'Connecting the dots' between industry and higher education: the evolving landscape of digital work

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CONTENTS

ABOUT THE PROJECT

Project focus and team

Digital work practices: where are the jobs, what are they, and how prepared are graduates? is an Australian Technology Network of Universities (ATN) Excellence in Learning and Teaching funded project for scholarship, research and innovation. It was led by RMIT University, with Queensland University of Technology and the University of Technology Sydney.

This multi-university, cross-disciplinary project focuses on preparing graduates for digital work and considers how to embed the development of digital capabilities into university curriculum. The project team were drawn from the academic disciplines of Creative Arts, Communications, Business and Management, Engineering, and Education, and have research interests in employability, pedagogy, interdisciplinary practice and the future of work.

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Project aim

The aim of the project was to create a learning model that supports the teaching of digital capabilities in Creative Arts, Communications, Business & Management, and Engineering, with potential application to other disciplines. The intention was to meet new industry needs, while positioning graduates for emerging digital work opportunities in the globalised world of work.

Stakeholders from both industry and the tertiary education sector were consulted in various ways to inform the development of a learning model rapid prototype.

Project reports

The following reports have been produced in the project:

- *Digital educators teaching digital natives? The challenges of developing digital capabilities in a Higher Education context* (Educator Survey Report)

- *Translating digital capabilities: using affordance theory for a developmental learning model across disciplines* (Educator Workshops Report)

- *Digital futures: what employers want from graduates* (Industry Roundtables 1-4 Report)

- *Employment trend data: where are the jobs?* (Employment/Labour Insights Data Report)

- *'Connecting the dots' between industry and higher education: the evolving landscape of digital work* (Industry Roundtables 1-5 and Employment/Labour Insights Data Report)

- *Positioning graduates for digital work futures* (Learning Model and Student Pilots Report)

Input to the learning model was invited from ***Educators*** at all five ATN universities through a survey in September-October 2017 (see Educator Survey Report). The survey was followed by five workshops six months later, where Educators were asked to provide feedback and further input on the learning model prototype developed by the research team (see Educator Workshops Report).

Work with ***Students*** comprised iterative teaching interventions as pilots of translating the learning model for existing curriculum (see Learning Model and Student Pilots Report).

Industry input was invited at a series of four roundtables: Melbourne (1), Sydney (2) and Brisbane (1) from June to September 2017. A fifth roundtable was held in Melbourne in February 2018 to seek further industry input and feedback on the learning model developed by the research team. Three project reports address employment; two of these reports draw on the industry roundtables.

The first report produced with RMIT Careers & Employability (*Employment trend data: where are the jobs?*) analysed graduate employment and labour insights data using the 'Burning Glass' tool. Analysis focused on whether graduates are securing jobs locally, what their roles are, if there are more graduates in Melbourne competing for the jobs available,

and whether roles are changing more rapidly in Melbourne than Sydney and Brisbane (or vice versa).

The second report (*Digital futures: what employers want from graduates*) analysed data gathered from the four Industry Roundtables conducted within the project from June to September 2017. The analysis focused on industry perspectives regarding the digital capabilities sought by employers and that need to be developed in graduates.

This is the third companion report on employment. It synthesises and expands upon the industry roundtable and employment data in the first two reports addressing employment.

INTRODUCTION

In focusing on emerging jobs, this report draws together data from three sources:

- Responses provided by participants at five industry roundtables in Melbourne, Sydney and Brisbane from June 2017 to February 2018
- Graduate employment data from the Australian Quality Indicators for Learning and Teaching site (qilt.edu.au)
- Data updated in December 2017 using Graduate Outcomes Survey/Australian Bureau of Statistics data and a labour insights tool ('Burning Glass') around jobs and their advertised 'digital' requirements

The industry roundtable is a productive and informative way to engage with employers and unearth insights that can inform both research and teaching practice in the academy. Triangulating these insights with employment trend data from Graduate Outcomes Surveys and from job advertisements provides a more nuanced picture of where the jobs are and what they are or might be, in relation to digital work practices.

In this report, the above three data sources are addressed in turn. Key issues arising are highlighted, with suggestions for further work needed.

Section 1 covers the *industry roundtables,* in terms of what industry needs. This includes roundtable discussion of the effects of digital disruption, new models, new roles and capability development, with a close look at what the jobs are and where they are according to the industry participant responses.

Section 2 compares *employment trend data* from the Graduate Outcomes Survey (GOS) for RMIT University (in Melbourne), University of Technology Sydney, and Queensland University of Technology (in Brisbane) in the project's sample disciplines of Creative Arts, Communications, Business & Management, and Engineering.

Section 3 synthesises additional employment trend data drawing upon the GOS and Australian Bureau of Statistics (ABS), together with *job advertisement data* generated by using the labour insights tool, 'Burning Glass'. This again helps to build a picture of the employment landscape.

Appendix 1 is the worksheet used at the first four roundtables with participants (*n=42*).

Appendix 2 is the worksheet used at the fifth roundtable with participants (*n=8*).

Both worksheets sought written responses to questions which also guided verbal discussions, with opportunity for participants to explore themes emerging. The written worksheet responses and verbal discussions were subsequently transcribed.

Appendix 3 presents employment rate comparisons from the Quality Indicators for Learning and Teaching website.

SECTION 1: INDUSTRY ROUNDTABLES – WHAT DOES INDUSTRY NEED?

Five industry roundtables were conducted for the project from June 2017 to February 2018 – two in Melbourne, two in Sydney and one in Brisbane. Participants were identified through institutional partnerships or the Program Advisory groups associated with the target disciplines at the participating universities and invited via email. All participants had leadership roles in organisations (public and private sector). Table 1 gives an overview of the participants.

Table 1: Industry Roundtable Participants

ROUNDTABLE LOCATION	NUMBER OF PARTICIPANTS	DISCIPLINES REPRESENTED	PARTICIPANTS' MEDIAN NUMBER OF YEARS' EXPERIENCE
Melbourne 1 (19 June 2017)	N=10	Creative Arts Communications Business and Management Engineering	>22.5 years
Sydney 1 (9 Aug 2017)	N=9	Creative Arts (Design)	>5 years
Sydney 2 (25 Aug 2017)	N=8	Communications (Journalism)	>15 years
Brisbane (15 Sept 2017)	N=15	Business and Management Engineering Science	>15 years
Melbourne 2 (12 Feb 2018)	N=8	Communications Business and Management Engineering Science/Health Education	>20 years
TOTAL	50		

Digital disruption

Industry Roundtable participants were asked to identify employment opportunities and trends by first noting the impact of digital disruption on their industry and organisation (in particular over the past two years) and the type of work that needs to be done. In their written responses, some especially highlighted the issue of new platforms, but also loss of past opportunities and the new ways of thinking needed to deal with rapid change in the marketplace.

> *Constant change/hard to get ahead. Shift of thinking styles. Rate of response and action. Virtual interaction. Less repetition, more problem solving and strategic/value-add thinking.*
>
> *- Brisbane, Engineering, written*

> *Customer experience and expectations; new ways of providing and consuming information – especially social media; opportunities to collect, analyse and utilise data; crowdsourcing/communities of skills and information – everyone is an expert!*
>
> *- Melbourne, Communication, written*

> *Loss of ad revenue to platforms: Facebook, Google. Emphasis on video – to meet platform/advertisers demands. Only some platforms will get people to come to them directly – experience mediated by third party.*
>
> *- Sydney, Design, written*

> *The rapid and growing dominance of social (Facebook) and Google on news distribution, the rise of social/digital video, fragmentation of audiences. Change in production style, emergence of new social platforms require bespoke content (eg Instagram/Snapchat).*
>
> *- Sydney, Journalism, written*

Discussions and written comments often turned to one word — data. Understanding and using data emerged across several disciplines and industries as a key capability needed but not always met.

> *Slow to move in legacy organisations. Too much data, not enough insight.*
>
> *- Sydney, Journalism, written*

How do you want to sell, how do people want to consume? Digital is everything. Pace of change – incremental. Organisational structure. Data + insights – 1) move from claimed behaviour to actual behaviour; 2) amount of data + ability to transform into insights/knowledge; 3) information dissemination – how consumers hear about brands; 4) better managing + offers. Tech + marketing a much closer relationship needed.

— Melbourne, Communication, written

There were numerous mentions of customer/user experience (CX) and engagement. Emerging needs included employing staff with the ability to interpret and communicate data for decision making and storytelling. Development of 'data intelligence' was signalled as a career advantage.

Tech debt, UK content far ahead, platforms, customer centric/experience as trend.

— Sydney, Design, written

AR/VR applications to customer service and customer experience. Design thinking – many people talking about it, less actually doing it.

— Melbourne, Communication, written

Software engineering for automation. Data Intelligence and Analytics. Data visualisation.

