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Bureau of  
Communications  
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# Creative skills for the future economy

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## Executive summary

New technologies are having, and will continue to have, a pervasive effect on the future of work. As a consequence, employment in digital-intensive industries has more than doubled over the past 30 years.

However, the effects are broader than just these industries. The majority of employment growth over that period has been in occupations that cannot easily be automated. This has seen an increase in what are termed ‘non-routine cognitive jobs’ which occur in fields such as education, healthcare, professional services, arts and design. This is also reflected in the growth of those employed in creative occupations, which grew at around double the rate of other occupations between 2011 and 2016.

As this trend continues, new employment opportunities are more likely to require skills which are resistant to mechanisation. Creative skills, requiring original thought and innovation, are particularly resistant and are likely to face relatively higher demand in the future. This paper contributes to the evidence base on the importance of creative skills for future economic outcomes.

A common misconception is that these skills are predominantly found solely in ‘creative’ fields, such as the performing and visual arts. In fact, 9.5 per cent of those employed in Australia in 2016—around a million workers—held a ‘creative’ qualification as their highest level of qualification. The most prevalent of these qualifications included:

- communication and media studies, graphic and design studies, visual arts and crafts and performing arts
- management and commerce, particularly sales and marketing
- information technology, including computer science
- architecture and building.

This underestimates the true prevalence of these creative skills. This is because the data includes formal qualifications (including vocational and non-award qualifications) not self-taught skills and ‘learning by doing’, which are essential to creators and creative industries.

Creative skills already have a substantial influence on the economy. Creative skills:

- Are critical to industries that provide inputs to produce a wide range of goods and services. In 2014–15, Australian businesses relied on around \$87 billion worth of creative industries inputs.
- Have been integral to fast-growing industries over the past decade. Around a quarter of those employed in Information, Media and Telecommunications, and a fifth of those employed in Professional, Scientific and Technical services hold a formal qualification in a creative skill.
- Are significant in some innovation-intensive industries. Of the top five most innovation-active industries, between 10 and 28 per cent of employees hold a creative qualification.
- Support Australia’s participation in the global economy. The share of exports in what Australia produces that can be attributed to complete or partially creative industries is 4.5 per cent.
- Will be vital to future employment growth. Around one in seven workers currently in the industries projected to grow the fastest over the next five years holds a creative qualification.

As the trend to automation continues, so does the likelihood that expanding industries will rely on creative skills. Understanding their role and influence will be critical to positioning Australia to benefit fully from new technologies and sources of growth.

## Automation is changing skills

### Key points:

- Technological change is affecting the nature of work in Australia and other countries.
- While predictions vary about how the nature of work will change, many suggest that technological change will continue or accelerate the trend of automation of routine or 'non-cognitive' roles and occupations.
- This implies that there will be relatively higher demand for occupations that are harder to automate, which in turn will have an impact on demand for different skills in the future.

## Automation is shaping the future of work

The nature of work—the occupations, skills, methods of organisation and its impact on individuals and society—is changing.<sup>1</sup> New technologies—including interconnected collaborative robots, machine learning, artificial intelligence (AI), and the internet of things (IoT)—are transforming the production of goods and services. These changes are expected to be far-reaching, with some describing the scale of change as the 'Fourth Industrial Revolution'.<sup>2</sup>

Robots and computers now have the capacity to perform routine tasks more efficiently than human workers.<sup>3</sup> These activities generally include repetitive and predictable tasks in highly structured environments, such as manufacturing processes.<sup>4</sup>

However, with recent technological developments, robots and computers are increasingly able to perform complex activities requiring cognitive capabilities.<sup>5</sup> For example, developments in AI, robotics and other digital technologies are producing innovations such as driverless cars.<sup>6</sup>

This has prompted a range of studies about the future of work, especially whether particular occupations are at risk of automation (table 1).

Table 1: Key studies that have examined the impact of automation on workforces

Study	Finding
Frey and Osborne (2013) <sup>7</sup>	47 per cent of occupations in the US are at a high risk of computerisation over the next couple of decades.
Edmonds and Bradley (2015) <sup>8</sup>	44 per cent of Australian occupations are highly susceptible to automation, while 33 per cent have a limited susceptibility.
Arntz, Gregory and Zierahn (2016) <sup>9</sup>	On average across 21 OECD countries, 9 per cent of jobs are potentially fully automatable.
McKinsey Global Institute (2017) <sup>10</sup>	49 per cent of the activities that people are paid to do in the global economy have the potential to be automated using currently demonstrated technology, but only less than 5 per cent of occupations have the potential to be fully automated.
PwC (2017) <sup>11</sup>	Up to 30 per cent of UK jobs could potentially be at high risk of automation by the 2030s, compared to the US (38 per cent), Germany (35 per cent) and Japan (21 per cent).

Study	Finding
PwC (2017) <sup>12</sup>	Across 27 OECD countries, as well as Russia and Singapore, the potential for automation of existing occupations is estimated to vary widely from 22 per cent of occupations in South Korea and Finland to 44 per cent of occupations in Slovakia.
Bakhshi, Downing, Osborne and Schneider (2017) <sup>13</sup>	9.6 per cent (8.0 per cent) of the current US (UK) workforce are in occupations expected to experience an increase in workforce share and 18.7 per cent (21.2 per cent) are in occupations expected to experience a decline.
AlphaBeta (2017) <sup>14</sup>	The average Australian worker will spend 2 hours less per week on manual and routine tasks by the 2030s. Some workers are at high-risk for unemployment and are expected to require targeted retraining and job transition programs.
Borland and Coelli (2017) <sup>15</sup>	Computer-based technologies have not reduced the total amount of work available in Australia, nor accelerated the pace of structural change and job turnover.

Sources: As noted above.

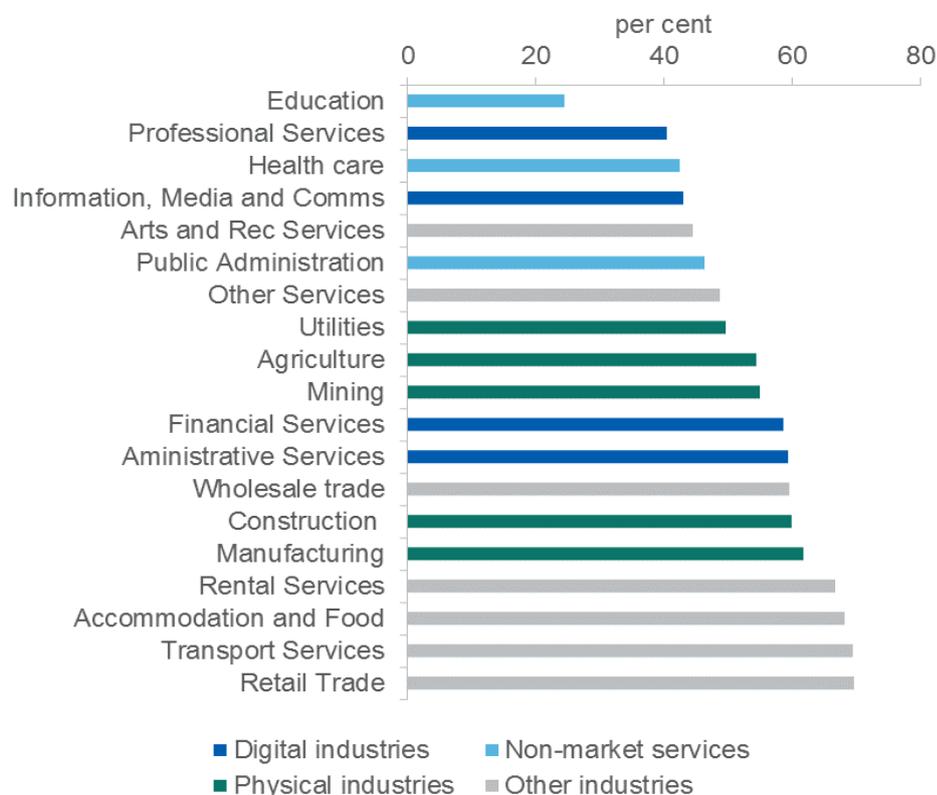
These studies suggest that although automation has the potential to displace labour, it may have a more significant impact on the nature of work itself. New technologies could act as a substitute or a complement for labour, depending on the task affected.<sup>16</sup> As automation becomes more common, workers are likely to perform a larger number of tasks that complement machines, as well as new and more complex tasks.<sup>17</sup>

As a result, automation is expected to change the nature of the tasks associated with particular occupations, even if the demand for labour does not fall.<sup>18</sup>

## The scale and scope of change will differ by sector

In the Australian context, Edmonds and Bradley (2015)<sup>19</sup> estimated the automation susceptibility of Australian occupations and industries. They define automation susceptibility as whether an algorithm could be developed to perform the tasks required by different occupations. They find that digital and non-market sector industries generally have lower automation susceptibility than other industries (figure 1).

