Automation Skills Cross-industry project

Case for Change

November 2017

Contents

1. Administrative information

Name of cross-sector project	Automation Skills Cross-Sector Project
Name of the lead SSO	Skills Impact
Project webpage address	http://www.skillsimpact.com.au/automation/
Members of the Project Reference Group	Attachment A
Training packages, qualifications, skill sets and units of competency impacted by proposed cross-sector training product components	Attachment B
Stakeholder consultation method and scale	Attachment C

2. Executive summary

Many of the skills most valued by industry apply in multiple sectors of Australia's economy. New and emerging work roles and activities are also relevant across industry boundaries as digital transformation and disruption reshapes traditional industry sectors.

The Australian Industry and Skills Committee (AISC) has identified emerging themes that are affecting future workforce skill requirements across all Australian industry. These themes have formed the basis for eight cross-sector projects that aim to reduce levels of complexity in the vocational education and training (VET) system by addressing common skill needs, minimising duplication of units, consolidating existing units and removing units that are no longer being used.

Automation skills cross-sector project

Purpose
The purpose of the Automation Skills cross-sector project, led by a Project Reference Group and managed by Skills Impact, is to identify skills that are shared by multiple industry sectors in relation to automation, and to develop a Case for Change recommending training package developments and modifications to address the identified cross-industry skill requirements.

This work will contribute to Australia having training products that can support and sustain automation-enabled economic growth through the development of skilled workers. The identification and development of responsive VET products is essential so that the training system is able to prepare the Australian workforce for the jobs of the future.

Scope

Automation has been used by industry for hundreds of years, however the capacity to automate a wider range of activities has recently been accelerating due to rapid growth in digital technology. Automation now involves an array of technologies, systems and processes. These include computerisation, cloud storage, artificial intelligence, data analytics, robotics and nanotechnology.

What can be automated is evolving as technological development moves beyond physical functions to encompass cognitive functions. The rapid development and deployment of these technologies has created a global period of economy-wide automation and labour market transformation.

This project has adopted the following definition of automation.

Automation is the use of technologies to improve processes and outcomes with substantially reduced reliance on human involvement.

Key themes in "digitally enabled" automation include:

- Technology – automation involves the deployment of an extensive and growing range of digitally enabled technologies. It is not possible to accurately predict how specific technologies will converge or combine to impact future skill needs.

- Routine tasks: physical and cognitive – automation involves using technology to perform a routine or transactional process relating to a defined task. Such tasks may occur in any job role and across any occupation or industry.

- Automatic – automation removes the need for human involvement in the automated process. Human involvement is shifted outside the process, potentially to roles in the design, supervision and maintenance of the automated process.

Machine learning now means that automated systems are not necessarily static. Intelligent automation uses technologies that can learn, adapt and improve their own functioning. Additionally, the range of human-centred activities that can be automated continues to grow and now includes cognition and reasoning, natural language generation, sensory perception, physical mobility, navigation and robotic process automation (RPA).

Objectives

In this transformation of the nature of work, the focus of this project is on the skills required to drive automation-enabled change and growth, and support the VET system to equip the Australian workforce with skills that are essential to the future of all industries.

Sectors and industries impacted

Current reports[1] attempt to predict the volume and speed with which automation will impact industry, employment and future workforce skills in Australia and internationally. While the predicted extent of the impact varies widely between many of these reports, it is clear that routine and high-

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[1] Such as: Committee for Economic Development of Australia (2015) *Australia's future workforce?* Canberra, CEDA; Frey, C.B., & Osborne, M. A. (2013) The future of employment: How susceptible are jobs to computerisation? Oxford, UK; Arntz, M., T. Gregory and U. Zierahn (2016) 'The Risk of Automation for Jobs in OECD Countries: A comparative analysis', *OECD Social, Employment and Migration Working Papers*, No 189, OECD Publishing, Paris

volume work across all industries will be most readily automated. However, the definition of 'routine' in this context is continually being redefined as greater sophistication of automated solutions makes it possible to automate increasingly difficult and complex tasks.

All industries are impacted by automation to varying extents and at varying speeds. Mature and new industries will be equally reliant on automation to harness operational efficiencies, reduce costs, enhance speed, improve sustainability and reliability, and increase productivity. But, while automation will be ubiquitous across industries, businesses and occupations; deployment will not be consistent in either extent or speed.

Analysis of existing training packages identified those that cover work functions that have potential to be transformed by automation. More than 200 units of competency were identified across 32 training packages where there is potential for unit content to be affected by change resulting from the uptake of automation. Training packages with the largest number of units that could potentially be affected include:

- Property Services
- Electrotechnology
- Information and Communications Technology
- Transmission, Distribution and Rail Sector
- Business Services
- Resources and Infrastructure
- Creative Arts
- Agriculture, Horticulture and Conservation and Land Management.

Summary of proposed changes

The changes proposed are:

1. Develop new units of competency, or adapt existing units, to address skills required within the following domains:

    a. Assessing the business opportunity for automation

        i. Research and discovery

        ii. Benefits analysis

    b. Designing and testing for automation

        i. Designing improvements

        ii. Testing, simulating and prototyping

        iii. Data reporting and integration

    c. Optimising business outcomes through automation

        i. Industrial automation equipment and technology control

  ii. Business process automation

  iii. Supply chain

 d. Planning change and automation deployment

  i. Change strategy

  ii. Managing human and social impacts of automation

  iii. Stakeholder engagement

 e. Managing deployment, including maintenance and evaluation

  i. Deployment

  ii. Maintenance and repair

  iii. Installation, safety and quality assurance

2. Develop five new skill sets, using the new automation units, as follows:

 a. Work with automated technologies or processes (AQF 3/4)

 b. Enable business adoption of automation (AQF 4)

 c. Deploy business process automation (AQF 4)

 d. Drive business adoption of automation (AQF 5/6)

 e. Lead business adoption of automation (AQF 8)

3. Develop nine new qualifications, using the new automation units, as follows:

 a. Certificate III in Industrial Automation

 b. Certificate IV in Industrial Automation

 c. Certificate IV in Business Process Automation

 d. Diploma of Industrial Automation

 e. Diploma of Business Process Automation

 f. Graduate Certificate in Leading Industrial Automation

 g. Graduate Certificate in Leading Business Process Automation

 h. Graduate Certificate in Leading Change

 i. Graduate Diploma in Industrial Automation

A suitable 'home' for the new units, qualifications and skill sets will need to be identified through further stakeholder consultation and consideration by the AISC, department, IRCs and SSOs.

Industry support for the proposed training products has been difficult to determine due to the evolving nature and staggered adoption of automation. While stakeholders from a wide range of industries express interest in training products for automation, many are not yet able to provide informed comment on the nature of skills or qualifications required. The development of training

products in this space will require extensive stakeholder consultation and input to ascertain industry support for the proposed products.

As described later in this document, development of the proposed cross-industry units, skill sets and qualifications, and their use by IRCs, has potential to prevent the development of many more new units (potentially hundreds). Without access to cross-industry units, there is a risk that many industry-specific units will be developed as each industry begins to grapple with the need to develop skills in automation.

3.   The case for change

Current and emerging developments in skills needs

Skills Impact commissioned DeakinCo to undertake some of the research and consultation activities contained within this project. Research findings and analysis were considered by Skills Impact and the Automation Skills PRG to inform the development of the Case for Change.

Current and emerging developments in skills needs have been identified both through a 'top down' and 'bottom up' analysis. The 'top down' analysis drew on desktop research and analysis of national and international industry and workforce trends, and stakeholder consultation.

Emerging themes from the 'top down' analysis are:

- **The diffusion and adoption of automation technologies is accelerating** – The speed, breadth and depth of change being driven by automation will continue to increase across all industries. The diversity of technologies and range of applications to which they can be applied mitigate against policy action that attempts to target the use of certain technologies in defined vocations. Automation will happen anywhere and everywhere, cross-sectoral approaches will be needed to address the accompanying workforce development challenges.

- **Automation is not just about job losses** – Although the focus of commentary in the mainstream media is on the proportion of jobs that will be lost to automation, the reality will be more nuanced with jobs being reshaped in three ways:

    o   replaced by automation

    o   augmented by automation – merging and converging of work activities and job roles

    o   created by automation – emerging and new jobs.

