

20 PERSPECTIVES ON HOW ENGAGED AND ENTREPRENEURIAL UNIVERSITIES WILL DRIVE GROWTH AND SHAPE OUR KNOWLEDGE-DRIVEN FUTURE UNTIL 2040

THE FUTURE OF UNIVERSITIES THOUGHTBOOK

AUSTRALIAN EDITION

BALZHAN ORAZBAYEVA, CAROLIN PLEWA, TODD DAVEY, ARNO MEERMAN, IXCHEL BRENNAN, JOHN SZABO, NATALIE FORDE, MARGIE ATKINSON, JACYL SHAW, KATHRYN ANDERSON

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The Future of Universities Thoughtbook Australian Edition

20 perspectives on how engaged and entrepreneurial universities will drive growth and shape our knowledge-driven future until 2040

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THE FUTURE OF UNIVERSITIES THOUGHTBOOK

20 perspectives on how engaged and entrepreneurial universities will drive growth and shape our knowledge-driven future until 2040 Predicting the future is an impossible and futile exercise, hence effective ways of anticipating future events are few and far between. Well intended future predictions often become amusing quotes in presentations many years later. Such as, the advice from a president of the Michigan Savings Bank given to Henry Ford's lawyer Horace Rackham not to invest in the Ford Motor Co: "The horse is here to stay, but the automobile is only a novelty – a fad."

Nevertheless, the exercise of anticipating the future triggers (1) simultaneous consideration of the events of the past. (2) estimation of the present situation, the most important forces affecting it and factors for success, as well as (3) brainstorming and analysing the likely future development possibilities. These aspects are the key elements of strategy development. Yes, the future may be impossible to predict, but by working together to envisage a course for a desirable 'tomorrow', it is possible to embrace adaptability and innovativeness and ultimately turn uncertainty into opportunity.

Given this highly complex activity and the high likelihood of error, the approach taken in the Future of Universities Thoughtbook (www. futureuniversities.com) was to invite global experts, or experts to offer a diversity of perspectives. This version of the Thoughtbook follows this path, focusing specifically on Australia and the Australian higher education system. While highly successful globally both in relation to its research and its education, the transformative and fast-paced times of today require new ideas for inspiring the Australian university of the future. The editors thus selected authors who:

• are already challenging and shaping the development of universities,

- are present or future 'game-changers' and 'thought-leaders',
- potentially already have a prominent position with respect to universities in Australia,
- together can provide a 360-degree view from the vantage of different stakeholder groups.

In doing so, a range of 'possible futures' emerge, from more conservative estimations predicting 'business as usual' for Australian universities, to situations whereby universities are superseded by technology and/or new market-facing competitors. These 'possible futures' provide a basis for the better establishment of university and industry strategies, which enable more efficient investment of resources and more productive outcomes.

When reading the contributions, a general consensus around the **op-portunities and challenges** facing Australian universities emerge. Like our experts' contributions, you will undoubtedly lurch from optimism to

doom with respect to the future of the university, and back again. If this is the case, then we have achieved our major ambition with the Thoughtbook! ... to take your thinking about the university of the future to pieces, and then offer insights into how you can piece a realistic future view back together.

Considering this, the Future of Universities Thoughtbook (FUT) Australia becomes a thought starter for the development of the Future-Oriented Australian University. A vision for the university by 2040 (University 4.0) whereby academics and students work in real time symbiotic partnerships with industry, government and societal stakeholders to simultaneously create and implement new knowledge and solutions to address business and social issues. Those universities that drive change hard within their institutions will get a head start on the rest by embracing uncertainty and a more innovative evolution whilst, if some of the contributions are precise, having a better chance of surviving.

Why now?

Facing enormous global challenges, there is an immediate need to better align universities with business innovation supply chains, talent needs of employers as well as regional needs more generally. Moreover, the development of knowledge-driven, 'smart' development of our societies needs informed leadership.

While globally relevant, and evidenced in the global Thoughtbook preceding this Australian edition, Australia in particular faces extensive challenges and opportunities as it navigates the future of higher education. Yet, the focus remains incremental adaptations of the existing models rather than adventurous and inspiring leaps.

We firmly believe that universities need to embrace change and seize the opportunity to define how they contribute to a prosperous society, or risk becoming irrelevant. But how? And for what future? The best way to avoid a new disruptor into your market is to disrupt your own market from within... Then the questions are, how will it all look in 2040 and will universities be willing to do it?

Vision

The Future of Universities Thoughtbook brings together 20 visions from invited professionals, together with some shorter thought pieces by the editors, to create a vision for the future of universities and how they could potentially impact the world and their community over the next 21 years.

Leading thought and practice leaders from business, the higher education sector, science, policy agencies, and governments will explore the topic of university engagement through an inspiring collection of thoughts, ideas and discoveries explaining how universities and their partners will shape our knowledge-driven future.

A THOUGHT-STARTER: THE LIKELY EFFECT OF MEGATRENDS ON THE DEVELOPMENT OF THE UNIVERSITY TOWARD 2040

Todd Davey, Max Riedel, Balzhan Orazbayeva and Arno Meerman

According to OECD predictions, the need for higher education globally as well as within industrialised countries will continue to increase¹.

This is only one of the many factors that will influence the future development of universities. As an introduction to the topic of universities of the future, we looked at universities through the lens of global megatrends. The consultancy firm McKinsey² identified four global megatrends, 'global shifts reshaping the world', which will impact society over the years to come:

• Emerging markets and urbanization

• Trade, people, finance, and data: Greater global connections

• Accelerating technological change

• Responding to the challenges of an aging world

We will look firstly at the impact of these megatrends, and subsequently, on what it will mean for universities until 2040.

'Emerging markets and the urbanisation megatrend' will lead to an unprecedented consumer market and the emerging-market cities will deliver half of the global GDP growth³. With the economic scales shifting towards the south and east, and cities arowing even further in size, where does this leave universities as anchor institutions? Firstly, there are opportunities for universities from industrialised countries to acquire income from tuition (education as an export) and brain-power for excellent research through international students. In this situation, masses of students from emerging nations, seek educational opportunities at higher ranked universities in more established markets such as the US. the UK and Australia. However, as the quality of local universities in emerging markets grows in the coming years, there will conversely be less demand to attend universities in industrialised countries. Nevertheless. opportunities for universities in developed nations to 'cherry-pick' the best and most motivated students from emerging markets will remain. The challenge for national governments and to a lesser degree universities will be to attract and retain that talent and thereby maintain their competitive edge in the knowledge society.

Moreover, as the overall population and the middle class is able to afford the costs of education from emerging markets grow, demand for higher education globally will continue to increase despite the population of Western economies starting to de-

cline. This megatrend will primarily benefit local universities in emerging countries as well as the elite universities from industrialised countries or more entrepreneurial universities⁴ from the pack of non-elite universities in industrialised countries.

Urbanization will generally favour urban, as opposed to regional, universities. However, following some prominent examples of regional universities closing, regional governments will recognise that their local universities are the engines of their region and part of the solution towards reducing this trend. There will be a realisation that through the loss of regionally-based universities, the 'brain-drain' to cities will intensify and the sources of new industry and local jobs will be lost. Resultantly, local governments and industry increasingly fight to save their universities.

The megatrend, 'Trade, people, finance, and data: Greater global connections', signals an increasing interconnectivity across the globe and the breaking down of geographical barriers for collaboration. The potential lies in more connected networks of universities, innovation networks including business, supply and open innovation networks as well as movement of students which will create a more polarised higher education sector. This polarisation will further enable the resource-rich and sought-after elite universities to increasingly collaborate with major international companies across the globe supplying them with leading-edge research and talent to solve innovation challenges.

At the same time, 'the rest' of the universities will be forced to diversify away, specialise, unite or innovate radically to survive while coping with mass-produced MOOCs and radical new players in the higher education sector such as Coursera, edX and LinkedIn. The successful diversification strategies pursued by the surviving universities will include focusing on (1) emerging needs (e.g. dual-study programmes, lifelong learning), (2) specific emerging technical capabilities (e.g. advanced manufacturing, ICT, artificial intelligence) and (3) specific programme topics (e.g. eco-energy, mobility, security and terrorism, big data management, social entrepreneurship). The 'rest' will also shift their education emphasis away from deep technical knowledge and towards developing more 'T-shaped' students with 'future-proof' competencies including problem-solving, self-management and entrepreneurship capabilities as well as soft skills and emotional intelligence.

The impact of these previous megatrends will also be influenced by the megatrend 'Accelerating technological change', whose effect will be two-fold. Firstly, as technology such as robotics and Al increasingly replaces jobs relying on highspeed accuracy and repetition in both the blue and white collar fields, the demand for knowledge-intensive jobs demanding cognitive, critical and creative thinking skills of humans⁵ will increase as will the need to have higher education degrees.

The use of technology is already reducing the amount of routine academic and administrative positions in universities and this trend will continue especially as information through the internet and MOOCs becomes more accessible. Moreover, combined with AI technology, the early years of the bachelor degree will be better and more individually supported by technology, reducing the quantity of lecturers required.

Conversely, there will be a need for more personalised mentoring as well as synthesizing group work and student interaction across disciplines and borders. This too will be partly supported by AI, which will monitor students' pulse-rate, pupils and facial clues as well as by providing live translations. These developments will also be aided by technology, as screens morph into international portals featuring avatars and realistic holograms of participants as well as new mobility devices, all of which enable better collaboration. This will also put the urbanisation and emerging market trend into a different perspective. In line with Thomas Friedman's thinking. the world becomes truly flat through the application of virtual, augmented, or mixed reality in higher education.

The loss of jobs to technology will be partly offset by the reduction in the working age population in industrialised countries and the need to 'respond to the challenges of an aging world'. Despite an increasing retirement age, the jobs of looking after baby-boomers will be partly taken over by technology, however will also require more human-centred health care workers creating a need for human-centric (social sciences and humanities) and health professionals (science, technology, engineering and mathematics).

Changing employer or even the type of job at an advanced age (e.g. beyond 50) will be more common. Experience will be valued more than today primarily because technology will make information and facts more ubiquitous and experience will be vital to filter out the most useful information and apply it to the task at hand.

The increases in life-spans and the likelihood that workers in the future will need to changes careers multiple times will present universities with significant opportunities. Considering that, there are few over 45 who grew up with today's technology and most have known the university as it currently is, many will still turn to the university to gain a new skill, reinvent themselves or out of interest as they move into retirement years. ¹ OECD. (2015). How is the global talent pool changing (2013, 2030)? Education Indicators in Focus, No.31, Paris: OECD Publishing

² https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-four-global-forces-breaking-all-the-trends

³ https://www.mckinsey.com/featured-insights/urbanization/unlocking-the-potential-of-emerging-market-cities

⁴ The use of the term 'elite universities' in this article primarily refers to top 100 ranked universities according to any of the major university ranking systems including THE, QS and Shanghai. By the nature of these rankings, elite universities tend to be heavily research intensive institutions.

⁵ http://www.machinedesign.com/ industrial-automation/yes-industry-50-already-horizon



SUMMARY OF SECTIONS

Contributions are captured in 4 sections, each with a common theme. The editors summarised each section to provide an overview of the book.

DISRUPTING EDUCATION

Five inspiring contributions make up the section 'Disrupting Education', offering diverse but connected perspectives into higher education in the future. Dan Sleeman opens the section by painting a vivid picture of the new generation university that fosters learning and skills development through experiential, transdisciplinary education. Sketching out two possible futures, Stephen Parker, emphasises the need for transformation of the tertiary education system to drive more comprehensive support for the world of work. Building on this, Conor **King** describes the challenge faced by the general education system, where universities represent siloed education providers among non-university training organisations. Stephanie Fahey reflects on how universities should prepare students best to the evolving nature of work by embracing collaboration with companies and application of technology rather than relying only on the traditional offerings. Finally, representing student voice, Pratik Ambani highlights the need for more non-traditional formats to foster the international education sector, also through matching education with both students' and employers' needs.

Several common trends can be identified in the contributions of this section. Authors expect that the close integration of university and business will benefit the provision of more relevant education and re-design of the traditional offerings. In ad-

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dition, authors envisage a prominent input of employers in education and an important role of technology, but as a mean and not an end in itself. There is a need for transformation of the whole education system where all players would work together to enrich education and to enable students to succeed in the rapidly changing world of work. The teaching and learning are foreseen to be flexible, collaborative, transdisciplinary and curiosity-driven. This also includes the challenge for universities to develop more comprehensive offerings for lifelong-learning and upskilling.

COLLISION OF TECHNOLOGY AND HUMANITY

The section dedicated to the 'Collision of Technology and Humanity' consists of five contributions, which explore the future relationship between man and machine and how this relates to universities. In her piece. Elisabeth Eastland, outlines how the technological explosion of today is changing the jobs of tomorrow and challenges universities to respond. Detailing five barriers for transformation within the University sector, Kumar Parakala outlines how universities can harness opportunities in the digital economy through cultural change. Kylie Walker provides concrete examples of how technology can link inter-connected communities of students and universities. Seeing the complementarity of technology for humans, Richard Watson identifies seven domains in which human can specialise or focus. Finally, Steven Worrall reflects on how universities will be impacted by and should react to digital transformation.

A number of shared threads runs through this highly exploratory section. All articles refer to the emerging 'threat' of technology and explore how universities can either utilise technology or prepare students for a digital future. A number of the contributors details the challenge to teaching and research as well as to career paths of graduates and the need to cope with a rapidly changing future. This in turn leads authors to challenge the university to respond to this evolving situation and to lead the upskilling, reskilling or cross-skilling of graduates and employees. Finally, some authors have also described concrete examples of how universities can support societies in this evolution as well as providing areas of focus for development.

UNIVERSITY ENGAGEMENT

The section titled 'Universitv Engagement' comprises five contributions shining light on changes to the future university's engagement with stakeholders. Megan Lilly envisions industry and university cultures intertwined with community, with widespread existence of Skilling Ecospaces. In re-defining university-business collaboration. Sanjay Mazumdar outlines three areas requiring change for maximising positive impact in 2040 - mutual understanding, strategy, and structure. John McGuire describes a blurring of boundaries, with unconventional connections between universities and businesses creating a new shape of academia and a new shape of vibrant cities. Noel Lindsay emphasises the need for adopting a holistic approach to entrepreneurship as a form of university engagement and integrating academic and non-academic entrepreneurship when cooperating with the communities. Peter Rohan projects a transformation of university operational models, centred around an enhanced engagement of universities with all levels of society.

Collectively, these contributions point towards a closer engagement of universities with their external stakeholders, such as business. Reflecting sentiments of contributions published in the inaugural global Thoughtbook, we can see a future in which borders between businesses and universities may fade away, allowing the place and time in which individuals work together more closely to enrich education and innovation as well as to more strongly contribute to communities and society at large. Indeed, the contributions point towards a transformative role of cooperation in shaping our cities through defining the education and research of the future.

INSTITUTIONAL CHANGE

Changing institutions as old as universities can be challenging, but also rewarding. These six contributions provide their perspective on how these institutions will change over the course of the next 20 years. Leo Goedegebuure and Lynn Meek reflect on two decades from the perspective of a Vice-Chancellor of a newly founded university, following a number of turbulent years labelled as 'Retreat'. 'Restructure' and 'Rebalance', reconstituting the art of rhetoric and debate. Will Grant argues that, whilst reflecting on the past six centuries, universities will not change as radically as some might believe over the twenty years to come. Although he anticipates or hopes for universities to become available to a larger audience. Roy Green emphasises the role of universities in preparing our future workforce and its long term strategic collaboration with government, business and society. Richard Head envisions structural changes that provide a transition between creative thought to application through end-user partnerships at scale. Catriona Jackson describes the university as an innovator of our society and as a 'profound game-changer'. Becoming a place of lifelong learning and a large contributor to the start-up economy the university will have strong relationships with industry in education and research.

The common trend in these contributions are the gradual change they predict. Recognizing that universities are establishing institutions, radical change will not occur within years, but rather gradually and over time. These institutions have always played and will remain to play a crucial role in education and research and will remain to be strong contributors to innovation. What will change is the way in which education is provided, to whom, and what it will result in. They see a future of stability, with universities as strong research institutions working in collaboration with other stakeholders. Addressing global challenges together, preparing our future workforce for the times to come.







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'HUMAN HISTORY BECOMES MORE AND MORE A RACE BETWEEN EDUCATION AND CATASTROPHE.'

– Herbert George Wells (H.G. Wells)



DISRUPTING EDUCATION

ExU – a Learning (Design) Laboratory

Dan Sleeman

Despite the creative license afforded me, writing this piece has been difficult. Perhaps fittingly, this particular type of creativity within-the-unknown is representative of how students of the future must learn, explore and create. The big question is, how can the university best prepare students for a world that can't be prepared for?

The experiential university

Recent research (such as that by Foundation for Young Australians) and popular discourse suggest a need to prioritise highly developed thinking and feeling skills - critical and ethical enquiry, complex problem solving, collaboration, community building and adversity intelligence, among others. At present, jobs that are high-touch - that is, those that are inherently human-centred, such as consulting or customer service - are increasing yearly at a rate of 86%. And low-skill, low-touch jobs are vanishing at a similar rate. Yes, the robots are already here. Hence the need for transferable skills.

We develop these skills by feeling, sensing and discovering through personal interactions and experiences. Alas, education is increasingly monetised and shipped at scale as 'content' rather than as 'learning' and is becoming impersonal – particularly in the digital space. Our uniquely human capabilities are at risk if this trend continues.

The successful university of 2040 therefore is one that is able to foster these human skills through experiential education, at scale and at quality. This experiential university – let's call it ExU – is a learning laboratory which emphasises transdisciplinary exploration of solutions to real challenges and is self-directed and curiosity-driven.

