

Innovation through Industry 5.0 lenses

How to approach innovation in digital transformation through Industry 5.0 thoughts?



Outline

Innovation through Industry 5.0 thoughts

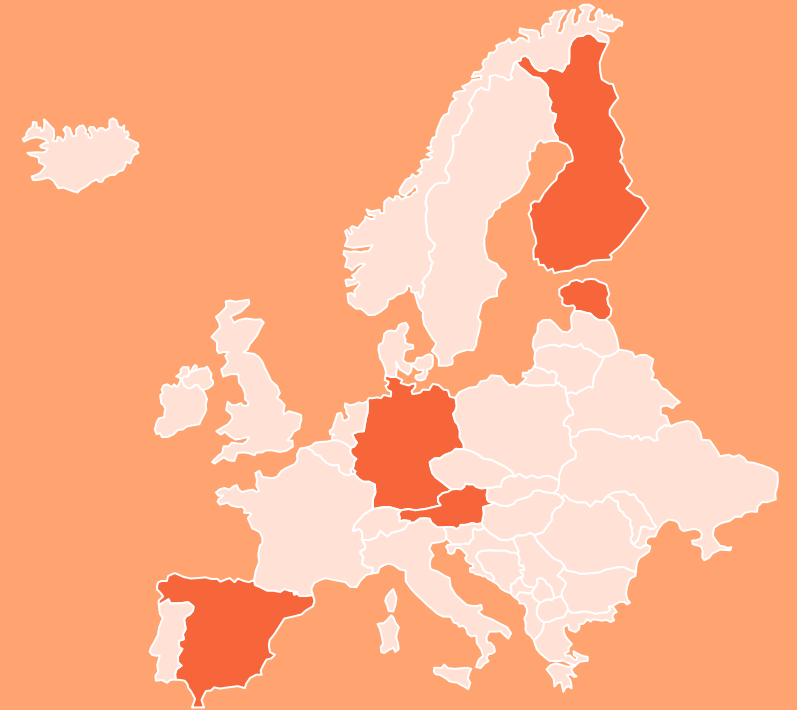
- Industry evolution - thoughts about Industry 4.0 and 5.0
- Industry 5.0 viewpoints in a few focused industry domains
 - Mobile work machines
 - Intelligent manufacturing factory
- Key enablers for innovation through Industry 5.0 lenses

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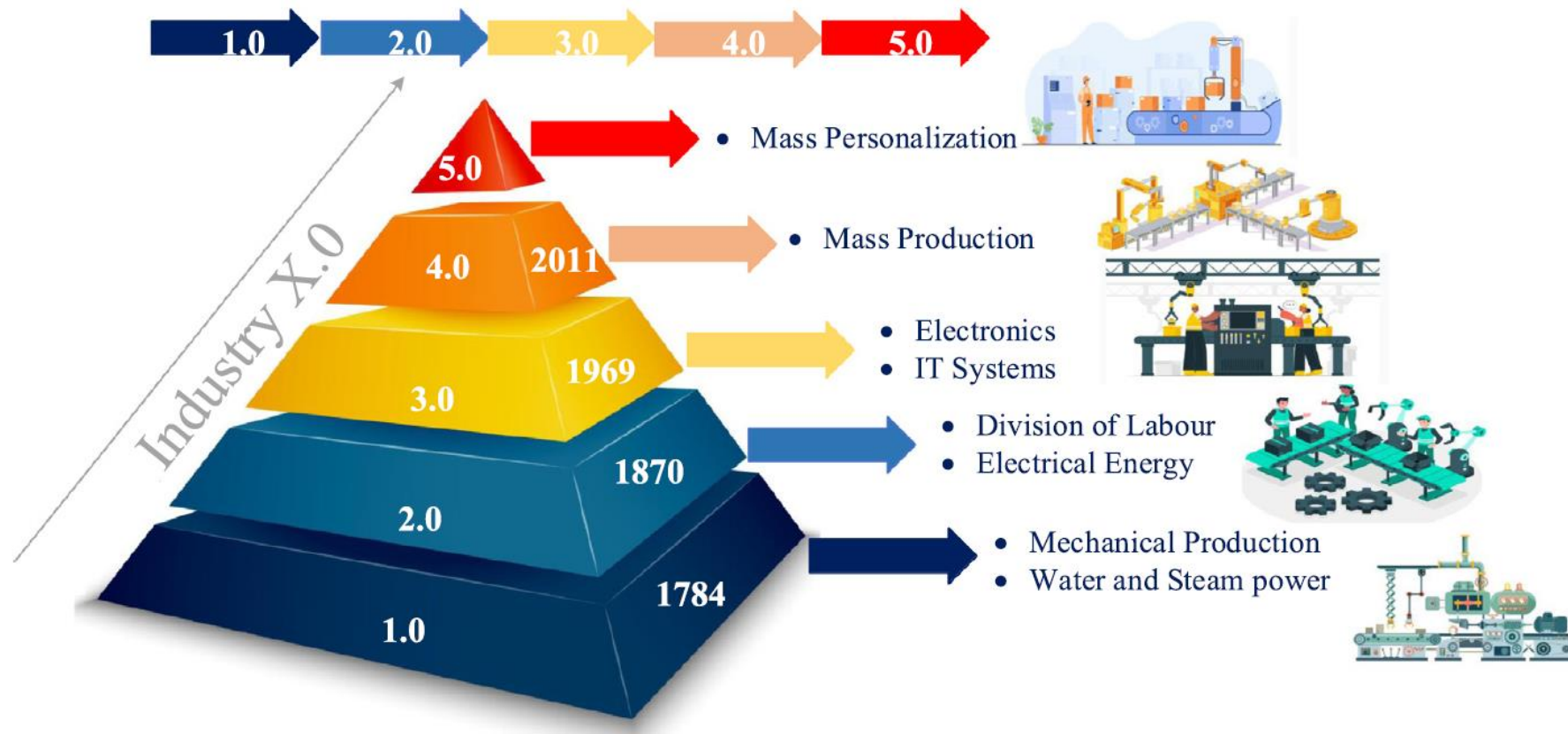
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Industry Evolution



Industrial Evolution – Technology view



Industry 4.0

- Industry 4.0 has focused more on digitalisation and AI-driven technologies for increasing the efficiency and flexibility of production.
- Innovation has been focused to technology and many time to specific solution area, which have focused system boundaries.