    Understanding the distinction between these three outcomes will be important for the VET system to provide timely responses to workforce skilling needs. Training products will need to incorporate the skills and knowledge required for people to consider and understand the social implications of the move to automated work processes, including how to manage the impact on a company, on the supply change, on the industry, and on society and the economy.

- **The effects of automation are difficult to predict** – The effect of automation on the Australian labour market is unclear because it is not be possible to accurately predict how technologies will transform, develop, and be taken up within specific industries. Analysis based on 'job clusters' rather than job roles may help to identify competencies required to use automation

technologies, work in automated processes, or secure work in the new jobs created by automation; and improve the targeting of investment in skills that will raise the future employability of individuals.

- **Employers are looking for soft skills and transferability** – When considering workforce requirements for implementing and working alongside automated processes and systems, industry stakeholders are identifying capabilities that are currently uniquely human. These include creativity, adaptability, initiative, inventiveness, communication, critical thinking, and cooperation, along with the ability to apply scientific and technical knowledge to new situations.

- **Workforce development solutions are not currently available through accredited training** – Employers report that they do not have access to suitable training products to build the skills needed to implement automation in their businesses. There is an opportunity for the VET system to take a leading role in preparing the workforce for automation by ensuring that available products balance the need for specific technical knowledge and skill in using new technologies with the more general skills required to be prepared for workforce change.

A 'bottom up' analysis was used to examine existing training package components and occupational data.

This analysis identified:

- skills and knowledge that are relevant to a range of occupations across multiple industries

- occupations that are vulnerable to the impact of automation

- job roles and skill sets with predicted high growth and potential exposure to automation that would benefit from the availability of automation units of competency, skill sets or qualifications.

The analysis also identified units of competency where automation has the potential to transform work tasks or processes. These units have been identified across 33 training packages and are listed in Attachment B, Table 1. Many of these are highly industry specific and are unlikely to have cross-industry application, and their ongoing industry currency and applicability is the concern of the responsible IRC. However, some of these units may be suitable for use across multiple industries and their potential should be considered in relation to the skills domains identified for new unit development. Areas where there is potential for existing units to be adapted for cross-industry use include:

- surveying and spatial data in the CPP Property Services Training Package

- digital media and applications in the CUA Creative Arts Training Package

- automated ICT systems in the ICT Information and Communications Technology Training Package

- system design and implementation in the BSB Business Services Training Package.

Five skills domains were identified through the research and consultation processes as essential for effectively implementing automated systems and processes. These are:

1. Assess the business opportunity

2. Design and test

3. Optimise business outcomes through automation

4. Plan change and automation deployment

5. Manage deployment, including maintenance and evaluation.

Although stakeholders have reported that skills in these domains are important for the capacity to harness the benefits of automation, the training package analysis found no units of competency that directly address the skills required for implementing automation.

Units that could be removed because of duplication
The unit analysis did not find examples of units that could be removed due to duplication.

The units identified in Attachment B, Table 1 cover work functions that may be affected by automation. There is potential that the introduction of automation in industry may make these units redundant over time, or that they would require significant updating. In some instances, technology changes may make it preferable to replace them with more generic cross-industry units of competency. The units identified are industry-specific and ongoing monitoring and consideration of the impact of new technologies on these units is the responsibility of the relevant Industry Reference Committees.

Units that could be imported into various training packages
A small number of units of competency identified in Attachment B, Table 1 may be suitable for application across multiple industries. Consideration of their currency and application to their current industry context is first required before any of these units can be considered for broader use.

Additional training package component consideration
Significant gaps in training package content have been identified in relation to the skills required to implement automated systems and processes. The development of a suite of units, skill sets and qualifications that can be applied across multiple industries is recommended to address the identified gaps.

Opportunities to promote occupation mobility and for modernising sector/industry specific units, qualifications or skill sets

The five skill domains identified through this project have relevance across all industries. In addressing the identified gaps in existing training package content, an opportunity exists to create new products that enable the development of transferable skills and knowledge that is valued in many industry contexts.

The resulting automation units, skill sets and qualifications could be adopted by multiple training packages and contextualised for specific industries. Automation is currently gaining attention in many industries and occupations. The creation of products for cross-industry use would be a timely intervention to prevent a potential proliferation of industry-specific responses to automation challenges.

Sector/industry drivers of change

Attachment D summarises drivers identified through project consultations to inform the development of this Case for Change.

Proposed changes

Proposed change	Rationale

1. Develop new units of competency (or adapt existing ones) in five skill domains:
  a. Assessing the business opportunity for automation
  b. Designing and testing for automation
  c. Optimising business outcomes through automation
  d. Planning change and automation deployment
  e. Managing deployment, including maintenance and evaluation
	Research and consultation have identified demand for workforce skills to implement automated processes and systems. Individual units in these areas could be imported into a wide range of qualifications at various AQF levels to support the development of skills that enhance existing job roles and reflect the 'augmentation' impact of automation.

2. Create five new skill sets:
  a. Work with automated technologies or processes
  b. Enable business adoption of automation
  c. Deploy business process automation
  d. Drive business adoption of automation
  e. Lead business adoption of automation
	Skill sets will enable upskilling at a number of AQF levels to support emerging roles in the implementation of automation across all industries.

3. Develop 9 new qualifications, using the new automation units, as follows:
  a. Certificate III in Industrial Automation
  b. Certificate IV in Industrial Automation
  c. Certificate IV in Business Process Automation
  d. Diploma of Industrial Automation
  e. Diploma of Business Process Automation
  f. Graduate Certificate in Leading Industrial Automation
  g. Graduate Certificate in Leading Business Process Automation
  h. Graduate Certificate in Leading Change
  i. Graduate Diploma in Automation
	Qualifications will support the emergence of new job roles and occupations in relation to the implementation and monitoring of automation. Qualifications will have application across industry, but will be able to be contextualised to suit specific industries through the selection of relevant electives.

Total proposed changes are:

· new units* to be created in five identified skill domains

· 5 new skill sets to be created

· 9 new qualifications to be created.

* Table 2 in Attachment B lists 86 skills that were identified during research and consultation as relevant to the development of units of competency for automation. It is anticipated that this list of skills will be rationalised through further consultation, and the identification of existing and under-development units that can be used to support training products in automation.

Implementation advice and considerations

The PRG has identified implementation issues that will need to be considered in relation to the proposed training products for automation. These are:

- Industrial relations implications of automation on employment conditions and the labour market, and flow on effects for society, e.g. unemployment, underemployment, changing demographics in employment, inequitable income distribution, regional inequality. Training products need to address the skills and knowledge to consider and manage the social implications of the move to automated work processes.

- Capacity of generic training products to simultaneously support contextualisation to meet industry requirements, and compliance with audit requirements under the Standards for RTOs.

- Capacity of training providers to work with industry to deliver relevant, contextualised training outcomes, including access to equipment and technology, and availability of skilled staff.

- Availability of appropriate support resources and implementation guides.

- Flexibility of funding arrangements to support the delivery of skill sets; accommodate the need to upskill workers of all ages, abilities and stages of professional life; and enable investment in pre-emptive workforce skilling that will allow regions to attract new industries, and workers to stay in work or transition to other employment opportunities.

- Engagement with stakeholders across all industries and IRCs to ensure generic products are broadly relevant and supported.

- Suitability of 'housing' arrangements for new products to ensure they are accessible and recognised by potential users across all industries.

4. Industry support for change

Consultation approach

Consultation processes used for the project have leveraged PRG and IRC member networks, Skills Impact stakeholders, and other SSOs. Consultations conducted by DeakinCo accessed employers, industry associations, employee representatives, training providers, and policy makers. Consultation activities included:

- Structured one-on-one interviews with 50 targeted industry respondents
Interviews were conducted face-to-face or using technology-mediated modes (Skype,

telephone). All interview responses were reported against agreed questions, in an agreed format, to aid quantitative and qualitative analysis.

