports patient-centred healthcare, as more patients have access to quality, reliable pathology tests; that means faster pathology results and receiving treatment faster. It also means patients who need critical care are identified more quickly and transported to larger hospitals to receive lifesaving treatments.</p> <p>Alternatively, patients who might have had to travel for pathology tests in the past, especially in rural and remote settings, can now stay where they are and reduce the time away from their home and families.</p> <p>Other drivers include:</p> <ul style="list-style-type: none"> <li>• budget pressure to reduce hospital length of stay and to avoid unnecessary transportation costs</li> <li>• opportunities for care optimisation that include accident scene testing, monitoring effects of therapies and screening prior to imaging or operative procedures</li> <li>• remote management of patients</li> <li>• the need for innovative solutions to manage patients with chronic disease safely at home and ease the burden on overflowing hospitals and an aging population</li> <li>• opportunities to redesign laboratory service models around POCT to help overcome workforce shortages for technicians.</li> </ul>

Rationale	<p>Feedback from industry suggests many of the skills required for POCT are already covered in the MSL Laboratory Operations Training Package. For example, basic understanding of the process of testing, and understanding of quality systems. The MSL Training Package was last reviewed and updated in 2018.</p> <p>The 2018 MSL Laboratory Operations Industry Skills Forecast identified the need for further investigation for new training package products in POCT. In the last 12 months, IRC members, SSO representatives and key industry stakeholders have worked assiduously and there is now strong support for a new unit and skill set to be developed.</p>
Impact of Change	<p>The development of a point of care skill set would be welcomed by employers in the pathology sector. Employees would be able to learn new skills, which prepare them for trends currently sweeping the industry, and which are only predicted (by NSW Health Pathology, amongst other large users of pathology services) to increase.</p> <p>The skill set would not impact negatively on students or RTOs; it would provide an alternative educational offering for workers, initially in the pathology sector looking to upgrade their skills, and allow RTOs delivering training for the pathology sector to better meet employer requirements.</p> <p>No other training packages would be impacted.</p> <p>There is one 'POC' accredited course, developed by the Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine (ASHM); 10144NAT – Course in HIV Point of Care Testing, which is accredited by ASQA. It is due to expire at the end of 2020.</p> <p>According to the Department of Health, in 2016, there were 1,007 pathologists employed in Australia, of whom 34.5% worked in New South Wales.<sup>25</sup> The POCT skill set would allow other medical practitioners, e.g. nurses, general practitioners and clinicians, to perform testing onsite during consultations and reduce the reliance on more costly and time consuming laboratory based pathology tests.</p> <p>The proposed unit and skill set could have broad application across a number of job roles. In the MSL Laboratory Operations Training Package, the new components would be relevant for those undertaking a Certificate III in Laboratory Skills or a Certificate IV in Laboratory Techniques wanting to work in pathology testing. In the HLT Health Training Package, those undertaking Certificate III in Pathology Collection are also a key target.</p> <p>There are two potential risks that will arise if the skill set is not developed. Firstly, Australians will not have access to the enhancements in pathology services that POCT provides; put simply, in some cases, serious diseases may go untreated or treatment may be delayed as a result.</p> <p>The second risk flows from the first, if the formal VET system cannot provide the POCT skills required, different organisations will continue to develop their own training, with no national consistency.</p>

<sup>25</sup> Department of Health, 2016, Pathology Factsheet <http://hwd.health.gov.au/webapi/customer/documents/factsheets/2016/Pathology.pdf>, accessed January 2019.



Industry Support for Change	<p>The need for POCT has been raised by the industry previously and was included in last year's Industry Skills Forecast as a Training Product Review Priority, but more work and time was needed to clarify how best to provide the skills required. It has now been agreed by industry that a skill set would be beneficial.</p> <p>Industry consultation and engagement has been extensive and extremely supportive. As a leader in this area, NSW Health Pathology has been heavily involved, especially the Strategic Leadership Team, who are strong advocates for developing national training standards. Meetings have been held with the following NSW Health Pathology staff: Acting Chief Medical Scientist and Executive Director of Clinical Operations, Executive Director of Clinical Services, Executive Director of People and Safety, Director of Point of Care and the POCT Training Coordinator.</p> <p>The Worldwide Organisationally Placed POCT Assembly (WOPPA), which includes representation from state/territory health departments across Australia, has been notified of this work and have shown great interest in the potential for training package development. Results of a survey circulated to WOPPA stakeholders in late 2018 further support this notion.</p>
Consultation Plan	<p>In preparing this case for change IBSA has conducted fit for purpose consultation appropriate to the scope of the project. Further industry assessment to validate skills required will be undertaken with a broad cross sector of industry stakeholders as part of the project. IBSA will consult closely with the project IRC and Technical Advisory Committee (TAC), and engage with key stakeholders across the laboratory, pathology and health industries.</p> <p>The IBSA Manufacturing training development methodology follows the Training Development and Endorsement Process Policy and uses a five-phase methodology. IBSA Manufacturing will coordinate the project and work with the IRC.</p> <p><b>Phase 1 – Initial research and analysis</b></p> <p>Establishment of a Technical Advisory Committee (TAC) to validate the project scope and plan, to contribute to further industry assessment and assist in determining industry needs and job role functional analysis.</p> <p>The IRC will appoint a TAC, with the current skills and knowledge across a broad range of industry job roles, to inform this work.</p> <p>Proposed membership will include, but not be limited to, representatives from:</p> <ul style="list-style-type: none"> <li>• representative/s from the WOPPA network</li> <li>• a Government Health Department representative</li> <li>• RTO representative/s</li> <li>• Other technical representatives as needed by the IRC.</li> </ul> <p>Further industry assessment will determine the specific skills to be included in the skill set. Due to the cross industry focus of the proposed skill set stakeholders from across the laboratory and health sectors will be consulted, including the Technicians Support Services Industry Reference Committee.</p> <p>The proposed POCT skill set will be developed under the direction of the TAC and then reviewed by the IRC at each phase.</p>