Industry 5.0

Industry 5.0 highlights the importance of research and innovation to support industry in its long-term service to humanity within planetary boundaries.

Industry 5.0 should not be understood as a replacement nor an alternative to, but an evolution and logical continuation of the existing Industry 4.0 paradigm.

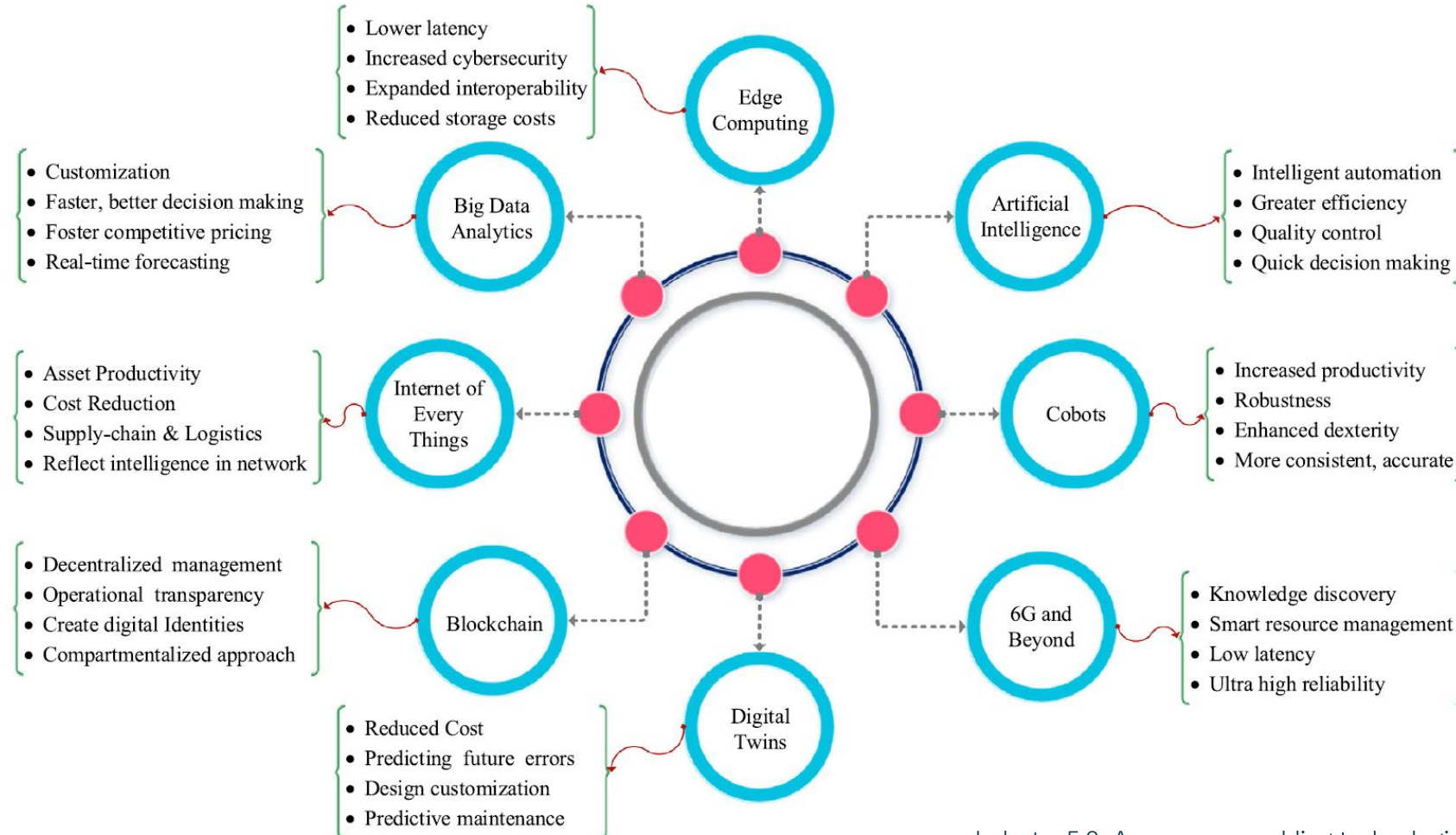
As such, the concept of Industry 5.0 is not based on technologies, but is centered around values, such as human-centricity, ecological or social benefits.

