





# ICT Graduates for the Future | Digital transformation ACDICT

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# Borges' Map

Nova Totius  
TERRARUM  
ORBIS  
TABULA  
ex officina G. a Schagen  
Amstelredami



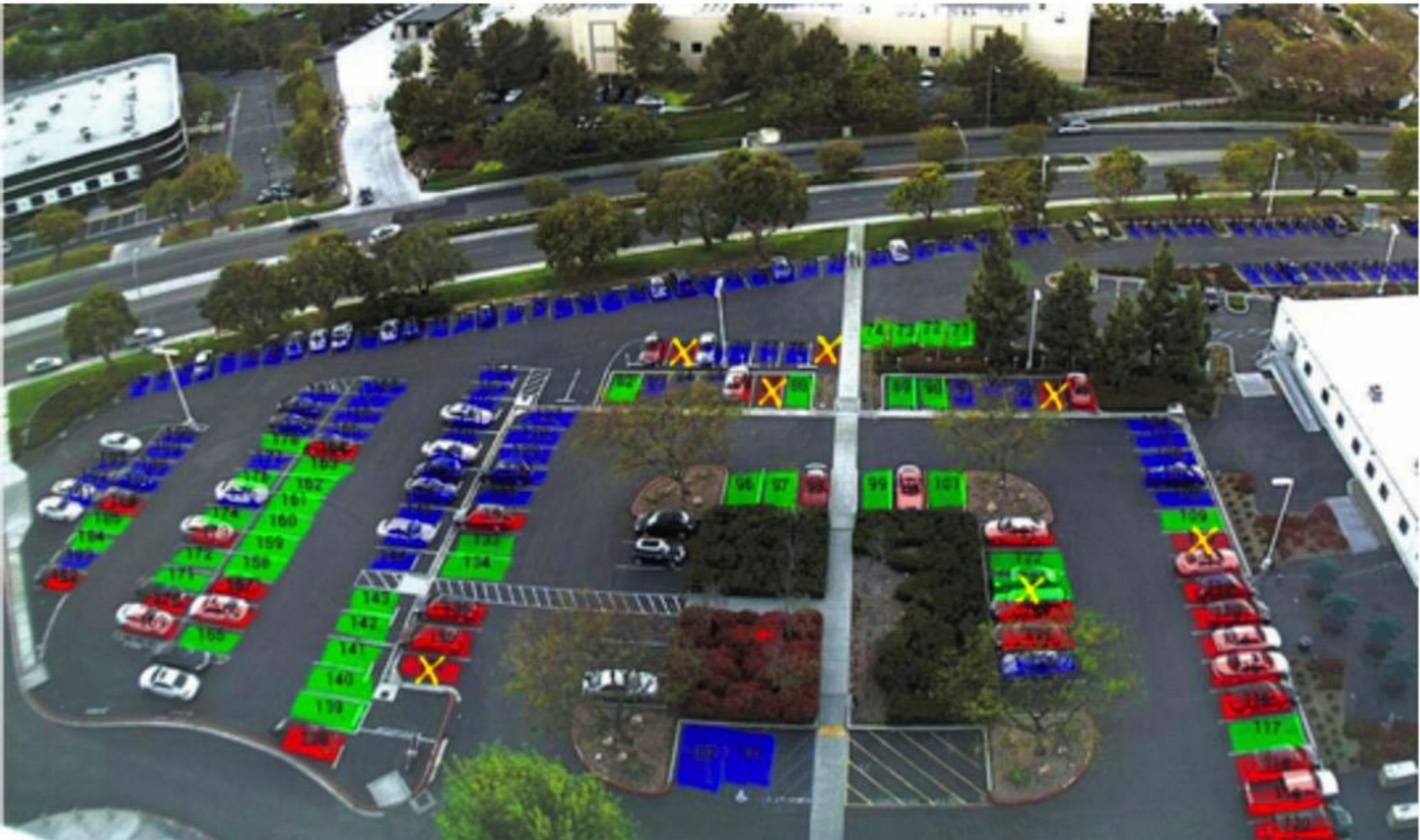
# The world becomes its own map

## What the Google self-driving car sees



# Self-mapping: Things describe themselves

## Streetline: Smart parking spaces



# Self mapping: Things describe themselves

Waze: Paris traffic through a day





# Self-interpreting

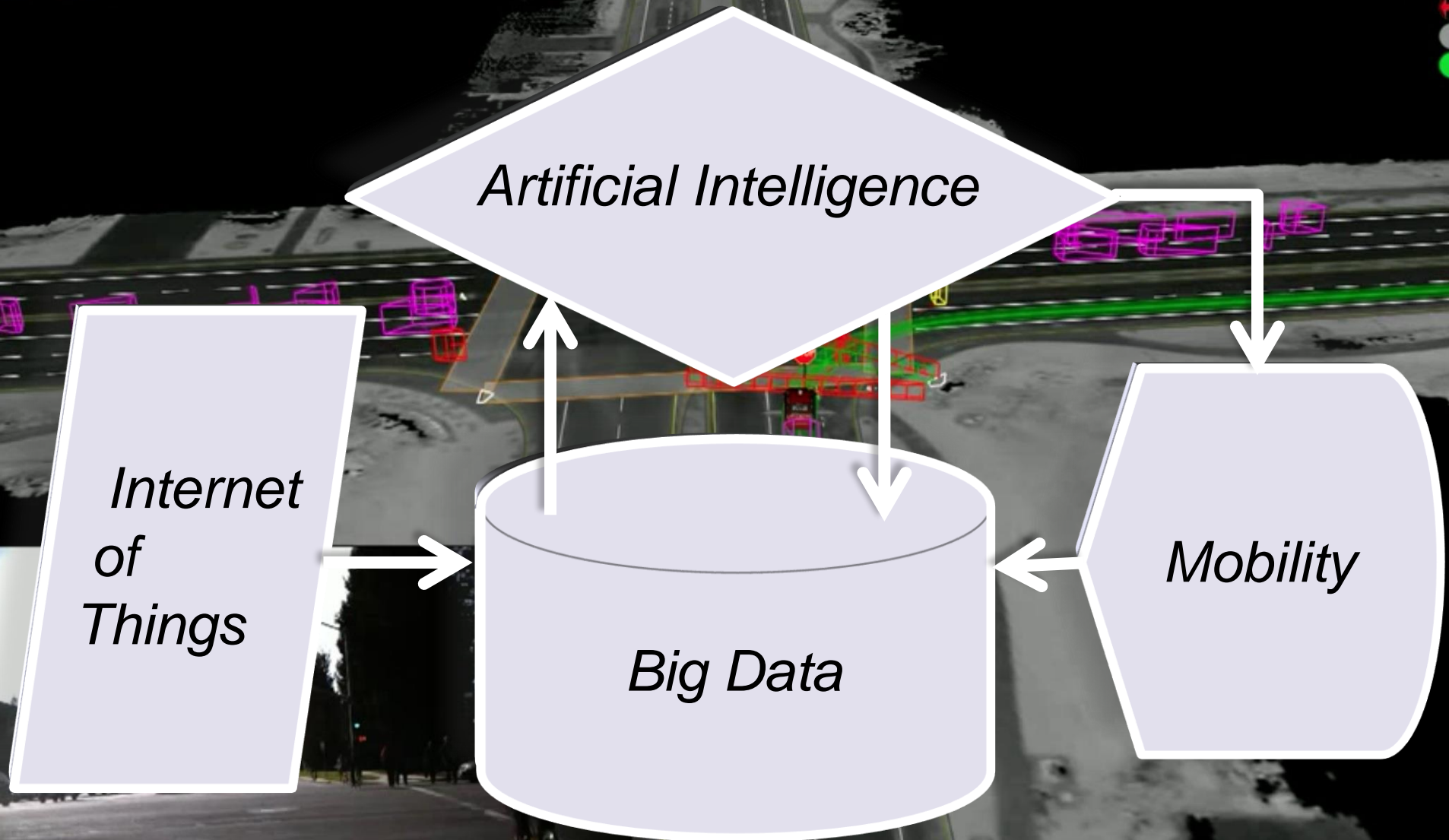
## NYU Center for Data Science: : What a smart cycle helmet perceives