Consultation Plan	<p><b>Phase 2 – Round 1 public consultation</b></p> <p>The first draft of training package components will be developed by the TAC and then the laboratory operations industry and RTOs.</p> <p><b>Phase 3 – Round 2 public consultation</b></p> <p>Respond to feedback and develop second draft of training package components. Feedback to be sought from the broader laboratory operations industry and RTOs.</p> <p><b>Phase 4 – Approval process</b></p> <p>Adjust training package components in response to further feedback and seek approval from respective committees, namely the TAC and IRC, and endorsement from state training authorities.</p> <p><b>Phase 5 – Submission to Department-AISC</b></p> <p>Submit to the Department of Education and Training for AISC approval.</p> <p><b>Consultation plan</b></p> <p>IBSA will create a project webpage to provide project updates, gather feedback from stakeholders and validate training package components.</p> <p>Proposed consultations include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• the state/territory health departments</li> <li>• the WOPPA network</li> <li>• current users of POCT devices</li> <li>• other key stakeholders identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC.</li> </ul>
Ministers' Priorities Addressed	<p>This Case for Change meets the following Ministerial priorities</p> <ul style="list-style-type: none"> <li>• <b>More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices</b></li> </ul> <p>A primary driver of all training package work is that the product reflects contemporary work organisation and job profiles, while incorporating a future orientation. In the pathology sector, the volume of POCT has been steadily increasing, with new devices emerging rapidly. The POCT skill set provides an alternative educational offering for learners in the pathology sector, looking to upgrade their skills. By delivering this skill set, training providers will be able to improve their delivery to consumers by better meeting employer requirements. Due to clinical demand, if the formal VET system cannot provide the POCT skills required, it is likely that different organisations will develop their own training with a consequent loss of national consistency and the potential for errors to occur.</p> <ul style="list-style-type: none"> <li>• <b>Foster greater recognition of skill sets.</b></li> </ul> <p>Skill sets meet identified niche industry or business needs. Creation of the POCT skill set is a formal recognition of a learner's POCT skills within the national training system; accessible to a range of VET learners and an agile response to industry needs. As mentioned above, this skill set would allow other medical practitioners to perform testing onsite during consultations and reduce the reliance on costlier and more time consuming pathology tests.</p>

Potential Outcomes	<p>The purpose of POCT is to provide accurate and timely test results that effectively contribute to immediate management decisions. Currently operator training for POCT devices is usually done 'in house,' but this is somewhat unsustainable considering the projected demand. The development of national training package products for POCT will ensure workers are readily able to access quality training, in turn able to be more responsive, and provide a better service, to clients.</p> <p>In the future, and as this technology becomes more widely used, there is the potential for a greater number of people to be trained in the use of POCT devices such as those working in the hospital networks (to allow critical testing to be performed at the bedside or in a clinic), specialist medical retrieval medicine, General Practitioner (GP) practices, Aboriginal and Torres Strait Islander medical services, specialist community health services, and in other situations or community settings, such as pharmacies, sporting venues and law enforcement. The ability to successfully pursue these opportunities will be underpinned by the right training for POCT clinicians.</p>
<b>Project Scope</b>	
Training Package	MSL Laboratory Operations Training Package
Timing	<p><b>Estimated Project Duration:</b> 12 months</p> <p>If approved, the project would be undertaken in stages.</p> <p><b>Anticipated Start Date:</b> July 2019</p> <p><b>Anticipated Completion Date:</b> Case for Endorsement to be submitted June 2020</p>
Qualifications	<p>No qualifications are impacted by this project</p> <p>The new unit will likely be a listed elective in Certificate III in Laboratory Skills and/or Certificate IV in Laboratory Techniques</p>
Skill Sets	<p>A total of <b>1 Skill Set</b> will be developed/update as part of this project.</p> <p><b>1 new skill set</b> to be developed:</p> <p>Point of care testing skill set</p> <p>The new skill set would include the proposed new unit and consider existing units in the following areas:</p> <ul style="list-style-type: none"> <li>• Quality assurance</li> <li>• Interpreting results</li> <li>• Infection control</li> <li>• Healthy bodies</li> <li>• Customer service</li> <li>• Work health and safety.</li> </ul> <p>Relevant units, including those in the HLT Health Training Package, will be reviewed for relevance and inclusion in the Skill Set.</p>
Units of Competency	<p>A total of 1 unit of competency to be developed as part of this project.</p> <p>1 new units of competency to be developed:</p> <p>Perform Point of Care Tests</p> <p>IBSA will work with relevant Industry Reference Committees to ensure this unit does not duplicate existing Training Package content.</p>

