



# Future of Work in the Digital Economy

## Developing skills for Industry 4.0

Industry leaders and international academics examine the impact of COVID-19 on the digital economy and analyse the critical skills required to drive this accelerated digital transformation.



## Message from Professor Aleksandar Subic RMIT University



**“The COVID-19 disruption has shown us that Industry 4.0 is not only about technology – it’s more about people and society.”**

We’re seeing automation remove repetitive and potentially unsafe or hazardous work – freeing up humans to engage in more creative and value-added tasks.

These new jobs are expected in areas such as systems design (cyber-physical, IIoT), modelling and programming, intelligent data analytics and machine learning to enable higher levels of autonomy, industrial automation and robotics, as well as security.

It’s important to note that the number of new jobs created is projected to outnumber any decline in jobs, such as those involving manual work, repetitive and procedural routines, conventional administrative tasks.

But maintaining a positive balance between new jobs created and those lost – and avoiding major disruptions and societal pain – is dependent on active collaboration between policymakers, educational institutions, employers and unions.

We need to partner in ways that we haven’t done in the past. It’s about co-design, co-investment

and co-delivery of transformational programs for the changing industrial environment and economy.

But it’s not only about creating the workforce of the future – it’s also about reskilling and upskilling the existing workforce at pace and scale, because we have an obligation and responsibility both for now and the future.

What skills will our staff need in the future? How can we reskill or upskill the people we have now so we can retain the industry experience but build out the skillsets needed to realise the full potential of Industry 4.0?

Strong, inclusive collaboration between industry, government and the education sector is critical for our small businesses to become medium ones, and for some of our medium businesses to scale-up further and take on the world.

It’s a tricky balance, but multi-sector universities like RMIT can help. Reach out and have a chat, to start a dialogue that can lead to real transformation for your business.

### German-Australian cooperation on Industry 4.0

Industry 4.0 is radically transforming national economies, as innovation and digitalisation call for a paradigm shift in manufacturing, industrial production, products and business models.

Since value chains do not end at national borders, closer international cooperation is key to the success of national economies in this field.

Germany and Australia, as dynamic players in the field of digitisation, have the initiatives Plattform Industrie 4.0 in Germany and the Prime Minister’s Industry 4.0 Taskforce in Australia, to keep up and improve their position in Industry 4.0 and IoT.



### Professor Aleksandar Subic

Deputy Vice-Chancellor College of Science, Engineering  
and Health & Vice President Digital Innovation  
**RMIT University**







### **In focus: Growth in the space industry sector through advanced manufacturing**

RMIT University has secured a research and development agreement with additive manufacturing company Titomic to assess the capabilities of its Titomic Kinetic Fusion (TKF) 3D printing process to create structural satellite parts.

The research, which is being conducted on behalf of global aerospace and defence company Lockheed Martin, will develop parts from high-performance metals, analysing both traditional and additive manufacturing methods relative to radiation shielding within satellites.

The project will contribute towards commercial opportunities for Titomic in space and defence sectors following the successful validation of the additively manufactured demonstration satellite parts.

RMIT's Centre for Additive Manufacturing is delivering the work.

Professor Aleksandar Subic, Deputy Vice-Chancellor College of Science, Engineering and Health & Vice President Digital Innovation, RMIT University

*Image: Titomic*



## A digital workforce is more important now than ever

**"Digitalisation has become more important than ever before. We need a level of flexibility and speed that hasn't been required to date."**

### Emerging business models

---

New business models in Industry 4.0 have emerged at an accelerated rate – and along with that, the need for a skills transition has become much more accentuated.

If we look at the impact of the current situation on travel, and to bring this into an industrial setting, it means we need to be able to maintain assets from afar.

It's a need more critical than ever, as we're even seeing borders closed within countries.

### Fostering transferable capabilities

---

This need underlines the value of a digital twin – a virtual replica of an asset.

And these assets, and the systems behind them, need to be reliably secure to ensure that things can keep working.