# Borges' Map

Our understanding of the world, embedded in the world

Cruise



# Moravec's paradox

“The hard problems are easy and the easy problems are hard”

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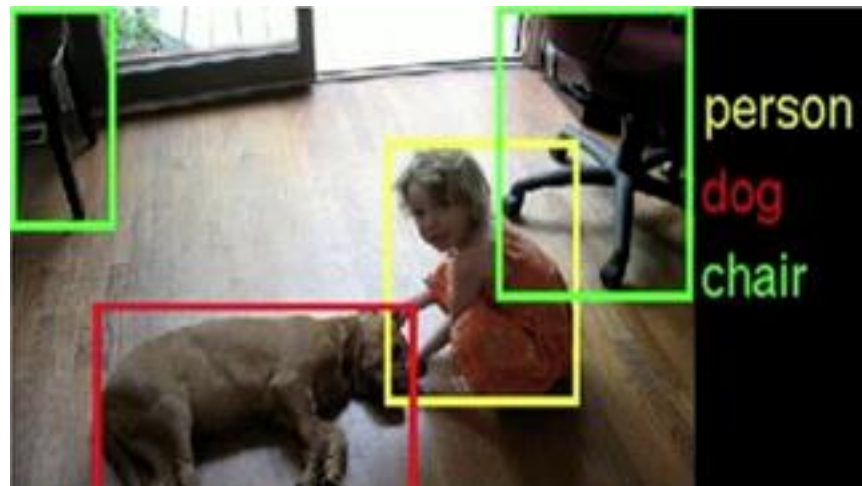
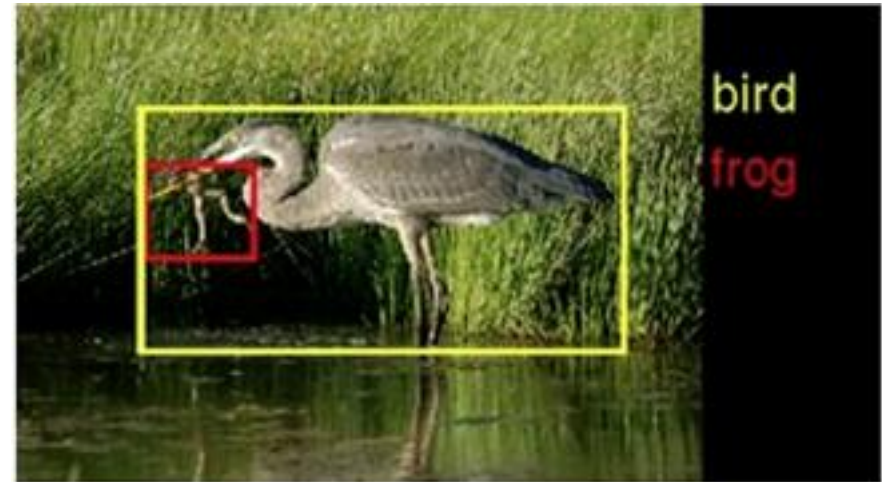
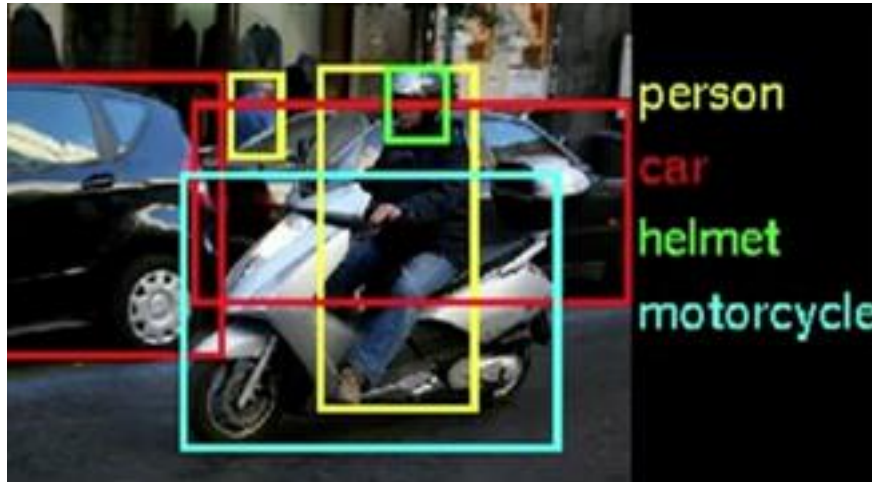
*It is comparatively easy to make computers exhibit adult level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to **perception and mobility***

- Hans Moravec *Mind Children* 1988 (emphasis added)



