

Disruption from Robots:

Insights from a Robotics Roadmap for Australia

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Chief Operating Officer



Australia isn't using robots

Australia currently lags global leaders in Automation



Australia's labour productivity has grown annually by **1.8%** (5 years to 2015-16)

It needs to be **2.5%** to maintain our standard of living

83 robots per **10,000** employees
Korea = 631
world average = 74

Australia ranks **18th** in industrial robots

International Federation of Robotics (2017) World Industrial Robot Market report. Productivity Commission 2017, Productivity and Income – The Australian Story, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 1, Canberra.



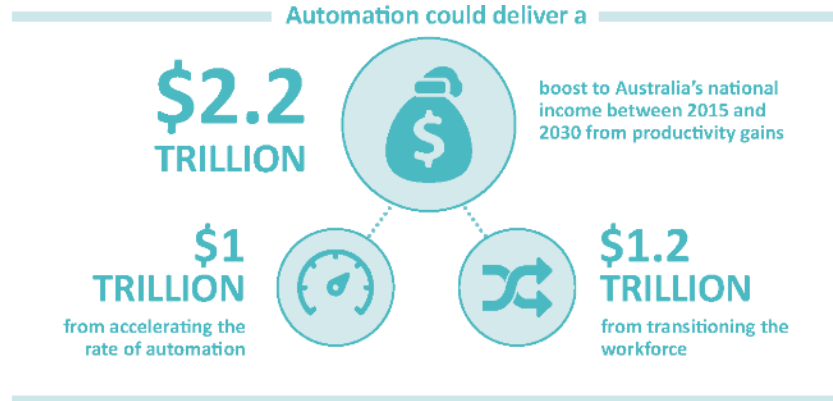
Despite productivity benefits

Robot driven productivity
10% GDP growth
over **14 years**

58% of CEOs
intend to **reduce headcount**
over the next **5 years** due to
robotics

94% of CEOs
say robotics has
increased productivity
in their business

By **2025**,
automation in
manufacturing could
increase employment
by **6%**



AlphaBeta, 2017, *The Automation Advantage*
PwC CEO pulse: *Pulse on robotics*

A range of other benefits



Creation of
new jobs

67% of CEOs agree
robotics will create
new & exciting
opportunities for
their employees by
automating
repetitive tasks

SAFER



Workplace injuries
will fall by 11% as
dangerous manual
tasks are automated

64% of CEOs think
robotics will bring
new innovation to
their business models
and increase
revenue per
employee



Reshoring of jobs
and companies
back to Queensland

MORE
SATISFYING



62% of low-skilled
workers will
experience improved
satisfaction

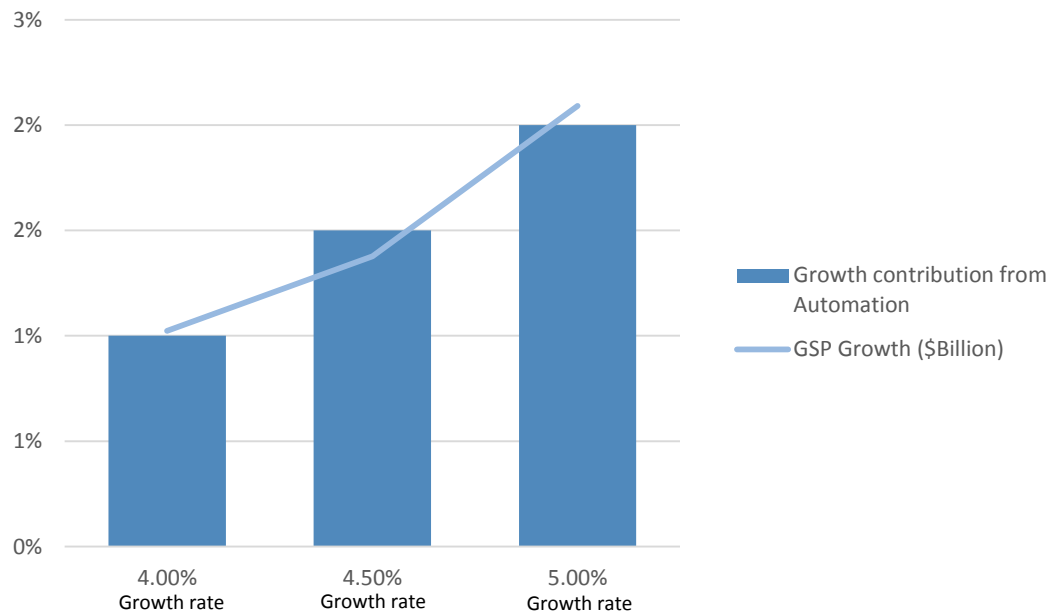
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And the need to move quickly