Discipline areas will be wide-ranging: philosophy, logic, innovation, technology, science, politics, health and commercial acumen. And students will need to be inherently entrepreneurial, human-centred and socially conscious.

To do this, ExU will significantly reduce the course options – a move away from longer-form domain specific courses such as a 3-year Bachelor of Marketing – and instead open up new and ambitious pathways and opportunities within select programs based on project opportunities. Electives therefore will no longer be the signifier of flexibility and choice, projects will. As an example, a project brief within an Enterprise Transformation program may require a student to execute marketing initiatives alongside leadership, systems thinking, psychology or the like. The learning process will be genuinely student-led, dynamic and transdisciplinary, not structured and siloed.

In this model, students are supported by experts – much like the present-day industry guest speaker or the tenured professor – but they are primarily supported by their coach, who is a highly skilled mentor with behavioural science, neuroscience, service design and teaching expertise.

'Online' learning will play a significantly different role. ExU effectively utilises virtual reality, mixed reality and artificial intelligence technologies so students can 'feel' and 'experience' as an augmentation to their project-based learning. Envision a student virtually testing communication approaches prior to confronting her client about an unpaid invoice.

Because ExU will require higher-touch resourcing - such as highpaid coaching staff - the business model of the current university will need to pivot. As value creation is at the heart of the student experience, the majority of university administrative work - marketing and communications, customer experience design, change management, events planning and career services - will be done by student project teams. For the few staff left it will be mandated that all staff are directly connected to the student experience - by providing expertise, facilitating workshops or leading students in a collaborative

project, for example. The student will be at the centre of the university, once again.

Blockchain will also disrupt the present-day institution. All learning experiences and assessment at ExU will be distributed on the smart ledaer system and mapped into a national network. This will reduce the load on administrative staff while providing a much more valuable record of the student's capability, which can be made available to future employers or new project teams. Thus constructive alignment will be usurped by a more student-centric pedagogical design approach which focusses on the learning process, rather than the learning outcomes.

The value-generating nature of ExU will allow it to find novel ways of generating revenue by driving commercial outcomes through project deliverables, demand-driven research and consultancy. In essence, a 'factory of innovative thinking' will replace the 'factory of degrees'.

ExU doesn't need to forgo its research responsibility. Like the learning experience, research undertaken at ExU can be explorative, value-creating and multidisciplinary. Students and researchers will proactively collaborate to solve research-based problems; it will no longer be domain specific and researcher-led. Research at ExU will be much quicker at responding to societal needs and trends.

Lifelong learning and upskilling

For all the importance placed on 'human' skills, professionals will also need to have complex technical skills. Experiential project-based learning isn't enough to support the next generation of robot programmers, artificial intelligence scientists, systems architects, drone engineers, memory surgeons, commercial space pilots, or indeed teachers! And these skills need to be learnt efficiently as technology evolves.

ExU will cater for demand-sensitive learning by strategically partnering with industry leaders who will provide work-and-learn programs delivered in-house. As an example, all computer science courses will be delivered within a tech firm so that students learn through practice. Such a shift will create new business models and revenue opportunities for learning-focussed industry partners, revitalise the vocational education sector, and facilitate more effective cross-sector collaboration.

Strategically, ExU will recognise its responsibility to play a critical role in lifelong learning and upskilling. It will offer lifetime memberships via a subscription model which will allow continued access to services, courses and project collaboration opportunities, while reducing the reliance on student loans and supply-centric course fees. In essence, the Alumni department will be replaced by the Lifelong Learning department. Finally, ExU will care deeply about learning experience design. Not only is ExU a student laboratory, it is also a learning design laboratory. Through effective data practices, the university can continually monitor and adjust the student learning experience. Mirroring the project-based approach, ExU will be entrepreneurial in its thinking and will continually test and iterate, and search for opportunities for value creation. The university of the future will practice what it preaches.

And that alone would be a welcome change.



Dan Sleeman believes in the power of education to foster genuine positive and meaningful change. He works at the intersection of entrepreneurship and education and fights to bring the entrepreneurial mindset to education design. In his current role with RMIT's Activator initiative, he is responsible for the design and delivery of a range of educational offerings that specifically focus on the development of entrepreneurship, leadership and innovation capabilities through experiential learning. Dan has worked with higher education, corporates, start-ups and government initiatives. He also runs The Shed, a community-minded woodworking space in Melbourne's inner north – the most creative and critical thinking happens when 'doing', he savs.

A Transformed Future

Stephen Parker

By 2040, it will make little sense to talk about "the" Australian university. If we take the transformation path described below, there will be a range of organisations, some with the title university, some without it, delivering programs of varying lengths and with varying types of recognition.

By 2040, the tertiary scene – to use a term designed not to imply that a definable "sector" exists any more – will be shaped by the decisions we make over the next few years.

As at 2019, we have a post-secondary system which is out of balance within itself and with the society it serves.

Higher education has expanded, to the detriment of vocational education and training (VET), although VET's woes have been compounded by policy failure, inconsistent regulation, the absence of a national tertiary system and old-fashioned bad behaviour.

University graduate outcomes are generally positive but there is a persistent gap between the long-term earnings of male and female graduates¹. There is also a gap between the skills that employers need, according to successive Skill Shortage Lists, and the supply of labour. The market is failing to respond to skill shortages by delivering sufficiently higher earnings in those areas which would normally attract growth.

Possible explanations for the persistent gender gap and the persistent skill shortages are similar. If the gender pay gap is the product of attitudes, power relations and the division of domestic labour, which outweigh the rationality of a market seeking out the best talent, the current skill shortages may be the product of attitudes about VET compared with higher education - the power of certain parts of society such as large corporates and the city, and the feminisation of some kinds of jobs, in the sense that many typically feminised occupations are often lower paid.

If we crudely summarise the gender gap as being the product of patriarchy, we can summarise the skills gap as the product of a class system. Neither has a place in a modern society and the future tertiary scene depends on what we do about it.

Of the many possible futures, two stark alternatives can be sketched; which I will call the disrupted future and the transformed future. The difference between disruption and transformation is the difference between allowing external forces to determine our future versus taking charge of our own future and engaging with reform.

The disrupted future

The disrupted future, by 2040, is one where institutions and policy makers have been incapable of effective action. Interest groups have circled the wagons to protect current perceived advantage. Policy-makers have lacked vision and awareness of the deep shifts in the world around them, particularly about technologies heading our way and the global rebalancing of power between East and West. Politicians have been concerned only with the short-term, driven by brief electoral terms, a polarised community and a 24-hour news cycle.

The result has been the collapse of some universities in outer urban areas, and the life-support existence of regional universities, kept afloat only by regional loadings and special schemes.

Similarly, some TAFE Institutes have gone under, and attempts to group them into wider systems have faltered because the essence of their work is a direct connection with place and local communities.

Large corporate providers of micro-credentials have grown significantly, and some employers have come to prefer these, with the consequence that the 3-year degree continues but is substantially reduced, and many institutions in reality only provide years 2 and 3 because year 1 has been effectively outsourced to pathways providers.

Private registered training organisations do provide a significant amount of training, as they do today, but they do not operate in thin markets or in fields of education that are capital intensive with long pay-back times. Some regional communities have died, in consequence.

The transformed future

A transformed future is the product of some serious thought about the three types of knowledge: knowing why (in Aristotle's terms, episteme); knowing how (techne) and knowing what to do (phronesis, or practical wisdom).

Rather than embody all three, in different mixes, in every tertiary institution, Australia in the latter part of the 20th Century developed a system whereby they were more strictly separated as between universities, vocational providers and the workplace.

The future world of work requires us to develop people who have all three: they have sufficient domain knowledge at an abstract level, they can do things with it, and they get better at doing it with experience and guidance.

A transformed tertiary scene will be an ecosystem of providers, accredited to offer some or all entries in an Australian Qualifications Framework. The AQF will be seen not as a ladder, but as a chassis. Different providers bring innovation and energy to different types of offering and they are accredited if they can do them well and sustainably. The aim is not to be at the top of a single ladder, but to be the best in type.²

No one knows what the effect of the so-called 4th Industrial Revolution will be. That's the point of this. All we can predict is that new mixes of the three types of knowledge will be required and we need to encourage regulated innovation to respond to changing circumstances.

It is up to us, in 2019, to chart a way to a transformed future.

¹ See Is Tertiary Education Worth It? KPMG, November 2018.

² See the ideas developed in Reimagining Tertiary Education: From Tertiary System to Ecosystem, KPMG, August 2018.



Stephen began his career in law, working in private practice and academia in the UK. Over the last 30 years he has held a number of high-profile roles in the Australian education sector including the Vice-Chancellor and President, University of Canberra, Senior Deputy Vice-Chancellor and Vice-President, Monash University and most recently, Director of Global, Development and Strategy at The Conversation.

In 2014, Stephen received the Order of Australia for "distinguished services to tertiary education through administrative, academic and representational roles, and as a leader in the growth and development of the University of Canberra". As KPMG Australia's National Sector Leader Stephen continues his passion for Australia's social and economic future through improvements in education and research outcomes. He leads our work across all parts of the sector including higher education. vocational and training and school education.

Stephen is a music lover and was the lead guitarist in the undiscovered University of Canberra band, The Hip Replacements. He supports a British soccer team which last won a major trophy when The Beatles were still playing together.

How Will the University Look in 2040?

Conor King

The current hype about the future of work often includes universities in its sights, questioning their capacity to adapt student learning to the predicted needs of coming decades.

What I expect to see instead is universities maintaining their dominance of the initial degree programs for generalist degrees and professions, and of the research degree. Together with many other providers, universities will also provide a vast range of follow on studies, giving people the opportunity to gain specific new skills or knowledge areas.

Research will remain a fundamental element of the university. The interesting question is how much research will continue to drive change in our lives, underpinning the greater wealth and wellbeing enjoyed across most parts of the globe during the 20th Century. The past two decades have seen much technical change but, driven by broader concerns about environmental health and national security, less acceptance that we are better off.

Analyses of the future workforce tend to concur that by 2025 or 2030 many current jobs will not exist or will be very different in nature. Some estimate that up to half of all jobs will be substantially affected. These predictions will have some aspects right, but equally, based on past experience with similar assessments, will not have factored in many of the changes to come and will overstate the significance of others. In considering the implications of jobs being very different in twenty years, it is valuable to reflect on expectations people had in 1990 about the future workforce, before email or the internet was in common use. In effect, almost every job in Australia has altered in significant ways over the past two to three decades and some notable roles from the past have been lost. This does not mean we will sail easily into the 2040s, but it does show that continued changes can be integrated.

The predictions about great change in the nature of work burst open the debate about the importance of immediate gaining of competencies versus the acquisition of underlying skill and knowledge sets. The former will get you work now, the latter ensure you get it in the future. The assumptions of great change in work buttress the traditional argument that university education is for the longer term and should not be too driven by the immediate. This strengthens my prediction that the base substantive degree will remain primarily a universitv role.

Over many centuries universities have retained basic characteristics that should carry them through several more decades at least. They are the place to gain the starting qualification for a career that involves both the learning of particular skills and the encouragement to think broadly about a subject area. Through most of their history they have been important centres for developing new knowledge. Those attributes stand regardless of modes of learning delivery and knowledge exploration.

So what is changing?

The economic and social reality is that nearly everyone now needs a post school qualification. University education is part of the general education system. This sounds obvious, yet it is a common refrain still that somehow universities sit apart.

It presumes most people can gain from post-secondary education and training. The evidence for this is quite strong, yet some still picture humans as having a set amount of educational capacity which begins being filled in primary school and, for some at least, ends shortly thereafter.

Educating all to their need should not hold back learning of those most naturally suited to academic learning. Schools already work to this notion. They are expected to take the whole cohort of five-year-olds and produce learning in all of them over the following 13-year period. We measure success by how well the group performs; how well the least successful do and how high the most successful shoot.

Tertiary education has the same challenge

This has created a mini industry of proposals to structure post school education more effectively. By 2040 these questions should be well and truly resolved, placing universities securely among a range of education opportunities.

There is an important debate about how to maintain work knowledge and skills after initial qualifications. Merely adding more qualifications is perhaps not the best solution, although historically that is what happens whenever a significant set of people undertake a similar, but not fully defined type of education.

I hope too we will have a clear role for non-university providers where they do not feel the need to pretend to be a university, but can instead focus at what they may be good at – if the market supports them.

We ought to have accepted that the system will support each person find their way to their desired education outcomes and have moved beyond attempting to force people into certain areas, which has never worked. Those who think individual choice is not a good basis should look back at previous predictions of workforce needs.



Conor King is the Executive Director of the Innovative Research Universities (IRU), a coalition of seven comprehensive Australian universities committed to inclusive excellence in teaching, learning and research. Conor is a leading expert in policy and strategy across the education and training sector, writing extensively on higher education and tertiary education issues.

Prior to joining the IRU, Conor was Principal Consultant with Phillips KPA, a specialist education consultancy group, and Institutional Strategist for Victoria University. Conor was Director, Policy and Analysis, with the Australian Vice-Chancellors' Committee, from 1998 to 2005 and a senior executive with the then Commonwealth Department of Human Services and Health from 1995 to 1998.

The University in 2040 – Moving towards Education 4.0

Stephanie Fahey

Rapid technological change is reshaping the way we live and work. The way we learn, therefore, must also change. The formation of Australia's universities followed the first industrial revolution – the transition from mostly agricultural economies to those dominated by machine-based manufacturing.

We are now in the midst of what has been called the 4th industrial revolution or Industry 4.0. This is creating a new global economy, one increasingly influenced by the rise automation and data exchange in manufacturing – technologies including cyber-physical systems, the internet of things, cloud and cognitive computing.

Universities themselves are contributing to this process through their role in research and development. Now they must also reflect it in the way they teach and interact with industry – the university of 2040 will be a product as well as a propagator of change.

We already know the future of work is global: workers of the future will need to understand international business practices, have foreign language skills, and the ability to build networks, both global and local. This is creating demand for different kinds of skills and different qualifications. At the same time technological progress and evolving business models and practices are disrupting the way such qualifications can be delivered. Australia's higher education sector has spent more than five decades establishing itself as a global powerhouse worth \$A32 billion annually. To continue to thrive, it must look towards new forms of teaching and new markets in areas such as borderless and offshore delivery. It must adapt to a new era, Education 4.0. The challenge comes from all sides – from international competitors, from technology and from industry itself.

While Australian universities are currently seeing strong growth in international enrolments, we can expect greater competition for students in future, including from what is currently our largest source market, China.

China is rapidly increasing the quality and scale of its domestic education offering and aspires to be a net importer of students, rather than an exporter. It is working on bringing 100 of its universities up to a worldclass standard and this is beginning to show in global university rankings.

If Australian universities are to remain competitive their offering must be as up-to-date and responsive as possible. This means practical and applied curricula that provide relevant, intensive immersion courses. Employers are looking for agile, intelligent employees with 21st Century skills – problem solving, creativity, collaboration, teamwork – and this in itself presents issues because they are increasingly willing to provide the necessary training themselves. Students of the future may have the option of bypassing higher education altogether and going straight into a business or industry which has created its own education programs. Companies increasingly want to be part of providing a pathway for school students into "new collar" jobs, rather than blue or white collar ones, jobs that reflect societal needs. One way of doing this may be through developing links with progressive schools rather than universities.

Before it has even opened its doors, Lindfield Learning Village, in Sydney's north – a public sector K-12 school in Sydney set to open in 2019 – has already fielded approaches from AT&T, Microsoft and the CSIRO. Some large multinationals such as EY in the UK are experimenting with no longer requiring a degree as a prerequisite for recruitment, stating that they see no link between university success and professional achievement.

The trend towards micro-credentialing is one example of why this might be happening. Micro-credentials provide a set of skills or knowledge within a given subject field that is more strictly defined and outcome-oriented than a traditional degree or diploma. They are often designed to address specific workforce needs and can be recognised through a system of digital badging. Micro-credentialing is as much as an opportunity for universities as a threat, and university innovation in this space is commendable, including that of DeakinCo and RMIT.

But it shows our institutions cannot afford to sit back and assume their traditional offering will automatically remain the gold standard in postschool education. Like Massive Open Online Courses and other open-access resources for students, micro-credentials are enabled by technology, providing new solutions that potentially disrupt established models of university education.

Yet technology also offers opportunities if harnessed in the right way. It allows universities to drill into niche segments, for example, providing highly structured online learning that meets industry needs.

Online platforms like Smart Sparrow, which helps educators better support and motivate students, show how the benefits of a private lesson can be shared limitlessly across students, time and locations. This is important because every student who sets foot on a campus has unique needs and expectations.

By forming partnerships with edtech providers, universities can use technology to pioneer smarter ways of responding to this, delivering scalable yet personalised experiences. Indeed, universities need to expand partnerships with industry across the board, looking for synergy in potential educational ecosystems, as well as sharpening their contribution to research and development.

The Government has invested considerably in fostering those critical partnerships over many years now, particularly through its National Innovation and Science Agenda. The Linkage Project grants, for example, provides funding of \$50,000 to \$300,000 for two to five years for collaboration projects across government, business and academia.

The ARC Centres of Excellence also act as a lightning rod for collaboration between academia, governments and businesses, publicly funded research organisations and other research bodies. ARC's 2018 priorities for its Industrial Transformation Research Program include advanced manufacturing and cyber security, two fields that are absolutely central to Industry 4.0.

The challenge for our universities is to help create this change without becoming victims of it. Rapid technological change is reshaping the way we live and work. The way we learn, therefore, must also change.

The formation of Australia's universities followed the first industrial revolution – the transition from mostly agricultural economies to those dominated by machine-based manufacturing.



Dr Stephanie Fahey is the Chief Executive Officer of Austrade, the Australian Government agency responsible for promoting trade, investment and international education, and tourism policy, programs and research. Stephanie has over 30 years' experience both as an academic and executive working in Australia and overseas.