This paradigm shift is based on the idea

- technological transformation can be designed according to the societal needs, not vice versa
- technologies are shaped towards value creation for defined values



Technology will evolve

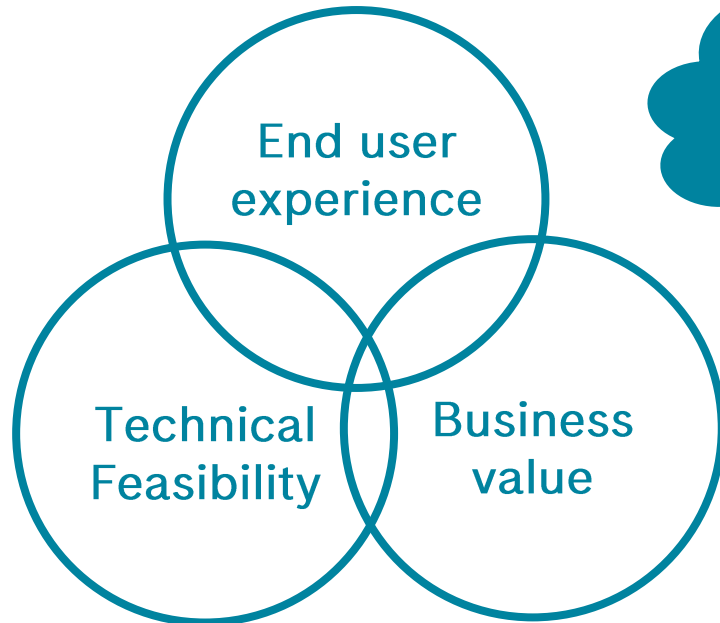


Industry 5.0: A survey on enabling technologies and potential applications – Maddikunta et al - [Link](#)

Opportunities for innovation in Industry 5.0 context

- Serving different people needs
- Understanding sustainability - footprint of our activities – how to enable different roles to influence in smaller footprint
- Enabling resilience for business to survive