- Online survey completed by 65 industry respondents (and an additional 28 partial responses) The survey was conducted between 5 August and 5 September 2017 and was open to stakeholders in all industries. Responses were received from across all ABS classified industry sectors. The survey also reached organisations of all sizes, from micro (less than 5 employees) to large (greater than 2,000 employees). Respondents spanned multiple roles and responsibilities associated with implementing automation.

Attachment C contains more information on stakeholder consultation methods and scale.

Cross-sectoral support for proposed changes

Cross-sectoral engagement in the project has been secured through PRG membership targeting key industries with interest in automation skills. PRG members have used their own IRCs and stakeholder networks to share information on the project. Responses to an online survey were received from the following industries:

- Agriculture and Production Horticulture
- Amenity Horticulture, Landscaping and Conservation and Land Management
- Animal Care and Management
- Business Services
- Civil Infrastructure
- Construction
- Food, Beverage and Pharmaceutical
- Gas
- Manufacturing and Engineering
- Metalliferous Mining.

All respondents indicated that automation skill areas identified in the draft Case for Change were relevant to their industry.

Issues identified by stakeholders

The issues identified by stakeholders focused on the challenges of implementing cross-industry training products in automation skills. They included:

- Concerns about the availability of trainers and assessors with the competency and experience to train and assess automation skills, especially where assessment must be carried out in the workplace due to the need to access plant and equipment. Associated OHS and cost issues were also identified.

- Difficulty of developing training products that are generic enough to apply across multiple industries but can still be aligned to the specific skills and knowledge required by industries and organisations. Gaining industry acceptance of a cross-industry approach was identified as a challenge.

- Variability in the maturity of industries in adopting change from digital disruption will impact the speed and extent of uptake of workforce development for automation.

5. Impact of change

Potential impacts of the recommended changes have been identified for stakeholders of the VET system as follows:

Industry wide impacts

- Greater capacity to effectively implement automation technologies, potentially contributing to competitive advantages and new business opportunities for Australian industry

- Potential to contribute to increased labour market disruption as a result of increased implementation of automation across industry

Employers

- New competitive advantage due to increased productivity, improved efficiency, reduced costs, and/or new business opportunities offered by the implementation of automation

- Reduced risk of poor decision-making around the implementation of automation

- Increased capacity to manage the workforce change challenges associated with implementing automation

Learners/employees

- Opportunities to enhance future employability through upskilling in areas relevant to automation

- New job roles created through the introduction of automation in organisations that are able to remain competitive, rather than the loss of all jobs if organisations are not able to automate to remain competitive

Registered training organisations

- Upskilling challenges to ensure trainers and assessors are capable of delivering new training products

- Change management required to add new training products to scope of registration and develop appropriate/compliant resources and delivery and assessment approaches

- Opportunity to offer new workforce development products in an identified area of need and industry and learner interest

Government

- Increased flexibility in training product offerings – may require some adjustments to funding arrangements to ensure products are able to meet industry expectations

- Increased employer awareness of workforce development management issues associated with automation

Implications of not implementing the proposed changes

The primary implication of not implementing the proposed changes is that the Australian workforce may not develop the skills required to effectively implement automation. The majority (58%) of employers responding to the consultation survey for this project reported that a 'lack of critical knowhow or expertise' was restricting their organisation's adoption of automation.

Without the workforce skills to capitalise on opportunities offered by automation, Australian businesses may be unable to compete in an increasingly globalised market. And without access to a skilled workforce, new businesses in emerging industries will not choose to establish themselves in Australia.

Although automation may be resisted by some stakeholders due to its potential for disrupting the labour market and eliminating existing jobs, Australia will only have an opportunity to benefit from the new roles that emerging and transforming businesses create if the Australian workforce is skilled to support new business models and help them thrive.

How the proposed changes advance the project's priorities

The cross-sector projects aim to address emerging, common skill needs that are relevant across all industries in a way that minimises duplication, reduces system complexity and improves mobility and transferability of skills. While this Case for Change has proposed the creation of new units, skill sets and qualifications, these are in areas that are not currently addressed in training products. Their creation as cross-industry training products will avert the potential development of many more similar products in multiple industry-specific areas and the potential for increased duplication across training packages.

Additionally, the Case for Change has identified existing units that could be reviewed to ensure their ongoing usefulness in industries where automation is having, or will have, a significant impact on work tasks. This review will help to ensure the currency and relevance of national training products.

Estimated timeframes for implementing the proposed changes

The proposed changes will impact numerous industry sectors and involve the review of units across 32 training packages to fully consider their potential for use in new automation training products. To accommodate this review activity, it is proposed that a 3-month scoping phase is conducted initially, followed by a 12-month development phase. The development phase will include extensive cross-industry consultation and validation to ensure that new training products are supported and suitable for use in multiple industries.

Links to other cross-sector projects

As the cross-sector projects address skill needs across all industries, it will be important for any crossover between the projects to be identified. The skills required for automation are closely linked to those in all other cross-sector projects:

- Cyber security

- Big data

- Digital skills

- Supply chains

- Teamwork and communication

- Environmental Sustainability

- Consumer engagement through social media

In addition, automation skills are likely to be relevant to many industry-specific training package projects that are currently underway due to their ubiquitousness and topicality across all industries.

6. Implementing the COAG Industry and Skills Council (CISC) reforms for training packages

The proposed Case for Change has considerable potential to address the focus areas agreed by the CISC skills session in November 2015.

Remove obsolete qualifications from the system
It is likely that a number of obsolete units of competency will be identified through the proposed review of 241 units identified as likely to be significantly impacted by automation.

Provide more information about industry's expectations of training delivery
The development of cross-industry training products will require supporting information – in the form of Companion Volumes – to clearly articulate expectations for industry contextualisation in delivery and assessment.

Better support individuals to move more easily between related occupations
The development of cross-industry training products will allow individuals to acquire skills in automation that can be applied in many work roles across many industries. Individuals with skills in a specific occupation or industry may also use the training products to upskill for work in new and emerging roles within their current industry.

Create more units that can be owned and used by multiple industry sectors
The proposed automation training products are not aligned with any existing training package, and would be designed for application in a wide range of industries. The new products will need to be

'housed' in an appropriate training package, or training packages, where they will be readily accessible and identifiable as suitable for use in other industry contexts.

Foster greater recognition of skill sets

The Case for Change proposes the development of five skill sets to suit industry needs for upskilling and just-in-time skill building at a variety of AQF levels. The availability of the skill sets in an area that is currently sought-after by many employers will serve to increase awareness of the benefits of skill sets as a workforce development option.

This Case for Change was agreed through resolution of the Project Reference Group.

Name (PRG member)	Rick Whistler
Signed on behalf of the PRG	
Date	30 November 2017

7. Attachments

Attachment A: Members of the Project Reference Group

Industry Reference Committee (or Subject matter expert)	Name	Organisation and position
Aerospace	David Peterson	Senior Standards Officer, Airworthiness and Engineering Branch, Civil Aviation Safety Authority
Agriculture and Production Horticulture	Rick Whistler	Manager of Education Quality, Queensland Agricultural Training Colleges
Automotive Allied	Bruce Chellingworth	Toyota Motor Corporation
Automotive Light Vehicle	Bruce Chellingworth	Toyota Motor Corporation
Automotive Strategic	Brett Dale	Group Chief Executive, Motor Trades Association of Queensland
Automotive Strategic	Mark Harper	Industry Consultant – Automotive & Engineering, Utilities Engineering Electrical and Automotive Training Council
Coal Mining	Scott Layton	BHP Billiton
Drilling	Nigel Haywood	General Manager – Education and Work Skills, National Energy Resources Australia
Food, Beverage and Pharmaceutical	Nick Miller	Senior Policy Officer, Education and Training, AiGroup
Forest Management and Harvesting	Mike Sutton (proxy for Sarah Hart)	Manager, Forest Information and Planning, Forestry Corporation of NSW
Gas	Joe Calabrese	Utilitrain

Maritime	Henning Christiansen	Director Professional Development, Australian Institute of Marine and Power Engineers
Meat	Kevin Cottrill	Australian Meat Industry Council
Process Manufacturing, Recreational Vehicle and Laboratory Operations	Nigel Haywood	General Manager – Education and Work Skills, National Energy Resources Australia
Rail	Nick Dickinson	Metro Trains Australia
Timber and Wood Processing	Mark Lourigan	Organisational Development Manager, Hyne Timber
Timber Building Solutions	Mark Lourigan	Organisational Development Manager, Hyne Timber
Transport and Logistics	Warren Smith	Maritime Union of Australia

Attachment B: Training package components to change

Skills Impact

Date submitted: 30 November 2017

Table 1: Units of competency highlighted due to the potential for automation to transform the related work tasks
While most of these units are industry-specific, some may have potential for cross-industry application in the skill areas described in Table 2.