Previously she was EY's lead partner for education in the Oceania region, Deputy Vice Chancellor (Global Engagement) at Monash University and Director of the University of Sydney's Research Institute for Asia and the Pacific. Dr Fahey brings an international perspective to her work and a wealth of experience across business and academia.

Austrade's first female chief executive. Dr Fahey has also served on the Australia China Business Council, the Australia China Council. the NSW International Education Advisory Board, the European Australian Business Council. the Board of Canberra Institute of Technology, the Foreign Affairs Council and the Australia Korean Foundation. Stephanie holds a PhD from the Australian National University and BA (Hons) from the University of Sydney. She speaks Melanesian Pidgin. She was inducted as a Fellow of the Australian Institute of Company Directors in 2012.

Future of International Education in Australia

Pratik Ambani

International education is growing at a rapid pace and has become the third largest contributor to Australia's economy.¹ As more students across the globe choose Australia as a preferred study destination, the struggle to retain some of this talent is real. The Higher Education and Vocational Education & Training (VET) sector cater to 75% of the total international students in Australia² and are the key sectors that prepare an individual for the labour market. This piece of work aims to anticipate (and to guide) the future of international education in Australia in the next two decades from an overseas students' perspective.

Matching Education with Students' and Employers' Needs

As students from various parts of the world will continue to arrive to Australia, it will be a challenge to create an education system that suits the needs of the student, the employer as well as the industry norms.

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Universities will be constantly required to change their course offerings to meet the demands of the workforce. Rather than a 'one size fits all approach', more tailored offerings would have to be developed to suit the grasping ability, prior knowledge and interest of students from various regions.

Students are starting to prefer specific short courses with practical exposure rather than lengthy theoretical degrees. Concepts such as unbundling and modular education are becoming more mainstream and a part of regular offering.³

Universities need to collaborate with the industry and provide a more holistic education by preparing students to be job ready - not only the technical knowledge but also from cultural awareness and simulated training perspective.⁴ Embracing international students in Australian workplace is becoming popular. This would be an opportunity for local businesses to then leverage the nuanced experience of natives to establish, run or grow their business overseas.⁵ To strengthen this collaboration, a 360° feedback model should be adopted where the university, the employer and the student exchange constructive criticism based on their experiences. To create an enhanced

education experience and to spark lifelong learning, students should be involved in the design of courses to include specific topics of their interest.

Research indicates that innovation and entrepreneurship would be some of the top skills for the future workforce.⁶ While there are some courses focussing on entrepreneurship offered as master's level programs, it must be appreciated that innovation or entrepreneurship will be within basic disciplines such as engineering, health sciences, nursing, sports or others. Consequently, in order to ensure that the potential of such entrepreneurship courses can be realised to the fullest, it would be wise to integrate it with the mainstream offering of the course itself.

Non-traditional formats to foster the International Education Sector

International education in Australia seems to have a promising future, yet there is a whole new area where it could be expanded. Transnational Education (TNE) is an emerging concept where universities extend their courses and qualifications beyond home countries.7 Developing countries in the African and Asian region have large number of students willing to study from an overseas institute but are not be able to do so owing to financial or other constraints. Over next two decades. Australian universities may be able to reach out to these students through TNE, MOOC (Massive Open Online Courses) or

partnerships with local institutions.⁸ This would ensure that students get a qualification that would be recognised in Australia, making it easier to transit or integrate them into Australian workforce at a later stage.

Experience in dealing with international students indicates that they would like to be prepared for the education system prior to arriving to Australia. Universities in Australia seem to be initiating steps in this direction by creating partnerships with education institutions abroad.9 This model could be strengthened by opening study centres in certain countries - where students can undertake a part of their studies in their home country, with the remaining studies in Australia. This could help ensure that Australian education and qualification remains relevant outside Australia as well. A challenge in implementing the TNE or partnership model would be the recognition of qualifications across countries to promote student mobility.¹⁰

We are in a period of great uncertainty where a student commencing a three to five-year degree may find that most of what they studied in the first year is outdated as they near completion of their course. It is a challenge to ensure that the education framework remains up to date with the market demands in order for the employability levels of graduates not to diminish.¹¹ ¹ Australian Government Department of Education and Training, 'Export Income to Australia from International Education Activity in 2017' (Research Snapshot, June 2018).

² Australian Government Department of Education and Training, 'International Student Data: Monthly Summary' (Monthly Summary, August 2018)

³ Michael Barber, Katelyn Donnelly and Saad Rizvi, An Avalanche is Coming: Higher Education and the Revolution Ahead (Institute for Public Policy Research, March 2013), 32–48.

⁴ Ernst & Young, Can the Universities of Today Lead Learning for Tomorrow? The University of the Future, 30.

⁵ International Education Association of Australia, International Students: A Guide for Australian Employers, 5.

⁶ Al Group, Developing the Workforce for a Digital Future: Addressing Critical Issues and Planning for Action, 14–22.

⁷ Australian Government Department of Education and Training, 'Transnational Education in the Higher Education Sector' (Research Snapshot, October 2016).

⁸ Angel Calderon, 'What Will Higher Education be Like in 2040?' on Global Edition, University World News (11 September 2015) <http://www.universityworldnews.com/article.php?story=20150908145912643>.

⁹ Simon Lancaster, 'Higher education in the UK and Australia: A Cross-Continental Discussion', Nous Group <https:// www.nousgroup.com/insights/transforming-connecting/>.

¹⁰ Australian Government Department of Education and Training, 'National Strategy for International Education 2025' (Strategy, April 2016) 24–25.

¹¹ Ernst & Young, 'EY Calls on Australian Universities to Future-Proof or Risk Major Disruption', EY News (1 May 2018).



Pratik Ambani is the President of Australian Federation of International Students (AFIS), Founder and President of Network for International Law Students Australia (NILS) and Co-Founder of Monash Cultural & Lingual Appreciation Network (M-CLAN). He is also an Ambassador for the Faculty of Law and a participant of Leadership Excellence with John Bertrand AO at Monash University.

Pratik has an extensive experience in dealing with international students and student issues. As a recognition of his contribution to the sector, he was nominated as a finalist for International Student of the Year - Higher Education at the Victorian International Education Awards 2017. Pratik is an international student from India and pursuing Master of Laws (Juris Doctor) at Monash University. He holds an undergraduate degree in Civil Engineering and 5 years of post-qualification experience in project management at Larsen & Toubro Ltd.


'VISION IS THE ART OF SEEING WHAT IS INVISIBLE TO OTHERS'

– Jonathan Swift



COLLISION OF TECHNOLOGY AND HUMANITY

The Cambrian Explosion of Technology and Its Impact on Education

Elizabeth Eastland

Cambrian Explosion

Hints of the future can often be learned from the past. In this case, the deep past. The Cambrian Explosion refers to a point in our evolutionary history 524 million years ago where there was an explosion of animal forms. Before this time, the world was awash with largely single celled animals which floated through the Cambrian Sea able to consume only the things they bumped into. During what is a relatively short period in evolutionary time there was a radical increase in biodiversity, in which 23 out of the existing 24 animal phyla that exist today were born. Deemed the most important evolutionary event on Earth to date, it changed the biosphere forever.¹

How eerily similar this explosion is to our own Anthropocene, where the effects we as living creatures have on the environment are profound. Let us revert to the Cambrian explosion allegory to see where it leads us.

Fossil records show us just how experimental this explosion was. There are many theories about what caused this explosion, but in 2014, Prof Andrew Parker, a researcher at Oxford University, published his in a book titled 'In the Blink of an Eye'. His theory is that it is the evolution of the eye that drove evolution cataclysmically forward. As eyes evolved, so did the ability for animals to seek out and find food, causing the 'predator/prey' relationship, which in turn caused the emergence of millions of new body forms. Predators developed teeth and prey developed exoskeletons. As eyes developed so did the need to develop camouflage, or bold colours that would make prey look bigger or more dangerous. One animal 'technology' led to another resulting in a massive diversity of innovative forms. Many of these experiments failed and died off but many became the foundation for life as we know it.

The technological explosion of today is changing the jobs of tomorrow

Like the evolution of the eye in the Cambrian period, today, we are witnessing this same kind of explosion of technologies. Material technologies have given birth to data storage and communications capabilities; increased processing speed allows for and even demands innovative software languages; communications combined with materials sensing technologies have created an entirely new, hyper connected, globally engineered world.

This rapid change in capability has led to new business models, radical new valuations, a plethora of alternate currencies, and created unprecedented volatility in the marketplace. Since the 1950s, the average life span of Fortune 500 companies has dropped from 75 years to 15 years², and this has led to a profound change in how this generation of students face their careers.

Automation and artificial intelligence will see the disappearance of 47% of current jobs in the coming decades. At the same time, entirely new industries will emerge. By 2030, the majority of Australian workers will be employed in industries that don't even exist yet³. A student today can expect to have 17 different jobs and five different careers and one of them is likely to be their own company. The days of 'a job for life' are long gone.⁴

Universities need to respond

It is no longer sufficient for universities to confer a single subject degree with little practical experience. Students and employers both agree that graduates are underprepared for the working world. To address this 'skills gap', universities must provide the opportunity for multi subject degrees, be taught to think for themselves, and be tested through real world experience.

My interest is in universities supporting students to initiate, explore, experiment, build, and test their own solutions in the marketplace and society. With so much volatility in the marketplace, outcomes are hard to predict.

Encouraging students in experimentation, testing and iteration based on real world feedback are ways of helping them respond to volatility without having to be always certain about outcomes. Students learn to accept feedback and not stigmatize it as failure, building up their resilience and cognition.

I'm speaking about the need to teach design thinking and entrepreneurial approaches as means for coping with an uncertain future and as a basis for a prosperous career and life. As of the last couple of years, 39 Australian universities have now launched entrepreneurial and design thinking courses with the intention of increasing their entrepreneurship offerings to students.⁵

My question, though, is this enough?

Climate change, environmental and biodiversity destruction, genetic engineering, mass migration, global economic upheaval and increasing inequity define the broader challenges for this age. Is it enough for our students to learn to be entrepreneurial, resilient, and respond only to market forces? Or do universities have an obligation to help them consider a wider landscape? What environmental impacts is their company leaving behind? What values is there entrepreneurial startup inadvertently reinforcing with the supply chain choices they make? When they build new technologies are they considering the full product lifecycle so that circular economies are considered from the outset?

Founder's Ethos

In order to build students' resilience to a challenging market, but also shape the world to be a fairer and more hospitable place, we have built our entrepreneurship program around what we have called the Founder's Ethos. We encourage social responsibility and what it looks like to make a commitment to giving back; we embed product design principles that build in sustainability: we teach them the value of diversity. In short, the UNSW Founders Program does more than just offer participants a roadmap for success in an entrepreneurial world; it gives them a new perspective on what success and excellence looks like.

¹ An excellent overview of the Cambrian Explosion can be found on line from the Royal Ontario Museum: https://burgess-shale.rom.on.ca/en/science/origin/04-cambrian-explosion.php#box7

² http://www.aei.org/publication/fortune-500-firms-1955-v-2017-only-12-remainthanks-to-the-creative-destruction-thatfuels-economic-prosperity/. See also https://www.innosight.com/wp-content/ uploads/2016/08/Corporate-Longevity-2016-Final.pdf

³ Carl Benedikt Frey and Michael A. Osborne 'The Future of Employment: How Susceptible are Jobs to Computerisation?' Technological Forecasting and Social Change January 2013; World Economic Forum 'The Future of Jobs Report' http://reports.weforum.org/ future-of-jobs-2016/

⁴ Foundation for Young Australians 'The New Work Mindset' Foundation for Young Australians 2017.

⁵ https://www.universitiesaustralia. edu.au/australias-universities/Universities-and-the-startup-economy/University-startup-support-programs



Dr. Elizabeth Eastland is the Director Entrepreneurship at UNSW, responsible for driving the entrepreneurship brand of the University, including scaling up its successful student start-up program with the aim of creating more than 100 start-ups per year. In her role, Elizabeth is responsible for bringing UNSW's commitment to entrepreneurship and innovation to life by developing collaborative relationships and growing the student and staff start-up ecosystem.

Flizabeth is a seasoned executive with three decades of business. innovation and technology experience. She has shown outstanding leadership in complex, fast changing, multi stakeholder environments with an ability to penetrate complex situations and develop and execute strategy. Elizabeth has thirty years' international experience in high tech research and development, innovation management, business development, M&A, and strategy, with senior executive roles at UNSW, CSIRO, University of Wollongong, Alcatel, Optus, Optus Vision, GEC, NorTel, BNR, and CEO of a startup.

Harnessing Opportunities for Universities in the Digital Economy

Kumar Parakala

We are in the era of the Fourth Industrial Revolution. It heralds enormous societal, economic, cultural and political change now and into the future. This revolution is a result of digital transformation and disruption. New technologies associated with this revolution are making a huge impact on our businesses, our education systems and our societies.

Interactions with more than 200 executives comprising of CEOs, CXOs, Chief Digital Officers and CIOs stronaly suggest that future-proofing is an important priority for these leaders in all sectors including higher education. In several well-known universities, the digital transformation discussion has just begun. Universities are taking steps to modernise culture, organisational structures, measurement systems and operating architectures. University leaders recognise the growing threat of becoming uncompetitive, especially if their digital transformation leveraging disruptive technologies is slow. The broad remit of Universities includes teaching and learning services to students and research services to private and public sector organisations. However, over the next decade, they will be constantly challenged by their customers to provide differentiated and high value experiences.

University leaders taking advantage of the technologies and opportunities afforded by this new revolution will not only survive but thrive. The top five barriers for transformation within the University sector are:

• Federated and siloed environment where faculties operate autonomously, • Legacy academic and business skills of staff,

• Outdated technology systems as resulted of long term underin-vestment,

• Lack of agility, internal politics and organisational culture,

• Lack of urgency and perception of "being protected" from competition.

Following are five ways for Universities to harness the disruptive forces and potential of digital technologies, leading up to 2040:

Transformation has to start at the top

The Manpower Group released a report From C-suite to Digital Suite where leaders agreed that "digital transformation has to start at the top and leaders need to lead differently". Leaders acknowledged the skills of current leaders, resistance to change, complexity and mindset issues are seriously slowing down organisations, making them vulnerable to disruptive forces. Vice-Chancellors have an important role to play in ensuring a digital strategy that is focused on harnessing and taking advantage of disruptive forces is developed and implemented. The Universities leadership team operationalise the strategy with a focus on new business models, student value enhancement and competitive differentiation.

Cultural change is a must

Cultural change is one of the most important drivers of success for Uni-

versity transformation. The ground rules, beliefs, and assumptions that drive culture will require rethinking the roles and responsibilities of academic and professional staff, administration, researchers and students. Universities will be required to transform themselves rapidly (changing in the next 5-10 years, way before 2040) and continuously to meet changing expectations of students as customers. Technology enabled student experiences, attraction and retention will become the most important drive of change and success.

Rapid reskilling the workforce

Both business and political leaders fear that millions of jobs in legacy organisations will be impacted, with early signs of job eliminations visible in many industries. Skills obsolescence at all levels and across all sectors will become a challenge. World leaders are calling for a major shake-up in the education system to help the workforce quickly reskill and upskill. Companies are revamping their learning and development strategies with firms like KPMG announcing a \$450 million learning and development centre to reskill its people and to deal with challenges of automation and robotics. Corporate Universities will be directly competing with conventional Universities in the next 10 years, with education and employment opportunities integrated to attract high quality people.

Invest in artificial intelligence, big data and robotics

Global CEOs leading companies such as Alibaba, Google, Microsoft, IBM and Siemens predict that artificial intelligence, big data and robotics will have a major impact on human beings. They all agree that this impact can be unfavourable to humankind, if not managed properly. On-demand platforms supported by artificial intelligence and other technologies will replace conventional teaching platforms.

The main objective should be augmenting human skills, talents and outputs, not replacing people. Despite Universities developing research labs and teams focused on these areas they must also invest in these technologies to transform their own value-chain, and enable their people to move up the value-chain, before disruptive forces negatively impact them.

Globalisation, strategic alliances and partnerships

In the lead up to 2040, Universities need to create new breakthrough value for their students, researchers and stakeholders continuously, not iust once. Unless Universities embrace global thinking, and establish strategic alliances and partnerships with industry in a global ecosystem, not just local, value creation will become very challenging in a rapidly changing higher education environment. Here, partnerships to create digital ecosystems will be crucial to reskill and upskill University's workforce, as well as find new ways to reskill and upskill their customers.

As disruptive forces become more dominant in this era of the fourth industrial revolution Universities will be redefining their business models many times to create new value for their customers, employees and partners. In the lead up 2040, the University sector needs to deliberately disrupt itself or risk being disrupted by those willing to take this opportunity.



An entrepreneur, business leader and a trusted advisor, Kumar Parakala has more than two decades experience building new and existing professional services businesses in global markets.

As the Global Digital Leader, Kumar led the creation of GHD Digital to help clients with their digital disruption and transformation priorities, leveraging a global network of 500+ digital professionals. GHD is a 90-year-old, world's leading professional services firm with 10,000+ professionals in 200+ offices. He served as a Senior Consulting Partner with KPMG for more than a decade.

Kumar engages at the Board and C-level, with more than 500 Board Director and CEO briefings on topics relating to technology and digital disruption. He is the recipient of multiple awards including SEARCC-ACS Digital Disruptors' International Professional of the Year 2016 Award. He was inducted into the ACS Hall of Fame and ranked in the Australia's Top 50 in Technology.

Tech-Led Communities and Real-Time Virtual Learning

Kylie Walker

The egalitarian, come-all universities of today may in many respects be unrecognisable to the undergraduates of 30 years ago. Go even further back, and 50 years ago universities were the exclusive preserve of the educational elite, research and academia. While modern-day tertiary education still features theoretical physics on many an Australian curriculum, you'll also find classes and research on everything from wine-making to the geography of surfing. Today's universities provide many thousands of people with education, while still playing a leading role in shaping thinking and solutions for the world's most wicked problems. Increasingly, they're also connecting across communities and sectors, integrating truly multi-dimensional experiences and ideas to shape thinking for the future.