The faster Queensland adopts robots and automation the greater the benefits in GSP and net job creation

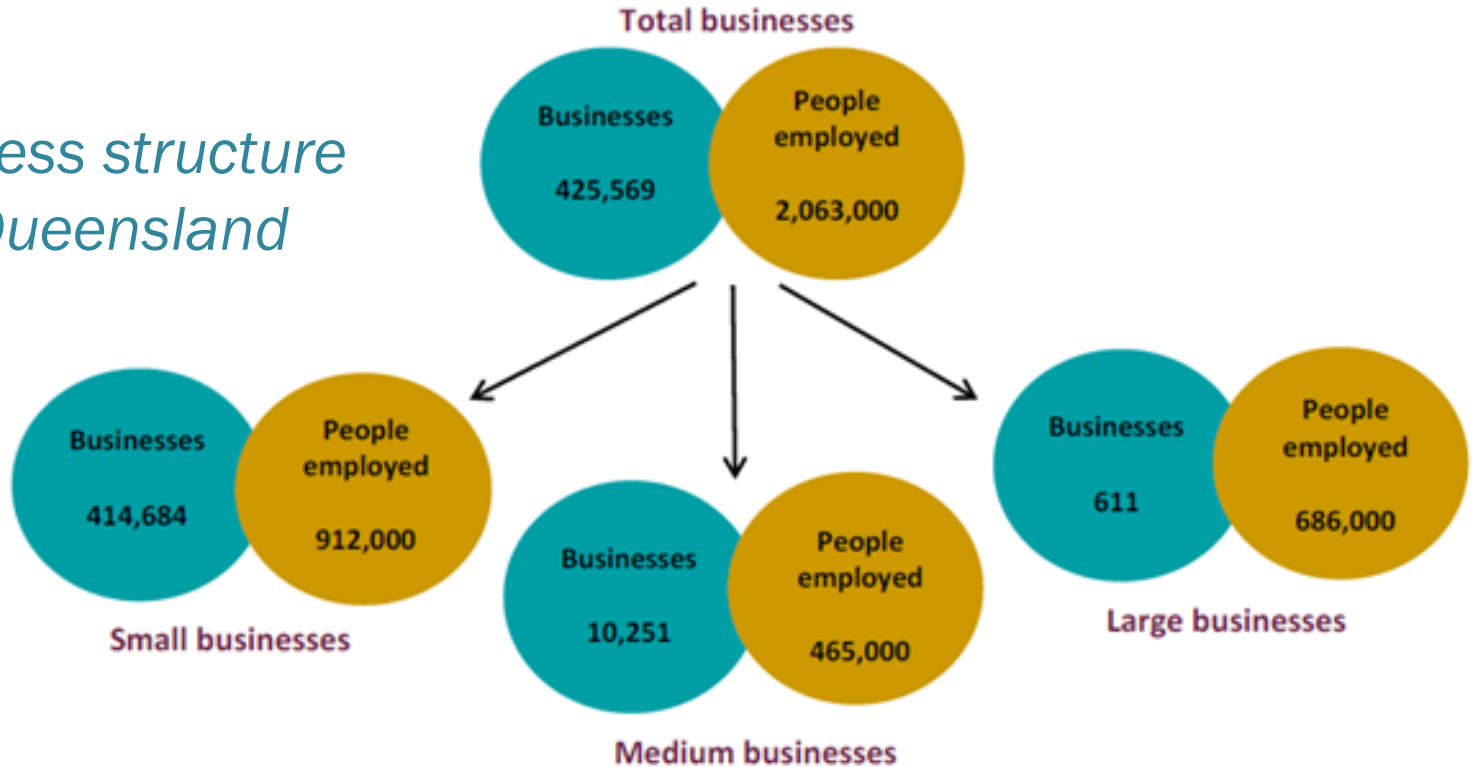
Additional Growth Contribution from Automation (%) and GSP Growth (\$Billion)



