Industry 4.0

What does it mean for NZ ?

Nathan Stantiall
Group Manager – Programmes

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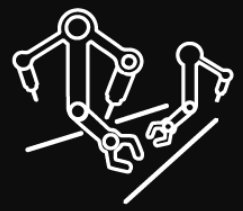
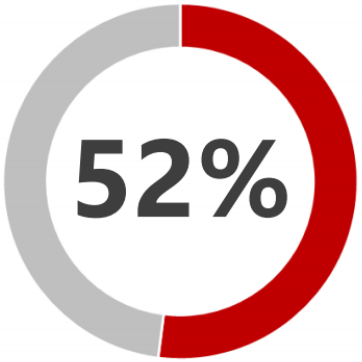
STEP CHANGE IN INDUSTRY INTRO PHASE

4.0	Cyber Physical Systems	
3.0	Computer & Automation	
2.0	Mass Production, Assembly Line & Electricity	
1.0	Mechanization, Water Power & Stream Power	

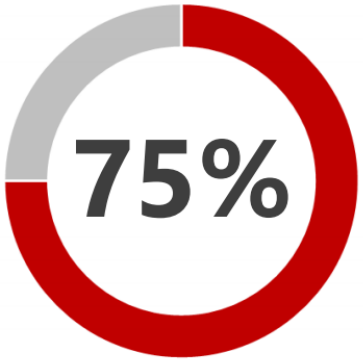
IoT is *Disrupting* Industry

HITACHI
Inspire the Next

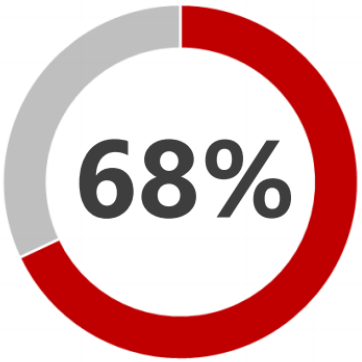
The secret of change is to focus all of your energy, not on fighting the old, but on building the new.



of companies in the Fortune 500 have gone bankrupt, been acquired, or ceased to exist since 2000.

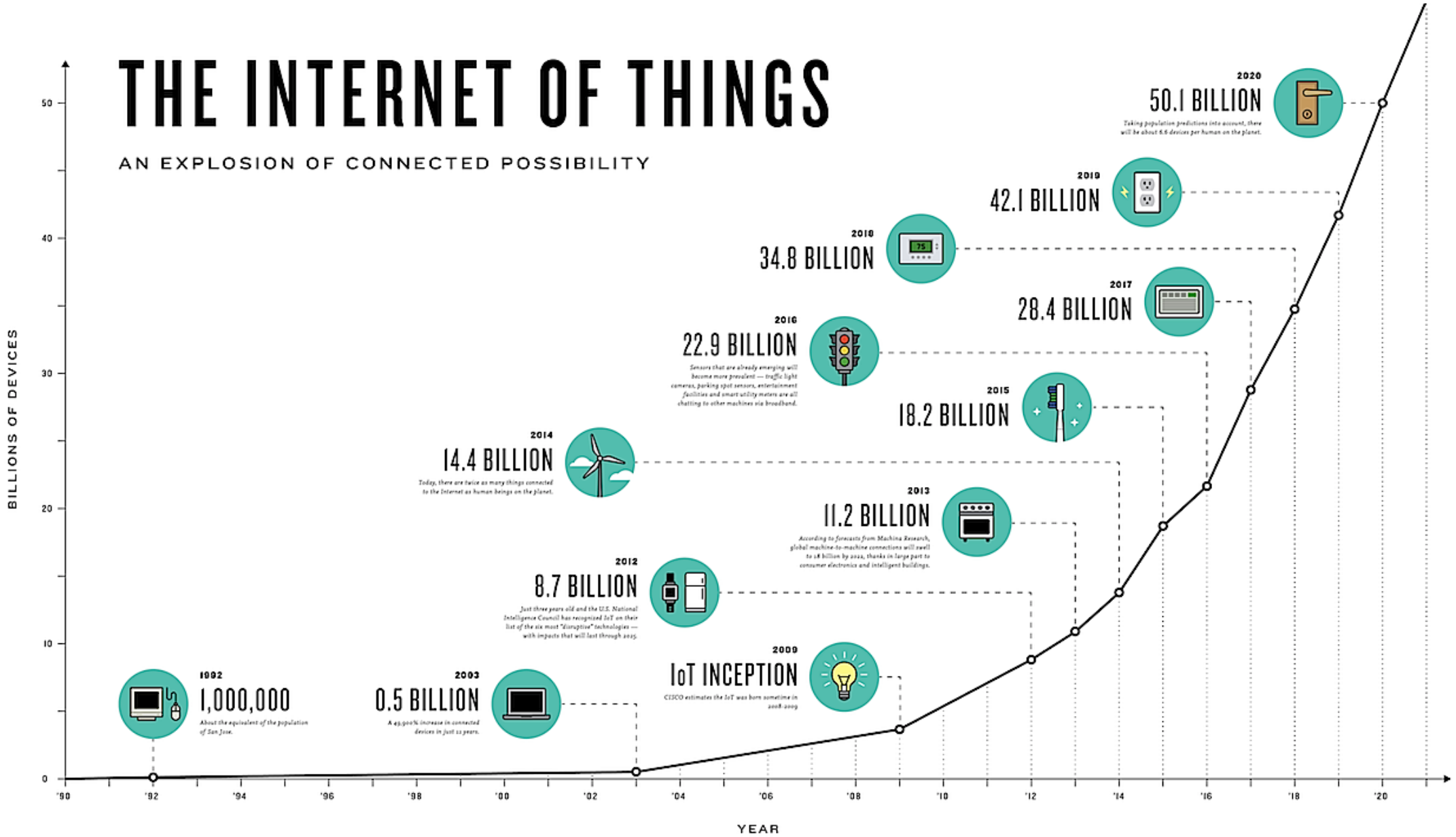


of Standard & Poor's 500 companies from 2012 will disappear by 2027.



of companies are allocating budget to IoT in 2018.

Established companies are vulnerable



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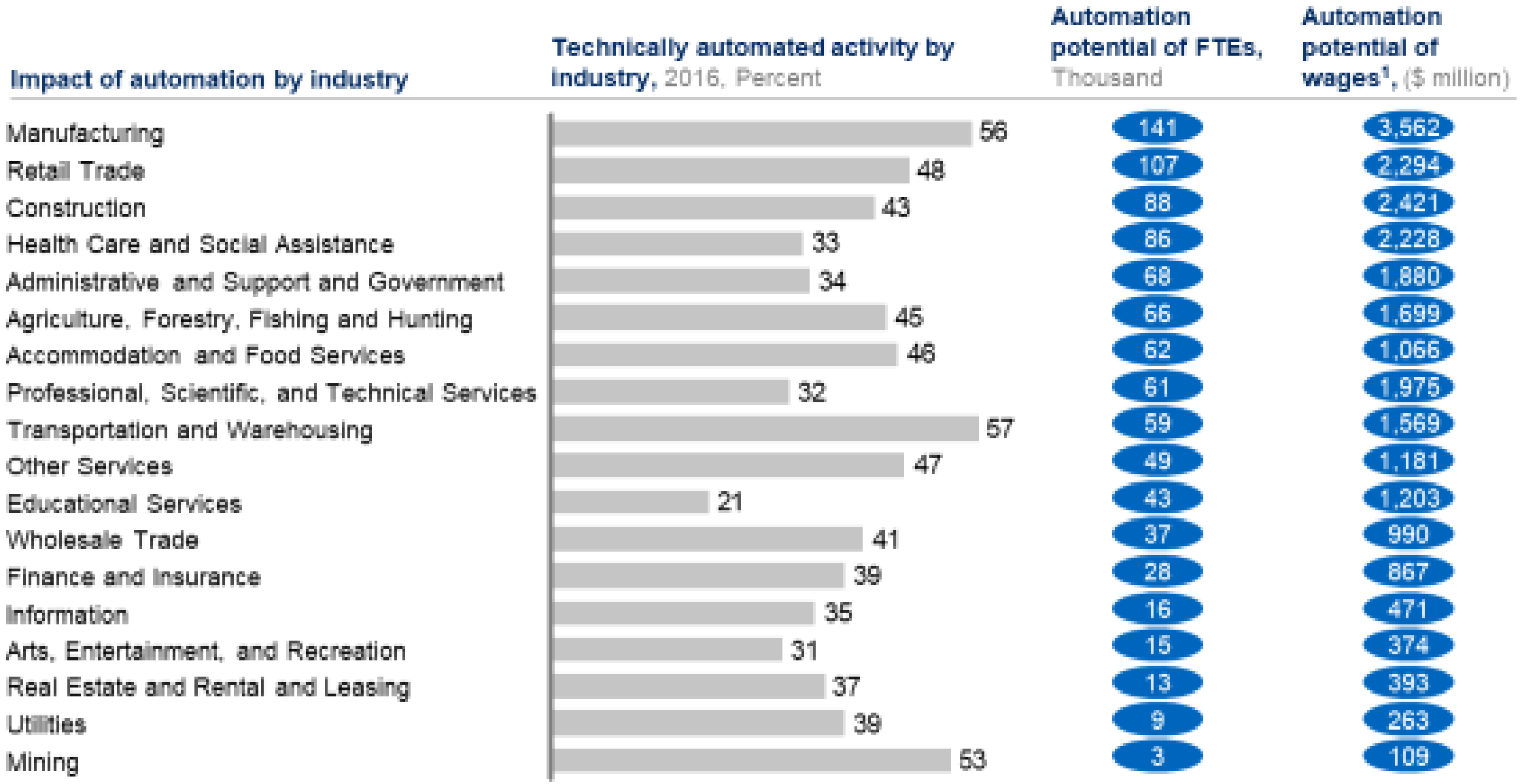
In New Zealand, automation could put ~950,000 FTEs at risk which is equivalent to ~$25B of wages …