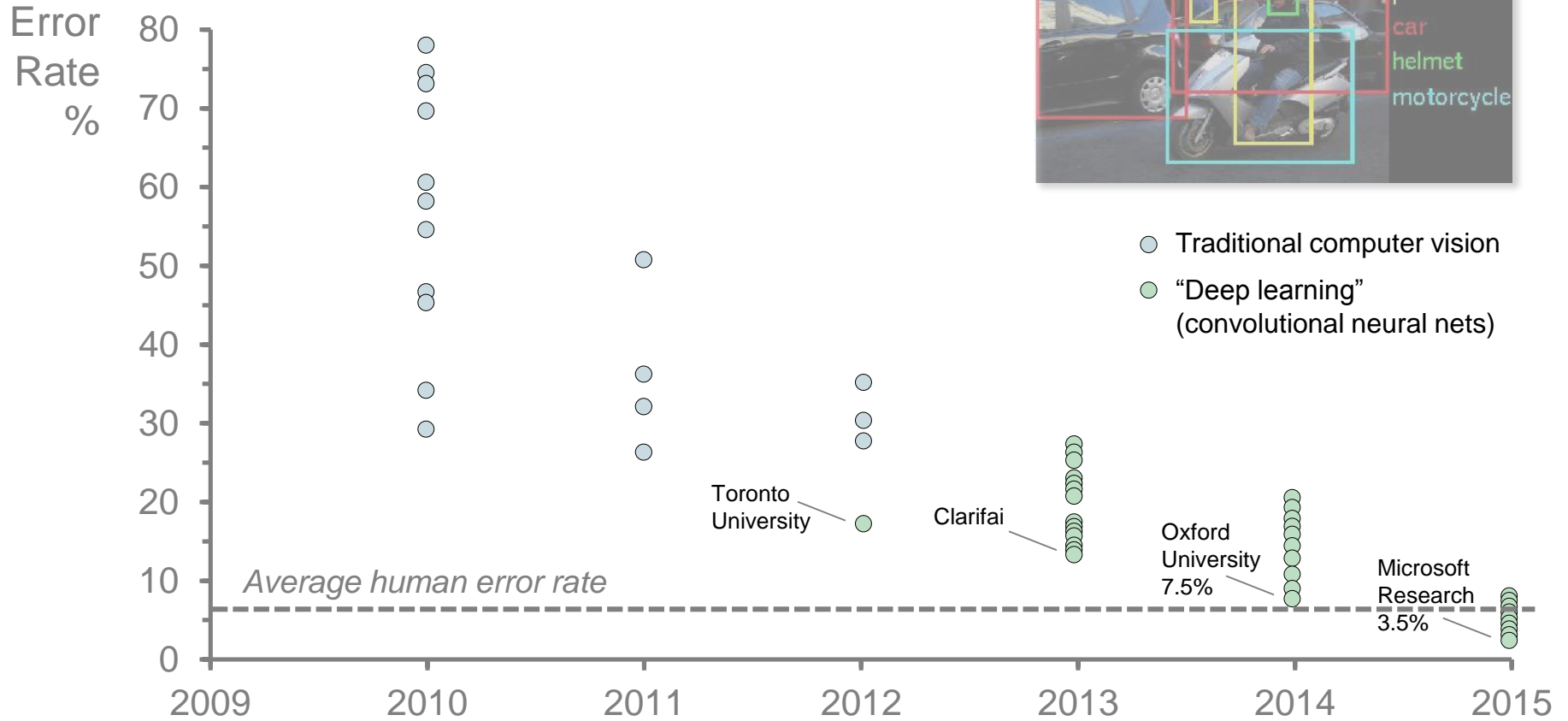
# Image recognition

Stanford ImageNet contest (100,000 images); ArXiv2015 algorithm



# Perception breakthrough

## ImageNet contest error rates

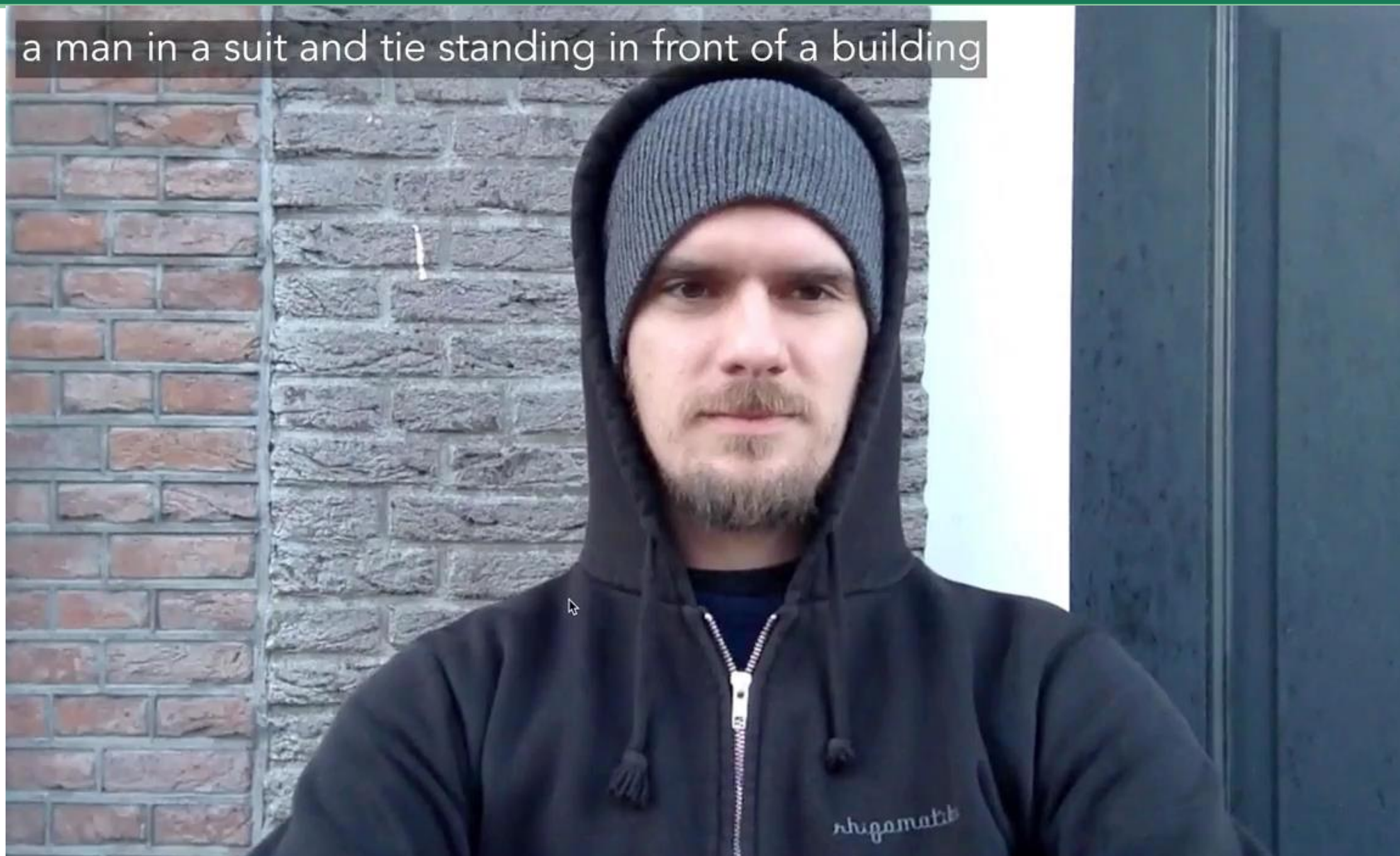


Source: ImageNet Large Scale Visual Recognition Challenge 2015 (ILSVRC2015) <http://image-net.org/challenges/LSVRC/2015/>