— Brisbane, Engineering, written

Typically, data was linked to other emerging technologies, including artificial intelligence, machine learning and the Internet of Things. At the fifth and final roundtable held in Melbourne, there was great interest in such technology developments and what the implications might be for jobs. One industry participant described a health research project currently underway bringing together scientists, engineers and clinicians to look at complex diseases, including how to manage the interactions between technology and human for the benefit of society.

You need the clinician who's having the patient journey and the patient connectivity. But then if you really want to solve the problem of epilepsy you've got to look at it in a much broader aspect so you need a mathematician for all the data. You need an engineer who's basically going to predict the seizures and create the actual chip that's going to go into your brain...with 3D bioprinting we can take stem cells that all of a sudden are going to create cartilage for you and repair your knee or build you an ear.

— Melbourne, Science, verbal

New models

It is hard to underestimate the impact of digital disruption on the media industry. The whole industry model — across all aspects of the business — has been changing rapidly and continues to do so:

> *Migration of the advertising revenue stream to news media such as Google, Facebook, Twitter. Impact of the entry of Amazon to the market will be felt as traditional advertisers suffer – JB HiFi, Harvey Norman etc and have less money to spend.*
>
> - Sydney, Journalism, written

> *Explosion in number of animation/production studios. Too hard for small studios to compete, designers need to work more broadly. Conventional services are automated. You only stand out when you're different. Creative – dispersed/fragmented model. Traditional 'bread & butter' work disappearing. Technology – you don't have to own everything. Contractor model/augmented workforce. Technologists – having to mix with society.*
>
> - Sydney, Design, written

Different business drivers and models of work were also highlighted as impacts, emphasising the potential of service differentiation and how disciplinary perspectives and thinking could/should be merged or thought about differently.

> *Digital transformation of Australian economy from resources to services.*
>
> - Brisbane, Business, written

> *The primary impact of digital disruption in design as a service has been on the content of what we sell and the revenue (source of) and the operating rhythm that we need to enable that.*
>
> - Sydney, Design, written

> *Asset management, energy delivery – sensors that allow for real-time info is a phenomenal capability. Could look to service delivery to optimise in the digital world.*
>
> - Melbourne, Engineering, written

Overall, there is a need for new models and jobs that acknowledge and signal integrated approaches for commercial advantage, as also indicated in the companion report.

New roles

In terms of near-future opportunities and challenges, roundtable participants again emphasised the need to break down silos of specialisation into a much more cooperative, collaborative and integrated approach. Several participants called for people with foundations in mathematics, coding, statistics, etc.

Pervasiveness of digital. Lack of foundation in maths and programming in IT graduates. Not enough students go into PhD in Computer Science (needed for leading transformation of Australian economy). Lack of venture capital opportunities in IT in Australia.

- Brisbane, Business, written

Electronic search/research. Process and logistics of programming. Data management. Data analytics/maths/stats. Partnering with technology ie. How to work with automation.

- Brisbane, Engineering, written

The need to develop capabilities in data, mathematics and coding in Higher Education extends beyond Australia. The National University of Singapore has recently announced a strategic initiative reported in the *Times Higher* requiring all students to do coding and statistics, irrespective of their discipline *(https://www.timeshighereducation.com/news/asias-top-university-makes-computational-thinking-compulsory).*

In addition to mathematics, coding and statistics, capabilities are needed in business thinking, collaboration and communication including multi-modal storytelling. This means that those from disciplines traditionally focused on mathematics, coding or statistics also need to broaden their repertoire to include some engagement and storytelling approaches, so they can liaise effectively with the communication and creative arts specialists, or be able to do enough themselves to explain and translate the possibilities in a business context. Conversely, creative arts, communication and business specialists need to know enough about coding, storytelling, etc.

At the final industry roundtable held in February 2018, further insights were sought on current *industry developments* and *emerging needs.* Business acumen, digital discernment and joined up thinking were again reinforced in comments by the industry participants.

> *It's not necessarily the understanding of the digital programs, that side of it, the digital is fine, they can understand how all that works. I think they actually have to understand how the actual industry works and how the business operates and what the day to day requirements are of that business.*
>
> - Melbourne, Business, verbal

> *The business requirements are really, really critical for me.*
>
> - Melbourne, Communication, verbal

> *What's the outcome you're looking for and what tools do you need to get there and how do you break through an incredible way a very crowded landscape as far as your message being credible and being believed.*
>
> - Melbourne, Business, verbal

> *Sometimes it's about knowing which data to look at or even thinking that you should be looking at data. So you might have someone who is very well versed in Facebook, a lot of people who are very technically savvy with Facebook - does that necessarily mean that they are getting a higher level of engagement through using Facebook? They might be getting more likes but is that resonating perhaps with a particular message, is it actually changing behaviour?*
>
> - Melbourne, Communication, verbal

With these ideas of integration in mind, the job titles mentioned in roundtable comments included 'social community managers', 'social media platform specialists', 'data detectives' and 'narrative strategists' in response to challenges such as data security and changing business imperatives. A key word here is *engagement*.

> *Engagement specialists who are really diving into the numbers, and informed story telling.*
>
> - Sydney, Journalism, verbal

> *Challenge: data security; new roles – data detectives.*
>
> *Opportunity: CX; immediacy; personalisation; meeting people's needs less annoying, less wastage; data lakes.*
>
> - Melbourne, Communication, written

Narrative strategist. Immersive/experiential designers. New jobs combining of old jobs, as such they can draw team members from diverse backgrounds.

- Sydney, Design, written

From the first to the fifth roundtable, there was a strong need highlighted for 'explainers' or 'translators' with business acumen. People are needed who can interpret the data, know enough about other specialisations to imagine the possibilities, and work with other specialists or other organisations for commercial advantage. Another phrase that came readily to mind: *joining the dots*.

Designers/specialists integrating into broader teams, working with diverse parties, empathy, balance of skills and sensibilities.

- Sydney, Design, written

Big opportunities to interlink similar datasets between similar organisations.

- Sydney, Design, written

Big data – analytics/evaluating/interpretation

Bringing diverse skills together on evaluating

Legal/accounting/engineering – corporate team process

Fake data/real data issues – how to gain capabilities to assess/evaluate/define

Communication - statistics

- Melbourne, Engineering, written

'Connecting the dots' to do things differently, with the business and its outcomes in mind, had emerged in the first four roundtables. This included drawing on previously separate notions of specialisation.

Integration of systems/channels; design thinking; data gathering + analytics; developers with UX skills; "storytelling".

- Melbourne, Communication, written

Experts in Cybersecurity. Digital Legislation Experts. Financial Tech / Reg Tech are an emerging industry.

- Brisbane, Business, written

Ability to rapidly build profile, visibility and brand through social media platforms and web at little extra cost to reach broader audience.

- Sydney, Journalism, written

Understanding data obtained and evaluating/assessing/interpreting the data obtained to optimise processes forward and comparing to cost/commerciality.

- Melbourne, Engineering, written

One participant provided a comprehensive list of jobs where digital capabilities are needed:

- *Creative Arts + Communication*

- *Strategy – data detectives; customer experience managers.*

- *Management – exec education data + analytics; Board membership legal + advisory education.*

- *Tech – data platform managers (people who know how to use the tech platforms.*

- *Design/creative – digital design.*

- *Hybrid role of tech/design creative.*

- *Tech/AI – tech knowledge to deliver creative ideas + Design/Creative – concept for tech product (design thinking).*

- *Tech - Cyber security*

- *Media – personalisation, AI, algorithm*

- *SAP – sales force*

- Melbourne, Communication, written

Where are the jobs?

In the context of major change, the industry roundtable participants indicated that jobs are most likely to be in Australian or international cities, with some reference made to regional employment.

Cities/global

- Melbourne, Communication, written

Based in Sydney, Brisbane and Perth (in that order) but working both in regions (across Australia) and internationally.

- Brisbane, Engineering, written

More and more distributed teams, but there needs to be a centre or focal point, at least in business, a fully distributed team feels too difficult.

- Sydney, Design, written

Participants also made a distinction between the 'place' where work is done and what work is done, highlighting the ability to work from anywhere via technology, including the rise of virtual and transient teams (formed to address particular problems).

Remote working, Increased usage of 3D analysis, Increased use of drones/radars/instruments.

- Brisbane, Engineering, written

Metropolitan areas is where the work is but where it can be done is up for grabs or online.

- Sydney, Design, written

I think within creativity, you're looking at this dispersed model. It's happening in advertising...the best work is being done by people that don't work in big traditional agencies.

- Sydney, Design, verbal

Nature of work. Ways of working/Teams.

- Brisbane, Engineering, written

It appears from the industry roundtable responses that Melbourne may have a more contract-oriented or self-employed workforce than Brisbane and possibly Sydney across Creative Arts, Communications, Business & Management, and Engineering.