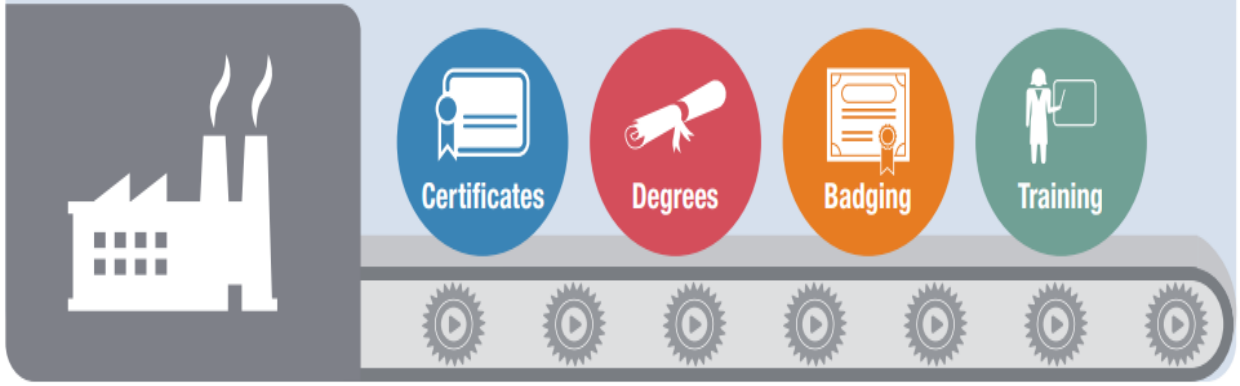
NOTE: Numbers may not sum due to rounding; labour data is for 2014 and is assumed to be constant in the model; 1 Real 2016 USD, PPP 2014

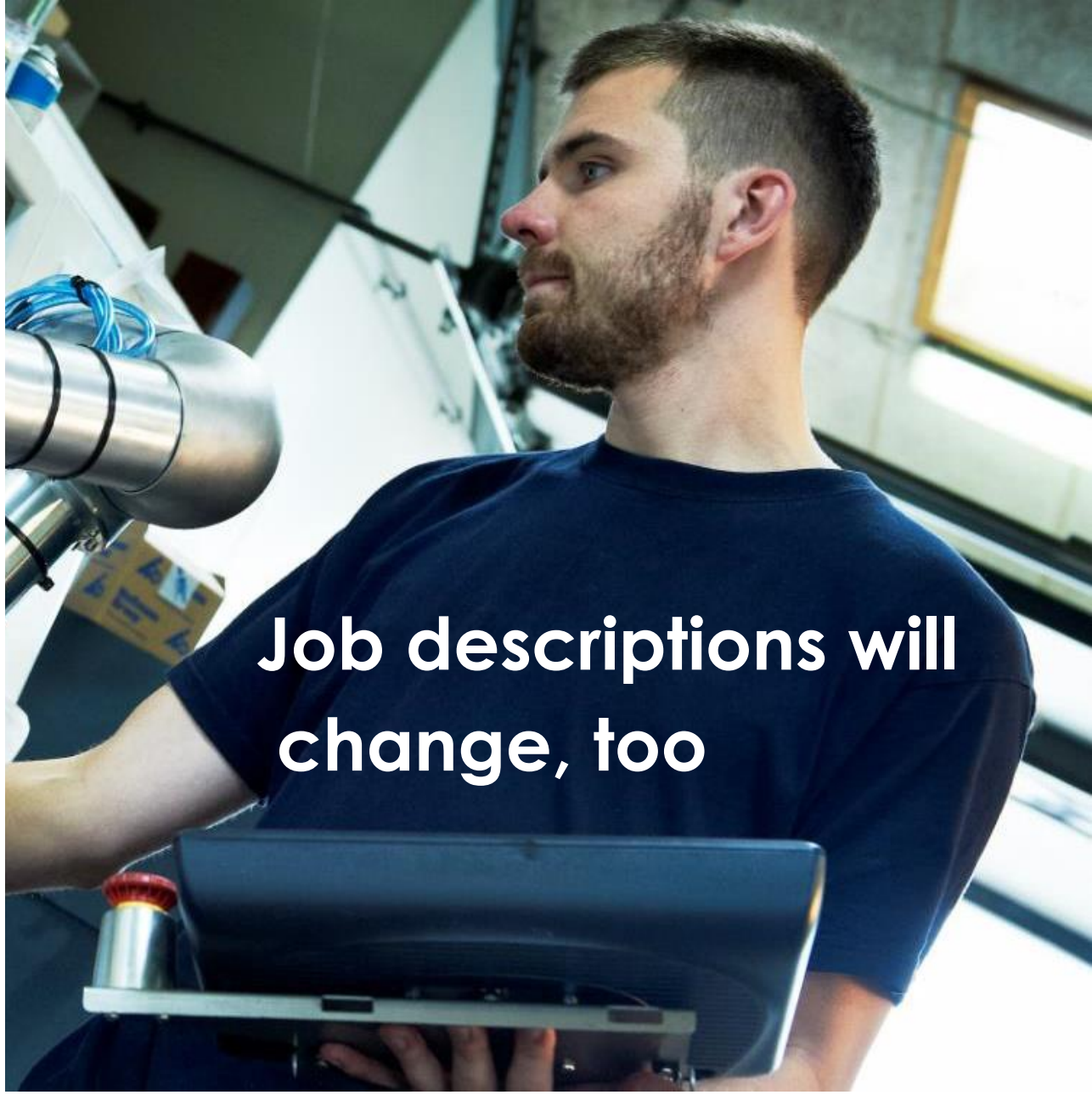
SOURCE: New Zealand Statistics; OMED; BLS; Oxford Economics; McKinsey Global Institute analysis

Factory of the Future: Digital Manufacturing Transition Roles

TWO-YEAR PROGRESSION:
Shop Floor to 35+ Transition Roles

- Product Life Cycle Quality Data Analyst
- Manufacturing Cybersecurity Technician
- Collaborative Robotics Technician
- Digital Data Tester





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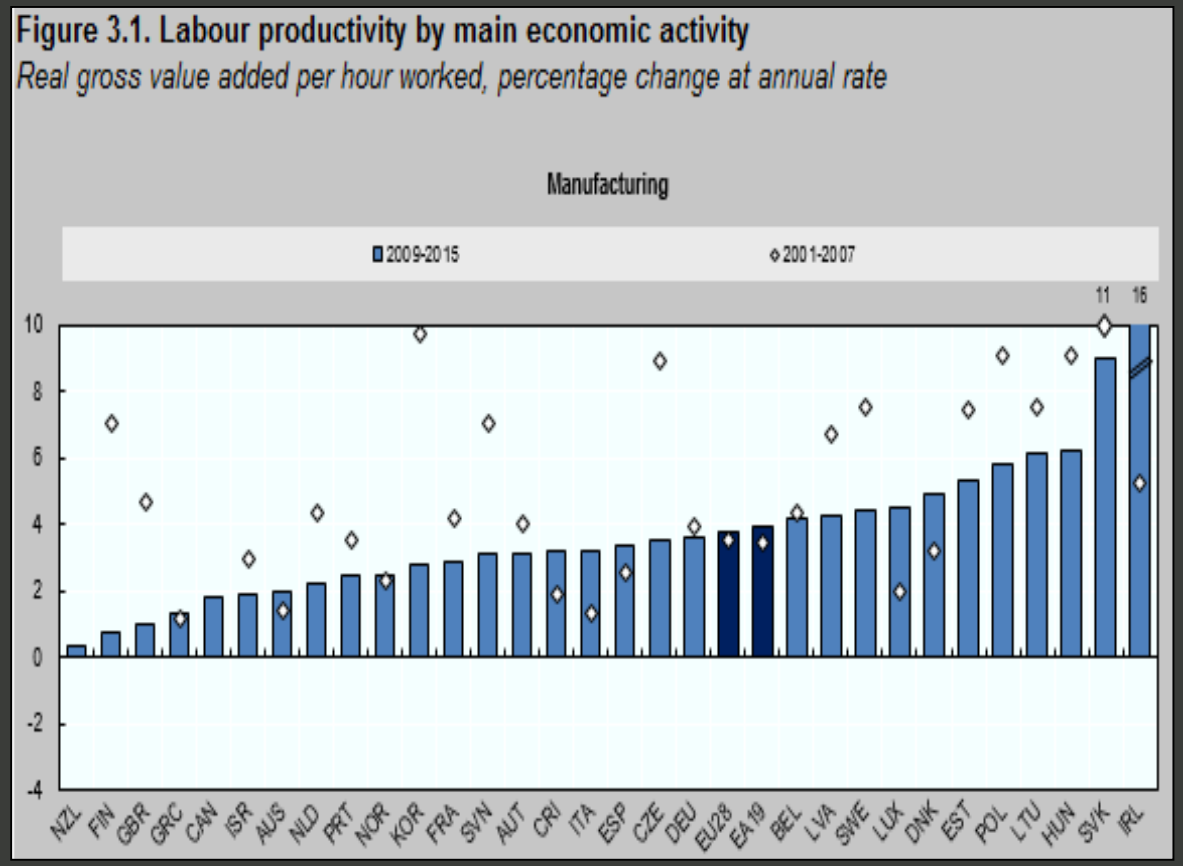
Manufacturing Sector Insights