# Captioning video

## Andrej Karpathy's Neuraltalk2 running on a laptop

a man in a suit and tie standing in front of a building





# Sensorimotor control: Industrial robots

The standard architecture: programmed, deterministic non-scalable





# Sensorimotor control

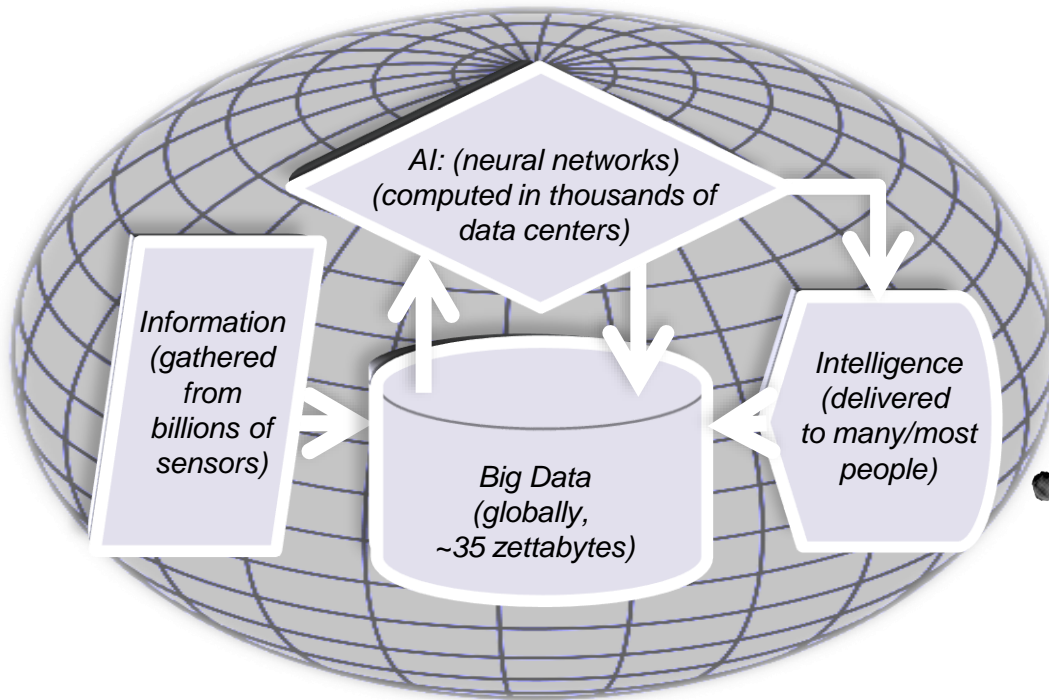
Boston Dynamics' "Spot:" mobile, autonomous, dexterous, robust