Advertising – very rare to get official tenure. Agencies still expand + contract to client revenue – less and less commitment/retainers more project work = freelance economy. Downside = takes a while to add value to client.

Marketing – tenure shorter + shorter.

- Melbourne, Communication, written

Primarily to contract worker – on project by project basis. Possibly entities like Alibaba or Microsoft or SAP in developing AI capabilities – global systems.

- Melbourne, Engineering, written

Contract based – more self-employed; contingent workforce; domain expertise.

- Melbourne, Business, written

Only have full-time/part-time employees. No contractors.

- Brisbane, Business, written

We are maintaining our model of using almost an entirely employee workforce. Senior staff ownership is an important part of our business.

- Brisbane, Engineering, written

Need/want more permanent employees. Casual/contract workforce has a negative effect on patient care.

- Brisbane, Business, written

It costs so much for us to hire and so much training that we only do full time roles.

- Sydney, Journalism, verbal

At the same time, participants acknowledged a growth in specialist work and specialist contracts in Sydney and Brisbane, echoing the trend highlighted above for remote working and responding to business opportunities on an 'as needed' basis.

Increasing specialization of roles, even at graduate level, Challenge for people with generalist skills.

- Sydney, Journalism, written

Trend is for core teams backed up by specialist contractors.

- Sydney, Design, written

Nearly all workers are employees. Some specific skills contracted out (e.g. remote sensing).

- Brisbane, Science, written

Contract workers used more frequently for 'niche' or newly emerging technologies.

- Brisbane, Business, written

Further investigation is needed into the prevalence of contract work and self-employment in Melbourne, Sydney and Brisbane. Given the limitation of the sample size (50 industry roundtable participants), their responses may be indicative of their own experience rather than an actual trend.

Key industry trends:

- Teams / remote work
- Specialist / contract / self-employed or self-generated work

Key industry needs:

- Professional learning about digital – emerging workplaces, evolving work practices and leadership

A learning model for digital capabilities

At the final industry roundtable, feedback was also sought on the **learning model** developed by the research team. The model is explained in detail in the project's Learning Model and Student Pilots Report (*Positioning graduates for digital work futures*). The learning model is based on an integrated hierarchy of digital capabilities, categorised as: Functional (what, how-to); Perceptual (when, why – in known contexts); and Adaptive (extending – in unexplored, emergent contexts).

Industry participants were positive about the model and its fit with industry needs:

> *Found the model to be useful and applicable.*
>
> - Melbourne, Education, written

Participant suggestions of the most important aspects to focus on for student learning often returned to the very real need for Perceptual and Adaptive digital capabilities, especially in relation to artificial intelligence, Internet of Things, etc and collaboration across disciplines.

> *Discernment, ability to adapt, change + collaborate.*
>
> - Melbourne, Business, written

> *Soft skills in amongst the learning; cross-disciplinary learning with a lateral perspective/outcome.*
>
> - Melbourne, Science, written

> *AI, industry specialisation, understand the reasons behind the use of digital, gain emotional intelligence/empathy, communication/how to manage up.*
>
> - Melbourne, Business, written

> *AI, VR, AR, IoT (increasing pervasiveness!).*
>
> - Melbourne, Communication, written

One participant cautioned that teaching practices need to be relevant.

> *How are you going to teach these digital work practices...if you are not applying the digital skills as educators, this will be theoretical not actualised.*
>
> - Melbourne, Engineering, written

At the same time, there was strong encouragement for building on collaboration and real-world projects connecting disciplines. In particular, 'messy' projects, fostering experimentation and risk-taking, were put forward by participants as being critical building blocks in the learning experiences designed to prepare graduates for work futures. There was support for ongoing work integrated learning, but an innovation model incorporating 'what-if' scenarios was advocated to target the Adaptive digital capabilities wanted by industry.

> *ML/AI, multidisciplinary problem-based projects, imperfect based learning/project innovation (with no complete right answer), promotion of multidisciplinary degrees, innovation model (researching, identifying and reporting trends, emergent markets, what if, what wows!).*
>
> - Melbourne, Business, written

> *Live projects with companies; campaigns as final assessments (run a business, solve a problem, improve a process etc); take them out of the classroom; mentorship programs with companies in fields of interests or even start-ups; careful assessment beyond traditional methods of examination.*
>
> - Melbourne, Communication, written

At most roundtables, professional learning was highlighted as being much needed and a growth opportunity – critical for leaders, employees and the self-employed, not only to 'keep up' but also to take the lead.

> *Online training developers and facilitators, Mobile Application developers, Social Media.*
>
> - Brisbane, Business, written

> *Challenge*
>
> *Silos of expertise (tech, IT, marketing, sales); executive expertise + knowledge; lack of managerial/organisational skills for people with technical expertise; branding expertise isn't technical (tech should support, not lead marketing), (taking time + tech proof principles forward)*
>
> *Opportunity*
>
> *Exec learning; postgrad data + analytics.*
>
> - Melbourne, Communication, written

Key industry trends:

- Data analysis / sense making / customer experience / engagement

- Artificial intelligence, machine learning

Key industry needs:

- Professional learning about advanced analytics/strategy – emergence, innovation crossing disciplines and organisations

SECTION 2: EMPLOYMENT DATA

In addition to the five industry roundtables, the project leader undertook a desktop comparison of employment rates reported by respondents in the Australian national survey of recent graduates.

Undergraduate employment

Employment rates according to responses from graduates were compared in the national 2016 and 2017 Graduate Destinations/Outcomes Survey for the three partner institutions in this ATN Innovation Project, in the sample disciplines of Communications, Creative Arts, Engineering, and Business & Management.

Detailed excerpts from the national Quality Indicators for Learning and Teaching website (qilt.edu.au) are provided in **Appendix 3** for each of these disciplines.

- The excerpts include full-time and overall employment rates for RMIT, QUT and UTS, together with the national average rates.
- The number of survey responses is noted (and these varied in some cases within disciplines).
- It should also be noted that RMIT has approximately double the number of completions in these disciplines as QUT and UTS (e.g. see http://www.education.gov.au/selected-higher-education-statistics-2015-student-data)

In summary, for these three ATN institutions (see qilt.edu.au):

In 2016, the **highest** full-time employment results were at UTS (in Sydney) for Communications, Creative Arts, and Engineering; and at QUT (in Brisbane) for Business & Management. The lowest results reported were at RMIT University (in Melbourne).

In 2017, the **highest** full-time employment results were at UTS for all four disciplines; while the lowest results remained at RMIT University (in Melbourne):

Table 2: Full-time Employment Rates

FULL-TIME EMPLOYMENT REPORTED IN 2017 GRADUATE OUTCOME SURVEYS			
	RMIT	UTS	QUT
Communications	59.8%	70.4%	60.0%
Creative Arts	52.6%	59.2%	55.8%
Engineering	70.5%	82.0%	74.6%
Business & Management	71.0%	77.8%	77.6%

Overall, there has been an **increase** in the rate of full-time employment from the 2016 to 2017 survey results for these four discipline groups in all three ATN institutions.

According to graduates' responses, however, the **greatest increase** in full-time employment from the 2016 to the 2017 surveys has also occurred at RMIT University in Communications, Creative Arts, and Engineering; and at UTS in Business & Management:

Table 3: Improvement in Employment Rates

INCREASE IN FULL-TIME EMPLOYMENT: FROM 2016 TO 2017 SURVEYS			
	RMIT	UTS	QUT
Communications	↑ 4.8%	↑ 4.3%	↑ 0.06%
Creative Arts	↑ 6.7%	↑ 1.1%	↑ 5.1%
Engineering	↑ 5.4%	↑3.6%	↑ 2.4%
Business & Management	↑2.7%	↑ 3.7%	↑ 2.2%

We may speculate that the full-time employment rate being lower at RMIT University is due to two factors: 1) RMIT has about double the number of graduate completions as UTS and QUT in these fields of education, which may mean that there are more graduates than full-time jobs in a crowded local market of universities; and 2) as indicated by the Melbourne industry roundtable participants, contract and self-employed work is prevalent locally – not only in the traditional settings of the Creative Arts, but across the disciplines represented.

It is also worth noting that RMIT University has made considerable efforts to improve the employability of graduates as a key strategic priority, which has likely contributed to the increase in full-time employment rates reported by graduates from that institution from 2016 to 2017.

Further investigation is needed into the number, types and locations of jobs available and the number of graduates competing for them (locally, regionally, nationally, internationally, online, full-time, contract).

Key employability trends 2017 – for Creative Arts, Communications, Business & Management, and Engineering:

- Highest full-time employment for all four disciplines = UTS (Sydney)

- Lowest = RMIT (Melbourne) *

- Greatest increase since 2016 = RMIT

* RMIT University has approximately double the number of graduate completions in these fields of education compared to QUT and UTS (e.g. see http://www.education.gov.au/selected-higher-education-statistics-2015-student-data).