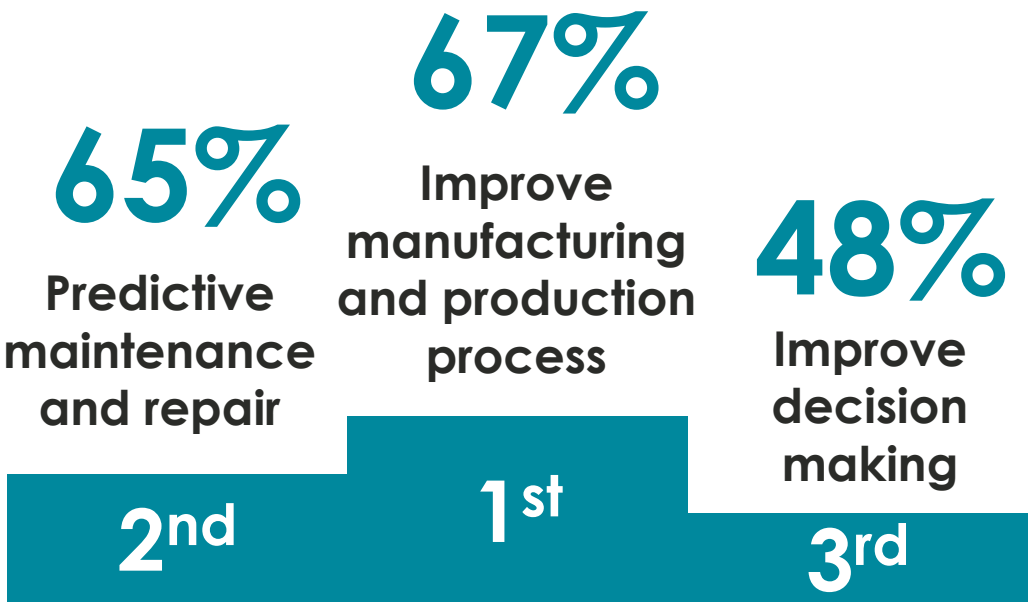
- Low Productivity Gain
- Lack of Skilled Staff
  - Average age late 40s.
  - Unattractive to Millennials
- Digital Convergence
  - Customisation
  - Servitisation



Source: OECD Compendium of Productivity Indicators 2017

Why adopt Industry 4.0?

Swiss study, asking 109 participants about motivators for adopting IoT technology



SMEs
(<250 employees)

Large Enterprises

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Heinis *et al. Journal of Innovation and Entrepreneurship* (2018) 7:10

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Smart Process and Smart Products

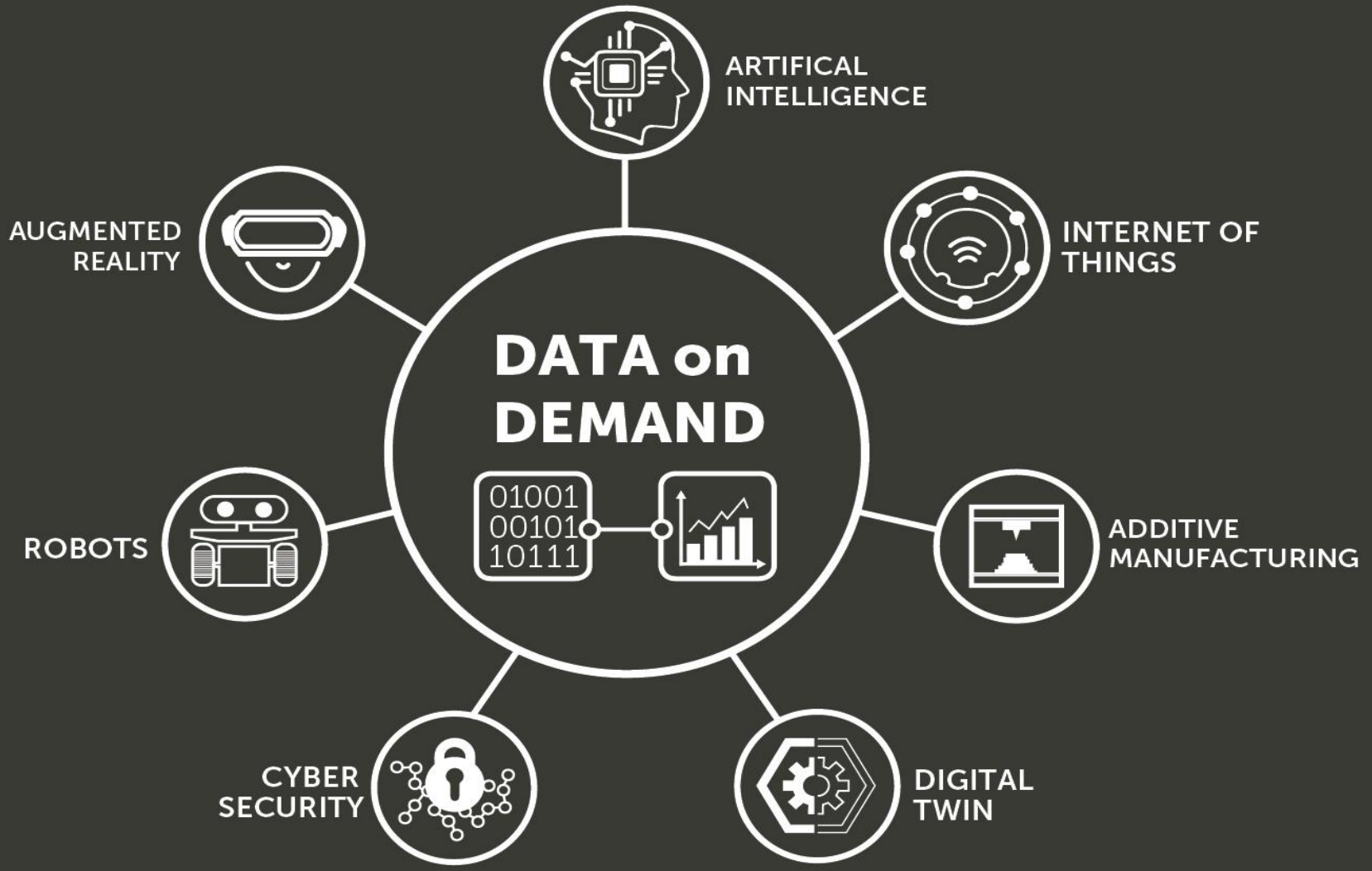
SMART PROCESSES

- Data processing in the production
- Machine to machine communication
- ICT intrastructure in production
- Man-machine interfaces
- Company wide networking
- Effciency with small batches

SMART PRODUCTS

- Intergration of Services
- Communications & Connectivity
- Monitoring
- Product related IT services
- Functions for data storage
- Business models around products