The next steps for universities are still in evolution, as the digital world becomes an increasing force in both shaping and threatening the institution of higher education. It is very likely that universities will continue to maintain their vital roles in education and research long into the future, but the way in which these functions will change and adapt to the digital age will determine the extent of their success. I see digital evolution as the key to reaching vastly greater potential new student bodies, deeply enhancing student engagement, exponentially accelerating research, and providing exciting new pathways to collaboration with other sectors and the community at large.

The evolving workforce

The needs of the future workforce are changing very quickly. In the next three decades, this vast and inexorable pulling force will demand that universities provide access to education for a higher volume and a greater diversity of people. Universities will not only train the next generation workforce, they will be required to help retrain a many-perspectived workforce for the digital age, and keep up with the latest technologies to ensure this education is engaging, effective, and cost-efficient.

This shift also brings potential for tertiary institutions to more meaningfully embed themselves into Australians' everyday lives; informing and empowering citizens to fully participate in their democratic society. With so many more alumni, universities could become places for people to return regularly as their career and role in society morphs and matures. Alumni, through the filters of their experience in diverse sectors and jobs could be contributing, learning new skills and interacting as members of the university community well beyond their degree. This could become a powerful new tool to reach beyond academia and engage more meaningfully with industry, government, the arts, the caring economy, and other spheres of society.

Growing inter-connected communities

Social media has transformed the way in which we connect and socialise and universities could better exploit digital interconnection and improve student outcomes using the online space and directly incorporating behaviours and tools students are using socially. This would lead to better and more opportunities for networking, inter-student mentoring, and direct access to international experts.

It's likely we'll take it even further, with fully on-demand access to high quality, well-produced, engaging, open source content providing flexible study options and a complete reshape of the way classes are delivered. Pairing this on-demand approach with a social media or crowd-sourced type rating system will quickly create strong market pull for more high quality content and ensure learning is fun and accessible.

Virtual reality, increased internet connectivity and even 3D printing will allow for remote education to not only provide the theoretical knowledge to students in regional and rural areas, but to bring to life the practical experiences that students on campus receive too.

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Imagine studying biology and using virtual reality to digitally participate in dissections in real time. Or as a long-distance engineering student, being able to build a scale model of a bridge, scan the dimensions and send them to your supervisor to 3D print for examination.

Adaptable education and research

Rapid technological advances are changing the way we work and leading to new jobs that look quite different to traditional roles. We need an adaptable workforce and an adaptable education and training system to cope. Some universities are already exploring how they package and deliver their content to support this. By 2040 it will no longer be plausible to undertake a single 4-year degree and hold a job in that field for the entirety of your career.

New tools and technologies will result in new researchable areas and universities will continue to be at the forefront of this work. However, technology is also changing research methodology, and the use of big data and modelling is increasingly replacing or significantly enhancing real world experiments, surveys and interviews. For example, in some areas of social science surveys and interviews are being replaced by huge datasets, mined for patterns and used to inform better city design, more efficient public transport and improved access and delivery of services.

Where we once had to capture, tag and semi-frequently recapture and measure animals to study their ecology, we are already using GPS tracking technology to remotely monitor and manage our most vulnerable wildlife.

Beyond the research itself there, is the capacity for large scale collaborations on our biggest global challenges. Sharing data and working together to analyse changes in climate on a global scale will one day not only predict the future of our climate, but perhaps even help us reverse adverse changes and control the weather itself.

These massive undertakings and grand collaborations require the traditional university to be more than just an institution servicing its local students, instead becoming part of a massive inter-connected local, national and international network.

With the right vision, leadership and investment, Australia's universities have the potential to super-charge education, research and community. Universities need to embrace their role as change-informers and change-makers, and to evolve to be as exciting and revolutionary in 2040 as the 'university of today' appears to mid-century students of yesterday.



Kylie Walker is CEO of Science & Technology Australia, Chair of the Australian National Commission for UNESCO, and co-Chair of the National Research and Innovation Alliance. She specialises in connecting scientists and technologists with governments, business, media and society - skills built over many years in senior federal communication and advocacy roles in the science and health sectors.

Kylie's a passionate campaigner for gender equity and is a proud member of the board of the ACT Domestic Violence Crisis Service and the steering committee for NOW Australia. She's also been a Press Gallery journalist for Australian Associated Press and the ABC, and is a visiting Fellow at the Australian National Centre for the Public Awareness of Science (CPAS).

CREATING THE FUTURE UNIVERSITY



THE FUTURE OF UNIVERSITIES THOUGHTBOOK





SPRING GULLY



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Setting Forth on the 7Cs

Richard Watson

What is the purpose of a university? What should they seek to encourage? You might think that universities, of all places, might be thinking more about this, but alas no. This exam question has largely fallen off the curricula. Neither is much study time being given to whom an Australian university should serve, how they might be funded or what should be taught and why.

There was a time when a university was a place where people were taught to think. They were communities of open debate. They were places where people went to be educated into the way of the world using grammar, rhetoric and logic. They were spaces where people went to explore and understand things, not least themselves. There were no 'safe spaces' or no-platform policies.

Universities nowadays are becoming where you go to further your career and earn more money. Following the Dawkins reforms in the late 1980s, students are now customers with all the biases and baggage this word entails. With notable exceptions, universities have become brands that churn out qualifications much in the same way that fast food establishments flip burgers, although it's sometimes difficult to tell which might be more damaging over the longer term.

Time to upgrade the system

A thriving university sector is essential in a hyper-competitive world where problems are becoming trickier and constraints are becoming stickier. But Australia is still stuck on a system created more than a century ago to produce muscle or memory workers for business. These are people taught physical dexterity, precision and endurance or taught to process and apply information according to sets of rules.

This output has suited us up to now, but looking ahead it seems that developments in machine learning and artificial intelligence mean that we are teaching a generation to compete head on with computers and it's a no-brainer who will win if the contest is about muscle, precision, memory, data processing or logic.

With the exception of teaching people how to create or collaborate with these machines, we should be teaching precisely the opposite, which is how to think in ways that computers can't.

Ultimately, there's not a lot that machines can't do if we allow them, but there could be a few domains that will remain the preserve of primitive carbon-based bipeds such as ourselves. The first is creativity. We should be teaching students how to think more imaginatively, whether the application be art, science or the art and science of innovation. We need tall buildings that don't fall down, but also ones that make the human heart soar.

Similarly, logical machines, no matter how smart, will continue to struggle with the faults and foibles of human beings, which, to my mind, means it matters that we teach people about other people and what motivates them.

Machines can be alluring, but I can't see them ever being inspiring, so teaching leadership should be paramount, whatever the discipline vou are attempting to impart. One of the issues I hear about regularly is that of students entering the workforce that are technically brilliant, but incapable of managing themselves let alone anyone else. Recognising and rewarding EQ alongside IQ might be a good way to not only create a functioning civil society and workforce, but also a way of creating the next generation of effective leaders. But don't suppose for a moment that this can be achieved online. We already have a problem with asocial students virtually incapable of human interaction. Let's not make this worse by deleting the human interface.

A further thing that's missing from the current system is ethics. Historically, many universities were linked to the church and the moral component was bedrock. Nowadays, the moral component of a degree is akin to a slippery slope of scree sliding down a hillside. Indeed, it's quite possible to use your head to pass through university with flying colours while remaining, at heart, an ego-centric, narcissistic, psychopath. One thing I stumbled upon recently was the 4Cs (Critical thinking, Communication, Collaboration, Creativity). I propose that we build upon this list and set off toward the distant horizon of 2040 on the 7Cs: Critical thinking, Creativity, Collaboration, Communication, Curiosity, Character and Compassion.

The first 4Cs are self-explanatory. We need people to think Critically and Creatively about the world's problems and Communicate and Collaborate across communities to come up with solutions. But the last 3Cs are especially important.

The aim of education generally, and of universities in particular, should be to instil a lifelong love of learning and this is becoming especially vital in a world where new knowledge is being created at an exponential rate. But how can we expect people to continually re-learn things without first instilling a sense of Curiosity about how things work or might be changed for the better?

Character is important for two reasons. First, as machines become more adept at doing the things that were once thought the preserve of humans, the value of emotionally-based work should come to the fore. Most jobs feature people at some level and if you are trying to persuade people to do something you're more likely to be successful if you are liked. An attractive personality cannot be taught, but it can be encouraged. Moral Character is equally important. We don't just want smart graduates, we want ethically grounded graduates too.

The final C, Compassion, is linked to moral character. Compassion is the resource the world is running out of faster than any other. Without Compassion the world is an ugly place. Universities have long focussed on IQ. Indeed, it's hard to get into a university without it. But at the risk of repeating myself, EQ might prove more valuable over the longer term, especially if IQ becomes the preserve of artificially intelligent machines.

It's hard to predict the future, and foolish to try in many instances, but I believe that imparting individuals with a better understanding of the human operating system would make them better prepared for whatever 2040 throws at them.



Richard Watson is Futurist-in-Residence at the Technology Foresight Practice at Imperial College London. He is also a lecturer at London Business School and a member of the Civil Aviation Authority's (CAAs) Aviation Futures Group. Richard has worked with the UK Department of Education and Teaching Australia.

Digital Transformation – Universities in Change

Steven Worrall

There is broad agreement that the advent of the fourth industrial revolution has ushered in an impending skills gap. Nearly half of today's jobs will be redefined within a generation¹, and nearly two-thirds of CEOs identify technology as their firm's greatest source of future competitive advantage.² How companies and governments respond to this is critical; the majority of Australia CEOs believe it to be the responsibility of their organisation to retrain their staff.³ Concerns also remain that the explosion in robotics and Artificial Intelligence will force employability pressures alongside the need for re-training.⁴

Our research shows that this is not only a problem that will impact our societies in the distant future. In the next 5 years in Australia alone, there is expected to be a shortage of over 300,000 ICT intensive workers⁵; employers suggest this is already having a negative impact on their business.⁶

It is unlikely that any industry will be immune to the impact of technological change. From law and fine arts, to fashion and agriculture – the shift from using technology to being driven by technology is likely to be an irresistible force.

At Microsoft, our mission – to empower every person and every organisation on the planet to achieve more – emboldens us to think beyond replacing workers with technology, and instead to focus on how we can work with our partners – commercial and educational – to build a new future for organisations and individuals that thrives within this shift.

We believe that the future of employment and education involves continuous re-skilling; delivering learning for life. Universities will have a central role in that future and supporting an ever-growing population of lifetime learners. The essential skills for our future will not be defined by a single period of tertiary education, nor will individuals seek to advance by pausing their career to enter full-time education for extended periods. Rather, we see a future of evolving skills, integrated into an entire lifetime, connecting across the multiple careers every person may undertake.

The role of the university must expand from a typical 3-year course with limited industry & employer engagement, to a model which ensures Australia, and Australians, stay at the forefront of emerging industries and skills. Individuals need continuous learning opportunities and support, as well as potentially full reskilling, throughout their career. Universities will thrive by providing opportunities for learning whenever and wherever an individual needs it, supported by the best academic and contemporary industrial practice.

For Microsoft, we aim to be the best partner for every organisation to thrive on the opportunities of this time of digital transformation. As a company, we believe deeply in being a part of this learning evolution and a partner in delivering it successfully for everyone.

We also recognise that the switch to a true model of flexible lifelong learning is both a challenge and an opportunity for the university sector, governments and regulators everywhere. As the pace of digitisation and transformation accelerates in Australia, the funding model for education will need to become more responsive to flexible learning and more individual learning pathways. Learning from the service led transformation of our economy and shifts in subscriber-led business models are just some of the ways the universitv sector can think about delivering a lifelong approach to learning.

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The university sector and funding model needs to develop further and better recognises Australia's need to stay at the forefront of new digitally transformed industries, and rapidly develops learning journeys for individuals in every career stage.

Education and industry need to deepen their partnership and create more permeable borders between them, allowing individuals to apply their knowledge immediately in an industry context whilst learning full time, and learn new skills whilst working full time. Together, by doing that well, we see an Australia that transforms from 1 million learning in our universities at any one time, to an Australia with 12 million active learners, all of the time from their university for life.

The opportunity for universities and industry is to harness the best academic practice, the best research practice, and the best industry practice to create this lifelong learning journey for Australians.

It's the kind of digital transformation example that I see every day in every industry in Australia and across the world, and the kind of transformations that are creating our new economy. As a global leader in education, Australia has the opportunity now to create this new world, and to establish a future university which demonstrates that luck has nothing to do with our success.

² Korn Ferry, The Trillion-Dollar Difference

³ ACS, 2018

- ⁴ Financial Review, 2018
- ⁵ Microsoft, 2018
- ⁶ Arnnet, 2017



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Previously Steven worked for IBM for 22 years and held a number of marketing, sales and general management roles in the services, software and financing segments of the organisation. Steven holds an Honours degree in Electrical Engineering and a Master's in Business Administration. He is a member of the Australian Institute of Company Directors.

¹ Bersin by Deloitte, Predictions for Talent Strategy 2017

CREATING THE FUTURE UNIVERSITY





INECESSITY IS THE MOTHER OF INVENTION²

- first ascribed to Plato



UNIVERSITY ENGAGEMENT

2040: Skilling Ecospaces Driven by Partners in Social Workforce Plan

Megan Lilly

It is 2040 and industry visions set twenty years ago are now being realised. At that time digital disruption, was only just taking hold. Prosperity through productivity and growth was threatened amidst fears about future of jobs and of socially exclusive economies.

However. industry recognised that capital deepening and increased competitiveness could be achieved by not only replacing workers with machines. but by building innovative capital - dewell-educated veloping and well-skilled workers. It was considered that. for innovation to occur, physical capital must be complemented by qualifications¹.

This vision has been successful because of a social workforce plan overseen by a coalition of industry, tertiary sector networks including universities, government and community. Part of the plan centred on the need for businesses and universities to closely integrate in order to develop and maintain a broad skills base, keved to fast changing workplaces. There were discussions about the need for tertiary education ecosystems, with a view that 'the ecosystem for sharing knowledge and imparting skills needs to be shaped by the four principles of: advancing innovation, fairness, efficiency and civil society.' $^{\rm 2}$

Companies now seek multiple arrangements with universities globally, cognisant of the advantage provided to them of graduates familiar with the workplace, its technologies, practices, cultures and systems. The various collaborative arrangements also drive research and development initiatives. Changed tertiary sector networks facilitate cooperation- a seamless pathway of post-secondary education and training exists for access by employers and individuals.³

As universities saw the need to become more outward looking and to learn from partners⁴ a paradigm shift emerged. There was recognition that universities were members of a broader social and economic network; that benefits would come from continually finding ways to join with partners to innovate and achieve results for all stakeholders. Partners to the visionary workforce plan have, however, held fast to the role of universities in developing higher critical enquiry.

In 2040 the cultures of industry and the university network have become much more intertwined with community. The leadership and integration of industry and the university network has fuelled innovation and helped shape economic development, boosted inclusion and equipped graduates with inclusive culture capabilities to do the same. Clear social goals ensure that opportunities for disadvantaged cohorts lead to greater participation in education and the workforce.

Around twenty years ago in 2019, deep collaborations were appearing between large businesses and universities. Examples then included significant university partnerships with businesses such as BAE. Lockheed Martin, CSL, Cisco and Siemens, often involving physical campus collaborations. These leading partnerships helped to model the now ubiquitous arrangements existing across the skilling eco-system between companies, education providers and the community. Learning by doing has become a fundamental principle driving variations of work integrated learning and work-based learning.

Skilling Ecospaces (SES) are now widespread in companies. They come with certified recognition and support from government. SES take many forms and can involve many partners. Within some large companies they are substantial physical spaces where university-enrolled student-workers learn and where testing labs for research and development thrive. Other SES exist virtually within companies and are registered only for chunks of training undertaken by existing workers.

Global and local universities bring different offerings. Negotiations around student learning respect flexibility needed by companies. Projects, workshops with a group of student-workers solving company problems, virtual placements are some examples of activities. It is common for university students to be employed by companies as they undertake their tertiary education: considered an effective way for entrants to develop broad enterprise capabilities as they develop deep knowledge.

Whether physical or virtual, SES in companies are not only open to existing workers and university students. They can be registered for learning by individuals from other education and training networks, the self-employed and community network clients. Where SES experiences are not in the workplace they are designed to be dominated by experimentation and play around activities that reflect the company's workplace, equipment, processes and practices; to be engaging and social, and to be anchored by outcomes and assessments.⁵

Social pledges made by all SES include the provision of mentors for all learners. It is recognised that all individuals develop through the assistance of others – the basis for social cohesion.⁶

Both industry and universities have reorganised workforce roles to maximise relationships and skills development. Companies have integrated mentoring capabilities into roles; universities have 'loosened' roles while still maintaining multi-professional communities of experts.⁷ These experts, SES navigators, conduct much of their work with companies and external partners; they have business development capabilities and they are able to fast track activities that involve companies, students and the university working together to benefit all.

Within each SES, the company continually negotiates with its university partners a fluid list of deep knowledge areas and broader capabilities needed in order that recruits and existing workers can adapt as the company has to adapt. The digital world allows always-relevant content.

The learners use virtual assistant apps to select from a list of topics offered by partner universities that can be stacked. Every worker's and student's individual digital learning portfolio automatically updates each time a chunk completes, informing them of the qualifications/capability groupings towards which they are building credits. These credits are also achieved through a variety of other life-learning experiences.

With flipped classroom concepts now at a new level, learners watch company operations virtually or physically. Sophisticated learning assistance, based on advanced augmented reality, is utilised by the learners. Existing workers who are training mix with university students, face-to-face or virtually, to complete activities that solve problems for the company.