Figure 1: Share of tasks susceptible to automation by industry



Source: Department of Industry, Innovation and Science Office of the Chief Economist calculations based on data from Edmonds and Bradley (2015).

A key reason for this is that workers in these industries spend more time completing non-routine tasks that are more difficult to automate.

On the other hand, industries with the highest automation susceptibility include retail trade, transport services, accommodation and food, and rental services. These industries contributed a significant amount to Australia's gross value added in 2016–17 at 15.2 per cent.<sup>20</sup>

Automation also has the potential to have positive impacts on employment. New automation technologies could create new types of jobs that do not currently exist, as previous technological advances have.<sup>21</sup> For example, the advent of the personal computer and the internet resulted in many new occupations. PwC calculated that 8 of the top 10 occupational categories in 2010 with the highest proportions of job types that did not exist in 1990 were directly related to computer technologies.<sup>22</sup> Although previous experience suggests it is likely that some new jobs will be created by automation, it is difficult to predict how many jobs will be created and what these jobs will be before new automation technologies are implemented.<sup>23</sup>

Besides effects on employment, automation has the potential to provide a number of opportunities for businesses and the economy as a whole. These could include (for example) labour cost savings, increased productivity, higher quality goods and services and improved safety.<sup>24</sup> Increased productivity could generate higher income firms, which would flow through to the rest of the economy as this income is spent or invested elsewhere.<sup>25</sup> This could increase the demand for labour in sectors where automation is less suitable.<sup>26</sup>

Overall, the full impact of automation is unclear. However the scale of change will require organisations to be more flexible, imaginative, intuitive and resilient.<sup>27</sup>

## Creative skills are likely to experience relatively higher demand

As workers focus less on routine tasks and more on tasks that complement machines, the skills desired by employers are expected to change, and workers may need to embrace new skill sets.

There is a growing expectation that workers will need more ‘21st Century Skills’,<sup>28</sup> including creative skills, higher-order cognitive skills, system-thinking skills, as well as interpersonal, emotional intelligence, and collaborative skills. Creativity is expected to be one of the key skills in demand in an automated world.<sup>29</sup> Nesta in the UK has examined some of these trends in detail (box 1).

### Box 1: Analysis in the United Kingdom—Nesta’s Future of Skills

Creative skills may be found outside of creative industries—in other sectors—and are likely to be in higher demand in the future. Research by Nesta<sup>30</sup> looked at which skills are expected to be in high-demand in the US and the UK in a world disrupted by automation. As jobs are displaced from existing ones, additional skills might help someone in a current job to be more employable in the future, or help that occupation evolve. According to the study, some of the key skills most likely to be in greater demand in the years to 2030 include interpersonal skills, higher-order cognitive skills and system-thinking skills—such as judgement and decision making, systems analysis and systems evaluation.<sup>31</sup>

The study also found that creative, digital, design and engineering occupations generally are forecast to grow.<sup>32</sup> While it is difficult to precisely predict the types of new jobs that could emerge in the future, it is possible to predict the skills mix that these jobs could require. The study predicts that in the UK, these could be jobs combining fine arts, originality or design.<sup>33</sup>

The study also predicts that currently around one-tenth of the US and UK workforces are in occupations that are likely to grow as percentage of the workforce, and around one-fifth are in occupations that will likely shrink—in other words, about seven in ten people are currently working in occupations with an uncertain future.<sup>34</sup> However, the study also suggests that occupation redesign coupled with workforce retraining could actually promote growth in those occupations.<sup>35</sup>

This analysis focuses on the direct influence of creative skills in employment outcomes, and therefore does not assess how creative skills support other skills to enable better outcomes. For example, PwC found that to maximise opportunities in the 21st century, students will need to have a range of skills such as problem solving and digital skills,<sup>36</sup> which are enabled to an extent by creativity and creative skills.

The importance of creative skills and creative industries is already reflected in government programs at a state and federal level in Australia, and in other jurisdictions. But these initiatives often focus on creative industries to provide creative outputs.

If creative skills and training have broader benefits and are expected to increase in importance as technological change continues, then the importance of government initiatives to underpin the creative economy may be greater than traditionally thought. This requires understanding how creativity is fostered and used, and the innovation and growth it drives.

## Defining creativity and creative skills

### Key points

- There are many approaches to defining and measuring creativity and creative skills.
- The Bureau of Communications and Arts Research (BCAR) approach to defining creative skills builds on work from Nesta and Australian academic research that uses consistent criteria to determine creative occupations. The more prevalent qualifications held by employees in these occupations are identified as creative skills.
- The analysis finds that creative skills, as proxied through creative qualifications, are much broader than the creative arts alone. Creative skills encompass fields that include mathematics, astronomy, marketing, computer science, and the humanities.
- Approximately 9.5 per cent of those employed in Australia in 2016—around a million workers—held a formal creative qualification. This does not include those that have learned skills through creative practice or learning by doing.

### What is creativity and what does it enable?

It is hard to define creativity in the abstract. Definitions of creativity often depend on context. For example, the creativity to write a piece of music is different to the creativity used to address a technical computer coding problem. Individuals are described as being creative, but so are organisations, firms and entire industries.

Identifying what creativity enables is more straightforward. An examination of the literature on the definitions of creativity indicates that creativity is critical for innovation (table 2) because it is the means to generate new or novel ideas. This is important for innovation, which is the expression or implementation of new or novel products and processes.

Creativity is also intrinsically linked to cultural impacts and outcomes. Analysis by the BCAR has found that the majority of creative activity in 2016–17 in Australia by value could also be classified as cultural activity.<sup>37</sup>

Table 2: Review of definitions of creativity

Reference	Definition of creativity
King <sup>38</sup>	“Work creativity is seen as the process by which an individual produces a novel and appropriate solution to a work-related problem.”
Amabile <sup>39</sup>	“...the production of novel, appropriate ideas in <i>any</i> realm of human activity, from science, to the arts, to education, to business, to everyday life. The ideas must be novel (...), appropriate to the problem or opportunity presented.”
Parkhurst <sup>40</sup>	“...the ability or quality displayed when solving hitherto unsolved problems, when developing novel solutions to problems others have solved differently, or when developing original and novel (at least to the originator) products.”
British Government <sup>41</sup>	[Creative industries are] “those industries which have their origin in individual creativity, skill and talent, and which have a potential for wealth and job creation through the generation and exploitation of intellectual property.”
Kampylis, Berki & Saariluoma <sup>42</sup>	“...the activity (both mental and physical) that (...) leads to tangible or intangible outcomes that are original, useful, ethical and desirable, at least to the creator(s).”

Reference	Definition of creativity
Zorloni <sup>43</sup>	<p>“Newness and utility adequately illustrate the essence of the creative act: an overtaking of the existing rules (newness) which have been granted economic, aesthetic or ethical value (utility)”.</p> <p>(...) “Creativity is an inherently immaterial and intangible resource that, if it is to be transformed into an innovation and to be disseminated, needs to be incorporated into materials formats (a painting, movie, book) or immaterial ones (a performance (...)). While the format is typically a private good, the creativity embedded in an object is a public good, characterized by non-rivalry in consumption and low costs of exclusion.”</p>

Source: Table compiled by the BCAR using the references listed above.

Creativity is also important for innovation in practice. For example, most Australian innovation-active firms in 2016–17 sourced the ideas and information for their innovation from within the business. This includes a range of innovations that are new to Australia and new to the world.<sup>44</sup>

## Occupational information can be used to identify creative roles

While it is not possible to directly observe the extent to which an economy can be considered ‘creative’, some approaches can be used to gauge creativity indirectly. One approach is to measure the number of people who are employed in creative occupations and/or creative industries.<sup>45</sup>

Researchers have previously examined what constitutes a creative occupation or role. Nesta in the United Kingdom defined creative occupations as:

*...those roles that utilise a range of ‘creative and design skills’ to create new or significantly different or enhanced services, artefacts and products of value, irrespective of the industries in which they do this. These creative skills involve a combination of original thought—with the most creative skills involving inspired problem-solving—within defined processes to deliver or realise the output. This combination of inspiration and implementation, we argue, also makes these roles more resistant to mechanisation.*<sup>46</sup>

Using this definition, Nesta derived a set of criteria to identify creative occupations. These criteria, and the questions that they pose, include:

- Non-Uniformity—is the ‘output’ associated with the occupation likely to vary each time it is created because of the interplay of factors, skills, creative impulse and learning?
- Creative Output—is the output of the occupation mostly perceived as novel or creative irrespective of the context in which it is produced?
- Not mere transformation—does the role merely ‘shift’ the service or artefact’s place or time?
- Novel process—does the role most commonly solve a problem or achieve a goal, even one that has been established by others, in novel ways?
- Mechanisation-resistant—is it resistant to automation?<sup>47</sup>

A similar approach has been applied for Australian data by researchers at the Queensland University of Technology.<sup>48</sup> For each Australian occupation,<sup>49</sup> the researchers applied the Nesta criteria; defining an occupation as creative if it achieved at least 4 of the criteria. This yields a list of creative occupations for Australia (detailed in [appendix A](#)).