At the core of Industry 4.0 : Data on Demand



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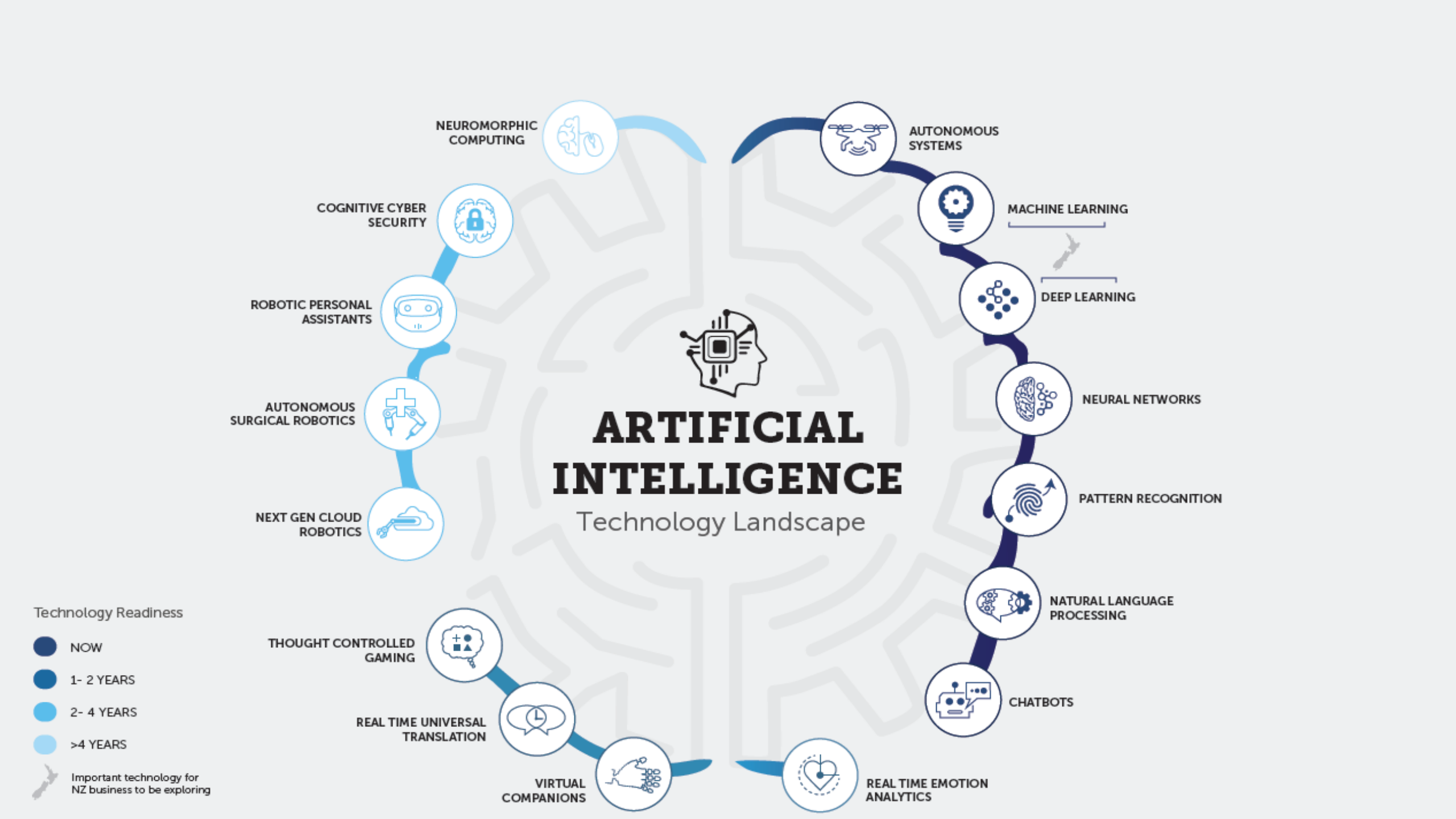
ARTIFICIAL INTELLIGENCE
Technology Landscape
AUTONOMOUS SYSTEMS
MACHINE LEARNING
DEEP LEARNING
NEURAL NETWORKS
PATTERN RECOGNITION
NATURAL LANGUAGE PROCESSING
CHATBOTS
REAL TIME EMOTION ANALYTICS
VIRTUAL COMPANIONS
REAL TIME UNIVERSAL TRANSLATION
THOUGHT CONTROLLED GAMING
NEXT GEN CLOUD ROBOTICS
AUTONOMOUS SURGICAL ROBOTICS
ROBOTIC PERSONAL ASSISTANTS
COGNITIVE CYBER SECURITY
NEUROMORPHIC COMPUTING
Technology Readiness
NOW
1- 2 YEARS
2- 4 YEARS
>4 YEARS
Important technology for NZ business to be exploring

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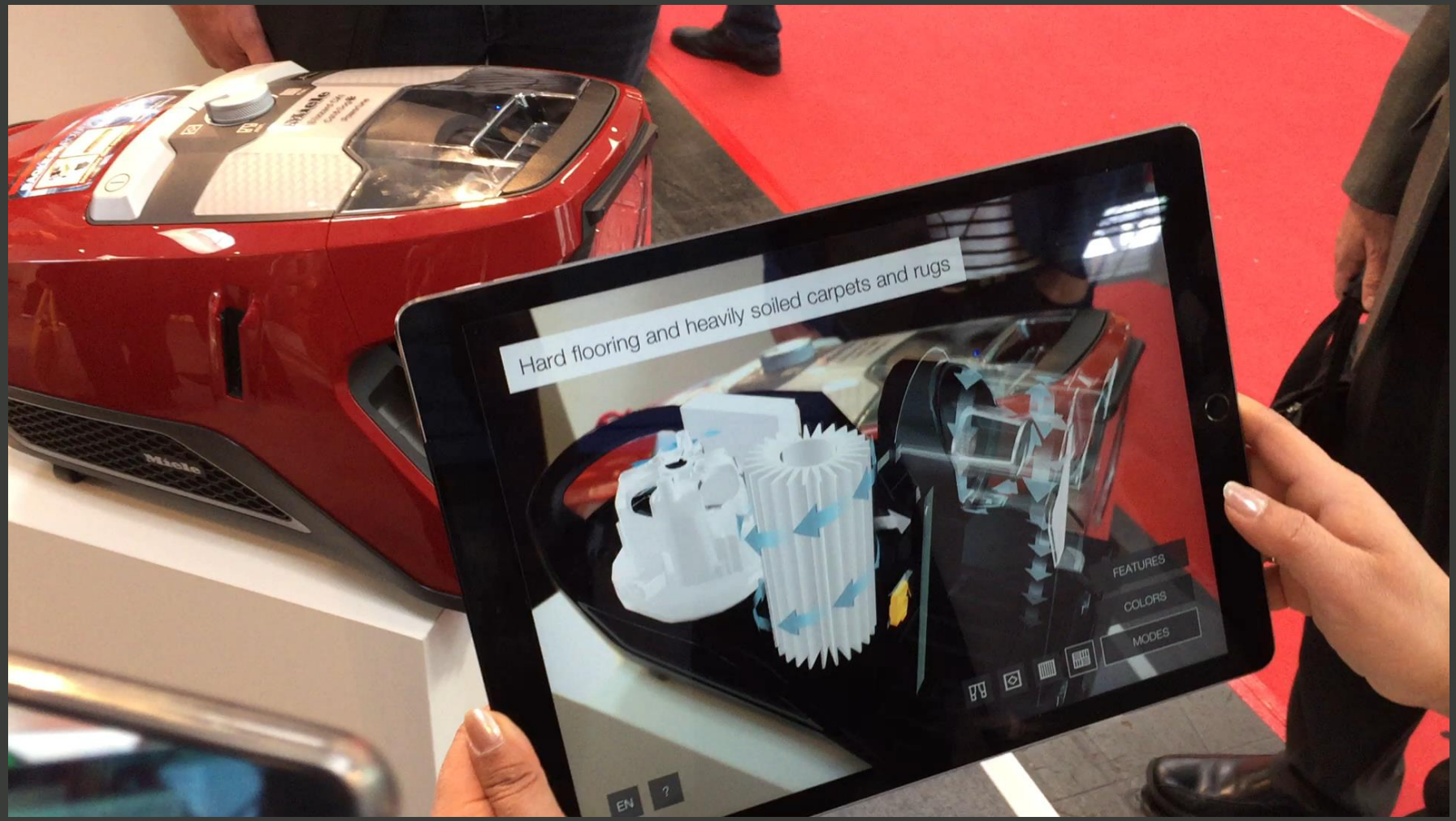
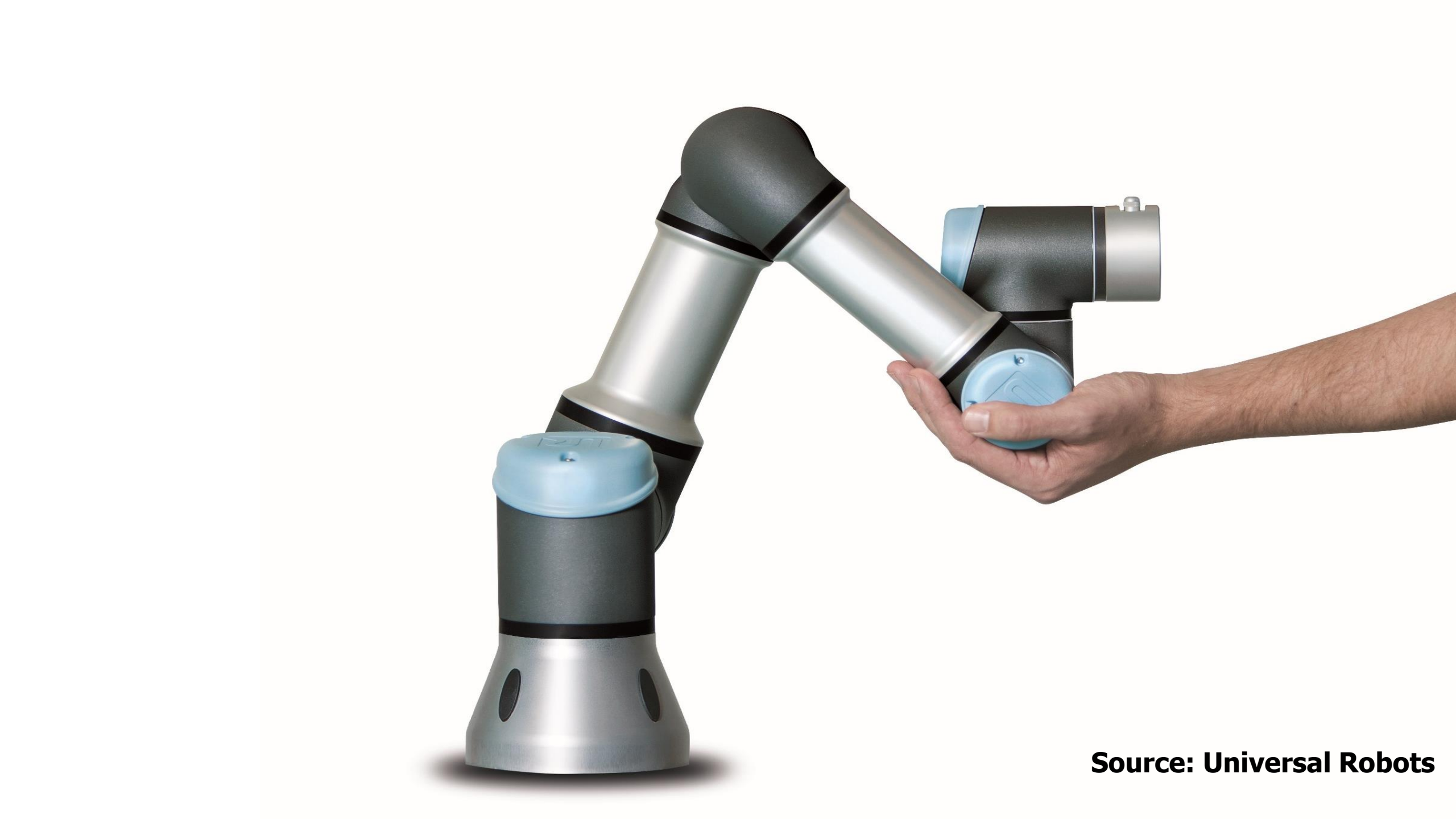
IoT – Smart Cargo