### Detail on training components proposed for work for 2019-20.

Qualification/ unit/Skillset	Code and Title	Previous change (endorsement date)	Previous work (transition/ update/ establishment)	Work (new/update/ deletion)	Entry level/ trade/ post-trade qualification	Expected date for endorsement
Skillset	[CODE TBC] Point of Care Testing	N/A	N/A	New	Entry level/ Trade	June-2020
Unit	[CODE TBC] Perform Point of Care Tests	N/A	N/A	New	Entry level/ Trade	June-2020

# Appendix A: Occupation Classifications

For the purposes of analysing employment trends, the following ANZSCO codes have been used.

Unit Code	ANZSCO Four-digit Class Name	Occupation Code	Occupation Title
1399	Other Specialist Managers	139913	Laboratory Managers
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

# Appendix B: Industry Classifications

For the purposes of analysing the business landscape, the following ANZSIC codes have been used.

ANZSIC Code	ANZSIC four-digit Class Name
6910	Scientific Research Services
6925	Scientific Testing and Analysis Services
6999	Other Professional, Scientific and Technical Services nec

Each sub-sector contains the following specialisations:

## 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 n.e.c.
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 n.e.c.
Translation service
Weather station operation

# Appendix C: 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
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

Organisation	Sector
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
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
HinSci	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 & Medical Research (ICPMR)	Biomedical Research/Pathology
John Curtin School of Medical Research	Biomedical Research



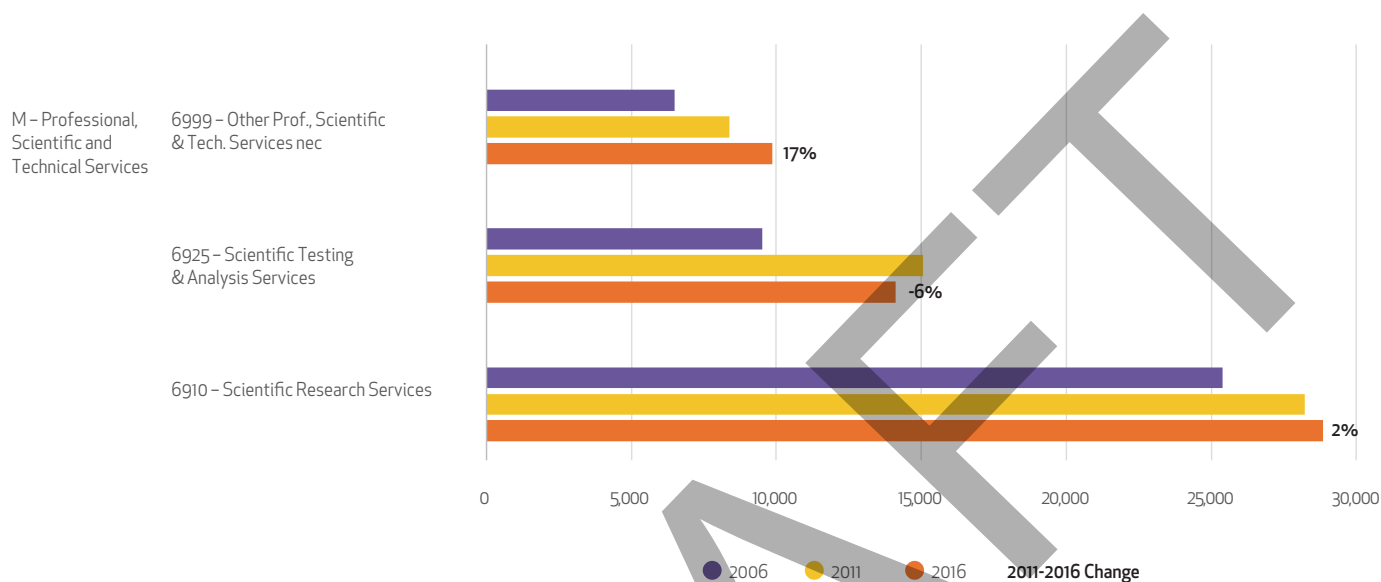
Organisation	Sector
Laboratory Operations Australia	Biomedical Research/Pathology/Pharmaceutical
Lavery Pathology	Pathology
Leica Biosystems	Biomedical Research/Pathology
Medlab Pathology	Pathology
Melanoma Institute Australia	Biomedical Research/Pathology
Metrology Society of Australasia	Calibration
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
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
Pathology Australia	Pathology

Organisation	Sector
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 & 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 (SESAHS)	Biomedical Research/Pathology
Southern IML Pathology	Pathology
Southern Sun Pathology	Pathology
St Vincent's Hospital	Biomedical Research/Pathology
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
Sonic Healthcare	Pathology
South Australia Police	Forensic
South Eastern Area Laboratory Services (SEALS)	Biomedical Research/Pathology
South Eastern Sydney and Illawarra Area Health Service (SESAHS)	Biomedical Research/Pathology