This information was then used to determine creative industries. If an industry class (ANZISC 4-digit) has at least a certain proportion of employees in creative occupations, it is deemed to be a creative industry under the Nesta approach. The choice of this threshold affects the number of creative industries. A threshold of near-zero would make nearly every industry creative, while a higher threshold would make no industry creative. Higgs and Lennon (2014) chose a threshold consistent with Australian conditions, which yields 35 creative industries ([appendix A](#)).<sup>50</sup>

The BCAR has adopted this approach to measuring creative industries and occupations in this paper.

## Determining creative skills from creative occupations

The approach used in this paper to examine the prevalence of creative occupations can also be used to identify which skills should be considered creative.

By analysing employment data, the skills that are relatively more prevalent in creative occupations can be identified as creative skills. For example, a qualification in Communications and Media Studies is held by around 12 per cent of those employed in a creative role (compared to around 1 per cent for all other occupations).<sup>51</sup> This means the skills gained from this qualification are more likely to be associated with creative occupations, and could be considered to be creative skills.

However, the Australian Standard Classification of Education (ASCED) taxonomy is the only approach available to consistently link creative occupations to the highest level of qualification achieved, which is used as a proxy for skills.<sup>i</sup> Despite some conceptual and theoretical limitations (box 2), ASCED makes the best use of the available data for the purposes of this paper.

Alternative approaches drawing on emerging data sources could be used for future analysis of the importance of creative skills. This might include defining creative qualifications and skills directly using other criteria, and data sources that provide more information on the link between skills and occupations, such as O\*NET data. (A discussion of some of the additional data sources needed to undertake more comprehensive analysis of creative industries is provided in [appendix C](#).)

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<sup>i</sup> Unless otherwise stated 'qualifications' refers to the highest level of qualification achieved, with levels ranking from postgraduate degrees as the highest possible level, through graduate certificates and diplomas, bachelor level degrees, and on to diplomas, certificates and non-award courses.

**Box 2: ASCED, skills and creativity**

ASCED is a taxonomy that outlines different fields of study and levels of qualification to describe educational attainment. It is used to categorise responses in Censuses to provide a consistent picture of the skills and level of qualification that Australians hold. It is ASCED that the BCAR has used to describe different skills, regardless of the level of qualification, for the purpose of its analysis.

A drawback of using this data, however, is that it only partially captures creative skills. ASCED describes skills by formal qualification, which is only one dimension of creativity and creative skills. Any skills learned through creative practice rather than through formal education and training are not captured in the ASCED data. Survey analysis by the Australia Council for the Arts finds that self-teaching and ‘on-the-job’ training are significant among artists, with 39 per cent nominating such training as the most important to become an artist.<sup>52</sup> The same research noted that the majority of artists undertake training throughout their careers, including vocational training, workshops and other specialist training. This highlights the relative importance of creative practice to learn skills, which is characteristic of many creative industries.

Further, because the data only captures the field of study for the highest level of qualification obtained, it may not fully capture creative skills in the economy. For example:

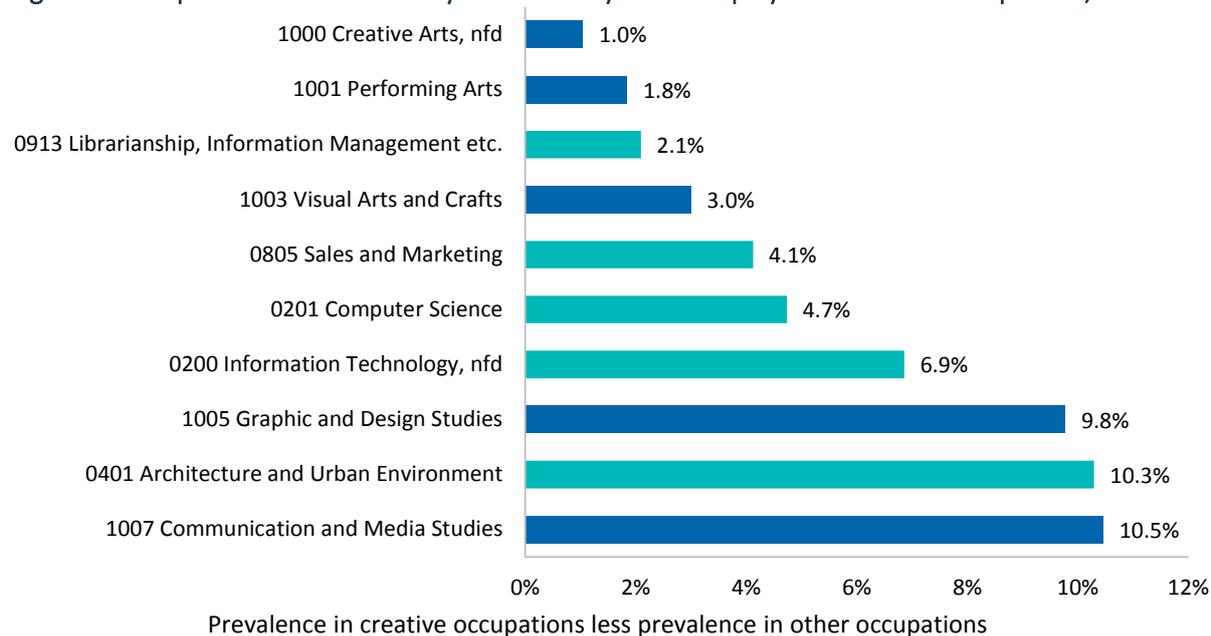
- a master painter that is self-taught would not be described as having any skills under the ASCED data in the census
- a person with a bachelor degree in journalism and a masters degree in economics would only report the economics qualification for the analysis
- a person with a bachelor degree in economics and a masters degree in journalism would only report the journalism qualification for the analysis—which may be misleading if they are employed for their economics skills in their current employment.

This last point highlights the main caveat of using qualifications and employment data—that while creative qualifications can be observed, those qualifications are not necessarily used in their present occupation. Similarly, because the analysis relies on employment status, the results do not include those that holding that are not employed.

The approach used in this paper to examine the prevalence of qualifications in creative and other occupations reveals a range of creative skills across many different fields of study (figure 2). In aggregate, around three-quarters of those employed in creative occupations in 2016 held qualifications in one of four of the broad fields of study qualifications defined in ASCED.

- Creative arts qualifications (around 28 per cent of those employed in creative occupations): including communication and media studies, graphic and design studies, visual arts and crafts, and performing arts.
- Information technology qualifications (15 percent): including the broad category of information technology qualifications without further definition and computer science.
- Architecture and building qualifications (11 percent): almost entirely vested in the architecture category of qualifications
- Management and commerce qualifications (8 percent): including business and management, and sales and marketing.<sup>53</sup>

Figure 2: The qualifications more likely to be held by those employed in creative occupations, 2016



Note: This lists the ten most prevalent creative qualifications identified in the BCAR analysis. The full list is provided in [appendix A](#). Darker bars represent qualifications from the 'Creative Arts' grouping of the ASCED. Source: BCAR estimates based on 2016 ABS Census Data (TableBuilder Basic, unpublished data).

Another way to show creative qualifications is to compare the share of those employed with a particular qualification in a creative occupation as a ratio to those employed in other occupations.

This approach reveals the relative prevalence of creative qualifications (table 3). Qualifications in Architecture and the Urban Environment is the most prevalent creative qualification, with that qualification around 17 times more likely to be held by someone employed in a creative occupation than in another occupation.

Other prevalent qualifications include Graphic and Design Studies (14 times more likely to be held by an employee in a creative occupation), Communication and Media Studies (10 times more likely) and Librarianship, Information Management and Curatorial Studies (9 times more likely). Some qualifications in natural and physical sciences, information technology, management and commerce, and society and culture are also revealed as being more prevalent among those employed in creative occupations.