Source: Core TT

Digital Twin





Source: Universal Robots

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Assa Abloy

PHOTOS SOURCE : UNIVERSAL ROBOT

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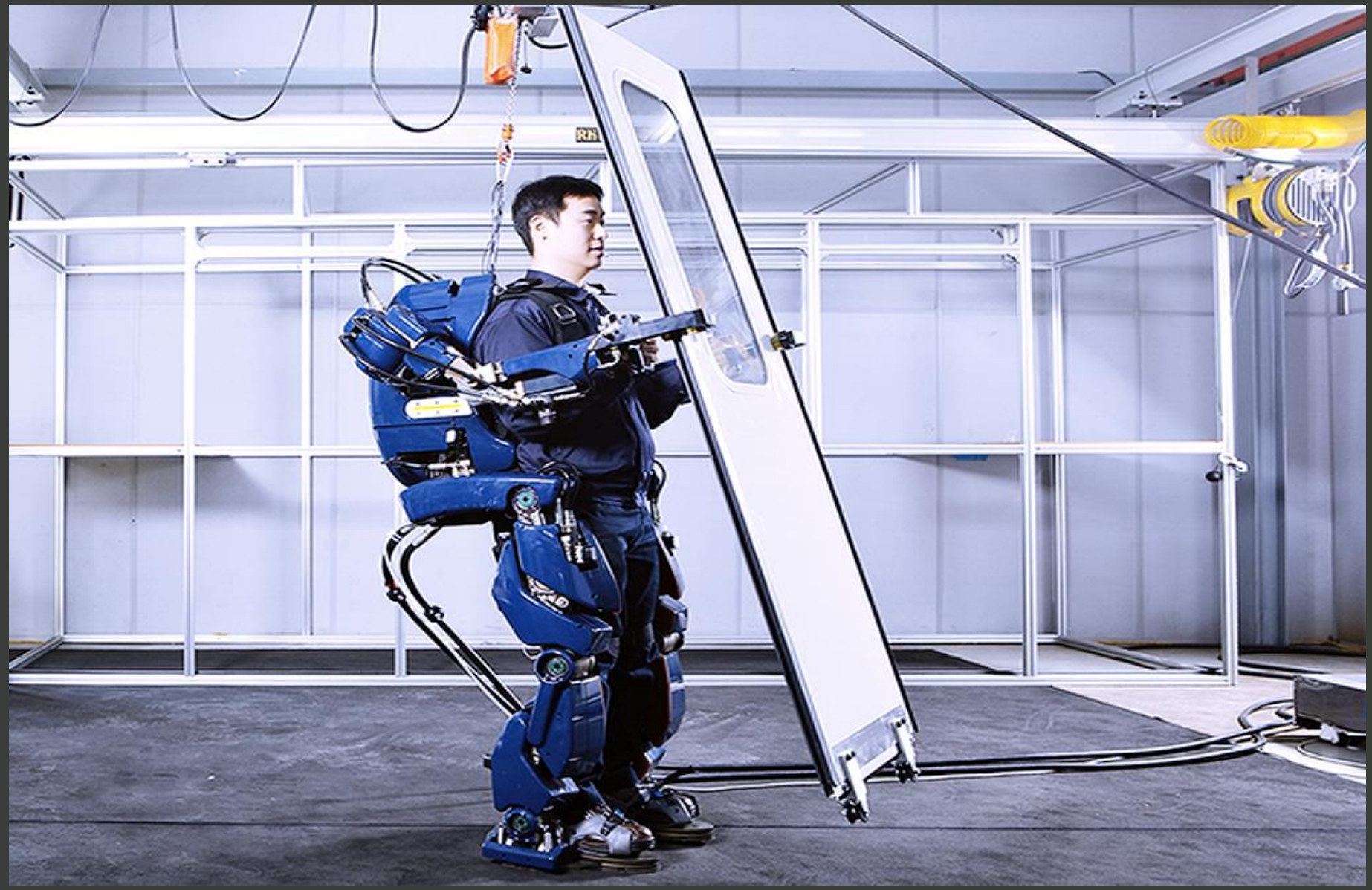

Source: Hyundai

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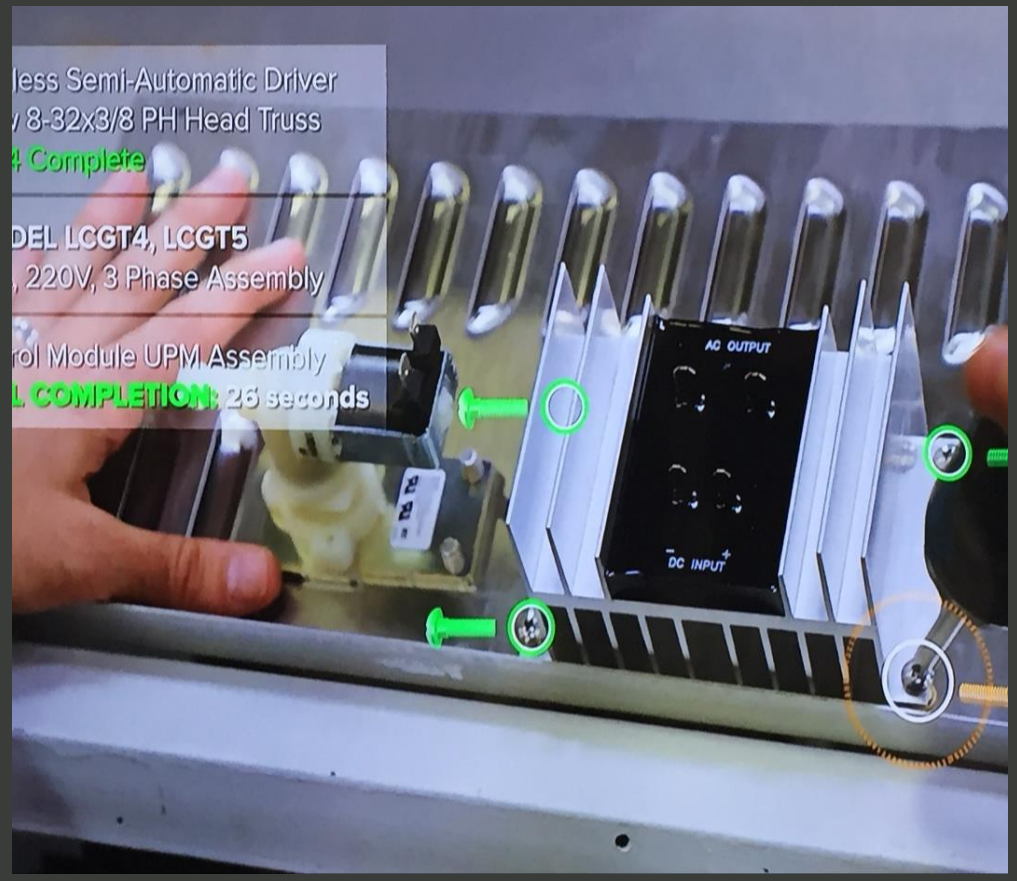
Augmented Reality



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GAS TURBINE ASSEMBLY/MAINTENANCE

