

Evolution of business models in the era of Industrial Internet

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About Me

Karan Menon



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- Master's in Material Science, Tampere University, Finland
- PhD Fellow (defense – early 2020), Unit of Information and Knowledge Management, Tampere University
- Research funded by Business Finland & Academy of Finland Projects, Finnish Cultural Foundation (Suomen Kulttuurirahasto), The Jenny and Antti Wihuri Foundation (Jenny ja Antti Wihurin rahasto), The Finnish Foundation for Technology Promotion (Tekniikan Edistämissäätiö)
- Topics: Industrial Internet, Industry 4.0, Business Models, Platforms, Business Data Analytics
- Collaborators: West Virginia University (USA), Copenhagen Business School (Denmark), ETLA (Helsinki), Manufacturing companies in Finland, Germany and USA
- Speaker for FMTX, MPDAYS, WVU (USA), Executive MBA programs etc.

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Agenda

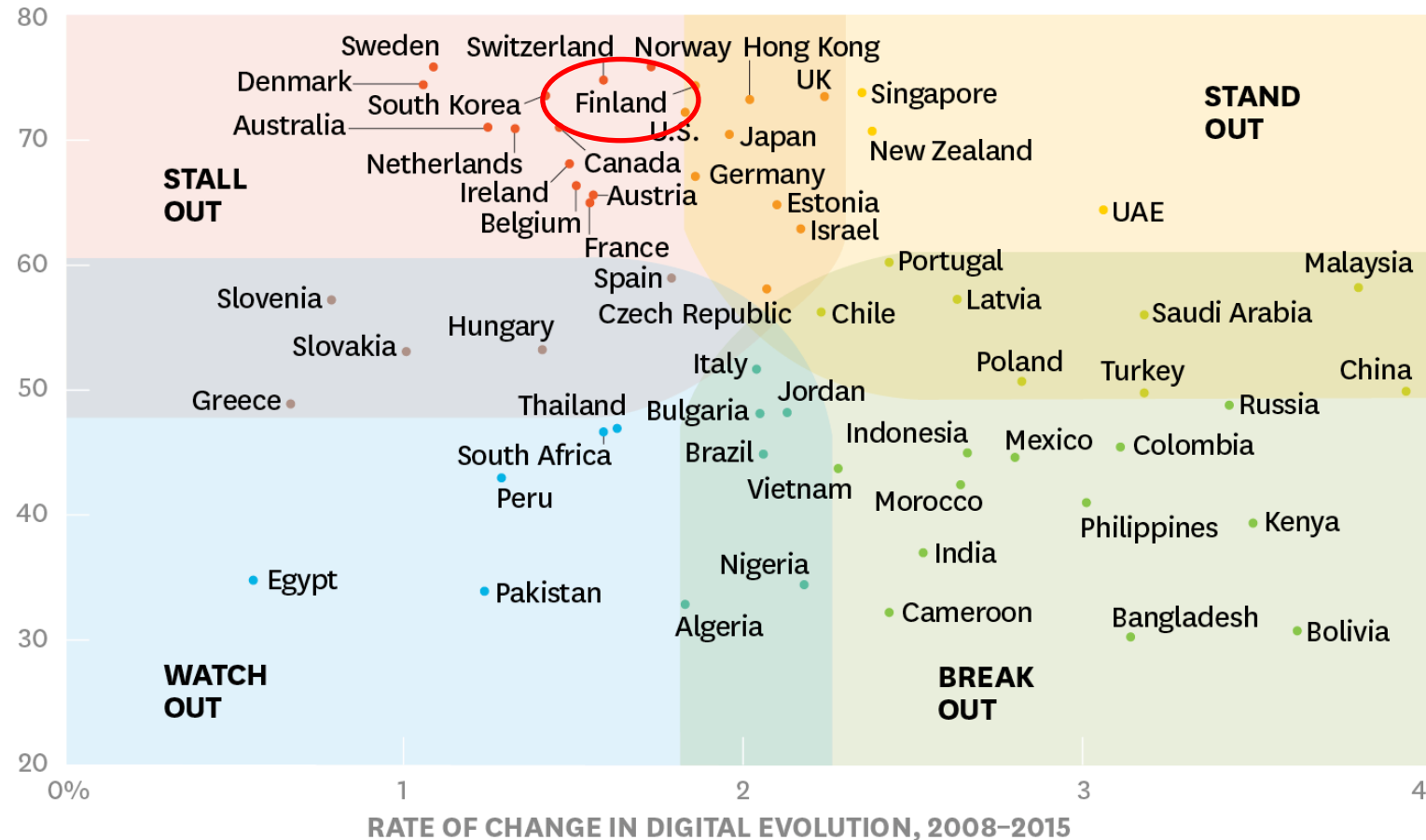
- Technology enables new business models
- Evolution of the Business Models
- SME perspective
- Case examples – Compressor Manufacturers
- Conclusions and takeaways