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Agriculture and Production Horticulture IRC Amenity Horticulture, Landscaping, Conservation and Land Management IRC	Skills Impact	AHC	Agriculture, Horticulture and Conservation and Land Management	AHCAGB402	Analyse and interpret production data
				AHCAGB501	Develop climate risk management strategies
				AHCAGB506	Manage application technology
				AHCAGB507	Select and use agricultural technology
				AHCAGB509	Select and implement a Geographic Information System (GIS) for sustainable agricultural systems
				AHCAGB510	Implement the introduction of biotechnology into the production system
				AHCARB405	Perform geospatial data collection
				AHCARB603	Interpret diagnostic test results
				AHCASW306	Use technology in Aboriginal sites work
				AHCBUS405	Participate in an e-business supply chain
				AHCIRG503	Design irrigation, drainage and water treatment systems
				AHCLPW405	Monitor biodiversity

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				AHCNRM507	Manipulate and analyse data within geographic information systems
Meat IRC	Skills Impact	AMP	Australian Meat Processing	AMPMGT502	Manage new product or process development
				AMPMGT504	Develop, manage and maintain quality systems
Automotive Light Vehicle IRC Automotive Heavy Vehicle IRC Automotive Strategic IRC	PwC's Skills for Australia	AUM	Automotive Manufacturing	AUMABA002	Operate load shifting equipment
				AUMAKM002	Produce computer-aided drawings
				AUMATK011	Use technical data relating to plant, tools, equipment and systems
				AUMATR002	Install and maintain motor vehicle instrumentation sensors and transmitters
				AUMATW001	Test vehicle welds ultrasonically
				AUMGTR001	Install and replace vehicle electrical units and assemblies
Aviation IRC	Australian Industry Standards	AVI	Aviation	AVIW5013	Operate air traffic control equipment and workstations
Business Services IRC	PwC's Skills for Australia	BSB	Business Services	BSBADM506	Manage business document design and development
				BSBDES403	Develop and extend design skills and practice
				BSBEBU501	Investigate and design e-business solutions
				BSBEBU502	Implement e-business solutions
				BSBFIA302	Process payroll
				BSBHRM502	Manage human resource management information systems

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				BSBINM401	Implement workplace information system
				BSBINM501	Manage an information or knowledge management system
				BSBITS401	Maintain business technology
				BSBLIB404	Use integrated library management systems
				BSBMGT801	Direct the development of a knowledge management strategy for a business
				BSBMGT802	Lead design and review of enterprise systems
				BSBMKG421	Optimise digital media impact
				BSBMKG525	Design effective web search responses
				BSBMKG527	Plan social media engagement
				BSBMKG530	Create distributed multiplatform digital advertisements
				BSBRKG403	Set up a business or records system for a small business
				BSBRKG502	Manage and monitor business or records systems
				BSBSMB412	Introduce cloud computing into business operations
				BSBWOR204	Use business technology
Construction, Plumbing and Services IRC	Artibus Innovation	CPC08	Construction, Plumbing and Services	CPCPCM4013A	Produce 2-D architectural drawings using CAD software
				CPCPCM5010A	Design complex sanitary plumbing and drainage systems

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				CPCPCM5011A	Design complex cold water systems
				CPCPCM5012A	Design complex stormwater and roof drainage systems
				CPCPPS5030A	Design pump systems
				CPCPPS5032A	Design siphonic stormwater drainage systems
				CPCPPS5033A	Design vacuum sewerage systems
Property Services IRC	Artibus Innovation	CPP/CPP07	Property Services	CPPBDN4004	Set up BIM-capable software and files for building design drafting projects
				CPPBDN4009	Analyse building design drawings and review findings
				CPPDSM3015B	Use and maintain property and client information databases
				CPPSIS3011	Produce basic maps
				CPPSIS4022	Store and retrieve spatial data
				CPPSIS4024	Source and assess spatial data
				CPPSIS4025	Collect spatial data using GNSS
				CPPSIS4026	Digitally enhance and process image data
				CPPSIS4034	Maintain spatial data
				CPPSIS4035	Apply GIS software to solve spatial data problems
				CPPSIS4037	Produce computer-aided drawings
				CPPSIS4039	Design and produce maps
				CPPSIS5032	Capture new spatial data

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				CPPSIS5035	Obtain and validate spatial data
				CPPSIS5036	Integrate spatial datasets
				CPPSIS5037	Maintain spatial data systems
				CPPSIS5038	Develop spatial databases
				CPPSIS5039	Plan and implement spatial projects
				CPPSIS5040	Interpret and collate spatial data
				CPPSIS5043	Design spatial data storage systems
				CPPSIS5047	Conduct GNSS surveys
				CPPSIS5048	Conduct engineering surveys
				CPPSIS5053	Perform advanced surveying computations
				CPPSIS5054	Perform geodetic surveying computations
				CPPSIS5060	Develop spreadsheets for spatial data
				CPPSIS5064	Coordinate GIS data manipulation and analysis
				CPPSIS5065	Design basic engineering structures
				CPPSIS6022	Produce mine drawings
				CPPSIS6036	Monitor engineering structures
				CPPSIS6037	Conduct advanced remote sensing analysis
				CPPSIS6040	Develop 2-D and 3-D terrain visualisations
				CPPSIS6041	Compile mine survey plans
				CPPSPS4012A	Design, install and service automated systems for swimming pools and spas

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Culture and Related Industries IRC	PwC's Skills for Australia	CUA	Creative Arts	CUAACD502	Create observational drawings
				CUAACD503	Select and refine a specialised drawing technique
				CUAACD506	Refine 2-D design ideas and processes
				CUAACD512	Work with photomedia in creative practice
				CUAANM301	Create 2D digital animations
				CUAANM302	Create 3D digital animations
				CUAANM303	Create 3D digital models
				CUADIG401	Author interactive media
				CUADIG402	Design user interfaces
				CUADIG403	Create user interfaces
				CUADIG405	Produce innovative digital images
				CUADIG502	Design digital applications
				CUADIG506	Design interaction
				CUADIG508	Refine digital art techniques
				CUADIG509	Investigate technologies for the creation of digital art
				CUADIG507	Design digital simulations
				CUAMCP501	Compose music using electronic media
				CUAMPF409	Perform music using digital media
Public Safety IRC	Australian Industry Standards	DEF	Defence	DEFFOR003	Gather and analyse electronic information

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Food, Beverage and Pharmaceutical IRC Pharmaceutical Manufacturing IRC	Skills Impact	FDF10	Food Processing	FDFFST4003A	Apply digital technology in food processing
				FDFGR4001A	Control power and automation for milling processes
				FDFOP2060A	Operate an automated cutting process
Forest Management and Harvesting IRC Timber and Wood Processing IRC Timber Building Solutions IRC	Skills Impact	FWP	Forest and Wood Products	FWPCOT6205	Prepare an enterprise carbon management report
				FWPCOT6209	Manage forest and wood products industry research
Aboriginal and Torres Strait Islander Health Worker IRC Ambulance and Paramedic IRC Complementary Health IRC Dental IRC Direct Client Care and Support IRC Enrolled Nursing IRC First Aid IRC Pharmaceutical Manufacturing IRC Technician Support Services IRC	SkillsIQ	HLT	Health	HLTADM001	Administer and coordinate Telehealth services
				HLTADM002	Manage Telehealth technology
				HLTADM004	Manage health billing and accounting system
				HLTAHA025	Contribute to client flow and client information management in medical imaging
				HLTAHW063	Implement office systems