Synergies, 2018, The Robotics and Automation Advantage for Queensland

To overcome the challenge of size

Business structure in Queensland



Synergies, 2018, *The Robotics and Automation Advantage for Queensland*



And meet the expectations of consumers



25% think **robotics** will have a **negative** impact on society

58% think **robotics** will have a **positive** impact on society

**PwC CEO pulse: Pulse on robotics*

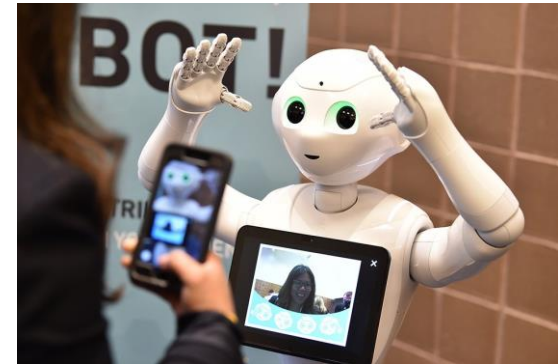


but beware of unexpected impacts

Robotics will increasingly be applied to office functions.

In 5 years **63%** of global manufacturers plan to adopt robotics in **IT, Customer Service and Sales.**

Retail





Robots have gained traction in some sectors – but at different rates

Maturing



Industrial manufacturing



Transportation and logistics

Gaining Acceptance



Doctor; healthcare; medical



Military / Security



Unmanned aerial vehicle / drone

Experimenting for differentiation



Retail and consumer



Energy and mining



Agriculture; Food Production



Engineering and construction

Exploring



Power and utilities



Hospitality and leisure



And industries are being transformed

Resources

Logistics



Asset Inspection

Manufacturing



Security





But at different rates

Construction



Transport



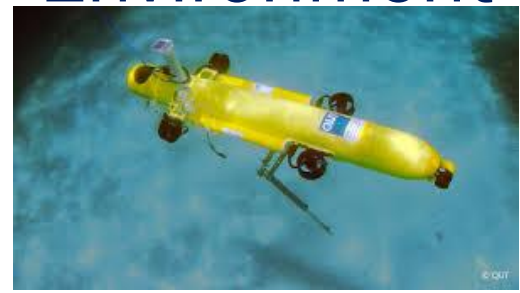
Healthcare



Agriculture



Environment

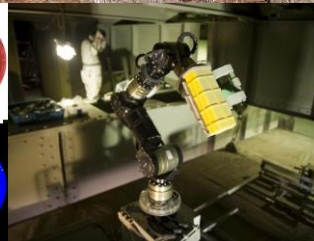
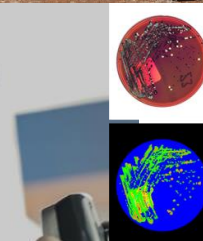
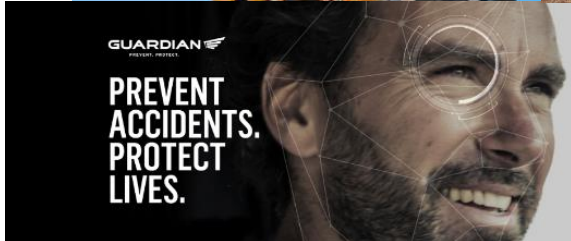