The capabilities and skills required in an Industry 4.0 world are just as relevant to process industries, infrastructure and services – not just factories.

A digitally skilled workforce was foreseen in the Industry 4.0 roadmap – but the pandemic has accelerated the urgency to establish these skills at scale.

### Educating for the future

---

Digitalisation technologies and skills are critical to Australia's prosperity in this new world.

Digitalisation has no borders and we have to learn how our economies can participate and thrive and be resilient in a global economy. This is no more evident than during the COVID-19 pandemic.

In many ways we already have a lot of the technology available that can help solve the world's most challenging problems.

The mission is to get that technology, and the skills needed to use that technology, into the hands of innovative and enthusiastic minds so they can create real and positive impact.

In a world too often filled with slogans and sound-bites and only focused on the 'what', we actually have an opportunity to embrace the most advanced technologies so we can move to the 'how'.



**Jeff Connolly**  
Chairman and CEO  
**Siemens Australia New Zealand**







”

### **In focus: Embedding digital skills in education**

Siemens recently delivered a significant grant of hi-tech industrial software to RMIT University as part of a multi-university trial of new curriculum to support an Industry 4.0 ready workforce.

This leading industrial software, combined with government support for new curriculum, will enable RMIT to continue their constant drive to innovate their models and offerings and to ensure an even greater connectedness to industry and government.

Australian industries can compete with the best in the world, so long as they have people coming through the entire tertiary education continuum with fit-for-purpose skills who are ready to tackle the needs of the future. These are not one-time skills.

The environment is fluid and these skills and tools change so nobody can afford to sit still. We all need a mindset of continuous learning or we are in danger of being left behind.

**Jeff Connolly, Chairman and CEO, Siemens Australia New Zealand**



## The opportunity for Australia's manufacturing sector

**"The manufacturing sector's transformation to digital production will benefit from all of a worker's existing skills – and then some."**

### **Returning to artisanal skills**

The skills inherent in hand and power tools are just as relevant to the digital workplace.

One of the attractions of the digital environment is the possibility of a return to artisanal production, where workers or teams of workers are responsible for the carrying out of all the functions needed to form a complete component or item, such as a car.

### **Learning from each other**

Although many Australian workplaces are yet to completely adopt Industry 4.0 principles, it's critical that any conversations on what will be implemented are a cooperative process.

We're not quite there yet in terms of this collaboration – and we can learn a lot from the German model.

### **Developing new ways of working together**

In the digital environment of the future, we'll see engineers, programmers, designers, tradespeople and production workers all involved in the making of the Industry 4.0 workplace.

And for that to take place, unions, employers and governments have to create and develop a new way of working together so that the thoughts and ideas of all engaged can be brought to bear.

### **Making the most of our people**

New technologies allow for many manufacturing processes to take place in smaller, customised volumes and in more remote locations.

Those trends will enhance the opportunities for Australian-based facilities to participate in global production chains – often undertaking particular stages of production, rather than start-to-finish vertically integrated assembly.

These models of advanced manufacturing naturally result in greater demand for highly-trained workers in all occupations: production workers, skilled trades people, technology specialists, and managers.



**Andrew Dettmer**  
National President  
**Australian Manufacturing Workers' Union**





”

### ***In focus: A Fair Share for Australian Manufacturing***

The Australian Manufacturing Workers' Union commissioned a report by the Australian Centre for Future Work that outlines the steps we need to take to create A Fair Share for Australian Manufacturing.

This means that we manufacture at home, at least as much as we use. And that we export as much as we import from abroad.

With the right policies, we can create A Fair Share for Manufacturing, which would create 400,000 new direct manufacturing jobs, a further 265,000 new jobs throughout the manufacturing supply chain plus add billions of dollars in additional tax revenue.

Manufacturing is a growing industry globally, and demand for manufactured goods is increasing here in Australia. With the impact of COVID-19 still being felt, this is the moment to launch a comprehensive effort to rebuild Australian manufacturing.

