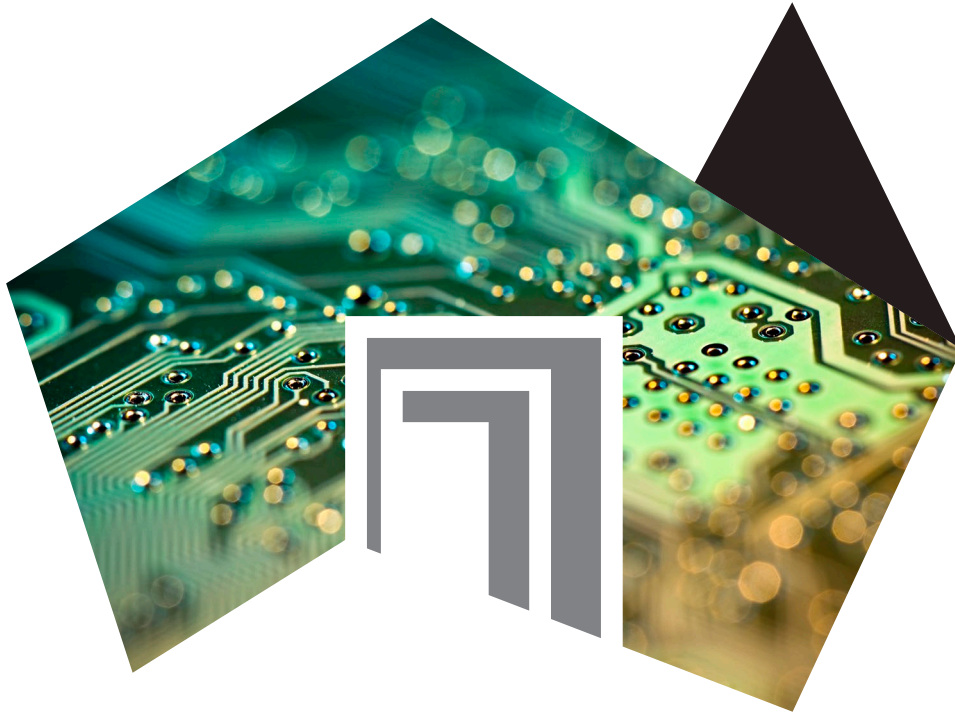


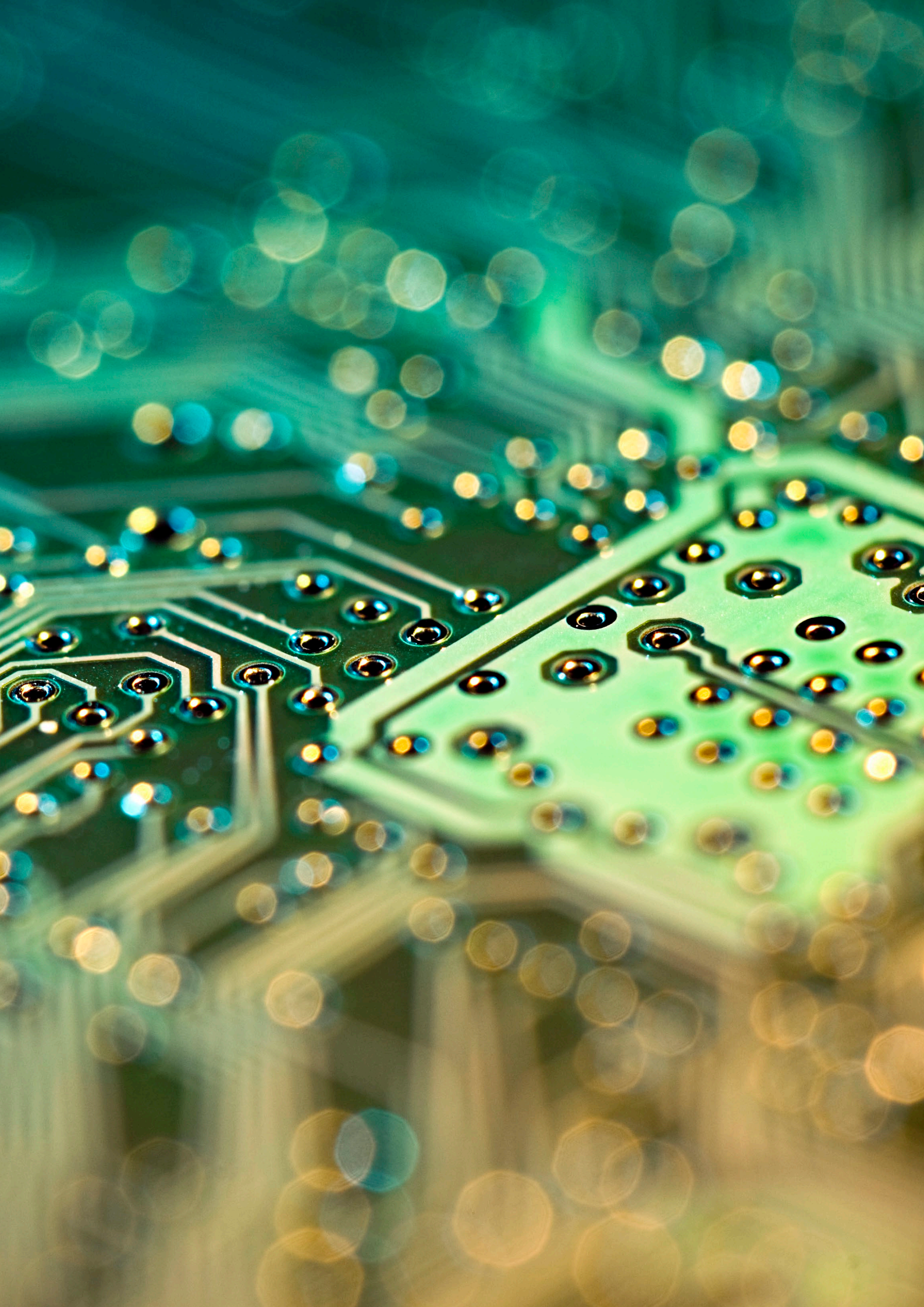
# Artificial Intelligence in South Australia