Finland?

Plotting the Digital Evolution Index, 2017

Where the digital economy is moving the fastest, and where it's in trouble.

HOW COUNTRIES SCORED ACROSS FOUR DRIVERS ON THE DIGITAL EVOLUTION INDEX (OUT OF 100)



SOURCE DIGITAL EVOLUTION INDEX 2017, THE FLETCHER SCHOOL AT TUFTS UNIVERSITY AND MASTERCARD

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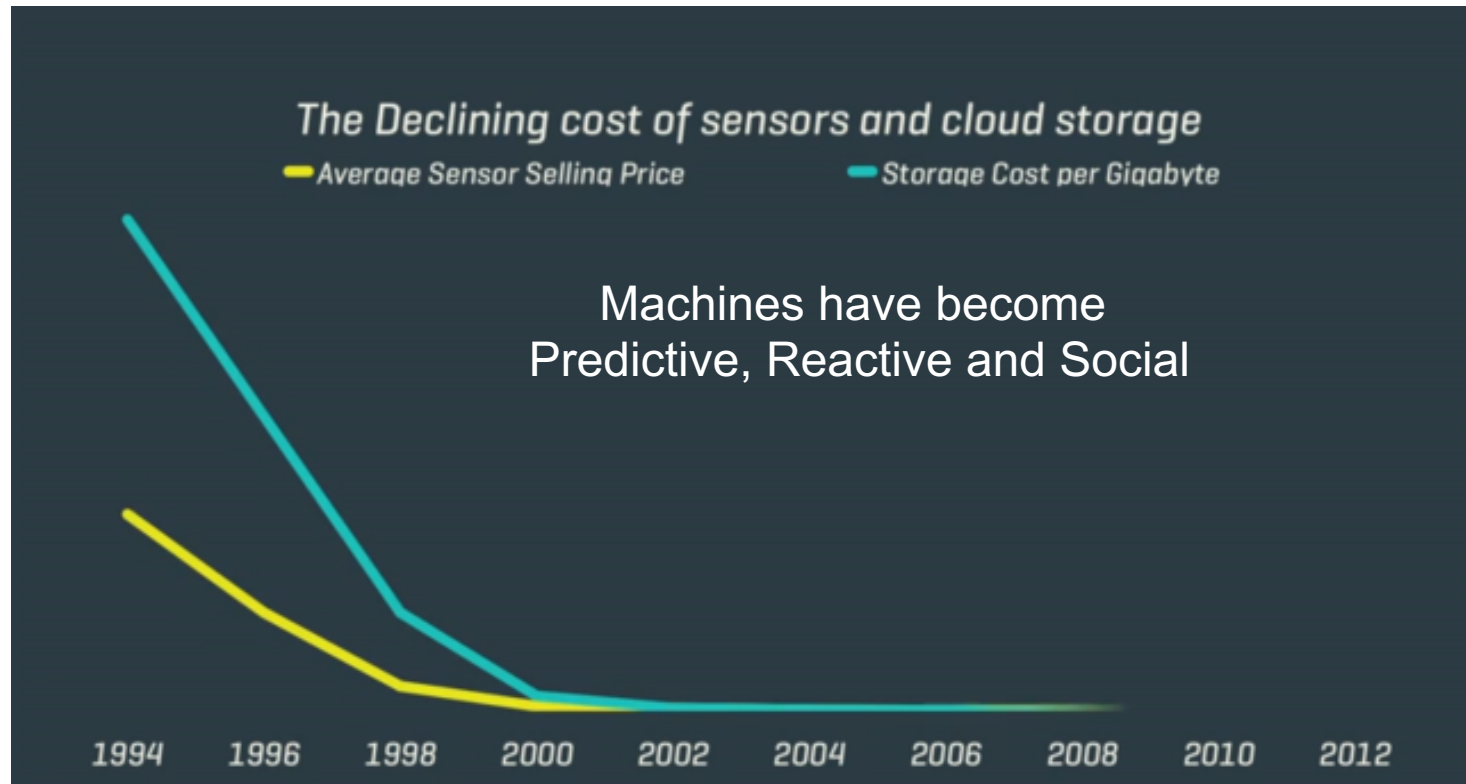
Stand Out countries are highly digitally advanced and exhibit high momentum.

