
Industry Skills Forecast and Proposed Schedule of Work

DRAFT for Printing and
Graphic Arts Industry
Reference Committee

*Printing and Graphic
Arts*

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Executive summary



In developing this Industry Skills Forecast and Proposed Schedule of Work (ISFPSW), PwC's Skills for Australia and the Printing and Graphic Arts Industry Reference Committee (IRC) continue to refocus the discussion of skills and training to ensure that training design is centred on what will equip learners with the right knowledge and skills to pursue fulfilling careers. This requires setting a clear narrative from sector trends, to skills needs, and through to specific training requirements. To do this requires four key elements (as reflected in the structure of this Industry Skills Forecast and Proposed Schedule of Work):

- **Understanding the sector** (*Sector overview*) – What activities make up the sector that training products are being designed for? What are the sub-sectors within the broader sector and how different or similar are they? Who are the employers and where are they located? Who is undertaking training in the sector and where is that training being undertaken?
- **Understanding the trends shaping the sector and the skills priorities they lead to** (*Employment and skills outlook*) – What does growth of employment in the printing and graphic arts sector look like? What factors are likely to influence the supply of graduates entering the sector? What is impacting on the sector? From how global trends in demographics and digital change are impacting on activities in the sector; how domestic economic conditions are influencing growth; to sector specific trends. How do these trends influence skills needs within the sector? What are employers telling us about their engagement with Vocational Education and Training (VET) and the skills acquired by learners?
- **Understanding the underlying factors driving change and the implications for training product development** (*Key Drivers for Change and Proposed Responses*) – What are the key factors driving change in the printing and graphic arts sector? What are the benefits for learners and workers? How will these drivers be reflected in training product development? What are the implications for occupations and stakeholders? Are there any risks with not proceeding with the proposed responses?
- **Implications for training** (*Proposed Schedule of Work*) – How do upcoming projects align with the trends and skills priorities identified? How do they deliver on the Ministers' priorities? What is the plan to ensure that robust industry consultation is conducted? What is the scope of the work, and what are the specific training product changes recommended?

The views of businesses, learners and other stakeholders in the printing and graphic arts sector are critical to the understanding of skills needs in the workforce and; therefore, the approach to training product review. This Industry Skills Forecast and Proposed Schedule of Work represents an update to the 2017 Industry Skills Forecast.

What is the printing and graphic arts sector?

The printing and graphic arts sector houses the skills that help organisations to communicate messages effectively through a range of media as well as assisting creative industries to deliver their products. Technological disruption and global industry trends continue to rapidly change the environment that requires changes to the industry skills profile.

Trends shaping the sector

Industry feedback, combined with research and analysis, indicates that the following trends will be shaping current and future skills needs.

1 Market adjustment

The printing and graphic arts sector does not just generate print media and there are several areas of potential growth such as customised direct mail advertising, food labelling and packaging, and other consumer goods.

2 Reputation and workforce transition

Based on consultation with the Printing and Graphic Arts IRC and our own research and analysis, attracting new talent and maintaining talent appears to be stemming from three core issues: perception and reputation of the sector; working conditions and prospects; and in many cases, an ageing and static workforce.

3 Customisation and multi-channel marketing

In response to market adjustments, industry participants are expanding into non-traditional service offerings, such as data driven customisation and multi-channel marketing whilst retaining printing as a core service offering and will therefore still employ workers in printing and design occupations.

4 Technological change

Technological changes continue to impact the demand of roles in which people work and the service offerings of the industry.¹ Recent industry changes include developments in data storage capabilities, with big players such as HP and Fuji Xerox developing 3D hardware and software in partnership with firms for implementation over the next 12 months. Additionally there have been significant price reductions in commercial technology.² Over the past year, there have been advancements in 3D printing with innovations in aerospace manufacturing and Monash University producing the world's first 3D printed jet engine in just four months.³

Skills priorities

To enable a flexible and skilled workforce and to adapt to the trends shaping the sector, the Printing and Graphic Arts IRC has identified the following skills priorities.

1 Industry awareness

Understanding of the broad industry and trends within printing and graphic arts, as well as the ability to research and absorb new information to keep up to date with industry trends.

2 Career and development planning

Ability to plan one's own career (or own business) in a changing industry environment by self-assessing skills and planning development and progression.

3 Creative, commercial and critical thinking

Ability to be creative and use problem solving skills in difficult situations.

4 Collaboration and relationship building

The ability to build working relationships and collaborate is becoming increasingly important at all levels. Organisations are expanding service offerings and requiring different parts of the business to work together. This includes communication techniques for identifying and working with different personalities.

5 Agility and flexibility

The ability to respond well to change and embrace new roles and technologies.

Proposed Schedule of Work

Our mandate as a Skills Service Organisation (SSO) to our IRCs, as set by the Australian Industry and Skills Committee (AISC), is to review all units of competency (UoCs) in the Printing and Graphic Arts (ICP) Training Package within the four years from 2017-18 to 2020-21. Additionally, the SSO may propose to create new UoCs or incorporate existing non-native UoCs into qualifications and skill sets, where analysis of trends and stakeholder feedback suggests this training product development activity is necessary. Therefore, the Proposed Schedule of Work in this Industry Skills Forecast presents projects anticipated to be conducted through to

¹ Discussed with IRC members at SSO and IRC meetings, 2017 and 2018

² Discussed with IRC members at formal SSO and IRC meeting, June 2017

³ Monash University (2017), Monash University Jumps into Space Age with 3D printed rocket engine, available at <<https://www.monash.edu/news/articles/monash-university-jumps-into-space-age-with-3d-printed-rocket-engine2>>

June 2021 which will review UoCs, and conduct additional activities to determine scope for the creation of new UoCs. The SSO and IRC drew on analysis of trends and skills to determine Training Package development priorities.

There are two types of projects in this Proposed Schedule of Work:

- **Training product development (TPD)** projects encompass a review of UoC content and are undertaken for the explicit purpose of creating or updating training products to provide for outcomes which meet the needs of industry. These reviews may include amendments to, or consolidation of, current UoCs and/or the creation of new UoCs.
- **Case for change activities.** Where there is not enough current information to determine the discrete nature of the training product development work, but where the IRC identifies subject matter that needs to be examined, this kind of activity has been termed case for change activity.

The 2018-19 project details, as well as the principles used for prioritisation and scheduling are included with the full Proposed Schedule of Work in Section E.

A summary of all training product development projects in the Proposed Schedule of Work is shown in Table 1 below.

Table 1: Summary of Proposed Schedule of Work

Year	Project type	Project code	Project name	Number of Native UoCs
2018-19	TPD	1c	Review design, marketing and other pre-press technical UoCs	66
Total UoCs in scope of review in year 2				66
2019-20	TPD	1d	Review print and post-press technical UoCs	180
Total UoCs in scope of review in year 3				180
2020-21	TPD	1e	Review of UoCs updated in 2016-17 and 2017-18 for currency	Unknown
Total UoCs planned to be reviewed in all years				246



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A. Administrative information

About PwC's Skills for Australia

PwC's Skills for Australia supports the Printing and Graphic Arts Industry Reference Committee (IRC).

As a Skills Service Organisation (SSO), PwC's Skills for Australia is responsible for working with industry and our IRC to:

- Research what skills are needed in our industries and businesses, both now and in the future, to provide the right skills to match our job needs; helping us to stay at the forefront of global competitiveness and support continued economic prosperity.
- Identify and understand current and emerging trends in the global and domestic economy and how they impact on Australia's skills needs.

Revise our vocational qualifications and training content to better match what people will learn with the skills needs of our industries and businesses, giving our population the best possible chance of developing work ready skills.

About the Industry Reference Committee

The Printing and Graphic Arts IRC includes 10 members. The Printing and Graphic Arts IRC membership was refreshed in June 2017.

Table 2: Printing and Graphic Arts IRC Membership

Name	Organisation	Title	IRC role
Andrew Macaulay	Printing Industries Association of Australia (PIAA)	CEO	IRC Chair
Lorraine Cassin	Australian Manufacturing Workers Union (AMWU) Print Division	National Secretary – AMWU Print Division	IRC Deputy Chair
Robert Black	Holmesglen Institute	Program Manager – Printing	IRC Member
Ben Eaton	Starleaton	CEO	IRC Member
Kerim El Gabaili	OnePoint	CEO	IRC Member
Julie Hobbs	FutureNow, Creative and Leisure Industries Training Council/ Design Institute of Australia	CEO/National Immediate Past President	IRC Member
Peter Lane	Lane Print Group	Managing Director	IRC Member
Michelle Lees	HP PPS Australia Pty Ltd	Marketing Manager – Graphic Solutions Business	IRC Member
Brett Maishman	Fuji Xerox Australia Pty Ltd	National Industry Manager	IRC Member
Michael de Souza	Australian 3D Manufacturing Association	CEO	IRC Member

B. Sector overview

The sector at a glance

The printing and graphic arts sector includes workers in Australia with skills that help organisations to communicate messages effectively through a range of media channels, as well as assisting creative industries to deliver their products. Technological disruption and global industry trends have created a rapidly changing environment that requires changes to the industry skills profile.

The Printing and Graphic Arts (ICP) Training Package has eight qualifications from Certificate II to Diploma, with a focus on the Certificate III level. More detail of the ICP Training Package, including an overview of enrolment levels, is included after the sub-sector descriptions and overview by location.

Sub-sector descriptions

The ICP Training Package, unlike other Training Packages, serves a limited and relatively defined workforce (as opposed to having many sub-sectors). The ICP Training Package prepares learners to enter two general occupations: printer and pre-print graphic artist. Due to the generalist nature and limited number of qualifications in the Training Package, each qualification cannot be said to be leading to a single specific occupation, but rather all the qualifications can be used to prepare for either occupation (which may be at different levels of seniority or responsibility).

Sub-sectors are therefore not particularly relevant in printing and graphic arts. Occupations in the industry have traditionally had a variety of specialisation areas, which is at the individual level and these individuals may work together in the same organisation or separately, but still fall in the same sector of creating printed products for clients. Specialisation areas have historically included:

- cardboards, cartons and corrugations
- converting binding and finishing
- desktop publishing
- digital printing
- digital production
- graphic pre-press
- ink manufacture
- mail house
- multi-channel communications
- multimedia
- print finishing
- print production support
- printing
- process improvement
- sacks and bags
- screen printing.

Anecdotal evidence from IRC members and consultations suggests that, increasingly, printing and graphic arts workers are working within multidisciplinary communications teams. In these teams, printing and graphic arts workers are doing a broad range of activities such as developing marketing strategies, designing marketing materials for print and online distribution as well as working closely with workers from other related fields such as information technology and advertising.

Overview by location

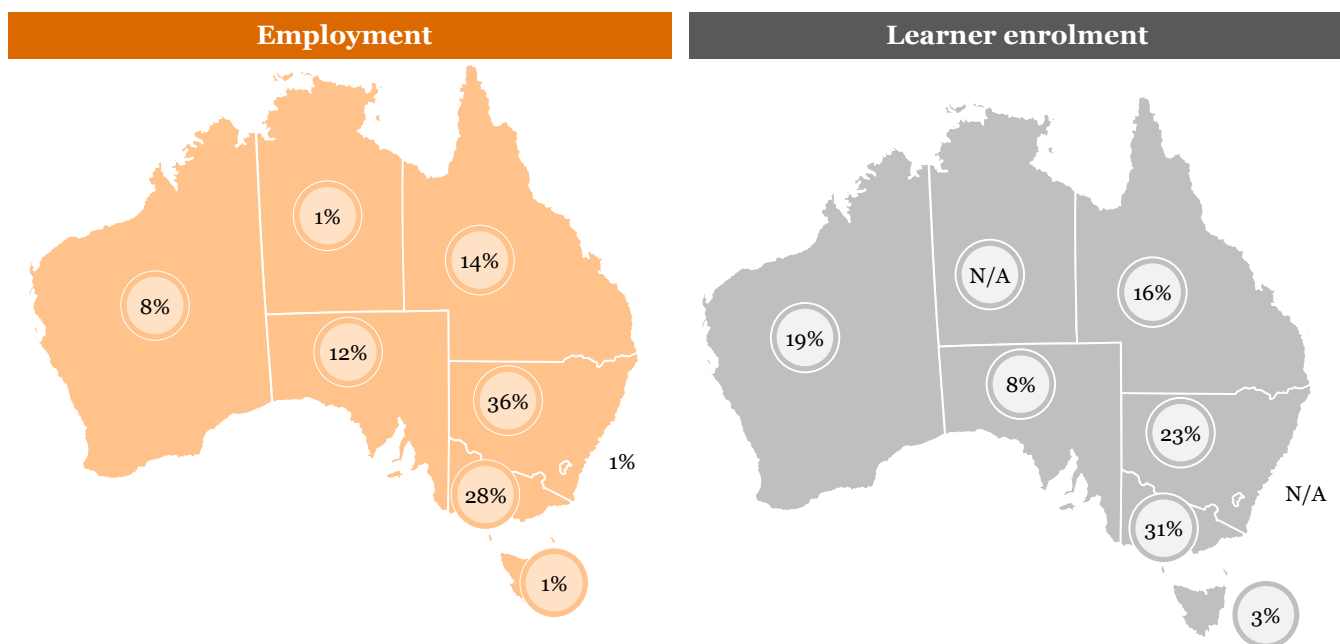
In developing printing and graphic arts training, ensuring direct linkage from a learner's training to their employment in the sector is important. One of the factors influencing the strength of these linkages is the geographical distribution of learners and their employers, with learners ideally located in the same region as their employers.

Key differentiating factors between the states and territories include:

- **Business clustering.** Similar businesses tend to co-locate in certain geographical areas or states. By co-locating, businesses may be able to improve their operating efficiency, leveraging existing networks, related businesses and interpersonal connections between workers.
- **Economic drivers.** The economic drivers within a state or territory shape the composition of sectors and employment. Given this influence, it is unsurprising that the number of workers and learners differ on a state and territory basis, and may have a higher/lower representation comparative to the population.
- **Lack of Registered Training Organisations (RTOs).** Currently the only option for students in the Northern Territory and the Australian Capital Territory is online education. This may be due to the high cost of running a Printing and Graphic Arts training program.