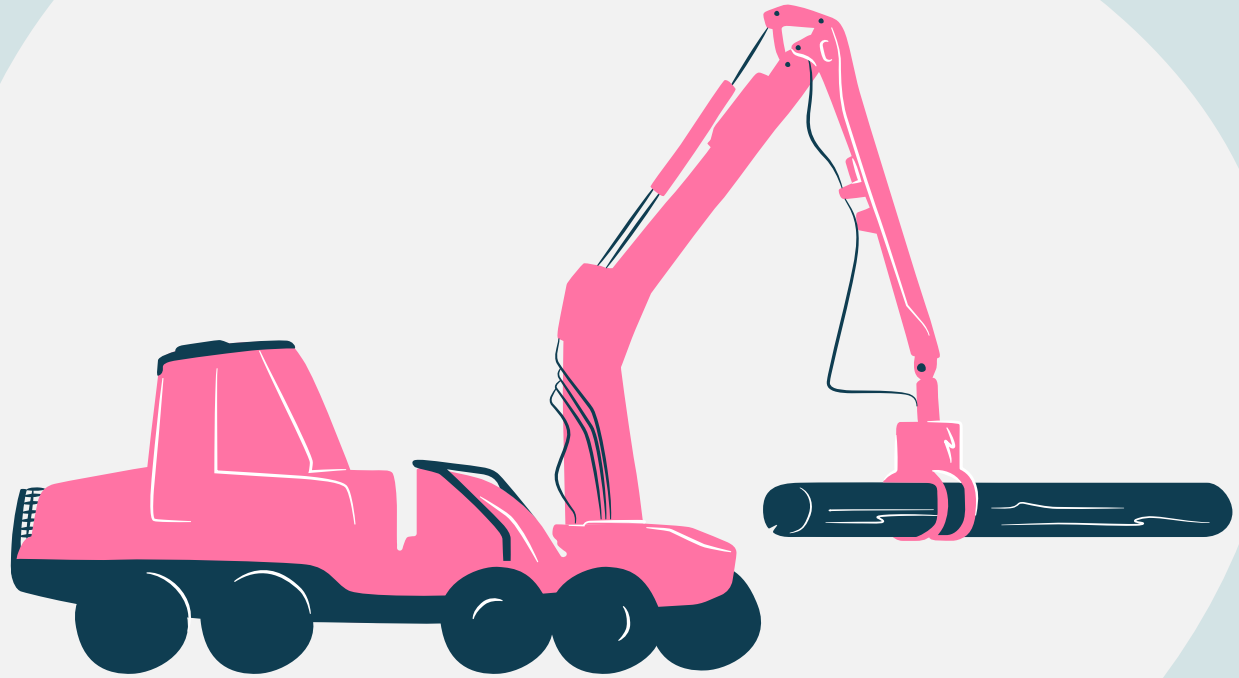
Ingredients for value creation



Value is optimized, when different viewpoints are taken into account

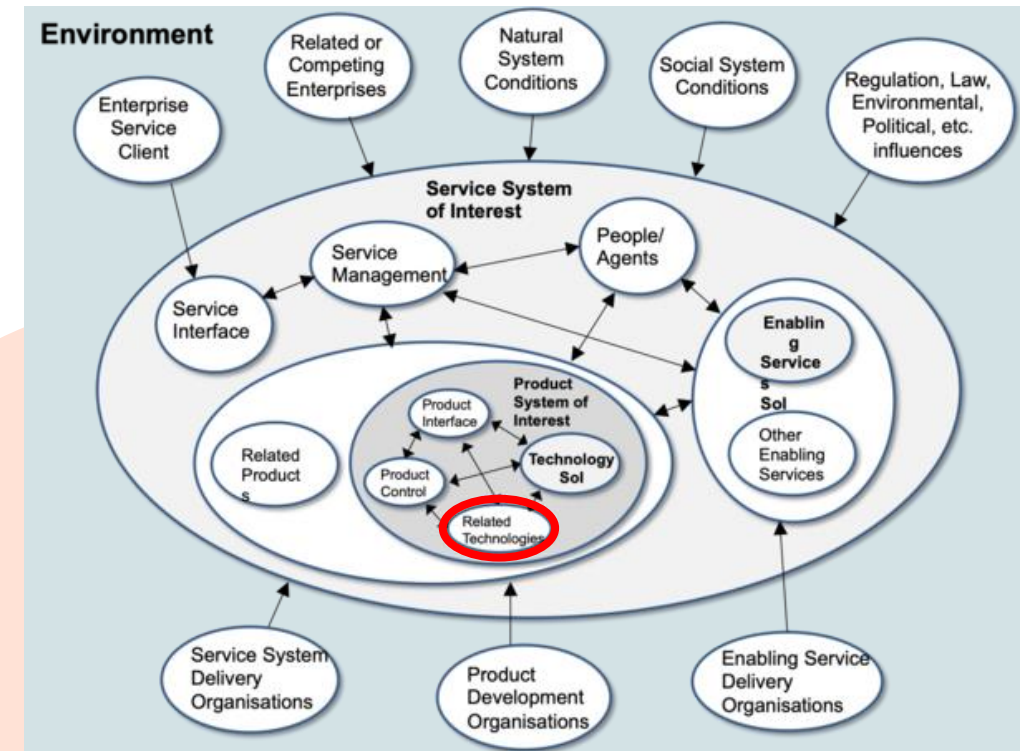


Mobile Work Machine development & Industry 5.0



Mobile machines as systems of systems

- Industry 4.0 related technology have provided ways to do more efficient work machines
- Machines are connected to cloud, which enables companies to develop more service based offering (servitization)
- Problems have changed from single system problems to systems-of-systems problems
- Engineers have provided innovative technology solutions for customers – but are solutions in balance with Industry 5.0 themes ?



SEBok Types of Systems – [link](#)

Humancentric innovation

- How can an engineer rely on that he will create a human centric solution, that enables user to do the work efficiently and same time without extra pressure?
- How a person, who is using the machine or digital service can intuitively use the solution without extra thinking about sustainable / resilient operations?
- How can an engineer build a complex machine with high quality standards without overloading the user?
 - Including production development with human – robot collaboration

-> Design thinking / approach / capabilities are a key enabler to involve users and other stakeholders in product development lifecycle. How well the design is a part of the development process?

-> Non-functional aspects of a system (quality, security, sustainability, safety) is developed and integrated as a part of development phase to final solution, does companies have processes & practices in place?

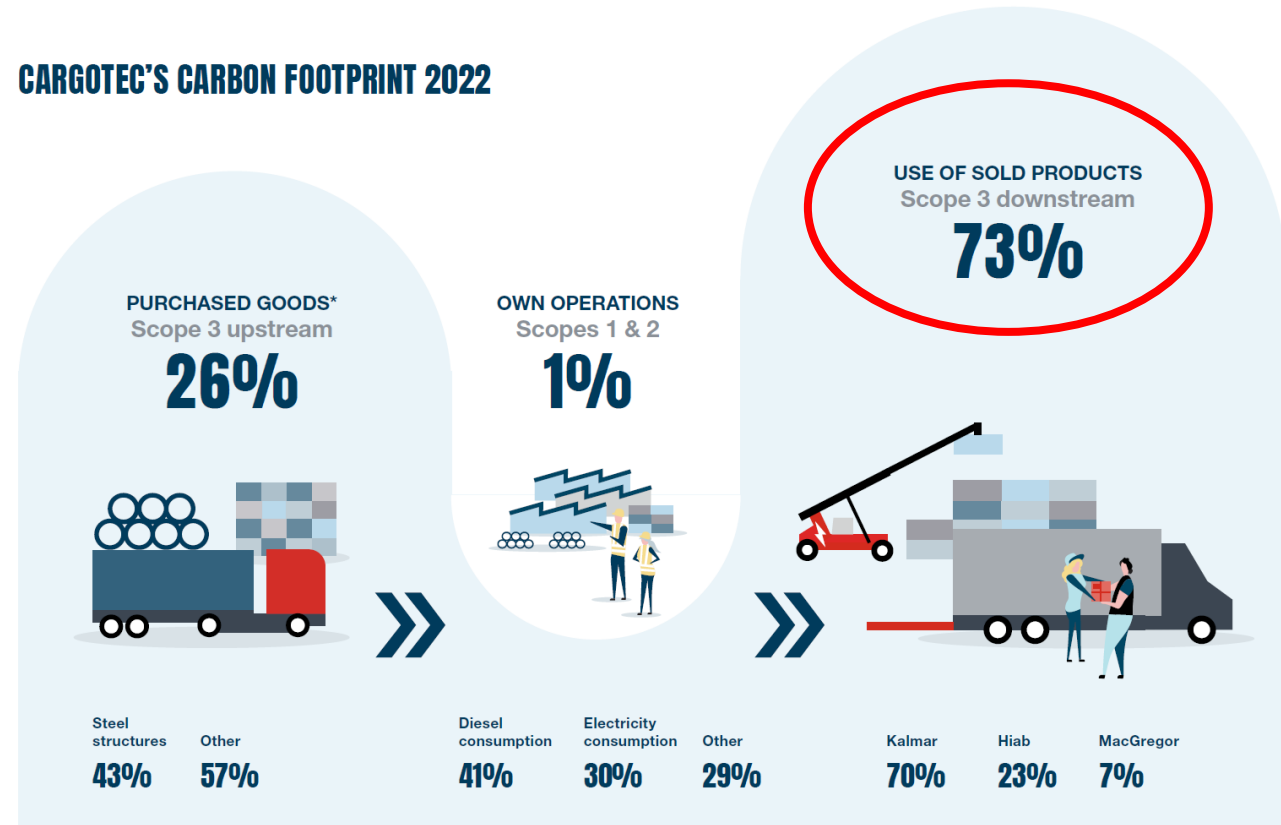
-> Holistic engineering tool set, which enables engineer to innovate – not focusing to home made Excel solution to collect information

Sustainable Product Creation

- Sustainability has many viewpoints
- Environment aspect has been already a hot topic in mobile work machines business
- But how
 - product owner
 - sourcing function
 - a development engineer
 - customer

can actively affect to carbon footprint in machine life cycle?