Stall Out countries enjoy a high state of digital advancement while exhibiting slowing momentum.

Break Out countries are low-scoring in their current states of digitalization but are evolving rapidly.

Watch Out countries face significant challenges with their low state of digitalization and low momentum; in some cases, these countries are moving backward in their pace of digitalization.

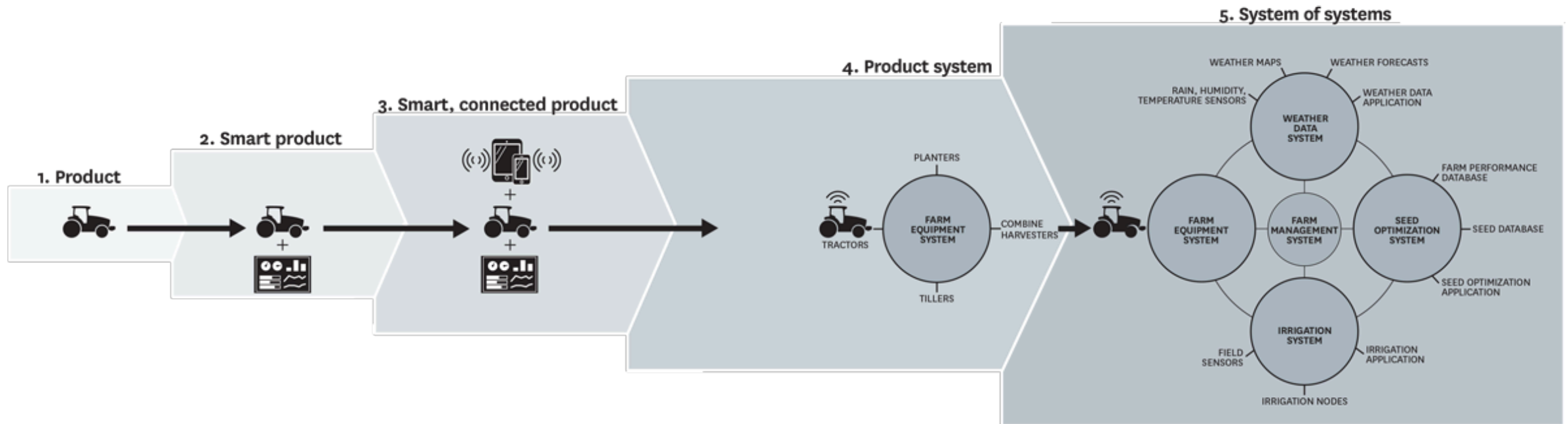
Why is industrial internet so good for business?



a sharp decline in the cost of sensors and, thanks to advances in cloud computing, a rapid decrease in the cost of storing and processing data

