What Is Driving Your Digital Manufacturing And Industry 4.0 Transformation?

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BLUE PALAIS Centre of Corporate Evolution

Blue Palais.eu

IUBH School of Business and Management
Agenda

1. Times of Change
2. The Nature of Digitisation
3. The Benefits of Digitisation in Manufacturing
4. Things to do to stay ahead of the Game
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1. Times of Change
2. The Nature of Digitisation
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4. Things to do to stay ahead of the Game
Understanding of Digitisation and I-4.0

Do change + disruption take place in your factory or somewhere else on this planet?
Understanding Digitisation and I-4.0

• No understanding of what is disruption?

• Disruption skills and attitudes: lacking!
Understanding Digitisation and I-4.0

• Too narrow focus on
  - intra-factory
  - on site manufacturing topics?

• Big Picture + Entrepreneurial momentum: missing!
Understanding Digitisation and I-4.0

• Too technical, too much IT + Engineering focus?

• Strategic + business momentum? Not clear!
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The Nature of Digitisation in Manufacturing

1. Information and Intelligence

- Value of
  Data
  Information
  Knowledge
The Nature of Digitisation in Manufacturing

General Business Model (single process)  Example: Transport

- **Driver**
- **Truck**

**Status Information**

**Process Information**

**Resources** = CPE

**By-product** (= CPE)

**Exhaust fumes**

**Transported Object**

**Product** = CPE

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The Nature of Digitisation in Manufacturing

General Process Model (Process Chain)
Sources of Uncertainty in Manufacturing

Financial
- Currency exchange
- Increased labour cost
- Fuel Price & Shortages
- Legislation & Compliance
- Bankruptcy

Geo-political
- Global Financial Crisis/Recession
- War
- Terrorism
- Industrial Unrest / Strikes
- Labour Shortages

Infrastructure
- Infrastructure Congestion
- Technology failure
- Outsourcing
- Consolidation of Operations
- Extending Manufacturing

Nature Hazards
- Contamination
- Fire
- Volcano Eruption
- Earth Quake
- Industrial Unrest
- Bankruptcy
- Legislation & Compliance
- Increased labour cost
- Fuel Price & Shortages
The Nature of Digitisation in Manufacturing

1. Information and Intelligence

- Major purposes
  - Transparency + control
  - Improved decision-making
  - New ideas + innovation

- Managing Uncertainty

- „Intelligence“ = strategic corporate skill!
The Nature of Digitisation in Manufacturing

2. Virtualisation

- Replace reality by information and data modelling
- Objects and processes
- Manifold of data sources
  - Sensors
  - Software apps
  - MES etc.
  - ...  
- New applications, e.g. augmented reality
3. Connectivity and Networking
Virtualisation + Linking example – Supply Chain

Fluctuation of orders ‘upstream‘: The Bullwhip Effect
The Nature of Digitisation in Manufacturing

3. Connectivity and Networking

• Connecting all Cyber-Physical Elements
• Overcome time + space barriers
• Connect + interact
• Total ubiquity, total access

What if no readiness to share information assets?
The Nature of Digitisation in Manufacturing

4. Integration and Standardisation
Supply Chain Integration

- Supplier
  - Flow of Material
- OEM
  - Flow of Material
- Retailer
  - Flow of Material
- Consumer
  - Flow of Information

⇒ Competition of Manufacturing Supply Chains

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The Nature of Digitisation in Manufacturing

4. Integration and Standardisation

- Elements add to Entities
- Systems approach
  - Synergy
  - Economies of Scale
- Unification / Standardisation

What if access to operations data for the purpose of maintenance and delivery is denied?
5. Automation

- Rules + algorithms-based complex process chains
- Major motifs:
  - Speed
  - Reliability / Q-control
  - Cost efficiency

What if complexity / inpredictability levels are too high
=> standard algorithms + automation fails
The Nature of Digitisation in Manufacturing

6. Enable => Innovate

- New processes enabled
- Process Re-engineering
- New business models
- Entrepreneurial skills at work
- New Strategic positioning
3D Printing will be mainly used for:
- High value products
- Highly customized products
- Low volumes

Examples are:
- Prototypes
- Prosthetics
- Spareparts
- Customized / individualized products
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The Benefits of Digitisation in Manufacturing

What is Driving your Digital Manufacturing and Industry 4.0 transformation?

