Manufacturing & Emerging Technologies

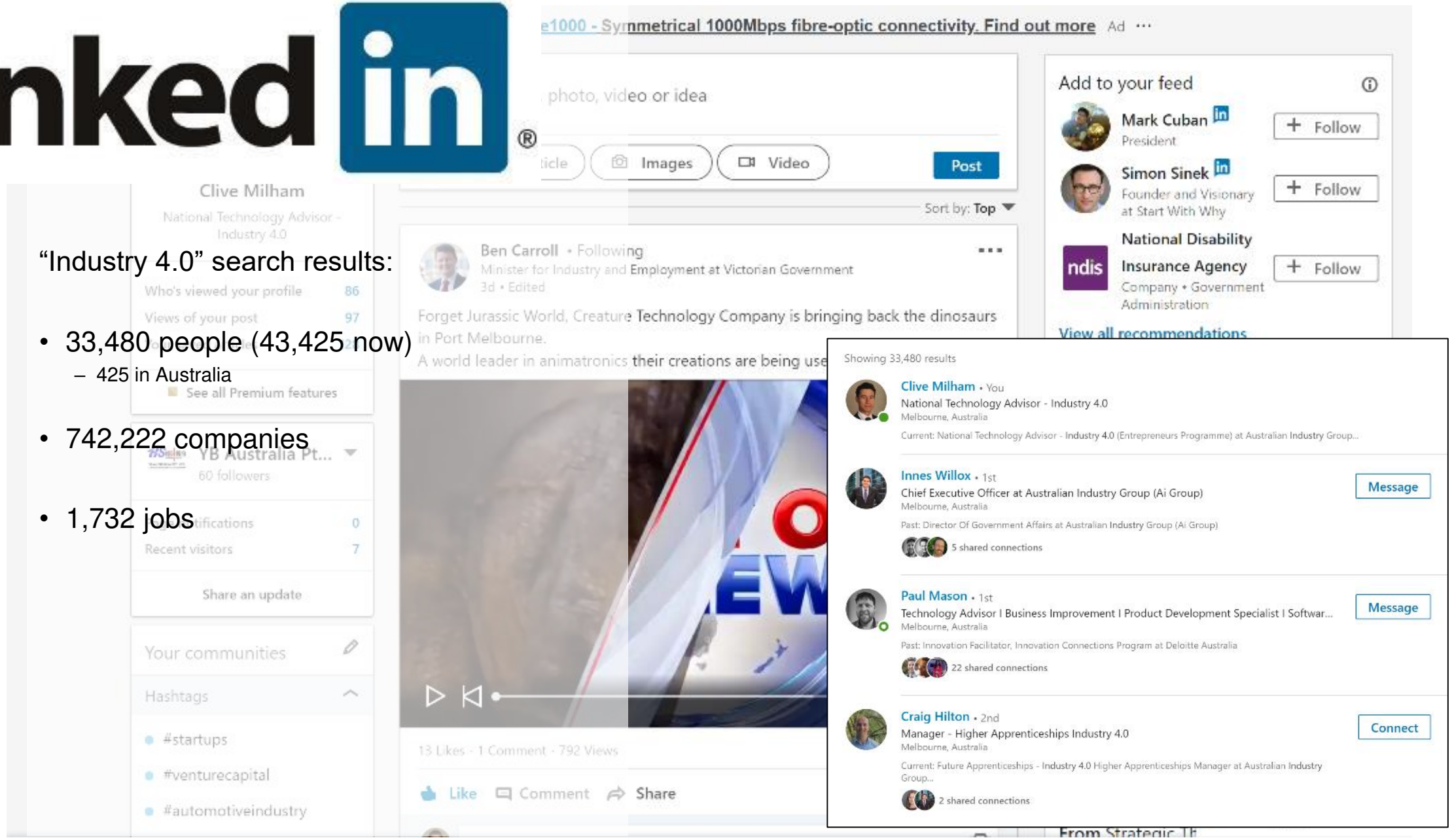
Automation, Robotics, Augmented reality, Virtual reality, 3D Printing

