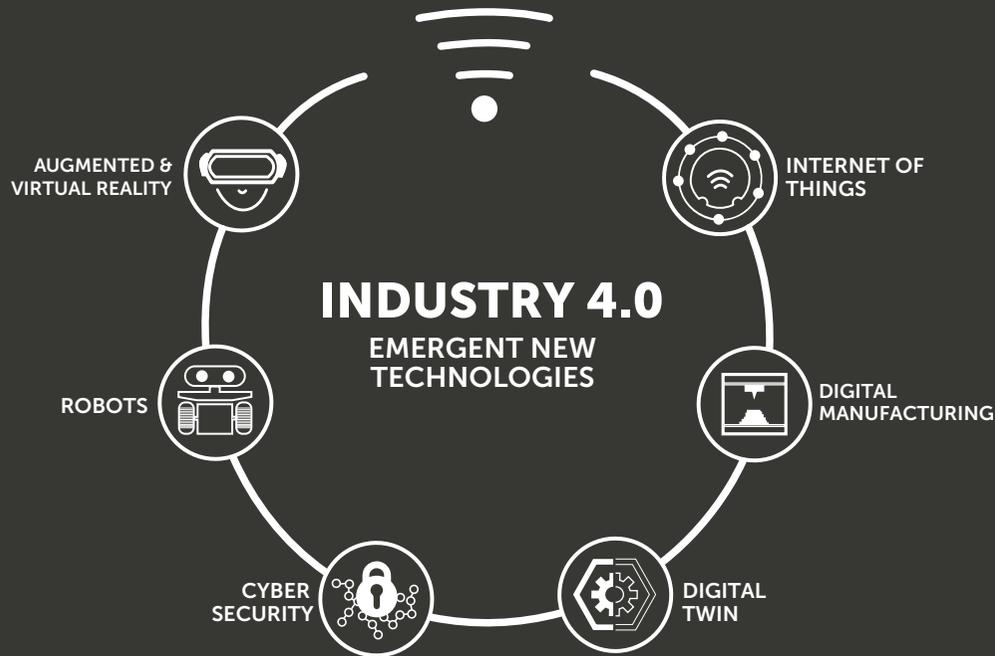# INDUSTRY 4.0

What is Industry 4.0?

Industry 4.0 is the use of a range of digital technologies to enhance the performance, output, monitoring and control of manufacturing processes. It can be broken down into two distinct areas that are not mutually exclusive - Smart Factories and the manufacturing of Smart Products. Industry 4.0 initiatives include process automation, real-time process monitoring, additive manufacturing (3D Printing) and virtual and augmented reality visualisation.

INDUSTRY 4.0
EMERGENT NEW TECHNOLOGIES

AUGMENTED & VIRTUAL REALITY

INTERNET OF THINGS

ROBOTS

DIGITAL MANUFACTURING

CYBER SECURITY

DIGITAL TWIN

Why is it Important to Your Business?

Capturing data across your business enables live monitoring, visualising and controlling your production resources in real-time. Use your machinery, labour and production assets more flexibly and reliably. Capturing data, using sensors in your products, will tell you how customers are actually using them. Benefits could include improved product performance, customer service, informing future design and the creation of new revenue models.

What Does Implementation of Industry 4.0 Look Like in Practice?

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 & 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.

Digital Manufacturing: Unmet Flexibility in Form and Function
Digital Manufacturing converts digital design data straight into physical objects. '3D printing' or additive manufacturing is one such example. It opens up new opportunities for manufacturers, increasingly replacing some components of traditional manufacturing and allowing new geometries and internal structures for lighter, stronger and more cost-effective designs.

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Augmented and Virtual Reality: Visualising Data for Insight

Augmented reality and virtual reality are visualisation technologies with applications ranging from product development through staff training and pinpointing maintenance and performance issues.

Cyber Security: Keeping You Safe

While technological advances bring many benefits to businesses they also bring risk especially in the form of cyber attacks. Implementing suitable cyber security solutions will help to protect you from ransomware attacks or theft of valuable intellectual property.

Case Studies (New Zealand)

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. PML works internationally and locally to help others implement the latest technologies incorporating plant layout, factory simulation, design-for-manufacture consulting, service, plant and production monitoring and management software, which together build smart factories. Its newest offering is COSMOline, production equipment software which collects, analyses and acts on efficiency, quality, maintenance and environmental production data generated.

Case Studies (International)

In Siemens' flagship factory for Industry 4.0 in Amberg, Germany, the factory is 8 times more productive than 25 years ago (with the same number of employees) thanks to the incorporation of digital intelligence.

The Bosch Rexroth factory at Homburg, Germany, adopted Industry 4.0 technology for its production of hydraulic valves for mobile machinery like tractors. Aiming to become more competitive through manufacturing at lower costs with increased flexibility, and higher quality standards, it has.

- Reduced set-up time from 450 seconds to zero
- Reduced inventory days from 3 to 1.5, with a 30% stock reduction
- Cut cycle times from 474 seconds to 438 seconds, with a 10% output increase
- Saved €500,000 per year

How Can We Assist You to Implement Industry 4.0 in Your Business?

Lean & Lean 2.0

Lean manufacturing, pioneered by Toyota, has now become widespread throughout industry, Callaghan Innovation runs Better By Lean programmes across New Zealand with annual workshops in most major centres. Attendees can access Lean consultants to come into your business and help you implement the approach. Callaghan Innovation is currently developing Lean 2.0 to add industry 4.0 approaches to existing Lean methodologies.

Research and Technical Services

Callaghan Innovation offers a range of specialist scientists and engineers in fields relevant to Industry 4.0, from Sensing and Data Science to Virtual Reality development. Talk to us about how we can support your initiatives.

The University of Auckland Industry 4.0 Lab

See real life industrial examples of Industry 4.0 technologies including the digital twin, augmented and virtual reality and IoT sensors on applications such as milling, turning, industrial robots and connected products.

Collaborative Robots & Automation

To support uptake of collaborative robots we can offer a one month free trial. We also have staff trained in integration of robots in existing process equipment.

Speakers, Collaborations and Overseas Missions.

Callaghan Innovation has a programme focused on bringing Industry 4.0 to New Zealand companies. Keep an eye out for upcoming events.

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