In addition to the above, geographic differences are driven by the ability of larger business and RTOs to attract trainees and fund training. Stakeholders have noted that these factors have been influencing low enrolments in New South Wales. PwC's Skills for Australia will work with industry and RTOs to understand the extent to which this is driving enrolments in other states and territories. Figure 1 below shows the current geographical distribution of domestic learners enrolled in printing and graphic arts training, alongside the distribution of employment in typical printing and graphic arts occupations.

Figure 1: Geographic spread of workers and learners



Source: Australian Bureau of Statistics (November 2017) *Labour Force, Australia – Detailed Quarterly*, cat. no. 6291.0.55.003, NCVET (2017) *Total VET Activity 2016*.

Note: Excludes all enrolments in Certificate II, as that qualification is primarily used as VET in Schools training and is not seen as directly leading to occupational outcomes. The printing and graphic arts sector has been defined by 6 unit level (4 digit) ANZSCO occupations. This definition has been based upon ANZSCO qualification classifications, taxonomy mapping and occupational outcomes of ICP qualifications. N.B Employment in the printing and graphic arts sector cannot be directly defined by the ANZSCO classification of qualifications these are at the 6 digit ANZSCO level but state-by-state employment data is only available at 4 digit level. Note 2: Learner enrolment data presented based on learner location – students who were located in other Australian territories or dependencies, overseas or not know were not included in the percentage calculations. Note 3 – the 2017 Industry Skills Forecast based learner enrolment on delivery location as opposed to learner location therefore care should be taken when comparing these statistics.

Given that a large proportion of the printing and graphic arts sector heavily utilises an apprentice based training model, it is likely to be more difficult for learners to move between states (as a new employer supporting the apprentice would need to be found and enrolment in training transferred to a new provider). As such, problems in the geographical mismatch of employers and learners may persist and cause issues in the sector as workers are unlikely to be highly mobile. However, it is recognised that there are a small number of learners enrolled in ICP training and learner enrolment data as presented in Table 3 below, may vary from year to year.

Printing and Graphic Arts Training Package profile

There are eight qualifications in the ICP Training Package as detailed in Table 3. Of the 4.2 million vocational education and training learners enrolled in 2016, just 1,966 were enrolled in the Printing and Graphic Arts Training Package, ⁴ down 23 per cent from 2015.

Table 3: Qualification scope and program enrolments

Qualifications	RTOs with scope (Jan 2018)	UoCs (native and imported)	Program Enrolments (2016)
Certificate II in Printing and Graphic Arts (General)	21	148	295
Certificate III in Print Manufacturing	8	129	485
Certificate III in Print Communications	17	86	396
Certificate III in Printing	10	165	717
Certificate IV in Printing and Graphic Arts (Mail House)	1	45	N/A
Certificate IV in ePublishing	0	91	N/A
Certificate IV in Printing and Graphic Arts	8	132	51
Diploma of Printing and Graphic Arts	8	110	22

Source: NCVER (2017) *Total VET Activity 2016*; Training.gov.au (2018) *RTO Scope Search Reports*

Note 1: enrolments are taken from 2016 data before Training Package consolidation and therefore numbers reflect all enrolments including those in superseded qualifications.

Printing and Graphic Arts IRC feedback has indicated that there is a concentration of overall enrolments in the Training Package within a single RTO. The effect on learner outcomes of this training density has not been investigated, however, as so few RTOs conduct training for the sector, change should be approached carefully, so as not to discourage existing RTOs from continuing to offer training.

Licensing, regulatory or industry standards issues

In some industries, VET is used to facilitate the completion of compulsory training to obtain a licence or meet certain regulatory requirements. In these cases, particular UoCs will be designed to make sure the individual gains the knowledge to satisfy these requirements.

In the printing and graphic arts sector, occupations are not individually licensed or regulated, with any legislation or standards being imposed at the organisational level instead. Therefore, UoCs are not designed to meet requirements at the individual or occupation level. Despite this, training is still designed to make learners aware of regulatory requirements that are imposed on their industry and enable workers to assist in ensuring that their organisation is meeting its obligations.

⁴ National Centre for Vocational Education Research (2017) *Students and courses 2016*

Regulation that workers in the printing and graphic arts sector need to be generally aware of include:

- **Copyright.** Employees (particularly in design) need to be aware of obligations and ensure that their work and the work of their organisation complies with copyright standards. Learners can choose to undertake 'BSBIPR401 Use and respect copyright', but general compliance is included as a knowledge outcome in over twenty other UoCs in the ICP Training Package.
- **Waste disposal.** Some printing processes can lead to the production of liquid and other waste that must be disposed of in accordance with regulatory requirements or industry best practice. Learners can choose to undertake 'ICPSUP323 Dispose of waste' and over fifty UoCs that teach specific printing competencies have knowledge outcomes of disposing of the waste in line with regulatory requirements.
- **Work health and safety.** Due to there being no specific work health and safety licensing requirements, there are no specific units in the ICP Training Package. However, understanding work health and safety requirements of using certain equipment or being in certain environments is included in a range of UoCs in this training package.

Challenges and opportunities

The views of businesses, learners and other key stakeholders in the printing and graphic arts sector are critical to understanding the skills needs in the workforce. The approach to the Proposed Schedule of Work in this Industry Skills Forecast and Proposed Schedule of Work is centred on this feedback and their views of the challenges and opportunities in their sector and organisations. Table 4 identifies some of the key stakeholders relevant to vocational education and training and the printing and graphic arts sector.

Table 4: Stakeholders in the printing and graphic arts sector

Stakeholder groups	Key stakeholders
Training Product Development	<ul style="list-style-type: none"> • Australian Industry and Skills Committee (AISC) • Printing and Graphic Arts Industry Reference Committee • Other Industry Reference Committees (IRCs)
Government	<ul style="list-style-type: none"> • Australian Skills Quality Authority (ASQA) • Federal, State and Territory Departments • National Centre for Vocational Education Research (NCVER) • Victorian Registration and Qualifications Authority (VRQA) • Training and Accreditation Council (TAC)
Employee representatives	<ul style="list-style-type: none"> • Australian Manufacturing Workers Union (AMWU) Print • Career advisors • Other unions
Employer representatives	<ul style="list-style-type: none"> • Australian Chamber of Commerce and Industry (ACCI) • Australian Graphic Design Association (AGDA) • Australian Industry Group (AIG) • Australian Sign and Graphics Association • Business Council of Australia (BCA) • Design Institute of Australia (DIA) • Printing Industries Association of Australia (PIAA) • Visual Connections • Other industry groups

Stakeholder groups	Key stakeholders
Registered training organisations (RTOs)	<ul style="list-style-type: none"> • Private and community RTOs • Secondary schools (not all provide training) • Technical and Further Education institutions (TAFEs) • Universities (not all provide training) • Teacher and trainer networks
Workers	<ul style="list-style-type: none"> • Graphic artists • Printers • Associated workers
Learners	<ul style="list-style-type: none"> • Domestic learners • International learners

The initial views on the challenges and opportunities faced by employers and learners are drawn from research, surveys and interviews by the SSO and IRC. In addition to face-to-face consultation and research: please also note that the initial views presented below will continue to be verified and expanded through wide consultation with industry, employers and learners in the development of cases for change and other ongoing work.

Employer challenges and opportunities

Drawing on initial consultations with employers in the industry, two key messages have been identified:

- **Employers need support to invest in staff training and development**
- **Printing is an evolving industry**

Employers need support to invest in staff training and development

As relayed by several Printing and Graphic Arts IRC Members, many employers in the printing and graphic arts sector have struggled to realise profitable growth over the past decade, largely due to the transition from traditional information sharing mediums to digital media content. This has inhibited employer ability to invest in the recruitment and professional development of staff. Employers and other stakeholders emphasised the importance of staff development to give workers the right mix of new and traditional skills and to provide adequate training in basic leadership and related skills. In interviews, stakeholders noted:

Training is following the funding, so we are producing graphic designers who can design for web and mobile, but they can't design for printing machines

Michelle Lees, HP PPS Australia Pty Ltd

- *Employers do not have the tools to support an apprentice* – Michelle Lees, HP PPS Australia Pty Ltd
- *RTOs do not have the resources to invest in understanding emerging printing technologies and establishing new courses given low enrolments* – Lorraine Cassin, AMWU Print Division

Printing is an evolving industry

Despite declining demand for traditional print media, employers noted several potential growth areas within printing, particularly in the customisable goods and 3D printing space. A common theme in consultations with our IRC, employers and professional institutions in the industry was the use of emerging print technologies to customise the user experience or market to users, such as on demand printing of customised goods as part of a multimedia marketing campaign. VET can play an important role in facilitating training as technological

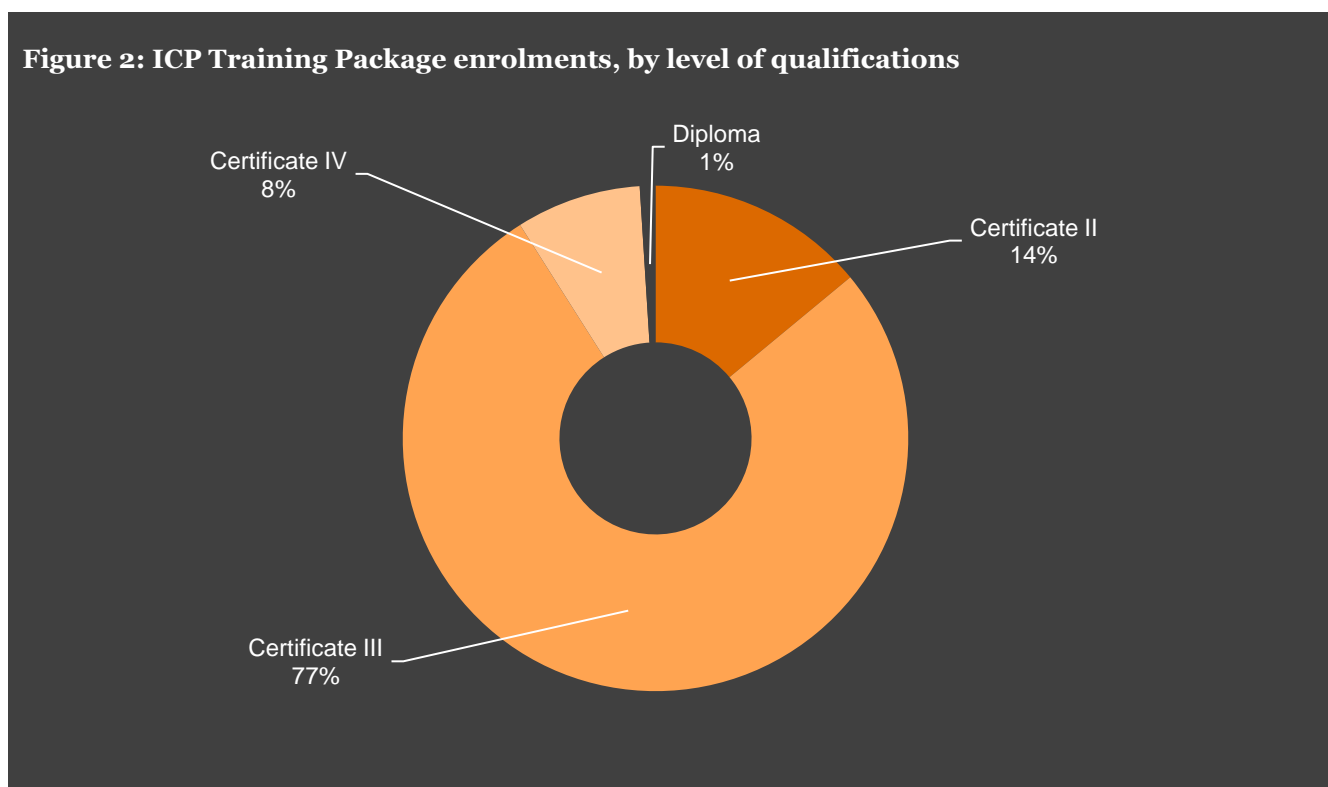
changes, ensuring employers have workers with appropriate skills, both technical and 'soft' to capitalise on technological change. In consultations, employers noted:

- *Less siloing of technical skills will result in a multifaceted worker, able to shift and change through different roles* – Julie Hobbs, FutureNow, Creative and Leisure Industries Training Council and Design Institute of Australia

Learner challenges and opportunities

To give learners the best possible opportunity to get fulfilling jobs, and to help our country to succeed, it is first useful to understand a basic profile of learners and graduates in the ICP Training Package, and the challenges and opportunities they face. A typical learner in the ICP Training Package is:

- Above school age. In 2016, the majority of learners in the ICP Training Package (70 per cent) were over 20 years of age.⁵
- More likely to be enrolled in lower level qualifications. In the Training Package as a whole, 91 per cent of learners are enrolled in Certificate II and III qualifications (Figure 2), 10 per cent higher than 2015.⁶ This is reflective of both the structure of the ICP Training Package, where learners are faced with the challenge of limited options, with only one Diploma on offer and nothing higher, as well as the choices made by learners.



Source: National Centre for Vocational Education Research (2017) *Total VET Activity 2016*, program enrolments

Note 1: enrolments are for 2016, previous to the Training Package restructure, therefore exact qualifications may no longer be representative

Drawing from the National Centre of Vocational Education and Research 2017 VET Graduate Outcomes data, the options and opportunities available to typical learners on completion of printing and graphic arts training are explored below.

⁵ National Centre for Vocational Education Research (2017) *Students and courses 2016*

⁶ National Centre for Vocational Education Research (2017) *Students and courses 2017*

- More likely to be employed than an average VET learner. 86 per cent of ICP graduates are employed six months after training, down from 91 per cent in 2016 and above the 78 per cent average across the VET sector.⁷
- Working in manufacturing. Approximately 63 per cent of graduates were employed in the manufacturing industry, a significant decrease from 76 per cent in 2016.
- Most likely to be employed in technical and trade roles. Of those graduates employed after training, 57 per cent were classified as technicians and trades workers.
- Earnings for an average graduate are comparable with VET graduates across the sector. ICP graduates earned \$54,800 on average in 2017, compared to \$55,000 across the VET sector.⁸ This is a significant decrease from an average of \$62,300 in 2016, however it is above the 2015 average of \$50,500, noting that the 2015 data excluded non-government funded graduates. The volatility of these results could be due to the low enrolment numbers in this training package.
- However, they are less likely to go on to further training. Only 27 per cent of ICP graduates go on to further training. This is low when compared to the 2017 average for graduates across all VET of 30 per cent.⁹

Employment prospects are above average

ICP graduates have better employment outcomes than the national average, with 86 per cent of graduates employed within six months, down from 91 per cent in 2016, and significantly higher than the total VET sector (78 per cent).¹⁰ Of those employed, 77 per cent of graduates find their training relevant to their current occupation, with 56 per cent in the same occupation as their training course.¹¹

Earnings are in line with the average

ICP graduates earned an average of \$54,800 per annum (of those employed full-time after training), down from \$62,300 in 2016 and in line with the \$55,000 across the VET sector in 2017.¹² There is no clear explanation as to why average salaries have decreased so markedly, however the low number of graduates in the ICP Training Package may be causing volatility in the statistics year on year.