What these results indicate is that creative skills, as proxied through creative qualifications, are much broader than the creative arts alone. Creative skills encompass fields that include mathematics, astronomy, marketing, computer science, and the humanities.

Table 3: List of creative skills, identified using qualification data

Qualifications (ASCED domain, code and title)	Relative prevalence of qualification in creative occupation
Natural and Physical Sciences	
0101 Mathematical Sciences	2.2
0103 Physics and Astronomy	1.8
Information Technology	
0200 Information Technology, nfd	3.8
0201 Computer Science	6.7
0203 Information Systems	3.6
Architecture and Building	
0400 Architecture and Building, nfd	4.2
0401 Architecture and Urban Environment	17.4
Management and Commerce	
0805 Sales and Marketing	2.7
Society and culture	
0903 Studies in Human Society	1.9
0913 Librarianship, Information Management and Curatorial Studies	8.9
0915 Languages and Literature	1.9
Creative Arts	
1000 Creative Arts, nfd	6.5
1001 Performing Arts	4.4
1003 Visual Arts and Crafts	6.8
1005 Graphic and Design Studies	14.2
1007 Communication and Media Studies	10.4
1099 Other Creative Arts	6.1

Note: This table shows the creative qualifications that are relatively more prevalent in creative occupations relative to other occupations. It is limited to those qualifications that are at least 50 per cent more prevalent within creative occupations relative to other occupations. For example, around 0.66 per cent of those in creative occupations have a qualification in the mathematical sciences compare around 0.30 per cent in other occupations. This yields a relative prevalence value of 2.2—indicating that mathematical sciences are about twice as likely to work in a creative occupation than not. ‘nfd’ denotes ‘not further defined’.

Source: BCAR estimates based on 2016 ABS Census Data (TableBuilder Basic, unpublished data).

## Where are these creative skills being used?

Creative skills are not only used in creative occupations. They are skills that contribute to different parts of value chains in a range of different industries. For example, design skills contribute to human-centred design in interfaces of ICT goods and services; sales and marketing contribute to helping consumers find products they want to buy; and IT skills contribute to a range of existing and emerging digital services.<sup>54</sup>

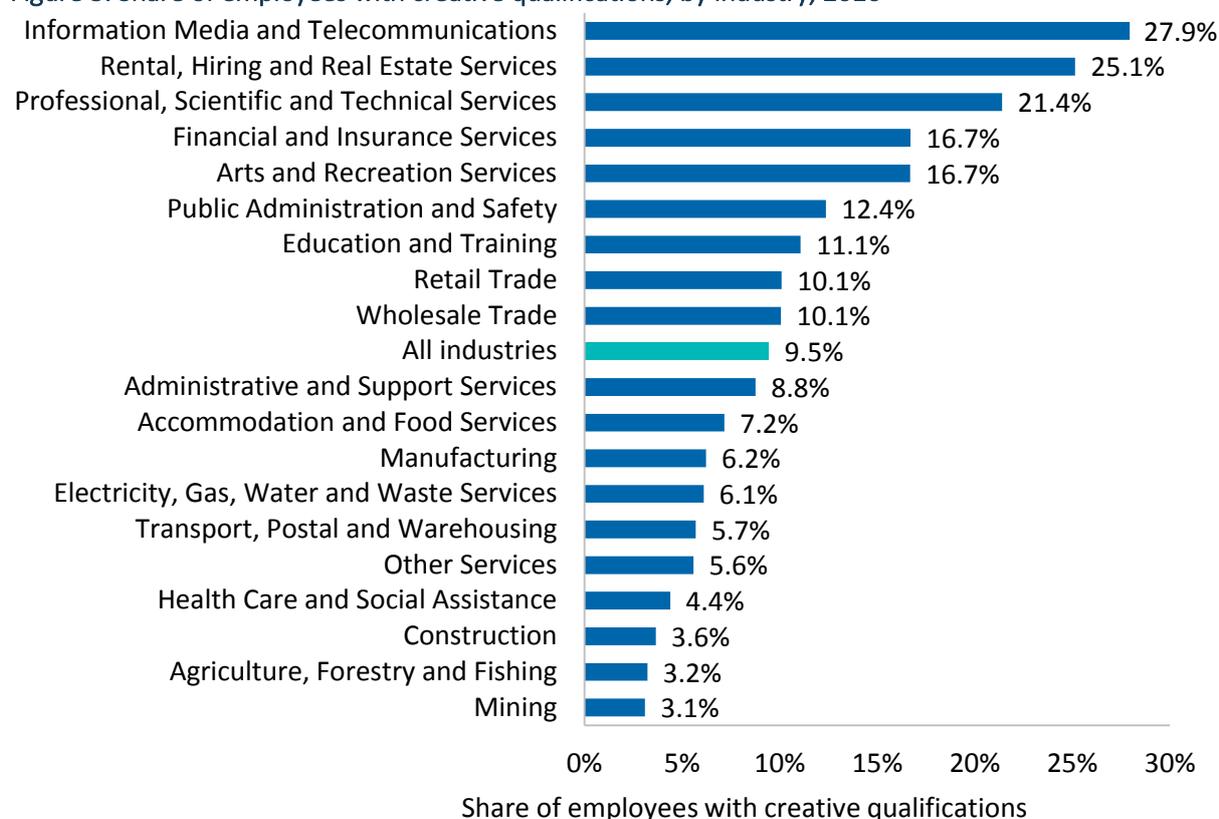
This is illustrated by the number of people that hold these creative skills, and the industries in which they are employed.

This approach has been undertaken previously by researchers at Queensland University of Technology as part of the 'creative trident' methodology, which disaggregates employment in Australia by whether employees are employed in a creative role and employed in a creative industry.<sup>55</sup> Based on the 2011 and 2016 Census data, those employed in a creative role and creative industry comprise 3.2 and 3.8 per cent of total employment, respectively.<sup>56</sup>

This paper extends this approach by adding skills as an additional dimension to the analysis.

Those employed with a creative qualification comprise around 9.5 per cent of total employment, with the prevalence of creative skills varying significantly across different industries (figure 3). The share of employees with creative qualifications by industry varies from around 27 per cent in Information, Media and Telecommunications to around 3 per cent in Mining.

Figure 3: Share of employees with creative qualifications, by industry, 2016



Note: All industries includes employees that did not state or inadequately described their industry of employment.  
Source: BCAR estimates based on 2016 Census (ABS TableBuilder Basic).

## Demand for creative skills is growing

### Key points:

- There is strong evidence that creative skills are important to the economy now and will be in the future.
- Growth in the number of those employed in creative occupations was double that of those employed elsewhere in the economy between 2011 and 2016.
- Around one in seven of those employed in the occupations expected to grow most quickly over the next five years holds a creative qualification.
- Many of the industries that have grown the fastest—in terms of economic output—employ workforces with relatively high shares of creative qualifications.
- Some of the industries with the highest prevalence of innovation have workforces with relatively high shares of creative qualifications.

### Faster-growing occupations and industries are likely to need creative skills

The importance of creative skills in the future will depend on whether the occupations in which they are used intensively are likely to grow both in number and pace compared to other occupations.

The number of those employed in creative occupations has grown more quickly than those in other occupations. Between 2011 and 2016, the number of those employed in creative occupations—holders of the creative skills identified above—grew at around double the rate of those in other occupations.<sup>57</sup>

Many of the faster-growing industries have also relied on workforces with creative skills. The following industries have experienced the fastest output growth over the decade to 2016–17:

- Mining (5.8% value added growth per year, on average, between 2006–07 and 2016–17)
- Health Care and Social Assistance (4.7 per cent)
- Professional, Scientific and Technical Services (4.5 per cent)
- Rental, Hiring and Real Estate Services (4.2 per cent)
- Agriculture, Forestry and Fishing (3.8 per cent)
- Information, Media and Telecommunications (3.5 per cent).<sup>58</sup>

Of these, the Professional, Scientific and Technical Services; Rental, Hiring and Real Estate Services, and Information, Media and Telecommunications industries hold the highest share of workers with creative qualifications, suggesting that these skills have been important for a proportion of growth.

There is also evidence that the occupations expected to experience growth in the future will be ones that currently rely on creative skills. Recent work in the United Kingdom has found that ‘creativity’ is consistently the most significant predictor for an occupation’s chance of growing, as a percentage of the workforce by the year 2030.<sup>59</sup>

From an Australian perspective, the Australian Government Department of Jobs and Small Business publishes forecasts of employment over the next five years, which can be used to identify the industries that are expected to grow the fastest and to identify the industries that are expected to contribute the most to total employment growth to 2023.