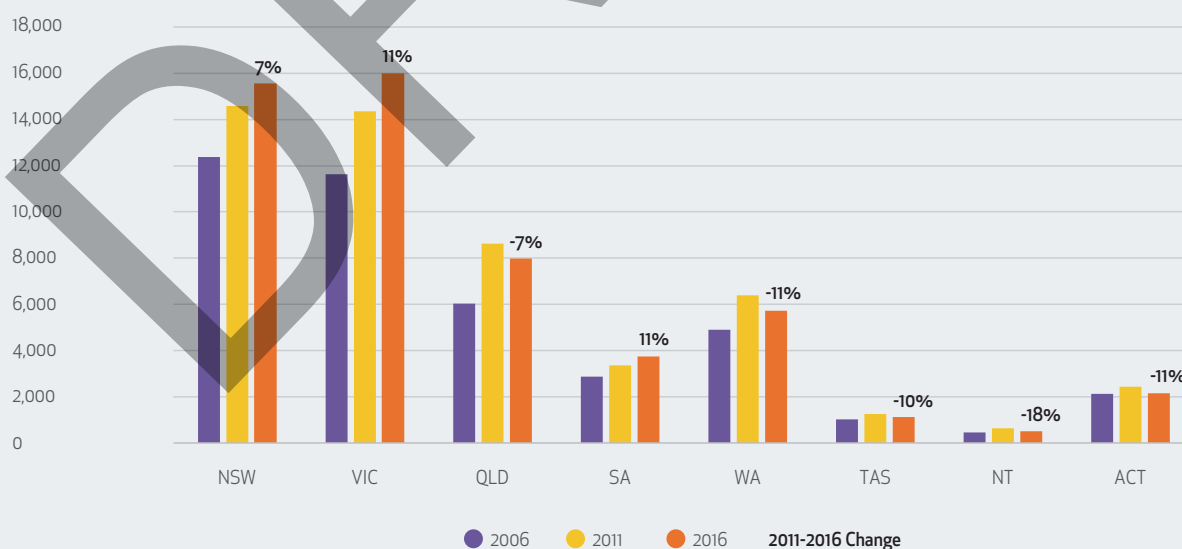
Organisation	Sector
Southern IML Pathology	Pathology
Southern Sun Pathology	Pathology
St Vincent's Hospital	Biomedical Research/Pathology
Sydney Adventist Hospital	Biomedical Research/Pathology
Sydney South West Area Health Service (SSWAHS)	Pathology
Symbio Laboratories	Food/Agriculture/Environmental
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 D: Census Snapshot

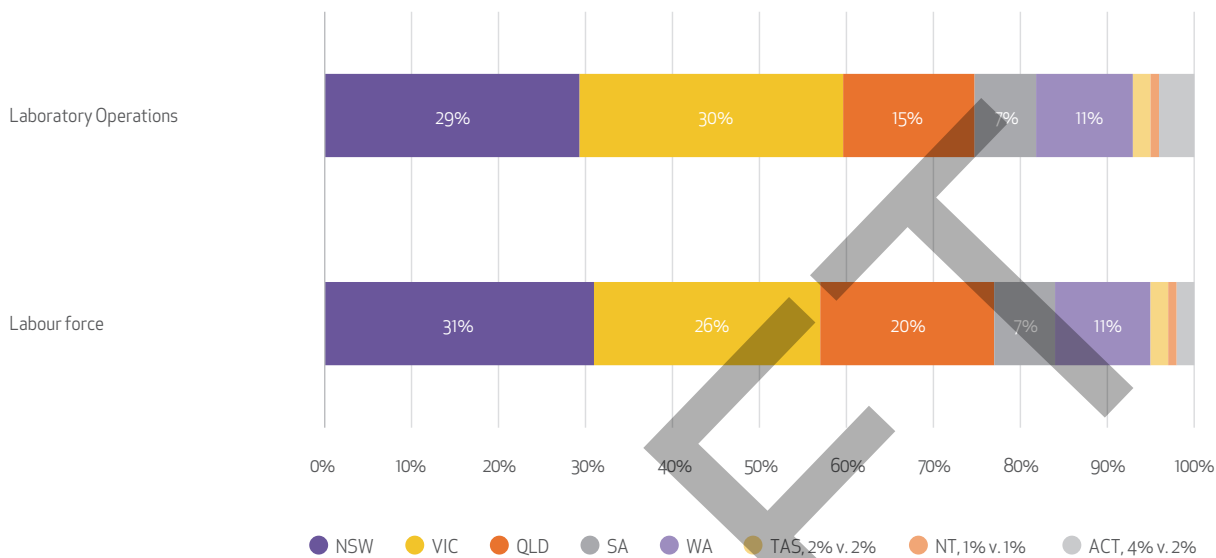
Number of employees in selected industry classes, Census 2006–2016, and five-year change from 2011 to 2016