⁷ National Centre for Vocational Education Research (2017) *Total VET activity survey 2016*

⁸ National Centre for Vocational Education Research (2017) *Total VET activity survey 2016*

⁹ National Centre for Vocational Education Research (2017) *Total VET activity survey 2016*

¹⁰ National Centre of Vocational Education and Research (2017) *VET graduate outcomes*

¹¹ National Centre of Vocational Education and Research (2017) *VET graduate outcomes*

¹² National Centre for Vocational Education Research (2017) *Total VET activity*

C. Employment and Skills Outlook

The purpose of this section is to provide a broad overview of the magnitude and growth of employment in the printing and graphic arts sector, and to discuss the factors which are likely to influence the supply of printing and graphic arts graduates to fill positions in the sector. It provides context for a more targeted analysis of the specific trends influencing the printing and graphic arts sector, which flow through to skills priorities and training needs.

In order to help understand the scale and growth of employment in the printing and graphic arts sector, historical and projected employment data from the Australian Bureau of Statistics has been analysed. Please also note that as with any empirical analysis of employment, there are limitations in the representativeness of employment data. As such, the limitations of any data are presented in addition to this analysis.

Industry employment outlook

Employment projections at an industry level are confined to specific occupational definitions used for statistical classification (as defined by ANZSCO).¹³ The following occupations have been identified as being most indicative of the printing and graphic arts sector:

- Printers
- Paper and wood processing machine operators
- Print finishers and screen printers
- Printing assistants and table workers
- Graphic pre-press trades workers

Table 5 below shows both current and projected employment data for the above printing occupations at a 4 digit level ANZSCO occupation level. However before interpreting this data, it is important to recognise its limitations, namely:

- The scope of the above occupations may exclude some workers in the broader printing and graphic arts industry, or include some workers outside of the printing and graphic arts industry. As an example, not all media printing is included in the above occupations. The above occupations only include entities involved in printing of media such as newspapers or magazines without publication.¹⁴ Employment in other integrated entities which both publish and print media such as newspapers or magazines is excluded.
- Paper and Wood Processing Machine Operators' is listed as a key occupation in the printing and graphic arts sector. While this occupational group does include operation of machinery used in production of printed paper packaging, it also includes those people involved in the manufacture of logs, plywood, solid laminates and similar timber products. As such, large proportion of employment in this occupational group is unrelated to the printing and graphic arts sector.
- Customisation of some printed products are not captured in the identified printing occupations. For example, employment in the production of self-published books or custom greeting cards are captured in the 'Book Publishing' and 'Other Publishing' industries respectively.

¹³ Australian Bureau of Statistics (2006) *Australian and New Zealand Standard Industrial Classification Cat. No. 1292.0*

¹⁴ Australian Bureau of Statistics (2006) *Australian and New Zealand Standard Industrial Classification Cat. No. 1292.0*

- Only employment which directly relates to the printing of documents and images is included in the above occupations. Furthermore, upstream services which printing and graphic arts workers may be involved in are not likely to be captured. Services which relate to print but are not directly part of the printing process – such as e-publishing, developing marketing strategies, graphic design or advice on how to effectively run a print advertising campaign – are typically not included in the identified printing occupations.
- Occupation level employment is inherently difficult to forecast. Part of the difficulty in producing accurate projections is the changing job roles of those involved in the printing and graphic arts sector. Changing job roles may cause workers to shift out of listed key occupations. For example, a printer who moves towards more of a sales or marketing role would not be captured within the key occupations.
- Employment is dependent on factors which are difficult to predict. Overall print volumes and hence employment is likely dependent upon consumer preferences for printed mediums over digital mediums. Further, the number of workers directly involved in the printing process i.e. 'Printers', 'Printing Assistants and Table Workers' is likely to be heavily dependent upon technical advancements in print machinery and software as well as the uptake of this technology by the sector.

Table 5: Projected employment levels for printing and graphic arts occupations

Occupation	Employment level May 2017 (‘000)	Projected employment level May 2022 (‘000)	Projected employment growth – five years to May 2022 (%)
Printers	12.6	10.5	-16.7
Paper and Wood Processing Machine Operators	6.3	6.3	nil
Print Finishers and Screen Printers	4.9	4.6	-6
Printing Assistants and Table Workers	3.8	3.8	nil
Graphic pre-press trade workers	2.4	2.3	-6

Source: Department of Jobs and Small Business (2017). *2017 Occupational Projections – five years to May 2022*

Note 1: the occupations displayed in the above table are identified as the most relevant occupations to the printing and graphic arts sector, and do not represent all occupations in the sector

The factors contributing to this decline in employment outlook are as follows:

- Ongoing technological improvements such as automation in print technology. As print technology improves, it is likely that fewer workers will be required to produce the same quantity of output.
- Changes in the print technology mix. As the printing industry continues to shift away from offset printing towards digital print technologies, fewer workers directly involved in printing will be required. Digital printing typically requires fewer staff than offset printing due to the higher number of processes involved in offset printing, such as plate preparation, printing, and binding/finishing function.¹⁵
- The shift towards non-traditional service offerings and new product segments. The printing and graphic arts sector is continuing to experience rapid change, shifting towards services and products not traditionally offered by the 'Printing and Printing Support Services' industry. As this shift continues, it is likely that fewer employees will be captured in the statistical definition of the 'Printing and Printing Support Services'.

¹⁵ IBIS World (2018), *IBISWorld Industry Report C1611 Printing in Australia*

Supply side challenges and opportunities

An important consideration in determining the magnitude and growth of employment in the printing and graphic arts sector is the supply of graduates trained for work in the sector. Overall, employment is projected to grow moderately across occupations, with a decline for print finishers and screen printers. A full understanding of the future industry direction should also consider how employment demand will be met. This requires an understanding of the factors which are likely to influence the decisions of learners to enrol in printing and graphic arts training and the supply of workers with training in the sector.

Table 6 lists some of the factors which may influence the decision of workers to undertake printing and graphic arts training and enter a role within the sector. It should be noted that, as discussed elsewhere in this Industry Skills Forecast and Proposed Schedule of Work, most of the factors in the below table represent challenges (rather than opportunities) to encouraging participation in the printing and graphic arts workforce. However, this does represent an opportunity to change some of these perceptions through training design, rather than succumbing to them as inevitable.

Table 6: Supply side influences

Supply side influence	Details
Reputation	<ul style="list-style-type: none"> • There is a public perception that the printing and graphic arts sector offers a poor employment outlook. Part of this reputational issue is poor awareness of what printers actually do and what broader service offerings the printing and graphic arts sector provides. • Research and consultation with the Printing and Graphic Arts IRC has revealed that the sector is often misunderstood by potential workers and career advisors. Furthermore, potential learners are often discouraged from engaging in training, with careers advisors not recommending training in the printing and graphic arts sector as a pathway to employment.¹⁶ • While printing occupations tend not to be highly regarded by society, graphic arts occupations do tend to be highly regarded. On the Australian Socioeconomic Index, printing occupations have a weighted average score of 34 whereas graphic arts occupations have a weighted average score 67 (where the average occupation score is approximately 50 and scores range from a low status of 0 to a high status of 100).¹⁷
Wages	<ul style="list-style-type: none"> • Data indicates that Printing and Graphic Arts VET graduates tend to receive wages in line with the average when compared to other VET graduates in their first six months of employment, however, have limited opportunity for wage growth. • In 2017, full-time employed Printing and Graphic Arts VET graduates received an average annual salary of \$54,800, compared to an average of \$55,000 for all VET graduates.¹⁸ • Progression pathways are often limited due to the prevalence of small or family-owned businesses with little room to develop into more senior roles or ability to invest in employee development.¹⁹

¹⁶ Julie McMillan, Adrian Beavis, & Frank L. Jones, (2009) *The AUSEIO6: A new socioeconomic index for Australia*, *Journal of Sociology*. Vol 45(2): 123-149.

¹⁷ Julie McMillan, Adrian Beavis, & Frank L. Jones, (2009) *The AUSEIO6: A new socioeconomic index for Australia*, *Journal of Sociology*. Vol 45(2): 123-149.

¹⁸ National Centre for Vocational Education Research (2017) *Total VET activity survey*

¹⁹ Canon (2009) *Digital Printing Directions*, available at <http://www.canon.fr/Images/Insight_Report-v1_o_tcm79-612893.pdf>

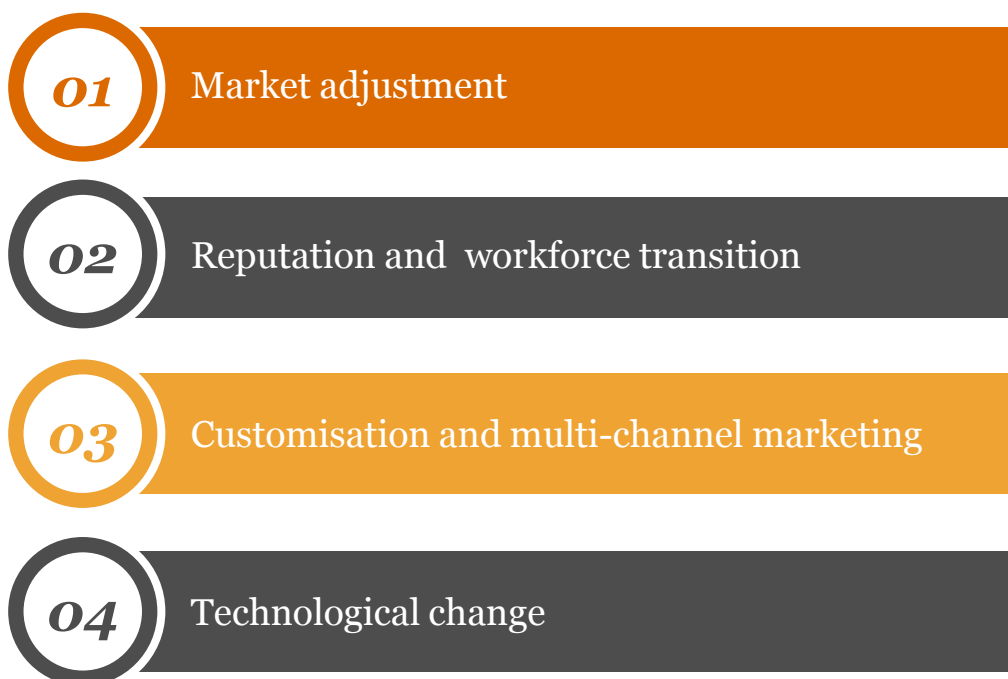
Supply side influence	Details
Working conditions	<ul style="list-style-type: none"> As relayed by the Printing and Graphic Arts IRC, working conditions in the printing and graphic arts sector vary by occupation. In some occupations such as graphic design, illustration or web-design working conditions are generally good, with little manual labour, stable employment and good employment opportunities with a variety of employers. Some sub-sectors of printing (such as news printing), by their nature, are night or shift work and can be 365 days a year to meet production deadlines. These hours and style of work can negatively impact on employee lifestyle.
Lateral movement	<ul style="list-style-type: none"> The IRC has indicated that the older workforce, along with the prevalence of small businesses, can make it difficult for workers to progress upwards or across organisations and does not create space for new workers to enter.
Funding	<p>Funding of VET is a complex and dynamic area. Programs to assist learners undertake training exist at both a state and federal level. For example, the federally funded VET Student Loans program, which replaced the VET-FEE HELP program provides loans to pay tuition fees for VET. State and Territory governments also have various programs in place to assist learners undertake training which may vary by jurisdiction, qualification, provider and background of the learner undertaking training.</p> <p>Consultation with an IRC member has revealed that government funding for retraining can often be difficult to access. As a result of the same standardised industry or occupation definitions being applied to a number of qualifications within the Printing and Graphic Arts Training Package, qualifications may be seen as equal for the purposes of funding. This may mean for example an offset printer, with an existing printing qualification wishing to retrain in pre-press and front-end application design is unable to access government funding to do so. One part of the complex funding arrangements are to target specific qualifications as priority needs and single out these qualifications for subsidies in addition to other subsidies offered on a non-qualification specific basis (such as for particular cohorts of learners).</p> <p>Each jurisdiction has a different list of identified priorities and ICP qualifications included are listed below (although this does not exclude subsidies being available under other programs):</p> <ul style="list-style-type: none"> New South Wales – No ICP qualifications are listed on the ‘Jobs of tomorrow scholarships eligible qualifications list’. However, the ‘NSW Skills List’ lists contains all Certificate II and III qualifications in Printing and Graphic Arts, meaning these qualifications are may be eligible for subsidy, depending on the provider. Victoria – All current ICP qualifications are listed on the ‘Funded Course Report’. Queensland – Currently, no ICP qualifications are listed on the ‘Queensland Training Subsidies List’. Western Australia – Currently, no ICP qualifications are listed under Future Skills WA ‘Priority industry qualifications list’. South Australia – The South Australian ‘Subsidised Training List’ currently lists available places in Certificate II in Printing and Graphic Arts (General), Certificate III in Printing and Graphic Arts (Print Finishing), Certificate III in Printing, Certificate III in Print Manufacturing and the Certificate III in Print Communications. Tasmania – Currently, a significant number of Printing and Graphic Arts qualifications are listed in the Skills Tasmania ‘User Choice – Tasmanian Apprenticeships and Traineeships Listing’. Northern Territory – The ‘Northern Territory Training Entitlement’ currently does not list any ICP qualifications. Australian Capital Territory – Currently, there are no ICP qualifications listed on the ‘Skilled Capital Qualification List’. <p>It is acknowledged that this area is complex and a brief summary cannot capture every detail of funding. Depending on a learner’s circumstances there may be restrictions to the subsidies listed here and subsidies other than those listed here also be available.</p>

As shown in Table 6 above, the supply side influences are not generally positive in the printing and graphic arts sector. With ongoing advancements in technology and the broadening in end to end service offerings, employees will increasingly require employees that can work across a range of equipment and technologies. Having the right number of people entering the labour market for certain occupations is different to those people having the right future fit skills. This presents an opportunity to attract learners into training that will meet the skills needs of the sector.