SECTION 3: LABOUR INSIGHTS

Method

As suggested in the previous section, the full-time employment rate appears to be lower at RMIT University than at UTS and QUT in the same sample fields of education of Creative Arts, Communications, Business & Management, and Engineering. The project leader therefore gained support from the RMIT University Careers and Employability area to investigate further the employment trend data for sample areas of Advertising, Journalism, Communication Design, Industrial Design, and Engineering. This support is gratefully acknowledged.

While the findings of that investigation are indicative, the insights warrant consideration and suggest a basis for further research.

The investigation drew upon de-identified data from the national Graduate Outcomes Survey (GOS) and the Australian Bureau of Statistics (ABS). The GOS gives an indication of whether graduates have been successful in gaining employment, and the industry and occupation codes are drawn from ABS data. To isolate employment outcomes/demographics by national Field of Education (NFOE) (Engineering, etc.), classifications were made based on the RMIT University program name, program descriptions and/or major area of study where applicable. As such, breakdowns provided by area are indicative and not a perfect subsection of the student population.

A labour insights tool 'Burning Glass' (licensed to RMIT University) was also used. This tool examines public advertisements for jobs but does not include SEEK or LinkedIn. It is not a perfect classifier of job advertisements and so the analysis provided should again be taken as indicative only. For example, to isolate journalism and advertising jobs, as the market is comparatively smaller, searches were run using combinations of key skills that an advertising or journalism degree would reasonably provide (e.g., show listings that ask for skills in journalism, digital journalism, print media, etc.).

Questions

The project leader had briefed the Careers & Employability area at RMIT University on the investigation needed, with a focus on where jobs are and what they are including digital capabilities and digital work practices. The questions set by the project leader to be explored were:

- Are graduates securing jobs locally or are they mobile, and what are their roles?

- Are there more graduates in Melbourne competing for the jobs available?

- Are roles changing more rapidly in Melbourne than Sydney and Brisbane (or vice versa)?

The full report (Employment trend data: where are the jobs?) is available *here*. This was a second iteration (as at December 2017), in which the RMIT Careers and Employability area was able to update the analysis for a smaller sample: Engineering; Journalism; and Communication Design. These sample areas aligned well with the teaching interventions undertaken in the cross-institutional project.

Please note that the results in that report reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting. As mentioned previously, the Burning Glass tool insights may be indicative and suggest a basis for further research.

With this qualification in mind, the indicative insights and broad trends are summarised on the following page (updated in December 2017), for RMIT University graduates as a sample.

Trends and Insights for RMIT Students:

There are *MORE* RMIT graduates overall competing for *MORE* jobs in Melbourne

- More RMIT students graduating (predominantly stay in VIC)
- Burning Glass total ads for Melbourne (all jobs) shows recent trend upwards

There are *MORE* RMIT Engineering graduates competing for *FEWER* Engineering jobs

- More RMIT Engineering students graduating (predominantly stay in VIC)
- Burning Glass total ads for Melbourne (Engineering job search) highlights a smaller market in recent years and gradually recovers

The *SAME* number of RMIT Journalism graduates are competing for *MORE* Journalism jobs

- Similar RMIT Journalism students graduating (predominantly stay in VIC)
- Burning Glass total ads for Melbourne (Journalism job search) indicates increase in 2016

There are *FEWER* RMIT Communication Design graduates competing for *MORE* Communication Design jobs

- Fewer RMIT Communication Design students graduating (predominantly stay in VIC)
- Burning Glass total ads for Melbourne (Communication Design job search) shows reasonably increasing market since 2014

Further work is needed to determine similarities and differences for a wider range of disciplines/specialisations and locations. Is it easier for graduates to gain full-time employment in Sydney or Brisbane (or elsewhere) than in Melbourne?

Job titles and software skills required

Details are provided next from the *full report*, for the 'top 10' advertised job titles cited in Melbourne, Sydney and Brisbane - according to 'Burning Glass' analysis undertaken early in 2017 and updated in December 2017.

Table 4: Top 10 Job Titles 2016-2017 - Burning Glass

BURNING GLASS: ALL JOBS

MELBOURNE		SYDNEY		BRISBANE	
Top 10 - 2016		**Top 10 - 2016**		**Top 10 - 2016**	
Title	**Count**	**Title**	**Count**	**Title**	**Count**
Sales Representative	7,101	Sales Representatives	15,625	Sales Representatives	3,389
Project Manager	5,415	Project Coordinator	4,837	Retail Manager	1,589
Office / Administrative Assistant	5,298	Retail Manager	3,611	Qualified Accountant	1,352
Software Developer / Engineer	5,019	Receptionist	3,172	Administration Officer	1,020
Customer Service Representative	4,448	Finance Manager	3,080	Project Coordinator	1,018
Store Manager	3,464	Client Services Clerk	3,043	Receptionist	896
Accountant	3,249	Financial Analyst	2,959	Retail Sales	834
Account Manager	3,022	Qualified Accountant	2,752	Sales Assistant	820
Registered Nurse	2,392	Systems Analyst	2,612	Enrolled Nurse	808
Solicitor	2,312	ICT Project Manager	2,569	Systems Analyst	807
Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Title	**Count**	**Title**	**Count**	**Title**	**Count**
Sales Representative	8,449	Sales Representatives	17,503	Sales Representatives	3,134
Project Manager	6,270	Project Coordinator	6,070	Retail Manager	1,389
Office / Administrative Assistant	5,947	Retail Manager	4,622	Project Coordinator	1,222
Software Developer / Engineer	5,600	Receptionist	3,929	Qualified Accountant	1,136
Customer Service Representative	5,190	Qualified Accountant	3,898	Registered Nurse	1,051
Store Manager	3,420	Developer Programmer	3,623	Administration Officer	992
Solicitor	3,346	Client Services Clerk	3,613	Construction Foreman/Manager	916
Accountant	3,280	Construction Foreman/Manager	3,314	Enrolled Nurse	911
Account Manager	3,069	Financial Analyst	3,236	Property Manager	872
Registered Nurse	2,980	Systems Analyst	3,216	Systems Analyst	771

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

It appears that *sales/retail* jobs were the ones advertised most frequently in Melbourne, Sydney and Brisbane in 2016 and in 2017. The frequency of advertisements for *project management/coordination* jobs appears to be greater proportionally in Melbourne and Sydney than in Brisbane, although this increased in Brisbane in 2017 compared to 2016.

Below are the 'top 10' **advertised job titles** cited in Melbourne, Sydney and Brisbane - according to 'Burning Glass' analysis undertaken early in 2017 and updated in December 2017 - for the sample fields of *Engineering, Journalism, and Communication Design.*

Table 5: Top 10 Job Titles 2016-2017 - Burning Glass Engineering Search

BURNING GLASS: ENGINEERING SEARCH					
MELBOURNE		**SYDNEY**		**BRISBANE**	
Top 10 - 2016		**Top 10 - 2016**		**Top 10 - 2016**	
Title	**Count**	**Title**	**Count**	**Title**	**Count**
Civil Engineer	606	Civil Engineer	2,183	Civil Engineer	417
Electrical Engineer	322	Electrical Engineer	840	Structural Design	303
Mechanical Engineer	298	Engineering Manager/ Project Engineer	824	Electrical Engineer	237
Engineering Manager/ Project Engineer	263	Structural Design	776	Civil Engineering Draftsperson	203
Revit Architectural Drafter	258	Mechanical Engineer	640	Mechanical Engineer	190
Surveyor	221	Surveyor	401	Engineering Manager/ Project Engineer	177
Structural Design	207	Structural Drafter	400	Structural Engineer	77
Engineering Manager	166	Civil Draftsperson	391	Civil Draftsperson	76
Electrical Engineering Technician	139	Civil Engineering Draftsperson	375	Engineering Manager	76
Civil Draftsperson	135	Revit Architectural Drafter	302	Surveyor	55
Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Title	**Count**	**Title**	**Count**	**Title**	**Count**
Civil Engineer	1,833	Civil Engineer	3,600	Civil Engineer	452
Computer Systems Engineer / Architect	1,192	Software Developer / Engineer	2,324	Software Developer / Engineer	220
Software Developer / Engineer	1,129	Computer Systems Engineer / Architect	2,111	Computer Systems Engineer / Architect	201
Mechanical Engineer	644	Electrical Engineer	944	Electrical Engineer	118
Electrical Engineer	570	Mechanical Engineer	909	Mechanical Engineer	112
Engineering Manager	507	Engineering Manager	863	Engineering Manager	98
Network Engineer / Architect	284	Network Engineer / Architect	417	Network Engineer / Architect	43
Transport Engineer	208	Network Support Officer	353	Process Engineer	37
Project Manager	162	Cyber / Information Security Engineer / Analyst	289	Project Manager	36
Other Technical Sales Representative	158	Data Architect	250	Mining Engineer	31