**Leveraging world-leading partnerships  
with Australian Institute for Machine Learning  
and MIT bigdata Living Lab**

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Adelaide, South Australia



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# **Contents**

<b>Executive summary</b>	<b>5</b>
<b>AI is a game changer</b>	<b>6</b>
<b>South Australia: a world-leader in AI</b>	<b>12</b>
<b>Adelaide – home of AI innovation for the world’s biggest tech companies</b>	<b>17</b>
<b>Case studies</b>	<b>22</b>
<b>Next steps – building your company’s future with Australian Institute for Machine Learning and MIT bigdata Living Lab</b>	<b>28</b>



## AI is a Game Changer

Forecast to add 14% and \$21 trillion  
to global GDP by 2030

# South Australia is a world-leader in AI



**MIT bigdata Living Lab**  
World's No. 1 data  
analytics capability



**Australian Institute for  
Machine Learning (AIML)**  
No. 2 in the world



**Adelaide is the home of  
AI innovation for the world's  
biggest tech companies**

Amazon Web Services  
Accenture  
Google Cloud

# Executive summary

## South Australia: the AI game changer

**AI is projected to add \$21 trillion to the global economy by 2030, driving the next great economic expansion.**

South Australia has world-leading capabilities in artificial intelligence and data analytics. The Australian Institute for Machine Learning (AIML) ranks in the top two globally and is Australia's largest AI capability, with over 140 researchers working with companies including BHP Billiton, Lockheed Martin, Google, Apple, BAE Systems and Roche. The Massachusetts Institute of Technology (MIT) bigdata Living Lab links South Australia to the world's number one data analytics capability, providing access to world leading secure data analysis tools and methodology to safely and securely analyse data to identify growth opportunities, improve government decision making and improve socioeconomic outcomes.

South Australia's position as a global leader in AI has attracted some of the world's most innovative and forward-thinking organisations. Amazon Web Services and Accenture have established operations in South Australia, focused on delivering AI innovation. By partnering with AIML and MIT bigdata Living Lab, these organisations will leverage innovation developed in Adelaide to further their global ambitions.

Establishing your business in South Australia provides a unique opportunity to engage with this world leading capability and evaluate emerging AI innovation. By aligning innovation with your pressures and pain points, you can leverage the opportunities opened up by AI to deliver for economies of the future.



# AI is a game changer

## What is AI

**Artificial intelligence (AI) is a collective term for computer systems that can sense their environment, think, learn, and take action in response to what they're sensing and their objectives.**

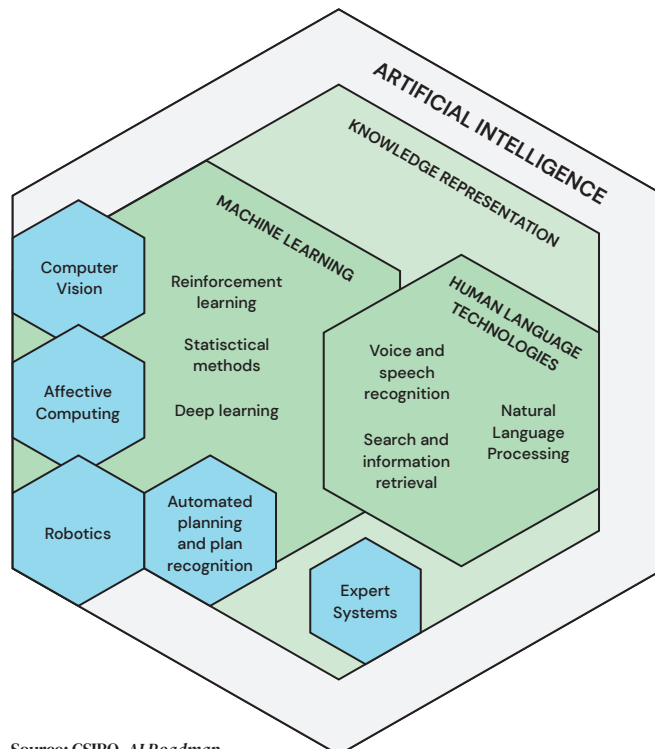
AI has the potential to be applied across almost every industry.