The following section analyses the trends affecting these potential workers, and how training can ensure the supply of workers is skilled correctly to meet future employment needs.

Trends shaping the sector

This section outlines **four key trends** shaping the printing and graphic arts workforce over the medium to long term.



1. Market adjustment

The printing and graphic arts sector continues to experience rapid change, largely driven by emerging print technology and the ongoing trend of people increasingly consuming print media through digital platforms rather than physical print.²⁰ Although some of the sub-classifications within the industry have declined in terms of revenue and employment, this perception is based on a high level view of the industry and does not take into account growth as businesses move into other areas. Many companies are innovating the way they operate and are moving into areas such as communications logistics, multi-channel marketing, advertising, digital design and 3D printing.²¹

The printing and graphic arts sector does not just generate information media, but produces a diverse range of products and services, including:

- The design and production of information media such as books, magazines, newspapers, financial and legal documents

²⁰ IBIS World (2018), *IBISWorld Industry Report C1611 Printing in Australia*

²¹ Print 21 (2017), *Innovation key to survival*, available at <<http://print21.com.au/innovation-key-to-survival-piaa-survey/127295>>

- The strategy, design and production associated with promotional materials such as catalogues, direct mail, brochures and other collateral
- The design and production of packaging products such as labels and printed folding, corrugated and flexible cartons
- Consumer products such as plastic cards, stationery, signage and manufacturing components
- Outdoor advertising products such as display banners
- Omni-channel marketing and communications services, from inception to delivery. This includes developing more accurate and personalised touch points for customers across print, mobile, social and online platforms.²²

When examining market growth and potential of the sector, it is important to recognise the different factors that may influence demand for all these products.

Data indicates that consumer preference for printed physical media is slowing. Consumers are demanding more convenience and multiple channels for consuming media, driven by the digitisation of traditionally printed mediums such as magazines, newspapers and books.

- Consumer spending on print newspapers is projected to decrease at an annual rate of approximately 6 per cent over the five years from 2017-2021 (\$1034 million to \$763 million). Over that same period, spending on digital newspapers is expected to grow approximately 21 percent (\$248 million to \$634 million).²³
- Similarly the mix of spend advertising between print newspapers and digital newspapers is expected to change, from approximately 79 percent spending in print and 21 per cent in digital in 2016, to 58 per cent and 42 per cent, respectively in 2021.²⁴
- Similar trends of a reduction in print and strong growth in digital with print remaining dominant in total size is also predicted in consumer books and magazines.

However, there are trends outside of print media that influence demand in the printing and graphic arts sector.

- **Overall business activity.** Businesses require a range of printed products such as business cards, brochures, documents, report and signs. Therefore, an increase in the total number of businesses tends to positively affect demand for printing services. As the overall number of businesses in Australia is projected to increase, at least in the short term, this is expected to be a driver of demand in the sector.²⁵
- **Food manufacturing.** Over the past five years, even as other printing services have slowed, demand for food products that require printed labelling and packaging has grown as a proportion of revenue.²⁶ There are also areas for potential growth in the printing and graphic arts sector, including environmentally sustainable packaging and packaging that incorporates QR codes to track food products. Anecdotal evidence from IRC members indicates the growth of employment in the food packaging sector.²⁷

²² Canon (2016) The Role of Print in Omni- Channel Marketing, available at <<http://pps.csa.canon.com/sites/default/files/papers/CSA-newsletter-cp-10-2016-pros.pdf>>

²³ PwC (2016) *Australian Entertainment and Media Outlook 2017-2021: Newspapers*

²⁴ PwC (2016) *Australian Entertainment and Media Outlook 2017-2021: Newspapers*

²⁵ IBISWorld (2018) *IBISWorld Industry Report C1611 Printing in Australia*

²⁶ IBISWorld (2018) *IBISWorld Industry Report C1611 Printing in Australia*

²⁷ Discussed with IRC members at formal SSO and IRC meeting, June 2017

There are areas for potential growth in the printing and graphic arts sector, including environmentally sustainable packaging and packaging that incorporates QR codes to track food products. There has been massive investment into the 'food packaging revolution'

Lorraine Cassin, AMWU Print Division

- **Retail trade.** Retail trade is a large user of print manufacturing, requiring product labels, packaging materials, point-of-sale promotions as well as catalogues and direct-mail advertising. Increased retail trade may drive an increase in demand for these print products.²⁸
- **Direct mail.** In retail advertising, direct mail advertising in particular is seen as having high growth potential.²⁹ This comes after several years of unpopularity and decline, as new technologies are making the customisation of direct mail advertising more easily attainable.³⁰ Australian consumer research has shown that catalogues, flyers and personalised direct mail ranked above any digital advertising channel in effectiveness.³¹ This effectiveness is likely to mean that these physical printed advertising channels are retained by retailers. This view of resurgence of direct mail has been confirmed by consultations with Printing and Graphic Arts IRC members.
- **Emerging product offerings.** Although in many cases, these products currently only make up a small part of the production in the sector, Printing and Graphic Arts IRC members have identified the following emerging product offerings (in addition to the key trends above): vinyl wrap printing, glass and metal printing, display boards and materials, radio frequency identification (RFID) embedded printed product, localised custom web printing.³²

Another trend that may continue is movement of printing and design services in-house, as opposed to contracting outside printing businesses. Lower costs and the improving quality of smaller machines have made small in-house print runs more economical, reducing demand for external printing services.³³ However, whilst this may appear as a decline in sector activity, it does not necessarily mean a decline in printing and graphic arts occupations. These workers may be brought in-house to non-printing businesses, but will still work in the sector and use the skills that could be contained in the ICP Training Package.

²⁸ IBISWorld (2018) *IBISWorld Industry Report C1611 Printing in Australia*

²⁹ Canon (2009) *Digital Printing Directions*, available at <http://www.canon.fr/Images/Insight_Report-v1_0_tcm79-612893.pdf>

³⁰ Marketing Mag (2014) *Direct mail: have we reached peak saturation or is it still a strong option for marketers?*, available at <<https://www.marketingmag.com.au/news-c/direct-mail-have-we-reached-peak-saturation-or-is-it-still-a-strong-option-for-marketers/>>

³¹ Australia Post (2013) *Creating connections that matter*

³² Discussed with IRC members at formal SSO and IRC meeting, August 2016.

³³ IBISWorld (2018) *IBISWorld Industry Report C1611 Printing in Australia*

What does this mean for the printing and graphic arts sector workforce?

Job demand	<ul style="list-style-type: none"> • Potential redistribution from traditional print media to other printing services.
Skills needs	<ul style="list-style-type: none"> • As the kind of printing and graphic arts products and services demanded changes and redistributes, workers will need agility to move between different kinds of printing or technology and different organisations. For example employees will need to be multi-skilled across a range of equipment and emerging technologies in addition to having knowledge of both traditional print and digital print as it becomes more likely that they will need to work across a range of these areas within the business.

2. Reputation and workforce transition

The ongoing challenge for the printing and graphic arts sector is attracting talent and maintaining a motivated and capable workforce. This appears to be stemming from two core issues as identified below. Combined these issues mean that new talent and skills are not entering the industry at a rate that might otherwise be expected. It is therefore important that any new workers that are being trained will come with the critical and creative thinking skills that will help bring fresh perspectives to the sector.

Perception and reputation of the sector

There are some parts of the printing and graphic arts sector that are in decline due to the popularity and prevalence of digital distribution channels. Whilst there are other sub-sectors with stronger prospects, it is those that are struggling that are publicly seen as core printing business and that receive the most public attention and coverage. This has led to a public perception of an industry that is struggling and caught in the past. Part of this reputational issue is a low amount of awareness of what printers actually do and what broader service offerings the printing and graphic arts sector provides.

Businesses in the printing and graphic arts sector are increasingly innovating and diversifying their product offerings. Greater public awareness of these new innovations is required to promote the positive visibility of the sector and understanding that print will remain an important communication channel in the digital economy, particularly for advertising, education and entertainment.³⁴

The concern is that because of a misunderstanding of the sector, potential workers are discouraged from even engaging in training, with careers advisors not recommending the printing and graphic arts sector as a pathway and parents encouraging children to enter university rather than technical qualifications. This perception may need to be addressed before training content is designed, to reposition the public perception of the printing and graphic arts sector. There is a clear need for better communication of pathways in the sector, which are built around entry level apprenticeships at a Certificate III level, with further learning often informal either on the job, through accredited vendor or short course training, or recognition of prior learning.

An ageing and static workforce

Anecdotal evidence from IRC members has indicated that the printing and graphic arts workforce is relatively static, with low turnover. The average worker is older than average and in many cases has less desire to up-skill or progress, and would prefer to stay in a steady position. However, it is recognised that this is not the case for all sub-sectors within the printing and graphic arts sector.

The average age of binders, finishers and screen printers is 44; graphic pre-press trades workers is 45; printers is 44; printing assistants and table workers is 45; and graphic and web designers, and illustrators is 37.³⁵ This compares to an average age of 39.4 years across all occupations in 2016.³⁶

³⁴ Future Now (2017), *Industry Workforce Priorities – Industry: Printing*

³⁵ Australian Bureau of Statistics (2016) *Employee Earnings and Hours, Australia, May 2016, cat. no. 6306.0*, latest update as of 25/02/2018

³⁶ Australian Bureau of Statistics (2016) *Employee Earnings and Hours, Australia, May 2016, cat. no. 6306.0*, latest update as of 25/02/2018

Although it is recognised that this is not the case in all sub-sectors and businesses in the printing and graphic arts industry, the older workforce, along with the prevalence of small businesses makes it difficult for workers to progress upwards or across organisations and does not create space for new workers to enter. This is creating skills gaps in the overall workforce such as:

- lack of adaptability or openness to new ideas as process is influenced by tradition
- less up to date knowledge as formal training was conducted longer ago
- lack of a cohort of emerging leaders to provide mentorship, which is of particular concern, as when the older cohort all approaches retirement together, there will be no one to guide replacement staff.

With advancements in technology, a decline in traditional processes and the broadening of business offerings, many employers are requiring employees that can be multi-skilled across a range of equipment and emerging technologies. There is a strong need to diversify the current workforce and attract younger people into training and employment in what is an exciting industry.³⁷

What does this mean for the printing and graphic arts sector workforce?

Job demand	<ul style="list-style-type: none"> • Low turnover and static workforce means that employer demand for workers is low. • Reputation and perception of poor employment prospects means that supply of potential employees is also low. • Potential emerging talent gap as current workforce nears retirement.
Skills needs	<ul style="list-style-type: none"> • Adaptability and creative thinking skills to combat a static and tradition driven workforce. • Leadership, teamwork and mentoring skills to develop new workers entering the sector.

3. Customisation and multi-channel marketing

As some traditional areas of the printing and graphic arts sector decline, organisations will need to respond to stay successful and responsive to market demands. Industry participants will need to think more creatively in seeking markets and pushing boundaries to enter non-traditional service offerings. Based on research and consultations with IRC members, two examples of the industry achieving this have been identified:

- Data driven customisation; and
- Multi-channel marketing.

The major influencer of these new service offerings are consumer demands. As a result, organisations which traditionally sat in the printing and graphic arts sector are expanding and now employ a greater proportion of non-printing roles. However, they are likely to retain printing as a service offering and will still employ workers in core printing and design occupations. It is not anticipated that individuals in these core job roles will be required to become data analysts or marketing specialists, however they will need to understand the more diversified businesses in which they sit and their alignment to their organisations. Particularly as workers develop into more senior roles, they will require strong industry awareness, adaptability and collaborative skills.

Data driven customisation

Modern digital printing technologies allow for each individual copy made to have customised graphics and text. This has allowed for new services to be offered by the printing and graphic arts sector including:

- **Targeted promotional materials.** Businesses are able to send more targeted and customised marketing material to individual customers on the basis of demographics or observed preferences.

³⁷ Future Now (2017), *Industry Workforce Priorities Industry: Printing*, available at http://www.futurenow.org.au/uploads/2/3/0/4/23042550/futurenow_printing_-_industry_snapshot_may_2017.pdf

- **Trans-promotional messaging.** Businesses sending letters such as bills are able to include full colour customised targeted advertising messaging as a part of the document.

Variable data printing requires skills in managing the databases from which personalised data is stored, as well as using special purpose layout programs. Customisation will also need an increasing use of data for segmentation and predictive analytics. Whilst the technical analytics may fall outside the realm of job requirements of an ICP graduate, they will need an understanding of the consumer demand for customisation and how it impacts their business.

Personalisation of goods is possible with sophistication of data, giving the consumer an interesting and unique customer experience through print

Kerim El Gabaili, One Point

Multi-channel marketing

In response to demand for traditional print media declining, businesses are refocusing towards multi-channel marketing which includes traditional print as a part of a wider marketing business.

*'Multi-channel marketing simply refers to sending out a message utilising more than one communication channel. With so many touch-points available to marketers it is important that the strengths and weaknesses of each communication channel are understood'*³⁸

Working in a multi-channel context will require workers with broader capabilities incorporating digital graphic design components, marketing skills, and the traditional printing skills.

What does this mean for the printing and graphic arts sector workforce?

Job demand	<ul style="list-style-type: none"> • It is expected that new service offerings such as customisation and multi-channel marketing will create new jobs outside the traditional core printing and graphic arts occupations. However, a core set of printing occupations within these organisations will still remain.
Skills needs	<ul style="list-style-type: none"> • Traditional print and design workers need to be able to operate in a multi-channel environment, including awareness of industry trends and data availability, collaboration and creative and critical thinking.