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

Table 5: Top 10 Job Titles 2016-2017 - Burning Glass Journalism Search

BURNING GLASS: JOURNALISM SEARCH					
MELBOURNE		**SYDNEY**		**BRISBANE**	
Top 10 - 2016		**Top 10 - 2016**		**Top 10 - 2016**	
Title	Count	Title	Count	Title	Count
Communications Officer	106	Journalist	140	Communications Officer	59
Public Relations Professional	39	Communications Officer	124	Public Relations Professional	22
Journalist	38	Campaign or Communications Manager	78	Journalist	16
Sales Representatives	35	Marketing Specialist	67	Marketing Specialist	14
Copywriter	27	Sales Representatives	65	Graphic Designer	10
Campaign or Communications Manager	23	Graphic Designer	39	Receptionist	9
Marketing Specialist	22	Copywriter	35	Copywriter	8
Content Producer	19	Marketing Manager	33	Marketing Manager	8
Personal Assistant	18	Content Producer	32	Sales Representatives	8
Intern	17	Public Relations Professional	32	Marketing Content Creator	7
Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Title	Count	Title	Count	Title	Count
Communications Coordinator	119	Communications Coordinator	176	Communications Coordinator	22
Public Relations Specialist	102	Public Relations Specialist	125	Public Relations Manager	13
Public Relations Manager	54	Public Relations Manager	88	Journalist	7
Copywriter	26	Account Manager	82	Marketing Specialist	6
Journalist	25	Journalist	73	Document Controller	5
Marketing Research Analyst	25	Producer	56	Public Relations Specialist	4
Producer	25	Editor	51	Web Developer	3
Writer	24	Marketing Research Analyst	43	Editor	2
Editor	23	Marketing Manager	40	Marketing Manager	2
Marketing Specialist	22	Web Developer	35	Marketing Research Analyst	2

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

Table 6: Top 10 Job Titles 2016-2017 - Burning Glass Communication Design Search

BURNING GLASS: COMMUNICATION DESIGN SEARCH

MELBOURNE		SYDNEY		BRISBANE	
Top 10 - 2016		**Top 10 - 2016**		**Top 10 - 2016**	
Title	Count	Title	Count	Title	Count
Marketing Specialist	631	Sales Representatives	1,619	Marketing Specialist	182
Sales Representatives	617	Marketing Specialist	1,225	Communications Officer	133
Marketing Manager	453	Marketing Manager	1,087	Marketing Manager	131
Communications Officer	375	Graphic Designer	766	Sales Representatives	128
Graphic Designer	316	Campaign or Communications Manager	523	Graphic Designer	76
Campaign or Communications Manager	214	Communications Officer	424	Civil Engineering Draftsperson	68
User Experience Designer	177	ICT Project Manager	331	Public Relations Professional	59
Interior Designer	158	Developer Programmer	294	Civil Engineer	55
Project Coordinator	135	Project Coordinator	287	Developer Programmer	54
Public Relations Professional	133	Accounts Clerk	273	Campaign or Communications Manager	53
Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Title	Count	Title	Count	Title	Count
Marketing Manager	676	Marketing Manager	1,467	Communications Coordinator	88
Graphic Designer / Desktop Publisher	492	Marketing Specialist	1,055	Marketing Manager	84
Marketing Specialist	470	Account Manager	926	Marketing Specialist	78
Communications Coordinator	462	Graphic Designer / Desktop Publisher	862	Civil Engineer	77
Marketing Coordinator / Assistant	388	Marketing Coordinator / Assistant	695	Software Developer / Engineer	72
Account Manager	367	Software Developer / Engineer	685	Graphic Designer / Desktop Publisher	63
Software Developer / Engineer	331	Sales Representative	647	Public Relations Specialist	57
Sales Representative	324	Communications Coordinator	623	Architectural Draftsperson/Drafter	50
Marketing Research Analyst	323	Civil Engineer	511	Office / Administrative Assistant	50
Public Relations Specialist	322	Public Relations Manager	510	Sales Representative	48

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

While acknowledging that 'manager' and 'coordinator' are not equivalent, we can see from the examples above that there is no significant difference in job titles in Melbourne, Sydney and Brisbane, for the discipline samples analysed:

- same for Engineering (civil engineer)

- same for Journalism (communication/PR coordinator): as opposed to 'journalist'

- similar for Communication Design (marketing manager in Melbourne and Sydney, communication coordinator in Brisbane): as opposed to 'designer'

The excerpts below from the *full report* show the **software skills** advertised as requirements for jobs in Melbourne, Sydney and Brisbane in Engineering, Journalism, and Communication Design. This again includes figures from 2016, updated in December 2017.

Table 7: Top 10 Software Skills 2016-2017 - Burning Glass Engineering Search

BURNING GLASS: ENGINEERING SEARCH		
MELBOURNE	**SYDNEY**	**BRISBANE**
Top 10 - 2016	**Top 10 - 2016**	**Top 10 - 2016**

Skill	Count	Skill	Count	Skill	Count
Computer Aided Drafting/Design (CAD)	629	Revit	1,093	Computer Aided Drafting/Design (CAD)	333
Revit	606	Computer Aided Drafting/Design (CAD)	974	Revit	226
Microstation	209	Civil 3D	331	Microsoft Office	134
Microsoft Office	181	Microsoft Excel	330	Microsoft Excel	94
Microsoft Excel	152	Microsoft Office	308	Design Software	87
Selenium	89	LINUX	177	Microstation	50
Microsoft Windows	79	JAVA	172	Civil 3D	40
JAVA	76	Python	159	SAP	34
SQL	74	Microsoft Windows	146	JAVA	30
Design Software	68	Selenium	128	Geographic Information System (GIS)	27

Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Skill	Count	Skill	Count	Skill	Count
Microsoft Windows	951	Microsoft Windows	1,853	Microsoft Windows	136
LINUX	806	LINUX	1,842	Microsoft Office	121
JAVA	674	Python	1,412	LINUX	112
Python	638	JAVA	1,392	JAVA	86
SQL	519	SQL	1,178	Python	84
JavaScript	438	JavaScript	1,044	C++	80
Git	410	C++	625	SQL	70
Microsoft Office	347	UNIX	621	Microsoft Excel	67
Computer Aided Drafting/Design (CAD)	327	Git	611	JavaScript	56
Microsoft C#	314	Microsoft C#	568	Computer Aided Drafting/Design (CAD)	55

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

Table 8: Top 10 Software Skills 2016-2017 - Burning Glass Journalism Search

BURNING GLASS: JOURNALISM SEARCH

MELBOURNE

Top 10 - 2016

Skill	Count
Microsoft Office	70
Facebook	52
Social Media Platforms	49
Microsoft Excel	42
Adobe Photoshop	34
Adobe Acrobat	33
Platform as a Service (PaaS)	29
Software as a Service (SaaS)	29
Adobe Indesign	25
Microsoft Powerpoint	22

Top 10 – 2017 YTD

Skill	Count
Microsoft Office	69
Facebook	58
Social Media Platforms	47
Microsoft Powerpoint	33
Adobe Photoshop	31
Google Analytics	24
Microsoft Excel	22
Adobe Acrobat	18
Microsoft Word	18
LinkedIn	16

SYDNEY

Top 10 - 2016

Skill	Count
Adobe Photoshop	137
Facebook	128
Microsoft Office	121
Social Media Platforms	108
Microsoft Excel	75
Microsoft Powerpoint	70
Adobe Indesign	64
LinkedIn	56
Adobe Acrobat	55
Google Analytics	39

Top 10 – 2017 YTD

Skill	Count
Social Media Platforms	84
Microsoft Office	83
Facebook	74
Microsoft Excel	66
Adobe Photoshop	63
Adobe Acrobat	40
Microsoft Powerpoint	37
Adobe Indesign	31
Google Analytics	26
LinkedIn	24

BRISBANE

Top 10 - 2016

Skill	Count
Microsoft Office	36
Social Media Platforms	35
Facebook	31
Adobe Acrobat	25
Google Analytics	24
Adobe Photoshop	21
Adobe Indesign	20
LinkedIn	17
Microsoft Sharepoint	17
Google AdWords	11

Top 10 – 2017 YTD

Skill	Count
Microsoft Office	13
Microsoft Excel	11
Microsoft Powerpoint	9
Microsoft Sharepoint	6
Microsoft Windows	6
Social Media Platforms	5
Web Analytics	5
Google AdWords	4
Customer Relationship Management (CRM)	2
Facebook	2