Total number of employees in selected industry classes by state of residence, Census 2006–2016



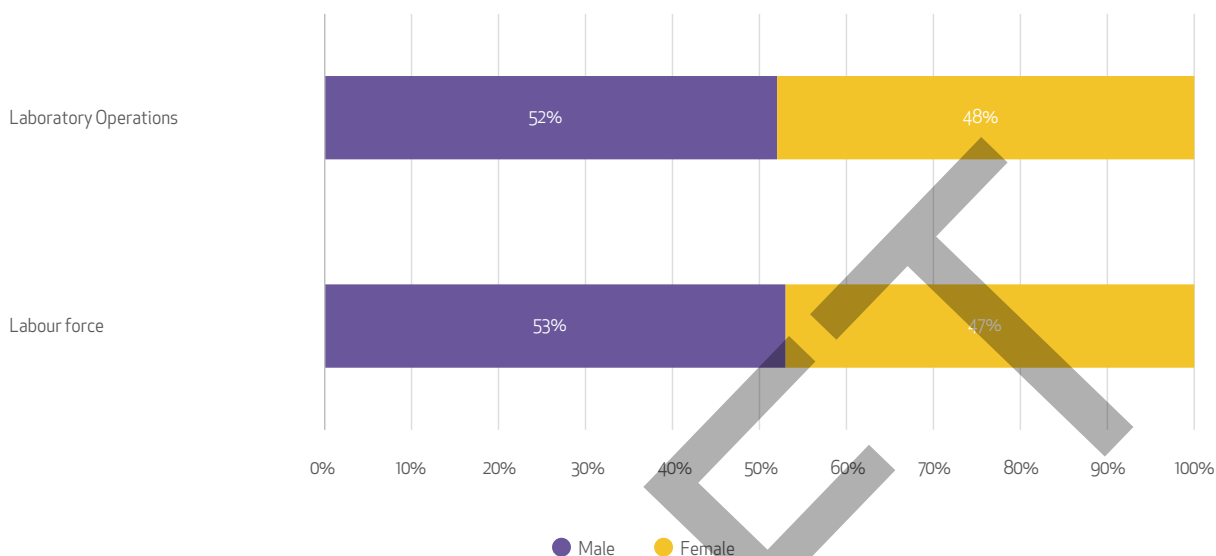
## State of usual residence of employees in selected industry classes versus the general labour force, 2016



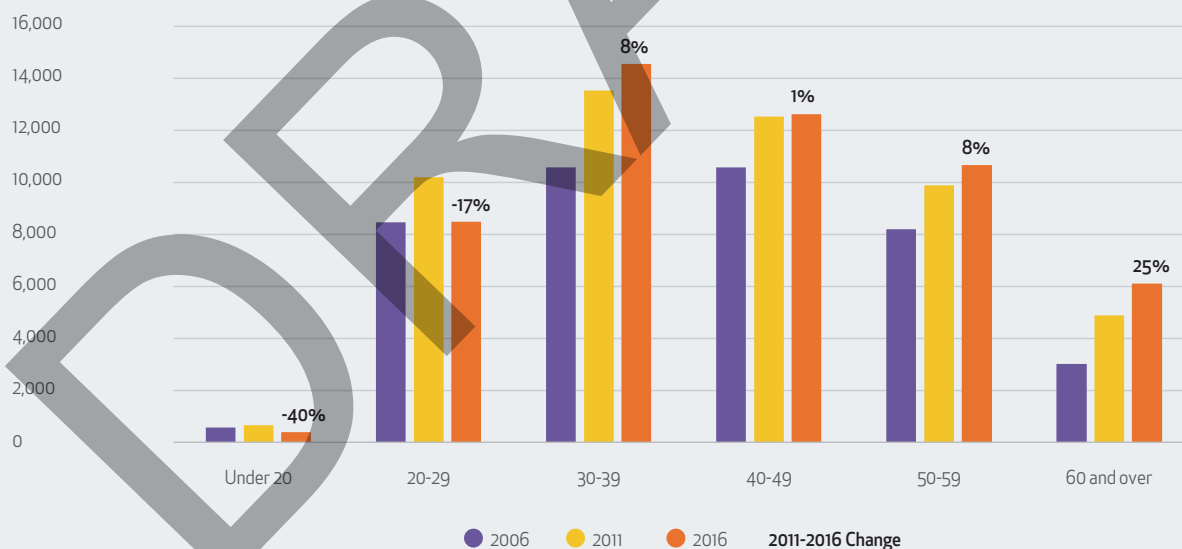
## Total number of employees in selected industry classes by gender, Census 2006–2016