AI comprises of multiple subfields that include machine learning, computer vision, human language technologies, robotics, knowledge representation and other scientific fields. The transformative power of AI comes from a convergence of a collection of these subfield digital technologies.

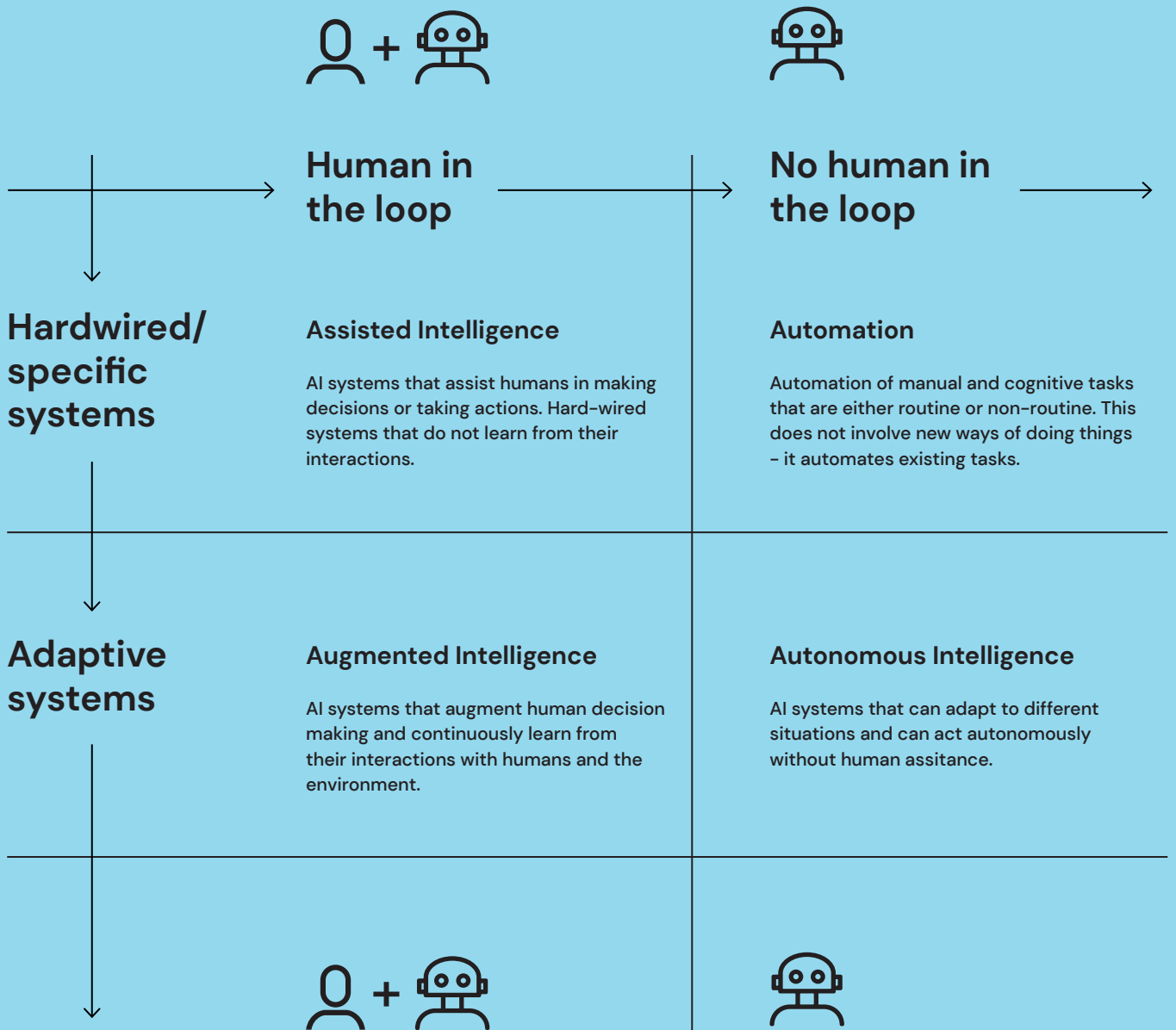
Industry is increasingly using AI applications to perform tasks and solve complex technical challenges to deliver goods and services at speed, with greater efficiency, cost effectiveness, safety and reliability.

Governments worldwide are increasingly using AI to solve challenging problems in health, welfare, safety, environment, energy, infrastructure, transport, education and other sectors.

The application of general purpose AI technologies to solve complex industry and government challenges is increasingly a global endeavour that is creating opportunities for the development of local solutions that can be scaled for global applications.