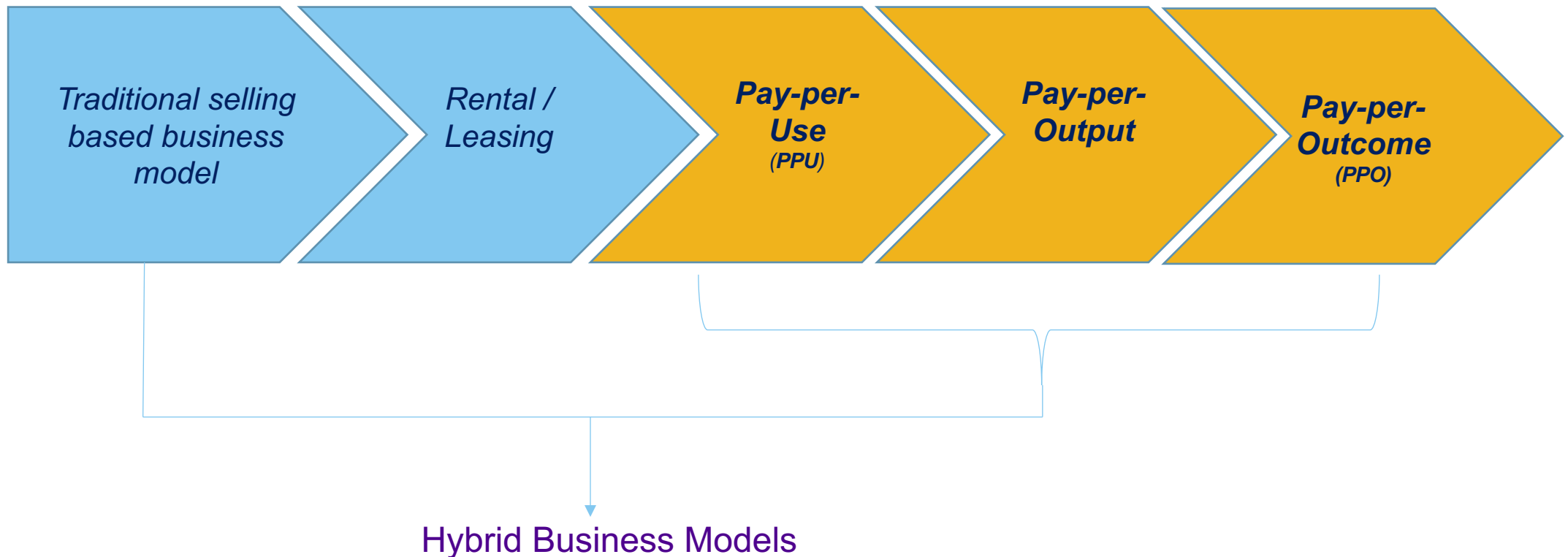
Source:
https://archive.org/details/MarcoAnnunziata_2013S

Change of traditional product boundaries



Porter, Michael E., and James E. Heppelmann. "How smart, connected products are transforming competition." *Harvard business review* 92.11 (2014): 64-88.

Evolution to non-ownership business models



SMEs and non-ownership business models

Pros n Cons

Why SMEs?

- SMEs represent over 99% of the companies located in the EU¹
- SMEs hire between 50 and 70% of the full time equivalent of persons employed¹
- SMEs have a gross value added share of over 50% of the European economy¹

What are SME manufacturing company issues?

- Lack of resources, expertise, competences
- High quality product manufacturers with restricted market access
- Competition from the big players
- Day-to-day survival issues

What can Non-ownership business models do to solve these issues?

- Risk distribution
- Steady, continuous and more predictable income flow
- Easier faster to sell products to the customer in this way instead of just investment manner
- New niche markets
- New opportunities for growth and strategic benefits – Sales growth, Market share expansion, New market creation²
- Internationalisation

Reference:

1. Müller, Julian Marius, Oana Buliga, and Kai-Ingo Voigt. "Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0." *Technological Forecasting and Social Change* 132 (2018): 2-17.
2. Gebauer, Heiko, Mirella Haldimann, and Caroline Jennings Saul. "Competing in business-to-business sectors through pay-per-use services." *Journal of Service Management* 28.5 (2017): 914-935.