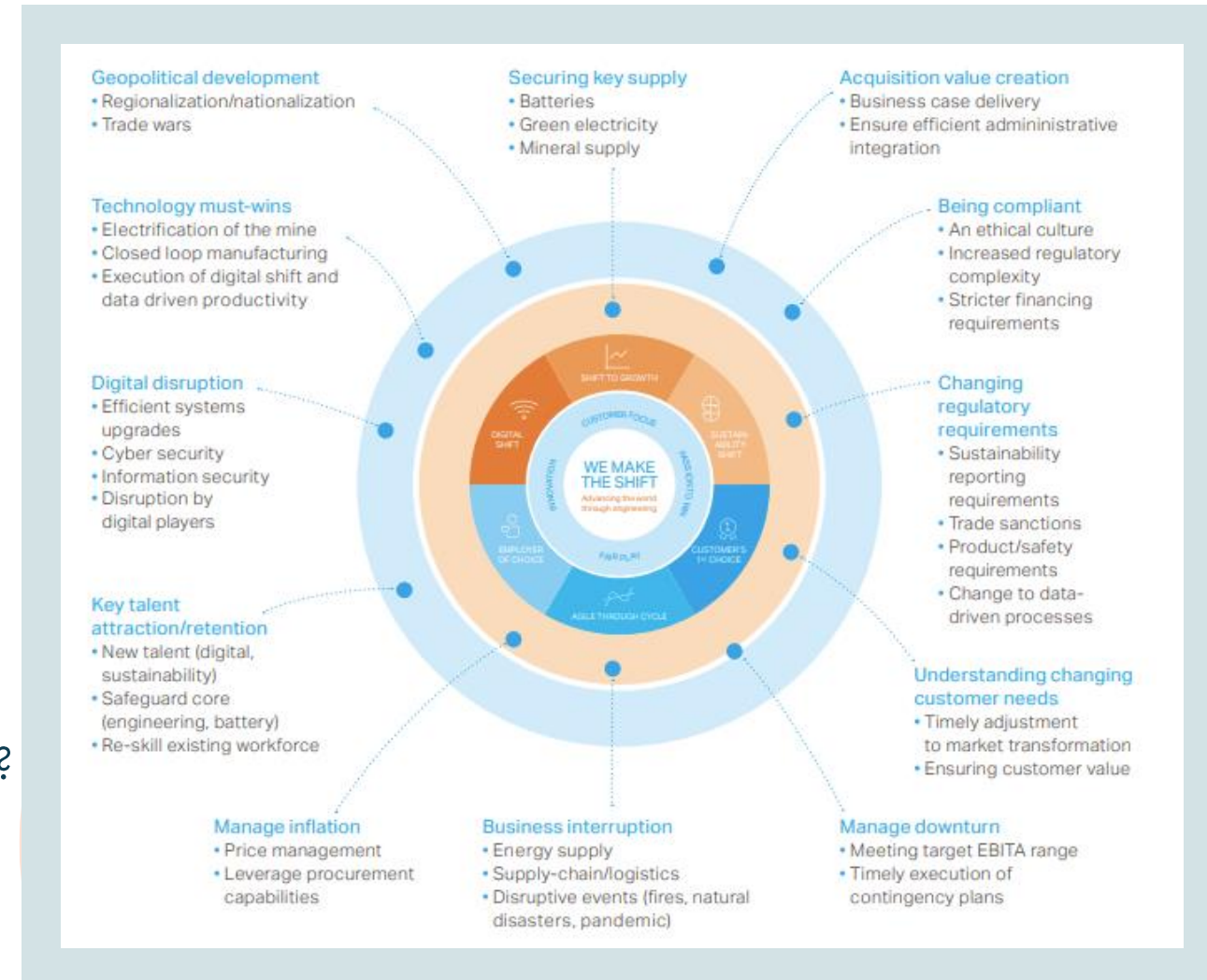
CARGOTEC'S CARBON FOOTPRINT 2022



Cargotec Annual Report 2022 – page 32 - [link](#)

Resilience in mobile machines business

- Sandvik's strategic risk landscape gives a holistic view for various threads / changes
- Resilience is necessity for the business
- How to develop a resilient organization?
 - enable fast decision making
- What technology is supporting resilient world?
 - Ensuring security of the systems
- Which kind of business models are more resilient?
 - Supply chain mgmt has come very vital area



Digitalized Product Lifecycle

Business Design - Digital Concept

Finding the right strategy for your business and product design.

R&D - Digital Prototype

Finding the best digital product design platforms and methods, shortening the time to market and decreasing R&D costs – including waste

Production - Digital Configuration

Simulated production environment to minimize extra costs.