Source: CSIRO, AI Roadmap.



# Global industry overview

**PWC forecast that the accelerating development and take-up of AI will add 14 per cent to the global GDP by 2030 – the equivalent of an additional \$21 trillion (\$16 trillion USD).<sup>1</sup>**

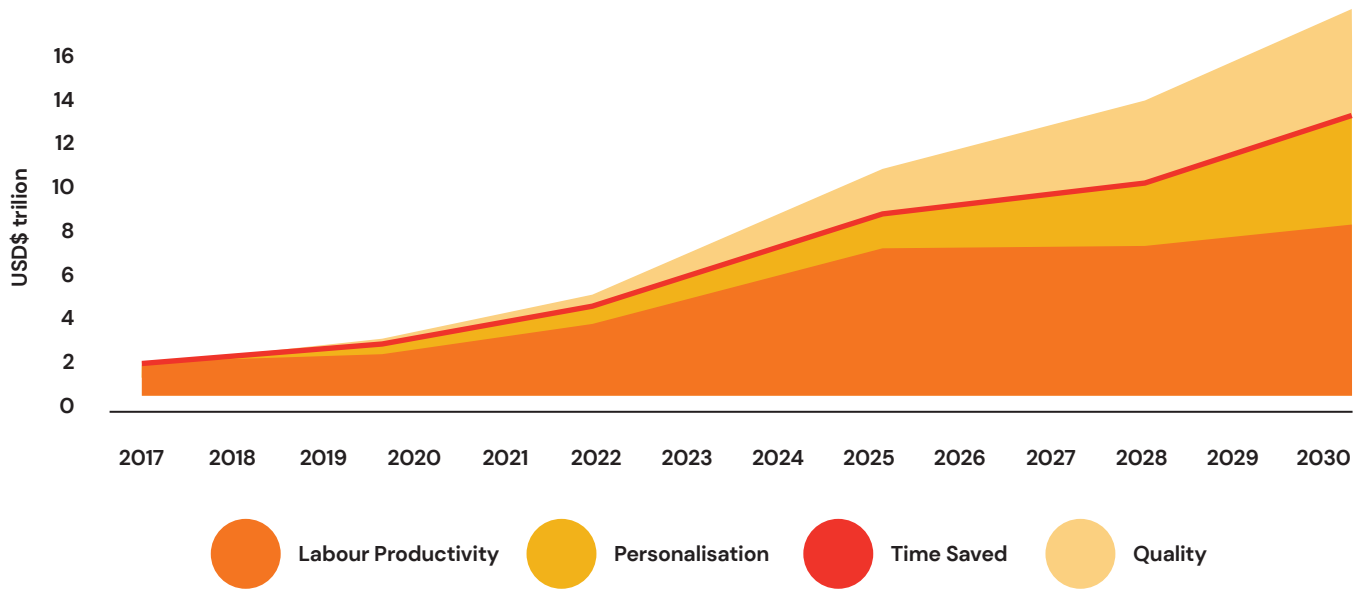
The AI journey will significantly impact productivity, competitively transforming industries, businesses and governments. Those that fail to adapt and adopt will quickly find themselves uncompetitive, risking loss of significant market share as a result of slower turnaround times and higher costs to deliver services and products.

Of the additional \$21 trillion contribution to global GDP, \$9 trillion is expected to come from productivity gains and \$12 trillion is expected to come from consumption side effects.

In the past few years, 14 of the world’s advanced economies have announced a total of \$86 billion in AI programs and activity. The majority public sector investments are being used to fund AI research and development, boost training and education, encourage industry adoption, seed start-ups and promote ethical application.<sup>2</sup>

There is a widespread view among these economies that AI will boost industry and worker productivity and assure competitive advantage in global markets.

## Global GDP impact by effect of AI



Labour productivity improvements are expected to account for over 55% of all GDP gains from AI over the period 2017 – 2030.

As new technologies are gradually adopted and consumers respond to improved products with increased demand, the share of impact from product innovation increases over time.

58% of all GDP gains in 2030 will come from consumption side impacts.

1. PWC, *Sizing the Prize*.

2. Hajkowicz SAI+, Karimi SI, Wark T1, Chen CI, Evans MI, Rens N3, Dawson DI, Charlton A2, Brennan T2, Moffatt C2, Srikumar S2, Tong KJ2 (2019) *Artificial intelligence: Solving problems, growing the economy and improving our quality of life*, CSIRO Data61, Australia.





# Australian market opportunity



**A recent report by consulting firm AlphaBeta states that the information technology sector currently contributes \$122 billion to the Australian economy employing 580,000 workers.**

The report suggests that we can boost Australia's GDP by \$207 billion/year if the Australian technology sector grows on par with global leaders.<sup>3</sup>

CSIRO's *AI Roadmap* report identifies three high potential areas for national AI specialisation that provide opportunities for companies across sectors including; natural resources and environment, health, aging and disability and cities, towns and infrastructure.