4. Technological change

The printing and graphic arts sector is heavily reliant upon printing hardware and software, both of which are continuing to change.³⁹ Technological changes are continuing to alter the roles in which people work and the service offerings of the industry. Such technological change is further stimulated by Australia's relatively high labour costs, which drive automation trends such as in manufacturing print lines. Three major changes have been identified:

- **Shift in printing technology from offset to digital.** Increased uptake of digital printing is changing the skills required to operate equipment.
- **On demand printing.** Cost-effective technology enables the industry to offer new services to book publishers and individuals.

³⁸ Bright Print Group (2015) *Multi-Channel Marketing*, available at <<http://www.brightprintgroup.com.au/main/index.php/services/integrated-marketing>>

³⁹ Average annual capital expenditure by the Australian printing industry is \$215 million (5 years to Dec 2015). Australian Bureau of Statistics (2016) *5625.0 Private New Capital Expenditure and Expected Expenditure, Australia*

- **3D printing.** Presents a significant growth opportunity for the printing and graphic arts industry.

Shift in printing technology from offset to digital

The continued shift towards digital print technology is altering the types of print products produced by the Australian printing and graphic arts sector as well as the nature of employment within the industry.

Historically, the sector has been mainly comprised of offset printing, producing large volume printed products at a low unit cost.⁴⁰ The industry is now shifting towards newer digital printing technologies such as commercial inkjet printing. This is also reflected in student enrolments, with a decrease in enrolments in traditional offset units of competency.⁴¹

Digital technologies continue to be the dominant source of growth in the printing industry.⁴² Developments in inkjet methods will see the fastest growth in digital processes across 2017-2022 in the global printing industry, leaving the previously dominant offset litho declining in value. In 2017, digital printing accounted for 2.9 per cent of global print market volume and is expected to accelerate to 3.9 per cent by 2022, whereas in the same time period, litho offset is expected to decline from 48.1 per cent to 39.5 per cent.⁴³

Shifting towards digital printing technology has enabled reduced print run lengths. Figure 3 shows that shorter run jobs are making up a larger proportion of total print volumes in recent years, with estimates indicating this trend is likely to continue. As a result of the shift towards shorter print runs, the nature of employment within the sector is changing in a number of ways:

- **Fewer technical staff involved directly in printing.** Digital printing typically requires fewer staff than offset printing due to the higher number of processes involved in offset printing, such as plate preparation, printing, and the binding and finishing function.⁴⁴
- **A shift towards customer facing roles.** Shorter digital print runs require the same amount of time to be spent working directly with customers to determine specifications, costing, billing, etc. However, because fewer copies are produced, less time needs to be spent on the actual printing, binding and finishing of documents, although it is likely that higher level skills will be required for workflow management, with enhanced skills required at the front-end. This means that a greater proportion of workers' time is likely to be devoted to customer facing functions.
- **Increased focus on quick turnaround.** Time frames are typically far shorter with digital printing compared to offset printing. This has led firms to offer rapid-turnaround printing services, requiring workers to have precise time management and prioritisation skills.⁴⁵

⁴⁰ Canon (2009) *Digital Printing Directions*, available at <http://www.canon.fr/Images/Insight_Report-v1_o_tcm79-612893.pdf>

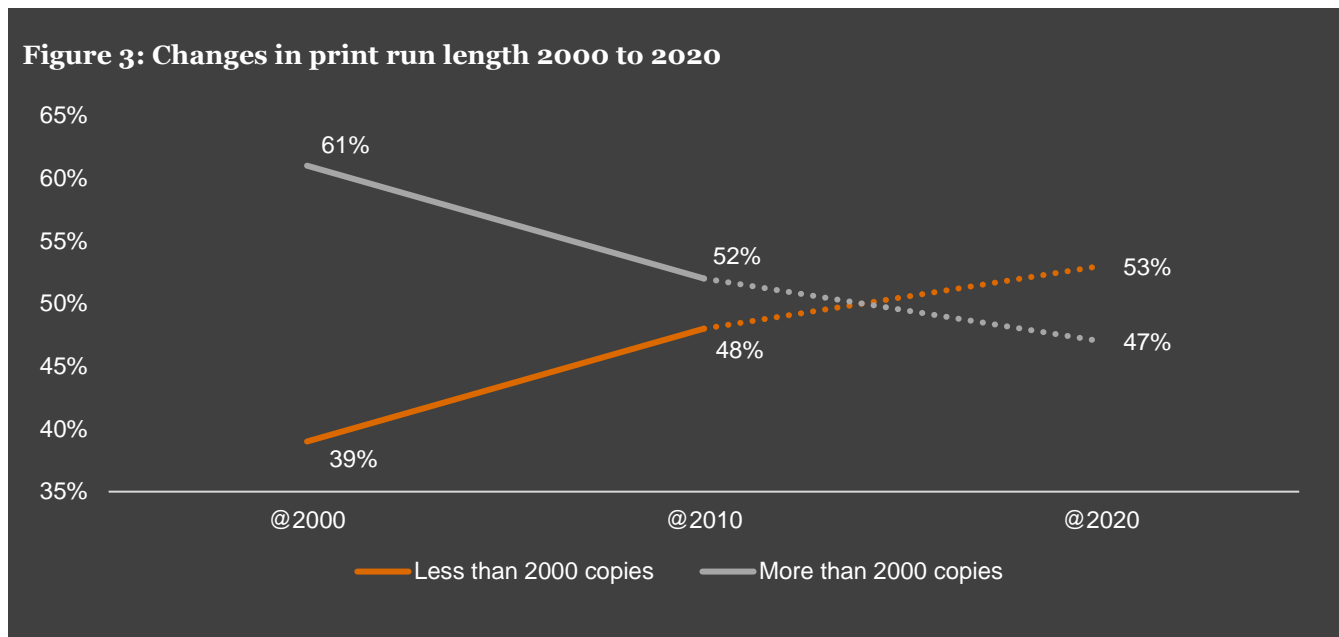
⁴¹ National Centre for Vocational Education Research (2017), *Total Student Enrolments*

⁴² Drupa (2016) *2nd Global trends report*, available at <http://www.drupa.com/cipp/md_drupa/custom/pub/content,oid,32300/lang,2/ticket,g_u_e_s_t/~2nd_drupa_Global_Trends_report.html>

⁴³ Smithers (2017), *Packaging is the growth engine for global print*, available at <<https://www.smitherspira.com/resources/2017/september/digital-vs-offset-printing>>

⁴⁴ Queensland Government (2005) *Queensland Government Department of Public Works Phase 2 Report: Goprint*

⁴⁵ Canon (2009) *Digital Printing Directions*, available at <http://www.canon.fr/Images/Insight_Report-v1_o_tcm79-612893.pdf>



Source: Canon (2009) *Digital Printing Directions*

On demand printing

Advancements in print technology are changing the structure of the book printing industry. Historically, books could only be produced cost-effectively if thousands of copies were produced. However, newer printing technology has made printing individual books more viable. This is giving rise to two new product categories:

- **Print on demand.** Book retailers and publishers are increasingly able to offer titles which are printed as customers order. Rather than holding a large inventory of titles which are infrequently purchased, retailers and publishers can hold digital copies of all titles and print books as orders are received. This enables retailers to both increase the size of their back list as well as reduce costs of holding an inventory of titles which are infrequently purchased.⁴⁶
- **Vanity publication.** Digital printing technology has also allowed the printing industry to offer low volume book publication services to individuals. Using digital print technology, it is possible to produce individual copies of books for customers such as hobbyists wishing to have their works published professionally.

These new service offerings are likely to require workers in the industry to deal increasingly with new types of customers. These may include small niche or technical publishers using print on demand services and individuals wishing to have their works published.

3D printing

3D printing (also referred to as additive manufacturing) is expected to become a key growth area within the global economy, with the market for 3D printing equipment and services estimated to grow from US\$2.5 billion in 2013 to US\$16.2 billion in 2018.⁴⁷ One Australian technology specialist, Steve Sammartino, has predicted that 3D printing will have an even bigger impact on economies and society than the internet.⁴⁸ Recent developments in the sector include innovations in renewable energy, with the University of Newcastle’s 3D printing water-based solar paint to improve solar panel technology,⁴⁹ and in medical devices, with 30 per cent

⁴⁶ The Conversation, Zoe Sadokierski (2014) *Shelf Promotion: how everyone can be a publisher with print-on-demand book*, available at <<https://theconversation.com/shelf-promotion-how-everyone-can-be-a-publisher-with-print-on-demand-books-30923>>

⁴⁷ PwC (2014) *The road ahead for 3-D printers*, available at <<http://www.pwc.com/us/en/technology-forecast/2014/3d-printing/features/assets/pwc-3d-printing-full-series.pdf>>

⁴⁸ Sarah Sedghi and Eleanor Hall (2015) *3D printing will have a bigger economic impact than the internet, technology specialist says*, ABC News Online

⁴⁹ The University of Newcastle (2016) Newcastle University’s Solar Panel Painting

of internal medical implants and devices to be 3D printed by 2020.⁵⁰ Furthermore, there have been innovations in aerospace manufacturing with Monash University producing the world's first 3D printed jet engine in just four months.⁵¹ These skills opportunities are currently being explored through the 3D printing Case for Endorsement.

The applications for 3D printing range across industries and traditional occupation roles. 3D printing draws on digital design, manufacturing, ICT and visual arts skills and has potential implications on all industries, from health to infrastructure to artistic expression. It is expected that applications will continue to be discovered as the technology becomes more widespread, but its potential can be seen in the uses already being explored. Examples include:

- **Changing the way that new products are developed.** For example, the use of 3D printing can reduce development time by up to 96 per cent and can produce products that are built in one part, reducing construction requirements and making complex components that cannot be made with conventional method.⁵²
- **Reducing manufacturing costs.** For example, the use of 3D printing in manufacturing can reduce costs by up to 40 per cent by removing expensive and complex components of conventional manufacturing and allowing the customisation of goods based on customer demand.⁵³
- **Exploration of medical implications.** For example, a 3D printed bio-ceramic implant to assist osteoarthritis sufferers,⁵⁴ or 3D printed heart models that can assist doctors in diagnosis and treatment planning,⁵⁵ and even the exploration of printing live cells.⁵⁶ In addition, the development of 3D printed dentures and temporary crowns, and even "bio printing," where 3D implants function as normal anatomical structures until native cells are repaired and replace the implant automatically so no artificial implant remains – reducing both the cost and pain of traditional surgeries for patients. ⁵⁷
- **Expansion into different printing mediums.** Including materials which can result in 4D printed objects, which are those that be respond to their environment, such as materials that respond to heat or moisture levels.⁵⁸

Not all roles to do with 3D printing will be reskilling of the existing printing and graphic arts workforce. The skills required are comprehensive, creating opportunity for individuals from varied backgrounds. 'Actually translating your designs into physical objects takes more work and a broader skill set that requires a combination of maths, programming, art or design, materials science, and mechanical engineering'.⁵⁹

However, the commercial printing industry is well positioned to capitalise on some parts of this growth. Many of the skills required to produce 3D printed objects are part of the key competencies held by workers in the commercial printing industry, namely:

- Advising as to suitability of different production techniques, materials and substrates
- Job costing

⁵⁰ 3D Printer and 3D Printing News (2017) *Gartner: 3D printing to accelerate in manufacturing industries in 2017*

⁵¹ Monash University (2017), *Monash University Jumps into Space Age with 3D printed rocket machine*, <available at <<https://www.monash.edu/news/articles/monash-university-jumps-into-space-age-with-3d-printed-rocket-engine2>>

⁵² The Conversation (2013) *Can 3D printing rebuild manufacturing in Australia?*

⁵³ Pacific Consulting Group (2017), *What does 3D printing mean for Australian business?*, available at <<http://www.pacificconsultinggroup.com.au/peg-insights/case-studies/what-does-3d-printing-mean-for-australian-business/>>

⁵⁴ 3Ders (2016) *3D printed bioceramic implants for bone repair to enter market soon*, available at <<http://www.3ders.org/articles/20160411-3d-printed-bioceramic-implants-for-bone-repair-to-enter-market-soon.html>>

⁵⁵ Bridget Butler Millsaps (2016) *Nothing short of amazing: The 3D printed heart library at jump trading center benefits everyone*, available at <<https://3dprint.com/127777/3d-printed-heart-library/?>>

⁵⁶ Virginia Harrison (2015) *3-D printers could soon make human skin*, available at <<http://money.cnn.com/2015/06/17/technology/3d-bioprinting-skin/>>

⁵⁷ Australian Government Department of Health (2017), *Proposed Regulatory Changes Related to Personalised and 3D printed Medical Devices*

⁵⁸ Science Alert (2014) *4D printing create structures that self-assemble*, available at <<http://www.sciencealert.com/watch-4d-printing-creates-structures-that-self-assemble>>

⁵⁹ The Conversation (2013) *Can 3D printing rebuild manufacturing in Australia?*

- Preparation of digital files for printing (pre-print and pre-flighting)
- Setup of complex machinery
- Maintenance of machinery.

The commercial printing industry is also likely to have the scale needed to provide the significant capital outlay required to purchase higher quality, higher volume 3D printing equipment (with some higher quality 3D printing equipment ranging in price from \$250,000 to \$750,000).⁶⁰ This is likely to give the commercial printing industry both a cost and quality advantage over small scale desktop production, particularly in larger scale production runs of 3D printed objects.

A lot is happening in the Print 3D space, biotechnology – we're now printing skin cells and bionic hands ... it's an interesting, progressive and changing industry

Michelle Lees, HP PPS Australia Pty Ltd

The Australian printing industry may look to capitalise upon the predicted growth in the 3D printing industry, however to do so, a skilled workforce with the necessary skills in 3D printing will be critical.

The developments in 3D printing also raise concerns with an increasing demand for ethical printing required, with current Intellectual Property rights insufficient in encapsulating 3D printing copyright and trademark laws.⁶¹ Through 3D printing, extensive personal manufacturing of copyrighted objects without authorisation can occur with computer-aided design (CAD) files readily available on the Internet.⁶² Furthermore, due to the decentralised production process of 3D printing, issues arise in regards to who holds the design right and patent protection – with some individuals creating the blueprint and others digitally modelling it. These ethical issues also emerge in 3D bio printing, where the use of viable living cells to print human organs is sparking intellectual property concerns as well as issues regarding safety and accessibility to middle-class economies. A robust portfolio of intellectual property rights will thus need to be established to allow the sector to be protected and grow in the long term.

