Summary: Preparing for Australia's Digital Future

A strategic plan for information and communications science, engineering and technology

Preparing for Australia's Digital Future is a collaboration between the Australian Academy of Science and the Australian Academy of Technology and Engineering. The objective of the strategic plan is to help position Australia as a successful, forward-thinking digital nation.

The term 'digital' is used to describe information and communications science, engineering and technologies, including their implications for education and training, business, public policy and the innovation system. The plan focuses on improving the linkage between Australia's industry, innovation and research sectors to capture the opportunities that digital technologies present for Australia. It provides actions that will help research and industry stakeholders, and those who influence or set public policy, to identify, create and access these opportunities.

The plan presents 32 recommendations grouped under five priority areas:

- encouraging digital leadership in industry
- fostering research and industry partnerships for our digital future
- safeguarding and strengthening our digital workforce and capability pipeline
- ensuring whole-of-government action for our digital future
- delivering research sector reforms.

Further reading

The plan is available online at www.science.org.au/digital-future and www.applied.org.au/digital-future

Headline recommendations

Encouraging digital leadership in industry

Industries identify key opportunities for digital transformation and provide leadership in digital transformation by initiating strategies for collaboration with appropriate research agencies.

Fostering research and industry partnerships for our digital future

The visibility of publicly funded research be increased by developing and maintaining a readily accessible, up-to-date directory of Australian ICT research strengths and capabilities relevant to the digital economy, including international benchmarking.

Safeguarding and strengthening our digital workforce and capability pipeline

Universities and publicly funded research agencies reshape their research culture by placing substantially higher emphasis on industry experience, placements and collaborations in hiring, promotion and research funding.

Ensuring whole-of-government action for our digital future

Undertake a comprehensive national future-readiness review for the Australian digital research sectors, including their links with industry and opportunities to harmonise state, territory and federal initiatives.

Delivering research sector reforms

Develop a position statement on intellectual property across all Australian universities and publicly funded research agencies to remove intellectual property issues as a barrier to research update by industry. The position statement must emphasise the importance of partnerships with industry and recognise the value of intellectual property and cost of research. The position statement should be a first step towards a more comprehensive framework on intellectual property. Where appropriate, universities should be encouraged to promote open IP policies.

Current Australian digital research capability

Digital technology research is a truly international endeavour, and so are the industries that apply it. As such, there can be considerable dividends, and much to learn, by targeted international benchmarking. It also means we can better focus our limited research budget on areas that are likely to have the greatest impact.

This section presents a high-level summary of the amount and quality of relevant research strengths in Australian universities and research institutions at a national level*.

Further information is presented in Chapter 6 of Preparing for Australia's Digital Future.

Current Australian digital workforce capability

Just over one half (52 per cent) of the current ICT workforce is employed outside of directly ICT-related industries. Among the top destinations for IT graduates in Australia are health care and social assistance; transport, postal and warehousing; manufacturing; wholesale trade; and retail trade.

Generic ICT skills and 'digital literacy' have also emerged as highly desired skills for jobs across the economy. They are also central to the process of learning, as primary, secondary and tertiary educational institutions increasingly utilise technology in the delivery of educational programs.