# Maps & Explorers

## Patterns of disruption

### Maps



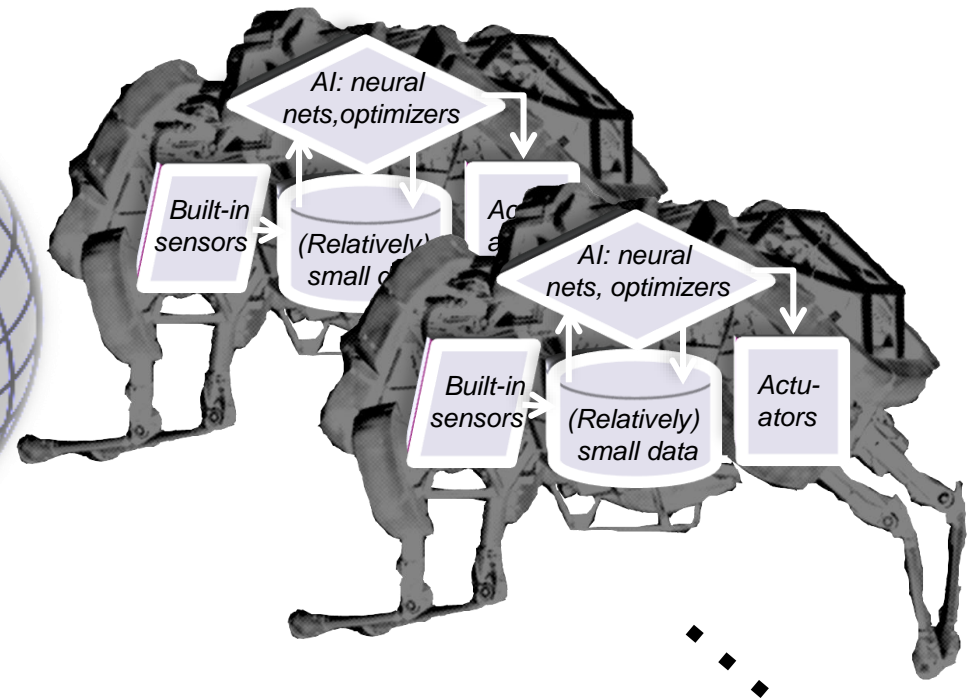
A single, unbounded, scalable system

Passive: provides context, insight

- Like a business ecosystem

**Disrupts capital**

### Explorers



Autonomous systems, loosely connected

Active: decision-making agents

- Like people

**Disrupts labour**

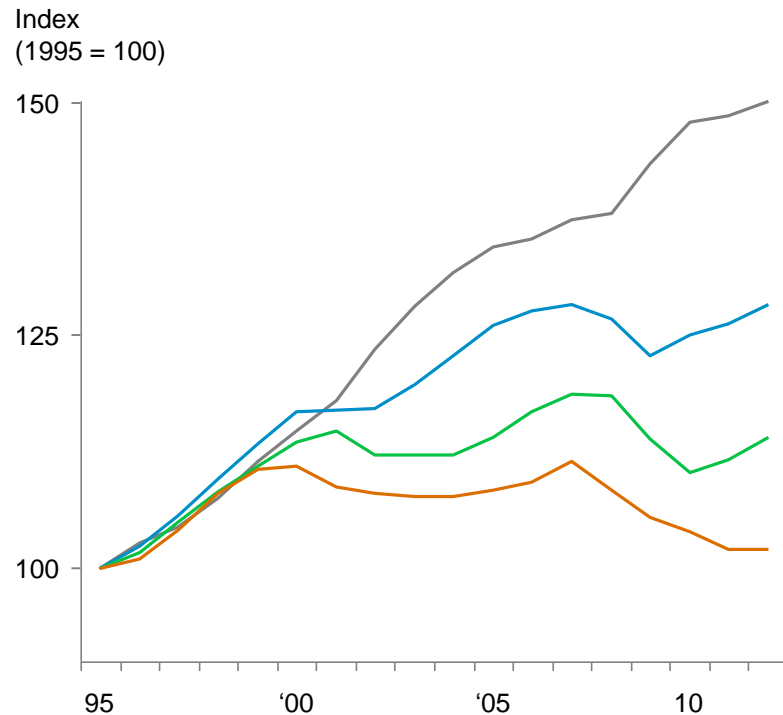




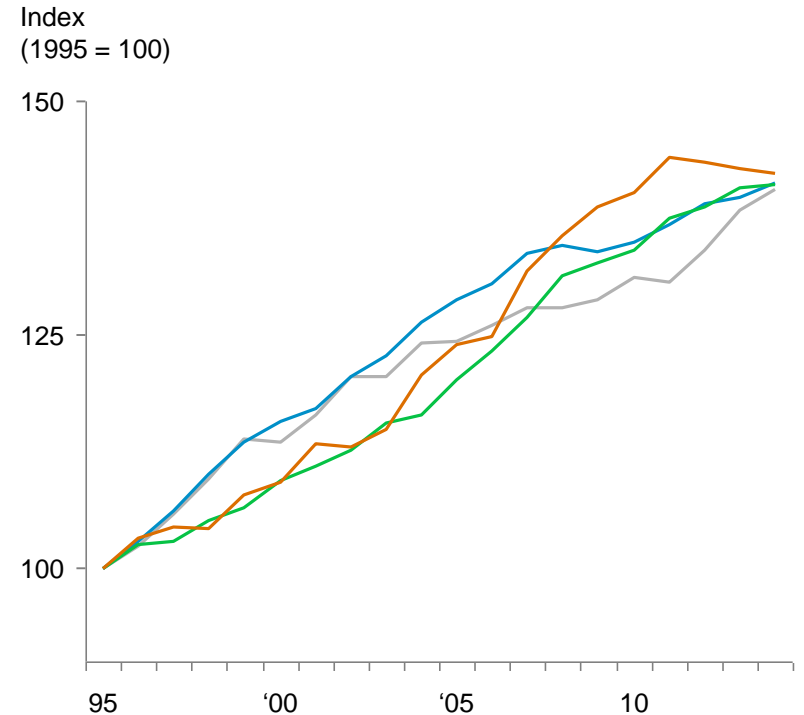
**What does this mean for Australia?**

# Good news, the great de-coupling in the US, hasn't occurred in Australia (... yet)

## USA



## Australia



— Labour productivity    — Private employment  
 — Real GDP per capita    — Median family income

Source: (US Data) Federal reserve bank of St. Louis; Erik Brynjolfsson and Andrew McAfee; From "The Great Decoupling, June 2015; (Australian Data) Economist Intelligence Unit, Australian Bureau of Statistics

# Fourth industrial revolution will see some jobs removed, some changed and some created

## Automated



Jobs that predominantly involve routine activities are at the highest risk of being completely automated

Remaining non-routine activities only relevant as complementary to routine activities will not be required post-automation

**Jobs eliminated**

## Augmented



Jobs with both routine and non-routine tasks will be augmented - automating routine tasks while allowing the worker to focus on the non-routine

This change will see improved productivity of human capital – leading to increase output or reduced demand for labour

**Jobs changed**

## Additional



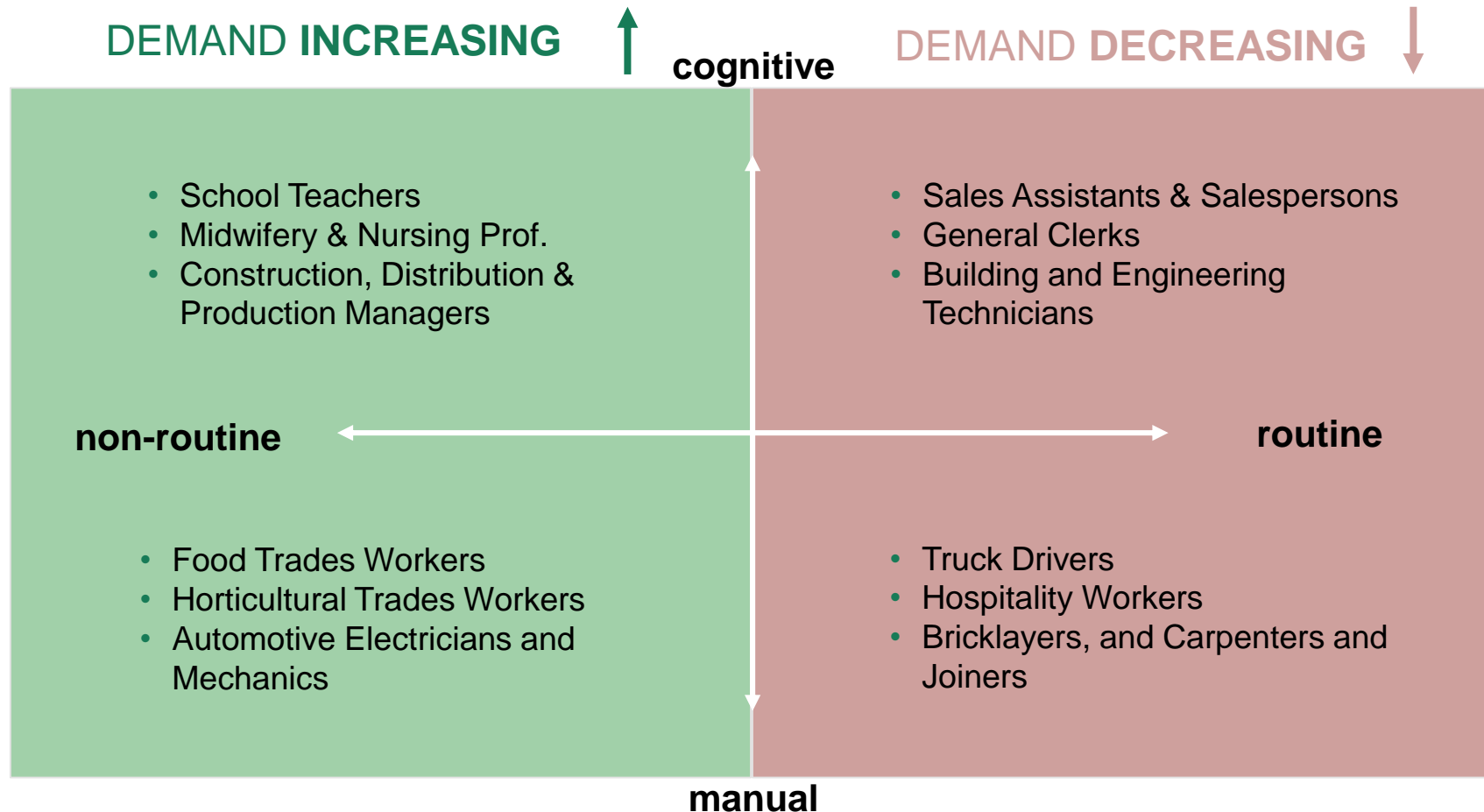
Brand new job categories will emerge over the coming decades as technology change introduces new needs

New job roles will require new abilities and qualifications with a focus on technical abilities and soft skills

**Jobs created**



# Automation of routine tasks will happen before non-routine, reducing demand for labour across manual & cognitive roles



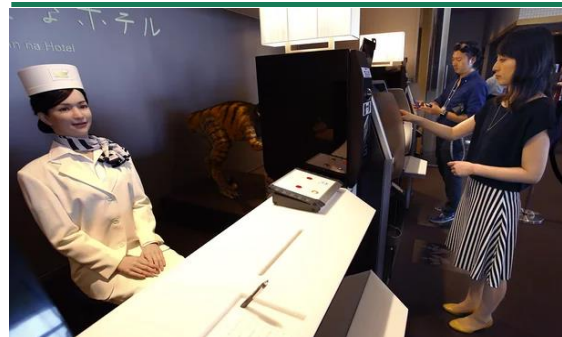
# We are increasingly seeing the progressive replacement of human workers with robot employees