The university's SES navigator uses various forms of communication to nudge reflection on activities. While it is still maintained that developing the capabilities of communication, team work, problem-solving and adaptability will always require some level of face- to-face interaction, learners can find themselves being taught by and studying in teams with cobots.

A condition placed on the SES involves development for the broader community. Activities that are beneficial to the company's goals are designed in conjunction with the university's SES navigator. The government partner recognises encouraging underserved student groups leads to a more inclusive and richer economy. It recognises SES take on additional risks in fostering disadvantaged cohorts, making them eligible to receive financial incentives.

Since the industry visions and social workforce plan were formed twenty years ago profound cultural shifts have occurred in companies and universities in recognition that in building a strong economy they will succeed if the broader community is nurtured. Industry sees that in partnering to build the skills it needs and in addressing social issues, it can find business opportunities that allow all to prosper.⁸ ¹ European Commission, The Future of Work: empowering people, Social Agenda No. 53, November 2018, http://europa.eu/!Qb38gF

² Stephen Parker, Andrew Dempster, Mark Warburton, Reimagining Tertiary Education, KPMG, 2018

³ PwC and Australian Higher Education Industry Association, Australian Higher Education Workforce of the Future, 2016

⁴ G. Davis in Geoff Sharrock, Organising, Leading and Managing 21st Century Universities, Visions for Australian Tertiary Education, Melbourne Centre for the Study of Higher Education, The University of Melbourne, February 2017

⁵ The Tech Edvocate, 7 Gamification strategies for corporate training, https://www.thetechedvocate.org

⁶ Andre Perry, Not enough students have mentors and we must change that, The Hechinger Report, October 2018.

⁷ Geoff Sharrock, Organising, Leading and Managing 21st Century Universities, Visions for Australian Tertiary Education, Melbourne Centre for the Study of Higher Education, The University of Melbourne, February 2017



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Ms Lillv is a member of the Australian Industry Skills Committee (alternating Director), Chair of Manufacturing Skills Australia. Deputy Chair - Worldskills Australia, member of the Australian College of Educators, member of the Salvation Army Disability Employment Services Advisory Committee, th AQF Review Panel and the Naval shipbuilding College - Delivery Advisory Committee. She has been a member of the Australia India Education Council, including Chairing the Skills Working Group, Australian Qualifications Framework Council. Queensland Ministerial Commission, Victorian Skills Commission and Australia Pacific Technical College.

Re-defining University-Business Collaboration

Sanjay Mazumdar

Fundamental change is required to the Australian university system to ensure that university-business collaborations consistently produce valuable outcomes. That is my hypothesis based on 25 years' experience engaging with the university sector to deliver outcomes to businesses and government agencies. The change required can be categorised into three areas – mutual understanding, strategy, and structure.

Mutual understanding

Based on my experience from the defence and technology sectors, I believe that there is a lack of mutual understanding of the challenges, motivations, incentives and operational environment of both sides of the business-university relationship. University staff often do not appreciate that businesses in Australia are very different to business elsewhere in the world, particularly the USA which is often used as an example when comparing the size of research funding from industry.

By-in-large, Australian industry tends to be project-centric, i.e. companies operate on a project-to-project basis producing bespoke solutions to a customer need. This is very much the case in the defence sector. By contrast, companies in the USA, Japan and many European countries are generally product-centric, i.e. they develop products for a specific market and as a result their survival depends on the success of products rather than the success of winning projects. As a result of their project-centric nature, many Australian companies take a short-term and tactical perspective on research and development (R&D). Their investment in R&D is motivated generally by two factors -(1) will it help the company get an edge over their competitors when bidding for a project or (2) will it help to de-risk aspects of a proposed solution. Both motivations result in the need for very applied R&D with a focus on delivering outcomes in a short timeframe, e.g. 1-2 years. In contrast, product-centric companies (think Apple, Google, Microsoft or my old company Motorola) generally operate with well-defined product roadmaps and, as a result, have a longer-term view of R&D (often 5+ years). As a consequence, they are more likely to invest in fundamental/ blue-sky research.

My interaction with universities is that they generally do not appreciate this difference - university staff often lament the fact that Australian companies do not invest in long term research like their counterparts at US universities experience. My experience is that those universities and researchers who do focus on short-term applied R&D are highly valued by industry - this often results in repeat R&D collaborations and even engagement on long-term, fundamental research. To emphasise this fact, I often say to university researchers - start off with "r&D" and then "R&d" will result!

Strategy

It is my strong belief that we have too many universities in Australia and most of them are focusing on an unsustainably broad portfolio of research areas. Moreover, there is a need for the overall university sector to focus on a smaller number of areas of national strategic importance and then, as a country, we should "double down" on these areas, i.e. invest more significantly in a small number of areas that will make a real difference to the country. We should then align our universities (with some consolidation and rationalisation during the process) to those areas. For example, the World Economic Forum in their report "The Next Economic Growth Engine, Scaling Fourth Industrial Revolution Technologies in Production"¹ and Data61 in their report "Digital Innovation: Australia's \$315b opportunity"² highlight the international and national importance of artificial intelligence and machine learning. The importance of AI/ML has been recognised by the Australian university sector and as a result almost every university now has some level of AI/ML activity. We would be far better off as a nation to consolidate our investment in this important area to a small number of universities (e.g. centres of excellence) and "double down" our investment in those COFs to achieve internationally competitive scale and significance.

Structure

From my perspective, universities have three major responsibilities -(1)generate new knowledge (fundamental research). (2) impart knowledge to students and the broader society (teaching) and (3) translate knowledge into innovation (applied research). However, I do not believe all universities should focus on all three responsibilities. We would be better off having specialist teaching universities or specialist research universities. However, to cover all three responsibilities, it should be divided among specialist groups and staff. For example, having dedicated staff who focus on fundamental research or teaching, or applied/industry focused research would help to ensure that staff are aligned to their individual strengths.

However, to achieve such a structural change would require fundamental changes to university funding models, university performance measures, staff incentives and performance measures, promotion criteria and so on. Such a change would also give businesses clarity about who in a university they should engage with and for what purpose.

Conclusion

When universities and businesses collaborate effectively, the results can be outstanding. I've seen this first hand during my career, however, it has generally been because of the excellence of specific researchers rather than a purposely designed collaboration strategy and framework. In this opinion piece, I've offered some thoughts on the fundamental changes I believe are required at a national level to achieve consistently excellent collaborations between business and university. If implemented, they will have a significant impact on how the Australian university will look in 2040.

> ¹ https://www.weforum.org/whitepapers/ the-next-economic-growth-engine-scaling-fourth-industrial-revolution-technologies-in-production

² https://www.data61.csiro.au/en/Our-Work/ Future-Cities/Planning-sustainable-infrastructure/Digital-Innovation



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In 2015, Sanjay was listed in The Australian newspaper's Knowledge Nation 100 as a "Big Data Pioneer". Sanjay holds a Bachelor of Engineering (First Class Hons) and a Doctor of Philosophy (PhD) from The University of Adelaide, and is a Fellow, Institution of Engineers (FIEAust) and a Chartered Professional Engineer (CPEng). Sanjay is also a Board Director of Fivecast and NQRY, two spinouts companies generated by the D2D CRC.

Redefining the Town and Gown in 2040

John McGuire

Throughout history learning and knowledge have formed a building block of economic growth and societal progression. They have been key components to long term growth and prosperity. Universities form a vital part of the educational continuum within a local community and, in addition, they have been an advancer of science and knowledge for industry to leverage.

The relationship between the university and its local community is symbiotic.

Students, often considered the lifeblood of the university, come in large part from the local community. In return the students provide the knowledge workers for businesses to grow. When businesses grow then societies progress.

The university, now operating in an increasing global market, attracts international students and academics introducing a source of diversity and richness to our populations. They act as a conduit from which local communities touch the world.

The university is undeniably a part of the fabric that makes up the tapestry of our cities.

This relationship is interconnected and inexorably entwined. Universities, communities and businesses rely on each other for survival. It is also a relationship that is subtle. There are elements that are obvious, like student education, however the true power in the relationship is hidden in the nuances that have perhaps not been appreciated or indeed by the unconventional connections that have not yet been fully explored.

The world however is changing. With that so must the relationship between academia and industry if both are going to thrive in a disrupting world. The relationship must now become far more purposeful, intentional and it must be mutually reinforcing. In a globally interconnected world where competition abounds in ways never contemplated the university-community-business tripartite relationship must evolve.

As the weight of the fourth industrial revolution bears down on us no business, no community and no university are immune to its influences. As technology allows products to be easily replicated it will be supply chains that compete and intellect and knowledge will be the competitive advantage.

The way in which the university and industry come together in 2040 will be critical. The smart universities and the smart businesses are exploring this now.

No longer can universities see their core purpose as just the education of students or the advancement of academic theory.

By 2040 the things that are novelties today will be commonplace. The internet of things, artificial intelligence, additive manufacturing, robotics and autonomous vehicles will change the face of all that we know. A challenge facing businesses and government regulators in the next twenty years is how do we make the transition from a largely analogue world of today in to a digital future of tomorrow and how will we solve the interim problem of where digital and analogue systems must co-exist in our cities until the transition is complete.

The problem facing us all will be how do we get there before our environment is irreversibly and irrevocably impacted.

We also face a world where government taxation bases are shrinking as our populations age. Public sector funding is retreating from education and privatisation is becoming a norm for public utilities and infrastructure. In this environment universities and industry must unite to create shared value streams and new forms of revenue that never existed before.

The boundaries must blur. Academics must become embedded in industry and industry must become embedded in the University.

The projects that create our cities' infrastructure must become vehicles for upskilling of mature aged workers. The projects our governments invest in the billions must become the "classroom" through which learning is delivered to mature aged workers whose current skills are in danger of becoming disrupted. These massive projects must become the real time "laboratory" where academic research is applied and true impact is felt.

This aspiration of infrastructure projects being seen as an object of learning for workers and a deployment of applied research can only be realised through an informed debate by a committed university and a progressive set of businesses.

It will be the universities and businesses that first make these unconventional connections and who throw off the shackles of their traditional silo thinking will be the ones who create the new shape of academia and the new shape of vibrant cities.

For those that don't there will be an uncertain future. Universities will be forced into consolidations they may not want and businesses will fail financially. Sadly, our communities and cities will suffer as a result.

Let that not happen to us.



John McGuire is the Managing Director for the Built Environment business for global engineering consultancy Aurecon. Reporting directly to the Global Chief Executive Officer and a member of Aurecon's Executive Committee John is responsible for driving innovation, design and strategic new directions within Aurecon. Prior to taking his current role John was the Chief Innovation Officer for Aurecon responsible for the organisations adoption of innovation as a strategy and a core way of doing and thinking.

John is a mechanical engineer with over thirty years of experience in the field of design. He is an Honorary Fellow at the University of Melbourne School of Engineering and a regular guest lecturer in the field of sustainable design and design led innovation. Facilitating Entrepreneurship in Communities to Augment University Engagement: Can This Wait for the Future?

Noel Lindsay

Universities have existed for hundreds of years with the University of Karaouine in Fez, Morocco, (established over a millennium ago) still operating. Although there are parallels between medieval universities and those of today as places of higher education and knowledge, many of today's universities have realized the need to break down the ivory tower walls, and become more immersed in and engaged with the communities they serve, while retaining pure the pursuit and dissemination of knowledge. As universities evolve and adapt to changing community attitudes and increasing technological and social change, community engagement is becoming an imperative underpinning relevance, resilience, and sustainability.

Entrepreneurship as a new form of university engagement

Community engagement, as an ethos and way of operating that is embedded in university culture, is evolving. Traditional approaches to community engagement can occur through meetings among university, industry, and government personnel, university workshops and seminars open to the public, community partnerships, etc. Although traditional engagement methods provide the foundations, evolving community expectations of universities require additional innovative engagement approaches as communities look for increasing university contributions to enhance their prosperity.

The facilitation of entrepreneurship in communities by universities provides opportunities for universities to engage with and contribute in ways not addressed by more traditional engagement methods. Entrepreneurship in universities has often been viewed from an academic disciplinary perspective underpinned by entrepreneurship teaching and/ or research and quite separate to engagement – though the two do not need to be mutually exclusive.

However, an increasing number of universities also undertake non-academic entrepreneurial activities through the establishment of business incubators, innovation hubs, co-share work spaces for students, etc. Other institutions take entrepreneurship a step further and look to develop a more entrepreneurial and innovative culture in both the student body and academic/professional staff.

The knowledge and experience universities accumulate through their entrepreneurship academic and non-academic activities can be significant and influential. Entrepreneurship is a powerful tool for developing and regenerating economies and so should not be overlooked as an essential tool for engagement. The time is ripe for institutions to address entrepreneurship engagement opportunities through co-creation and collaboration with industry and government to meet the increasing wider community needs.

Capitalizing upon their accumulated entrepreneurial knowledge and experience, universities can position themselves as leadership exemplars for facilitating entrepreneurship in communities because they, more than any other entity, are in a position to provide a multi-layer value bundle to the communities they touch comprised of economic. intellectual, social, and cultural value.

Thus, engagement through entrepreneurship can augment traditional engagement efforts. But this means that universities themselves need to embrace entrepreneurship; not just in a piecemeal fashion. That means, entrepreneurship teaching, research, and engagement are required to be present in the university with the boundaries among the different academic and non-academic components being permeable (rather than having impenetrable academic versus non-academic silos) with each component complementing and informing the other.

Those universities poised to become more successful at engaging with communities through entrepreneurship will adopt a holistic and systemic approach to entrepreneurship that integrates the academic research and teaching and non-academic engagement entrepreneurship components. Their success will be underpinned by the creation of a one-stop shop entrepreneurship portal that provides a dedicated pathway into the university as well as a focused entrepreneurship unit poised to engage with communities that can provide a plethora of entrepreneurial services, skills, knowledge, advice, and experience.

The future-thinking university – with entrepreneurship embedded

And so, consider a future-thinking university that integrates its academic entrepreneurship research and teaching staff with its non-academic mentoring, innovation hub incubation facilities, and prototyping activities into one cohesive unit with innovation hub nodes embedded across the university and in local, regional, and international communities. The benefits are many.

Its students studying entrepreneurship or undertaking entrepreneurship learning alongside other degree programs have the opportunity to undertake internships with the entrepreneurial ventures located in the incubator(s) and various internal and external nodes or set up their own business. In this way, they not only learn about entrepreneurship, but are doing entrepreneurship. That means, when they graduate they not only have a University degree but also a functioning start-up venture that can be integrated into the community.

If the university has established international business incubation facilities in overseas communities. the students undertaking internships in these facilities not only develop an appreciation for global entrepreneurship and dealing with risk and uncertainty in overseas environments. Rather, the communities supporting the incubators also benefit from the students being there - culturally, economically, socially, and intellectually through the exchange of ideas - as they integrate into the community (at least for the term of their internship studies).

For example, imagine if a non-European university had established an incubator in the Champagne region in France with students undertaking a for-credit internship course with local French businesses in the incubator and being given the opportunity to undertake work experience in the Champagne Houses, French Patisseries, and/or French Cheese-Making businesses located in the region. The students benefit and the community benefits, in multiple ways. And, because of the ongoing relationships developed between the university and the community there, other engagement, research, and/or educational opportunities may evolve benefiting both the university and the community.

Technological change moves at a significant pace, compelling social change in its wake. Higher education institutions should be at the forefront of this wave, but the bureaucracy involved in the revolutionary change required often cannot keep pace. Disruption is a given! Change should be brought about by the proactive directive of institutions rather than a lagged reactive response that still may not fully meet the changing demands of society.

And so, while entrepreneurship can assume a more traditional role in universities contributing to their teaching load and research outputs, while other university business units assist students and staff to commercialise their research innovations by way of tech transfer and business incubation, entrepreneurship can also be a key pillar in facilitating community engagement through developing ongoing relationships with communities and generating real value in those communities.

Adopting a holistic approach and integrating the academic and non-academic entrepreneurship components will create additional value. While using entrepreneurship to engage with communities may be something for the distant future for many universities, there are some that are already doing this now because they see the benefits of augmenting/disrupting the traditional community engagement approach and using entrepreneurship to drive growth and shape their future.



Noel Lindsay is Pro Vice Chancellor – Entrepreneurship and Director of the Entrepreneurship, Commercialisation & Innovation Centre (ECIC) at The University of Adelaide, where he is the Professor of Entrepreneurship and Commercialisation. Within his position, Noel has gained extensive experience in leadership, team building, strategy, quality assurance, corporate governance, and change management, which complements his role in establishing and developing an Australian University in South Africa.

Noel has investigated blended learning approaches to teaching entrepreneurship to high functioning intellectually disabled young people in his recent major research projects. He has established and harvested ventures in various countries, including Australia, South Africa, and Malaysia.

Universities – Engagement or Irrelevance – in 2040

Peter Rohan

Shift in societies' expectations of what universities should be providing as a "return on investment" from high student fees and large investments of public funds will force universities to re-assess their fundamental purpose of being, while changes in technology will continue to force university business and operational models to undergo dramatic transformation. These changes will be associated with demand for greater transparency around the nature and quality of teaching and research activity being conducted by universities.

The impact of these changes is already seen in education, for example, by the increasing number of universities providing a mixture of on-line and blended learning, "flipped classrooms", and an improving digital experience. Universities are even grappling with the notion that students are their "customers" and that there are many types of potential 'students'. Universities will no doubt adapt to the emergence of life-long learning – people seeking to either re-enter the workforce or enhance their existing technical skills and career paths, with contemporary qualifications, or simply seeking an enriching learning experience - and see it as an additional business opportunity.