⁶⁰ Australian Broadcasting Corporation (2014) *3D printing seen as manufacturing route for the future*, available at <<http://www.abc.net.au/news/2014-10-13/3d-printing-seen-as-manufacturing-route-for-the-future/5807984>>

⁶¹ World Intellectual Property Organisation (2017), *3D Printing and IP Law*, available at <http://www.wipo.int/wipo_magazine/en/2017/01/article_0006.html>

⁶² Intellectual Property Watch (2017), *Inside views: to print or not to print – Innovations and IP issues in 3D printing*, available at <<https://www.ip-watch.org/2017/07/19/print-not-print-innovation-ip-issues-3d-printing>>

What does this mean for the printing and graphic arts sector workforce?

The continual and rapid evolution of printing processes and software means that workers in the industry are likely to need to adapt to ongoing technological change.

Job demand	<ul style="list-style-type: none"> Workers will need to be able to shift jobs within the printing industry, as focus shifts towards digital printing and new printing market segments.
Skills needs	<ul style="list-style-type: none"> Up to date digital printing skills (rather than traditional offset printing skills) are essential as the industry moves towards a greater proportion of digital printing. Workers in the printing industry need to be flexible and able to adapt to change and upskilling of current employees in new technologies may also be required. Understanding of 3D printing technology and services.

Creating a future fit workforce

Using feedback from stakeholders and the data available, five priority skills have been identified for the ICP Training Package (Table 7). This list is an assessment of the priority areas for development following an assessment of key trends and the state of the Training Package. It is recognised that these skills are cultivated to varying extents in the sector, but feedback suggests they are of ongoing critical importance.

It is important to note that, due to the pace of change in technology and consumer preferences, required technical skills in the sector are changing. PwC’s Skills for Australia and the IRC intend to continue to consult with industry to understand what these new and emerging technical skills are, with a particular focus on the delineation of skills in screen printing compared to wide format, and the variety of skills required for ‘hard output’, ‘processing’ and other variations of 3D printing.

Table 7: Priority skills in the printing and graphic arts sector

	Skill	Definition	Rationale
1	Industry knowledge	Understanding of the broad industry and trends, as well as the ability to research and absorb new information to keep up to date with industry trends.	<ul style="list-style-type: none"> As highlighted in the trends analysis, different parts of the sector are contracting, growing or transforming in response to external factors. This will include a general understanding of the growing use and importance of data in business decision making, recognising that there will be other more specialised occupation roles that will undertake this analysis. Increased industry awareness of workers is likely to lead to adaptability and sustainability of the industry itself, allowing it to adapt to changes outlined in the trends shaping the sector.⁶³
2	Career and development planning	Ability to plan one’s own career (or own business) in a changing industry environment by self-assessing skills and planning development and progression.	<ul style="list-style-type: none"> With the above knowledge of the industry, workers will also need the skills to self-assess and plan their own careers in this changing environment. This will build upon industry knowledge and help identify the opportunities to diversify, as well as where there is a need for core printing services.
3	Creative, commercial and critical thinking	Ability to be creative and use problem solving skills in difficult	<ul style="list-style-type: none"> Although it may not be the case in all sub-sectors of the printing and graphic arts industry, IRC feedback suggests that many workers (including managers) in the sector do not have the skills to recognise problems, isolate the root-cause of that

⁶³ Consultation with an IRC member

	Skill	Definition	Rationale
		situations.	<p>problem and then find and implement the solution. These core problem solving skills are important to any technician or manager working in the sector, however IRC feedback suggests that these skills are currently lacking in the Training Package. However, it is also recognised that this may not be the case for all sub-sectors within the printing and graphic arts industry.</p> <ul style="list-style-type: none"> • These skills are not about the printing and graphic arts workforce taking on different roles but about being able to undertake the same roles by bringing problem solving skills alongside technical expertise.
4	Collaboration and relationship building	Ability to build working relationships and collaborate within an organisation that may be broad ranging in its service offerings, but required different parts of the business to work together. This includes communication techniques for identifying and working with different personalities.	<ul style="list-style-type: none"> • These communication skills go hand in hand with industry knowledge and understanding to allow workers in the sector to operate to the best of their ability in changing environments. • As organisations in the sector begin to offer broader service offerings, workers will need to collaborate with the broader teams. • These skills are seen as particularly important to develop in the printing and graphic arts sector because of the static workforce and reputation of the industry. Ability to collaborate meaningfully feeds in to the values and culture of the sector. Strong interpersonal skills and ability to communicate the value of the sector will help to attract talent and change the standing of the sector.
5	Agility and flexibility	The ability to respond well to change and embrace new roles and technologies.	<ul style="list-style-type: none"> • Changing technology and preferences is requiring workers in the printing and graphic arts sector to ‘top-up’ their skills to keep up to date with change. • ICP graduates will need adaptability and flexibility so that they can move seamlessly between sub-sectors or organisations that may not have their core business in the sector, but still require printing and graphic arts skills. • This agility will also include the ability to be autonomous and self-directing in a changing sector. • Agility, together with problem solving skills, will make workers more open and able to understand new technologies, and their associated applications and benefits to their specific field. This will enable the sector to harness the possibilities of technological change.

In addition to skill priorities identified in this section, the IRC is required to rank a supplied list of 12 generic workforce skills (supplied by the Department) in order of importance to relevant employers. For the printing and graphic arts sector, these skills have been ranked below in Table 8.

All skills listed in Table 8 are important. Low ranking does not imply that the skill is not important, but rather lower ranking only indicates that these skills are not critical priorities for the printing and graphic arts sector. Further, Table 8 also only shows rankings of importance as an average across the whole sector, some skills may have higher or lower importance for particular organisations and particular sub-sectors. Note that these skills are read in line with definitions provided by the Department.

Table 8: Ranking of key generic workforce skills

Importance	Generic workforce skill
1	Learning agility/Information literacy/Intellectual autonomy and self-management
2	Customer service/Marketing
3	Design mindset/Thinking critically/System thinking/Solving problems
4	Technology use and application
5	Entrepreneurial
6	Data analysis
7	Managerial/Leadership
8	Communication/Collaboration including virtual collaboration/Social intelligence
9	Financial
10	Science, technology, engineering and maths (STEM)
11	Language, literacy and numeracy (LLN)
12	Environmental and sustainability

Opportunities for collaboration on training development across industry sectors

Training Packages are not always developed in a way that recognises the importance of skills in multiple sectors and which can be used to their full potential in various industry contexts. The AISC has identified several cross sector skill areas where opportunities exist to create flexible and transferable package components that will benefit industry, learners and the broader VET sector.

PwC’s Skills for Australia has been commissioned to develop training package components that address skill needs across industries in four cross sector skill areas: Cyber Security, Big Data, Teamwork and Communication, and Inclusion of People with Disability in VET. The expected outcomes of these cross sector projects include:

- Significant reduction in the level of duplication across the national training system
- Better support for individuals to move between related occupations
- Improved flexibility and efficiency in Australia’s VET system.

Table 9 below identifies opportunities for linkages between existing cross sector project work and the ICP Training Package.

Table 9: Training development opportunities across industry sectors

Cross sector project	Project scope	Link to ICP Training Package
Automation	Identify related skill and knowledge needs in automated processes and the use of robotics, drones and remote operations systems shared by multiple industry sectors.	This project may affect current ICP UoCs related to workflow automation.
Big Data	Identify related skill and knowledge needs in data management, data analytics and data driven decision-making that apply across multiple industries.	This project may affect current ICP UoCs related to data-driven customisation.
Cyber Security	Identify related skill and knowledge needs in information security, data protection and privacy shared by multiple industry sectors.	Currently no identified overlap, however any unit created as part of the project will be considered for importation into the ICP Training Package where relevant and required by the industry.
Consumer Engagement through Online and Social Media	Identify related skill and knowledge needs in cultural awareness, customer service, marketing, communication and social media skills shared by multiple industry sectors.	Potential overlap identified specifically related to the shift toward a greater customer focus within the printing industry and the impact of digital on marketing and advertising which is impacting on the skills needs of individuals. Where appropriate, the leveraging of appropriate units for importation into ICP Training Package will be considered.
Digital Skills	Identify related skill and knowledge needs in digital literacy, 3D printing/additive manufacturing and coding skills that apply across multiple industries.	This project could affect a number of ICP UoCs, particularly those relating to digital printing; 3D printing; online newspapers; digital advertising; multi-channel marketing.

Cross sector project	Project scope	Link to ICP Training Package
Environmental Sustainability	Identify related skill and knowledge needs in environmentally friendly products, manufacturing and waste processes, and sustainable energy production that apply across multiple industries.	This project may affect current ICP UoCs related to disposal of waste and environmental hazards.
Inclusion of People with Disability in VET	Develop training package components that can be used by multiple industries to build the capability of VET educators and employers to foster greater inclusion of people with disability in vocational education and training, employment, and customer service contexts.	This project will consider the implications for the development of both printed and online materials in the ICP Training Package, including compliance with guidelines around accessibility such as web accessibility and screen readers, particularly for visually impaired students. This is essential to ensure that the print/graphic content being developed is accessible to people with disability.
Supply Chain	Identify related skill and knowledge needs in traditional supply chain management practices as enabling services for the economy that apply across multiple industry sectors.	This project may affect current ICP UoCs related to digital information and inventory management.
Teamwork and Communication	Develop common teamwork and communication units that address common skill and knowledge needs and can be contextualised across multiple industries.	This project may affect current ICP UoCs related to communication which is an increasingly essential skill for workers. The ability to collaborate and work as part of a team is required within organisations in order to understand the more diversified business in which they sit. The importation of appropriate units into ICP will be considered.

Industry consultation has identified a number of potential cross sector skill and capability areas, relevant for future workers in the printing and graphic arts sector and also more broadly applicable across multiple industry sectors. These present opportunities for future collaboration on training package development, improved flexibility, and enhancing occupational mobility for learners. Although not an exhaustive list of potential cross sector skill and capability areas, these include:

- **Adaptability and flexibility skills.** Given the ongoing evolution in printing and graphic arts, workers in the sector will need to remain open and receptive to new printing technologies and non-traditional product and service offerings. As well, the increasing demand for a multifaceted worker, who is able to shift and change through different roles in the printing and graphic arts sector, suggests a need for adaptability and flexibility skills. These skills also have broader applicability to other industry sectors, including: information and communications technology (given the accelerating pace of technological change in the sector); tourism and hospitality (e.g., to flexibly respond to different customer needs); health and nursing (e.g., to adapt and react to changes in patient needs).

- **Entrepreneurial skills**⁶⁴. The rapid advancements in digital and 3D print technologies, together with the rise of user experience customisation, suggest a need for entrepreneurial skills, particularly in creativity, innovation and marketing. Such skills also have broader applicability to other industry sectors, including: culture and related industries (e.g., where workers need to promote their professional brand and build a portfolio of work); construction (e.g., a business mindset to ensure a pipeline of new projects for business viability); retail (e.g., to support product evolution and business).
- **Resilience skills**. The time pressured, creative nature of work in the printing and graphic arts sector places demands on workers to be able to continuously innovate in time sensitive environments. As well as needing entrepreneurial skills, this suggests workers in the sector will increasingly need skills in resilience. Resilience skills also have broader applicability to other industry sectors, including: agriculture and farming (e.g., where farmers need to cope with the seasonality pressures on their crops); community services (e.g., where workers need to bounce back from emotionally challenging situations and outcomes); emergency services (e.g., where first responders continually face threats to personal safety); business services (e.g., where workforce managers need to bounce back from stressful management challenges).
- **Professional and ethical practice skills**. Workers in the printing and graphic arts sector may have, at any one time, multiple clients or be working on sensitive information before it reaches public domain. This suggests a need for skills in professional and ethical practice, and complying with legislative and regulatory requirements. Professional and ethical practice skills also have broader applicability to other industry sectors, including: financial services (e.g., to follow professional and ethical guidelines in the delivery of financial services and products); child care and support (e.g., to comply with legal responsibilities regarding working with children and following proper escalation procedures); food and beverage (e.g., to adhere to food safety standards and uphold company values and principles).

⁶⁴ Entrepreneurial skills used in this context refer to the commercial skills and mindset, the ability to take any idea and turn that concept into reality, bring it to market, and make it a viable product or service.

D. Key Drivers for Change and Proposed Responses

Design, marketing and pre-press

The Printing and Graphic Arts IRC has prioritised Design, Marketing and other Pre-press Units of Competency as a key area for review in 2018-19, given that the review will address a key emerging trend related to market adjustment.

Four key drivers for change have been identified below in addition to an outline of proposed training product responses and the impact on stakeholders informed through consultations with industry. We have gathered multiple perspectives from industry stakeholders on the proposed training package responses which are not expected to have a major impact on any particular stakeholder group(s), given their limited scope. It is important to note that the Printing and Graphic Arts Training Package underwent a significant restructure relatively recently, so excessive change is not recommended.

The following drivers are impacting on the industry's ability to react and adapt to change in addition to shifting the skills needs required by the industry.

Table 10: Key Driver for Change

Key driver for change

- 1 Organisations are placing a greater emphasis on marketing and sales and data driven customisation.** Employees will now commonly require both core printing and non-traditional knowledge and skills to deliver on new service offerings. In order for businesses to remain adaptable and flexible to changing roles, an increased customer focus and the ability to customise services is necessary in addition to an understanding of how this refocus will impact on the overall business.⁶⁵ The Training Package needs to anticipate and cater for this shift by ensuring that the traditional manufacturing focus is combined with a focus on service. Marketing and sales skills are also becoming increasingly pertinent to printing and graphic arts businesses in addition to the move to customisation as the market continues to shift toward providing an end-to-end service for customers. Industry stakeholders have emphasised that the pace of change is unlikely to slow, thus adaptability and flexibility are critical skills for learners and workers moving into new or changed roles.

Proposed Responses

The following is proposed in response to the above key industry driver for change:

Table 11: Proposed responses

Proposed Responses

- 1 Review existing UoCs related to sales and marketing** in light of industry needs with close consideration of existing units from other Training Packages which could potentially be imported into the current package **and/or the development of a new skill set** focused on capability uplift in sales and marketing. It is anticipated that imported Units will be relied on to address the needs of the Printing industry in this regard.
- 2 Develop one skill set in graphic design with a print production focus.** It is anticipated that this will allow individuals to move from design fields into the printing and graphic design field which will allow for the upskilling of individuals. This skill set will comprise of both native and imported Units of Competency to ensure they are consistent with the blend of skills required by employers.