SIEMENS

Traditional
480

DAQRI AR
45

Minutes to first assembly

Source: DAQRI

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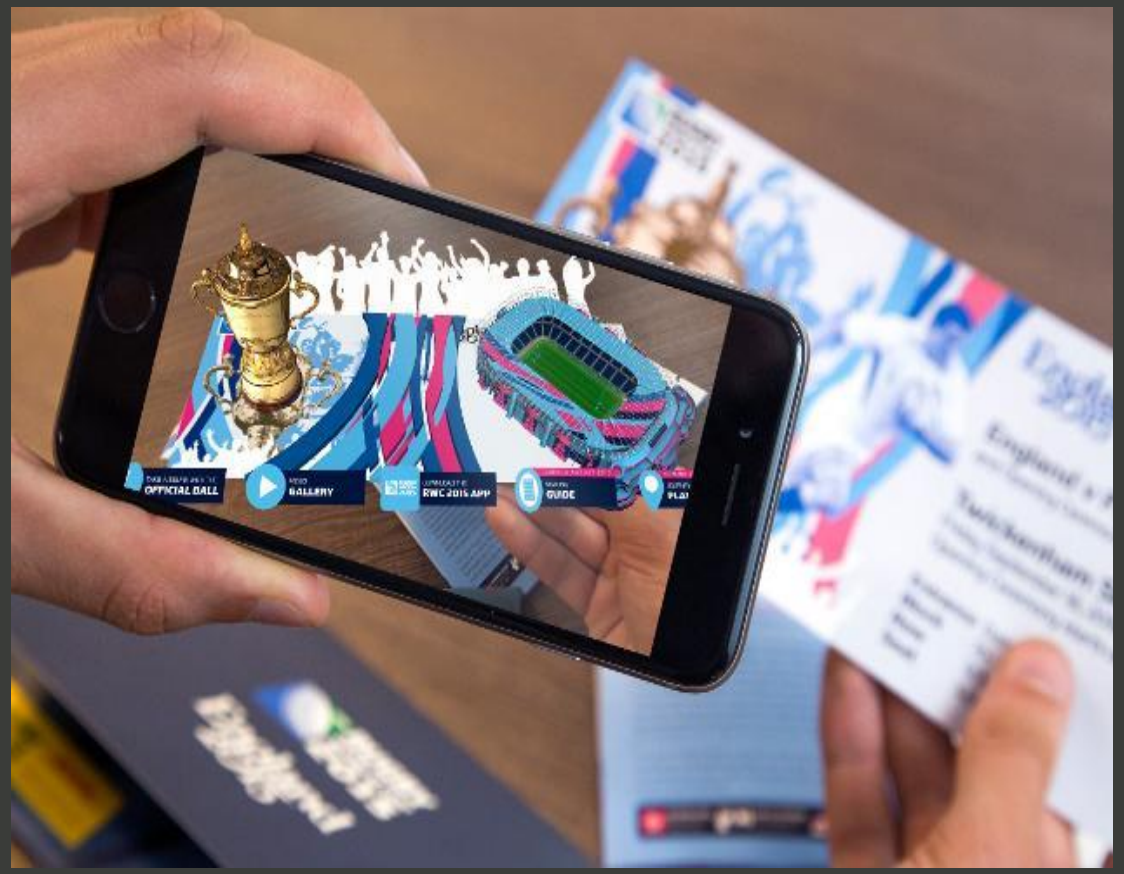
Augmented Reality



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Lean 2.0 Prototype

Using Machine Learning & Augmented Reality to work alongside Quality Inspectors for detecting defects in plastic components

GALLAGHER

Beca

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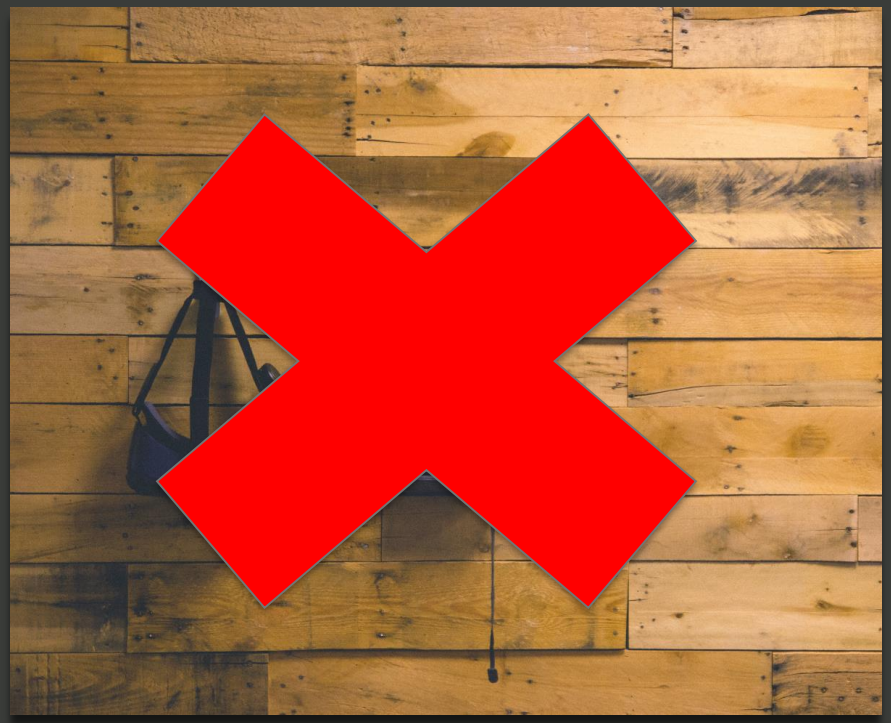
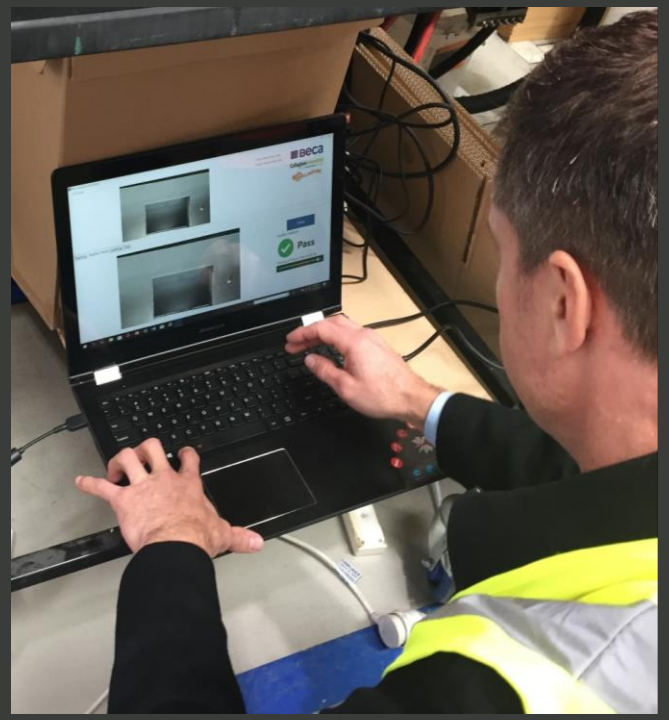
Lean 2.0





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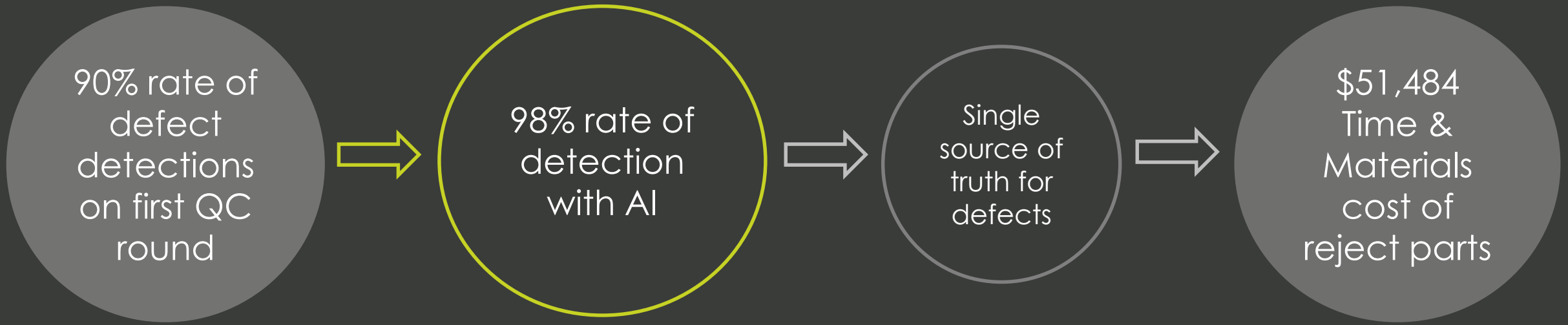
Result:



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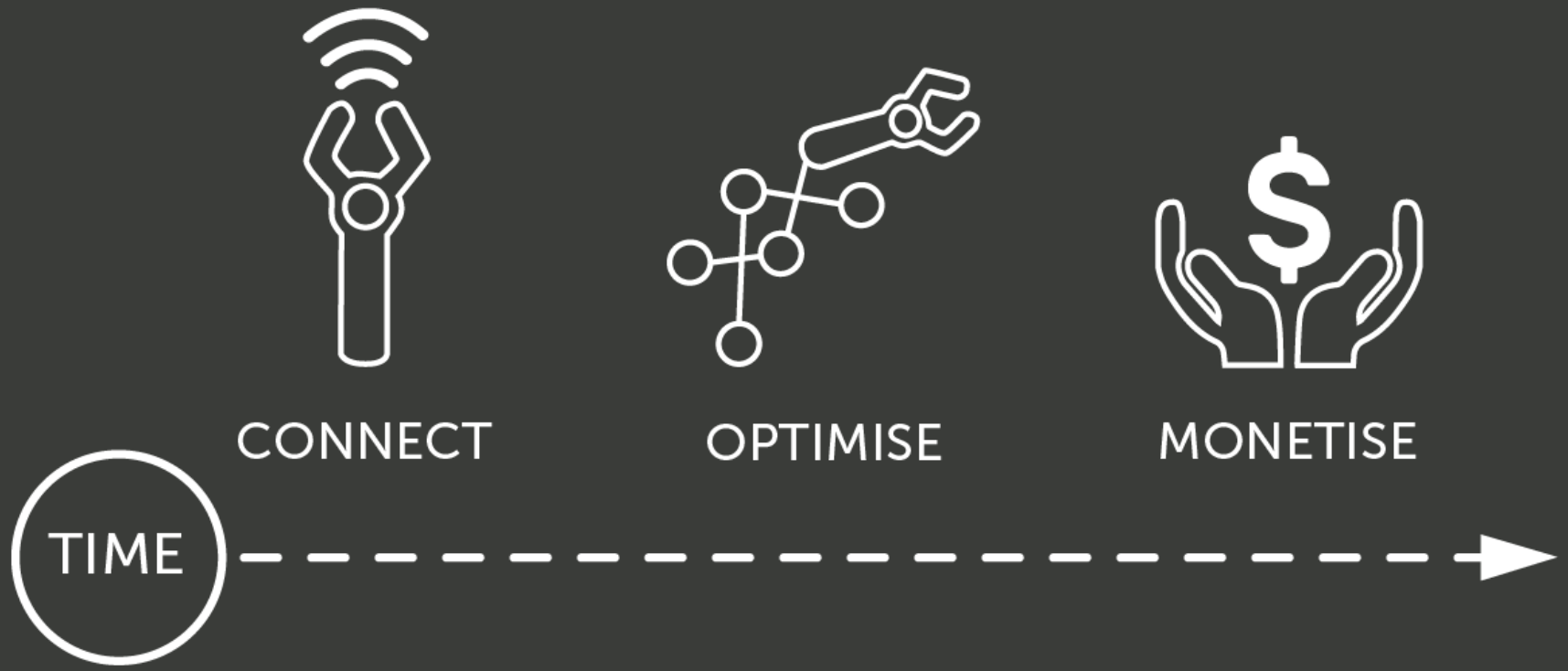
Think Big. Start small. Scale fast.