## Robotic bartenders



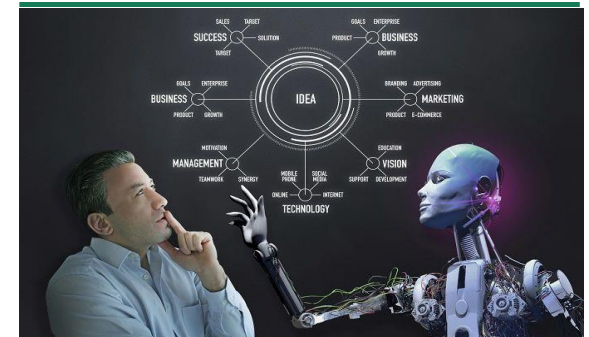
*Take drink orders from customers via tablets located around the bar*

## Robotic hotel receptionists



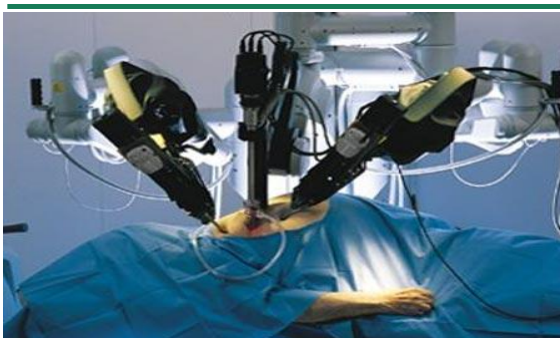
*Save on labour costs and increase check-in efficiency*

## Robo-advisors



*Provide automated, algorithm based portfolio management advice*

## Robotic surgery



*Can improve surgical outcomes by reducing human error*

## Fully robotic manufacturing



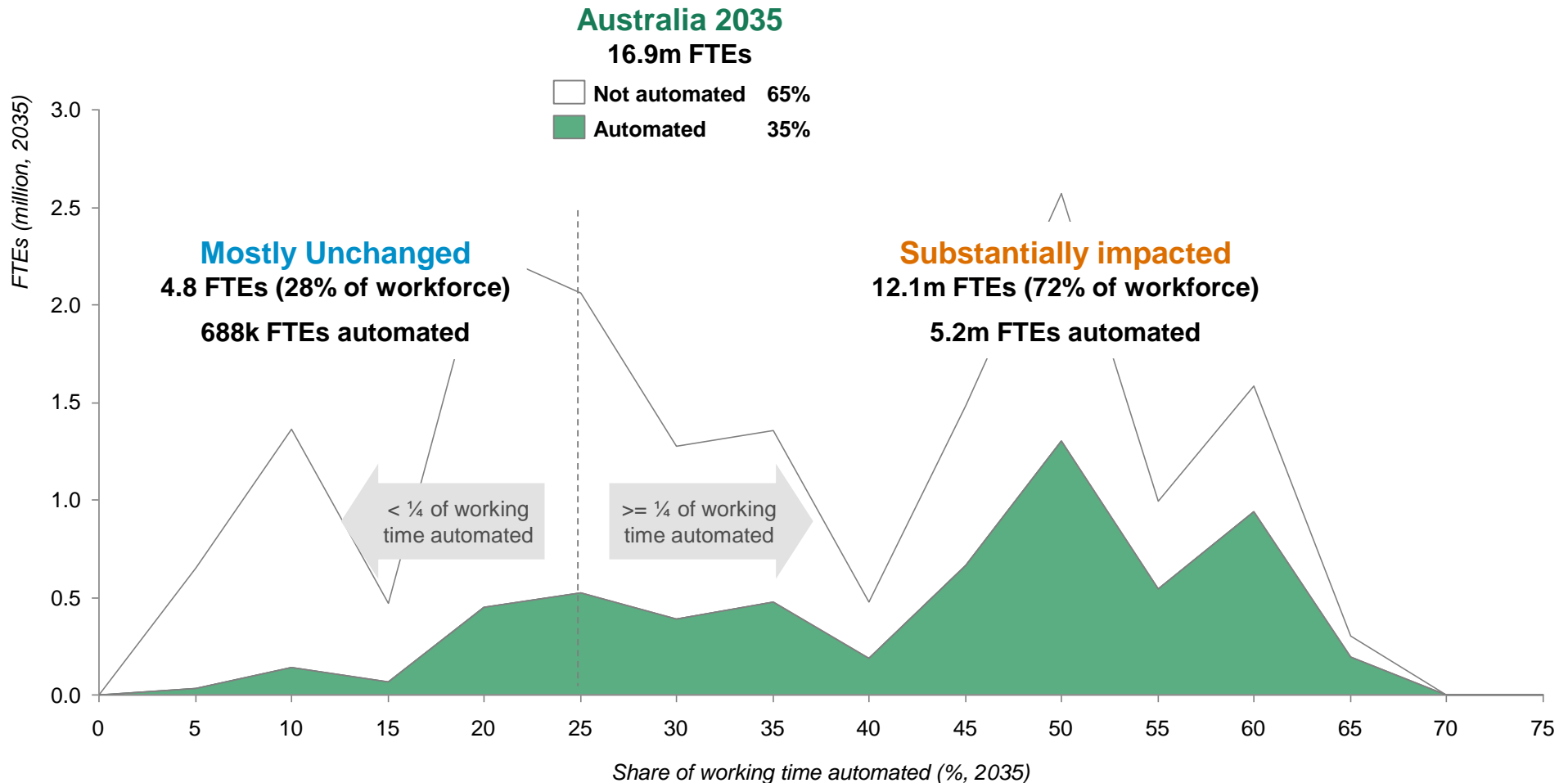
*Reduces labour costs and improves health and safety outcomes*

## Autonomous cars



*Can sense their environment and navigate without human input*

# BCG analysis suggests in Australia, 35% of work automated; around 72% of all FTEs substantially impacted by 2035



Note: Underlying population 15 to 64 year olds

Source: Australian Bureau of Statistics; Department of Employment; O\*Net; BCG analysis

BCG ACDICT Pres.pptx

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# New job families and fields will emerge as a result of disruptive tech creating demand for new skill types