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Printing and Graphic Arts IRC	PwC's Skills for Australia	ICP	Printing and Graphics Arts	ICPPRP484	Set up and operate automated workflow
Information and Communications Technology IRC	PwC's Skills for Australia	ICT	Information and Communications Technology	ICTCBL405	Remotely locate and identify cable network faults
				ICTDMT402	Produce interactive animation
				ICTGAM401	Produce an interactive game
				ICTGAM402	Identify and apply principles of games design and game playing
				ICTGAM404	Apply artificial intelligence in game development
				ICTGAM410	Develop 3-D components for interactive games
				ICTGAM412	Design interactive media
				ICTGAM509	Design interactive 3-D applications for scientific and mathematical modelling
				ICTICT306	Migrate to new technology
				ICTICT307	Customise packaged software applications for clients
				ICTICT423	Select cloud storage strategies
				ICTICT814	Develop cloud computing strategies for a business
				ICTICT815	Manage automated ICT system applications using enterprise wide operating system
				ICTNWK306	Evaluate characteristics of cloud computing solutions and services

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				ICTNWK411	Deploy software to networked computers
				ICTNWK419	Identify and use current virtualisation technologies
				ICTPRG405	Automate processes
				ICTPRG409	Develop mobile applications
				ICTPRG604	Create cloud computing services
				ICTWEB417	Integrate social web technologies
				ICTWEB425	Apply structured query language to extract and manipulate data
Maritime IRC	Australian Industry Standards	MAR	Maritime	MARL5005	Demonstrate basic knowledge of marine control systems and automation
Aerospace IRC	IBSA Manufacturing	MEA	Aeroskills	MEA271	Lay out avionic flight management systems
				MEA717	Evaluate avionic digital systems
				MEA718	Evaluate rotorcraft flight control systems
Manufacturing and Engineering IRC	IBSA Manufacturing	MEM05	Metal and Engineering	MEM16008A	Interact with computing technology
				MEM23122A	Evaluate computer integrated manufacturing systems
				MEM23126A	Evaluate industrial robotic applications
				MEM30031A	Operate computer-aided design (CAD) system to produce basic drawing elements
				MEM30033A	Use computer-aided design (CAD) to create and display 3-D models
				MEMPE001A	Use engineering workshop machines

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Furnishing IRC	IBSA Manufacturing	MSF	Furnishing	MSFFM3009	Produce manual and computer-aided production drawings
Process Manufacturing, Recreational Vehicle and Laboratory IRC	IBSA Manufacturing	MSL	Laboratory Operations	MSL905003	Create or modify automated calibration procedures
Sustainability IRC	IBSA Manufacturing	MSS	Sustainability	MSS015001	Measure and report carbon footprint
Water IRC	Australian Industry Standards	NWP	National Water	NWPIRR032	Monitor and control rural water distribution operations
				NWPIRR033	Coordinate and monitor the operation of irrigation delivery systems
				NWPNET004	Monitor and operate network systems
				NWPNET005	Optimise network systems
				NWPSOU053	Coordinate and monitor groundwater system usage
				NWPSOU054	Monitor and operate pump stations
				NWPTRT044	Operate and control desalination processes
				NWPTRT045	Assess and improve desalination processes
Process Manufacturing, Recreational Vehicle and Laboratory IRC	IBSA Manufacturing	PMA	Chemical, Hydrocarbons and Refining	PMASUP341	Monitor and maintain instrument and control systems
		PMB	Plastics, Rubber and Cablemaking	PMBPROD265	Operate portable vulcanising equipment
				PMBPROD375	Vulcanise products using an autoclave
		PMC	Manufactured Mineral Products	PMC556031	Design structural/mechanical components
Public Sector IRC	SkillsIQ	PSP	Public Sector	PSPBDR009	Analyse surveillance products

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				PSPGSD012	Provide specialist technical service delivery
				PSPREG016	Conduct data analysis
				PSPSCI004	Undertake scientific/technological research
				PSPSEC004	Undertake information technology security audits
				PSPSEC006	Implement security risk treatments
				PSPSEC016	Define information systems framework
Public Safety IRC	Australian Industry Standards	PUA12	Public Safety	PUACOM004B	Manage organisational communication strategies
				PUAECO004A	Operate computer aided dispatch system
				PUAFIR409B	Develop air attack strategies
				PUAPOL028B	Manage investigation information processes
Civil Infrastructure IRC Coal Mining IRC Drilling IRC Extractive IRC Metalliferous Mining IRC	PwC's Skills for Australia	RII	Resources and Infrastructure Services	RIICRC321D	Use automated paving guidance systems
				RIICWD530D	Prepare detailed design of surface drainage
				RIIMEX602D	Establish and maintain surface mining ground control and slope stability systems
				RIIMEX603D	Establish and maintain underground mining ground control and stable mining systems
				RIIMEX604D	Establish and maintain surface product haulage and transport systems
				RIIMPG301D	Control and monitor automated plant/machinery
				RIIMPO337D	Conduct articulated haul truck operations

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				RIIPRO302D	Perform process control room operations
				RIISTD201D	Read and interpret maps
				RIISTD302D	Process data and maintain accurate records
				RIIUND501D	Implement the ventilation management plan
				RIIUND601D	Establish and maintain the ventilation management system
				RIIUND603D	Manage, operate and maintain the mine ventilation system
Tourism, Travel and Hospitality IRC	SkillsIQ	SIT	Tourism, Travel and Hospitality	SITHGAM005	Analyse and report on gaming machine data
				SITHGAM014	Manage gaming activities
				SITHGAM015	Attend casino gaming machines
				SITHKOP008	Select catering systems
				SITTPPD007	Research and analyse tourism data
				SITTTSL002	Access and interpret product information
				SITTTSL010	Use a computerised reservations or operations system
				SITXEBS002	Develop, implement and monitor the use of social media in a business
				SITXEBS003	Build and launch a small business website
				SITXINV005	Establish stock and purchasing and control systems
				SITXMPR005	Participate in cooperative online marketing initiatives

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				SITXMPR007	Develop and implement marketing strategies
Food, Beverage and Pharmaceutical IRC	Skills Impact	SUG02	Sugar Milling	SUGZPC2A	Operate a process control interface
Rail IRC Transport and Logistics IRC	Australian Industry Standards	TLI	Transport and Logistics	TLIA5058	Manage facility and inventory requirements
				TLIL5019	Implement and monitor transport logistics
				TLIL5055	Manage a supply chain
				TLIS3010	Test rail using ultrasonic equipment
				TLIS3011	Test rail using nondestructive testing equipment
Electrotechnology IRC	Australian Industry Standards	UEE11	Electrotechnology	UEENEED104A	Use engineering applications software on personal computers
				UEENEED117A	Install and configure network systems for internetworking
				UEENEEE077B	Write specifications for automated systems projects
				UEENEEE126A	Provide solutions to basic engineering computational problems
				UEENEEH132A	Fault find and repair global positioning system
				UEENEEI113A	Setup and configure Human-Machine Interface (HMI) and industrial networks
				UEENEEI123A	Design electronic control systems
				UEENEEI125A	Provide solutions to fluid circuit operations
				UEENEEI127A	Analyse complex electronic circuits controlling fluids

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				UEENEEI128A	Set up and configure controls on complex fluid systems
				UEENEEI129A	Set up electronically controlled mechanically operated complex systems
				UEENEEI130A	Set up electronically controlled robotically operated complex systems
				UEENEEI136A	Manage automated control systems projects
				UEENEEI137A	Plan automated and control systems projects
				UEENEEI150A	Develop, enter and verify discrete control programs for programmable controllers
				UEENEEI151A	Develop, enter and verify word and analogue control programs for programmable logic controllers
				UEENEEI152A	Develop, enter and verify programs in Supervisory Control and Data Acquisition systems
				UEENEEI153A	Design and configure Human-Machine Interface (HMI) networks
				UEENEEI154A	Design and use advanced programming tools PC networks and HMI Interfacing
				UEENEEI155A	Develop structured programs to control external devices
				UEENEEI156A	Develop and test code for microcontroller devices
				UEENEEI157A	Configure and maintain industrial control system networks