⁶⁵ IBIS World Industry Report C1612 (2017) *Printing Support Services in Australia*. Hayley Munro-Smith.

Table 12: Implication of proposed response for stakeholders

Stakeholder	Impact
Industry/employers	Potential employees have current and relevant skills, less ‘on-the-job’ training required, improved options for upskilling and reskilling that can be accessed by employees, and easier recognition of qualifications and the accompanying skills that can be expected
Employees	Improved employability and job readiness, less ‘on-the-job’ training required, improved options for upskilling and greater recognition of qualification and skill level
Learners	Pathways to transition between sub-sectors, increased breadth of knowledge, increased currency and relevance of skills
RTOs	Increased opportunity to offer relevant, industry supported training
Other IRCs/Training Packages	Impacts are not expected to be significant.

Implication of proposed response for occupations in the industry

It is anticipated that the proposed changes will impact on those in:

- Design related fields
- Graphic design
- Generalist and niche printing businesses
- Organisations with in-house printing capabilities

Risk of not proceeding with proposed response

The base case (the ‘do nothing’) option must be considered as an alternative to the proposed changes in order to enable effective comparison between the two scenarios. This option negates the need for investment in training products, however does not address the current state issues identified. The likely impacts of this option are outlined below:

Likely impact (s) if not addressed

- **Ongoing confusion and uncertainty** about the specific value of ICP qualifications due to generalist nature and lack of structure
- **Learners being trained in obsolete technologies**, undermining training value as well as employment outcomes and ability to contribute to the workforce
- **Current skills gap** in understanding design for different types of printers will not be addressed, leaving some graphic designers not fully equipped to adapt to different technologies and channels
- **Missed opportunity to improve competitiveness** of printing businesses by equipping new and upskilling workers in the importance of sales and marketing skills in training
- **Missed opportunity to streamline and modernise** the ICP Training Package by removing Units that are no longer required by industry, many of which are barely used.

Table 13: Key Driver for Change

Key driver for change

- 1 **A reduction in offset printing technology and the shift to digital printing is changing skills needs in the industry.** Technological changes such as the uptake of digital printing technology and the shift away from offset printing are resulting in an increasing shift towards digital printing due to advantages including:

Key driver for change

- lower cost for small print runs
- faster production times⁶⁶
- less staff hours required per print run

This shift in technology means that some skills currently embedded within the Training Package are becoming obsolete or no longer requiring formal training.

Additionally, there are non-traditional areas of growth within the printing industry which are not well captured by current data due to their recent emergence. The traditional scope of the printing industry data does not reflect areas of growth such as food labelling, 3D printing, on demand printing, environmentally sustainable packaging, vinyl wrap/metal/glass printing, and RFID embedded printing which are growing in demand and relevance.

Proposed Responses

The following is proposed in response to the above key industry driver for change:

Table 14: Proposed responses

Proposed Responses

- 1 Review existing UoCs** that have been identified by industry as being out of date, not fit for implementation, duplicative, or no longer required. For example those related to offset printing skills and technology where they are no longer current or required.
- 2 Develop new UoC** to address identified skills gap in advanced use of graphic application skills and knowledge.

Table 15: Implication of proposed response for stakeholders

Stakeholder	Impact
Industry/employers	Potential employees have current and relevant skills, less 'on-the-job' training required, improved options for upskilling and reskilling that can be accessed by employees, and easier recognition of qualifications and the accompanying skills that can be expected
Employees	Improved employability and job readiness, less 'on-the-job' training required, improved options for upskilling and greater recognition of qualification and skill level
Learners	Pathways to transition between sub-sectors, increased breadth of knowledge, increased currency and relevance of skills
RTOs	Increased opportunity to offer relevant, industry supported training
Other IRCs/Training Packages	Impacts are not expected to be significant. The cross sector impacts of any unit deletion will be closely considered (for example ICPDMT296 Create and test an interactive CD-ROM/DVD has been identified for potential deletion, a unit currently used within Culture and Related Industries qualifications).

Implication of proposed response for occupations in the industry

It is anticipated that the proposed changes will impact on those in:

⁶⁶ Canon (2009) *Digital Printing Directions*, available at <http://www.canon.fr/Images/Insight_Report-v1_o_tcm79-612893.pdf>

- Design related fields
- Graphic design
- Generalist and niche printing businesses
- Organisations with in-house printing capabilities

Risk of not proceeding with proposed response

The base case (the ‘do nothing’) option must be considered as an alternative to the proposed changes in order to enable effective comparison between the two scenarios. This option negates the need for investment in training products, however does not address the current state issues identified. The likely impacts of this option are outlined below:

Likely impact (s) if not addressed

- **Ongoing confusion and uncertainty** about the specific value of ICP qualifications due to generalist nature and lack of structure
- **Learners being trained in obsolete technologies**, undermining training value as well as employment outcomes and ability to contribute to the workforce
- **Current skills gap** in understanding design for different types of printers will not be addressed, leaving some graphic designers not fully equipped to adapt to different technologies and channels
- **Missed opportunity to improve competitiveness** of printing businesses by equipping new and upskilling workers in the importance of sales and marketing skills in training
- **Missed opportunity to streamline and modernise** the ICP Training Package by removing Units that are no longer required by industry, many of which are barely used.

Table 16: Key Driver for Change

Key driver for change

- 1 **Low uptake of enrolments and RTO availability.** There is a common misconception that with the decline of traditional offset printing comes the decline of the printing industry. In fact there are emerging new roles and opportunities that are leading to a transition of the industry and not a decline. At a time when the industry is undergoing radical changes, attracting young innovative talent is vital to the growth of the industry. The key inhibitors of enrolments and training availability include:
 - limited earning trajectories for ICP graduates⁶⁷
 - limited opportunities for progression⁶⁸
 - poorly perceived work-life balance for some sub-sectors (e.g. news printing)

In light of these key issues, it is important that the training package offers contemporary and accurate training that highlights the potential for innovation, and opportunity to partake in high growth new technological fields (e.g. 3D printing).

Proposed Responses

The following is proposed in response to the above key industry driver for change:

⁶⁷ National Centre for Vocational Education Research (2017) *VET student outcomes survey*

⁶⁸ Canon (2009) Digital Printing Directions, available at <http://www.canon.fr/Images/Insight_Report-v1_o_tcm79-612893.pdf>

Table 17: Proposed responses**Proposed Responses**

- 1 A review of the suitability and packaging rules of three qualifications:** Certificate III in Print Communication, Certificate IV in Printing and Graphic Arts, and Certificate IV in ePublishing as per industry feedback, with a focus on industry relevance and realistic delivery.
- 2 A review of existing UoCs** that are out of date, not fit for implementation or where nil- very low enrolment numbers indicate possible obsolescence.
- 3 This review will also consider the UoCs proposed for inclusion in the skill sets,** and consideration of marketing and sales related UoCs in light of the industry needs in this area.

Table 18: Implication of proposed response for stakeholders

Stakeholder	Impact
Industry/employers	Potential employees have current and relevant skills, less ‘on-the-job’ training required, improved options for upskilling and reskilling that can be accessed by employees, and easier recognition of qualifications and the accompanying skills that can be expected
Employees	Improved employability and job readiness, less ‘on-the-job’ training required, improved options for upskilling and greater recognition of qualification and skill level
Learners	Pathways to transition between sub-sectors, increased breadth of knowledge, increased currency and relevance of skills
RTOs	Increased opportunity to offer relevant, industry supported training
Other IRCs/Training Packages	Impacts are not expected to be significant. The cross sector impacts of any unit deletion will be closely considered (for example ICPDMT296 Create and test an interactive CD-ROM/DVD has been identified for potential deletion, a unit currently used within Culture and Related Industries qualifications).

Implication of proposed response for occupations in the industry

It is anticipated that the proposed changes will impact on those in:

- Design related fields
- Graphic design
- Generalist and niche printing businesses
- Organisations with in-house printing capabilities

Risk of not proceeding with proposed response

The base case (the ‘do nothing’) option must be considered as an alternative to the proposed changes in order to enable effective comparison between the two scenarios. This option negates the need for investment in training products, however does not address the current state issues identified. The likely impacts of this option are outlined below:

Likely impact (s) if not addressed

- **Ongoing confusion and uncertainty** about the specific value of ICP qualifications due to generalist nature and lack of structure
- **Learners being trained in obsolete technologies**, undermining training value as well as employment outcomes and ability to contribute to the workforce
- **Current skills gap** in understanding design for different types of printers will not be addressed, leaving

Likely impact (s) if not addressed

- some graphic designers not fully equipped to adapt to different technologies and channels
- **Missed opportunity to improve competitiveness** of printing businesses by equipping new and upskilling workers in the importance of sales and marketing skills in training
- **Missed opportunity to streamline and modernise** the ICP Training Package by removing Units that are no longer required by industry, many of which are barely used.

Table 19: Key Driver for Change

Key driver for change

1 Printing organisations are specialising in niche markets in order to stand out. The printing and graphic arts sector is rapidly evolving and organisations within the sector are required to be innovative in their service delivery in order to stay competitive⁶⁹.

As technology progresses, the printing equipment and software is becoming more cost-effective, accessible, and user-friendly; inclining businesses to turn to in-house printing rather than outsourcing the work to industry firms⁷⁰. This development has enhanced repercussions for smaller firms, as smaller printing jobs are the most likely to be transferred to in-house. The industry is highly fragmented with 94.8% of firms hiring less than 20 employees⁷¹. In response to the market conditions, printing firms are finding that they need to differentiate themselves by either specialising in a niche area or delving into non-traditional printing services to provide a comprehensive end-to-end experience for customers.

Examples of areas that printing organisations are specialising in include:

- Design and production of a specific media (e.g. books, magazine, newspapers, financial papers, legal documents or photo books)
- Design and production of specific packaging products (e.g. labels, corrugated cartons or flexible cartons)
- Design and production of marketing products (e.g. signage or display banners)

Each of these areas of print requires a technical skill set and as such it is important that training is allowing learners to gain and communicate their skills in their area of employment or prospective employment.

Multiple Training Package restructures in the past decade have reduced the number of qualifications offered from over 40 to just eight qualifications⁷². As a result qualifications tend to be generalist, without specification of niche or technical skills. For example:

New qualification (ICP)	Previous qualifications (ICP10)
Certificate III in Printing	<ul style="list-style-type: none"> • Certificate III in Printing and Graphic Arts (Screen Printing) • Certificate III in Printing and Graphic Arts (Digital Printing) • Certificate III in Printing and Graphic Arts (Printing)

While a streamlined Training Package is essential, there is currently limited opportunity for learners to indicate their specialist skills easily to prospective employers. This is leading to industry confusion as to what outcomes individuals are achieving as part of the general qualifications.

Proposed Response

The following is proposed in response to the above key industry driver for change:

⁶⁹ Print 21 (2017), Innovation key to survival, available at <<http://print21.com.au/innovation-key-to-survival-piaa-survey/127295>>

⁷⁰ IBIS world (2018) *IBISWorld Industry Report C1611 Printing in Australia*

⁷¹ IBIS world (2018) *IBISWorld Industry Report C1611 Printing in Australia*

⁷² Training.gov.au (accessed February 2018) ICP05, ICP10 and ICP Training Package Details

Table 20: Proposed responses**Proposed Responses**

- 1 Develop five skill sets** to enable reskilling, upskilling and specialisation focused on flexographic printing, lithographic printing, wide format digital print, sheet-fed digital print and ePublishing. These skill sets will provide clear options for reskilling, upskilling, and specialisation within the industry and will be comprised of both native and imported Units of Competency to ensure they are consistent with the blend of skills required by employers.
- 2 Import existing UoCs related to marketing and sales** from other training packages, where appropriate.
- 3 Review existing UoCs** where necessary to ensure their currency and the removal of units which are no longer required by industry or that have been identified by industry as being out of date, not fit for implementation, duplicative, or no longer required will be undertaken. This review will also consider the Units proposed for inclusion in the skill sets, and consideration of marketing and sales related Units in light of the industry needs in this area.

Table 21: Implication of proposed response for stakeholders

Stakeholder	Impact
Industry/employers	Potential employees have current and relevant skills, less 'on-the-job' training required, improved options for upskilling and reskilling that can be accessed by employees, and easier recognition of qualifications and the accompanying skills that can be expected
Employees	Improved employability and job readiness, less 'on-the-job' training required, improved options for upskilling and greater recognition of qualification and skill level
Learners	Pathways to transition between sub-sectors, increased breadth of knowledge, increased currency and relevance of skills
RTOs	Increased opportunity to offer relevant, industry supported training
Other IRCs/Training Packages	Impacts are not expected to be significant. There is potential that the unit proposed for creation may be relevant to some learners enrolled in other training packages with elements of design, and this will be considered throughout the development process. The cross sector impacts of any unit deletion will be closely considered (for example ICPDMT296 Create and test an interactive CD-ROM/DVD has been identified for potential deletion, a unit currently used within Culture and Related Industries qualifications).

Implication of proposed response for occupations in the industry

It is anticipated that the proposed changes will impact on those in:

- Design related fields
- Graphic design
- Generalist and niche printing businesses
- Organisations with in-house printing capabilities

Risk of not proceeding with proposed response

The base case (the 'do nothing') option must be considered as an alternative to the proposed changes in order to enable effective comparison between the two scenarios. This option negates the need for investment in training products, however does not address the current state issues identified. The likely impacts of this option are outlined below:

Likely impact (s) if not addressed

- **Ongoing confusion and uncertainty** about the specific value of ICP qualifications due to generalist nature and lack of structure
 - **Learners being trained in obsolete technologies**, undermining training value as well as employment outcomes and ability to contribute to the workforce
 - **Current skills gap** in understanding design for different types of printers will not be addressed, leaving some graphic designers not fully equipped to adapt to different technologies and channels
 - **Missed opportunity to improve competitiveness** of printing businesses by equipping new and upskilling workers in the importance of sales and marketing skills in training
 - **Missed opportunity to streamline and modernise** the ICP Training Package by removing Units that are no longer required by industry, many of which are barely used.
-

E. Proposed Schedule of Work

The Proposed Schedule of Work presents activities anticipated to be conducted through to June 2021. This section is structured into three parts:

- **Status update for Year One (2016-17) and Year Two (2017-18) projects**
- **2018-19 Project Details**
- **Proposed Schedule of Work – 2017-18 to 2020-21**

Status for Year One (2016-17) and Year Two (2017-18) projects

The Printing and Graphic Arts IRC scheduled various projects for Years One and Two, as shown in Table 22 below.