## New Jobs

### Machine compliance manager



Ensure robots / AI comply with business rules

### Connectivity advisor



Models networks to help position products or clients in best place

### Preventative health helper



Examines all aspects of client's life and crafts bespoke plan

### Automated systems tech



Deals with non-routine errors that automated systems can't handle

### Professional triber



Assembles teams of freelancers into short term project teams

### Virtual reality designer



Analyses experiences and replicates in augmented reality

### 3D scanning / printing tech



Specialises in the design and creation of 3D finished parts

### Drone coordinator



Oversees drone traffic and flight operations for deliveries

## Required Skills

### Functional skills

- Science
- Technology
- Engineering
- Math
- Digital literacy

### Soft skills

- Creativity
- Entrepreneurship
- Empathy
- Communication
- Problem solving

### Sources of skills

#### Acquire

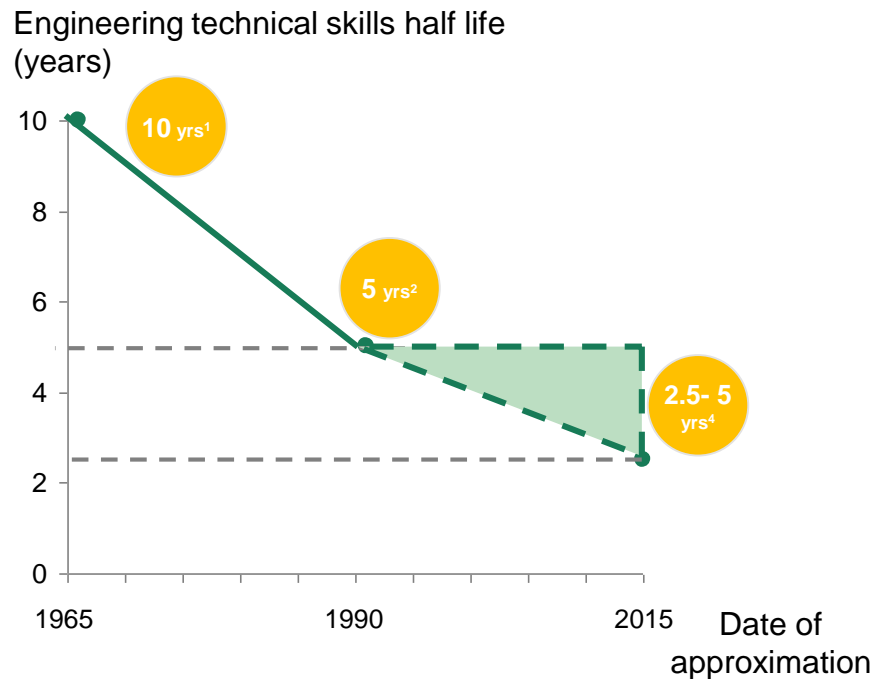
- Ongoing education
- On the job experience

#### Express

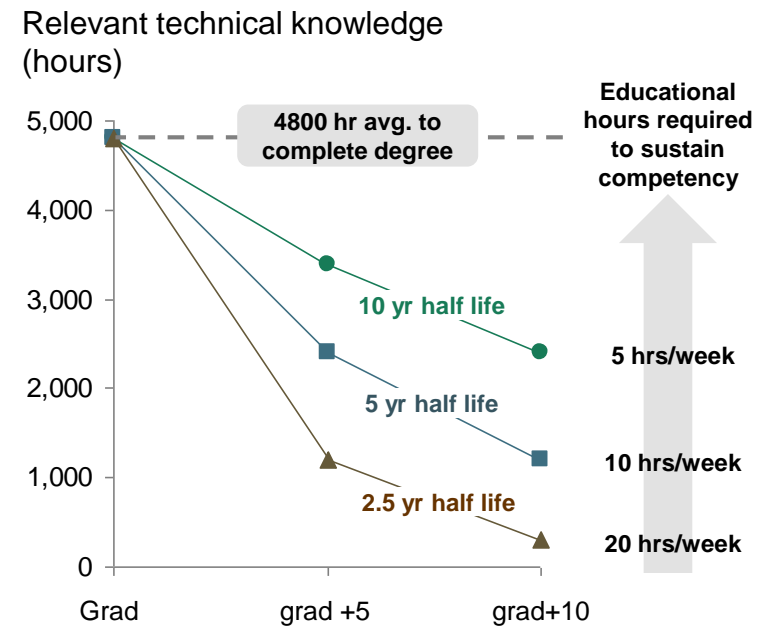
- Certifications
- Industry training and recognition

# Technical skills will be in demand for shorter periods of time increasing the demand for continuing education

## Longevity of technical skills is decreasing...



## ...increasing the need for ongoing education and training



Hiring practices requiring a 4 year tertiary education to enter a field may decrease as the need for incremental education to keep knowledge 'current' becomes the new standard

# People will have more jobs and careers than previously

**Means that millennials can expect 17 jobs and 5 careers across their lifetime**

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**National average job tenure**

**3.3 years**



**Average lifetime jobs**  
(assuming work from 18-75<sup>1</sup>)

**17**



**Average lifetime careers**  
(assuming 3 jobs/career<sup>1</sup>)

**~5**

1. Assumptions as made by McCrindle research and reported in: "Job Mobility in Australia", 18.06.15  
Source: McCrindle Research; HILDA Study

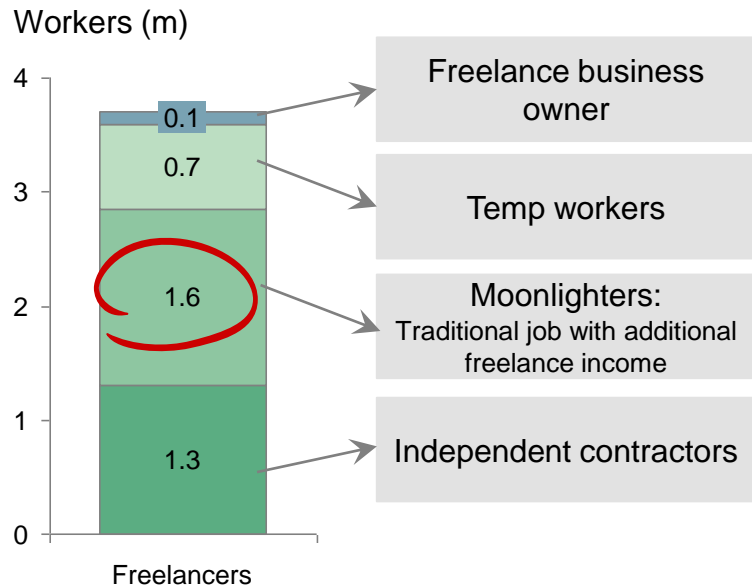


# And will diversify income streams outside of primary job

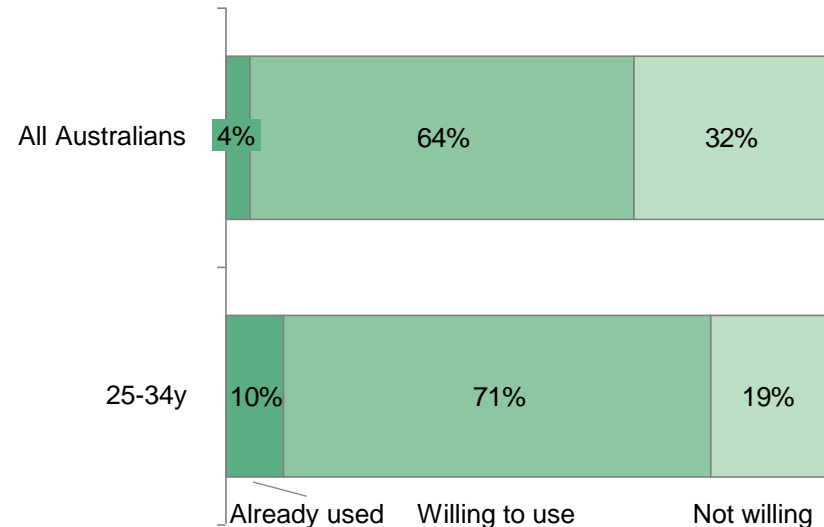
~1.6m workers in Australia earning additional income outside of primary job