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
Gas IRC	Australian Industry Standards	UEG11	Gas Industry	UEGNSG117B	Plan and implement the data acquisition and metering requirements of a gas system
				UEGNSG121B	Prepare safe design specifications of a gas system
				UEGNSG131A	Compile a gas industry technical report
Electricity Supply Transmission, Distribution and Rail IRC	Australian Industry Standards	UET12	Transmission, Distribution & Rail Sector	UETTDRDS35A	Design overhead distribution power systems
				UETTDRDS36A	Design underground distribution power systems
				UETTDRDS37A	Design power system distribution substations
				UETTDRDS38A	Design power system public lighting systems
				UETTDRDS43A	Develop high voltage and low voltage distribution protection systems
				UETTDRDS44A	Design power system substations modifications
				UETTDRDS46A	Develop planned power systems outage strategies
				UETTDRDS49A	Establish and manage power system geographical information systems data
				UETTDRDS50A	Design customer power system substations
				UETTDRDS51A	Manage power system transmission and sub-transmission design process
				UETTDRDS52A	Design power system transmission, sub-transmission and zone substation buildings
				UETTDRDS53A	Design power system transmission and sub-transmission substation primary plant

Responsible IRC	Responsible SSO	TP code	Training Package name	Unit code	Unit title
				UETTDRDS54A	Design power system transmission and sub-transmission protection and control
				UETTDRDS55A	Design power system transmission and sub-transmission substation earthing
				UETTDRDS56A	Design power system transmission, sub-transmission and zone substation civil and structural components
				UETTDRDS57A	Design power system overhead transmission systems
				UETTDRDS58A	Design underground transmission systems
				UETTDRSO36A	Develop low voltage distribution switching programs
				UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
				UETTDRSO38A	Develop and evaluate power systems transmission switching programs
				UETTDRSO51A	Manage network systems power flows
				UETTDRTS29A	Develop power systems secondary isolation instructional documents

Table 2: New units of competency recommended for development

This table lists skills that were identified during research and consultation as relevant to the development of units of competency for automation. It is anticipated that this list of skills will be rationalised through further consultation, and the identification of existing and under-development units that can be used to support training products in automation.

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Identify the role and impact of automation on work	New unit	New AQF 3 unit in the skill domain of *assessing the business opportunity – research and discovery*
					Identify future trends and likely role and impact of automation on existing processes and technologies	New unit	New AQF 4 unit in the skill domain of *assessing the business opportunity – research and discovery*
					Plan and integrate automation in various manufacturing, process, supply chain or technical applications	New unit	New AQF 5/6 unit in the skill domain of *assessing the business opportunity – research and discovery*
					Manage automation plans and projects within specific operational, process or areas of business practice	New unit	New AQF 7/8 unit in the skill domain of *assessing the business opportunity – research and discovery*
					Identify major application areas for automation technology and calculate the business benefit for specific automation options	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain of *assessing the business opportunity – benefits analysis*
					Research and analyse the benefit of adopting emerging and future automation technologies	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain of *assessing the business opportunity – benefits analysis*
					Develop metrics and means to accurately report organisational benefits from automation	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain of *assessing the business opportunity – benefits analysis*
					Design measurement control systems (e.g. accuracy, repeatability, linearity, turndown and speed of response)	New unit	New AQF 5/6 unit in the skill domain of *design and test – designing improvements*
					Design, specify and support the integration of automation systems with other systems	New unit	New AQF 5/6 unit in the skill domain of *design and test – designing improvements*
					Design systems and infrastructure to support automation projects and requirements	New unit	New AQF 7/8 unit in the skill domain of *design and test – designing improvements*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Analyse, design and develop solutions to automate and control the production and delivery of goods and services	New unit	New AQF 5/6 unit in the skill domain of *design and test – designing improvements*
					Design and sponsor technology improvements that optimise business processes or customer outcomes	New unit	New AQF 7/8 unit in the skill domain of *design and test – designing improvements*
					Complete routine testing of sensing, communication, measurement or actuation devices	New unit	New AQF 4 unit in the skill domain of *design and test – testing, simulating and prototyping*
					Assemble, set up and prepare a prototype or simulation for specific automation technologies or tools	New unit	New AQF 4 unit in the skill domain of *design and test – testing, simulating and prototyping*
					Calibrate, troubleshoot, and test sensing, communication, measurement and actuation devices	New unit	New AQF 5/6 unit in the skill domain of *design and test – testing, simulating and prototyping*
					Specify and design the installation and testing of sensing, communication, measurement and actuation devices necessary for automation	New unit	New AQF 7/8 unit in the skill domain of *design and test – testing, simulating and prototyping*
					Manage the testing and outcomes reporting of major automation projects	New unit	New AQF 7/8 unit in the skill domain of *design and test – testing, simulating and prototyping*
					Present and visualise data supporting an automation initiative	New unit or adaptation of existing unit	New or adapted AQF 3 unit in the skill domain *design and test – data reporting and data integration*
					Identify relevant data sources required to measure the effectiveness of an automation project	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *design and test – data reporting and data integration*
					Assure automation data accuracy, reliability, validity and integrity	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *design and test – data reporting and data integration*
					Communicate and build stakeholder commitment to an automation project	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *design and test – data reporting and data integration*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Analyse, document and collect data to assure automated processes and technologies meet all operational requirements	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *design and test – data reporting and data integration*
					Develop predictable, stable and consistent operational targets	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *optimise business outcomes through automation – industrial automation equipment and technology control*
					Develop continuous data reporting and process controls	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *optimise business outcomes through automation – automation equipment and technology control*
					Establish control monitoring and reporting systems	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *optimise business outcomes through automation – industrial automation equipment and technology control*
					Analyse and assess ways to optimise processes using business process automation tools	New unit	New AQF 4 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Identify appropriate business process automation software	New unit	New AQF 4 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Map processes for software to automate	New unit	New AQF 4 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Set up a build, test and deployment environment for business process automation	New unit	New AQF 4 unit in the skill domain *optimise business outcomes through automation – business process automation*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Use business process automation to automate routine, well-defined activities	New unit	New AQF 4 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Identify and quantify opportunities to use business process automation to optimise performance or revenues	New unit	New AQF 5/6 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Build and rewrite scripts for the business process automation tool	New unit	New AQF 5/6 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Test and assess proposed business process automation improvements	New unit	New AQF 5/6 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Identify alternative business process automation tools or methods for analysing and visualising process improvements	New unit	New AQF 5/6 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Assist others to automate established processes using business process automation	New unit	New AQF 5/6 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Coordinate and manage the operationalisation of business process automation	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Isolate priority processes for business process automation	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Evaluate and advocate for prioritised needs and benefits that justify business process automation investment	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Oversee business process automation activities	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Align business process automation deployment with business outcomes	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Integrate business process automation activities into the wider automation strategy	New unit	New AQF 7/8 unit in the skill domain *optimise business outcomes through automation – business process automation*
					Identify factors within a work area that are a constraint to work efficiency, customer outcomes or productivity	New unit or adaptation of existing unit	New or adapted AQF 3 unit in the skill domain *optimise business outcomes through automation – process improvement*
					Assess and collaborate with others to proactively identify ways to automate and improve operational efficiency and processes	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *optimise business outcomes through automation – process improvement*
					Coordinate implementation of an automation improvement project plan against agreed targets	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *optimise business outcomes through automation – process improvement*
					Communicate and effectively engage with others to execute an improvement project	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *optimise business outcomes through automation – process improvement*
					Champion major automation change and transformation projects	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *optimise business outcomes through automation – process improvement*
					Foster a culture of continuous learning and improvement	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *optimise business outcomes through automation – process improvement*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Use evidence-based methods and statistical measurement to evaluate the impact of improvement projects	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *optimise business outcomes through automation – process improvement*
Supply Chain cross-sector project	**Australian Industry Standards**				Manage automated material handling and distribution systems	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *optimise business outcomes through automation – supply chain*
Supply Chain cross-sector project	**Australian Industry Standards**				Facilitate execution and measurement of automation improvements across value chain partners	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *optimise business outcomes through automation – supply chain*
Supply Chain cross-sector project	**Australian Industry Standards**				Integrate supply chain information and data sharing and reporting	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *optimise business outcomes through automation – supply chain*
Supply Chain cross-sector project	**Australian Industry Standards**				Use technology to optimise stock or freight control, movement and inventory management	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *optimise business outcomes through automation – supply chain*
Supply Chain cross-sector project	**Australian Industry Standards**				Map and quantify opportunities for automation to improve business outcomes across all partners in a supply chain	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *optimise business outcomes through automation – supply chain*
					Engage effectively in change processes	New unit or adaptation of existing unit	New or adapted AQF 3 unit in the skill domain *plan change and automation deployment – change strategy*
					Facilitate and monitor progress against the change goals	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *plan change and automation deployment – change strategy*
					Translate change strategies and objectives into an operational reality	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *plan change and automation deployment – change strategy*
					Drive and report strategic outcomes from change processes or projects	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *plan change and automation deployment – change strategy*
					Assess the workforce capability and readiness to execute required changes	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *plan change and automation deployment – managing human and social impacts of automation*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Assess organisational maturity and responsiveness to technological disruption	New unit	New AQF 7/8 unit in the skill domain *plan change and automation deployment – managing human and social impacts of automation*
Sustainability	IBSA Manufacturing	MSS	Sustainability	MSS402010	Manage the impact of change on own work	Review unit to confirm use in automation skill sets and qualifications	Existing unit for possible use in the skill domain *plan change and automation deployment – managing human and social impacts of automation*
Sustainability	IBSA Manufacturing	MSS	Sustainability	MSS407001	Prepare for and implement change	Review unit to confirm use in automation skill sets and qualifications	Existing unit for possible use in the skill domain *plan change and automation deployment – managing human and social impacts of automation*
					Champion change and establish the means to resolve or escalate change issues	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *plan change and automation deployment – managing human and social impacts of automation*
Business Services	PwC's Skills for Australia	BSB	Business Services	BSBLDR805	Lead and influence change	Review unit to confirm use in automation skill sets and qualifications	Existing unit for possible use in the skill domain *plan change and automation deployment – managing human and social impacts of automation*
					Cooperate with others to clarify and address change issues or facilitate change initiatives	New unit or adaptation of existing unit	New or adapted AQF 3 unit in the skill domain *plan change and automation deployment – stakeholder engagement*
					Identify and influence stakeholders' expectations for a well-defined change initiative	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *plan change and automation deployment – stakeholder engagement*
Business Services	PwC's Skills for Australia	BSB	Business Services	BSBINN601	Lead and manage organisational change	Review unit to confirm use in automation skill sets and qualifications	Existing unit for possible use in the skill domain *plan change and automation deployment – stakeholder engagement*
					Maintain strong relationships with internal and external stakeholders throughout a change initiative	New unit or adaptation of existing unit	New or adapted AQF 7/8 unit in the skill domain *plan change and automation deployment – stakeholder engagement*
					Use automation technology and equipment	New unit	New AQF 3 unit in the skill domain *manage deployment, including maintenance and evaluation – deploy*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Analyse and determine the need for additional infrastructure or training to support automated processes or activities	New unit	New AQF 4 unit in the skill domain *manage deployment, including maintenance and evaluation – deploy*
					Assure automated systems and infrastructure adhere to established standards, procedures and requirements	New unit	New AQF 5/6 unit in the skill domain *manage deployment, including maintenance and evaluation – deploy*
					Manage automated processes and technologies throughout their lifecycle	New unit	New AQF 7/8 unit in the skill domain *manage deployment, including maintenance and evaluation – deploy*
					Maintain automation equipment, tools and systems	New unit	New AQF 3 unit in the skill domain *manage deployment, including maintenance and evaluation – maintenance and repair*
					Identify, diagnose, and/or repair automation equipment and technologies	New unit	New AQF 3 unit in the skill domain *manage deployment, including maintenance and evaluation – maintenance and repair*
					Organise and document maintenance and repair of automation equipment and technologies	New unit	New AQF 4 unit in the skill domain *manage deployment, including maintenance and evaluation – maintenance and repair*
					Collaborate with others to ensure maintenance, repairs and related documentation meets operational needs	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *manage deployment, including maintenance and evaluation – maintenance and repair*
					Review automation equipment, systems and infrastructure initiatives against strategic requirements	New unit	New AQF 7/8 unit in the skill domain *manage deployment, including maintenance and evaluation – maintenance and repair*
					Complete routine set up or calibration of automation equipment or technologies	New unit	New AQF 3 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Use automation processes and technologies in a safe and compliant manner	New unit	New AQF 3 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Maintain and optimise equipment and technology reliability	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Assure adherence to safety requirements and specification	New unit or adaptation of existing unit	New or adapted AQF 4 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Establish documentation and procedures to install and support the integration of automation systems with other systems	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Monitor, control and improve automation processes, technology and devices to meet customer and operational requirements	New unit or adaptation of existing unit	New or adapted AQF 5/6 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Assure the safe and reliable installation and operation of automation processes and technologies	New unit	New AQF 5/6 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*
					Review deployment of technology and devices throughout the automation project lifecycle	New unit	New AQF 7/8 unit in the skill domain *manage deployment, including maintenance and evaluation – installation, safety and quality assurance*