Table 22: Status of 2016-17 and 2017-18 projects

Year	Project type	Project code	Project name	Status
2016-17	Case for change activity	2a	Establishing a competency framework for the industry to inform future reviews of the Training Package.	Completed.
2016-17	Case for change activity	2b	Investigate the broader industry needs for 3D printing. <i>*This project includes the scope of Project 1a listed below.</i>	Case for Endorsement being drafted.
2017-18	Training product development	1a	Review 3D printing units and skill set.	See 2b above.
2017-18	Training product development	1b	Review UoCs related to industry knowledge and priority employability skills.	Draft Case for Change pending IRC approval.

2018-19 Project Details in the Proposed Schedule of Work

Description

Design and marketing skills, along with technical pre-press competencies, represent the technical skills required from a worker prior to actual printing. This Industry Skills Forecast and Proposed Schedule of Work has highlighted in Section D that as the market adjusts, there is increased (and changing) emphasis on these skills, as printing organisations work to increase their offerings by including more design and marketing strategy prior to printing.

The Printing and Graphic Arts capability framework created for the industry as part of project 2a informed the initial consultation process, and will continue to form an important reference point during the Case for Endorsement development stage.

Rationale

Please refer to pages 33 to 40 of this Industry Skills Forecast.

Minister's Priorities

Reform	Evidence of reform being addressed
Removing obsolete and superfluous qualifications from the training system	30 UoCs have been identified as possibly being outdated due to no enrolments in the past three years. They will be closely considered, and may ultimately be removed from the Training Package.
Making more information available about industry's expectations of training delivery	Extensive industry consultation will be undertaken. A specific focus on ensuring that training is realistic and useful for learners and employers, as well as deliverable by RTOs will be maintained throughout the project particularly given the low availability and uptake of training currently.
Ensuring the training system better supports individuals to move easily from one related occupation to another	With the industry expectations being focused on breadth of skills and business focusing on expanded service offerings, the changes proposed capitalise on the links between graphic design, printing, and sales and marketing.
Improving the efficiency of the training system by creating units that can be owned and used by multiple industry sectors	While multiple new UoCs have not been proposed, the single new Unit is anticipated to hold relevance for learners enrolled in Culture and Related Industries and Business Services Training Packages.
Fostering greater recognition of skill sets	New skill sets will support recognition by employers of the specific skills of prospective employees. Just as importantly, the specialised skill sets provide a clear option for existing workers wishing to upskill or reskill.
Ensuring that accredited courses 'fill the gap' in training packages and provide for training courses to be developed as quickly as industry needs them and support niche skill needs.	Improved clarity by reviewing identified existing units allows for easier understanding around where 'gaps' might lie in the ICP Training Package.

Scope of project

PwC's Skills for Australia anticipates that if this Case for Change is approved, a Case for Endorsement will be submitted to the AISC in June 2019.

Training Package to be developed/revised:

ICP – Printing and Graphic Arts Training Package (Release 2.0).

Review three qualifications:

- ICP31415 – Certificate III in Print Communications
- ICP40115 – Certificate IV in Printing and Graphic Arts
- ICP40815 – Certificate IV in ePublishing

Create seven skill sets:

- Marketing and Sales for Print
- Graphic Design for Print
- ePublishing

- Lithographic
- Flexographic
- Wide format digital print
- Sheet fed digital print

Review twenty four units of competency:

- ICPPRP232 – Electronically combine and assemble data
- ICPDMT296 – Create and test an interactive CD-ROM/DVD
- ICPDMT293 – Access and use the internet
- ICPPRP267 – Produce offset lithographic plates
- ICPPRP268 – Make photopolymer plates (flexographic)
- ICPPRP494 – Develop document content and structure
- ICPPRP252 – Output images
- ICPPRP396 – Generate high-end PDF files
- ICPDMT321 – Capture a digital image
- ICPDMT322 – Edit a digital image
- ICPPRP211 – Develop a basic design concept
- ICPPRP221 – Select and apply type
- ICPPRP224 – Produce pages using a page layout application
- ICPPRP225 – Produce graphics using a graphics application
- ICPPRP260 – Proof images
- ICPPRP311 – Develop a detailed design concept
- ICPPRP321 – Produce a typographic image
- ICPPRP322 – Digitise images for reproduction
- ICPPRP324 – Create pages using a page layout application
- ICPPRP325 – Create graphics using a graphics application
- ICPPRP334 – Prepare an imposition format for printing processes
- ICPPRP435 – Generate complex imposition
- ICPSUP211 – Prepare ink and additives
- ICPSUP311 – Prepare ink and additives (advanced)

Review thirty units of competency for potential rationalisation:

- ICPDMT491 – Create an extensible document
- ICPDMT492 – Create an extensible style sheet
- ICPINK211 – Select and prepare materials for production
- ICPINK221 – Blend chemicals
- ICPINK251 – Filter and pack product
- ICPINK331 – Manufacture inks and coatings

- ICPINK335 – Manufacture varnish and resin
- ICPPRP223 – Photograph a line image
- ICPPRP231 – Manually combine spot colour and basic four-colour images
- ICPPRP266 – Produce relief plates
- ICPPRP269 – Produce photopolymer plates for pad printing
- ICPPRP272 – Produce gravure cylinders manually
- ICPPRP281 – Design basic carton
- ICPPRP283 – Prepare artwork for screen printing
- ICPPRP284 – Produce PDF files for online or screen display
- ICPPRP285 – Scan a mono image
- ICPPRP286 – Scan images for reproduction
- ICPPRP323 – Photograph and produce halftone images
- ICPPRP331 – Manually combine complex four-colour images
- ICPPRP352 – Output complex images
- ICPPRP360 – Undertake special colour proofing
- ICPPRP370 – Produce multiple image plates
- ICPPRP372 – Produce gravure cylinders electronically
- ICPPRP423 – Apply colour to design brief
- ICPPRP452 – Output complex images direct to plate or press
- ICPPRP481 – Design complex carton
- ICPPRP484 – Set up and operate automated workflow
- ICPPRP485 – Develop a digital data template
- ICPSCP382 – Produce computer image for screen printing
- ICPSUP212 – Prepare coatings and adhesives

One Unit of Competency to be developed:

- Produce graphics using a graphics application (advanced)

Consultation Plan

To ensure training product development is a reflection of broad industry-driven demand, PwC's Skills for Australia intends to seek industry input and guidance for this project via the following methods:

- Industry Project Working Groups (PWGs)
- Open forums (in person workshops) across a variety of locations
- Focus groups (in person and/or via teleconference)
- Targeted one-on-one consultations (in person and/or via teleconference)
- Online nationwide survey
- Desktop research

PwC’s Skills for Australia intends to engage a wide range of stakeholders relevant to design, marketing and pre-press. Types of stakeholders to be consulted with include:

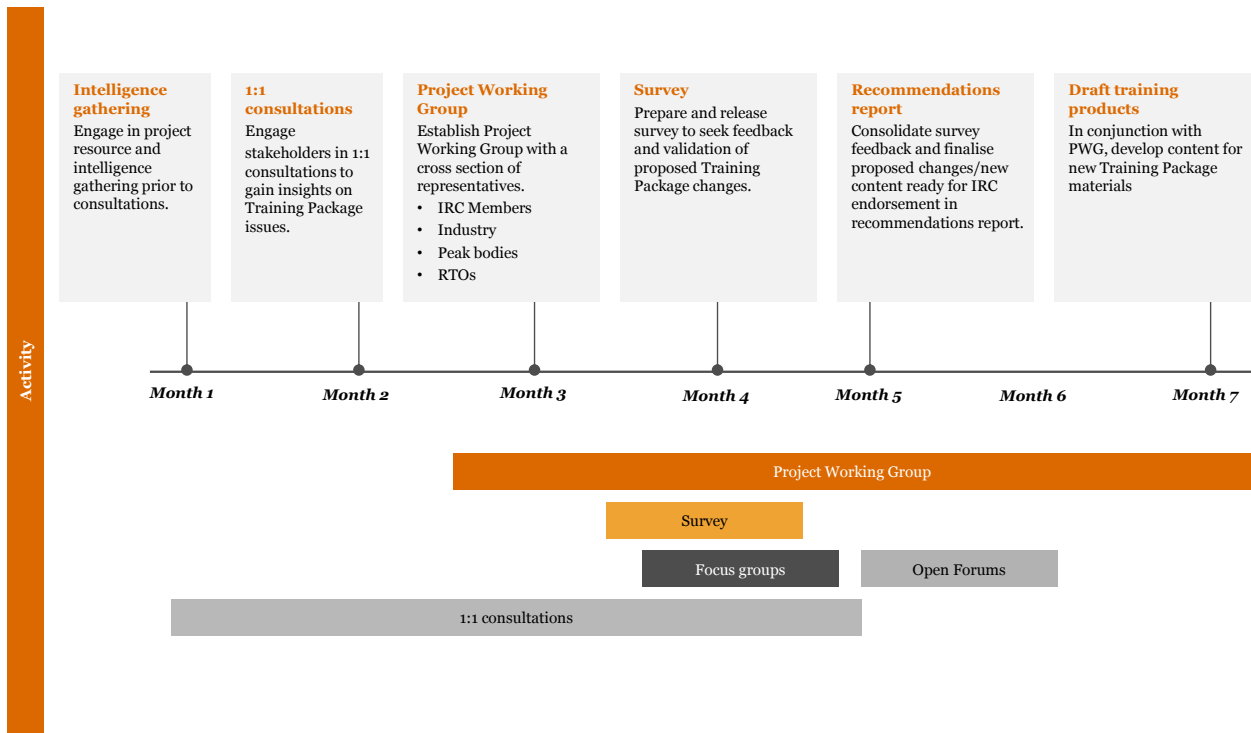
- Employers, essential to the VET sector given the role that they play in demanding the skills that lead to vocational outcomes.
- Industry associations/Peak bodies, who act on behalf of the printing and graphic arts industry to represent their needs and promote the interests of their member organisations.
- Public/Government bodies, who are often responsible for legislative requirements and funding arrangements affecting the printing and graphic arts sector.
- Registered Training Organisations (RTOs), who deliver either existing ICP training products or national/state accredited courses relevant to the area of scope.

The stakeholders that will be proactively engaged include those listed below in Table 23. Many of these stakeholders have been consulted during the development of this document to ensure early inclusion and engagement. The list below is not exhaustive; it is intended that as further consultation progresses, additional stakeholders will be identified and their perspectives captured and considered. See Attachment 1, Table 24 for additional details regarding experts consulted.

Table 23: Stakeholders to engage for Project 1C

Employers	Industry associations/Peak bodies	RTOs and education providers	Public/Government bodies
<ul style="list-style-type: none"> • Impact International • The Print Managers • Print Logistics • UniPrint • The Print Press • JDA Print Recruit • Stockdale Personnel • Lane Print and Post Group • Scott Printing • Discus on Demand • Other independent printing companies within the industry 	<ul style="list-style-type: none"> • Printing Industries Association of Australia (PIAA) • Australian Manufacturing Workers Union (AMWU) • Council of Small Business Organisations Australia (COSBOA) • Australian Graphic Design Association (AGDA) • Arts, Communications, Finance Industries, and Property Services (NSW) • FutureNow • Australian Industry Group (AIG) • Business Council of Australia • Design Institute of Australia (DIA) 	<ul style="list-style-type: none"> • Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs) • Universities undertaking progressive 3D printing work (including Monash University) 	<ul style="list-style-type: none"> • State and Territory Authorities •

Figure 4: Consultation Plan for Training Product Development



Proposed Schedule of Work – 2017-18 to 2020-21

Table 24 below presents the Printing and Graphic Arts IRC Proposed Schedule of Work for 2017-18 to 2020-2021. Specifically, it contains the activities endorsed by the IRC through to June 2021 in the previous work plan, and an action to review all UoCs in 2016-17 and 2017-2018 projects for currency in 2020-21. Previously endorsed projects have been reviewed to ensure alignment with AISC and COAG Industry and Skills Ministers’ priorities, following advice from the Department. Specifically, the Department asks that the review of UoCs is aligned to the qualifications that form part of the VET Student Loans Program, review of qualifications with low or no enrolments, reduction of duplication across the system, creation of cross-industry UoCs and greater recognition of skill sets.

In a small Training Package such as ICP, a significant proportion of UoCs are shared across several qualifications. Due to this, and because projects have been defined on a UoC basis, qualifications have not been included in the table below. However, as there are only eight qualifications in the Training Package, all four training product review projects are expected to involve all qualifications to some extent.

Our mandate as an SSO is to review all UoCs in the ICP Training Package over four years. Additionally, the SSO may propose on behalf of the IRC to create new UoCs or incorporate existing non-native UoCs into qualifications and skill sets, where analysis of trends and stakeholder feedback suggests this training product development activity is necessary.

Table 24: Proposed Schedule of Work 2017-18 to 2020-21

Project code and name	Planned review start (year)	Training Package code	Training Package name	Qualification code	Qualification name
1a Review 3D printing units and skill set	2017-18	ICP	Printing and Graphic Arts	N/A	N/A
1b Review UoCs related to industry knowledge and priority employability skills	2017-18	ICP	Printing and Graphic Arts	N/A	N/A
1c Review design, marketing and other pre-press technical UoCs	2018-19	ICP	Printing and Graphic Arts	N/A	N/A
1d Review print and post-press technical UoCs	2019-20	ICP	Printing and Graphic Arts	N/A	N/A
1e Review UoCs updated in 2016-17 and 2017-18 for currency	2020-21	ICP	Printing and Graphic Arts	N/A	N/A

F. IRC signoff

This Industry Skills Forecast and Proposed Schedule of Work was agreed to by:

Andrew Macaulay
Chair
Printing and Graphic Arts IRC
[Date]