3. Hajkowicz SA1+, Karimi SI, Wark T1, Chen CI, Evans MI, Rens N3, Dawson DI, Charlton A2, Brennan T2, Moffatt C2, Srikumar S2, Tong KJ2 (2019) *Artificial intelligence: Solving problems, growing the economy and improving our quality of life*, CSIRO Data61, Australia.



## Natural resources and environment

Develops AI for enhanced natural resource management to reduce the costs and improve the productivity of agriculture, mining, fisheries, forestry and environmental management.



## Health, ageing and disability

Develops AI for health, ageing and disability to reduce costs, improve wellbeing and make quality care accessible for all Australians.



## Cities, towns and infrastructure

Develops AI for better towns, cities and infrastructure to improve the safety, efficiency, cost-effectiveness and quality of the built environment.

# South Australia: a world-leader in AI

**South Australia has world-leading capabilities in AI and is ideally positioned as this technology drives the next great economic expansion.**

The Australian Institute for Machine Learning and Massachusetts Institute of Technology (MIT) bigdata Living Lab are two of the world's leading AI and data analytics capabilities. Together they are the foundation of the state's knowledge ecosystem, generating new knowledge and technologies.

By establishing your company in South Australia, you can engage with this world-leading capability, leveraging their proximity and access to world-class knowledge, innovation and business ecosystems to deliver the economies of the future.



**Digital technologies,  
including AI, are potentially  
worth AU\$315 billion to the  
Australian economy by  
2028.**

# **MIT bigdata** **Living Lab**

**South Australia is the only Australian state to have a globally unique collaboration between Massachusetts Institute of Technology (MIT), government and business with Adelaide's MIT bigdata Living Lab – which is using data analytics to shape future planning decisions.**

The MIT bigdata Living Lab is one of only three such labs outside of the United States (the others being in Beijing and Istanbul). This collaborative research initiative is led by the South Australian Government in partnership and participation with MIT, Bank SA, Optus and DSpark.

The bigdata Living Lab uses MIT's world-leading secure data analysis tools and methodology to ensure data privacy is maintained and government, private and public organisations are able to safely and securely analyse data to identify growth opportunities, improve government decision making and improve socioeconomic outcomes.

Working with MIT bigdata Living Lab will:

- protect the community's private data through world-leading tools, methodologies and data governance
- define the right question to ask of the data to give insights that lead to better decision making and improved socioeconomic outcomes; and
- unlock greater insights by securely accessing multiple bigdata sets across government and industry without compromising privacy.



**“We identified Adelaide early on as the prime location for a Living Lab in Australia and the broader region due to its leadership in data analytics and machine learning.”**

Professor of Media, Arts and Sciences at MIT,  
Professor Alex ‘Sandy’ Pentland



## **Data governance and access**

**AI depends on large, detailed and diverse datasets. Machine learning applications often need a ‘training dataset’ which allows the algorithm to be designed, tested and improved before being applied in the real world. Access to training datasets has become one of the most critical and complex stages of AI development.**<sup>4</sup>

A large number of highly beneficial and life-saving AI applications in health, transport, law enforcement and other sectors hinge upon data governance. Globally, the development of AI technologies will depend on all parties resolving the legal, ethical and practical challenges of accessing sensitive data access.

The ethical and acceptable use of private data owned by South Australian Government agencies is a fundamental consideration when applying AI to solve problems. The gradual increase in the comprehensiveness and granularity of data held about people which, when cross-referenced to other data, provides even more detailed personal insights requires that people’s private and confidential information is properly protected and managed.<sup>5</sup>

The state’s partnership with the MIT bigdata Living Lab provides access to the world’s leading secure data analysis tools. The MIT bigdata Living Lab offer a unique solution for interrogating data to provide insight without sharing the actual data itself. This process uses an API that ensures data is never extracted or transferred externally from an organisation’s database and that the data is deidentified when it is interrogated. This unique partnership with the MIT bigdata Living Lab make the South Australian Government an ideal partner for companies looking to leverage the insights gained from the state’s big data sets.

4. Hajkowicz SAI+, Karimi SI, Wark TI, Chen CI, Evans MI, Rens N3, Dawson DI, Charlton A2, Brennan T2, Moffatt C2, Srikumar S2, Tong KJ2 (2019) *Artificial intelligence: Solving problems, growing the economy and improving our quality of life*, CSIRO Data61, Australia.

5. Ibid.

# Australian Institute for Machine Learning



The South Australian Government has co-invested with the University of Adelaide to create the Australian Institute for Machine Learning (AIML). Established in early 2018, AIML is the largest AI facility in Australia, with over 140 researchers working with companies including BHP Billiton, Lockheed Martin, Google, Apple, BAE Systems and Roche. AIML is a key anchor tenant of Lot Fourteen.

AIML ranks in the top two worldwide in computer vision and has world-class expertise in the methods that support this, AI, computer vision and deep learning.