Retail





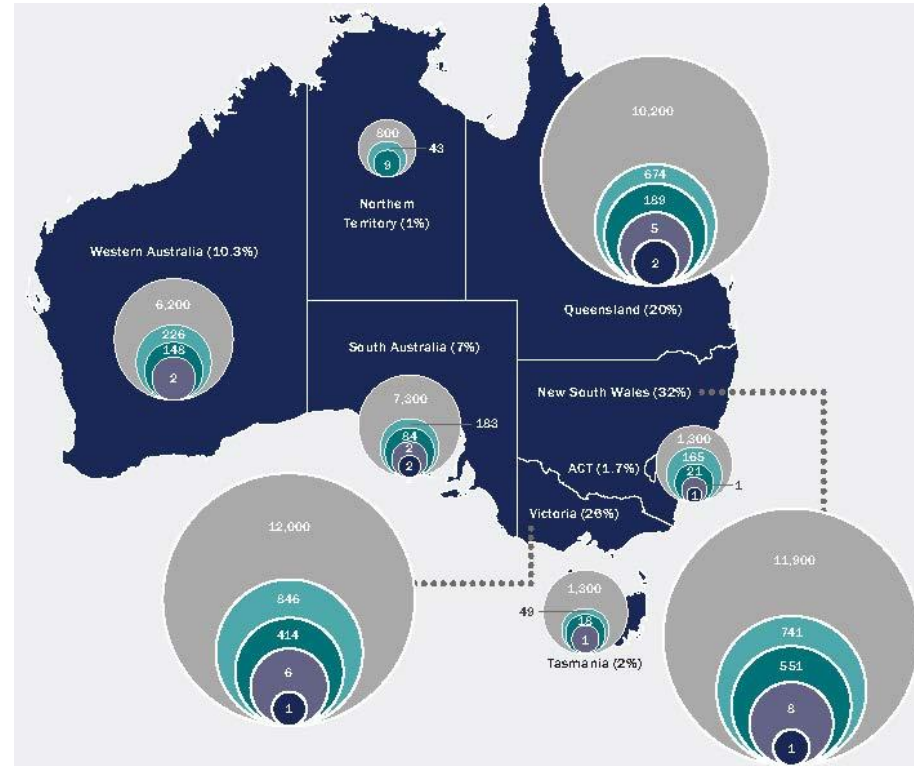
Australian companies



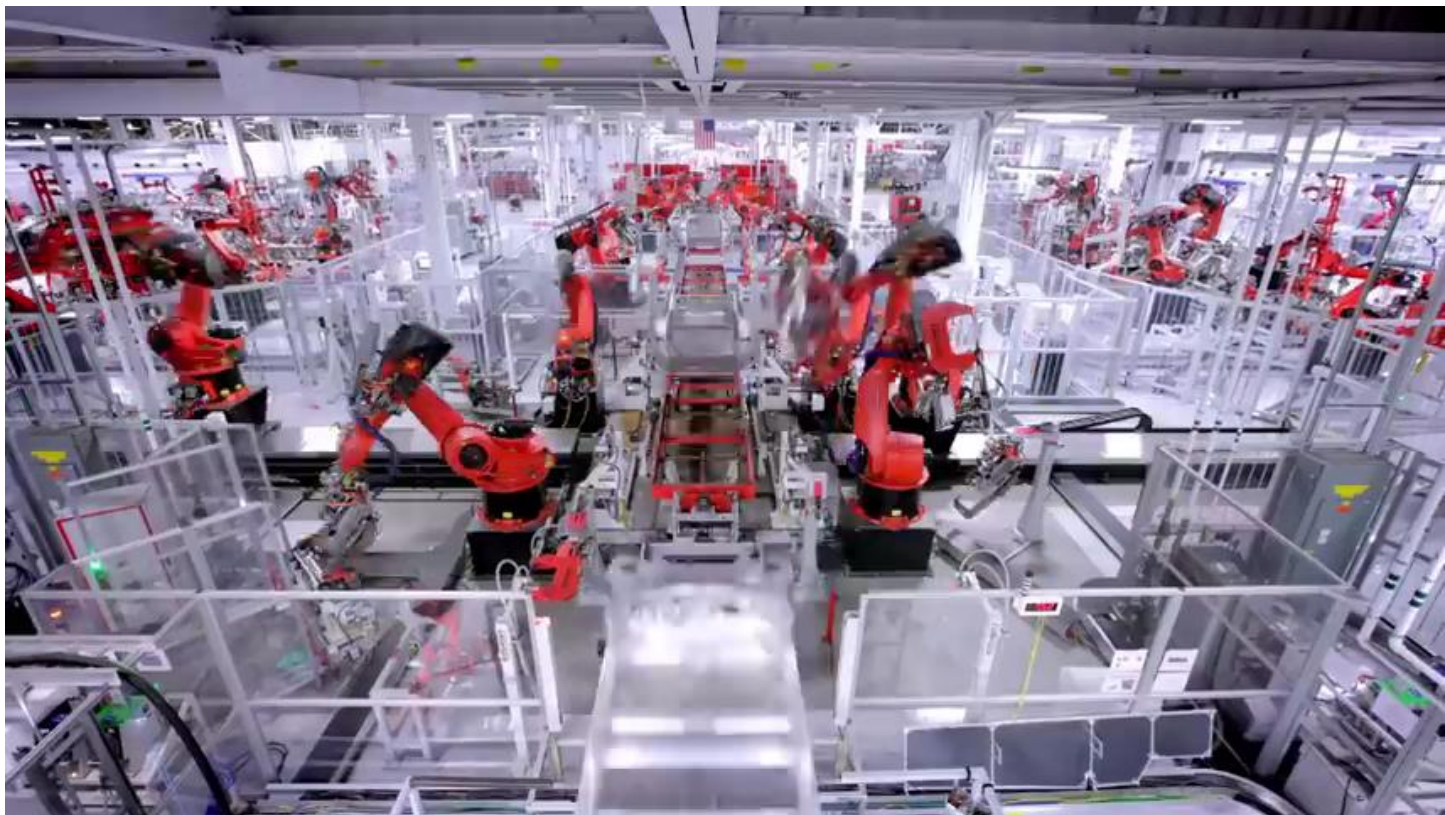


The Robotics Industry in Australia

>1,100 companies
>50,000 employees
>\$12b revenue

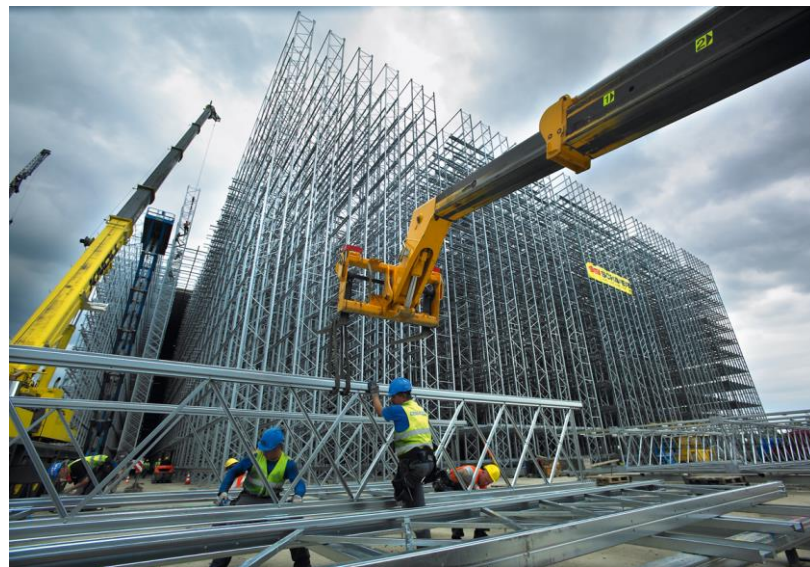


So where are all the robots?





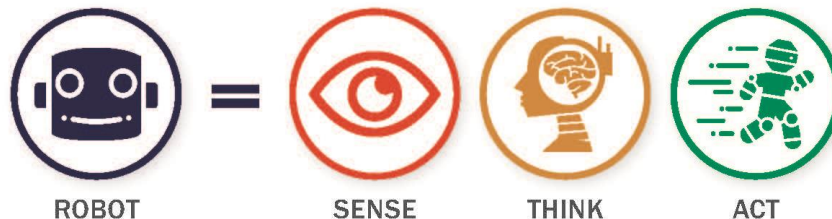
Robots are still not commonly applied in unstructured environments



Because they can't see, which is why Robotic Vision is important

Creating robots that see and understand their environment, that can work safely with people, to benefit society.

