



Science & Technology AUSTRALIA

Digital Economy Strategy

12 December 2017

Dear Digital Economy Strategy team,

Thank you for the opportunity to take part in the consultation to inform the development of a Digital Economy Strategy for Australia.

Representing almost 70,000 scientists and technologists across the breadth of the science, technology, engineering and mathematics sectors around Australia through our membership, Science & Technology Australia (STA) has a significant interest in the success of this endeavour.

Digital research infrastructure, a prosperous economic environment, and a workforce that is ready and able to participate in a changing digital landscape are vital components to strong Australian science and technology now and into the future.

With an ambitious Strategy and dedicated execution, Australia can achieve a formative and influential role in the creation of the global digital economy.

Through emerging work in artificial intelligence, quantum computing, block chains and more, Australia has the potential for early adoption of these transformative technologies, setting the nation on a course to commercial and research success.

We would welcome further opportunities to contribute to the development of this Strategy, directly or by connecting our broad and engaged membership, and look forward to playing a part in realising its aims and objectives in the near future.

Kind regards,



Professor Emma Johnston
President
Science & Technology Australia



Kylie Walker
CEO
Science & Technology Australia

Overview

The Digital Economy will play a significant role in Australia's future prosperity, and will disrupt a range of aspects of the global economy. Advances such as the birth of *The Internet of Things* and *Industry 4.0* have proven this, and we can expect new discoveries to continue in this vein.

Science and technology – both in research and industry – will not be the same following the leap towards a digital, knowledge-based economy. With world leading digital research infrastructure, Australia can shape new industries and fully realise opportunities to fuel a brighter, stronger economy for the nation.

For example, the increasing ease of access, broad understanding, and effective utilisation of big data is having a significant effect on research generally, and the Australian economy more broadly. Innovative projects like the [Atlas of Living Australia](#) rely on widespread connectivity of researchers and the ability to handle big data, neither of which were possible prior to the digital technology revolution. This project provides a glimpse of what is possible in the broader economy if the science and technology sectors are appropriately supported to play a part in advancing Australia's digital economy.

These advances will also have meaningful impacts on traditional industries such as manufacturing and agriculture, where big data on weather patterns is already analysed by farmers for increased productivity, and advances in artificial intelligence and robotics have already led to more efficient manufacturing.

Science & Technology Australia (STA) would like to see an Australia that is engaged in the creation of a strong digital economy, connected with new digital technologies in all aspect of life.

STA is advocating for:

- Enabling access to cutting edge technologies for all Australians in the next 20 years
- A universal understanding of, and ability to participate in, the digital economy
- Increased accessibility to world-leading digital research infrastructure for scientists and technologists
- Access for small to medium enterprises (SMEs) to advanced manufacturing, digital expertise and support to enable effective and successful participation in the digital economy
- An Australian workforce that is sufficiently prepared to adapt and thrive in an ever-changing digital landscape
- Consultation and inclusion of minority groups that are typically disengaged with the digital economy in the development of this strategy

Below, where STA and our membership could add value, we have responded to the specific questions laid out in the Consultation Paper.

Specific feedback

1. How are advances in digital technology changing the way you work, your industry and your community?

In the science and technology sectors, digital technologies are enhancing the way researchers can use and analyse data, access and conduct their work, and distribute and disseminate their findings.

Australia has the opportunity to accelerate the development of a number of specific technologies that will underpin the digital economy. Australian researchers already excel in areas such as big data, block chain business models, quantum computing and additive manufacturing, and it is expected that these technologies will become more important as the digital economy develops further.

There are also areas where Australia has the potential to achieve much more with limited investment, such as cyber security and artificial intelligence. Identifying these opportunities should be a priority for government, so that they can play a role in strengthening the future Australian digital economy.

According to a review by [Telsyte](#) into organisational spending on big data, private enterprises are already prioritising these new technologies by spending as much on big data analytics as they are on customer relationship management software – and this trend is predicted to rise.

Distributed ledgers or “block chain” research is an area in which Australia is working hard, but more work is required to genuinely transform into a digital economy. Given Australia’s vast domestic distances – as well as its geographic isolation from much of the rest of the world - distributed ledgers will become a vital tool to enable Australian enterprises and researchers to compete on the international stage.