The institute is led by Professor Simon Lucey, who was previously Principal Scientist at Argo AI – a \$1 billion start-up company that builds self-driving cars.

With its high-quality research staff, AIML has grown to be one of the best AI and Machine Learning research groups in the world focussed on:

- collaborating with world-leading companies and government, to develop hi-tech products and solutions
- carrying out world-leading research in one of the most competitive fields globally
- providing a focus for innovation in South Australia; and
- creating demand for, and developing world class technological skills in South Australia.

AIML is globally recognised as:

- the largest Machine Learning Group in Australia (140+ researchers and students)
- second in the world for computer vision
- first in Visual Question Answering Challenge 2.0
- first in the world in retinal image segmentation; and
- first in the world in cityscapes, a key driverless car benchmark.



## Bringing AI innovations from the research lab to the world

South Australia is growing its established and emerging innovation and business ecosystems to optimise the benefits of the Intellectual Property (IP) emerging from our knowledge ecosystems. Together these ecosystems are exploring and developing practical applications for the emergent IP and commercialisation opportunities.

Development and commercialisation of IP is supported by MIT bigdata Living Lab, AIML's numerous industry and research partners and start-up incubator Stone & Chalk. Stone & Chalk is co-located at Lot Fourteen and partners with experts, universities, investors, mentors, corporates and government organisations to bring the best of what is available externally to complement its own internal capabilities in meeting the commercialisation needs of startups and the growth needs of scaleups.

**Stone & Chalk is the largest dedicated startup and scaleup innovation community in Australia with hubs also in Sydney and Melbourne.**

Adelaide's Stone & Chalk is home to 130+ entrepreneurs across all emerging tech industries with a focus on cleantech, space, machine learning, artificial intelligence and defence.





# **Adelaide – home of AI innovation for the world’s biggest tech companies**



**The world’s largest technology companies have established AI-focused innovation hubs in Adelaide. Amazon Web Services and Accenture recognise that their future success is directly linked to their ability to deliver on the potential of AI.**

These organisations are aligning their strategy for the next decade on the ability to deliver AI-focused projects and have selected Adelaide as the best location to unlock and deliver on this potential.

## Amazon Web Services

**Amazon, one of the world's leading technology companies, is expanding its presence in Adelaide and aims to create more than 50 jobs in South Australia over the next three years.**

Teams growing at Amazon's Adelaide office will include Amazon Web Services (AWS), Amazon's cloud computing subsidiary, and Amazon Sciences, a team carrying out world-leading artificial intelligence (AI) and machine learning (ML) research. With plans to be based at Lot Fourteen, Amazon aims to expand its innovation programs in the city and create more than 50 jobs by 2024.

AWS teams will provide support and cloud enablement to local businesses and government agencies to assist with their digital transformation journeys and assist local businesses to become more competitive on the global stage.

The Amazon Science team will conduct new research programs to improve the customer experience for AWS customers.



**"The decision by Amazon to invest here is proof that South Australia is a major drawcard to international companies across hi-tech and high-growth sectors."**

Hon Steven Marshall MP, Premier

## Accenture

**The global technology consultancy leader has selected Adelaide as the home for a new technology hub. Envisioned as the engine room that powers innovation for the APAC region, this new facility will employ 2000 staff and focus on the design and development of Intelligent Operations capabilities utilising artificial intelligence and analytics.**

With a massive innovation portfolio of more than 7,400 patents, Accenture's global team of R&D technologists work to prototype and deliver breakthrough ideas that generate new sources of competitive advantage and drive strategic impact for both clients and the company.

Accenture recognised that establishing a hub in South Australia presents a unique opportunity to further expand the organisation's innovation portfolio by leveraging the state's world-class capabilities around AI and data analytics.

South Australia has the knowledge, research, skills, ability to scale and collaborations to further expand the company's ability to unlock game changing value and drive opportunities in the hi-tech sectors, including defence, space, education and health.

Accenture is committed to working in partnership with the state, it's educational institutions and the business community.

The hub will enhance the company's existing operations in Melbourne, Sydney, Perth and Canberra.

Establishing this hub in Adelaide confirms South Australia's unique ability to unlock significant value for international organisations across hi-tech and high-growth sectors.



**“Our goal is for South Australia to become the engine room of Accenture’s innovation architecture in the country.”**

Bob Easton, Accenture,  
Chairman and Senior Managing Director

## Google Cloud

### Google has established a presence in South Australia.

The state's outstanding hi-tech ecosystem, made Google's decision to deliver data analytics and artificial intelligence innovation here an easy one, particularly given the well-known names already operating in the state. These include the MIT bigdata Living Lab, AIML, and the Australian Cyber Security Collaboration Centre, all of which call Lot Fourteen home.

Google has selected Adelaide as a centre for innovation, attracted by the combination of the city's hi-tech capabilities and world leading data ecosystem.