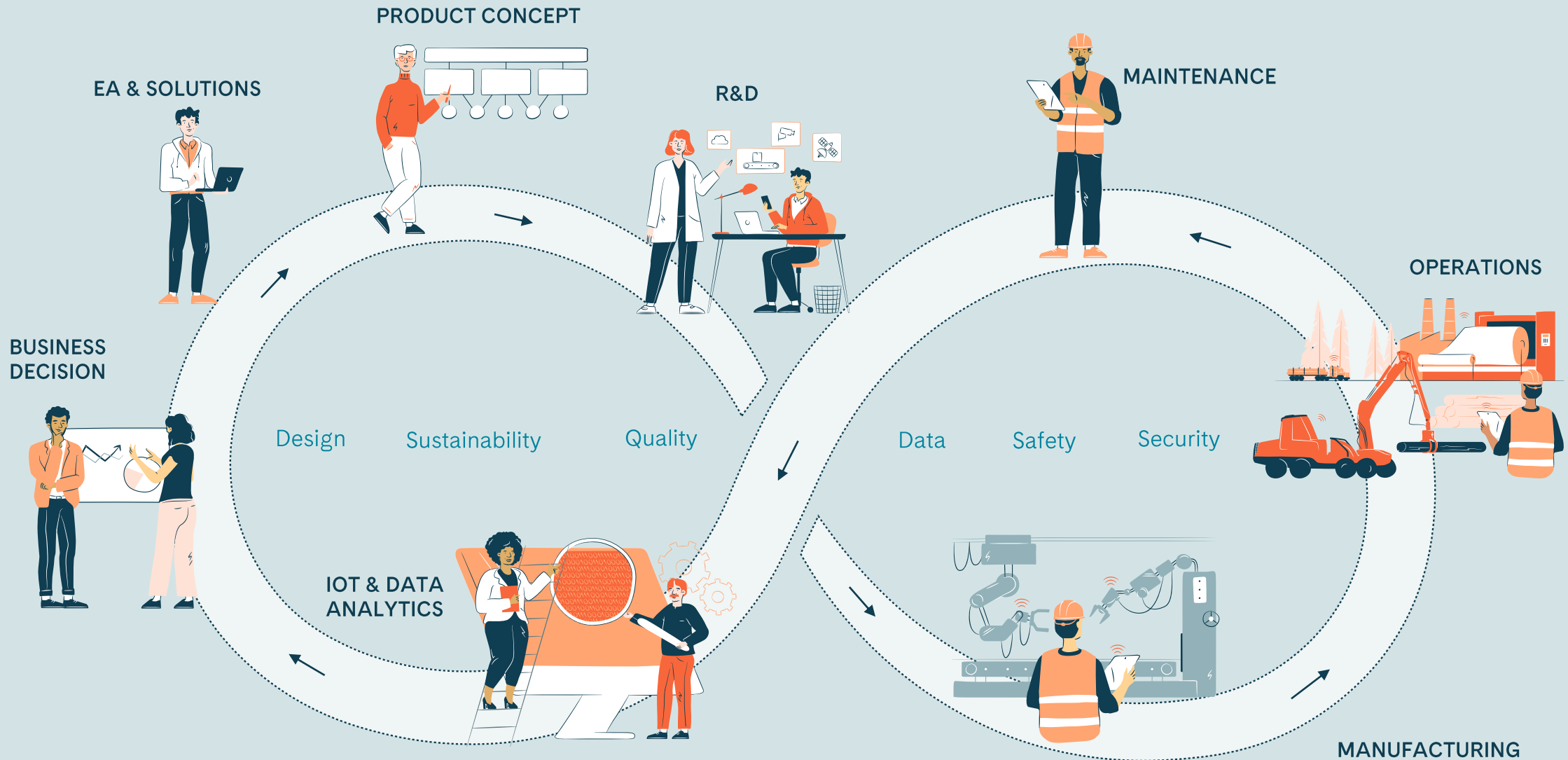
Mastering configuration management to enable fluent production.

Operation - Digital Twin

Digital Twins connect the product structure and data related to the usage. This enables next-level data analytics, which can be utilized both in the maintenance, and in the further development of more sustainable products.