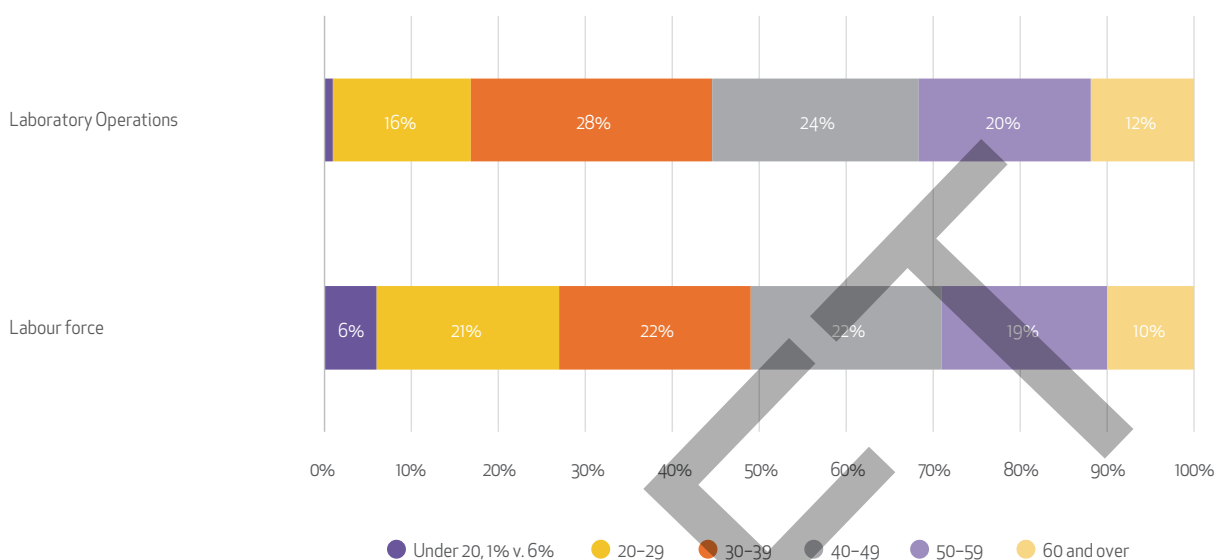
## Gender of employees in selected industry classes versus the general labour force, 2016