Daniel Gronowski – CCIC, May 2019

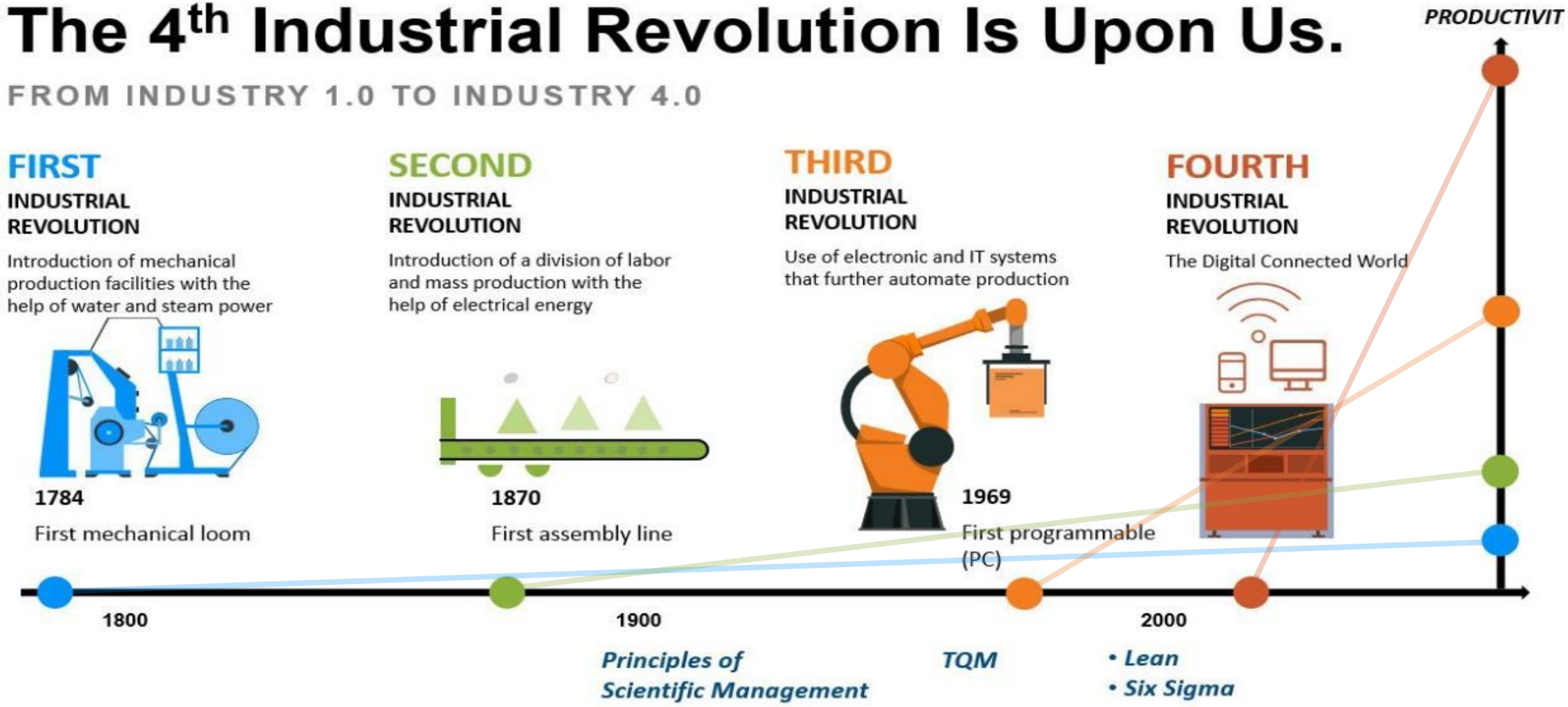
LinkedIn

“Industry 4.0” search results:

- 33,480 people (43,425 now)
  - 425 in Australia
- 742,222 companies
- 1,732 jobs



Industry 4.0 – What is it?



Automation Trends

Automation of both digital and physical systems

- Combination allows for smarter machines
  - better safety (No need for cages)
  - autonomous decision making (navigation and collision avoidance)
- Increased simplicity to set up and program
- Lower cost and more flexible

Automatic data collection with advanced sensors,

- Barcode readers, RFID etc for tracking goods
- Machine utilisation for process improvement
- Sensors in products enables new business models

Digital design linked directly to manufacturing

- Enabled by cost effective short production runs
- Allows for mass Customisation to increase customer value