CSIRO’s [Data61](#) has already made significant positive steps towards developing distributed ledgers and addressing initial concerns regarding adoption of this new technology. Given the level with which such technologies increase the efficiency of business transactions, the greater the investment in this space, the greater the potential to accelerate performance.

New digital technologies will also impact the way information and data is used, stored and shared. An example of positive change occurring, thanks to the developing digital economy, is [med.data](#). This project sees NSW hospital admissions data used by the UNSW City Futures Research Program, together with population projections from the ABS, to project demand for health services across the state (more on this [here](#)). This example of digital technologies helping to enhance already useful government data provides a glimpse of what is possible with a sophisticated and coordinated digital economy.

2. What is your vision for an Australia that thrives in a digital economy? Where would you like to see Australia in five, 10 and 20 years’ time?

To thrive in the new digital economy, STA believes Australia will need a workforce more effectively equipped with science, technology, engineering and mathematics (STEM) skills.

In five years, Australia can and should be on a clear path to realise the potential it has to build a strong, world-leading digital economy.

The Australian population should be well versed in digital technologies, connected to high-quality high-speed internet and early adopters of new digital tools. Australia, like other countries, will have to develop a universal digital platform for government, business and the public to engage with. The use of digital identifiers for the public to access government systems, financial information and businesses will be the first step for the development of an effective digital economy.

Our workforce should be able to meet demand for new skills to suit the digital economy. Reskilling and a whole of education approach to STEM skills will be needed in the long-term to shore up Australia's digital workforce. However, within the next five-years strategic immigration programs should be used to ensure adequate STEM skills in Australia in the short term.

In 10 years, Australia should be a leader of the digital economy amongst English speaking nations. We should have built strong digital research infrastructure, a workforce that is well equipped to deal with the short-term challenges and a new generation of passionate, capable and innovative men and women to take full advantage of long-term opportunities.

Along with a digitally prepared workforce and stable and effective infrastructure, technological developments such as quantum computing and additive manufacturing will also lead shifts in the way Australia interacts with international markets and will contribute to Australia's booming digital economy.

In 20 years, Australia can be leading from the front, taking a strong leadership role in the Asia-Pacific region and beyond. The Australian education system should have been re-formed to suit the changing needs of our workforce, and nations modelling their own activities on those being developed and delivered in Australia.

STA believes in 20 years, Australia can and should be a hub for innovative businesses, with organisations moving here to take full advantage of our cutting edge digital infrastructure, our supportive and consistent digital platforms, and our favourable regulatory and tax systems.

3. What is the role of government in achieving that vision?

It is the Federal Government's role to act as an enabling force for the development of Australia's digital economy, and the relevant skills and support structure unpinning it.

STA believes there are three key areas in which the Federal Government can enable the successful development of a strong and successful Digital Economy Strategy.

Digital Infrastructure

In the short-to-medium term, the infrastructure required to enable the digital economy in Australia will rely heavily on a combination of high speed internet and accessible mobile network coverage.

Australians who are less engaged with digital technology usually preference the use of mobile networks. The implementation of the 5G mobile network will improve the ability for disengaged Australians to more effectively connect with the digital technology.

Similarly, it is vital the Government implements strong and stable long-term funding for digital research technologies to support strong and stable science and technology. This infrastructure will underpin much of the developing digital technologies that will enable Australia to become a major player in global digital economy.

For example, supercomputers used by researchers to analyse and process complex data sets require regular upgrades to remain competitive internationally. Funding from the National Collaborative Research Infrastructure Strategy has provided this necessary support in the past, however some digital infrastructure is now becoming out-dated with little vision for how this will be addressed in the near future.

Investments made through other initiatives and programs (NCRIS for example), must be built upon in a strategic, continuing fashion to keep existing infrastructure up-to-date. This allows Australians to take full advantage of our existing infrastructure, effectively extending the return on our initial investment.

Government should take a clear stance on supporting this important infrastructure, and a clear pathway for funding this integral research infrastructure should be included in the Digital Economy Strategy.

Developing a digital ready workforce

A digital economy will be ineffective without the presence of people to operate productively within it – i.e. a digital ready workforce. Through STEM skills, we can prepare our workforce for the disruption expected by the growth of the digital economy. The Federal Government is already focused on the development of STEM skills for primary and secondary students in Australia and enhancing these programs will be essential to ensure the long-term future of the digital economy. Collaboration between the states and the Federal Government should lead to the development of a national coding and information technology curriculum, and funding and policy levers need to be introduced to encourage the adoption of this curriculum.