Table 3: New skill sets recommended for development

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Work with automated technologies or processes	New skill set	AQF 3/4 level packaging of units to cover: · Identify the role and impact of automation on work · Use automation technology and equipment · Maintain automation equipment, tools and systems · Use automation processes and technologies in a safe and compliant manner
					Enable business adoption of automation	New skill set	AQF 4 level packaging of units to cover: · Identify future trends, and likely role and impact of automation on existing processes and technologies · Identify major application areas for automation technology and calculate the business benefit for specific automation options · Assess and collaborate with others to proactively identify ways to automate and improve operational efficiency and processes
					Business process automation	New skill set	AQF 4 level packaging of units to cover: · Analyse and assess ways to optimise processes using business process automation tools · Identify appropriate business process automation software · Map processes for software to automate · Set up a build, test and deployment environment for business process automation

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Drive business adoption of automation	New skill set	AQF 5/6 level packaging of units to cover: · Plan and integrate automation in various manufacturing, process, supply chain or technical applications · Research and analyse the benefit of adopting emerging and future automation technologies · Design, specify and support the integration of automation systems with other systems
					Lead business adoption of automation	New skill set	AQF 8 level packaging of units to cover: · Manage automation plans and projects within specific operational, process or areas of business practice · BSBLDR805 Lead and influence change

Table 4: New qualifications recommended for development

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Certificate III in Industrial Automation	New qualification	AQF 3 qualification with a core covering: 1. Use automation processes and technologies in a safe and compliant manner 2. 2. Use automation technology and equipment 3. 3. Maintain automation equipment, tools and systems Plus electives selected from automation units or another source
					Certificate IV in Industrial Automation	New qualification	AQF 4 qualification with core covering: 1. Identify future trends and likely role and impact of automation on existing processes and technologies 2. Identify major application areas for automation technology and calculate the business benefit for specific automation options 3. Identify relevant data sources required to measure the effectiveness of an automation project 4. Analyse and determine the need for additional infrastructure or training to support automated processes or activities Plus electives selected from automation units or another source

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Certificate IV in Business Process Automation	New qualification	AQF 4 qualification with core covering: 1. Analyse and assess ways to optimise processes using business process automation tools 2. Identify appropriate business process automation software 3. Map processes for software to automate 4. Set up a build, test and deployment environment for business process automation 5. Use business process automation to automate routine, well-defined activities Plus electives selected from automation units or another source
					Diploma of Industrial Automation	New qualification	AQF 5 qualification with core covering: 1. Plan and integrate automation in various manufacturing, process, supply chain or technical applications 2. Research and analyse the benefit of adopting emerging and future automation technologies 3. Design, specify and support the integration of automation systems with other systems 4. Communicate and build stakeholder commitment to an automation project 5. Monitor, control and improve automation processes, technology and devices to meet customer and operational requirements Plus electives selected from automation units or another source

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Diploma of Business Process Automation	New qualification	AQF 5 qualification with core covering: 1. Identify and quantify opportunities to use business process automation to optimise performance or revenues 2. Build and rewrite scripts for the business process automation tool 3. Test and assess proposed business process automation improvements 4. Identify alternative business process automation tools or methods for analysing and visualising process improvements 5. Assist others to automate established processes using business process automation Plus electives selected from automation units or another source
					Graduate Certificate in Leading Industrial Automation	New qualification	AQF 8 qualification with core covering: 1. Manage automation plans and projects within specific operational, process 2. Develop metrics and means to accurately report organisational benefits from automation Plus electives selected from automation units or another source
					Graduate Certificate in Leading Business Process Automation	New qualification	AQF 8 qualification with core covering: 1. Coordinate and manage the operationalisation of business process automation 2. Isolate priority processes for business process automation Plus electives selected from automation units or another source.