Tools to implement non-ownership business models: Morphological Box

- Work in progress -

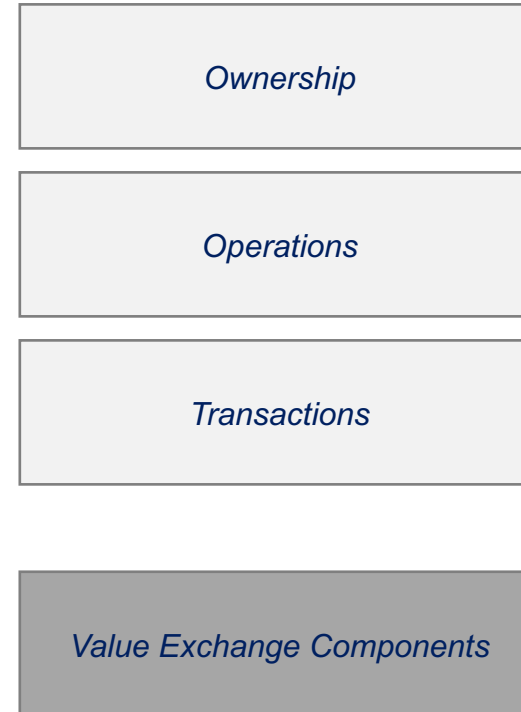
- Companies understand the *benefits of non-ownership* business models
- Yet, many *struggle with the transition*
- Hence, many initiatives *lead to*:
 - unsuccessful pilot projects,
 - non-sustainable business models,
 - unhappy customers,
 - unhappy employees, ...
- *Reasons* for the struggle include:
 - unclear objectives (*where do we want to go*),
 - unclear baseline (*where are we today*),
 - neglecting key elements,
 - lack of awareness of possible options, ...

This was our *motivation to investigate* how we can help companies interested in non-ownership business models but are struggling

Our approach:

Morphological Box as a framework to describe and define non-ownership Business Models

Key Elements of Morphological box:





Tools to implement non-ownership business models: Morphological Box

- Work in progress -

| Characteristic Features | | | | Options | | | | | | | | |
|------------------------------------|---|-----------|-----------|----------------------------------|---|----------|-----------|---|-------------|------------------------------|-------|--|
| OWNERSHIP | | | | | | | | | | | | |
| Ownership of Equipment | During the phase of use | | | Customer | Leasing Bank/financial institutions | | | Equipment Producer | | | | |
| | After the phase of use | | | Customer | Leasing Bank/financial institutions | | | Equipment Producer | | | | |
| Ownership of Software | During the phase of use | | | Customer | Leasing Bank/financial institutions | | | Equipment Producer | | | | |
| | After the phase of use | | | Customer | Leasing Bank/financial institutions | | | Equipment Producer | | | | |
| Ownership of Data | Production Optimization Related Data (Production Outcome) | | | Customer | Third Party (platforms or someone else) | | | Equipment Producer | | | | |
| | Service related Data (state of the machine) | | | Customer | Third Party (platforms or someone else) | | | Equipment Producer | | | | |
| OPERATIONS | | | | | | | | | | | | |
| Machine Utilization Level | | | | High | Medium | | | Low | | | | |
| Raw Materials / Consumables | | | | Controlled by Equipment Producer | Controlled by Customer | | | Standardized (?) | | | | |
| Location of operation | | | | Customer’s establishment | Shared infrastructure | | | Equipment Producer’s establishment | | | | |
| Logistics | | | | Customer | Third Party | | | Equipment Producer | | | | |
| Personnel | Manufacturing | | | Equipment Producer | Customer | | | Third Party (e.g., Data Scientists, Platform Consultants, etc.) | | | | |
| | Maintenance | | | Equipment Producer | Customer | | | Third Party (e.g., Data Scientists, Platform Consultants, etc.) | | | | |
| TRANSACTIONS | | | | | | | | | | | | |
| Single/multiple customer operation | | | | One Customer | Key Customers | | | All Customers | | | | |
| Payment Model | | | | Fixed Rate | Hybrid Model | | | Pay for assets (equipment, software, etc.) | | Pay-per-use/ Pay-per-outcome | | |
| Value Exchange Components | Data (Servers, Storage, Mobility) | Analytics | Expertise | Facility | Customization | Hardware | Personnel | Service | Maintenance | Software | Money | |