Digitalized Product Lifecycle to enable continuous development

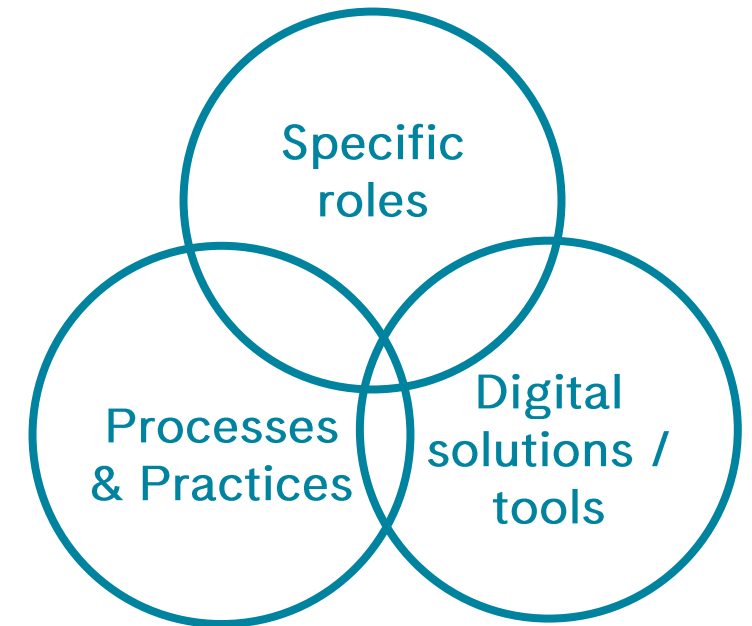


Intelligent Manufacturing Factory & Industry 5.0

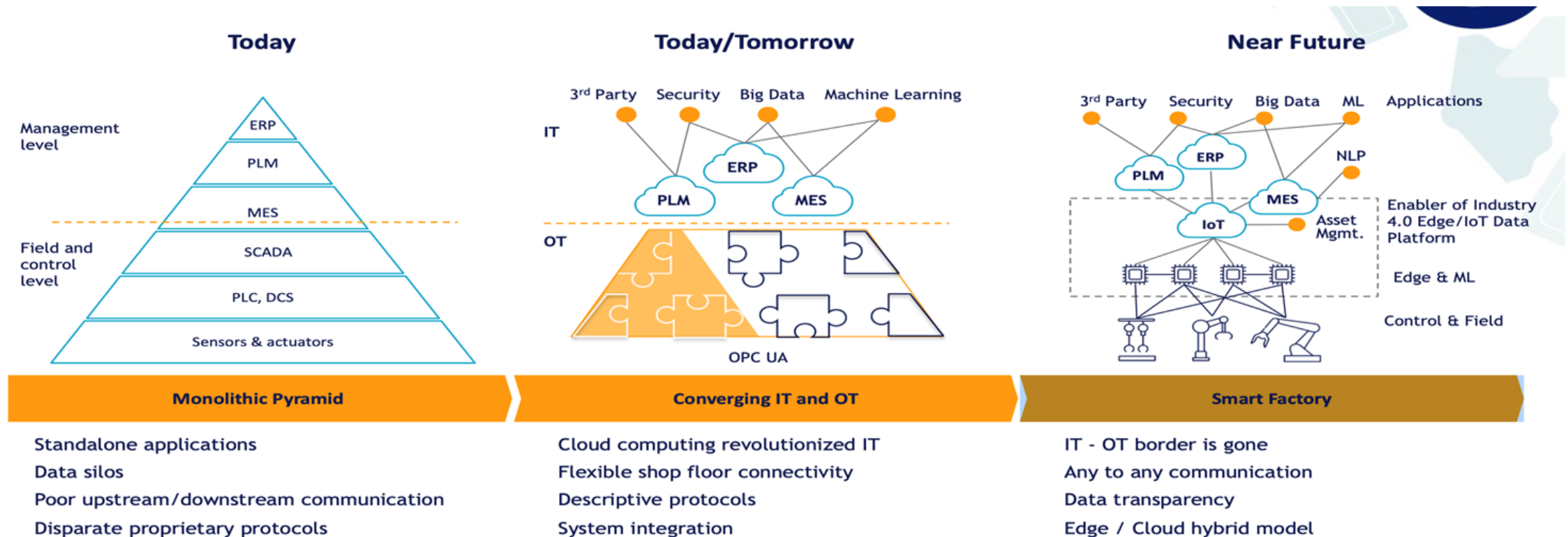


Industry 5.0 in Intelligent Factory

- Industry 4.0 related technology provides new ways to do & develop more efficient green & brown field factories with traditional KPIs
- Factories has taken many new Industry 4.0 technologies, but how to get all benefit for Industry 5.0 viewpoints?
- Many factory roles are following still quite traditional production KPIs – are these in balance with Industry 5.0 themes?
- Global companies have factories in different countries, how to create internationally scalable factories with Industry 5.0 thoughts in place?