Responsible IRC	Responsible SSO	TP code	TP name	Product code	Product name	Review status (New or updated)	Change required
					Graduate Certificate in Leading Change	New qualification	AQF 8 qualification with core covering: 1. Drive and report strategic outcomes from change processes or projects 2. Assess organisational maturity and responsiveness to technological disruption Plus electives selected from automation units or another source.
					Graduate Diploma in Automation	New qualification	AQF 8 qualification with core covering: 1. Manage automation plans and projects within specific operational, process or areas of business practice 2. Develop metrics and means to accurately report organisational benefits from automation 3. Design and sponsor technology improvements that optimise business processes or customer outcomes 4. Design systems and infrastructure to support automation projects and requirements Plus electives selected from automation units or another source

Attachment C: Stakeholder consultation method and scale

Name and organisation of stakeholder	Detail method(s) and scale of consultation
Industry experts and IRC members	Targeted phone consultations
Targeted Industry Reference Committees	Call for PRG nominations, vial email and SSO liaison, targeting IRC representatives from impacted industries
ACPET Ausfarm Fresh Australian Industry Group Australian Workers' Union Bendigo TAFE BHP Bundaberg Fruit and Vegetable Growers Cooperative Ltd Chisholm Institute of TAFE CHM Alliance Pty Ltd Costa Pty Ltd Curriculum Management Service Victoria Department of Education and Training Department of Education WA Department of Training and Workforce Development WA DET Victoria Farm Machinery and Industry Association of WA (Inc) Gateways to Industry Schools Program – Manufacturing and Engineering Goulburn Ovens TAFE Greefa Automation Systems	Skills Impact project webpage outlining and updating project, including option for stakeholders to register interest – resulting in a database of 46 interested stakeholders from across a range of industry areas

Growcom Holmesglen TAFE Illuminate Group Jobs Queensland Landscaping Victoria Logistics Training Council Matrix Enterprises WA Pty Ltd MINTRAC Montague NSW Department of Primary Industries Portable QFF/RJSA QMI Solutions QMI Solutions Queensland Agricultural Workforce Network SEED Science TAFE NSW TAFE Queensland RedSpace TAFE SA Thiess	
	Structured one-on-one interviews conducted by DeakinCo with 50 targeted industry respondents. Interviews were conducted face-to-face or using technology-mediated modes (Skype, telephone).
	Online survey completed by 65 industry respondents (and an additional 28 partial responses). The survey was conducted between 5 August and 5 September 2017 and was promoted to stakeholders in all industries.

| Farm Machinery and Industry Association of WA (Inc)
Australian Workers' Union
DXC Technology
Central Region TAFE
ISAC NT
Food, Fibre and Timber Industries Training Council (WA)
South Metro TAFE
TAFE NSW
Dianne Fullelove & Associates
Queensland Agricultural Training Colleges | Draft Case for Change disseminated by PRG members and through Skills Impact and other SSO communication channels.
A total of 14 individual online survey responses on the draft Case for Change were received from the following industries:
   o   Agriculture and Production Horticulture
   o   Amenity Horticulture, Landscaping and Conservation and Land Management
   o   Animal Care and Management
   o   Business Services
   o   Civil Infrastructure
   o   Construction
   o   Food, Beverage and Pharmaceutical
   o   Gas
   o   Manufacturing and Engineering
   o   Metalliferous Mining. |

Attachment D: Sector/industry drivers identified through consultation

This draft Case for Change is informed by the following industry drivers identified through desktop research and stakeholder consultations.

1. **Potential relevance to all job roles**
    While some jobs will disappear entirely, most roles are being changed or displaced to varying degrees by automation. Skills training will need not only to be national – targeting many industries where common activities are tasks will be automated – but will also need to directly enhance how individuals respond to automation and develop transferable, employable human capabilities that are more likely to be resistant to being replicated by machines in the foreseeable future.

2. **Relevance to established and emerging industries**
    The potential of automation is not limited to new industries. There are significant opportunities to use automation technologies and systems to improve mature industries. These mature industries often involve large regional employers and represent high-potential markets for entrepreneurs, digital businesses and start-up businesses looking to compete using automation. Skilling strategies can 'seed' the speed and capability of these more mature industries to grow, transform, and enhance no only their competitiveness but also their ability to retain or grow employment. This can occur by:

    - Automating to enhance operation efficiency, reduce costs and improve supply chains and market access

    - Shifting products, services and processes to target new customer segments

    - Enhancing production technologies and processes

    - Accessing lateral markets (adjacent market opportunities, old competencies applied in new markets)

    - Accessing incentives or regulatory reforms that encourage technology deployment tied to enhanced global competitiveness

    - Augmenting or enhancing job efficiency, making it more cost-effective not to outsource certain activities to locations where labour costs are lower

    - Improving logistics to reduce 'to market' time and costs.

    According to research by Deloitte[2], Australian industries that have significantly enhanced their competitiveness through process automation include manufacturing, mining, agriculture, forestry and fishing, accommodation and food services, and arts and recreation services. However, continual technological advancement make the assessment

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[2] Deloitte (2012) *Digital disruption: Short fuse, big bang?*, accessed 26 October 2017, https://www2.deloitte.com/au/en/pages/building-lucky-country/articles/digital-disruption-harnessing-the-bang.html

and adoption of automation and ongoing aspect of business operation, rather than a single event.

3. **Ongoing need to address industry transformation through automation**
   Digital disruption or potential to automate an industry is not static. Industry transformation takes time and is affected by the emergence of new automation technologies and approaches. Applying new technologies to an existing industry or business may not create global, sustainable competitive advantage, but it may buffer job loss and socio-economic impacts on a region or industry for a sufficiently long period to allow the workforce and economy to transition to new opportunities. Some principles guiding the use of automation as part of an industry development strategy include:

   - Emerging and new industries may offer growth, but industry and skills development strategies need to accommodate the lag before sustainable employment is created in emerging industries

   - Economic contribution may shrink over time, but removal of mature industries from the economic mix can negatively affect a region's economic performance and therefore its national GDP. Mature industries are typically the heart of a region – familiar examples include the regional impact from closing paper mills, steel smelters, car manufacturing plants, mines and power stations

   - The core competence of a mature industry's workforce is often misaligned with future needs, and the required reskilling and alignment takes both time and commitment.

4. **Potential to counter recent out-sourcing trends**
   Automation has the capacity to challenge outsourcing and return certain jobs to Australia. Activities such as call centres, textiles and component manufacturing can be automated or their processes improved. This can not only decrease cost but also raise productivity given Australia's advanced infrastructure and skilled workforce comparative to populous countries where these industries have been outsourced[3]. The skills required to conduct a job that involves interaction with a machine or an automated process involve higher levels of cognition and complexity than are necessarily available in a low-skilled, less-educated workforce with the sole competitive advantage of cost.[4]

These trends and industry drivers make workforce skilling to support automation relevant to all industries and businesses – including those that have already embraced the opportunities that automation offers, and those that have yet to confront change.

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[3] King, G. (2015) *Why it's time to bring manufacturing back to Australia*, accessed 26 October 2017, https://www.industrysearch.com.au/why-it-s-time-to-bring-manufacturing-back-to-australia/f/17535
[4] International Federation of Robotics (2016) *US-Industry: 135,000 new robots bring jobs back home*, accessed 26 October 2017, https://ifr.org/ifr-press-releases/news/us-industry-135000-new-robots-bring-jobs-back-home