Based on these forecasts, 13 industries could be classified as high-growth—growing around double that of the average expected across the entire economy.<sup>60</sup> Of these industries presently, 14.6 per cent of their workforce hold a creative qualification, compared to around 9.5 per cent overall. This indicates that creative skills are an important part of enabling future jobs growth.

## Creative skills contribute to innovation-intensive industries

Innovation depends on the generation of new ideas and therefore creativity. The share of creatively qualified employees is higher on average in industries that are innovative.

The following industries are among the most innovation intensive, based on the high proportion of firms that are innovation-active—that is, they introduced or are planning to introduce an innovation in the previous year:

- Information, Media and Telecommunications (60.5% of firms were innovation active in 2016–17)
- Retail Trade (54.4 per cent)
- Wholesale Trade (54.1 per cent)
- Arts and Recreation Services (52.0 per cent)
- Financial and Insurance Services (50.8 per cent).<sup>61</sup>

As with high-growth industries, the share of employees holding creative qualifications varies: between 10.1 per cent in Retail Trade, to 27.9 per cent in Information, Media and Telecommunications.

What this suggests is that for those industries where innovation activity occurs among the majority of firms, the share of creatively qualified employees is higher on average relative to other industries.

## Indirect demand for creative skills is considerable and complex

An examination of creative skills alone, however, does not reflect the full importance of creative output and creative skills to the Australian economy.

Analysis by the BCAR indicates that the contribution of creative activity to Gross Domestic Product (GDP) in Australia was around \$99.7 billion in 2016–17 or approximately 5.7 per cent of GDP.<sup>62</sup> But also of importance is the flow of creative goods and services that are used by businesses that might otherwise not be thought of as creative, but nonetheless rely heavily on the contribution from fields such as the arts, design and computer science.

Different industries rely on others to supply goods and services as ‘intermediate inputs’ to produce final output. Creative industries rely on inputs from other industries, and other industries in turn rely on creative industries to produce output. However, because the industry involved in the ‘last stage’ of production has all output attributed to it, this can mask the importance of contributions from other industries in earlier stages of production (box 3).

### Box 3: Understanding the flows of inputs and outputs between industries

Input-output tables are published for Australia by the Australian Bureau of Statistics (ABS). What these tables detail, at a reasonably fine level of disaggregation, is the value of goods and services from different industries by other industries—known as ‘intermediate inputs’. They also detail the value of goods and services that are supplied for ‘final use’—which includes consumption by households and governments; the use of materials for investment purposes; and exports.

Input-output tables can be used to track the flows of goods and services from particular industries to others. For the purposes of this paper, the input-output tables are used to track the flow of value from creative industries to other industries as they use these creative products to produce others. More information on the approach used to measure input-output flows is contained in [appendix B](#).

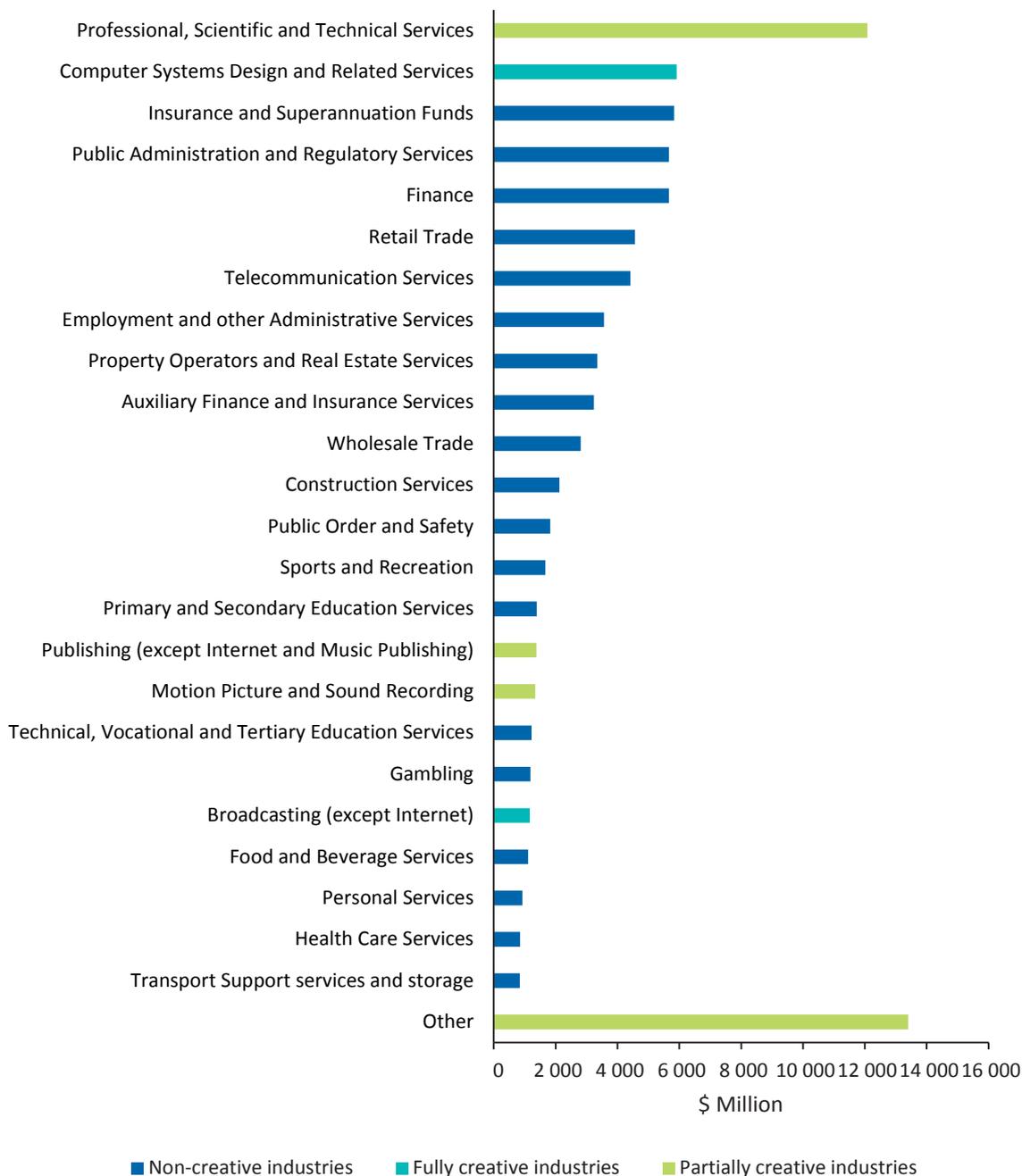
The ABS input-output product categories are not directly comparable to other industry or sectoral classifications, including some of those used by the ABS. For example, the value of screen exports would be captured across categories including broadcasting, motion picture and sound recording, and other categories not shown in the figure above.

Figure 4 shows the value of intermediate inputs used by different industries, ordered from largest to smallest use of intermediate inputs.

This shows that a wide range of industries rely on inputs from creative inputs in order to produce final output. The Professional, Scientific and Technical Services sector alone uses around \$12 billion worth of creative inputs, with the Computer Systems Design, Insurance and Superannuation Funds, Public Administration and Regulatory Services, and Finance industries each using around \$6 billion of creative inputs.

In total, around \$87 billion worth of inputs from creative industries were used by firms in Australia to produce final output in 2014–15.