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

BURNING GLASS: COMMUNICATION DESIGN SEARCH

MELBOURNE		SYDNEY		BRISBANE	
Top 10 - 2016		**Top 10 - 2016**		**Top 10 - 2016**	
Skill	Count	Skill	Count	Skill	Count
Microsoft Office	980	Microsoft Excel	2,346	Microsoft Office	336
Microsoft Excel	934	Microsoft Office	2,128	Microsoft Excel	273
Adobe Photoshop	894	Adobe Photoshop	2,062	Computer Aided Drafting/Design (CAD)	227
Facebook	716	Facebook	1,726	Facebook	195
Adobe Acrobat	669	Microsoft Powerpoint	1,320	JavaScript	194
Computer Aided Drafting/Design (CAD)	642	Adobe Indesign	1,309	Adobe Photoshop	185
Adobe Indesign	565	JavaScript	1,217	Adobe Acrobat	176
Social Media Platforms	526	Adobe Acrobat	1,180	SQL	170
JavaScript	516	Social Media Platforms	1,094	Social Media Platforms	163
Revit	470	Google Analytics	987	Adobe Indesign	156
Top 10 – 2017 YTD		**Top 10 – 2017 YTD**		**Top 10 – 2017 YTD**	
Skill	Count	Skill	Count	Skill	Count
Microsoft Excel	1,105	Microsoft Excel	2,236	Microsoft Office	180
Microsoft Office	1,028	Microsoft Office	1,951	Computer Aided Draughting/Design (CAD)	151
Adobe Photoshop	955	Adobe Photoshop	1,716	Microsoft Excel	133
Adobe Acrobat	792	Facebook	1,427	Adobe Photoshop	110
Facebook	731	Adobe Indesign	1,191	Adobe Acrobat	89
Adobe Indesign	676	Microsoft Powerpoint	1,147	Adobe Indesign	84
Social Media Platforms	598	Social Media Platforms	1,087	Facebook	79
Computer Aided Drafting/Design (CAD)	534	Adobe Acrobat	1,042	JavaScript	77
Microsoft Powerpoint	532	Google Analytics	897	SQL	69
JavaScript	418	SQL	885	Social Media Platforms	67

Please also note that these results reflect point-in-time data and are subject to change as improvements are made to the aggregation and reporting methodologies. Burning Glass does not recommend use of this data for time series reporting.

We can see from these samples that, as at December 2017, according to the public advertisements analysed (excluding SEEK and LinkedIn) in terms of software skills required:

- For **Engineering**, the top software skills advertised for in Melbourne, Sydney and Brisbane included Microsoft Windows, Java, Linux and Python.

- For **Journalism**, the top software skills advertised for included Microsoft Office in all three locations. However social media platforms/Facebook were emphasised more in Melbourne and Sydney, and Excel and Powerpoint were emphasised more in Brisbane.

- For **Communication Design**, the top software skills advertised for included Microsoft Office/Excel and Photoshop in all three locations. Facebook/social media platforms were emphasised more in Melbourne and Sydney, and CAD was emphasised more in Brisbane.

These findings are consistent with the digital skills identified in the project's companion Industry Roundtables 1-4 Report: *Digital futures: what employers want from graduates;* and in the Educator Survey Report: *Digital educators teaching digital natives? The challenges of developing digital capabilities in a Higher Education context.*

The search of advertised jobs was limited to job titles typically associated with the sample fields. As mentioned, the job advertisements analysed did not include SEEK and LinkedIn; and jobs may not be advertised in public at all. Furthermore, the search undertaken sought to identify the 'top software skills' mentioned in the public advertisements for these jobs. It is therefore likely that using this search criterion resulted in the functional skills list generated.

Further research is needed into the ***advertised digital requirements*** for a wider range of disciplines/specialisations and locations. This should also include search criteria specifying broader digital capabilities beyond what may be a functional focus on using particular tools – which was suggested in the research outlined above.

Labour insights data trends:

Graduates in full-time jobs in Melbourne – varies for discipline samples (harder for engineering, easier for journalism and communication design)

Job titles are similar for discipline samples in Melbourne, Sydney and Brisbane:

- same for Engineering (= civil engineer)
- same for Journalism (= communication/PR coordinator): as opposed to 'journalist'
- similar for Communication Design (= marketing manager in Melbourne and Sydney, communication coordinator in Brisbane): as opposed to 'designer'

"Digital skills" required (according to job advertisements excluding SEEK and LinkedIn) are fairly similar for discipline samples in Melbourne, Sydney and Brisbane.

CONCLUSION AND RECOMMENDATIONS

Analysis of data from different sources as presented in this report, together with other project reports, has created an interesting picture of what digital capabilities are needed, whether graduates have these capabilities, what jobs are emerging, what jobs/digital requirements are advertised, and whether graduates have been gaining employment to date in sample disciplines of Creative Arts, Communications, Business & Management, and Engineering, in Melbourne, Sydney and Brisbane.

Where are the jobs and what are they?

While some industry participants said that full/part-time work is the norm, it appears (from their comments at least) that jobs are increasingly contract-based, or for the self-employed, especially in Melbourne and possibly to a lesser extent in Sydney. Jobs also appear to be increasingly undertaken remotely/online, with interaction and collaboration across disciplines seen as very important.

New and emerging jobs identified in the companion report *Digital futures: what employers want from graduates*, drawing upon the comments of industry participants at the first four roundtables, are reproduced below. Additions to the list are indicated in green because they were particularly reinforced at the final industry roundtable in February 2018.

The **professional learning** / online training addition to the earlier report's jobs list is significant, in terms of the ongoing need pointed out for staff including leaders to 'keep up' and 'keep ahead'. This was indicated in both verbal and written comments at the roundtables and professional learning was again reinforced strongly at the final roundtable.

New and emerging jobs identified by multiple participants at the project's industry roundtables included:

- Mobile Application Developers
- Cyber-security experts
- Digital strategists (and related roles e.g. Digital Officers, Head of Digital)
- Digital Content Authors/Creators
- Data Platform Managers
- Data Detectives
- Customer Experience Officers/Managers

- Systems designers

- Professional learning designers, online training developers/facilitators (e.g. executive development and professional learning for staff: artificial intelligence, machine learning, Internet of Things)

In *Science and Engineering*:

Geotechnical engineers:

- Tunnel designers

- Engineering geologists

- Remote sensing/Geographic Information System/Image Analysis experts

- Software Developers, testers and engineers

In *Creative Arts (Design)* and *Communications (Journalism)*:

- Digital designer/Art director

- Immersive/Experiential Designers

- Social Community Managers

- Narrative Strategists

- Commercial Editors

What capabilities are needed?

As noted in two other project reports, the companion *Industry Roundtables 1-4 Report* and the *Educator Survey Report*, assumptions about students as 'digital natives' have been challenged and there is clearly a place for ensuring that Functional capabilities are developed. In terms of specific focus areas, however, the digital capabilities considered most important and in need of development are:

- Data analysis capability

- Coding

- Communicating using digital media

An overarching characteristic in this debate is an ability to transverse specialist fields and *'connect the dots'*. The three major areas that seem to be needed for full/part-time, contract or remote/online work arrangements include combinations of knowledge, skills and real-world experience in:

- **BUSINESS:** knowing enough about how organisations work, what their business objectives and imperatives are; AND/OR to interact with business specialists

- **CODING AND STATISTICS**: knowing enough to generate and analyse data; AND/OR to interact with data scientists

- **COMMUNICATION AND DESIGN:** knowing enough to visualise data, translate, explain and use storytelling to engage users/customers or to support strategic decision making and complex problem solving; AND/OR to interact with communication and design specialists

Functional, Perceptual, Adaptive

Over the course of the five industry roundtables held by the project team in Melbourne, Sydney and Brisbane (June 2017 – February 2018), participants increasingly highlighted the importance of digital capabilities that go far beyond functional knowledge and skills in using tools. Although the initial discussions tended to describe 'digital capabilities' in functional (tools) terms, with the much-needed higher-level capabilities seen as being separate from (and more important than) 'digital capabilities', this view appeared to shift over the 8-month course of the roundtables.

Participants at the final roundtable not only saw 'digital capabilities' as necessarily including the higher level, but also recognised the learning model put forward by the project team as being in line with the sorts of digital capabilities needed in industry. Such capabilities involve discernment in known contexts (Perceptual digital capabilities) and imagination in exploring the application or use of technology in previously unknown ways, combinations or contexts (Adaptive digital capabilities).

We are yet to establish if higher-level Perceptual and Adaptive digital capabilities are evident as job requirements, according to public advertisements for jobs. However, Adaptive capabilities are highly sought after and in short supply in industry, where grappling with data and rapidly evolving technologies (artificial intelligence, machine learning, deep learning, Internet of Things, etc.) is a shared challenge. This was highlighted in the roundtables, especially in the most recent one held in February 2018. It is therefore vital that students can develop and articulate Perceptual and Adaptive capabilities with confidence for new and emerging contexts and job roles. Such digital capabilities can be fostered within both universities and the workplace for the ongoing careers of graduates.

