



**The Engaged University of the Future:
Where Technology meets Humanity**

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Acknowledgement of country

I would like to respectfully acknowledge the Traditional Owners of the land on which we gather. I pay respects to all Aboriginal Community Elders, past and present, who have resided in the area and have been an integral part of the history of this region.

We live in complex and volatile times. Our predictions about the future and associated decisions and actions we take are made against a backdrop of divisive political turmoil and concerning effects of climate change and environmental disasters. We see growing social and economic disparity and waves of technological innovation that are both celebrated and feared.

Volatility is not new. Human beings have navigated many upheavals, as new technologies and discoveries have led to transformations in how we function as a society.

Yuval Noah Harari (2016) reminds us in his book, *Homo Deus* that, 'People are usually afraid of change because they fear the unknown. But the greatest single constant of history is that everything changes'.

We are now encountering the fourth industrial revolution. In this room, most people are at the forefront of this revolution- seeing this from a technological, scientific and/or industry perspective.

Industry 4.0 is a term that captures the trend of automation and data exchange in manufacturing technologies. Industry 4.0 includes technologies such as cyber-physical systems, the Internet of Things, cloud computing, and cognitive computing.

These specific technologies have been developing for some decades. However, they are now influencing each other, and are more widely available. Industry 4.0 is impacting smaller businesses and individuals as well as large companies, altering the ways that value is created and captured.

In a classical manufacturing paradigm, a company such as Rolls Royce sold aircraft engines. Now, it now sells flight hours. The business model has shifted from selling an object to selling the function of the object. Needless to say, such business model shifts require sophistication on the part of companies to survive and thrive.

We are also noticing changes in the ways in which we deliver services that were once considered within the domain of human caring. For example, our researchers are working with physiotherapists to train robots to teach rehabilitation exercises to children recovering from orthopaedic surgery. The children's motivation and compliance with the rehabilitation treatment have been excellent and physiotherapists are learning how to work with technology for improved outcomes.

And so, we are prompted to consider the ways in which we understand the fourth industrial revolution through a social lens?

A particular challenge is the pace of change. We are all familiar with Moore's law. The law is of course, not a physical or natural law – but an observation and prediction that the number of transistors in a dense integrated circuit doubles about every two years. While it is not logical to extrapolate from the historical growth rate into the indefinite future, technological advances are changing at a pace that challenges us. This pace of change gallops ahead of usual legal and policy frameworks and disrupts familiar practices and social interactions (Schaller 1997).

A thousand years ago, it was relatively easy to predict how the world would look in 1050. Today, who can predict how the world will look in 2050? What kind of political system will we have, how will the job market be structured? 'What kind of bodies will the earth's inhabitants possess?' (Harari 2016).

Harari writes that we are facing the “paradox of historical knowledge’. Today our knowledge is increasing at breakneck speed,’ he says... ‘theoretically we should understand the world better and better. But the opposite is happening. Our new-found knowledge leads to faster economic, social and political changes; in an attempt to understand what is happening, we accelerate the accumulation of knowledge, which leads only to faster and greater upheavals. Consequently we are less and less able to make sense of the present or forecast the future” (Harari 2016).

Futurist Anab Jain, co-founder of speculative design studio Superflux, has spoken of how overwhelmed and disconnected people can feel in this rapidly changing world. She speaks of how this creates uncertainty and anxiety to the point where we just 'let the future happen to us', and fail to connect 'future me' with the choices we make today (Jain 2017).

Techno-Anthropologist, and Director of the 3A Institute at ANU, Professor Genevieve Bell, suggests that our experience of the past can be used as a guide to the questions we should ask ourselves as we create our next chapter (Bell 2017; Dodd 2017).

As we write the algorithms of our future, we have opportunities to address inequality based on gender, race and age, growing disparity between rich and poor, and conflict. We have opportunities to bring our humanity to the new world we are forging as we embrace the power of digitisation, big data, predictive algorithms, automation and machine-to-machine communication.