Morphological Box: Example using a real case

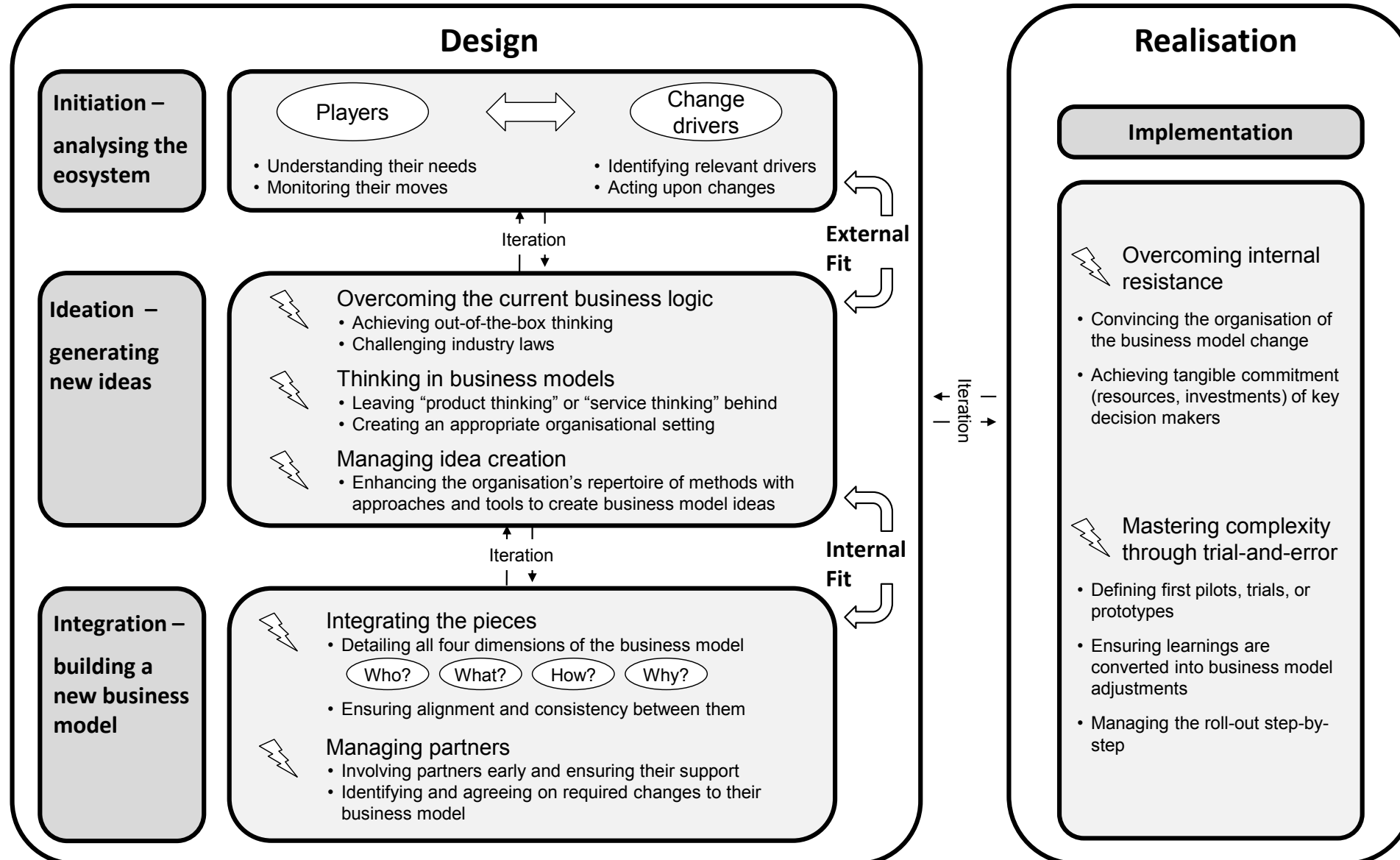
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[illegible]

- Once future vision is mapped, detail BM using the BM Canvas
- Translate the key elements into a unique BM reflecting the values, capabilities, and resources of the organization
- etc.