Further, most students now attend universities for essentially vocational reasons – to build a career, to get a job. Universities are being selected based on their "brand value", or perceived quality of the university from an potential employer's perspective, on the relevance of the course to the students' preferences, as well as on the capacity to fit the education product into busy student lives.

Projecting into the future of 2040, how far can these trends go?

As more and more courses go online or are provided outside traditional 9-5 working hours, universities should expand the common view of a "student" and seek new customer groups such as:

- Multi-national companies seeking standardised, leading edge training across their global workforces,
- Industry professional associations – seeing access to tailored professional training updates for their members,
- Other "on-line" content providers – seeking to complement their own offerings – of films, news updates, etc. – with education packages suitable for their target market.

These new breeds of customers will seek education products from providers that are credible and know how to curate diverse sources of knowledge into a contemporary, structured education and learning package. These customers will also expect to have input to the focus and content of these courses. This may indeed be the key competitive edge of universities into 2040 – leveraging their status as a university to provide credible products to others.

Well before 2040, customers will be also expecting courses – in whatever
format – to be delivered by a professionally trained teaching workforce, not just a large pool of casual workers. In Australia, approximately 60% of undergraduate teaching is provided by university-qualified casual staff, often doing PhDs.¹

Universities themselves may choose – or be forced to choose – to specialise in product development only (including curation, assessment, certification and quality control over services provided by others - teaching, student support). Such models are already emerging in the Australian university landscape, especially in cases where the provision of fully on-line courses are outsourced to a third party (e.g. Pearson, Keypath plus others), and the university only provides the product (course content), with the third party providing most if not all of the marketing and student support during the study life of the student.

Another recent variation on the theme of specialisation is the collaboration between RMIT University and Apple to provide a suite of tailor-made programming courses using Apple's App Development with Swift curriculum.

"Novice coders and aspiring iOS developers will be supported by RMIT's expert teachers to unleash their creativity and entrepreneurial skills to join the booming app economy." (RMIT website)

External parties are likely to be more skilled and nimble in the areas of recruitment (marketing and sales), product delivery (via digital channels), as well as student (customer) support, with each of these elements common in most industry sectors. Will Google, Facebook and/ or Microsoft become the Amazons of the university education sector?

Beyond being a source of funding, Governments will continue to exert a strong impact over the sector by means of setting "performance standards" for all existing and potential new universities. Existing universities unable to achieve the required performance standards - quality of product, student feedback, transparency and financial viability – will have their license for accreditation reviewed/revoked. The university market will be opened up to new players so long as they meet the required performance standards.

How will these trend affect research?

The push for greater transparency and deemed "return on investment from public funding" will extend into the field of research. European countries and universities appear to have understood the importance of directly linking university research to industry – and thus rank high on levels of collaboration between the two groups. Often-cited examples include the Max Planck, Fraunhofer and Leibniz Institutes in Germany.

Other models could relate to research devoted to societal issues – aging societies, gender, indigenous communities and homelessness – with partnerships between university researchers and relevant community groups and government policy makers. This is the model upon which the Amsterdam Institute for Advanced Metropolitan Solutions in the Netherlands was founded.

What is clear is that the successful models are very deliberate in structuring research relationships between industry and universities – not at the whim of individual researchers.

The famous Magna Charta Universitatum – a document to celebrate the fundamental values and principles of the university, in particular institutional autonomy and academic freedom – will need to be re-interpreted well before 2040 to encourage universities to seek and develop relevant partnerships and collaborations with the broader society in which they exist. Autonomy and academic freedom can still co-exist with the notion of contributing to the broader society and being accountable to that society.

Universities in 2040 will be providing course content to a wide variety of students and organisations, with a suitable mix of face to face and on-line delivered content. Almost all services outside the core product development/curation will be provided by specialist third parties. The flow of students into research degrees and further research will be facilitated and directed through dedicated – potentially global – institutes established around key themes deemed of most relevance to the current and future well-being of societies.

Greater levels of engagement by universities at all levels of society will enhance their perceived value, reputation and connectedness with societies.

The days of universities as ivory towers will be a very distant memory.

¹ Lachlan Clohesy, The Casualisation of Academia: impacts on Australian universities, The AIM Network, May 2015



Peter Rohan is an Independent Strategic Advisor and Program Director, following his almost 20 years as a Consulting Partner at EY (Ernst & Young) and Cap Gemini. Mr. Rohan held a number of leadership positions during his career: National Head of Education, National Head of Business Consulting, Global Account Executive in Financial Services based in Paris.

Peter's work has been broad, ranging from strategic alignment through to major operational reform. He recently co-authored an article on "University-Industry Collaboration" (2018) as well as sponsoring and contributing to the key EY White Papers on "University of the Future" (2012) and "Higher Education and the Power of Choice"(2011).



'ROADS? WHERE WE'RE GOING, WE DON'T NEED ROADS.'

– Dr. Emmett Brown, Back to the Future



INSTITUTIONAL CHANGE

Reflections of a Vice-Chancellor

Leo Goedegebuure & V. Lynn Meek

Dear Colleagues,

Today, October 18, 2040, marks the end of my service as Foundation Vice-Chancellor of Cleaver Greene University (CGU). It has been a privilege working with you over the last 10 years, seeing CGU grow from challenging idea to splendid reality. I would like to take the opportunity to not only reflect on our own journey, but more broadly on the turbulent times we have endured these last 20 years. When I started my academic leadership career the global higher education landscape was significantly different from today. I think it is fair to carve the last 20-odd years up in three periods: Retreat (- 2025), Restructure (2025-30), and Rebalance (2030-40).

Retreat (- 2025)

Starting with the Retreat period, we cannot ignore what we collectively brought upon ourselves. We let the powers that be ignore all the warning signs the Academy produced. The 'places ignored' indeed took their revenge and nationalism, extremism and populism took over, aided by a demise of the critical press and undue influence of social media spun out of control. Notwithstanding ongoing scientific progress, such as the advent of quantum computing and massive medical breakthroughs, our world became increasingly polarized and conflict-ridden. Our political system proved unable to deal with this, resulting in defunct national governments, spilling over to the international arena. It allowed the greatest danger of all, global warming, to progress almost unchecked. Calls from the IPCC were ignored, as were draughts, famine, floods and mass people movements. The academy was not the cause of this, but implicit in their effects due to inaction.

It took the perfect storm to bring order to this chaos. 2025 has gone down in history as the 'thunder year'. To me it always has been the 'turning year': nothing focuses the mind as much as the prospect of hanging, to paraphrase Samuel Johnson. Sydney, Melbourne, Brisbane, Adelaide and Perth flooded with the Antarctic ice sheet disintegrating, as happened the world over. Extreme weather was hitting home. Academe finally convinced the polity that collective action was the only answer. We saw the 'supra-nationalisation' of satellites to monitor weather patterns. Containment policies were put in place to 'rebalance' the global climate, including significant reduction in air travel which, apart from its emissions, had simply become too dangerous as a result of massive turbulence.

But, as the famous Dutch soccer player Johan Cruvff used to profess: "Every disadvantage has its advantage" - or as many a vice-chancellor maintains: "never waste a crisis". The advantage of the unified satellite system combined with the leap in quantum computing meant that within a blink of the eye our world was truly interconnected at superspeeds previously unknown.

Restructure (2025-30)

Limits on international travel and superspeed interconnectivity almost overnight killed off Australia's golden goose: the international student market collapsed. Grabbing the technological opportunity VirtU was created through a joint venture of Google, Microsoft, Apple, Coursera, EdEx and the likes. VirtU brought the ultimate global classroom to our home, as holographic and full virtually reality becoming reality; "study where you want, with whom you want and what you want". The ultimate individualized and optimized student experience at your fingertips, using the best course materials and staff across the world. This left the Australian university sector in tatters. And VirtU picked up the pieces. Not since Dawkins had Australia experienced such a merger/takeover frenzy. Only the strongest research universities survived the onslaught, propped up by a government finally realizing that in a knowledge-based future it needed to invest in the nations knowledge infrastructure.

Yet regional and global developments further complicated life for what remained of Australia's university sector. Following the European Union, ASEAN established the Asian Research Council to further basic research, funded by its members, including Australia. Internationally, the Global Brain Trust was established to concentrate the world's sharpest minds on how to combat global warming and contain the Internet of Things, with quantum computers going into self-programming mode. By 2030 this resulted in a moderate containment of the global climate and some form of political stability.

Rebalance (2030-40)

Technological change remained high with the ensuing need for workforce retraining/upskilling taking care of by VirtU partnering with local industry groups. Electronic portfolios of micro credentials became the knowledge workers' currency. Demand for the once-traditional bachelor degree slumped. The ARC started to pay off with both Tsinghua and Beijing universities entering the ARWU top 10. Australia maintained its leading position in medical research, but in other areas saw top researchers taking their ARC grants to China, the strongest economy and academic centre in the world.

It was in this context that our founding father had his brainwave. As Chief Justice he had not only seen the rapid demise and slow rebuild of the Australian political system, he had also observed the hollowing out of the public debate. Many in his close circle lamented the lack of thoughtful exchange of ideas and disrespect for tradition. This reminded him of Cardinal Newman's 'formation of the mind', none of which featured in the VirtU curricula or in the remaining Australian universities. Thus, upon his retirement from the High Court, sponsored by his longtime friend and philanthropist Harry Strang, he founded CGU as Australia's first liberal arts college.

CGU never was to be a large university. Today I pride myself on maintaining our 2,000 student community despite continued pressure to expand. Our 600 international faculty, the crème de la crème in their fields, have reconstituted the art of rhetoric and debate. Our alumni slowly but steadily are reforming the public and private sectors through their values-based leadership. Our region has been transformed through our commitment to academic, social and cultural engagement. Yes, we have been branded as 'elitist'. If our achievements over the last 10 require an 'elitist' approach, I take that any day! Leading you has been a privilege for which I thank you profoundly.

Prof. Jack Irish



Director at the LH Martin Institute, Professor Leo Goedegebuure is active in the field of higher education policy research and management. Prior to his move to Australia in 2005 (University of New England, Centre for Higher Education Management and Policy), Leo was Executive Director of the Center for Higher Education Policy Studies (CHEPS), at the University of Twente, Netherlands, Europe's largest research centre in this field.



Professor and Foundation Director of the LH Martin Institute, V. Lynn Meek was previously Professor and Director of the Centre for Higher Education Management and Policy at the University of New England. Having completed a PhD in the sociology of higher education at the University of Cambridge, he has more than three decades experience researching higher education policy issues.

The More Things Change...?

Will Grant

"You see, Brother William," the abbot said. "to achieve the immense and holy task that enriches those walls" and he nodded toward the bulk of the Aedificium; which could be glimpsed from the cell's windows, towering above the abbatial church itself - "devout men have toiled for centuries. observing iron rules. The library was laid out on a plan which has remained obscure to all over the centuries, and which none of the monks is called upon to know. Only the librarian has received the secret. from the librarian who preceded him, and he communicates it, while still alive, to the assistant librarian, so that death will not take him by surprise and rob the community of that knowledge. And the secret seals the lips of both men. Only the librarian has, in addition to that knowledge, the right to move through the labyrinth of the books, he alone knows where to find them and where to replace them, he alone is responsible for their safekeeping. The other monks work in the scriptorium and may know the list of the volumes that the library houses. But a list of titles often tells very little; only the librarian knows, from the collocation of the volume, from its degree of inaccessibility, what secrets, what truths or falsehoods, the volume contains. Only he decides how, when, and whether to give it to the monk who requests it ... "

This 14th Century monastic world – as described by Umberto Eco in The Name of the Rose – is, of course, centuries adrift from Australian universities of today – and no doubt more so from Australian universities of 2040.

Yet this passage has always rung like a gong in my understanding of what universities are.

You see, we hold in our collective heads the idea that universities are bastions of innovation, revolution and radical thinking: that the job of the university is to change the world. We in the university community hope that the rest of the world sees us as bringing great new ideas, solutions and insights to life. Even if we're more humble, we'll at least believe that many in the rest of the world see our ideas as... different.

Perhaps this is true. Perhaps universities are fountains of the new. I don't really seek to argue against such a position here. But it is also true that universities are, like the monasteries from which they emerged, fundamentally conservative institutions.

When I first read the passage above, I was completing my PhD in political science: spending days on end touring archives and rare book libraries, reading obscure 300 year old tomes. To get access, I'd book a seat at a dedicated desk, and then submit my student card and a form detailing the requested volume to the librarian. While the librarian scurried off into the labyrinth behind the desk (this library too was at the top of a tower), I'd put on white gloves in anticipation. Sitting there waiting, I'd daydream about the scholarly wonders contained in that labyrinth behind the altar. Ten minutes later the librarian would return and reverently place the book in front of me, intoning, with a grave look, the worth of the volume.

Like the library in The Name of the Rose, universities are, despite what many people think about them, inherently conservative. Their job – perhaps even more than creating new knowledge – has been to preserve the knowledge that does exist.

There's a good reason for this. Good, trustworthy knowledge is hard to produce. It doesn't just take one study, or even one career to produce knowledge - in each field it takes hundreds of highly intelligent people around the world working day in, day out, to learn what is already known and then spot minor problems: to think up solutions to these problems. test them with the most rigorous method they can find, peer review each other's work, and then think some more. New knowledge is hard to produce, and it can't really be trusted until it's old knowledge.

And so, when we consider what might change in Australian universities over the next two decades, I would first of all wager that they will look more similar to the universities of today than they will look different.

Universities will, for instance, continue to preserve the hard fought knowledge that has been produced, and teach that to new generations of students. Some fields will have seen small changes, some will have seen large. Yet for most fields the knowledge taught will largely be the same as today. But will things be identical? No – it is likely that today's growing suspicion of hard and fast disciplinary boundaries will increase. Interdisciplinary knowledge will prove ever more useful in solving the key challenges of the world, and universities will move, however shakily and slowly, to embrace this.

When we turn to students, I very much believe (and hope) that universities will continue to play transformative roles in young people's lives – expanding their horizons as much as is possible in the short time they'll spend with us. Will things differ? Here I hope (and expect) that universities will expand this transformative role to wider groups of people who haven't been able to go to university in the past, and to expand their engagement to communities of people not enrolled.

And finally, I believe universities will continue to push back against those who would raise simplistic, dogmatic, dangerous descriptions of the world. We live in times of epistemic strife, and that's sadly not likely to get better soon. But I can guarantee it will get worse if universities shrink from the challenge we are facing in this post truth world.

Whatever else divides us in universities, we know that seeking the truth is a worthy calling, but claiming you have it is bullshit. I hope – but won't go so far as to expect – that universities will rise to this challenge.



Will Grant is a Senior Lecturer at the Australian National Centre for the Public Awareness of Science at the Australian National University. Most of his work has focused on the interaction of science, politics and climate change, and how such interactions are changing with new technology. Awarded for his public policy and outreach work, he tweets at @willozap, and podcasts at @WholesomeShow.

Changing Idea of the University

Roy Green

Traditionally, the university has been imagined as a community of scholars distilling and pursuing knowledge for its own sake, with an emphasis on imparting the main elements of this knowledge to its students. Indeed, in Newman's famous 1852 treatise on The Idea of a University, its primary role was to be 'a place of teaching universal knowledge'. This approach enabled the rise of outstanding public intellectuals but excluded many from higher education.

More recently, while research and teaching continued to reside at the core of most formal university missions, it was increasingly recognised that universities can also serve a much broader purpose. This case was advanced, controversially at the time, by the then President of the University of California Clark Kerr in his 1963 lectures on The Uses of the University:

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"The university today finds itself in a quite novel position in society... It faces a new role with few precedents to fall back on. We are just now perceiving that the university's invisible product, knowledge, may be the most powerful single element in our culture, affecting the rise and fall of professions, and even of social classes, of regions, and even of nations." For the emerging 'radical' university movement in the 1960s, this argument signalled capitulation to the 'military-industrial complex', with researchers cravenly dependent on corporate and defence funding. For conservatives, it was an unwelcome departure from the rarefied elitism of the hallowed halls of academe, with one Berkeley professor labelling Kerr's remarks as the 'least discreet' ever delivered by an American university president.

In retrospect, however, we can appreciate Kerr's prescience, as he foreshadowed a number of major developments in higher education, including, first, the opening up of universities to population groups who were previously denied such an opportunity. Second, the increased quality and quantity of research, often but not always with beneficial socio-economic impact. Third, the development of collaboration with business and the community, and fourth, most profoundly, the university's growing role in social change and innovation.

Where to next for the university? The teaching mission remains central, but it is itself changing with new technologies, skills and expectations. No longer does the labour market require people who are adept at repetitive tasks, or even specialised ones in many areas. To prepare the workforce of the future, universities have now begun to emphasise the development of 'boundary-crossing' skills, such as critical thinking, personal resilience and creative and analytical problem-solving.

Importantly, these skills are not a substitute for specialised knowledge but a necessary additional layer of competence. At the same time students themselves desire an environment that enables them not just to qualify for a job in a large firm or organisation but to create their own job through a new entrepreneurial venture. A recent survey at the University of Technology Sydney found that 40 per cent of students had an interest in building their own venture, which the university was in a position to facilitate through its programs in cooperation with the surrounding innovation ecosystem.

Research also remains central to the purpose of a university, but it can no longer be pursued in isolation from the grand challenges of our time. While governments and funding bodies around the world should always make adequate space for 'blue sky' research, resource constraints will require priority areas and capabilities to be identified. Such constraints will privilege research which explicitly addresses recognised challenges and which incorporates a 'pathway to impact'. The important point about impact is that it can be delivered through innovative public policy and social improvement as well as through translating research to commercial outcomes.

In this context, the university has an interest in long term, strategic collaboration with government, business and community organisations. Funding bodies also are doing more to encourage such collaboration as a way of increasing the resources available for research and technology development and adding value to the research through the participation of stakeholders who benefit from it. Indeed, universities are increasingly becoming key drivers of competitive advantage for firms and entire industries in global markets and value chains.