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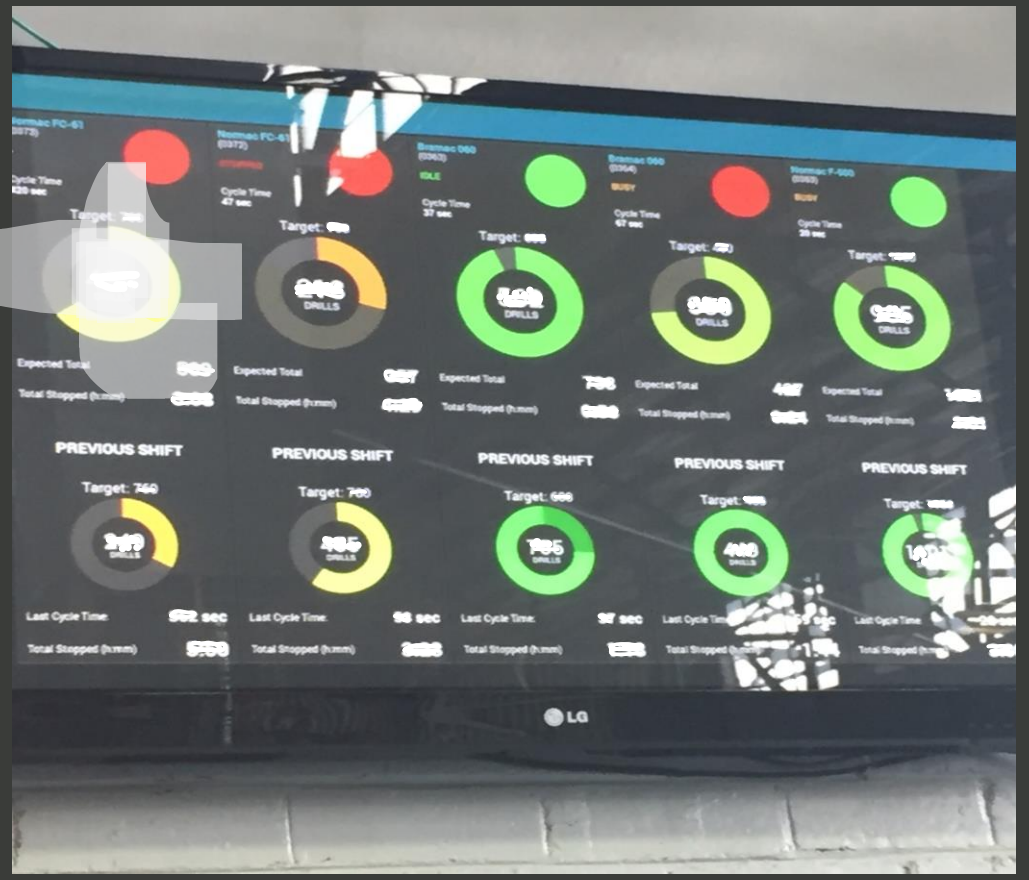
Smart Enough Factory ?



PHOTOS SOURCE : STEVE DOWEY SUTTON TOOLS AUSTRALIA

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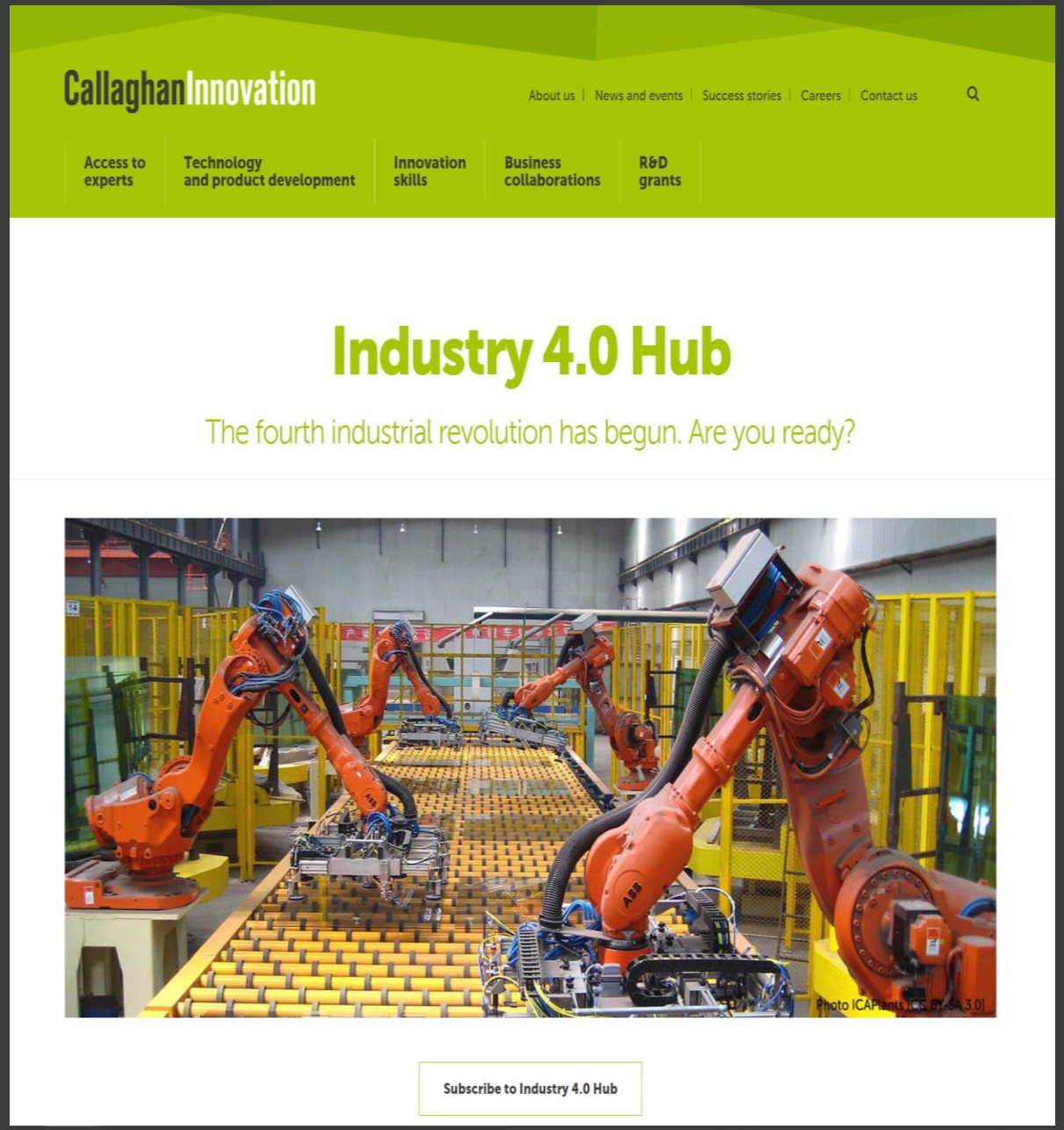


www.callaghaninnovation.govt.nz/industry-4

What is Industry 4.0?

We are now experiencing the fourth industrial revolution – dubbed 'Industry 4.0'. This is characterised by a fusion of technologies that is blurring the lines between the physical, digital and biological.

Just as businesses 150 years ago had to adapt to electricity enabling mass production, today's enterprises face the challenge of embracing smart technologies (such as robotics and artificial intelligence) and data to drive intelligent action in the physical world.

Knowing when and how to incorporate these new technologies into your business model isn't easy, and helping companies adapt to Industry 4.0 is a priority for Callaghan Innovation in its role as New Zealand's innovation agency. We do this by connecting you to the capabilities, co-funding and networks you need to succeed, and by providing valuable insights and ideas.

What does Industry 4.0 look like in practice?

Advances include:

Internet of Things: monitoring and control for increased efficiency

Recent advances in sensing and communication technologies enable you to better understand your production and manufacturing processes. You can identify process bottle-necks and implement predictive and preventative maintenance. Sensors can provide you live updates on your production process as well as identifying when tools are becoming worn or require maintenance.