Although artificial intelligence can unpick massive volumes of data with unimaginable speed, complex problems and the application of ethically sensitive solutions require more than machine logic.

I offer an example from a recent analysis by Dr Sean Gallagher, Director of Swinburne's Centre for the New Workforce (Gallagher 2018).

The taxi booking firm Uber's "surge pricing" algorithm automatically raised fares by as much as four times its normal rate when demand shot up during the Lindt Café siege in 2014. The firm apologised and eventually interceded and started offering free rides out of the city – because this was the ethical and humane thing to do. The algorithm made a mistake - context, compassion and common sense were needed.

Our future will also rely upon our creativity and innovation. These human attributes enable us to take leaps of imagination and twists of perspective to find new approaches, ask new questions and see to it that what we value as human is intrinsic in our thinking.

We will also bring to our future a diversity of human experience. Studies have shown how workplace diversity is critical to a company's success. And we are asking ourselves to consider how we foster genuine, diversity of thought so that claims of diversity are more than skin-deep.

To our future, we bring our human imperfection. It is notable, that although digital automation brings precision to mass production, bespoke product design and development is enjoying a resurgence. We continue to value the unique, the special and the often imperfect objects that we make and treasure. Some of the value appears to be in the making itself, as we see a burst of ‘makers spaces’ where people find intrinsic reward in creating solutions. And some of the value is evident in the market for bespoke solutions and products.

To our future, we bring our hearts. People want to talk with people. To be healthy and happy we need empathy. Despite the availability of online counselling and remote monitoring devices for elderly people needing support – the need for caring, human connection and a sense of being known, remain important.

These critical components that will shape our future inform the nature of universities. Universities are people businesses. Universities such as Swinburne must be structured to develop creativity and innovation, foster diversity and provide environments where we can bring our hearts and ethical frameworks to designing the future.

Information is available to us in many forms, but our students and researchers come to us for context. They come to make contact, to develop their minds and ideas.

This can happen in virtual or physical spaces, but it is in the communities of learning and questioning that universities provide where human interactions bring algorithms to life.

Human interactions remain essential for our future workforce. The notion of a 'job for life' has been fading over recent decades. The Foundation for Young Australians predicts that today's 15 year old is likely to have five career changes and an average of 17 jobs in their lifetime (FYA 2015).

Consequently, universities must prepare our students to continuously adapt. We must ensure that our graduates develop flexibility and skills that transfer across different fields. We will of course, continue to provide deep discipline learning in a meaningful context. And increasingly, education and work are becoming entwined to provide this contextual learning.

You may have noticed that much of the public discourse about university education focuses on school leavers. Young people are our future and their education needs are critical. However, the fast and disruptive future of work requires us to reconsider who else we educate. Universities need to establish lifetime relationships with a wider range of people and workplaces. We need to support innovation in industry and the ongoing participation of the workforce who will be working over 60 or 70 year careers (Haldane 2018).

Andy Haldane, Chief Economist of the Bank of England, when speaking to the Guild Society at the University of Oxford in May, has called for the development of a ‘multiversity’ – referring to multiple entry points and multidisciplinary teaching and research.

People will come and go from universities – returning for additional education as they relearn and reposition themselves for the dynamic nature of work. He argues that this ongoing education and training will be technical, cognitive and social (head, hands and heart) (Haldane 2018).

Indeed, industry 4.0 demands a review of our model of education, and new ways for us to bring our expertise to the public discourse. The skills that are most needed in the early years of our adult education are the meta-skills that stay with us for life – personal resilience, adaptability, critical thinking, and creative problem-solving.

And let’s be clear. These so-called ‘soft’ skills are actually hard to acquire. Developing these ‘hard skills’ requires genuine cross-disciplinary education, diversity of input and perspectives, new ways to support imaginative and creative thinking, and tools that help us see problems from many points of view.

At the same time, it is essential that our educational institutions foster deep knowledge. Our Fellow of the Academy and Chief Scientist, Dr Alan Finkel (2018), spoke of this recently at the Australian Science Teachers annual conference. The well of deep knowledge is our research.

