Operationalising Industry 4.0 for Businesses

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Business Opportunities Through Industry 4.0
Industry 4.0 – What is it?

A confluence of multiple technology sets...

"...the (real-time) intelligent integration of humans, machines and objects towards a management of systems....."
# Changed Value Creation and Capture

<table>
<thead>
<tr>
<th></th>
<th>Traditional (Manufacturing) Mindset</th>
<th>Digital (Manufacturing) Mindset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Creation</strong></td>
<td></td>
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<tr>
<td>Customer Needs</td>
<td>Service existing needs, reactive</td>
<td>Address real time + emergent needs in a predictive manner</td>
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<tr>
<td>Offering</td>
<td>Product obsolescence as a function of time</td>
<td>Product refresh via software update, partial physical upgrade, synergistic</td>
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<tr>
<td>Role of Data</td>
<td>Single data point to define future products</td>
<td>Use data to create product experience, enable services, synergies with other systems</td>
</tr>
<tr>
<td><strong>Value Capture</strong></td>
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<tr>
<td>Profit Creation</td>
<td>Sell the next/more of product</td>
<td>Enable recurring revenue</td>
</tr>
<tr>
<td><strong>Control Points</strong></td>
<td>IP ownership, brand, commodity advantage</td>
<td>Personalisation, context, network effects</td>
</tr>
<tr>
<td><strong>Capability</strong></td>
<td>Use existing core competence, resources and processes</td>
<td>Systems thinking, n-sided markets, platforms</td>
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Opportunities arising from Digitisation in Manufacturing

**Operational Efficiency**
- Better visibility into factory
- Better visibility into supply chain
- Better HSE outcomes
- Asset utilisation
- Operational cost reduction
- Worker productivity
- Pay per use
- Software based services
- Data monetisation
- Servitisation
- Predictive/preventative maintenance
- “Pay per laugh”

**New Products & Services**
- Pay per outcome
- New connected ecosystems
- Platform enabled marketplace
- On demand, hyperlocal manufacturing of customised products for audiences of one
- Self-assembling factories
- Self-configuring factories

**Outcome Economy**
- Continuous demand sensing
- End to end automation
- Resource optimisation and waste reduction

**Autonomous Pull Economy**
- Continuous demand sensing
- End to end automation
- Resource optimisation and waste reduction
Ok I get it....

...but how do I go about operationalising this....
How to Operationalise This?

- Articulate the business outcomes
- Define the value drivers
- Define technology required to deliver value drivers
How to Operationalise This?

- Articulate the business outcomes
- Define the value drivers
- Define technology required to deliver value drivers

A new product that:
- Is customised for individual customers
- Allows my customer to get from A to B
- Gives my customer information about his fitness
- ...

- Custom frame
- Custom joints
- Connected odometer
- Heart rate monitoring
- Wheels
- Breaks
- ...

- Process to get information about anatomy of my customer
  - 3D scanning
  - Customer specific design
    - E.g. custom algorithm to design joints etc...
  - Manufacturing process for lots of 1
  - Sensors
  - Data Platform
  - Analytics
Articulating Business Outcomes

Hypothesis-Driven  

Strategy Driven
Hypothesis Driven Business Outcomes

enabled by Industry 4.0
Hypothesis-Driven: Be a scientist and de-risk

- Very new ideas
- Low company competency/skill set
- Smaller companies
- Left field ideas “that could just be it”
- Ideas where ROI isn’t clear
- Time constraints do not allow you to pursue an idea in house

Be a scientist
- Use rapid ideation, prototyping and testing to experiment

De-risk
- Tap into low cost resources to do so – university collaborations
- Leverage innovation support

https://www.nngroup.com/articles/design-thinking/
Digital Experimentation and De-risking

E-Class Tram Re-design

- Objective: To improve safety, particularly for pedestrians in vicinity of trams

- Achieved by:
  - Increasing driver sightlines – thinner A-pillars, wider side windows, lower console equipment
  - Reducing glare on driver’s windscreen

Courtesy Dr Ambarish Kulkarni, Swinburne
De-risking Through Digital Tools
Improving Sightlines

CURRENT

NEW CAB

Courtesy Dr Ambarish Kulkarni, Swinburne
De-risking through University/Industry Collaboration

e.g. Factory of the Future

Digital Design and Prototyping

Atom-based Prototyping
Derisking: Leverage Students and University Collaboration

- Internships
  - Unpaid
  - Full time
  - 3 months

- Work Placements
  - Unpaid
  - 2 days/week
  - 6 or 12 months

- PhD Projects
  - PhD internship
  - PhD consultancy
  - PhD placement

- Multi-year, (multi-partner) research

Increasing value, increasing complexity, increasing risk
Leverage Funding

e.g. Commonwealth Funding

Duration of projects investment (months)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Increasing value, increasing complexity, increasing risk

 Courtesy David Chuter, IMCRC
Strategy Driven Business Outcomes

Enabled by Industry 4.0
Business Aspects

• (Manufacturing) companies do not have digital strategies
• (Manufacturing) companies do not understand business models enabled by digital
• (Manufacturing) companies do not know how to take advantage of IoT/Industry 4.0/Industrial Internet

• Lack of skills

cf. Germany:
80 % of value chains digitised by 2020
Strategy provides the rationale...