Automation - Examples

- Collaborative robotics (Cobots)
  - Useful for simple unskilled tasks such as pick and place, packaging, labelling etc
  - The Robot People / Universal Robotics, Omron / TM, local suppliers (Sydney)
  - Can also be programmed for more difficult tasks - Robotics Systems (Newcastle)
- Sensors and data collections (Automated realtime data)
  - Can be applied to optimise machine utilisation, energy, maintenance etc
  - Movus (QLD) – Fitmachine magnetic machine health sensors
  - NSW govt energy efficiency grant ($50,000 for energy monitoring equipment)
- Automated Warehousing
  - Everything from automatic material selection for MFG to fully automated transport
  - Robotics batching for assembly (ABC Manufacturing)
  - Toyota Materials Handling – Autonomous forklift
  - Automated Robotic Vehicles (Small drone vehicles <500kg)

Augmented and Virtual Reality

- Virtual or immersive mixed reality environments
  - Virtual reality environments with or without VR glasses
  - Tracking of objects and environments (Xbox Kinect, Microsoft hololens)
  - Use of mobile applications for viewing and scanning
- Can often be directly created from existing CAD/CAM designs
  - Most major CAD suppliers link to an AR/VR tool
  - Laser and image scanning to CAD model automation
- Combination with machine vision technologies
  - Automatic recognition of parts and assemblies
  - Tracking of individual within an immersive space

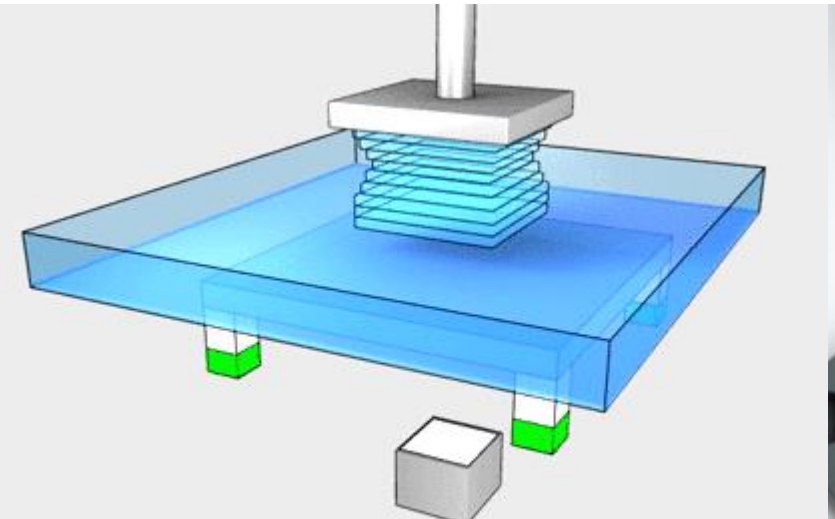
AR and VR - Examples

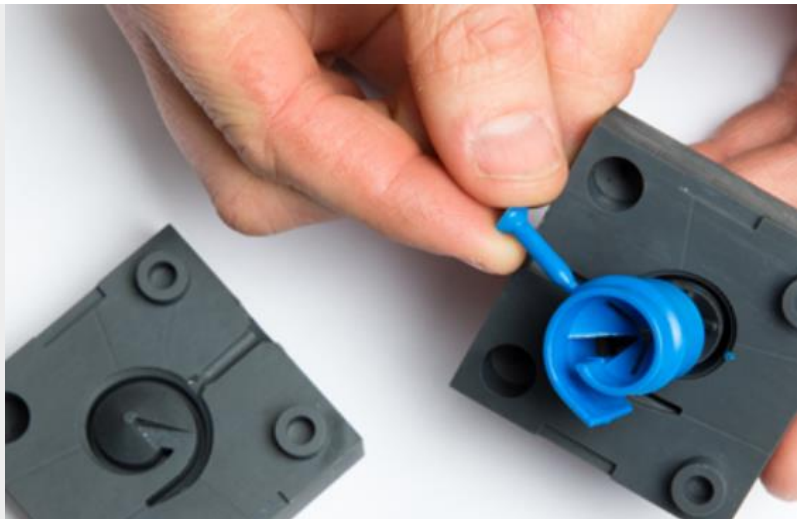
- Training environments
  - Flying Doctors immersive training
  - Mining safety training (UNSW iCinema)
- Product visualisation and design
  - Showing customers designs in place
  - Testing design ergonomics, form and function
  - Helimods – Scanning, digitisation and 3d modelling to test form and function
- Field repairs and servicing manuals
  - Utilises existing CAD models for disassembly and visualisation
  - Integration of sensor data into imagery
  - Leap technologies -

