The robotics and automation advantage for Queensland

How the state can harness the benefits and adapt its workforce to the new robot economy

ROBOTICS & AUTOMATION IN QUEENSLAND

1.1 million reasons to embrace it. **Fast!**

In the coming decade, the new robot economy has the potential to transform Queensland industry, productivity and quality of life in ways not before imagined. In the best-case scenario, Queensland stands to reap the benefits of **more than 1.1 million new jobs**, equating to an **$117.5 billion boost to Gross State Product (GSP)**. This is dependent on a high striker approach of 'managed' *rapid uptake* (2% pa growth of GSP attributable to robotics and automation), backed by the full weight of *government and private sector support.*

Bottom line: the faster Queensland embraces robotics and automation, the greater the benefits to GSP and net job creation. Importantly, the more rapid the growth, the greater wealth (income) effects and capacity for new technology to alter rather than replace jobs. What's more, in Queensland, where small- to medium-sized enterprises (SMEs) comprise 97.4% of the economy, another positive knock-on effect of rapid growth is falling cost and wider affordability of robotics and automated systems.

private enterprise working with government

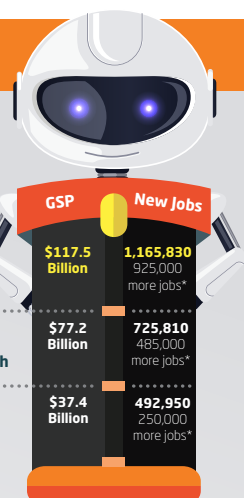(re-training and redeployment), = better growth and economic benefit

▲ *A high striker approach to rapid uptake of robotics & automation*

	GSP	New Jobs
Optimistic 2% / annum growth	$117.5 Billion	1,165,830 925,000 more jobs*
Very Likely 1.5% / annum growth	$77.2 Billion	725,810 485,000 more jobs*
Conservative 1% / annum growth	$37.4 Billion	492,950 250,000 more jobs*

* than previous 10 years

Future work will fall into one of **three** categories

① People who work FOR machines

② People who work WITH machines

③ People who work ON machines

Red what will end as a result of automation

An end to boring, repetitive and often dangerous work

Amber what needs to be done to ensure best results

Need for government and industry to work together

Managed introduction of automation, re-training and re-deployment

Focus on distribution of created wealth to ensure social acceptance of automation

Green positive results of automation

Big productivity gains, job creation, emergence of new and more satisfying jobs, reshoring of former Queensland-based companies
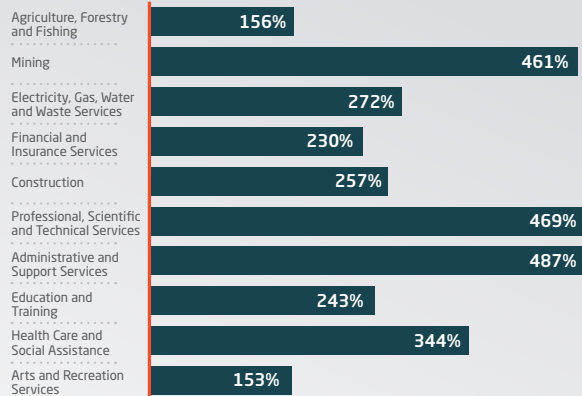
Advances in health and well-being

Greater automation = cheaper robots/ systems + access to SMEs (97.4% of Queensland's economy), helping them become or remain competitive
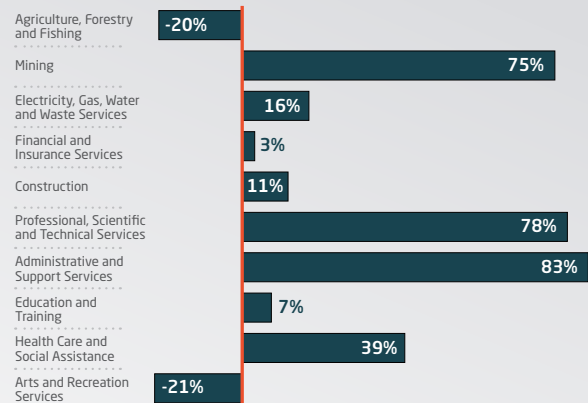
The industries that will benefit from automation and robotics

Queensland's economy is strongly diversified, and, in common with many advanced economies, a shift to service industries — ripe to harvest the benefits of a new robot economy — has been underway for many years. While mining and agriculture continue to be the headline in any analysis of the state's economy, others are increasingly vying for the top spot. Between 1999 and 2017 Queensland's GSP grew from $93,144 million to $298,254 million.

Top industry growth from 1999-2017

Industry	Growth
Agriculture, Forestry and Fishing	156%
Mining	461%
Electricity, Gas, Water and Waste Services	272%
Financial and Insurance Services	230%
Construction	257%
Professional, Scientific and Technical Services	469%
Administrative and Support Services	487%
Education and Training	243%
Health Care and Social Assistance	344%
Arts and Recreation Services	153%

Top industry change in relative share

Industry	Change
Agriculture, Forestry and Fishing	-20%
Mining	75%
Electricity, Gas, Water and Waste Services	16%
Financial and Insurance Services	3%
Construction	11%
Professional, Scientific and Technical Services	78%
Administrative and Support Services	83%
Education and Training	7%
Health Care and Social Assistance	39%
Arts and Recreation Services	-21%

In the short term, Queensland's comparative advantage in the introduction of automation and robotics lies in mining, agriculture, as well as food technology, hospitality, and tourism related activities.

In the medium to longer term, opportunities exist in small to medium enterprises using light robotics in manufacturing and tapping into the Asian value chain.