Our workforce supply side is experiencing a range of challenges, including the ICT industry carrying a legacy of negative perceptions of desk-bound, repetitive, isolating jobs; skills supply being limited by the low levels of female and mature-aged workers in the ICT workforce; and many students who pursue an ICT education experiencing difficulty in finding employment in the sector upon graduation, with many graduates using their qualifications to pursue careers outside ICT.
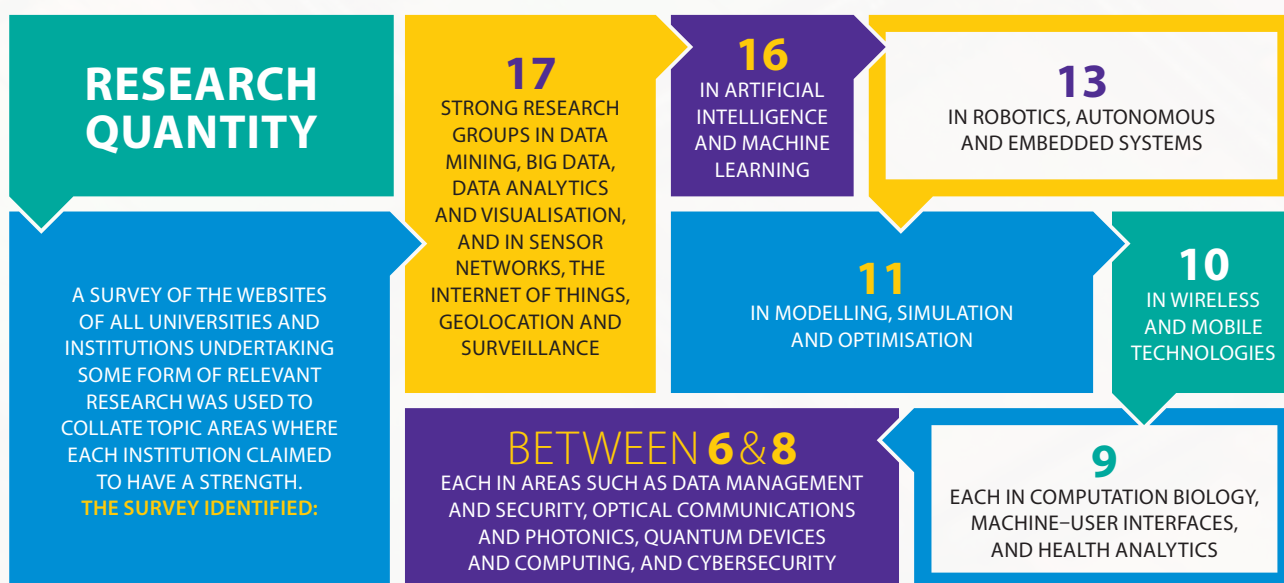
Research quality

Across all of computer science, the H-index for Australian publications is 253, and Australia ranks 9th in the world.

Australia ranked 7th in information systems, signals processing, and hardware and architecture; 8th in human–computer interactions, computer networks and communication, computer science applications, and computation theory and mathematics; and 10th or below in software, computer vision and pattern recognition, and artificial intelligence.

Research quality and quantity: a national overview

In broad terms, Australia has existing research strengths in many areas. There are significant strengths (both in quantity and quality) in:

- quantum devices and computing
- data mining, big data, data analytics and visualisation
- sensor networks, the internet of things, geolocation and surveillance
- modelling, simulation and optimisation
- wireless and mobile
- robotics, autonomy and embedded systems
- artificial intelligence and machine learning.

RESEARCH QUANTITY

A SURVEY OF THE WEBSITES OF ALL UNIVERSITIES AND INSTITUTIONS UNDERTAKING SOME FORM OF RELEVANT RESEARCH WAS USED TO COLLATE TOPIC AREAS WHERE EACH INSTITUTION CLAIMED TO HAVE A STRENGTH. THE SURVEY IDENTIFIED:

17 STRONG RESEARCH GROUPS IN DATA MINING, BIG DATA, DATA ANALYTICS AND VISUALISATION, AND IN SENSOR NETWORKS, THE INTERNET OF THINGS, GEOLOCATION AND SURVEILLANCE

16 IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

13 IN ROBOTICS, AUTONOMOUS AND EMBEDDED SYSTEMS

11 IN MODELLING, SIMULATION AND OPTIMISATION

10 IN WIRELESS AND MOBILE TECHNOLOGIES

BETWEEN **6** & **8** EACH IN AREAS SUCH AS DATA MANAGEMENT AND SECURITY, OPTICAL COMMUNICATIONS AND PHOTONICS, QUANTUM DEVICES AND COMPUTING, AND CYBERSECURITY

9 EACH IN COMPUTATION BIOLOGY, MACHINE–USER INTERFACES, AND HEALTH ANALYTICS

* As at the end of 2017