In working with students and educators in our universities, we have reflected further on a clear call from industry to step up *professional learning*:

> *"We all need mechanisms and a culture that encourage the embrace of new technologies, kindle the passion for knowledge, and ease barriers to creativity and serendipitous advances"*
>
> (Ishak 2017, p.2).

Recent commentary about research and development within organisations also underlines the significance of professional learning and the processes and culture required to support it - whether in industry or in higher education:

> *"Midcareer job training will be essential, as will enhancing labor market dynamism and enabling worker redeployment. These changes will challenge current educational and workforce training models, as well as business approaches to skill-building."*

(Manyika et al. 2017, p.1).

In summary,

The analysis undertaken in this project suggests there is scope to improve graduates' readiness for evolving digital work practices, including Functional, Perceptual and Adaptive capabilities.

As noted in the project's other reports and publications, we need to re-imagine professional learning for students, graduates and educators alike, to keep up with - and potentially lead - digital work practices. The learning model proposed in this project has been designed to support this and can be adapted for different situations and contexts, including universities and other organisations and professional associations.

In focusing on where the jobs are and what they are, the review of industry roundtable and employment data has highlighted an opportunity for further work in two broad areas, to continue 'connecting the dots' between higher education and industry:

Key recommendations are to pursue industry professional learning initiatives; and produce nuanced jobs data

1. Opportunities for professional learning initiatives in collaboration with industry

Professional learning emerged as a key issue warranting further research. This includes professional learning for students and for graduates in their ongoing careers. It also includes supporting employees and leaders within organisations as they transition their workforce to the 'quick march' of technology developments; for example, grappling with data, customer experience, artificial intelligence, machine learning, etc. It would be important to target perceptual and adaptive digital capabilities for students, graduates/employees and leaders at the organisational level: for 'keeping up' and for transformation.

- These ideas will be discussed further with industry at a Roundtable in the Centre for Media Transition at University of Technology Sydney in May/June 2018, with exploration of potential partnerships.

2. Advertised digital requirements for jobs in a wide range of disciplines; and prevalence of contract and online work (in Melbourne, Sydney, Brisbane, Perth, Adelaide)

Program development and renewal should be informed by trend data on a) advertised digital requirements and b) any increase in contract, online and collaborative work. An expanded ATN comparative analysis of graduate employment would be useful and could follow the RMIT Careers and Employability method described in this report. Search criteria should specify broader digital capabilities beyond a functional focus on using particular software/tools. The original brief may again provide a useful starting point, with questions for investigation adapted as follows for scaling up to other ATN locations and disciplines:

- Are job advertisements calling for perceptual/adaptive digital capabilities in addition to functional software skills; and is there an increase in contract, online and collaborative work?
- Are graduates securing jobs locally or are they mobile, and what are their roles?
- Are there too many or not enough graduates competing for the jobs available in particular locations?

FUTURE DIRECTIONS OF THE RESEARCH

The findings presented within this report focus on the work with industry and employment data in the development, implementation and evaluation of a rapid prototype learning model, in the project Digital work practices: where are the jobs, what are they, and how prepared are graduates? The developmental learning model supports the teaching of digital capabilities in diverse disciplines.

At the completion of the project in May 2018, key findings and resources will be published online at *https://sites.rmit.edu.au/digitalworkpractices/*. Additional publications authored by project team members will also be listed in the website.

Building on this project, future directions of the research include the continuum of professional learning for students, graduates/employees and leaders. The focus would be adapting the learning model for transforming approaches to digital work practices within organisations. Professional development for educators can also be embedded in scaled-up implementation of the learning model.

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REFERENCES

Ishak, W. (2017). Creating an innovation culture. *McKinsey Quarterly*, September. Retrieved from *http://www.mckinsey.com*

Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R., & Sanghvi, S. (2017). Jobs lost, jobs gained: Workforce transitions in a time of automation. Executive Summary, December. Retrieved from *http://www.mckinsey.com*

APPENDIX 1 AND 2 (HANDOUTS: FROM ROUNDTABLES 1-4 AND ROUNDTABLE 5)

See following pages:

Digital work practices: where are the jobs, what are they, and how prepared are graduates?

Melbourne Industry Roundtable 1

Monday 19 June 2017 at Leadership Hub, Engineers Australia

Participant data please (to be de-identified and coded):

Your name:

Your email (for your review of transcript after roundtable):

Your career experience: *(please circle)*

>30 years   >15 years   >5 years   <5 years

Your own discipline/s:

Your role:

Your organization's name:

Industry or field (e.g. construction, tourism):

Scale of your organization: (*please circle*)

>2000 employees   >1000 employees   >500 employees

<500 employees   <50 employees

Scope of your organization   local   national   international   (*please circle*)

Australian Technology Network of Universities Research Project:

RMIT University, Queensland University of Technology, University of Technology Sydney

Project Leader: Associate Professor Fiona Peterson, RMIT University
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Worksheet

1. Introductions and your context:

a) Main effect of digital disruption in your industry or organization – what has been the major change in the last two years?

b) What key opportunity / challenge do you see coming up?

2. What are the jobs and where are they?

a) **What jobs / roles are available and emerging for Communication, Engineering, Business & Management, or Creative Arts (big data, analytics, other)?**

Are they completely new jobs, or different versions of existing jobs?

Some examples please:

b) Employee or contract work, in large / global organization or SME – are there trends by discipline, or for cross-functional teams?

c) Where are graduates most likely to be employed – Australian or international city or region?

3. Graduate Capabilities

a) What does a graduate need to be employable in the digital space – what digital knowledge, skills and attributes are required?

Some general and/or discipline specific examples please:

b) In your experience, how ready are graduates now for digital work practices in your organization? Strengths and areas for improvement?

c) **What digital capabilities (top 3) should we focus on with students?**

d) **Could we develop these capabilities through internships or virtual projects?**

Digital work practices: where are the jobs, what are they, and how prepared are graduates?

Melbourne Industry Roundtable 2

Thursday 15 February 2018 at RMIT University, Activator Boardroom

Participant data please (to be de-identified and coded):

Your name:

Your email:

Your career experience: *(please circle)*

>30 years   >15 years   >5 years   <5 years

Your own discipline/s:

Your role:

Your organization's name:

Industry or field (e.g. construction, tourism):

Scale of your organization: *(please circle)*

>2000 employees   >1000 employees   >500 employees

<500 employees   <50 employees

Scope of your organization   local   national   international   *(please circle)*

STANDOUT THEME FROM INDUSTRY

- ## Data analysis / sense making / customer experience / engagement

As one Design industry roundtable participant put it, there is a **strong need for joined up thinking when it comes to digital capabilities:**

> "It's not about just can I code. It's about I can understand the technical architecture that consists of 500 systems and be able to think around that and think around the business implications of that…"

The need for 'connectors' has been highlighted by many industry participants from different disciplines. A Journalism roundtable participant explained this capability gap:

> "I think it's **connecting the dots**. We're drowning in data [reports] at work…But the reports don't tell you anything a lot of the time. There's no insight to say, what is the meaning of these? You have to change the way you did that story because it didn't resonate for these reasons. I think that's the missing part of it for us..."

Industry participants in different cities often echo the digital work practices and capabilities needed, such as **translators and sense makers**:

> "know the result you get out of that software is meaningful in the real world…actually **makes sense**" **(Engineering participant, roundtable 1)**
>
> "you will **translate** business requirements, help the business to understand how to become customer centric, and help IT and the tech guys to design and develop that" **(Design participant, roundtable 2)**
>
> "what works really well are **explainers**…understanding what analytics means" **(Communications participant, roundtable 3)**
>
> "there seems to be a real lack of connectivity between the business requirement and IT solution…you need to have those people **in-between** that…can make that connection" *(Business participant, roundtable 4)*

Some observations so far

"There were no digital jobs six years ago. Now there's chief digital officer jobs and head of digital. So the titles are actually coming out that didn't even exist before. (**Business participant, roundtable 4**)

Drawing on literature and our interactions with industry, educators and students:

1. some educators may be teaching but not assessing digital capabilities

2. some educators may assume that capabilities for digital work practices are being developed in a different part of a degree program

3. some students may be operating more at a FUNCTIONAL level

4. some industry participants and educators appear to interpret "digital capabilities" at a FUNCTIONAL level (describing, using tools), while others talk about a strong need for "deeper understanding" (it's not just about the tools)

5. some industry participants highlight capabilities like complex problem solving as being separate from - and more important than - "digital capabilities"

6. some industry participants highlight the significance of networking and collaborating across specialisations

7. some industry participants highlight the need to work remotely ("specialists out of the building") and that online and contract work are on the rise in the gig economy

8. some educators and students may not be addressing digital identity and presence (personal, professional, organisational) including implications, risks, strategies

9. some educators and students may not be addressing key industry issues of data and customer/user experience – especially interpreting data for strategic decision making and storytelling/engagement (inter/transdisciplinary opportunity, joined up thinking)

10. some educators and students may not be addressing business outcomes and digital innovation (emergence, entrepreneurship, business nous, new ideas, possibilities)

Learning model: interpreting affordances of technology as a lens for learning and professional practice

Functional affordances relate to the operation of technology; this includes naming, knowing and operating the features of a technology/technologies to perform tasks.