## Total number of employees in selected industry classes by age, Census 2006–2016

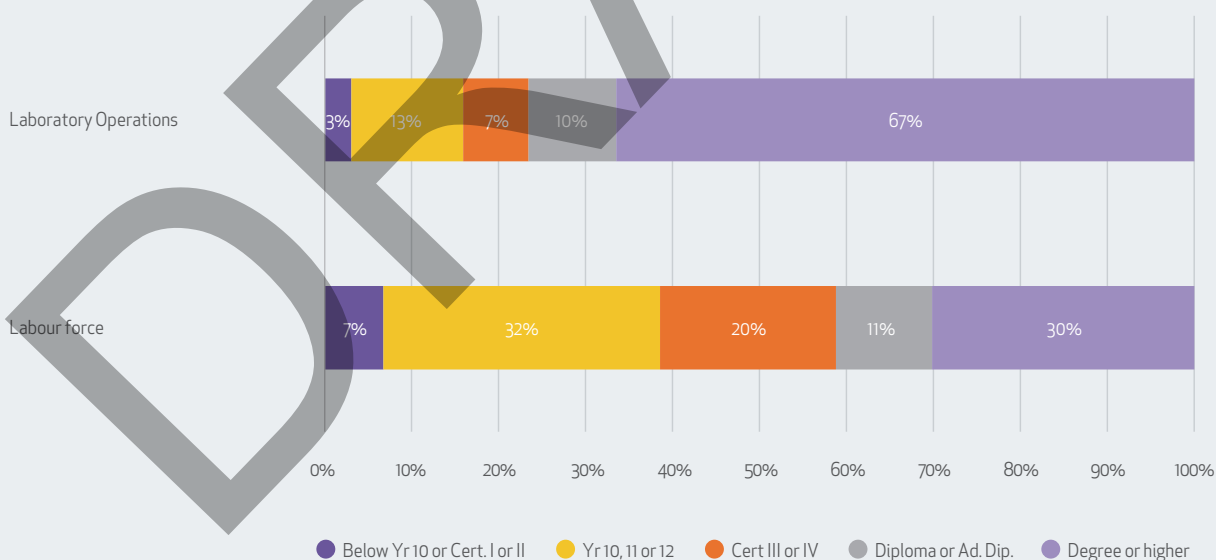


## Age of employees in selected industry classes versus the general labour force, Census 2016



## Highest educational attainment – selected industries vs. general labour force, 2016

excludes those whose educational attainment was not stated or not applicable

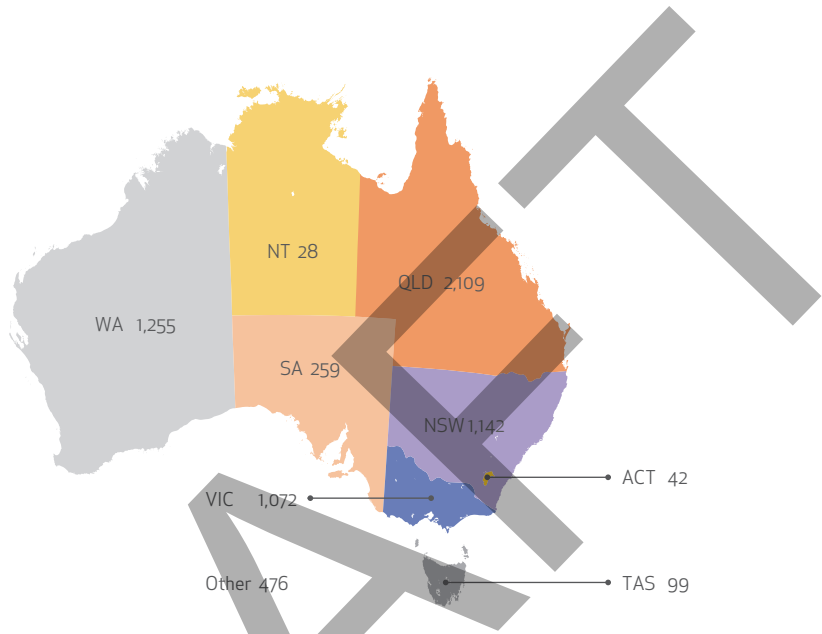


Source: Australian Bureau of Statistics (ABS) Census of Population and Housing: 2016 Census – Employment, Income and Education; 2011 Census – Employment, Income and Unpaid Work; 2006 Census – Labour Force. Data extracted using TableBuilder.

# Appendix E: Enrolment Snapshot

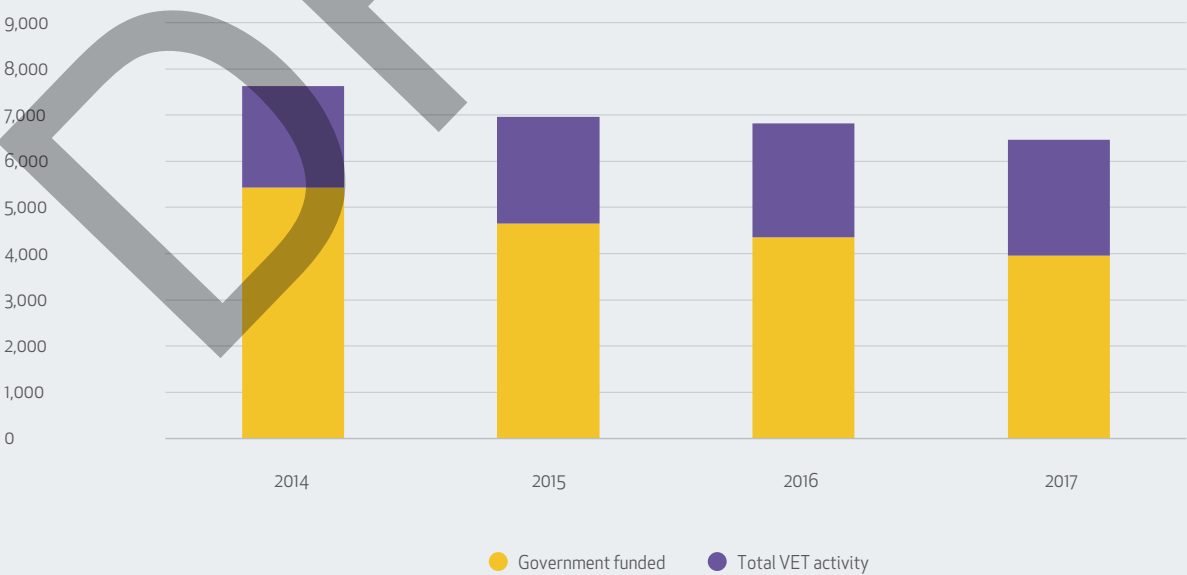
Program enrolments in MSL Laboratory Operations qualifications by state/territory of student resident

2017 Total VET Activity



## Total program enrolments in MSL Laboratory Operations qualifications

2014–2017 Total VET Activity





## Proportion of program enrolments in MSL Laboratory Operations qualifications by training provider type

2014–2017 Total VET Activity

	2014	2015	2016	2017
TAFE	52%	49%	47%	49%
Private training provider	35%	36%	37%	35%
University	5%	7%	6%	7%
Enterprise provider	2%	1%	2%	1%
School	6%	6%	6%	5%
Community education provider	1%	1%	2%	3%