Universities are the research engine that supports our future prosperity and wellbeing. The world's leading economies recognise the importance of research and development and invest accordingly. Australia's investment, at 1.88 per cent of GDP, lags behind our competitors and is well below the OECD average of 2.38 per cent. (ABS 2017; OECD 2017)

Deloitte Access Economics estimates that in 2014, Australian university research contributed approximately 10 per cent of GDP, or \$160 billion per annum to our economy (Deloitte 2015). The economic argument for investment in our research engine is clear.

This evening I have spoken of the important role universities will play in our future. However, I have also argued that to remain relevant in our changing world, universities must adapt and evolve.

I see the engaged, future 'multiversity' as a responsive, responsible and rigorous learning community. The engaged university of the future enjoys academic freedom and institutional autonomy, but is engaged with the communities it serves. We must be inquiry-driven and at the same time learning and community focused. We must be professionally attuned, but humanely informed, taking seriously our global responsibilities.

The evolution of education is underway across our nation, and across the globe.

As a university of technology – we at Swinburne are taking deliberate steps to be the place where technology meets humanity. We are creating deliberate connections between learning and the world of work – supporting our students to be clear about their professional purpose from the moment they first engage with us.

Every undergraduate course includes a work integrated learning experience for students to provide them with contextual, authentic human learning opportunities. We have established an office dedicated to work placements and internships.

We are not building classrooms – we are recreating new learning spaces – with studios, project spaces, workshops and labs to allow students to interact and learn in teams together.

We have created more cross discipline electives and made our courses more flexible and tailored to individual student needs – allowing more double degrees, double majors, majors and minors, and creative discipline combinations, such as gaming and science, health sciences and design.

We are enhancing the traditional ATAR approach to university entry, piloting an alternate entry program for students who may find the ATAR channel limiting or unhelpful to their learning. This does not mean that we have lowered standards – rather, we are trialling ways to engage more actively with high schools to help students to better identify their tertiary education interest and shape learning assessments to align with study interests. Some students are taking first year university courses while they complete year 12. There is growing interest in this approach and we are engaging with others in the sector to progress this work.

At Swinburne we have never confused excellence with elitism – and our approach to inclusion and respect for diversity has prompted us to offer more doorways to tertiary education. We do this through high- touch online learning and pathways education for students who may have experienced educational disadvantage.

We have a neurodiversity program where we tailor learning and approaches for students with a range of cognitive and neurological variations and particular aptitudes. We do this in partnership with industries seeking talent in areas such as data science.

We have created special Welcome Scholarships for students who are refugees and people seeking asylum. We have a number of initiatives to encourage women in STEM studies. A more diverse university community is a more humane community allowing us to ask a wider range of questions and understand issues from a broader perspective.

We bring the intersection of technology and humanity together in our research programs through five key institutes – all with a focus on social and economic impact. These include our Data Science Institute, Institute for Social Innovation, Iverson Health Innovation Research Institute and our Smart Cities Institute. The institutes draw upon the deep expertise of 15 focused research centres. The Institutes undertake research questions that must include at least two discipline areas and one industry partner. Our extensive data science infrastructure underpins the work and our innovation precinct has become a front door to the university, unlocking the expertise and engagement that a “multiversity” should offer.

We are partnering with industry to design and deliver learning experiences and undertake research questions that warrant attention. We are building learning, research and industry networks that traverse the globe from Melbourne to Tel Aviv and from Shandong to Silicon Valley. Global connections foster our humanity.

Change is constant. How universities respond to change to make our students, our industries and societies more adaptable and innovative will determine how well prepared we are for the unknowns ahead.

This brings me to the Academy. Our universities and the academies are vital partners in navigating the future. Our Academy is fortunate to have the expertise of leading experts on technology, engineering and science; men and women who are at the forefront of the early stages of the fourth industrial revolution. We have an opportunity and indeed, a responsibility to inform decisions at the intersection between technological and scientific change and humanity. The future is ours to shape.

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