Perceptual affordances relate to interpretation and being discerning about technology tools and practices for their suitability and in-context operation in known contexts.

Adaptive affordances relate to imagining, adapting and extending technology use in previously unexplored and emerging contexts; this requires functional knowledge/skills and perceptual experience.

Digital Capabilities Descriptors have been developed for Design, Journalism, Engineering, and Music Industry. These Descriptors interpret affordances in sample domains – categories of practice and related capabilities for particular jobs or roles.

In Journalism, for example, one of the domains is Data including a focus on Statistics. Affordances could be interpreted as follows to guide new program development, or learning activities and assessment for existing curriculum:

Digital Capabilities and Work Practices		
JOURNALISM: Data Domain, Statistics Focus		
Functional Affordance	**Perceptual Affordance**	**Adaptive Affordance**
Name basic statistical concepts and perform basic statistical calculations	Interpret statistical findings to identify news value; use statistical findings in support of stories	Select appropriate statistical tools to investigate data sources, to identify news value and to illustrate news value in innovative ways

Worksheet

1. Overview of industry roundtable themes in 2017

Q. Any surprises in the key themes identified at industry roundtables in Melbourne, Sydney and Brisbane, in terms of digital trends, roles and capabilities?

2. Overview of learning model

Q. Any strengths or key aspects we have missed in the learning model, in relation to the digital capabilities identified at the previous industry roundtables?

   a) *Strengths of learning model approach – using Functional, Perceptual and Adaptive lenses for using technology*

   b) *Gaps, or aspects we should focus on most for student learning?*

Q. Have there been further significant developments in industry that we should factor into our Digital Capabilities Descriptors, or is the stand-out still Data analysis / sense making / customer experience / engagement?

3. Recommendations

Q. How could we build on and improve the model, to help graduates prepare for work and meet your industry needs?

APPENDIX 3: COMPARISONS OF EMPLOYMENT BY DISCIPLINE

1. Graduate Employment – Undergraduate Communications

Data source: qilt.edu.au

Graduate Destinations Survey 2014-2015 and Graduate Outcomes Survey 2016 *

Graduate Destinations Survey 2015 and Graduate Outcomes Survey 2016-2017 **

	RMIT UNIVERSITY 2016•	NATIONAL AVERAGE
Full-time employment	**50.4%** (45.8% - 55.0%) 244 responses	56.4%
Overall employment	83.1% (80.2% - 86.0%) 314 responses	85.0%

	RMIT UNIVERSITY 2017••	NATIONAL AVERAGE
Full-time employment	59.8% (55.7% - 63.9%) 286 responses	58.3%
Overall employment	84.8% (82.3% - 87.4%) 363 responses	84.4%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2016•	NATIONAL AVERAGE
Full-time employment	**66.1%** (63.4% - 68.7%) 563 responses	56.4%
Overall employment	90.0% (88.6% - 91.5%) 673 responses	85.0%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2017••	NATIONAL AVERAGE
Full-time employment	70.4% (67.6% - 73.1%) 530 responses	58.3%
Overall employment	89.4% (87.8% - 91.1%) 635 responses	84.4%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2016*	NATIONAL AVERAGE
Full-time employment	59.4% (54.2% - 64.5%) 197 responses	56.4%
Overall employment	86.1% (82.9% - 89.3%) 237 responses	85.0%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2017**	NATIONAL AVERAGE
Full-time employment	**60.0%** (55.5% - 64.5%) 240 responses	58.3%
Overall employment	85.0% (82.1% - 87.9%) 287 responses	84.4%

2. Graduate Employment – Undergraduate Creative Arts

Data source: qilt.edu.au

*Graduate Destinations Survey 2014-2015 and Graduate Outcomes Survey 2016 **

*Graduate Destinations Survey 2015 and Graduate Outcomes Survey 2016-2017 ***

	RMIT UNIVERSITY 2016*	NATIONAL AVERAGE
Full-time employment	**45.9%** (42.2% - 49.6%) 401 responses	49.3%
Overall employment	79.1% (76.7% - 81.4%) 593 responses	83.4%

	RMIT UNIVERSITY 2017**	NATIONAL AVERAGE
Full-time employment	**52.6%** (49.2% - 55.9%) 481 responses	52.1%
Overall employment	78.1% (76.0% - 80.2%) 730 responses	81.9%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2016*	NATIONAL AVERAGE
Full-time employment	**58.1%** (52.9% - 63.3%) 172 responses	49.3%
Overall employment	87.7% (84.9% - 90.5%) 227 responses	83.4%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2017**	NATIONAL AVERAGE
Full-time employment	**59.2%** (53.5% - 65.0%) 157 responses	52.1%
Overall employment	84.1% (80.7% - 87.5%) 220 responses	81.9%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2016*	NATIONAL AVERAGE
Full-time employment	**50.7%** (47.1% - 54.2%) 381 responses	49.3%
Overall employment	85.8% (83.9% - 87.8%) 529 responses	83.4%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2017**	NATIONAL AVERAGE
Full-time employment	**55.8%** (51.8% - 59.9%) 317 responses	52.1%
Overall employment	87.5% (85.3% - 89.7%) 440 responses	81.9%

3. Graduate Employment – Undergraduate Engineering

Data source: qilt.edu.au

*Graduate Destinations Survey 2014-2015 and Graduate Outcomes Survey 2016 ***

*Graduate Destinations Survey 2015 and Graduate Outcomes Survey 2016-2017 ****

	RMIT UNIVERSITY 2016*	NATIONAL AVERAGE
Full-time employment	**65.1%** (62.6% - 67.6%) 745 responses	74.3%
Overall employment	79.3% (77.4% - 81.3%) 817 responses	85.1%

	RMIT UNIVERSITY 2017**	NATIONAL AVERAGE
Full-time employment	**70.5%** (68.2% - 72.8%) 783 responses	76.8%
Overall employment	80.5% (78.7% - 82.2%) 906 responses	85.6%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2016*	NATIONAL AVERAGE
Full-time employment	**78.4%** (76.3% - 80.5%) 574 responses	74.3%
Overall employment	84.2% (82.4% - 86.0%) 589 responses	85.1%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2017**	NATIONAL AVERAGE
Full-time employment	**82.0%** (79.4% - 84.6%) 406 responses	76.8%
Overall employment	86.1% (83.8% - 88.3%) 416 responses	85.6%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2016*	NATIONAL AVERAGE
Full-time employment	**72.2%** (69.3% - 75.1%) 428 responses	74.3%
Overall employment	85.3% (83.0% - 87.5%) 448 responses	85.1%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2017**	NATIONAL AVERAGE
Full-time employment	**74.6%** (71.6% - 77.6%) 417 responses	76.8%
Overall employment	84.6% (82.2% - 87.0%) 436 responses	85.6%

4. Graduate Employment – Undergraduate Business & Management

Data source: qilt.edu.au

*Graduate Destinations Survey 2014-2015 and Graduate Outcomes Survey 2016 **

*Graduate Destinations Survey 2015 and Graduate Outcomes Survey 2016-2017 ***

	RMIT UNIVERSITY 2016*	NATIONAL AVERAGE
Full-time employment	**68.3%** (66.0% - 70.6%) 842 responses	73.1%
Overall employment	84.6% (83.0% - 86.3%) 937 responses	89.3%

	RMIT UNIVERSITY 2017**	NATIONAL AVERAGE
Full-time employment	**71.0%** (69.0% - 73.1%) 973 responses	74.8%
Overall employment	85.4% (84.0% - 86.9%) 1104 responses	88.3%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2016*	NATIONAL AVERAGE
Full-time employment	**74.1%** (72.5% - 75.6%) 1493 responses	73.1%
Overall employment	90.9% (90.0% - 91.8%) 1648 responses	89.3%

	UNIVERSITY OF TECHNOLOGY SYDNEY 2017**	NATIONAL AVERAGE
Full-time employment	**77.8%** (76.0% - 79.5%) 1156 responses	74.8%
Overall employment	91.5% (90.4% - 92.6%) 1282 responses	88.3%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2016*	NATIONAL AVERAGE
Full-time employment	**75.4%** (73.6% - 77.1%) 1146 responses	73.1%
Overall employment	90.4% (89.3% - 91.5%) 1259 responses	89.3%

	QUEENSLAND UNIVERSITY OF TECHNOLOGY 2017**	NATIONAL AVERAGE
Full-time employment	**77.6%** (75.8% - 79.5%) 1002 responses	74.8%
Overall employment	90.4% (89.2% - 91.6%) 1103 responses	88.3%