**Andrew Dettmer, National President, Australian Manufacturing Workers' Union**



## Engineers play a critical role in industrial transformation

**“The expert voice of engineers in the current situation is something that we’ve seen in demand globally.”**

### Reshaping multiple sectors for recovery

---

People need to be at the centre of Industry 4.0 when the conversation centres on our economy as it stands now and how it will look in the future.

We’re seeing government stimulus measures focus on infrastructure as part of plans to boost economic recovery – infrastructure being another sector reshaping through digital transformation.

### Embedding lifelong learning

---

To ensure the right skills are developed for any sectoral transformation, it is critical to embed lifelong learning in all professions.

Digital skills and a data skills set aren’t necessarily things that people come to straight away.

Some of the ways we’ve been tackling this is through accessible learning offerings, such as micro-credentialing.

### Breaking down boundaries

---

Global recognition of Australian engineering qualifications must also be a priority.

We’ve been working with our counterparts in Germany to set up the right framework to let the engineering profession work across boundaries.

### Prioritising collaborative efforts

---

- Keep the focus on infrastructure projects.
- Build skills for a digital future, including cyber engineering and a better understanding of how to engage with data.
- Invest in research and development and emerging technologies, industries and careers, and do so with a ‘start-up mindset’ that is less constrained by analysis paralysis.
- Reverse the STEM skills deficit by getting into the school system earlier.
- Prioritise global recognition of Australian engineering qualifications.
- Double down on diversity, especially in engineering, to attract the best and brightest minds from every part of society.

### Fostering multidisciplinary skills

---

The digital technologies that contribute to Industry 4.0 will be familiar to all engineers as concepts but in the future they will need to be integrated into all projects, including:

- Mobile devices
- IoT platforms
- Advanced cyber-physical systems
- Augmented reality
- Smart sensors
- Big data analysis and advanced processing.



**Dr Bronwyn Evans**  
Chief Executive Officer  
**Engineers Australia**







”

### **In focus: Data and water security**

Water security is one of the greatest issues facing Australia, and engineers have a significant role to play in helping to meet the challenge.

In a submission to the Australian Productivity Commission's Inquiry into progress on National Water Reform, Engineers Australia and its National Committee on Water Engineering (NCWE) called for better data to assist with water planning and management.

Poor data collection and management systems mean that we can't plan adequately for climate variability and change, we can't properly evaluate environmental or cultural impacts, and we can't evaluate in real time if users are complying with licence conditions.

The submission took a 360-degree view of water management in Australia, highlighting the need to ensure better connections between planning agencies, enhanced monitoring and compliance activities, inclusion of Indigenous perspectives and increased support for regional and remote communities.

**Dr Bronwyn Evans, Chief Executive Officer, Engineers Australia**

*Image: Getty*



## Global partnerships are key for solutions to global challenges

“The impact of the current situation and its unprecedented acceleration of the digitalisation of business has meant a focus on partnerships to solve challenges.”

### Connecting industry and research

It's easy to make global collaboration happen – it's no longer about where you're located but more the time zone of your partners, whether they be in Brazil, Australia, Asia or the Americas. This global lens is critical when working to bridge industry and universities.

### Extending to other sectors

We must be focused on finding new ways of collaboration, new ways in the digitalisation of industry as well as new ways of working in a post COVID-19 landscape.

But in addition to the digitalisation of factories, there are so many other sectors where there are opportunities for future global partnerships, such as in food, energy and health.

What's important is that it's not just about developing the technology – it's also getting ready for its adaptation across other sectors.

### Emerging business opportunities

- Manufacturing Platform Economy
- Personalisation and individualisation
- Software-driven manufacturing
- XaaS – Everything as a Service
- Energy and efficiency contracting

### Exploring what comes next

- Quantum technologies:
  - Computing
  - Communications
  - Sensors such as SQUIDS
- Biological transformation – the increasing use of materials, structures, organisms and principles of living nature in technologies with the aim of sustainable value creation:
  - Bionic Implants
  - Synthetic Biology
  - Autonomous Swarms



**Professor Frank Wagner**  
Dean Industry and Enterprise  
University of South Australia







### **In focus: Future Work Lab in Germany**

Under the auspices of the Fraunhofer Institute for Industrial Engineering IAO, the Future Work Lab is an innovation lab geared towards work, people and technology.