To prepare the existing Australian workforce to be flexible and responsive, these school initiatives should be augmented with ongoing adult education such as re-training programs and relevant professional development. The Federal government can take the lead in this regard through the funding of higher education and vocational education training programs that allow the awarding of sub-bachelor training, internships and apprenticeships that can be undertaken by those in need of it.

Supporting SMEs to thrive in the digital economy

Unequal access to technologies and data is an urgent issue that must be addressed before Australian SMEs are properly supported to thrive in a digital economy.

Large enterprises are more likely to have access to high speed internet and more likely to utilise data analytics for direct marketing, administration, performance management, and to address supply chain issues. To encourage SMEs to invest in digital infrastructure, tax rebates could be offered in a similar fashion to those in the United Kingdom that allow organisations to develop and upgrade their digital technology (such as connecting to Fibre to the Premises internet).

5. What communication services, and underlying data, platforms and protocols, does Australia need to maximise the opportunities of the digital economy?

One of the biggest challenges to the functionality of the digital economy will be compatibility when multiple digital platforms of varying ages need to communicate with one another.

Incompatibility between these platforms will result in a significant loss of economic efficiency for government and industry alike.

A universal platform for the digital economy is possible and necessary, as has been demonstrated in countries like Estonia. By providing a unique digital identifier to entities (both personal and business) to access government, financial and other services, engagement with the digital economy is more efficient, secure and consistent.

The Estonian example is important, because their global leadership in this space has led to [increased open access to publically-funded research data](#), [unmatched digital access for government services](#), and increased [collaboration with international research partners](#) – just to name a few.

The development of a universal platform, similar to that seen in Estonia, will become the standard for countries with a strong digital economy in the next 5-10 years. Providing a universal platform is much like the Babel's Tower (a science-fiction concept that ensures universal translation of languages) for technological platforms. It allows different systems to communicate and share information and is the basis for a block-chain and additive manufacturing. For every enterprise that wants to enter the digital economy, compatibility of their systems is often a complicated issue. The development of a universal platform will make it easier for SMEs to enter the digital economy without needing significant expertise in business information systems.

A universal platform would also address issue of geographical isolation, allowing a business in Perth to talk to customers, manufacturers, banks and officials in a different state, without the need for costly communication integration packages for each different node within the supply chain.

The earlier this universal platform is introduced, the less impact there will be when trying to convert numerous platforms to a universal platform in 5 or 10 years time.

The benefits go beyond simplifying the process domestically too, as with the Estonian digital ID program and new e-residency program, it is possible for digital businesses to register, and communicate with customers, banks and government without a physical presence in Estonia. In Australia where, distance is a key challenge for Australian businesses, a universal platform would allow SMEs to access markets previously closed to them, as well as provide access to the Australian market for international business.

9. What opportunities do we have to build trust and community confidence through resilience to cyber threats, online safety and privacy?

One of the biggest challenges facing the digital economy in Australia and globally is ensuring transactions between consumers and businesses are secure and safe. This is particularly important for science and technology, so that the discoveries and innovations, sensitive data and commercially sensitive research produced in Australia are protected from threats existing in the digital world.

According to the Australian Bureau of Statistics, 16% of businesses experienced an Internet security incident or breach that most commonly resulted in the downtime of

services in 2015-16. As more businesses move online, this issue will only become more pressing.

The issue of national security is also a concern, as the community needs to have confidence that their data is secure from external threats. One issue that warrants analysis is government access to data for national security purposes, as this can erode confidence within the business community, and has the potential to damage the effectiveness of encryption.

Community confidence and resilience must be addressed in three ways – by increasing the effectiveness of encryption and cyber security technology; encouraging best practice adoption of these technologies across all sectors and at home; and through the implementation of an effective awareness campaign to educate people on how to exist online in a safe and secure way.

14. What is holding Australian businesses back in terms of benefiting from digital technologies?

According to the recent figures from the Australia Bureau of Statistics, a lack of access to digital infrastructure and a lack of understanding of the technologies available to them are significant barriers for small enterprises in Australia.