**"I am very excited to be part of this new chapter in the technology industry here in South Australia. Google and more broadly, parent company, the Alphabet Group, is one of the most innovative companies on the planet, and I am looking forward to building an ecosystem that takes advantage of South Australia's innovation and leadership in defence, cyber, health, manufacturing and AI capabilities."**

Mike Duhne, Google,  
General Manager Public Sector South Australia



# Case studies



## Condition Assessment and Risk Management System

**The Condition Assessment and Risk Management System (CARMS) was created through collaboration between the Australian Institute for Machine Learning and the Department of Primary Industries and Regions South Australia (PIRSA).**

CARMS uses satellite remote sensing and geospatial data, Geographic Information Systems and advanced data analysis, to create annual reports on vegetation cover for all 323 pastoral leases, within the context of rainfall trends and vegetation cover over the past 20 years.

These reports are used by PIRSA staff to support land condition assessments and compliance decision-making, and to assist planning on-ground assessments.

## Mission-directed research

**A mission-directed approach to technology development aims to identify and solve state problems and challenges. Mission-directed research designs could be used to concentrate AI capabilities while building industries that export the solutions globally.**

## LBT Innovations

LBT Innovations is a groundbreaking designer of advanced technology solutions for the medical industry. The company's core capabilities include artificial intelligence, image analysis and software engineering solutions that improve medical diagnostic workflows.

LBT Innovations first technology was an automated culture plate streaking system called MicroStreak. It was brought to market as the PREVI® Isola and initiated a new era in automation for clinical laboratories.

Following its success, the company partnered with AIML to develop the Automated Plate Assessment System (APAS®). This technology performs automated image capture, analysis and interpretation of culture plates delivering efficiencies to the microbiology workflow. In 2016 it became the first artificial intelligence diagnostic medical device to achieve FDA Class II clearance and is now being commercialised globally.



## Presagen – world leader in using AI to improve IVF outcomes

Presagen is an AI-focused health technology company that develops medical imaging software for specific diagnostic problems, which can then be delivered at scale and at low cost.

Presagen's flagship product, Life Whisperer, offers new hope to IVF patients, promising to improve pregnancy rates with a cloud-based AI system. Developed in South Australia, the system is trained on over 20,000 globally-sourced 2D embryo images; a powerful basis for the Life Whisperer AI to quickly identify features invisible to the human eye.

Clinics around the world use Life Whisperer to identify the most viable embryos to focus on for their patients. With greater IVF certainty, more people can attempt IVF to build their family.





Photo credit: Compagnie Carabosse

## Peak and the South Australian Tourism Commission

Peak, a startup founded by members of Sandpit, a studio that combines physical design and technology for visitors and audiences across the cultural sector, is collaborating with the South Australian Tourism Commission (SATC) to develop a proof of concept application that captures the visitor journey of festival goers.

Working with MIT bigdata Living Lab, SATC and Illuminate Adelaide festival, Peak is proofing their digital application, also called Peak, to better understand customer behaviour, expenditure patterns and the ultimate return on destination marketing spend.

Through a collaboration with MIT bigdata Living Lab and their technology partner DSPARK, Peak is accessing and analysing the mobility and financial data sets captured in and around the Illuminate Adelaide festival to gain insights into the movement and behaviour of event visitors.


It is anticipated that the learnings gained will provide thorough insights into visitors' behaviour and create predicative algorithms that can be further developed, scaled and commercialised globally for destination marketing of large events.

**"We've been working with Peak and MIT bigdata Living Lab on the development of a prototype to better measure the impact of our marketing activity on tourism visitation and expenditure in South Australia.**

**In particular, we are looking at ways to link a person's exposure to SATC digital advertising to their subsequent movements in order to better quantify the impacts of our destination marketing activity. If a cost effective functional model could be developed, it would be of great use, not only to SATC, but to destination marketing organisations worldwide."**

**Brent Hill, Executive Director of Marketing,  
South Australian Tourism Commission**





**“The proof of concept hinges on accessing and analysing financial and mobility big data sets. The opportunity to collaborate with MIT bigdata Living Lab, SATC and partner with Illuminate Adelaide festival is game changing.**

**Peak has the potential to revolutionise global destination marketing, improve visitor experience, provide predictive behaviour insights and useful metrics on returns on marketing spend. Peak would not be possible without MIT bigdata Living Lab.”**

Sam Haren, Co-Founder,  
Peak



## Re-designing service delivery through business and knowledge ecosystems

Ecosystem strategies map and model the entire network of institutions, resources and/or individuals relevant to achieving a department's business objectives. They look beyond organisational and/or jurisdictional boundaries to the flow of ideas and resources.

They are an effective approach for the AI enablement of businesses and institutions based in South Australia given that our AI capability is distributed across multiple public and private sector institutions, research organisations and diverse geographic locations. There is also considerable connectivity with overseas research capability.

### SA Health

Partnering with MIT bigdata Living Lab, SA Health has initiated a project that leverages Adelaide's AI ecosystem to improve capacity planning for the South Australian hospital network.