What is a robot?



- Vision is our most impressive sense
 - We can see close and far
 - We make many measurements per second
 - We see shape, texture, colour & movement
- Cameras are
 - lightweight, ubiquitous, low-power, cheap





So we have an ARC CoE in Robotic Vision

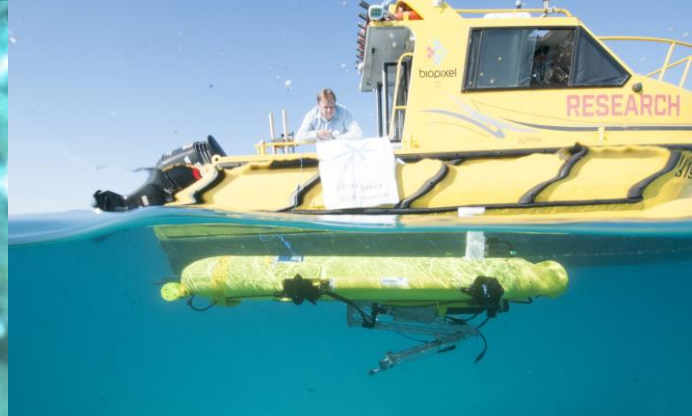
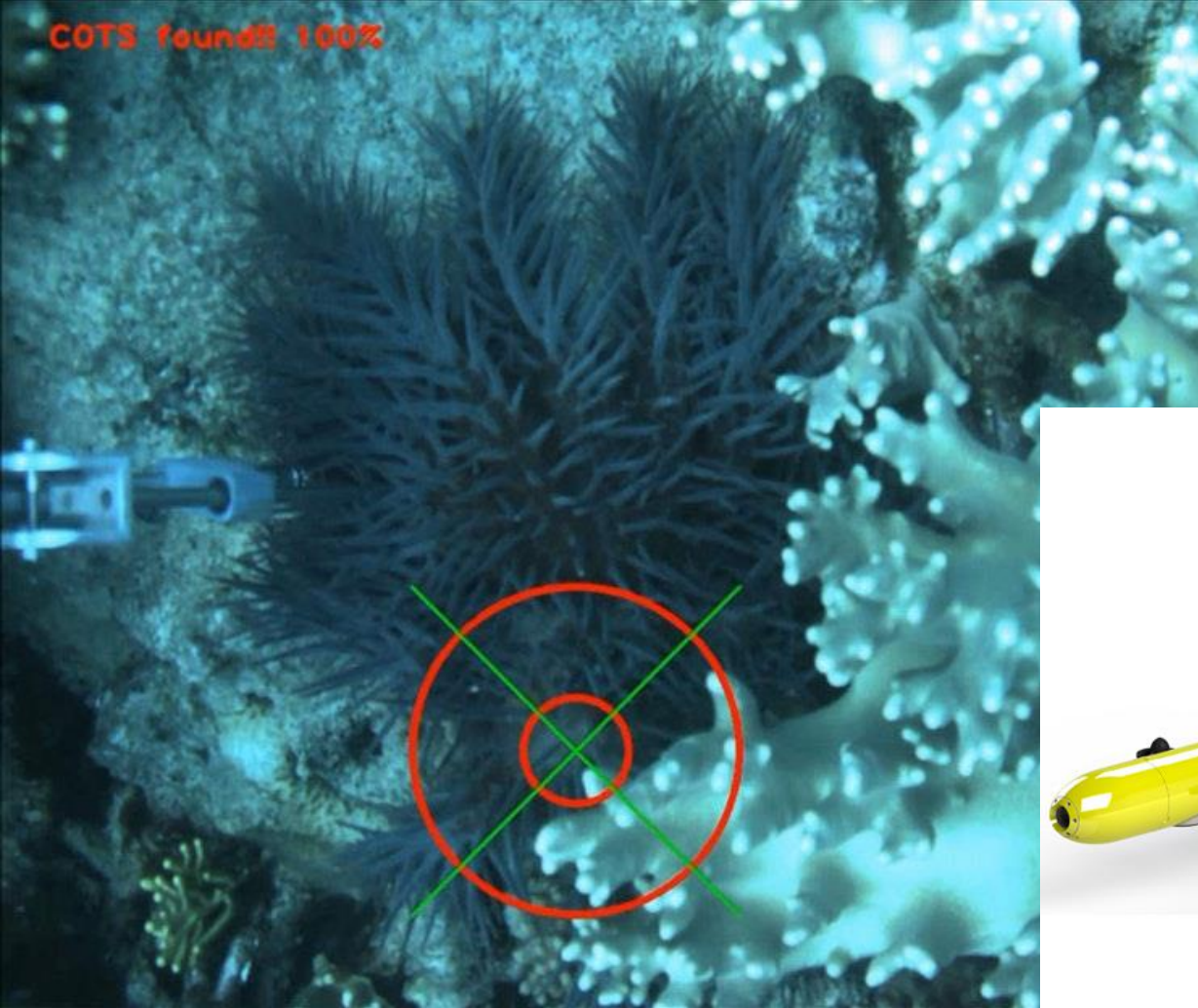
Australia's largest investment in key areas of research