As organisations grow in size, they are more likely to enjoy enhanced digital skills or capability amongst their staff, and more likely to use digital technologies like cloud computing to enhance their work. Where large business enterprises are shown to have a high level of engagement with digital technologies, small to medium business enterprises are reluctant to invest in such areas.

In order to encourage small and medium business enterprises to embrace digital technologies, a better understanding of the costs and benefits of digital technologies must be emphasised, coupled with investment incentives to offset set-up costs.

Action to address affordability, such as targeted tax incentives, will go a long way to encouraging small to medium enterprises to invest in the implementation of these technologies. For example, this could subsidise the installation of fibre to the premises connectivity to the National Broadband Network, which is a particular barrier given that the majority of small to medium businesses are not connected to high speed internet.

16. What efforts are you or your organisation making to respond to digital transformation? Why?

STA is embedding digital technologies into all the services and programs we deliver, in an effort to equip our relevant sectors with an awareness, passion and understanding of the potential for Australia to thrive in the global digital economy.

Our strong focus on connecting technologists and researchers with business is fostering collaboration, which promotes the uptake of digital technology breakthroughs with industry. STA also plays a major role in the presentation of big policy ideas and political questions regarding the development and uptake of digital technologies.

We hope that through our work we can assist in forging resilient, valuable and effective science and technology sectors, well equipped to participate in forging the best future for Australia.

20. What opportunities do we have to equip Australians with the skills they need for the digital economy, today's jobs, and jobs of the future?

The development of a digitally adapted workforce is an ongoing challenge for all countries that are focussing on their digital economy, and should be a priority for Australia now and for many years to come.

With the rapidly transformational nature of the digital economy, understanding what skills the workforce needs should be one of Australia's primary concerns. As such it is important that we work quickly to define, analyse and respond to this issue to avoid defining the problem at a point where it is too late for us to address it.

Internationally, STA recommends looking to the example set by the United Kingdom which created a high-level Skills and Strategy Group to identify what future skills will be required, how these skills can be acquired in a timely manner, and how the quality of these skills can be maintained.

A similar approach should be adopted in Australia so that skill development can be proactive rather than reactive. This Group should include links to the Department of Education, the Department of Industry, Innovation Science, and any other stakeholders, inside and outside government, who will need to play a role in securing the skills necessary for a strong digital economy moving forward.

One issue of particular urgency for Australia will be a lack of trained ICT specialists. According to a [review](#) of the information technology sector by Deloitte there are currently 640,000 ICT workers in Australia, but this number is expected to increase to 722,000 by 2022. This is a growth rate of 2%, which is much higher than the predicted growth of 1.4% based on the rest of the workforce.

Previous deficits in the ICT workforce has been covered by the immigration of skilled ICT workers, so any Skills and Strategy Group should include a liaison with the Department of Immigration and Border Protection to ensure that skills shortages and training shortages can be temporarily supplemented by overseas workers.

While filling gaps through a combination of reskilling and the immigration of experts in the digital economy can address pressing gaps in the digital workforce, it is not a long-term solution for Australia's future.

The National Innovation Science Agenda focuses on teaching STEM subjects in both primary and secondary education, and by pursuing this focus Australia can address the long-term issues standing in the way of a digitally ready workforce. STA suggests that more extensive benefits would be reaped if a greater focus on information technology and coding education is adopted additional to this.

It is important that teachers with appropriate skills are prioritised too, which could be achieved by providing opportunities for existing teachers to up-skill through scholarships and training, or offering incentives to attract IT professionals to consider a career in teaching.

Furthermore, an education system that is flexible and responsive will allow Australia to adapt for new and emerging opportunities as the domestic and global digital economies continue to evolve.

21. What opportunities do we have to bridge the ‘digital divide’ and make the most of the benefits that digital technologies present for social inclusion?

Any digital economy strategy must address these issues of connectivity to ensure inclusivity with the digital economy for all Australians.

The ‘digital divide’ can be bridged by improving:

1. affordability;
2. regional connectivity; and
3. universal digital literacy training.

It is also vital that minority groups and those traditionally disengaged with digital technologies – such as older, Indigenous, non-English speaking, and disabled Australians – are incorporated in the design and development of this Strategy.

An inclusive and consultative Strategy will lead more easily to a digital economy that does not exclude those who stand to gain the most.