Queensland's challenge: in order to remain competitive globally and maintain living standards, the state's development of a vibrant technological ecosystem, buoyed by accelerated growth of robotics and automation across all industries, should be driven by:

Appropriate technical advice - especially to small and medium sized industries concerning the optimum time for the introduction and management of the automation process and creating the required ecosystems.

The development of adequate funding sources (including seed funding) for technical development.

Developing a skilled workforce capable of making best use of available technologies.

Developing industry specific readjustment packages to cope with any short-term dislocations.

Providing adequate educational and information services to demonstrate the value of automation and robotics and its wealth generating potential.

LESSONS FROM HISTORY

Since the first industrial revolution, continual change due to technological development has been a defining feature of advanced economies.

Some of these changes are incremental and result from learning effects over time, while others are transformational and result in new industrial paradigms.

The continual change has given us unprecedented improvements in quality of life by the applied use of technology through such things as food production, electric lighting, telephones, electric appliances, transportation, refrigeration, clean water, sewerage systems and medicines.

Today, we are in the middle of another revolution; one that has the capacity to change how we live and work.

The revolution is defined by the convergence of a number of remarkable technologies: innovative software, novel materials, more dexterous robots, new processes (such as 3D printing) and a whole range of web-based services. These changes are blurring the lines between manufacturing and services in a way that would have been hard to imagine even 10 years ago.

First industrial revolution
18th to 19th century
Agrarian, rural societies became industrial and urban.
Industries: Iron | Textiles
Technologies: Steam engine

Second industrial revolution
19th to early 20th century
Growth of existing industries.
Industries: steel | oil | electricity
Technologies: mass production | telephone | electricity | internal combustion engine

Third industrial revolution
1980s - present
Advancement from analogue and mechanical devices to digital technology, and automation.
Industries: information
Technologies: personal computer | automation | internet | information and communications technology (ICT)

Fourth industrial revolution
Present
Technology becomes pervasive in industry and society as a whole.
Industries: all
Technologies: robotics | materials | artificial intelligence | nanotechnology | biotechnology | 3D printing

What happens if Queensland doesn't automate?

The cost of not automating adds up to **at least AU$37.4 Billion in lost GSP, and 492,950 jobs over the next 10 years.**

Globally, Queensland is under-developed in terms of automation and robotics. This is due to the state's lack of heavy manufacturing, such as ship and car building; industries among the first to embrace automation.

Queensland, however, is recognised as a global leader in robotics research and development and, in 2017, was placed second nationally as home to the most tech start-ups. In 2014, the Australian Government announced the creation of the world-first Australian Centre for Robotic Vision, headquartered in Brisbane at QUT. The Centre stakes its claim as the largest expert research body of its kind on the planet, comprising more than 200 researchers from across Australia and the world. In June 2018, it released Australia's first Robotics Roadmap, showing how the so-called fourth industrial revolution, characterised by automation and increased use of robots (at home and in the workplace), will not replace but create jobs, with potential to boost Australia's productivity by $2.2 trillion over the next 15 years.
Visit: www.roboticvision.org/robotics-roadmap/

Queensland is in a box seat to capitalise on the benefits of robotics and automation. By contrast, the cost of not embracing technological change is significant:

Not automating
represents costs of at least
AU$37.4 billion
and
492,950 jobs
over the next ten years.

- Initial impact on traded goods and services sector.
- A loss in competitiveness and decline in the terms of trade.
- Lower productivity growth.
- Increased imports, particularly competing imports.
- Reduced growth and job opportunities / Loss of tax revenue base / Reduced government services.

The risks to Queensland of automating

With every opportunity comes risk. In Queensland, as with every other economy, the main risk lies in the impact on employment.
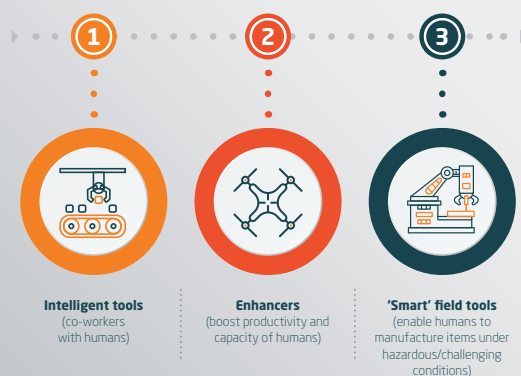
Over the past two decades (1999 to 2018), the Queensland economy has undergone significant structural change in both industrial and occupational employment patterns, some of which resulted from technological developments.

Globally, automation has also been shown to improve workplace morale, flowing from better job mix and new, more creative and higher-skilled jobs. Workplace change is characterised not so much by people changing jobs, but changing the way they work in a job.

Despite the speed of structural change, Queensland added 790,000 new jobs (a 50% increase), and a 89.1% increase in real Gross State Product (GSP). This shows that the State has the capacity to absorb, and benefit from rapid change.

It is inevitable that automation will have an impact on some jobs in the short term, but this dislocation will be outweighed by employment gains in other areas. Automation will not displace occupations on a large scale, but change the existing job mix and create new and, arguably, more satisfying jobs (minus the dull / dangerous / dirty tasks).

3 ways robots can be integrated into Queensland workplaces

1

Intelligent tools
(co-workers with humans)

2

Enhancers
(boost productivity and capacity of humans)

3

'Smart' field tools
(enable humans to manufacture items under hazardous/challenging conditions)

Robotics and automation is all about enhancing human life.

A vibrant robot economy will help maintain living standards; safeguard the environment; provide services to remote communities; reduce healthcare costs; create safer and more fulfilling jobs; encourage investment; and reshore jobs back to Queensland.