⇒ Where´s the Competitive Advantage?

⇒ What to Achieve? Where´s the proven Benefit?

⇒ How to justify Investments?
The Benefits of Digitisation in Manufacturing

Objectives supported by Digitisation

... seen from a strategic position
The Benefits of Digitisation in Manufacturing

Objectives supported by Digitisation:

- **Meta Objective**: Long term Survival, i.e. **Sustainability**
The Benefits of Digitisation in Manufacturing

Objectives supported by Digitisation:

- **Meta Objective:** Long term Survival (i.e. sustainability)
- **Security – Safety - Stability**
The Benefits of Digitisation in Manufacturing

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- Meta Objective: Long term Survival (i.e. sustainability)
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- Adaptability („Flexibility“)
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The Benefits of Digitisation in Manufacturing

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- **Size <= Growth <= Surplus / Profits <= Efficiency + Productivity**
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- **Attractiveness** for all Stakeholders
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BUT: What’s really new – technology?

- Virtualisation – Network – Automation

2 crucial drivers

- more data (Big Data)
  - => new applications – usage of information

- internet, wireless
  - => Information everywhere available
  - => unlimited mobility of all CPEs
What Is New?

That’s New: Entrepreneurial Spirit, Innovative Momentum => Real Strategic Impacts

1. Big Data – 21st Century Gold
2. „Intelligent“ Hardware + Service Strategy
3. Self Service / On-Demand Principles
4. Internet: Ubiquity + Space/Time Independence
5. Batch size 1 / Total Mass Customisation
What Is New?

1) Big Data – the 21st Century Gold

- **New applications and usage** for data
  => new **markets** and **willingness to pay** for data

- Data deliver triggers for **automation**
  => Impacts: productivity, cost reduction, process quality, independence

- More **transparency**: Benchmarks + Control => Security

- **Agility and Acceleration** => faster / better decisions + plannings

- More Information: more **opportunity for improvements**

- Stimuli information: **new ideas** generated
What Is New?

2) „Smart“ Hardware and CPE

- Make all products „smart“ and „intelligent“:
  add IT interface and connect to valuable information

- Generate new functionalities,  
  create new user benefit with **valuable information + apps**

- Service abonnements = Δ **business model** => customer loyalty

- Offensive Service Strategies
3) **Apply Self-Service Principles**

- Self-services: Shift *workload* and *responsibility* over to customer
- On-Demand (KANBAN)

- Self-Service + Automation  
  => Cost reductions  
  => Customer autonomy
4) **Web Ubiquity** – Independence in Space and Time via Total Connectivity

- **Decentralisation** of activities and CPEs (e.g. 3-D-printing)
- **Full mobility** of all activities and CPEs
- **Integration** and **Standardisation impacts**: Power for your Organisation
- **Swarm Power** mobilises unknown potentials, energies, capacities e.g. crowdfunding, shitstorm, R&D contributions, intra- and inter-firm collaboration, m2m machine parks / robot farms
- **Unlimited geographical Reach** (Globalisation)
- **Volume and Size impacts**: => *economies of scale*
5) **Customizing**

- Customised Product and Order Specifications including Delivery Service!
  - Variety towards 1,000,000
  - Batch size down to 1
  - \( \Rightarrow \) Adaptability (Flexibility)
The Benefits of Digitisation in Manufacturing

Example:

Maintenance Order Workflow Automation - Real Time
The Benefits of Digitisation in Manufacturing

Supplier of Parts
Machinery Company

Execute Supply Order

Maintenance

PPS

Operation data

MES

Operation Process
The Benefits of Digitisation in Manufacturing

Example: Maintenance Order Workflow Automation - Real Time

Features and Advantages:

- Early and fast detection of break-down cases
- Exchange of failing parts prior to break-down
  => Avoid or Reduce Down Times
- Early and optimised Scheduling of Spare Part Manufacturing and Delivery and Repair Processes
- Automation – also within inter-corporate workflow !!
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Managerial Consequences

3 Considerations:

1. Analyse potential Disruption in your + related industries

2. Evaluate Change + Digitisation Options

3. Build your own Digitisation Roadmap

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Thank you for your attention!

Take Action!

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