Figure 4: Value of creative inputs used by different sectors, 2014–15



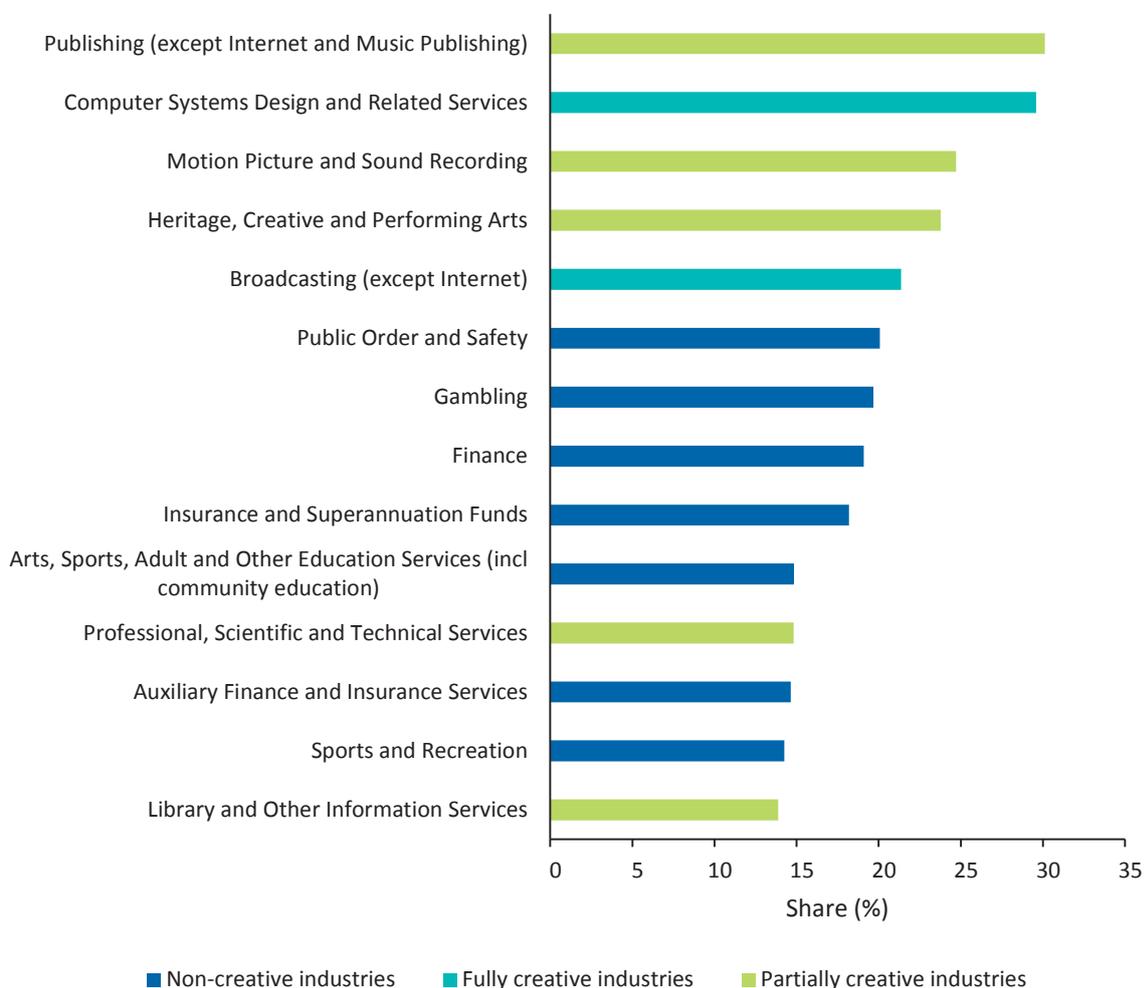
Note: Industries are classified by whether they are creative industries (as identified using the taxonomy above). Because input output tables are published using a different classification to ANZSIC, there are some input-output industry categories that include both creative and non-creative industries. These are classified as ‘partially’ creative industries. Other industries refers to all other input-output product categories not listed in the figure. Source: BCAR estimates based on ABS (2017) Australian National Accounts: Input-Output Tables, 2014–15, Cat. No. 5209.0.55.001.

Another way to examine the intensity of creative inputs use by industries is to look at the value of intermediate inputs produced by creative industries as a share of total intermediate inputs used (figure 5).

What this shows is that many creative industries rely on other creative industries for inputs—the five most intensive groupings of industries are all ones that include (partially or completely) creative industries, and rely on at least 20 per cent of inputs from other creative industries in order to produce their own goods and services. (This does not mean that the production of creative output is only used by creative industries, but rather that creativity from a range of goods and services enables further creativity elsewhere in creative industries.)

Other industries also rely heavily on inputs from creative industries. Of the intermediate inputs used by the Public Order and Safety, Gambling, Finance, and Insurance industries, at least 15 per cent by value is comprised of inputs from creative industries, including inputs such as video production, design and information technology services. The industries listed above contributed 18.1 per cent to Gross Domestic Product in 2014–15; a contribution that appears reliant, in part, on creative industries and creative skills.

Figure 5: Intensity of creative goods and services used in production, 2014–15



Note: Industries are classified by whether they are creative industries (as identified using the taxonomy above). Because input output tables are published using a different classification to ANZSIC, there are some input-output industry categories that include both creative and non-creative industries. These are classified as ‘partially’ creative industries.

Source: BCAR estimates based on ABS (2017) Australian National Accounts: Input-Output Tables, 2014–15, Cat. No. 5209.0.55.001.

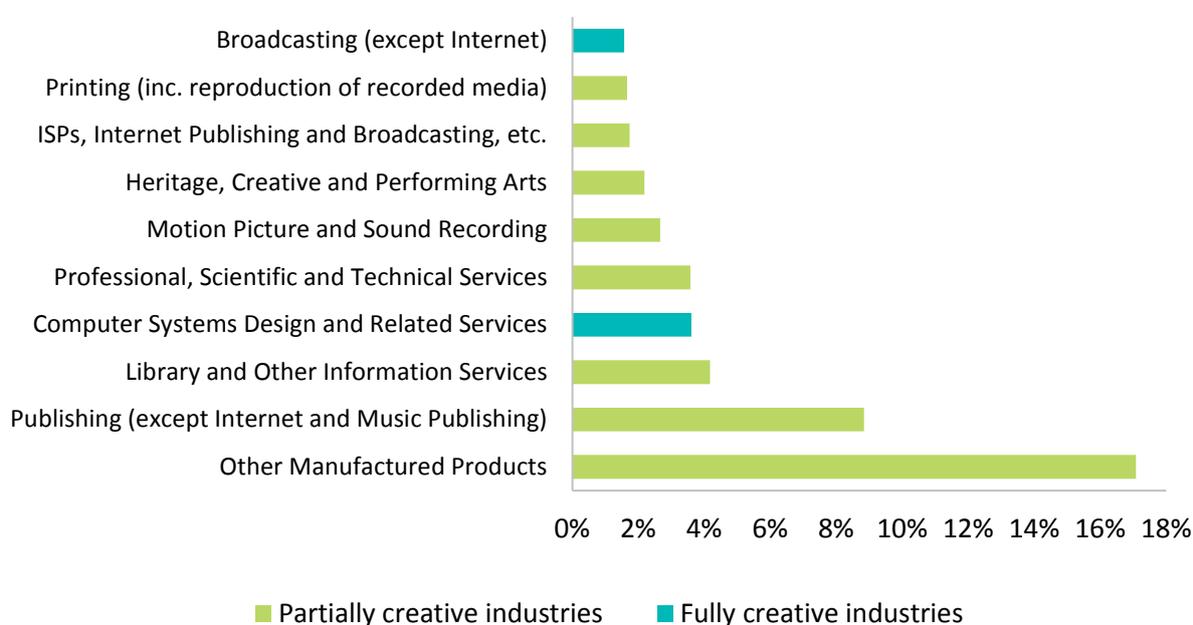
This does not include industries whose inputs from creative inputs comprise less than 15 per cent by value. Some of these industries may be dependent on the use of lower-value, but still critical, inputs from creative industries, which cannot be identified from the input-output data alone.

### The flow of creative exports is significant

Figure 6 shows the creative industries that export the highest share of their gross output, and shows a range of export intensities—the share of final demand comprised by exports—across a range of different creative industries.

Among the most export intensive is jewellery manufacturing (an industry included in the ‘other manufactured products’ category) with around 17 per cent of its gross output exported overseas. Offline publishing, library and other information services, computer systems design and broader professional, scientific and technical services all export around 4 to 5 per cent of their final output.

Figure 6: Exports as a share of gross output, by industry, 2014–15



Note: Industries are classified by whether they are creative industries ([appendix A](#)). Because input output tables are published using a different classification to ANZSIC, there are some input-output industry categories that include both creative and non-creative industries. These are classified as ‘partially’ creative industries ([appendix B](#)). As outlined in box 3, this figure relies on ABS input-output product categories. The data also capture export intensity at a point in time, where the flow of returns to some creative goods may occur over a period of time.

Source: BCAR estimates based on ABS (2017) Australian National Accounts: Input-Output Tables, 2014–15, Cat. No. 5209.0.55.001.

In aggregate creative industries have a lower export intensity than for the economy as a whole. Partial or completely creative industries have an export intensity of 4.5 per cent, compared with 16.6 per cent for the whole economy and 5.4 per cent for service-based industries.<sup>63</sup>

The relatively lower export intensity, however, can also be explained in part by difficulties in ascribing creative inputs and outputs to exports. Many creative products—which embody the creative skills used to create them—are sold as finished goods or services in product groups that are not defined as ‘creative’.

For example, a user-centred design interface for educational services that better enables the sale and use of Australian educational services overseas relies heavily on design—a creative skill. However, because educational services is not considered a creative industry, its exports are not counted towards the export intensity measure above.

This means that export intensities, as measured using definitions of creative industries, are likely to understate the true contribution to export value.