## Program enrolments in MSL Laboratory Operations qualifications by gender

2017 Total VET Activity



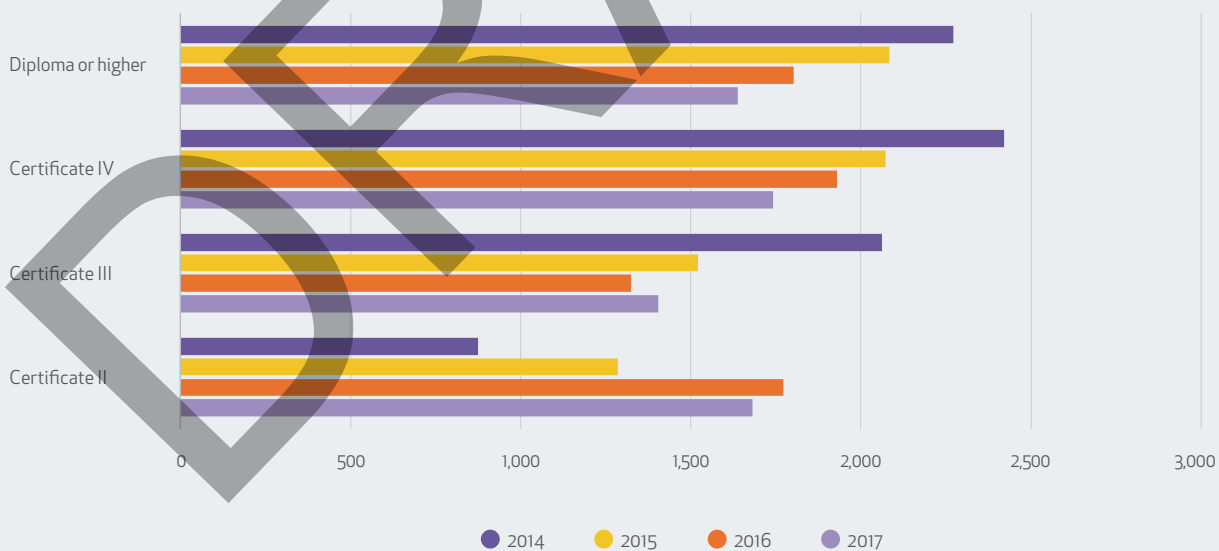
## Program enrolments in MSL Laboratory Operations qualifications by age group

2014–2017 Total VET Activity



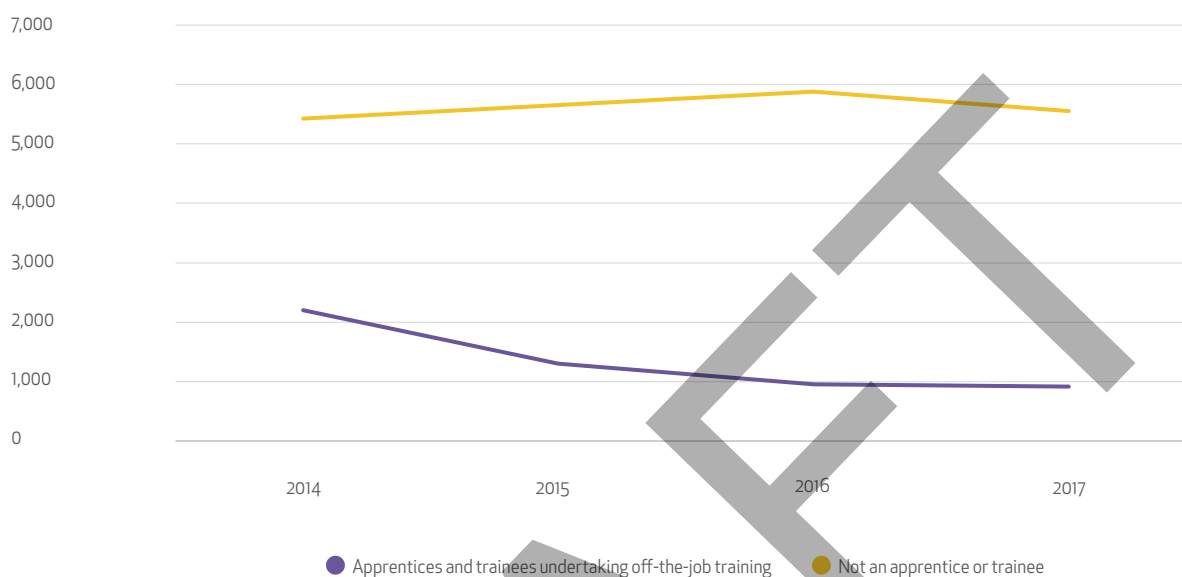
## Program enrolments by qualification level in MSL Laboratory Operations qualifications

2014–2017 Total VET Activity



## Program enrolments in MSL Laboratory Operations by apprentice/trainee undertaking off-the-job training

2014–2017 Total VET Activity



Source: All data in this appendix was extracted from VOCSTATS on 15/08/2018 by IBSA Manufacturing who take responsibility that the information extracted is appropriate for its intended use.

VOCSTATS 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 F: Consultation List

The 2019 Skills Forecast and Proposed Schedule of Work 2019–2023 builds on the consultations undertaken as part of the 2018 return. Feedback on industry imperatives were also captured as part of training package development projects undertaken throughout 2018.

More specifically, key individual industry and group stakeholders, identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC, were consulted during the development of the Industry Skills Forecast. See the consultation list below.

Feedback was gathered via the following methods:

- forums, meetings and focus groups – attended in person and via webinar
- one-on-one consultation – attended via phone/teleconference and/or face-to-face.

## Consultation List

### Organisation

ALS Global	NSW Health Pathology
Bureau Veritas	Royal College of Pathologists of Australasia Quality Assurance Programs (RCPAQAP)
Douglas Hanly Moir Pathology	SGS Laboratories
ELANCO	Sonic Healthcare
Histology Society of NSW	St. Paul's Catholic College
Histopath	Symbio Laboratories
Kurri Kurri High School	TAFE NSW
Laverty Pathology	Whiteley Corporation
LTT Training	Worldwide Organisationally Placed POCT Assembly (WOPPA)