Finally, there is the less defined but no less important role of the university in understanding social change, and at the same time promoting it constructively with the evidence and 'cultural capital' that universities are in a unique position to mobilise in a post-Enlightenment world. There is a danger that with the unremitting focus on research 'excellence', measured by journal publications, universities will neglect their role in fostering engaged public intellectuals. This may be one area where we can learn something from the past in preparing for the future.



Emeritus Professor Roy Green is Special Adviser on Innovation and Chair of the UTS Innovation Roundtable and former Dean of the Business School at the University of Technology Sydney. His doctorate is from the University of Cambridge and he's worked in universities, business and government in Australia and overseas, including the University of Newcastle. He is also a Fellow of the RSA, Royal Society of NSW and Irish Academy of Management.

Roy chaired the Australian Government's Innovative Regions Centre, CSIRO Manufacturing Sector Advisorv Council. NSW Manufacturing Industries Advisory Council and Queensland Competition Authority. and he served on the Prime Minister's Manufacturing Taskforce and a range of industry and innovation bodies. Currently, Roy is also Chair of the Port of Newcastle and a board member of the Innovative Manufacturing Cooperative Research Centre. He is a member of the BCA Innovation Taskforce and NSW Government's Sydney Entrepreneurial Ecosystem Advisory Committee and program adviser to the Sydney School of Entrepreneurship.

Scale, Role and Purpose Matter

Richard Head

Looking back to look forward

You only need to think about the activities vou've undertaken in the last 24 hours to see the influence of human creativity on our everyday lives. We are a problem-solving species that has used centres of creative thinking and training to improve our lives and to bring prosperity to our communities. In many societies and cultures these centres have become Universities. As we cast forward to 2040 and the significant changes, challenges and needs our communities, economies and environments will face. I believe Universities will have a central role to play. But to understand what this role will be, we need to understand better the future and to situate the role of universities within this. To begin this, I'm going to channel the deep insight of the famous Winston Churchill quote, "The longer you can look back the farther forward you can see".

Scale and global challenges

To uncover the future role of universities we need to understand the context we'll be living in as we look ahead to 2040. But first, what has the historic role of creativity and innovation been for our world? In looking back thousands of years we can identify a very defined set of imperatives that we have innovated around; Energy, Food, Water, Health/ Survival, Mobility, Communications and Shelter (built environment). These imperatives are fundamental to humanity, they exist today and will be constants into the future.

Population growth will be a significant driver of continuing innovation across these imperatives. Added to this, a spike in demand across these fundamentals will come as our global population grows to ~ 9 billion people (by 2050) and with it the size of the middle class.

Put another way, scale in population will drive a corresponding need for scale in products that almost paradoxically will be driven by a societal trend towards personalisation – adding further complexity to the scale agenda.

Taking three imperatives as examples - electricity, food and water, you can really start to appreciate the issue and layers to 'scale' and the importance of taking a global view to this process. By 2050 an additional 2 billion people could have access to electricity, to meet this demand we will need to innovate: supply, to decrease the energy input to GDP and to increase use efficiencies. By 2050 a large percentage of the world's population will be urban. This will create an increased demand for food with no major increase in resources. Innovation in food production will need to emphasise safety, nutrition and personalisation. Finally, water demand will be immediately impacted by population growth. In addition to domestic use, demand for water

will come from manufacturing and energy production. Similar predictions apply to mobility, communications, health/survival and the built environment.

Responding to these dynamics, I believe, will shape universities and societies' expectations of their role and that Universities will find themselves as central planks in the competitive positioning of Cities, States and Nations. This will take not only a reframing and evolution of the role of universities, but societies, governments, business and finance sectors too.

It is also conceivable that global measures of creativity and innovation performance as key determinants of National progress (perhaps an extension of the Economic Complexity Index).

Chaperoning change

If you were to ask what organisation in society is best suited to understand the role of innovation, creative thinking and training with the complexity of scale, it is unquestionably Universities. Within two to three decades Universities will retain their fundamental roles in training and research, but modified by the critical drivers of:

• the portability and diffusion of information and knowledge at scale both within Institutions and across Institutions, facilitated by the digital revolution, • the growth in human skills for selecting and linking with precision useful and often disparate information from a wealth of data at scale to drive unique solutions to grand challenges.

• the fostering of specialisation, co-creation and entrepreneurship at or across disciplinary and Institutional boundaries.

The Australian imperative

While the broad global considerations discussed above apply to the Australian setting there are a set of indicators that highlight a pressing need to accelerate the changes described above in Australia as we move to 2040. These measures include:

- A lack of high technology and diversified Australian exports, we rank low in the of measure of economic complexity on a global measure (The Observatory of Economic Complexity, Economic Complexity Rankings, 2016)
- Historically low levels of collaboration between Australian businesses and research organisations
- Low levels of researchers working in industry (ACOLA, Translating research for economic and social benefit: country comparisons)

• Australian business expenditure on R&D (BERD) is low relative to expenditure in other countries (ISA, Performance Review of the Australian Innovation, Science & Research System, 2016)

Driving innovation to scale in key sectors where Australia is globally competitive and leveraging our unique asset base is the place that Australia needs to be as we move to 2040. Australian Universities will be vital to this.

Structure follows strategy

When planning for the future, the question of 'do we have the right structure' often arises. The fundamental essentials for University existence remain as successful centres of creative thought, problem solving, training and research, so structural arrangements must accommodate those roles.

The key change I'm describing is the context for the future and role that Universities need to play in this. To my mind, the main structural changes need to be linked to creating environments and conditions within Australian Universities that nurture a seamless transition between creative thought to application through end-user partnerships at scale. This is something that our national funding and recognition system has not historically supported. This effort needs to be supported by a shift in focus to be undertaken by our national funding and recognition systems as we move to 2040.

Successful environments will be characterised by:

• Innovation and problem solving that is challenge based and appreciates scale and complexity.

• Interconnectedness will be fundamental to universities in delivering to global challenges and training for the future. In this context knowledge creation should not be hampered by boundaries and its utility encouraged in environments with effortless diffusion across disciplinary boundaries.

• Structural arrangements must permit permeability across boundaries. Permeability between universities and society, between universities and commerce, between universities and societal communities and organisations.

Remaining the same with constant change

We are a problem-solving species, we have evolved over centuries Universities as centres for this purpose. Future Universities will adapt to train and conduct research in much the same way as the past, but they will adapt to do so in an era of unprecedented scale and complexity.



Professor Richard Head is a Pharmacologist and is currently Emeritus Professor in the Division of Health Sciences, University of South Australia. Affiliate Professor in the Discipline of Pharmacology, The University of Adelaide and Honorary CSIRO Fellow. Previously he was the interim Director of the Future Industries Institute at the University of South Australia, the Deputy Vice Chancellor & Vice President: Research and Innovation for the University of South Australia with a substantive position as the Director of the Sansom Institute for Health Research. Division of Health Sciences also at the University of South Australia.

Professor Head has a unique background and skill base in pharmacology and nutrition. He is a Member of numerous professional organisations and has extensive experience in research and research management.

University 2040

Catriona Jackson

The university of 2040 isn't a world away. In fact, the campuses of tomorrow are already visible. They are being designed right now – as you'd expect given that universities are the world's original disruptors.

You can see it in the driverless buses already taking students across campuses at La Trobe and Curtin. And in Deakin's Genie — a digital personal assistant for every student which schedules their classes, helps tackle assignments and meet deadlines, plans their day, and tells them where to get the best coffee on campus. The future university is emerging before our eyes.

It has ever been thus. From rocket fuel to the flu shot, the seatbelt and solar power, even the humble spreadsheet — all of these and many more innovations have emerged from our universities.

When I think about what universities will look like in 2040, I know there will be no lack of ideas and innovation. The tools we use to find, challenge and communicate ideas may evolve, but the core purpose of a university — to educate ourselves and our communities, to broaden our minds — will endure.

Universities will never sit still, never stop exploring, never stop asking students to respect evidence and expertise but to challenge ideas and conventions at every turn. Universities will never resign themselves to the view that our world cannot be different and better.

Universities will continue to push the boundaries of knowledge, educate the skilled workers and entrepreneurs, generate new jobs and industries, and drive economic and social development.

Much like today, the universities of 2040 will be profound game-changers.

The university of 2040 will be a place of lifelong learning. It will continue to provide an excellent foundational higher education for the nation's students. This extends beyond equipping them with professional skills in their discipline — to the wider skills of learning and inquiry that produce worldly, thoughtful and curious minds.

Building on that bedrock, universities will seek a lifelong relationship with their alumni, so when they need a micro-credential unit of study or micro-degree to upgrade a specialist skill, their universities might even know it before they do – and have one tailored to suit. The student experience will have been transformed by Al and digital technology. Digital personal assistants like Deakin's Genie will be widespread. But the rise of the robots won't have dimmed students' desire for human connection and experiences – quite the opposite. Campus life will continue to be a thriving hub of activity, ideas, debate and experiences.

The university of 2040 will be even more integral to Australia's startup economy — currently worth \$160 billion.¹ They will continue to produce startup founders in extraordinary numbers, building on the four in five founders who were university graduates in 2017. And we will see even more of the university accelerators and hubs that foster startups, building on the 100 we see today.

The university of 2040 will have even deeper connections with industry, including work placements and internships. More schemes will exist like the Monash Industry Team Initiative (MITI), a work placement program that sees high-achieving students help solve industry challenges — from using big data to build the offices of the future to developing autonomous helicopters to fight bushfires.

And there will be even more collaborative research — to the benefit of business and universities alike. 2018 modelling by Cadence Economics for Universities Australia found that there are 16,000 companies already partnering with universities.² These companies derive \$10.6 billion in revenue from their collaborations. And for every dollar invested in collaborative research with a university, a company stands to get \$4.50 in return.

Beyond its work on applied and collaborative research, the university of 2040 will also continue to pursue advances in 'blue sky' research. This is the curiosity-driven research that has led to some of the greatest seismic shifts and breakthroughs in our understanding and knowledge. It will continue to be the foundation stone of university research, on which other knowledge is built.

The university of 2040 will continue to be a place that seeks answers to the fundamental challenges of the day; to improve society; and to improve the human condition.

Universities help us realise our own potential. University education and research is not just about filling our minds, it is about showing what our minds can do.

In his keynote address at the 2018 Universities Australia's Higher Education Conference, Aspen Institute Future of Work initiative co-chair Bruce Reed said:

"Universities will be the Jedi masters who teach us to look inward for the strengths we need to survive and adapt. Universities hone the skills that hold up best and are the hardest to automate: Critical thinking, curiosity, judgment, a willingness to challenge orthodoxy. Universities teach us the skills robots won't learn unless we teach them: Collaboration, emotional intelligence, the value

of community and service, the search for meaning."

¹ https://www.universitiesaustralia.edu.au/ Media-and-Events/media-releases/Universities--the-driving-force-in-Australia-s-startup-economy#.XAhQHmgzaUk

² https://www.universitiesaustralia.edu.au/ Media-and-Events/media-releases/Unis-tobusiness--tap-into-our-talent-and-expertise#. XAhQeWgzaUk



Catriona Jackson is the CEO of Universities Australia, the peak body representing Australia's university sector. Catriona is a highly experienced advocate for higher education and has deep experience of the policy making process. Prior to her appointment as CEO, she served as University Australia's Deputy Chief Executive Officer and gave evidence to Parliamentary inquiries, briefed kev decision makers and plaved a key role in lobbying the government on behalf of the sector. She is the former CEO of Science and Technology Australia and has also served as Director of Communication and External Liaison in the Office of the Vice-Chancellor at ANU. and as a senior journalist and Ministerial

Catriona is the Chair of the Advisory Board for the ARC Centre of Excellence for Nanoscale Biophotonics, a founding member of the peak body for not-for-profit science groups, the Science Sector Group (SSG), and co-founded the National Research Alliance within the Australian Academy of Science. Catriona is an outstanding communicator who is held in strong regard in higher education, politics and the media.

CREATING THE FUTURE UNIVERSITY



Imagine... a university without borders, without campuses and without limits

Carolin Plewa

One where universities work with other thought leaders and activators in business, government and the community, to create and advance knowledge, ideas and resources that allow everyone in that community to thrive in their purpose and direction.

One where neither titles nor roles, affiliations or backgrounds, disciplines or institutional borders, walls or regulations limit interactions or partnerships between individuals and groups. One where we all truly respect and celebrate diversity, each individual's strengths and their contribution to, and impact on, the betterment of life.

Imagine a place and time of unlimited curiosity and wonder, of learning and ideas, of innovation and fulfilment. One where you never begin and you never leave, but one that you instead feel an integral part of throughout your life. Or, in other words, imagine a university truly fulfilling its role as the lifeblood of the community, nurturing, protecting and encouraging free speech, critical thinking, entrepreneurialism and growth. Then zoom out, and imagine all universities as the beating hearts of their local, regional, national and global communities - universities that jointly help optimise a system for life. It is this vision that ignites my passion and that of so many around the world. And it is these people who will see this future come to life.

Imagine... a university with no mandatory degrees or majors

Balzhan Orazbayeva

One that offers access to learning in real time from anywhere. One where everyone can acquire knowledge and skills through customised, on-demand learning experience that is designed and tailored to what learner wants to achieve. One that provides education beyond degrees through cross-disciplinary and experiential immersions that bring learners virtually or physically together from all over the world.

This is the university of the future. This is a safe physical and/or virtual environment where learners are not instructed but trained on how to learn and re-learn. This is where learners create their own learning paths and help to educate each other and apply knowledge in real time. 'Pick and mixed' programmes designed by learners are accelerated by learning leaders from different industries and disciplines and supported by variety of latest technologies and tools.

Learners are able to top up the skills they've acquired with just-intime applications and short and sharp on-the-job trainings that fix skills gaps and furthermore help to solve real-world pressing challenges. Working side by side with companies, start-ups, scale-ups, governmental and non-governmental institutions. learners have the opportunity not only to validate and translate the acquired knowledge and skills into tangible outcomes, but to contribute to the local communities and society at large. Not striving for any degrees, learners don't choose the major but declare a mission. Thus learners create their own purpose-oriented and mission-driven learning experiences that accelerate both outward social impact and personal sense of meaning.

That is the university that embraces social inclusion and provides access to education to everyone who is curious and eager to learn. A chance to get higher education is not a privilege anymore but an inalienable right that is about giving people of all ages the right opportunities to inclusive and equitable lifelong learning.

Imagine... a university campus with no students

Jacyl Shaw

Many of the realities of this new millennium have been difficult to predict let alone imagine: September 11? Twitter? President Trump? The metamorphoses of universities are no different. As we transition from the third to the fourth industrial revolution- an era defined by the blurring of the physical, digital and biology worlds – we experience the evolution of our university campuses and the impact upon those they employ, provide for and engage with.

History shows the role of universities was well understood during the 'Age of Enlightenment'. Academic discovery and university patronage fostered new ways of thinking and innovations including L'Enclopedia, the telescope, laws of gravity and the invention of steam.

Communities at that time must have heard the future whispers of 1970's US Senator Daniel Moynihan: 'If you want to build a great city, create a great university and wait 200 years'. As a consequence, many have benefitted from this vision of creating places that are magnets for talent, incubators for ideas and laboratories for learning. Now in an era MIT Professor Neri Oxman calls the 'Age of Entanglement' universities find themselves challenged about their value, role and purpose.

Much of this is due to the digital economy with its many guises characterised by the explosion of the internet, online learning opportunities, the changing nature of work and graduate attributes and evolving desires and expectations of those 'born digital'.

This era will create winners and losers across multiple dimensions - economic, social, cultural and political. Will universities survive, thrive or fade? Will they become virtual only or will there always be a place for place - the university campus?

Is UCL's Paul Temple correct when he says "Universities [...] are possibly the least intensively used space you can imagine." There are examples of silent buildings and empty corridors; ghost towns as students gather in online classes and academics work remotely with peers in global communities.

I am optimistic that the campus experience won't emulate a Charles Dickins-esque "Bleak House". Universities will coexist with an online world of learning because as Former President of the University of Michigan Mary Sue Coleman suggests "Ironically, and thankfully, the glorious abundance of the virtual has created an even greater longing for the real."

As complex challenges demand people to collaborate and converge, places like university campuses will evolve as geographic incubators of the digital economy with industry partners; returning value to the communities they serve. They will also showcase history through archives, museums and cultural connections. Similar to Renaissance Florence's Guilds and the London coffee clubs at the turn of the 20th century, universities will continue to provide places that excite curiosity, bring us together to contemplate the pressing issues of our time and thoughts and aspirations into long lasting community benefit

Imagine... you are heading into your final year of high school

Kathryn Anderson

By the year 2020 you will leave the world of schooling behind and stretch forward into adult life. And beyond school, you will step into a world that can no longer deliver on a promise of a stable, ongoing career.

The school leaver of today is likely to have around six career changes over the course of their working life. In a VUCA economy, characterised by its Volatility, Uncertainty, Change and Ambiguity, some 40% of Australian jobs will likely be impacted by automation. An increasingly globalised workforce sees international workforce competition, and Australians work internationally, virtually or in person. The gig-economy equals multiple types of employment, for varying periods of time. For our school leavers, the world beyond secondary is full of opportunity and risk. For the rest of us, we are already immersed in this highly fluid workforce

So, what does this mean for the University and its role?

Our universities have always been engines for innovation. The opportunity is now to leverage the assets of our universities to spark entrepreneurship and increase enterprise skills in our graduates, to generate the next wave, not only of big thinkers, but of big doers.