More comprehensive information about the imports of creative goods and services and whether they are inputs that compete with Australian creative goods and services would be needed to determine the contribution of creative industries to exports. In particular, the rise of ‘gig economy’ platforms that enable the outsourcing of specific tasks, including to overseas jurisdictions, may affect the trade in creative services.

Creative skills already make up a sizeable component of qualifications currently and can be expected to increase. The growth in the share of cognitive roles in the workforce; the importance of creative skills to innovative and high-growth industries currently; and the prevalence of creative skills in workforces that are expected to grow in the coming years are all indicators that creative skills are important now, and will be important to Australia’s economy in the future.

## Appendix A: How creative skills, occupations and industries are determined

### Creative occupations and industries

The list of creative occupations is drawn directly from the 2014 paper ‘Australian Creative Employment in 2011—applying the Nesta Dynamic Mapping definition methodology to Australian Classifications’.<sup>64</sup> That paper adapted the Nesta methodology to identify the occupations under the ANZSCO classification that could be deemed creative (table A.1).<sup>65</sup>

Table A.1: List of creative occupations

ANZSCO Code	Name of occupation
131111	Advertising and Public Relations Manager
131113	Advertising Manager
212411	Copywriter
225100	Advertising and Marketing Professionals
225111	Advertising Specialist
225113	Marketing Specialist
131114	Public Relations Manager
225300	Public Relations Professionals, not further defined
225311	Public Relations Professional
232000	Architects, Designers, Planners and Surveyors
232100	Architects and Landscape Architects
232111	Architect
232500	Interior Designers, not further defined
232511	Interior Designer
232112	Landscape Architect
233916	Naval Architect
232600	Urban and Regional Planners
232611	Urban and Regional Planner
232300	Fashion, Industrial and Jewellery Designers
232311	Fashion Designer
232400	Graphic and Web Designers, and Illustrators
232411	Graphic Designer
211300	Photographers, not further defined
211311	Photographer
232312	Industrial Designer
212000	Media Professionals
212112	Media Producer (Excluding Video)

ANZSCO Code	Name of occupation
212300	Film, Television, Radio and Stage Directors
212311	Art Director (Film, Television or Stage)
212312	Director (Film, Television, Radio or Stage)
212313	Director of Photography
212314	Film and Video Editor
212318	Video Producer
212399	Film, Television, Radio and Stage Directors Nec
212114	Television Presenter
212315	Program Director (Television or Radio)
212317	Technical Director
212416	Television Journalist
212113	Radio Presenter
212414	Radio Journalist
211200	Music Professionals
211211	Composer
211212	Music Director
211213	Musician (Instrumental)
211214	Singer
211299	Music Professionals Nec
211111	Actor
211199	Actors, Dancers and Other Entertainers Nec
211112	Dancer or Choreographer
139911	Arts Administrator or Manager
210000	Arts and Media Professionals
211000	Arts Professionals
211100	Actors, Dancers and Other Entertainers
212100	Artistic Directors, and Media Producers and Presenters
212111	Artistic Director
399514	Make Up Artist
211113	Entertainer or Variety Artist
212212	Book or Script Editor
212415	Technical Writer
224200	Archivists, Curators and Records Managers
224211	Archivist
224600	Librarians, not further defined
224611	Librarian

ANZSCO Code	Name of occupation
212400	Journalists and Other Writers
212412	Newspaper or Periodical Editor
212413	Print Journalist
212499	Journalists and Other Writers Nec
212200	Authors, and Book and Script Editors, not further defined
212211	Author
232413	Multimedia Designer
232414	Web Designer
261200	Multimedia Specialists and Web Developers
261211	Multimedia Specialist
261212	Web Developer
225212	ICT Business Development Manager
261100	ICT Business and Systems Analysts
261111	ICT Business Analyst
261112	Systems Analyst
261300	Software and Applications
261311	Analyst Programmer
261312	Developer Programmer
261399	Software and Applications
232313	Jewellery Designer
399400	Jewellers, not further defined
399411	Jeweller
399514	Make Up Artist
224212	Gallery or Museum Curator
234911	Conservator
211412	Potter or Ceramic Artist
211413	Sculptor
211400	Visual Arts and Crafts Professionals
211411	Painter (Visual Arts)
211499	Visual Arts and Crafts Professionals Nec
232412	Illustrator

Note: 'Nec' stands for not elsewhere classified.

Source: Higgs & Lennon (2014) Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications', pp.18–19.

Creative industries (at the 4-digit, or 'class', level of the ANZSIC)<sup>66</sup> are defined as those that have at least 20 per cent of their workforce employed in creative occupations.<sup>67</sup> These industries are listed in table A.2.

Table A.2: List of creative industries

ANZSIC06 Code	Industry name
J000	Information Media and Telecommunications, nfd
1612	Printing Support Services
5600	Broadcasting (except Internet)
R000	Arts and Recreation Services, nfd
6991	Professional Photographic Services
9002	Creative Artists, Musicians, Writers and Performers
5511	Motion Picture and Video Production
6924	Other Specialised Design Services
5514	Post-production Services and Other Motion Picture and Video Activities
9001	Performing Arts Operation
5621	Free-to-Air Television Broadcasting
6921	Architectural Services
5610	Radio Broadcasting
2591	Jewellery and Silverware Manufacturing
5620	Television Broadcasting
5510	Motion Picture and Video Activities
5410	Newspaper, Periodical, Book and Directory Publishing
5400	Publishing (except Internet and Music Publishing)
5412	Magazine and Other Periodical Publishing
9000	Creative and Performing Arts Activities
6940	Advertising Services
5411	Newspaper Publishing
5700	Internet Publishing and Broadcasting
6010	Libraries and Archives
5900	Internet Service Providers, Web Search Portals and Data Processing Services
5420	Software Publishing
5500	Motion Picture and Sound Recording Activities
5413	Book Publishing
5419	Other Publishing (except Software, Music and Internet)
8910	Museum Operation
5622	Cable and Other Subscription Broadcasting
7000	Computer System Design and Related Services
5520	Sound Recording and Music Publishing
9003	Performing Arts Venue Operation
5522	Music and Other Sound Recording Activities

Source: Higgs & Lennon (2014) Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications’, pp.20–21.

## Linking to creative skills

The qualifications at the ASCED 4-digit level that are more prevalent among creative occupations than other occupations are used to identify creative skills. This is carried out using 2016 Census data (table A.3).

Table A.3: List of creative skills, identified using qualification data

ASCED Code	Qualification field	Prevalence within creative occupations	Prevalence within other occupations
1007	Communication and Media Studies	11.577%	1.116%
0401	Architecture and Urban Environment	10.918%	0.626%
1005	Graphic and Design Studies	10.515%	0.740%
0200	Information Technology, nfd	9.303%	2.444%
0201	Computer Science	5.560%	0.826%
0805	Sales and Marketing	6.582%	2.461%
1003	Visual Arts and Crafts	3.522%	0.522%
0913	Librarianship, Information Management and Curatorial Studies	2.357%	0.264%
1001	Performing Arts	2.391%	0.543%
1000	Creative Arts, nfd	1.239%	0.192%
0903	Studies in Human Society	1.277%	0.673%
0915	Language and Literature	1.257%	0.671%
0203	Information Systems	0.578%	0.172%
0101	Mathematical Sciences	0.657%	0.304%
0901	Political Science and Policy Studies	0.550%	0.385%
0900	Society and Culture, nfd	0.649%	0.532%
0103	Physics and Astronomy	0.246%	0.137%
0800	Management and Commerce, nfd	1.693%	1.589%
0919	Economics and Econometrics	0.758%	0.733%
0400	Architecture and Building, nfd	0.012%	0.003%
1099	Other Creative Arts	0.001%	0.000%
0299	Other Information Technology	0.031%	0.030%

Source: BCAR estimates based on 2016 Census data.

## Alternative definitions of creative occupations

Another definition of creative occupations is the set outlined in the Australian Bureau of Statistics (ABS) Australian National Accounts: Cultural and Creative Activity Satellite Accounts, which is also used in the Bureau of Communications and Arts Research (BCAR) working paper on Cultural and Creative Activity in Australia 2008–09 to 2016–17.<sup>68</sup> The ABS used a different approach to determining creative activity, including different sets of occupations and industries.

The definition of occupations is important, as it defines how creative skills are identified. A different set of occupations could lead to the identification of different skills.

However, despite the different approach, the list of creative occupations between the ABS and set of occupations outlined above are similar and lead to near identical results in the identification of creative skills. The differences between the occupation lists are:

- The ABS definition includes Production Assistant (Film Television, Radio or Stage) (ANZSCO code 599912), which the QUT definition does not. In 2016, approximately 1200 people were employed in this occupation (out of a total of around 10.7 million employees).
- The QUT definition includes ICT Business Development Manager (225212), which the ABS definition does not. Around 3000 people were employed in this occupation in 2016.