- ◆ 7 years to 2021
- ◆ \$25.6m AUD
- ◆ 11 research organisations
- ◆ >100 researchers



COTS found! 100%



A Robotics Roadmap for Australia





Recommendations to adapt our work

Industry

Ensure Australia's ongoing prosperity by stimulating formation of new hi-tech firms, encouraging global tech giants to invest in Australia, and reskilling Australian workers

Education

Equip all Australians with Industry 4.0 relevant skills

Government

Lead the region in catalysing robotics activity by setting ethical, legal, regulatory and standards frameworks, adopting robotics in government services

R&D

Develop clusters of robotics research activity, encourage VC investment, develop aspirational research challenges and encourage application of the social sciences

Culture

Support an entrepreneurial culture around Australia's niche robotics capability and harness the nation's imagination through aspirational challenges solving Australian challenges

And share information across industries

Resources



Manufacturing



“The diffusion of new technologies and business practices from the most productive firms globally to the most advanced firms nationally, and then on to other domestic firms, is a key source of productivity growth”

**OECD 2015, The future of productivity, July, Joint Economics Department and the Directorate for Science, Technology and Innovation Policy Note, Paris.*



All industries will be impacted

- Australia's traditional industries are high tech (mining, agriculture etc)
- These industries are building Australia's tech capacity
- We need a more diverse workforce or we are missing 50% talent
- The narrative around job creation needs to change

The logo for the ARC Centre of Excellence for Robotic Vision, featuring a stylized 'C' shape with a red dot and a grey arc.

And all industries will need to adapt

- Many businesses can be made more structured many sectors are starting to overlap with manufacturing
- Automation will gain traction across all sectors – be ready
- Automation is rapidly evolving, even in "mature" sectors
- Need to plan for robotics, automation and workforce reskilling

Robotics in Australia

Australia was the first country in the world to automate its ports.



Australian companies are using robots in manufacturing to reshore jobs back to Australia.



Australian minesites already deploy self-driving haulage vehicles that transport tonnes of material each day.



Australian group CanberraUAV are major contributors to the ArduPilot autopilot system used in UAVs all over the world.



Australia won the Amazon Robotics Challenge in 2017, demonstrating our strength in robotic vision applied to logistics.



The Opportunity:

\$AU23 billion global market for robotics and autonomous systems by 2025.



Australian scientists are developing flying and underwater robots to protect the Great Barrier Reef.



www.roboticsroadmapau.org



AUSTRALIAN CENTRE FOR
ROBOTIC
VISION



Australian Government
Australian Research Council



THE UNIVERSITY
of ADELAIDE



THE
AUSTRALIAN
NATIONAL
UNIVERSITY



MONASH
University



UNIVERSITY OF
OXFORD

Inria
INVENTORS FOR THE DIGITAL WORLD

Imperial College
London

ETH zürich

Georgia
Tech