Entrepreneurial mindset, and an innovation skillset are the front edge of this new wave in higher education. And it makes good sense. Mindset attributes such as open-mindedness, agility, risk appetite and lifelong learning coupled with skillsets in opportunity identification, critical thinking, digital literacy, and solutions architecture go much further than immediate employability, to future-proof careers for the graduates coming out of our universities. Universities have traditionally focused on teaching field-specific content in a broadly theory-to-application process. The reality of our future working lives is that we will need to re-educate and re-skill, in a cycle of doing and learning, learning while doing and doing while developing. As our careers become lifelong portfolios of achievement, our universities must respond.

Imagine. A university where your degree is itself, a portfolio. You tailor your education to your skills and to your work goals, thinking about your potential outlets for remuneration that fit with your life circumstances. You have access to micro-credentials, bite sized learnings that build on each other to progressively create a meshed skillset. You take courses in enterprise and innovation, learning to spot opportunities and build

the business case to bring them to fruition. There is startup support, and your graduate position may be as Founder of your own business. You graduate not only with the content knowledge of your degree, whether that be engineering, art, healthcare or other, you have also developed a mindset that embraces opportunity, and a skillset to navigate a constantly changing economy.

Imagine... the future of science and publicly-funded scientists

Margie Atkinson

Imagine a world where knowledge is the prime currency for all, irrespective of education level and socio-economic background, and where adoption of knowledge across business and the community drives the economy in Australia. A world where all people are encouraged and supported to be curious and embrace diverse and critical thinking and innovate. Imagine a world where publicly-funded scientists are embedded across the innovation ecosystem and have social licence to operate because they are trusted to collaboratively deliver evidence-based solutions that have a measurable positive impact for Australians and the economy.

In this world, the next generation of scientists graduate with domain expertise as well as competency in design thinking and essential skills such as creativity, critical thinking, effective communication, collaboration and experience working in cross-cutting teams. At the same time, existing publicly-funded scientists embrace the opportunities that employers provide for them to upskill in these areas recognised as critical for success in solving complex problems to deliver impact.

Imagine that publicly funded science research organisations (including universities) are the connection points for local innovation ecosystems. Bringing together specialist clusters of kit, technology, capability and knowledge alongside the knowledge and experience of the industries and communities seeking to co-create transformative solutions for complex problems. Imagine that this public-private partnership approach is well understood as being a 'value chain' where people and institutions play to their strengths to generate new ideas and take ideas and solutions from concept to reality. In this scenario the role of public investment in research infrastructure, science training and research is widely recognised as a critical de-risking component to enable further private investment in science-based innovation.

Now consider the increasingly wicked problems we face globally and imagine that we solve these by putting together the very best mix of people and facilities. Using design thinking principles to deeply and rapidly understand the problems before they try to solve them, these trans/ multidisciplinary, cross-sector teams build collaboration from shared strategic purpose and an assumption that more can be achieved together than via each on their own. Putting together these 'dream teams' is achieved through the integration of technology and people who are boundary spanners and connectors, to find the kit and capability needed at various points along the pathway from ideas to impact. Obstacles to effective collaboration have been removed or minimised - administrative systems and processes are more interoperable allowing people to move fluidly across organisational boundaries to work in these teams. In this world, a triple bottom line lens is taken to achieving impact; effective cross-sector partnerships share risk and reward; planning, monitoring and evaluation of impact and partnership health is routine; and behavioural motivation is based on a 'win: win' approach, not a 'zero sum' game.

Imagine... universities as the catalysts for change

Ixchel Brennan

Imagine a future where universities were the driver of an integrated education system, connecting the dots across the breadth of the knowledge creation chain to produce dynamic innovation.

Given the scale of change anticipated to effect Australia's economy and society, we must at least contemplate major reforms in education and training that will equip ourselves for a different future. New technologies, shifts in the global order power, and longer (working) lives are some of these changes – significantly influencing the ecosystem for sharing knowledge and imparting skills.

Imagine then that Australia has embraced the concept of a flexible, adaptable tertiary education and training system, giving us the best chance of thriving in a continuously, and at times rapidly, evolving world.

In this environment, universities could take a leadership role catalysing a more joined up system – facilitating an open dialogue between industry, government, vocational education and training providers, and higher education, to drive stronger connectivity and ultimately, more impact and advancements for the communities that they serve. There are already many sectors where this kind of response is needed now, including in our health care and defence industries.

Imagine if Australia were audacious enough to transition away from an unstable, fragmented and competitive education system, which holds us back from our potential, to one which prioritised the provision of the blended knowledge and learning typologies we know will be crucial for the future. Imagine if Australia developed a new set of conditions whereby education providers could innovate more simply, more effectively, and increasingly, more collaboratively and based on what is needed by the system as a whole.

This involves embracing a new mindset; one that moves beyond tweaking at the edges, and is not operating in reactive crisis mode, but with the necessary strategies and resources to create and sustain positive change. Change that ensures Australia strengthens our competitive advantage, and our education system delivers on its responsibilities to society and the community.

Imagine... a university as a hub for collaborative innovation, and a local access point for skills, competencies

Arno Meerman

These will be universities fully embracing their responsibilities towards society. Imagine that universities no longer strive to be better than their peers who are located on the other side of the world, or compete over students from distant countries solely to increase their revenues. Image universities whose actions are led by local needs in terms of knowledge generation and transition. Universities which form a hub in the local communities to create a stronger, more innovative and inclusive society. These universities form a meeting place for business, government and society to collaborate, strengthen their organisations and provide mutual benefits.

In these institutions education takes place both in and outside the classroom, in physical and virtual spaces and results in a recognition of skills and competencies which can be continuously updated or expanded upon. Being a student is no longer a time restricted occupation but rather a life-time endeavour. Education at these universities is based on their institutional strengths and keeps global challenges into consideration, but is tailored towards the needs of local and regional stakeholders.

This university utilizes its infrastructure in collaboration with industry and societal partners, ensuring the full utilization of its resources. It will provide a platform for start-ups, SMEs and larger industry partners collaboratively working on solving global challenges on a regional level. These institutions will function as an incubation space for talent, ideas and innovation and will form an integral parts of our lives for both young and old.

Imagine... a university dedicated to challenge like global warming

Todd Davey

The entire strategy, structure and activities are oriented around meeting this challenge and preparing the talent capable of addressing this complex phenomenon headon. Problems are sourced from the local and national government and addressed by teams of cross-disciplinary students (bachelor, master, PhD and lifelong learners), scientists and businesses. The students are supported in the projects by special education programmes to build technical knowledge from industry and academic sources, targeted softskills training from professionals and networking events to build linkages. Students support industry professionals and scientists in the project and they in turn support the students through mentoring and access to the job market and academic path

Global experts and leaders from industry make guest presentations whilst students build own knowledge relevant to the topic through a series of own mini thesis, white papers and consulting reports. These activities are designed to improve knowledge, whilst government and industry funding provides the spaces the support this learning, specifically development of infrastructure, facilities and equipment. Students go on site visits together with project partners from industry and academia as well as having own learning journeys visiting other universities and problem locations, which they document. All of these activities are documented in usable forms, such as those listed above as well as videos, blog articles and social media posts, and fed back into the group.

Professionals from industry and academia run a series of blue-sky, engaged and focussed research projects, supported by students and overseen by a project manager and project board. Large companies are anchor partners for the projects, providing funding, equipment and guest professors, whilst SMEs and startups are more free to come in and out of the project contributing at appropriate moments and all offering students work placement learning opportunities.

The university itself is a spin-off company fully owned by a traditional university, which gives it freedom to operate and ability to be more agile. The traditional university provides access to accreditation and facilities as well as branding and reputational support. It is funded by a combination of government and industry funding as well as moderate student fees and run by a mix of industry,

academic, governmental and societal actors.

Now imagine the potential impact... the rescue of a specie, the repatriation of a coral reef, the repurposing of a desert to grow vegetables or the temporary protection of homes from bushfire. And all solutions with entire supply chains of skilled professionals, scientists, entrepreneurs and large companies positioned to support their propagation to other regions or other global warming problems.

The 25th Anniversary Energia Australia Lecture

Natalie Forde

Ladies and Gentlemen,

As I speak tonight, 1.2 billion people rely on Energeia for their energy. And while all electrons may appear equal, their generation is not. Energia's products are amongst the most efficient and sustainable on the planet and they are making a difference everywhere. They are creating efficiencies in crushing ore, moving water over vast distances, decreasing the cost of food production and keeping the elderly and young safe from climate change driven temperature extremes.

Today I want to go beyond a stocktake of success and look at the thinking that drove this outcome.

Cast your mind back to 2019... a time before driverless cars, when social media supported decision making, a flight from Sydney took 19 hours and there were 2 billion fewer people living on the planet. To the casual observer Australia was in a good place – low export diversity but a high wage economy with enviable social security. However, a closer look revealed disturbing complacency. This was well illustrated at the time by the landmark The Future of Universities Thoughtbook. In 2019 universities enjoyed a unique sense-making perspective of the world, but they sat off to the side of the action. They were a wealth of reliable knowledge, but struggled for traction with solving real world problems. Universities needed to be at the heart of a national transformation with a new sort of collaboration. This was a time when we were just beginning to understand that the creation of sovereign wealth needed to focus on unmet needs in the fundamentals of health, energy, water, food, shelter, transport and communication.

In 2020 came the National Summit and the acceptance that universities would be the 'go to' for community understanding of the big issues in these fundamentals, and trusted partners to inform decision making about creating sustainable, long term economic and social value. This required partnership across universities, business, government and society from the outset – a shared mission and an understanding of scale, its opportunities and consequences.

The conversion of strategic intent to implementation was impressive. Rather than focusing on a range of potential future opportunities, one was chosen: energy. And the driving force was the amazing 500. I was one of the 500 PhD scholarships allocated across every aspect of the energy sector. For those first three years every participant presented once a year at the MCG at the

Forum of Forums, and what have we learnt? One thing above all else. Complacency is debilitating and collaboration driven by a shared vision and mission is transformational.

I am delighted to see the vision for 2070 released at this meeting and I wish you the very best.

Thank you!

EDITORS



Balzhan Orazbayeva

Affiliated with the Science-to-Business Marketing Research Centre (S2BMRC) at Münster University of Applied Sciences (MUAS) in Germany, Balzhan Orazbayeva researches university-business cooperation and social innovation. She leads creative research processes as part of Erasmus+ projects in the field of social innovation. In her role of educator, Balzhan is a lecturer in social innovation and social entrepreneurship. She also coordinates industry projects executed by students in Münster School of Business. She was an analyst in the consulting project for the European Commission (DG Education and Culture), implementing the largest European study in the area of university-business collaboration. Balzhan is a doctoral candidate at Free University of Amsterdam (VU Amsterdam) and focuses in her PhD on academic engagement in education-driven university-business cooperation. She holds a Bachelor degree on International Relations from German-Kazakh University (DKU) in Almaty, Kazakhstan, and a Master degree on Integrative Project Management from Dresden University of Technology (TUD) in Germany.



Carolin Plewa

Carolin Plewa is Professor in Marketing and Stakeholder Engagement at The University of Adelaide, the Deputy Director of the Entrepreneurship, Commercialisation and Innovation Centre, as well as a research member of the Institute of Photonics and Advanced Sensing. She specialises in the interaction and value co-creation across a myriad of organisations and individuals, with a particular emphasis on university-business collaboration, as well as service and social contexts. Her research in the context of university-business engagement, in particular, has led to her appointment to the South Australian Science Council (2015-2018) and to her appointment as an inaugural co-chair of the University-Industry Innovation Network (UIIN) Australia Chapter. Professor Plewa has published her research in international marketing, management and education journals, such as Journal of Service Research, European Journal of Marketing, Psychology & Marketing, Journal of Services Marketing, Marketing Theory, R&D Management, the Journal of Engineering and Technology Management, Education and Training and others.



Todd Davey

Todd Davey is an Associate Professor of Entrepreneurship at the Institut Mines-Télécom Business School in Paris and a visiting researcher at Imperial College (UK) and Adelaide University (AUST) in the topics of entrepreneurship and innovation. Formerly a Senior Manager with Deloitte Australia's Technology Commercialisation Group and responsible part of the executive team for one of Australia's fastest growing start-ups in the 2000s. Todd has 'switched sides' to work within academia. completing his PhD at the VU Amsterdam. He was the Project Director of the largest study yet completed into cooperation between European universities and business, a study completed for the European Commission in 2010 and again in 2017. Todd is author of the book 'Entrepreneurship at Universities'. a Director at the University-Industry Innovation Network (UIIN) and the creator of TechAdvance[™], a tool for evaluating technologies.



Arno Meerman

Arno Meerman is the co-founder and CEO of the University Industry Innovation Network, a leading global network that facilitates interaction and stimulates cooperation between higher education institutions and industry. In this role Arno has built UIIN to one of the largest networks on university-industry interaction globally. Through this he has established its annual conference series on University-Industry Interaction, consults universities, government and industry towards professionalisation of university-business cooperation, entrepreneurial universities and partnerships and has led a number of UIINs research and development projects for the European Commission. Arno is also the Director for Business Development at the Science-to-Business Marketing Research Centre at Münster University of Applied Sciences in Germany. Besides project acquisition and strategic development, he conducts research on entrepreneurial and engaged universities and university-business collaboration.



Ixchel Brennan

Dr Ixchel Brennan is Manager in KPMG's Policy, Programs & Evaluation team within the Management Consulting Practice. Ixchel has managed numerous engagements across the education sector, including with state and federal governments, higher education, and the vocational education and training sector. Ixchel joined KPMG with a particular focus on delivering to the education sector, and has extensive experience in academic and professional management roles within universities over a fifteen (15) year period. Ixchel is a skilled leader, and plays a key role in project management, including the provision of high level advice and recommendations to inform decision making, stakeholder engagement, and complex program and risk management. Prior to joining KPMG, Ixchel was Program Manager of the South Australian State Government funded Future Industries Accelerator (FIA) at the University of South Australia. Ixchel holds a PhD in Medicine and Bachelor of Science (Honours), and is currently undertaking an MBA.


EDITORS



John Szabo

John Szabo is the Head of Partnerships, Corporate Relations Centre at UTS. John supports the Director in setting the Centre's strategic direction in relation to managing existing and growing new whole of university strategic partnerships. John's primary focus is to identify, foster and establish new strategic partnerships that align with UTS' values and the UTS 2027 strategic objectives and introduce institutional quality strategic relationship management practices. Prior to joining UTS, John's career spanned close to 20 years in the health industry. His early career was spent as a senior health consultant and later as the National Business Development Manager for one of Australia's leading corporate health providers serving both the federal government and private sector. He has also worked for Executive Health Solutions, Australia's leading executive health provider, driving business development and client relationships with a diverse range of national clients. A strong advocate for higher education and its impact on industry, government and the wider community.



Natalie Forde

Natalie Forde is UniSA's Head of Partner Engagement and responsible for the university's industry engagement and partnering strategy. Natalie leads a team of professionals that develops comprehensive, whole of enterprise partnerships and partnering services for UniSA. Natalie's successes in both large and small businesses within the private & public sector has developed her strong commercial acumen and her understanding of how to use innovation to contribute to an organisation's competitiveness. Natalie is experienced in innovation strategy, commercialisation, new product and business development and University Business Collaboration. This knowledge and experience built up over two decades has been crucial to her credibility as a broker of trusted engagements between industry and the higher education sector. Natalie has worked across Australia, New Zealand, USA and Europe where she has worked with a variety of organisations and national innovation systems.



Margie Atkinson

Margie Atkinson is the Executive Manager Collaboration at CSIRO. She has a marine and environmental science background, and more than 18 years practical experience developing policy and strategic programs, and as a knowledge broker and change facilitator. Highlights during this time have included working in multidisciplinary, cross-sector teams: to rezone and manage the multi-use, iconic Great Barrier Reef Marine Park; to develop climate change adaptation strategies with the Queensland fishing industry; to bring together opposing points of view to co-create new management arrangements for a politically sensitive fishery in a World Heritage area; developing research partnerships to support the sustainable development of Northern Australia; developing a novel industry-PhD partnership program; and building an evidence-based planning, monitoring and evaluation framework for supporting strategic research partnerships that deliver transformational impact for end-users and other key stakeholders.



Jacyl Shaw

As Digital Innovation Practice Director at global engineering firm GHD, Jacyl Shaw oversees the creation and delivery of a suite of programs and activities to foster a culture of innovation and leads the engagement strategies for current and prospective partners in community, government and industry. Prior this Jacyl held several senior roles at the University of Melbourne including Director (Engagement) of Carlton (Melbourne) Connect- a capital and cultural transformation project to create an innovation district on a former Hospital site adjacent to the university. She has also been a corporate lawyer, Supreme Court Judges Associate, worked abroad and started a few startups. Jacyl is well known amongst industry colleagues for her enthusiasm and tenacity as well as her strategic creativity to 'boundary span' and create new interdisciplinary, multi sector opportunities and benefits. She has a BA, LLB and LLM and a Masters (Enterprise); sits on several boards, writes and tells stories to bring innovation to life.



Kathryn Anderson

Serial Intrapreneur, Business Model Catalyst and Deputy Director Enterprise at New Venture Institute, Kathryn Anderson works alongside stakeholders to align needs and vision, creating programs, partnerships and connections that move strategy into tactics. In her role at the New Venture Institute, she has driven the growth of NVI's industry face, delivered the award-winning Icebreaker event with \$2.9mill of economic impact, and crafted NVI's first regional business incubator, eNVIsion Limestone Coast, connecting the region with Tonsley and beyond, and winning more than \$1mill in startup funding. Kathryn is an occasional author with a book, Engaging Australia in print, and is a regular speaker at conferences across Australia and internationally. She is passionate about supporting people to reach their goals, through involvement with SheEO as an Activator, CSIRO as a Co-Chair of WiN Book Club, UIIN as an ASEAN founder, and through her personal advocacy.





'IT ALWAYS SEEMS IMPOSSIBLE UNTIL IT IS DONE.'

– Nelson Mandela