Digital twin: modelling your product and processes

Using the data collected by sensors and building a computer model of your product or process will allow you to create a Digital Twin. This will give you real-time status updates on your product and processes, as well as going through 'what-if?' scenarios, without putting your assets at risk.

Robots and automation: increased efficiency and precision, reduced health & safety risks

Modern production systems are increasingly automated. However you can also retrofit automation to existing and older machinery to improve performance. Integration of assistive robots, e.g. to perform repetitive and dangerous tasks, delivers further benefits.

Download our infosheet to find out more about Industry 4.0: Industry 4.0 Infosheet (PDF, 121.5 KB)

Download our providers map to find out who provides Industry 4.0 in New Zealand: Industry 4.0 New Zealand providers map (PDF, 372.3 KB)

Case study: Production Machinery Limited (PML): PML, set up originally by Fisher and Paykel last century to develop a single production line for all their appliances, has continued to evolve and is now an exemplar for Industry 4.0. **Read more...**

Case study: Siemens. In Siemens' flagship factory for Industry 4.0 in Amberg, Germany, the factory is eight times more productive than 25 years ago (with the same number of employees) thanks to the incorporation of digital intelligence. **Read more at the Siemens website**

Internet of Manufacturing Trek – 2018. Callaghan Innovation in collaboration with EMA and the Manufacturer's Network is heading to the US with future-focussed New Zealand manufacturers to get an inside look at leading Midwest factories and meet some of America's manufacturing trendsetters. **Read more...**

MaD2018. This event is focussed on the future of NZ manufacturing and design. Come along and be inspired by collaborative industry and research projects and an exciting line-up of speakers #MaD2018. **Find out more at www.mad.org.nz**

How we can help

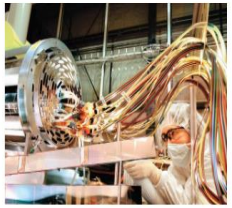
Callaghan Innovation can help your business make the most out of the opportunities Industry 4.0 offers.

Our experts deliver a range of relevant services, including advanced manufacturing R&D, Lean manufacturing training, 3D printing and industrial robot hire. We also provide access to events, sector collaborations and overseas delegations.

Lean

Unleash the value in your business by putting every step of the business process under the Lean lens. Eliminate waste and improve your customer experience.

Read more about Lean →



Tech and product development

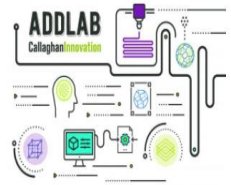
Take an idea from concept to commercial reality with our tailored R&D solutions.

Read more about Tech and product development →

Manufacturing robots

Trial a collaborative robot in your workplace to validate digital manufacturing as an R&D tool for your business.

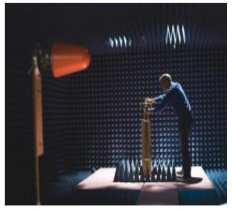
Read more about Manufacturing robots →



AddLab

Our AddLab was developed to inspire and enable more New Zealand businesses to explore new R&D territory through additive manufacturing.

Read more about AddLab →



Data & Internet of Things

Our IoT and data experts will accelerate your product development throughout the entire IoT stack

Read more about Data & Internet of Things →

Hannover Messe 2017

In 2017 we visited the world's largest industrial technology show with some of New Zealand's future-focused manufacturers.

Read more about Hannover Messe 2017 →

Further insights and inspiration

- **Forces of change: Industry 4.0** (Deloitte Insights)
- **Industry 4.0 — Reinventing the Factory Stack** (Medium.com)
- **Industry 4.0: The remaking of manufacturing** (Idealog)

Get in touch to subscribe to updates, give us feedback or suggestions, or ask us how we can help you.

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Industry 4.0 - Providers Guide

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Industry 4.0 - Providers Guide

Data storage & Analytics

aws, Microsoft, Rexroth Bosch Group, SEW EURODRIVE, The Instillery, solnet, Automated Technologies, AXOOM, Beckhoff, DATACOM, IBM, FlexWare, DataNow, TAITCONTROLS, KotahiNet, thinxtra, ubiquiOS, GE imagination at work, Google Cloud Platform, FESTO, SAP, iotstream, FISHER & PAYKEL PRODUCTION MACHINERY LIMITED

Data Visualisation, Augmented & Virtual Reality

FlexWare, Beckhoff, TAITCONTROLS, Schneider Electric, Microsoft, iotstream, DAQRI, harmonic analytics, tableau, Define, CUCUMBER, FANUC OCEANIA PTY LTD, StaplesVR, Automated Technologies, FISHER & PAYKEL PRODUCTION MACHINERY LIMITED

Wireless connectivity

Southern Technology Ltd, ubiquiOS, FlexWare, thinxtra, Vodafone xone, Beca, KotahiNet, iotstream, TAITCONTROLS, Define

Consulting & Systems Integration

eis, FlexWare, Reynolds Group, solnet, PILZ, Microsoft, Automated Technologies, FISHER & PAYKEL PRODUCTION MACHINERY LIMITED, iotstream, Bencom Ltd, CATAPULT, feature IT, kanDO innovation, SAP, ubiquiOS, FESTO, IBM, SEW EURODRIVE, CallaghanInnovation, motiondesign, qdp, DataNow, KotahiNet, swarm INTELLIGENCE, Beca

Research

THE UNIVERSITY OF AUCKLAND FACULTY OF ENGINEERING, chronoptics, HITLabNZ, MASSEY UNIVERSITY, CallaghanInnovation, Beca

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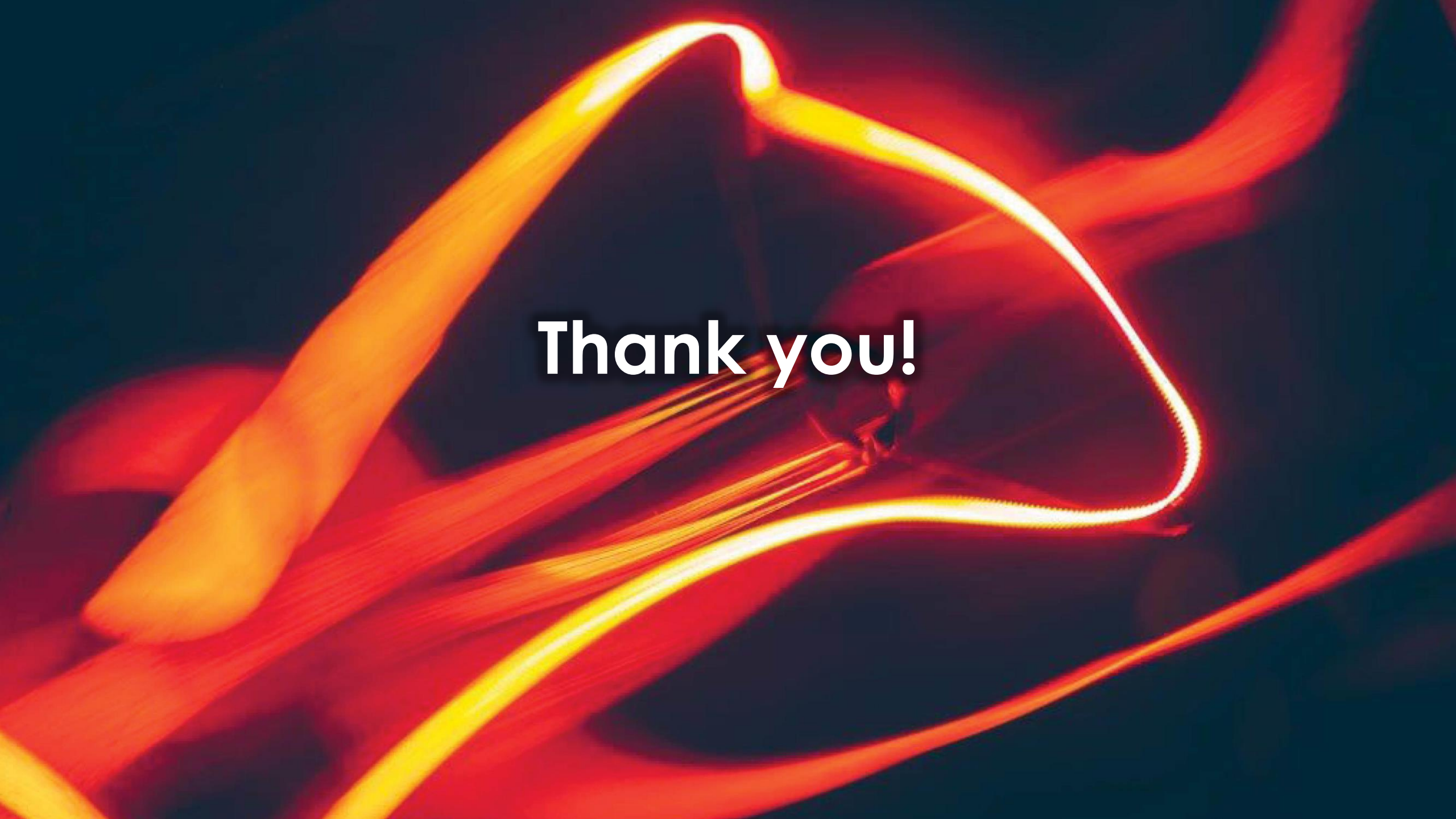
Thank you!