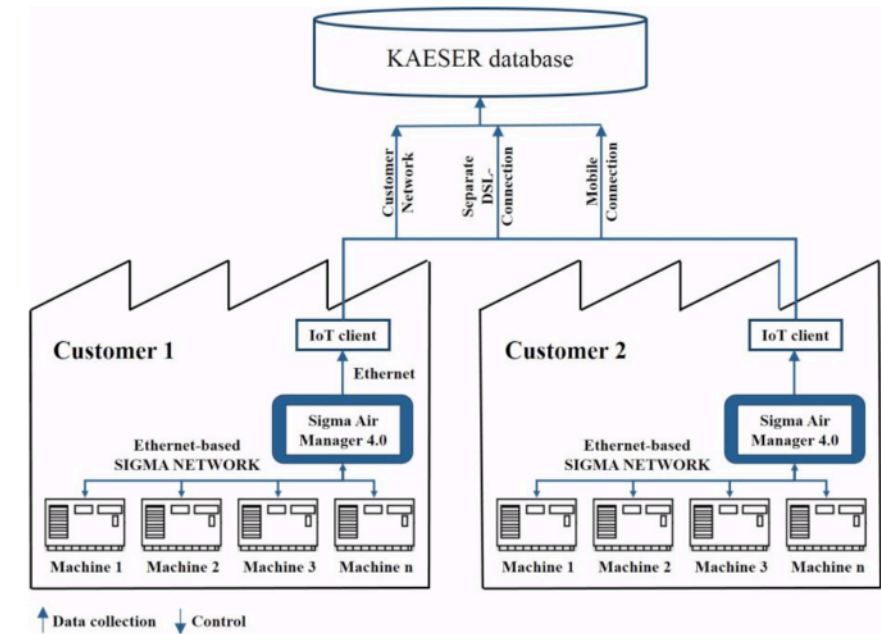
Tools to implement non-ownership business models: 4I-framework



Case A: KAESER COMPRESSORS, GERMANY

Background:

- KAESER is a leading global manufacturer of compressed air systems and services
- Industry is characterized by high competition
- Transformed towards service-based BM in response to shifting customer demands
- Customers no longer purchase customized air compressors but pay for used compressed air
- KAESER manufactures, operates, & owns the systems
- Industry 4.0 technologies play a key role (e.g., data analytics & predictive maintenance)



Bock et al., 2019

Key benefits (customer):

- reduced cost & increased flexibility,
- transfer of operational risks,
- increased transparency,
- improved operational planning.

Key benefits (manufacturer):

- reduction in service cost,
- development of a long-term partnership
- synergies in product development & innovation

Lessons Learned

- Lack of cost transparency on customer side
- Changing role of sales dept.
- Emphasis of partnerships & inter-disciplinary teams
- Introduction of new risks
- Need to 'ease in' the new BM
- Privacy & Security concerns

Case B: TAMTURBO OY, FINLAND (<https://www.tamturbo.com>)

Background:

- Tamturbo Oy is a manufacturing company of high-end, expensive, compressed air units
- Company is an SME (small-medium enterprise)
- Company manufactures capital intensive compressor units
- Company very advanced in monitoring and control of the compressor units
- Adopted the pay-per-output (pay-per-m³ of air produced) in order to increase the business
- It is very rare that a high-end product in a compressor manufacturing business is sold under pay-per-output
 - This is the niche market access they could get
- Plans to increase the % of compressor units sold under the pay-per-output model

Key benefits (customer):

- Access to a high end product at low cost
- transfer of operational risks,
- Better understanding of the quality of air,
- improved operational planning.

Key benefits (manufacturer):

- Increased sales of the expensive product
- Almost nil service cost,
- development of a long-term partnership
- Compete with large companies in the high-end product range

Case C: SME Compressor Manufacturer from Northern Europe

Background:

- Case C is a manufacturing company of compressed air systems and services
- Company is an SME (small-medium enterprise)
- Competition is tough from large compressor manufacturers, such as Atlas Copco
- Adopted the pay-per-output (pay-per-m³ of air produced)
- Integration of compressors manufactured by other manufacturers into the system in order to produce compressed air
- This integration has given them an access to a niche market
- Plans to move towards a more advanced outcome-based model, where intend to bill the customers based on the savings customers make using their compressed air systems

Key benefits (customer):

- Freedom in terms of product usage
- increased transparency,
- improved operational planning,
- Multiple systems integrated under one