Additive Manufacturing (3D Printing)

- Adding material than subtracting material
  - (e.g. bricklaying Vs CNC machining)
- Benefits
  - Great for innovation and prototyping, production runs of 1
  - Can create intricate shapes for improved performance
  - Allows for physical realisation without expensive tooling
- Challenges
  - Material properties and costs
  - Speed of production

- Cheap Fast and effective materials
  - Polymer filaments
  - UV cured plastics
  - Ceramics
- Slower and more expensive equipment
  - Metals (e.g. titanium laser sintering)
  - Large scale (concrete for buildings)

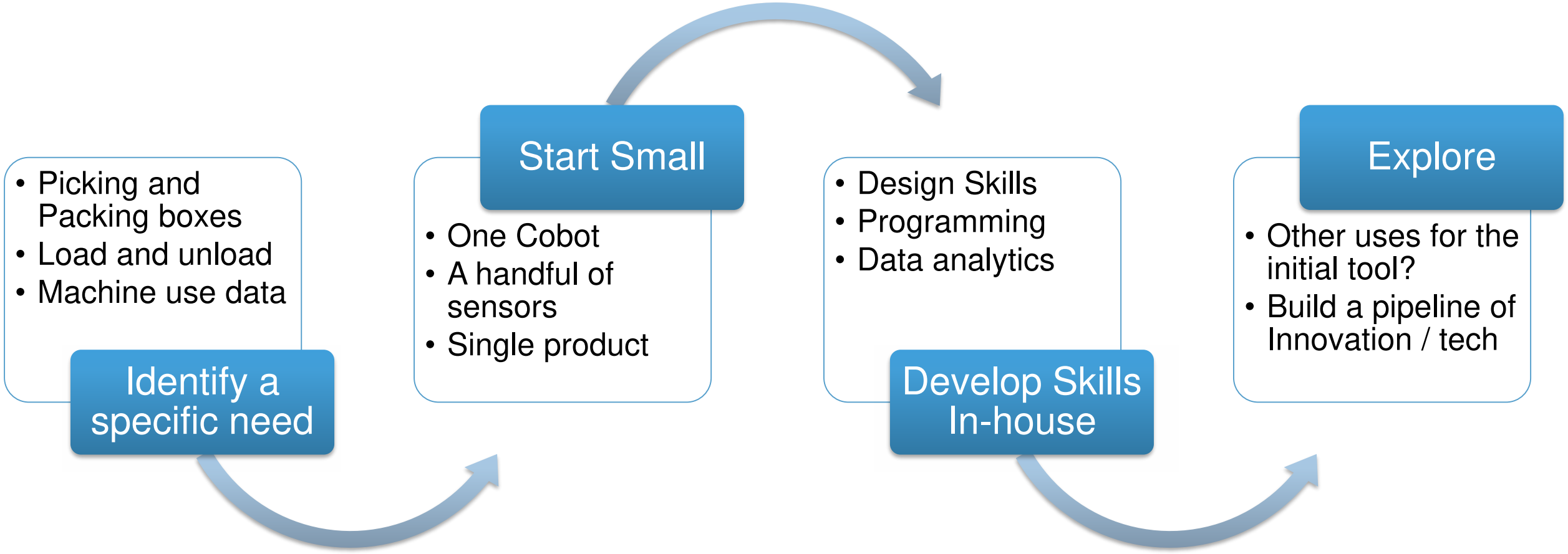




3D Printing - Examples

- Rapid Prototyping
  - Simplest form of adoption
  - Allows for rapid iteration of molds, part geometries,
  - Any polymer metal printer could enable sacrificial casting into metal
- Medical Devices and Dental
  - Asiga (UV cured polymer), Worlds first affordable high res 3d printer (Sydney Based)
  - Used for dental (Invisalign, veneers etc) and Custom jewellery
  - Both high value, highly customised applications
- New part geometries and improved performance
  - Allows for intricate shapes and designs not available to traditional machining and casting
  - Value uplift > speed and efficiency
  - Rocketlabs (NZ) creates 3D printed high efficiency rocket engines

Tips for exploring new technologies



Thank You and Questions?

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