**"The Office of the Chief Medical Information Office, SA Health is developing innovative solutions to help clinicians access and use clinical data to improve patient care and patient outcomes.**

**By partnering with MIT bigdata Living Lab we are working to introduce groundbreaking protocols that protect the community's data while linking clinical data with broader community trends to generate insights that can transform care across the entire health service.**

**This project promises to revolutionise how we think about health treatment in South Australia, enhancing preventative care, while focusing resources."**

**Dr Santosh Verghese, Chief Medical Information Officer, SA Health**



## Natural Resource Management

Within the environmental management sphere, improved weather and climate forecasting systems which use machine learning and data science approaches could more accurately predict temporal and spatial weather patterns.

AI will also allow enhanced systems for monitoring the condition of biodiversity and ecological assets and robotic systems for predicting, detecting and physically managing threats.

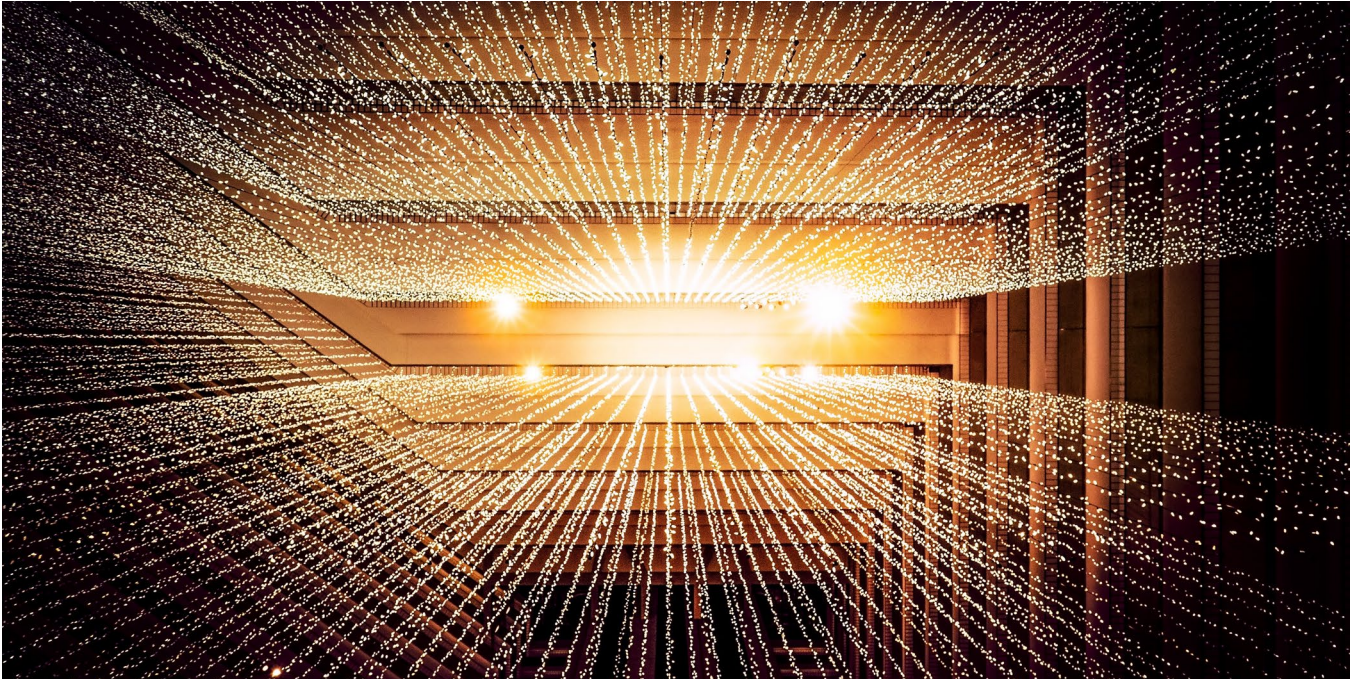
## Reducing environmental impact of human activity

The use of AI in environment protection also includes:

- monitoring water and energy consumption
- reducing the wastage of water and electricity consumption when not required
- reducing waste generation
- reducing carbon footprint; and
- water management in irrigation.



# Next steps – building your company's future from South Australia



## Take the first step to realising the potential

### What a partnership with AIML and MIT bigdata Living Lab means for you

**1**

Evaluate emerging technological developments and competitive pressures, how quickly they will arrive, and how you will respond.

**2**

Identify the operational pain points that automation and other AI techniques could address, what opportunities are opened up by the AI that's available now, what's coming up on the horizon and what a partnership with AIML and MIT bigdata Living Lab will do for you.

**3**

Contact Stuart Davis at DTI at [Stuart.Davis@sa.gov.au](mailto:Stuart.Davis@sa.gov.au) or on +61 (8) 303 2232 to explore how AI can benefit you.

**To make the most effective use of this technology, it's important to instil a data-driven culture that blends intuition and analytical insights with a focus on practical and actionable decisions across all levels.**

Source: PWC – *Sizing the Prize*.



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## Please contact our team to explore how AI can benefit you.

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