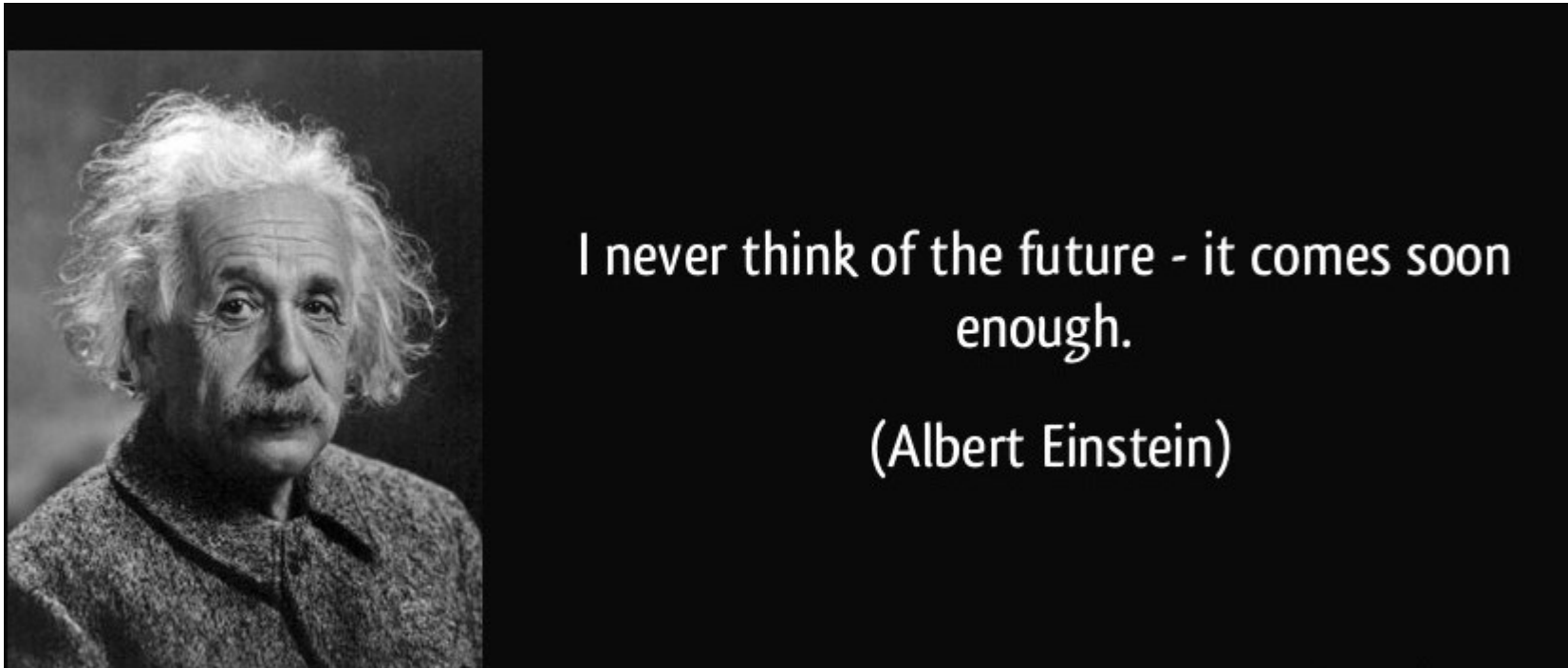
Key benefits (manufacturer):

- Access to the niche market
- Better sales, being an SME
- development of a long-term partnership
- synergies in product development & innovation

Key take aways

- Technology enables better calculation power, real-time/near real-time data access
- Connectivity has gone up with 4G, LTE and 5G connections
- AI, Blockchain, Industrial Internet/Industry 4.0 makes manufacturing more transparent, accurate and fast
- Advantages of the technology should be translated in the business related value creation
- Non-ownership business models and traditional selling business models should make new hybrid models
- SMEs can access niche markets, create continuous earnings, internationalize and grow faster
- Morphological Box allows you to assess and configure the advanced business model that suits your firm
- 4I-framework allows you to implement the business model in step-by-step manner
- Finally, nothing will work if the mindset does not change with the technological and business model evolution

Kiitos! Thank you! धन्यवाद



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