Without strategy

• No rationale for investment in **people and training**
• No rationale for investment in **new technology**
• No rationale for investment in **R&D**
• No rationale for investment in **Design**
• No rationale for investment in **Prototyping**
### Strategy Driven Business Outcomes at Factory of the Future

<table>
<thead>
<tr>
<th>Playing</th>
<th>Thinking</th>
<th>Doing</th>
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</table>
| Development of technology demonstrators showing business outcomes (Federal Gov Grant)  
• e.g. increased productivity through better resource usage  
• e.g. increased productivity through better predictive maintenance  
• e.g. competing on differentiated value through products of one for markets of one - reconfigurability | Co-creation of Industry 4.0 Strategy with businesses – consulting services (Vic Government I 4.0 Hub grant)  
• Delivery of Innovation Audit  
• Delivery of Industry 4.0 readiness assessment  
• Development of Industry 4.0 enabled product strategy  
• Development of product and technology roadmaps | Training and scalable university engagement models  
• Scaled, Industry-led R&D  
• Short technical courses  
• Industry 4.0 for Leaders  
• FoF as a Lab for Industry |
Playing – Getting the Conversation Started
Business Outcome: Better Resource Usage
Thinking

Co-articulation of Industry 4.0 enabled business-product and technology strategy with business
Strategy and Innovation Journeys

Step 1: FutureMap Innovation Capability Assessment

Step 2: Industry 4.0 Readiness Assessment

Step 3: Industry 4.0 Intensive Training

In partnership with IMCRC, Victorian Government
futuremap™

• Market positioning,
• Leadership, strategy and change management; and
• Innovation and use of technology; and
• Digital manufacturing (Industry 4.0).
Strategic Approach

In partnership with IMCRC
Industry 4.0 Business or Production Readiness

Use a Readiness Assessment Framework

Results
Diagnostic of current state of company
Identification of areas for improvement

• 31 “Super-Indicators”
• 5-7 “Sub-Indicators”
Indicators

**Lean**

1. Design of Value Stream
2. Materials Ordering and Supply
3. Implementation of Continuous Improvement Processes
4. Workplace Design
5. Leveling of Production and Logistics
6. Process definition and documentation
7. Standardisation
8. Design for assembly and manufacturing
9. Employee Qualification
10. Cultural Awareness
11. Employee Flexibility
12. Quality Consciousness of Employees
13. Total Productive Maintenance

**Industry 4.0**

1. IT and Cybersecurity
2. Legal Requirements for new technologies
3. Industry 4.0 target planning
4. Information supply at the workplace
5. Technology and innovation management
6. Knowledge exchange and cooperation networks
7. Application of cloud services
8. Company-wide connecting
9. Monitoring and operational data collection
10. IT supported production planning
11. Digital map of the production
12. Machine-to-machine communication
13. Intelligent plants and machinery
14. IT-supported logistics management
15. Real time process control software
16. Human-machine interface
17. Application of simulation models
18. Smart Data
Industry 4.0 Product Management

GPS

- GPS Module
  - Satellite Triangulation
- Signal Processing
  - IC 1 Function
  - IC 2 Function
- Data Storage
  - Store Data
  - No data storage
- Output Module
  - Switch/Relay
  - Communicate Visual to User
  - Transmit

Functional Attributes
- Delivered by current technologies
- Requested by current markets
- Delivered by new technologies (incl. Industry 4.0)

Value Drivers

Product

Output Module
Industry 4.0 Product Management

Step 1 – Hypothesise new I 4.0 enabled value drivers
- Articulate the business outcomes
- Define the value drivers
- Define I 4.0 technology required to deliver value drivers

Step 2 – Prioritise using multiple tools (e.g. Pfeiffer Matrix)

Led by IMCRC
Trend Radaring
Combine With Market Context into Roadmap

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
</tr>
<tr>
<td>Product Development Projects</td>
</tr>
<tr>
<td>Technologies</td>
</tr>
<tr>
<td>Technology Development Projects</td>
</tr>
<tr>
<td>Knowledge &amp; Competencies</td>
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</table>
Doing

De-risked Innovation Projects and Training
Testlab pilot program prepares for revolution

21 December 2018

A new program designed to prepare businesses for the fourth industrial revolution will take place in six selected Australian universities.

The University of Queensland, the University of Technology Sydney, the University of South Australia, the University of Western Australia and Swinburne University of Technology have been chosen to participate in the pilot program.

These institutions join the University of Tasmania, which has already been allocated funding to participate in the program.
An Open Demonstrator, Industry Outreach, Teaching and Research Platform for Industry 4.0

Co-creation with industries
Empowerment thru upskilling
Inclusion: network of universities
In Summary

Basic Business Capabilities
- Manufacturing Leadership
- Business Model Innovation

Digital Business Capabilities
- Industry 4.0 readiness
- Industry 4.0 strategy

Design Services R&D Services
- Universities
- Research Providers
- Funding Across TRL and IRL Scales

Innovation Process
- Innovation Precincts
- Accelerators/Incubators
- Venture Capital

Market

Skills

Societal Stakeholders: Human Centricity
Thank you!

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