Increase in moonlighting as platform-savvy younger cohorts enter workforce

Australian's willingness to earn additional income via platforms<sup>1</sup>



Australian's willingness to earn additional income via platforms<sup>2</sup>



1. Edelman Berland, "Freelancing in Australia: A National Survey of the New Workforce", 15.10.14 2. The New Work Order, FYA, 2015  
 Note: "Moonlighters" are composite category from "moonlighters" (primary traditional job) and "diversified workers" (mix of traditional employers and freelance work)  
 Source: Foundation for Young Australians; Edelman Berland

# Traditional culture requires changes along five dimensions

## From...

## To...

### Risk averse



- Avoid uncertainty and risk-taking; concerned about consequences of failure

### Experimentation



- Encourage a willingness to take risks and "fail-fast" / "test and learn" mindset
- Establish comfort around uncertainty and possibility of failure

### Channel centricity



- Technology, product or channel centric thinking
- Develop product/service from technology vs. customer need

### Customer centricity



- Innovate based on customer insights along customer journey
- Shift mindset on peer group; benchmark against best-in-class experience across industries

### Siloed



- Individual KPI/division KPI
- Limited communication/sharing across divisions/groups

### Collaboration



- Nurture a culture that is open & collaborative – shifting away from command, control & power centers, encourage sharing, celebrate for others

### Rigid



- Focus on following a set process
- Decisions need to go through long process and many layers to be made

### Agility



- Encourage flexibility and iteration in processes
- Remove bureaucracy for short decision making cycle and fast implementation

### Focus on running the business



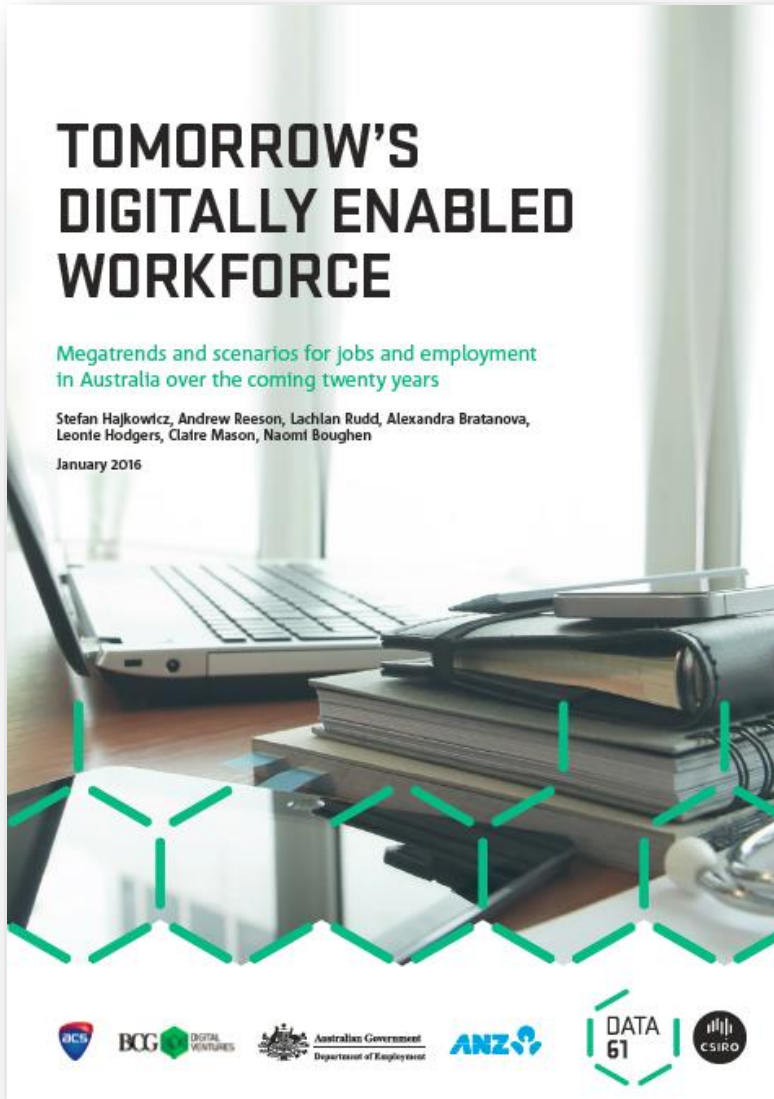
- Reward efficiency and proficiency of BAU / status quo

### Working modes



- Establish an atmosphere of continuous innovation / improvement to keep pace with evolving working norms and customer expectations

# Recommended further reading from ACS, CSIRO et al



## 5 THE SCENARIOS

The scenario planning model requires the identification of axes which represent continuums of possibilities at a future date (2035 in this study). The axes capture critical uncertainty and impact in the megatrends narrative. In reality there are countless sources of uncertainty and impact buried within the trends and megatrends. However, the scenarios cannot capture everything that matters in detail. Rather, they create a simplified model of a much more complex reality. To do this we select axes which have the highest level of impact and uncertainty. We have identified the extent of task automation and the extent of institutional transformation for the two axes (Figure 35).

Both ends of the technological change axis describe a future with more automation in the workplace than exists today. However, there is much uncertainty about the reach of automation — from slightly more to vastly more. There is a future where the promises of artificial intelligence come to fruition and the vast majority of human tasks are performed better, faster, more safely and more cheaply by robots. This highly automated workplace creates job opportunities, and requires skills, very different from those that exist today. There is also a future where artificial intelligence has failed to deliver on its promises and in which some job tasks have been automated, but many have not. In this future the jobs and skills required are not too much different from now. Which one of these two futures eventualities will have an impact on Australia's labour markets.

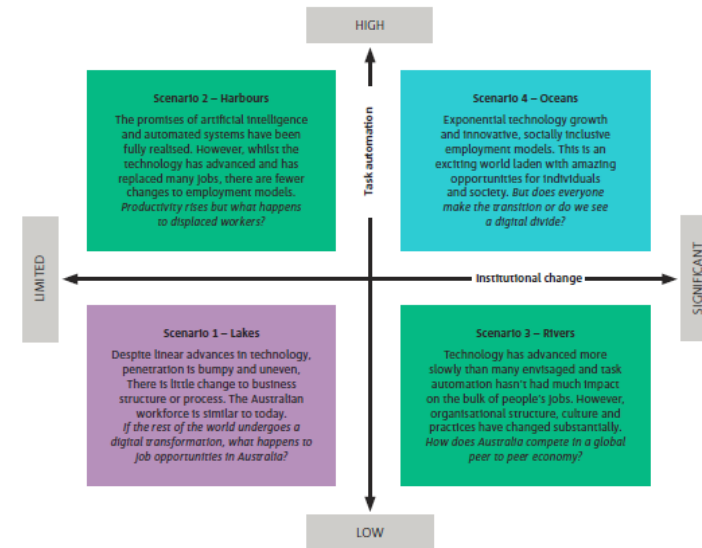


Figure 35 Scenarios for jobs and employment in Australia in the year 2035



# For further information

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Thank you

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