It pools expertise in all aspects of Industry 4.0 and is designed to provide industry with a platform for support on the digitalisation of the industrial value creation chain.

Companies need new ways to equip their employees for digital working and the implementation of new technologies.

It's an opportunity to boost manufacturing efficiency – but it also brings disruptive innovations that transform existing processes and structures. If a company is to thrive long term in this dynamic market environment, it must adopt a systematic approach to innovation processes and embed this within its strategy.

**Professor Frank Wagner, Dean Industry and Enterprise, University of South Australia**



## Cyber security underpins the success of Industry 4.0

**"We rely on digital infrastructure, and the data that it carries, for almost everything we now do in our 'cyber-physical world.'"**

### Addressing skills gaps

When we look at it from a workforce perspective, and drawing on the deep analysis we've undertaken at AustCyber, we need more skilled people within the Australian economy to guarantee trust in our digital infrastructure and the integrity of that data.

And when we look at the skills challenge around cyber security, the size of the challenge is not insurmountable.

But I do believe it does underpin the future success of Industry 4.0.

### Building robust pipelines of skills

AustCyber has been working with its partners over the past three years to develop resilient and robust pipelines of skills needed across key competencies.

It's all about collaboration, but perhaps what's more important is also building on the collaboration that has already started, not just in Australia and in Germany, but globally.

We need to work together to drive the development of the skills needed – and this should be from the top down and the bottom up.

### Cross-cutting sectors

Cyber security as a business activity as well as an economic pursuit cuts across many different sectors and industries.

It includes not only providers of cyber security capability who comprise the cyber security sector, but also organisations in other sectors that employ in-house cyber security staff.

Furthermore, cyber security products and services also protect and enable the infrastructure, supply chains and value chains of the digital aspects of the global economy, but the benefits of cyber security have not been studied to the necessary depth and richness.

Solving these measurement challenges will allow governments to form more robust and sophisticated industry development policies; encourage investment in the sector; and help cyber security companies to better understand their commercial surroundings and the opportunities available to them.



**Michelle Price**

CEO

**AustCyber – Australian Cyber Security Growth Network**







”

### **In focus: Blackberry and the next generation of cyber professionals**

Leveraging new technologies and re-focusing resources is one way to address the cyber skills shortage in Australia, but more needs to be done.

Collaboration between government, industry and educational institutions is imperative to foster talent and narrow the gap.

That's one of the many reasons BlackBerry partnered with AustCyber for CyberTaipan – an educational competition helping to foster new skills for the next generation of cyber professionals.

It saw talented and capable young Australians solving complex problems using a broad range of skills, many of which form the foundation of careers in cyber.

**Michelle Price CEO, AustCyber – Australian Cyber Security Growth Network**



### About this publication

This publication is an outcome of the global webinar on the *Future of Work in the Digital Economy – Developing Skills for Industry 4.0* on 25 June 2020, which was opened by the Australian Ambassador to Germany and hosted by RMIT Europe.

#RMITFutureWork

Published November 2020

### About RMIT Europe

RMIT's European hub in Barcelona, Spain, is the gateway for European research, industry, government and enterprise to innovation and talent in Australia and Asia.

We leverage RMIT University's global connections to deliver an international dimension to research and innovation beyond Europe's borders.

We provide early access to the next generation of talent for European industry including servicing our partners seeking local talent for their operations in Australia.

We also work with our partners looking to extend their workforce in Europe through the diversity and depth of international talent.

Talk to us about the ways you can leverage our presence in Europe to extend your markets to Australia and Asia through innovation and talent.

To know more about RMIT Europe, visit [rmit.eu](https://rmit.eu) or contact [europe@rmit.edu.au](mailto:europe@rmit.edu.au)