Another point of difference between the two definitions is the approach to determining creative industries.

- The definition used by the ABS is based on a judgment of how industries are linked to creative value chains. This means that industries like clothing manufacturing and some retail/wholesale activities are included as creative industries.
- In contrast, the QUT definition requires a minimum threshold of employment in creative occupations within an industry to define it as creative. As a result, it includes fewer industries than the ABS definition.

The choice of which definition to use is a subjective one, which should depend on the type of analysis being undertaken. Because the focus of this paper is on the skills of employees, the BCAR has used the QUT definition that is derived from occupations, rather than the ABS definition that focuses on industries.

## Appendix B: Use of input-output data and creative industries

Input-output tables published by the Australian Bureau of Statistics (ABS) allow the use of outputs from creative industries to be tracked to other industries as inputs, to households for final consumption, and as exports. The Bureau of Communications and Arts Research (BCAR) has used the creative industries defined in [appendix A](#) as the list of creative industries for this analysis.

One limitation of this approach is that the classification of industries in input-output tables—input-output product categories (IOPC) and input-output product groups (IOPG)—is different to ANZSIC. The two classification structures do not perfectly align, but the BCAR has attempted to do the best matching possible. This results in sets of input-output groups that are:

- ‘not creative’—the groupings that do not include any creative industries
- ‘partially creative’—the groupings that include some creative industries and some non-creative industries where the classification structures cannot be disaggregated
- ‘fully creative’—the groupings that include only creative industries.

This groupings are detailed in table B.1.

Table B.1: List of creative industries from input-output tables

IOPG Code	Industry name	Partially or Fully Creative
5601	Broadcasting (except Internet)	Fully creative
7001	Computer Systems Design and Related Services	Fully creative
1601	Printing (including the reproduction of recorded media)	Partially creative
2502	Other Manufactured Products	Partially creative
5401	Publishing (except Internet and Music Publishing)	Partially creative
5501	Motion Picture and Sound Recording	Partially creative
5701	Internet Service Providers, Internet Publishing and Broadcasting, Websearch Portals and Data Processing	Partially creative
6001	Library and Other Information Services	Partially creative
6901	Professional, Scientific and Technical Services	Partially creative
8901	Heritage, Creative and Performing Arts	Partially creative

Note: All other input-output product groups (IOPG) are defined as not creative.  
Source: BCAR estimates.

## Appendix C: What information could better inform analysis of creative skills?

This paper relies on a range of data sources to identify and measure the importance of creative skills. These sources enable an understanding of the contribution of creative skills in broad terms.

Information that would be of use includes:

- **The Australia New Zealand Standard Classification of Occupations (ANZSCO).** The finding that creative skills include a range of computer science and information technology fields highlights the relevance of understanding roles that are important to the growing and evolving digital economy. The current ANZSCO includes a range of technology fields relevant to computer science and information technology, but was last compiled in 2006.
- **Data on skills, especially skills outside of formal qualifications.** While this paper uses formal qualifications as the proxy to identify skills, creative skills are broader than formal qualifications alone. Better information on those that have been involved in creative practice (to reflect ‘learning/skilling-by-doing’) and details about multiple qualifications and cross-disciplinary qualifications would help to paint a more complete picture of creative skills and their use through the economy.
- **Detailed data on innovation.** Currently, industry-division level data on innovation activity as published by the Australian Bureau of Statistics (ABS) does not readily enable the identification of industries that innovate through the use of creative skills. The Business Longitudinal Analysis Data Environment can provide access to more disaggregated data, but at a level that may not be statistically robust for disaggregating to the level necessary to analyse creative industries.
- **Job advertisements and outcomes.** Collection and analysis of job advertisements can be used to identify the skills and characteristics of employees that businesses are searching for. These data are being used in Australia<sup>69</sup> and overseas<sup>70</sup> to identify future skills needs. Understanding whether these jobs are filled, and filled by those with the skills sought in advertisements, could help identify creative skills, or the skills that are substituted when the creatively skilled are not available.

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- <sup>45</sup> Other approaches are detailed in the literature of the creative economy, including Howkins, J. (2013) *The Creative Economy: How People Make Money From Ideas*; and Cunningham, S. & Potts, J. (2015) *Creative Industries and the wider economy*, in Jones et al. (eds) *The Oxford Handbook of Creative Industries*, Oxford University Press, Oxford, United Kingdom, pp. 387–404.
- <sup>46</sup> Bakhshi, H., Freeman, A. and Higgs, P. (2012) A Dynamic Mapping of the UK's Creative Industries, NESTA, London, as quoted in Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints, p. 17.
- <sup>47</sup> Bakhshi, H., Freeman, A. and Higgs, P. (2012) A Dynamic Mapping of the UK's Creative Industries, NESTA, London; Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints, pp. 4–5.
- <sup>48</sup> Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints.
- <sup>49</sup> This analysis was carried out at the ANZSCO 6-digit level.
- <sup>50</sup> Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints, pp. 20–21.
- <sup>51</sup> See [Appendix A](#).
- <sup>52</sup> Throsby, D. & Petetskaya, K. (2007) [Making Art Work: An Economic Study of Professional Artists in Australia](#), p. 39.
- <sup>53</sup> BCAR estimates based on ABS 2016 Census data (ABS Tablebuilder Basic). A similar distribution is observed for 2011 data, suggesting that these proportions are roughly stable.
- <sup>54</sup> For example, see Bloore, P. (2009) [Re-defining the Independent Film Value Chain](#). (Accessed 7 November 2018).
- <sup>55</sup> Cunningham, S. & McCutcheon, M. (2018) [The Creative Economy in Australia](#).
- <sup>56</sup> Cunningham, S. & McCutcheon, M. (2018) [The Creative Economy in Australia](#), p. 1.
- <sup>57</sup> Cunningham, S. & McCutcheon, M. (2018) [The Creative Economy in Australia](#), p. 1.
- <sup>58</sup> BCAR estimates based on ABS (2017) Australian System of National Accounts, 2016–17, Cat. No. 5204.0.
- <sup>59</sup> Easton, E. & Djumalieva, J. (2018) [Creativity and the future of skills](#), Creative Industries Policy and Evidence Centre, Nesta, United Kingdom. Accessed 19 November 2018.
- <sup>60</sup> BCAR estimates based on Department of Jobs and Small Business (2018) [Industry Projections—five years to May 2023](#). High growth industries are defined by the BCAR as those industries that are growing more than a standard deviation above the average growth estimate for the total economy, which equates to employment growth of around 14.6 per cent over the 5 years to 2023. This identifies the following 3-digit ANZSIC groups as high-growth: Allied Health, Waste Collection Services; Motion Picture and Video Activities; Sound Recording and Music Publishing; Internet Publishing and Broadcasting; Scientific Research Services; Management and Related Consulting Services; Other Professional, Scientific and Technical Services; Computer System Design and Related Services; Preschool Education; Adult, Community and Other Education, nfd; Adult, Community and Other Education; and Other Social Assistance Services.
- <sup>61</sup> BCAR estimates based on ABS (2018) Innovation in Australian Business, 2016–17, Cat. No. 8158.0.
- <sup>62</sup> BCAR (2018) [Cultural and Creative Activity in Australia, 2008–09 to 2016–17](#), Canberra, p. 5
- <sup>63</sup> BCAR estimates based on ABS (2017) [Australian National Accounts: Input-Output Tables, 2014–15](#), Cat. No. 5209.0.55.001.
- <sup>64</sup> Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints.
- <sup>65</sup> A full list of ANZSCO definitions can be found at the ABS website, [here](#).

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<sup>67</sup> Higgs, P. & Lennon, S. (2014) [Australian Creative Employment in 2011—applying the NESTA Dynamic Mapping definition methodology to Australian Classifications](#), QUT e-Prints, p. 7.

<sup>68</sup> ABS (2014) [Australian National Accounts: Cultural and Creative Activity Satellite Accounts, Experimental, 2008–09](#), Cat no. 5271.0, pp. 38–40; BCAR (2018) [Cultural and Creative Activity in Australia, 2008–09 to 2016–17](#), Canberra.

<sup>69</sup> For example, see NCVER (2018) [Internet job postings: trending and emerging skills—infographic](#), accessed 15 November 2018.

<sup>70</sup> For example, see Djumalieva, J. & Sleeman, C. (2018) [An Open and Data-driven Taxonomy of Skills Extracted from Online Job Adverts](#). ESCoE Discussion Paper 2018-13.