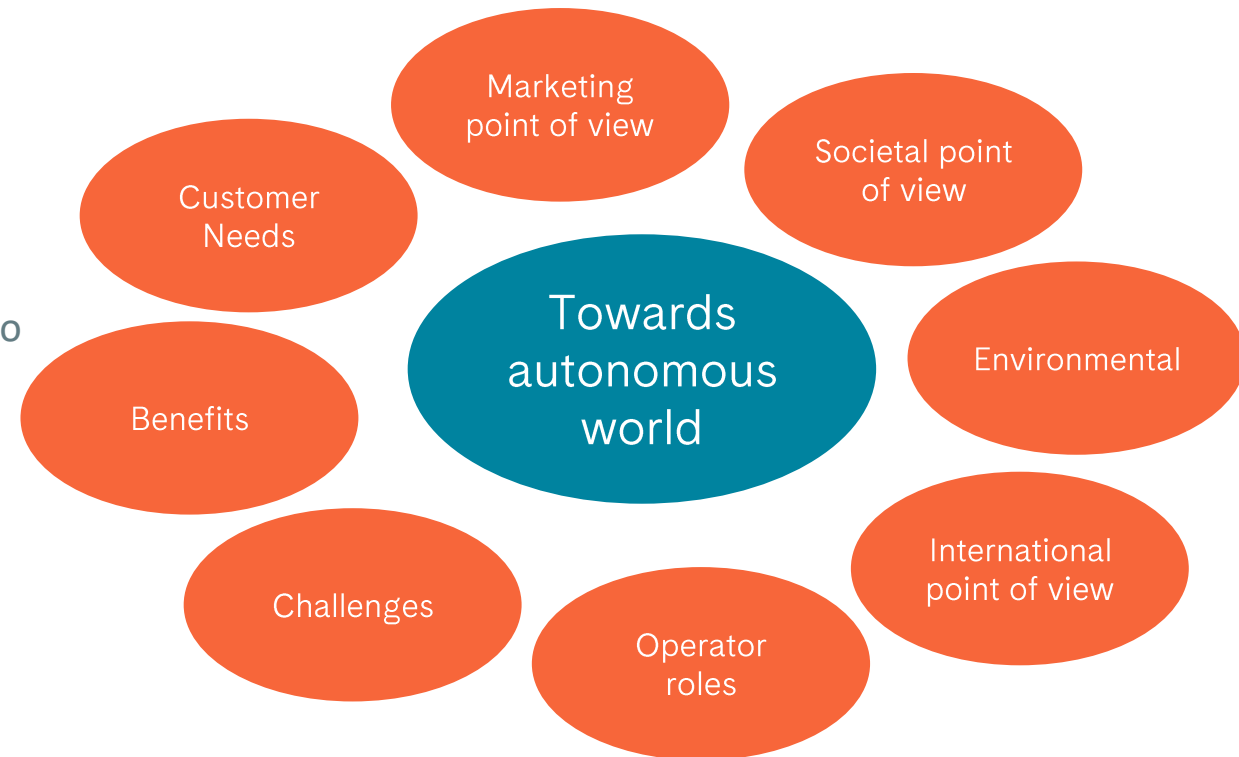


Technology evolution in factory floor



Humancentric Autonomous Solution

- The discussion around autonomous processes has been ongoing for decades.
- There is a long way to go to fully autonomous processes
 - if 4.0 drives to use more the evolving technology
 - 5.0 wants to use technology to adapt the production process to the needs of the worker
- Manager role in factory as a task list facilitator is changed to a people leader, who understand a worker's needs as a human.



Sustainable Manufacturing

- How to adopt sustainability and carbon footprint reduction processes?
- How to drive own business to more in circular economy?
- How to brand own company for new generation of workers?
 - Evaluate own ethical thinking under sustainability umbrella
- Data is at the center to make person to act:
 - How can the required data be collected to support decision making?
 - How is data analyzed and combined with other available information?
 - How to model information that supports decision-making in an understandable form?

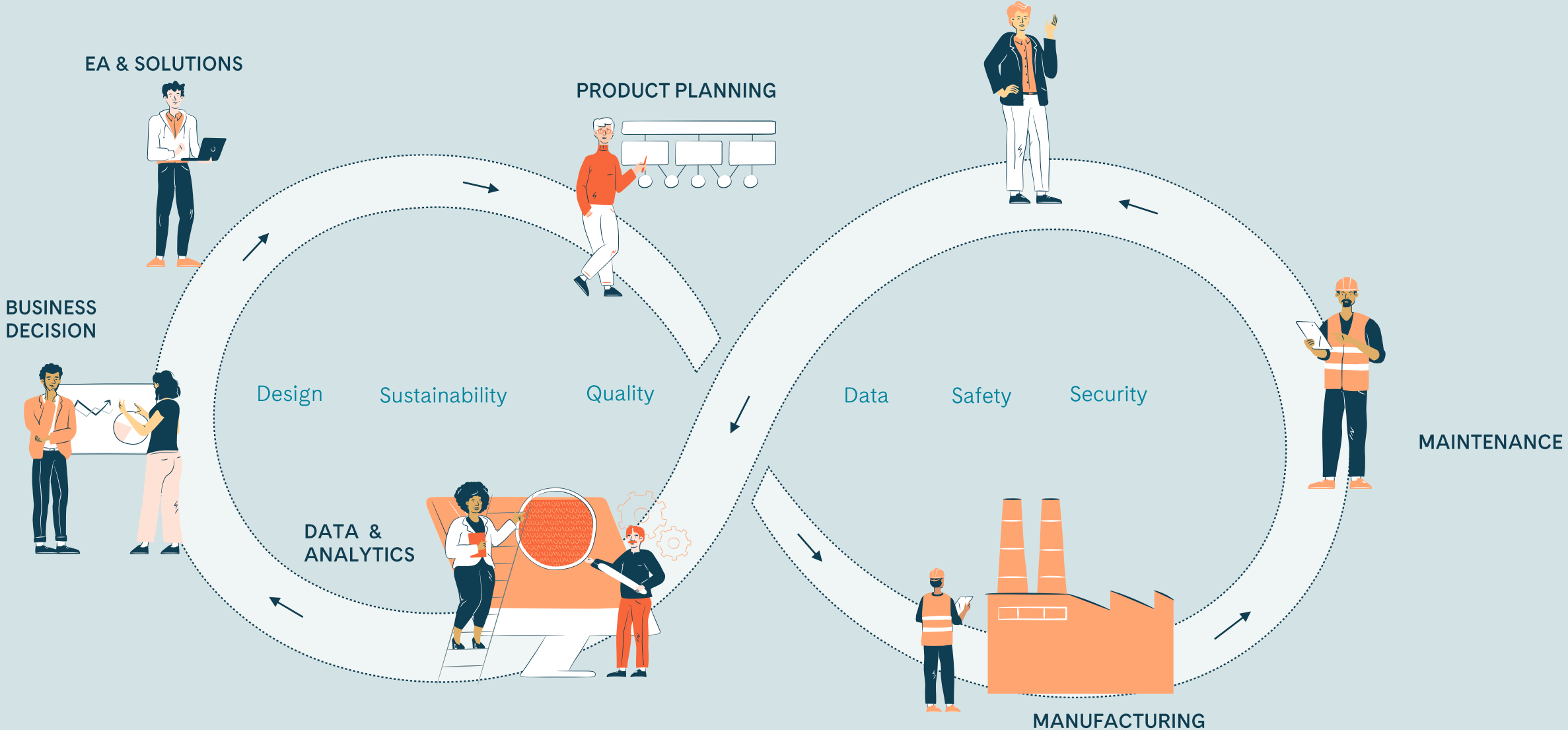


Resilient Factory

- How to find more flexible and resilient factory environment in the face of business disruptors?
 - Organization agility
 - Production technology / production system agility
 - Supply chain agility
 - Business agility - deliver the right products to market faster
- Holistic understanding of the business context –
 - How to make change in own table?
 - How to influence others?



Digitalized Manufacturing Lifecycle through data to enable continuous development



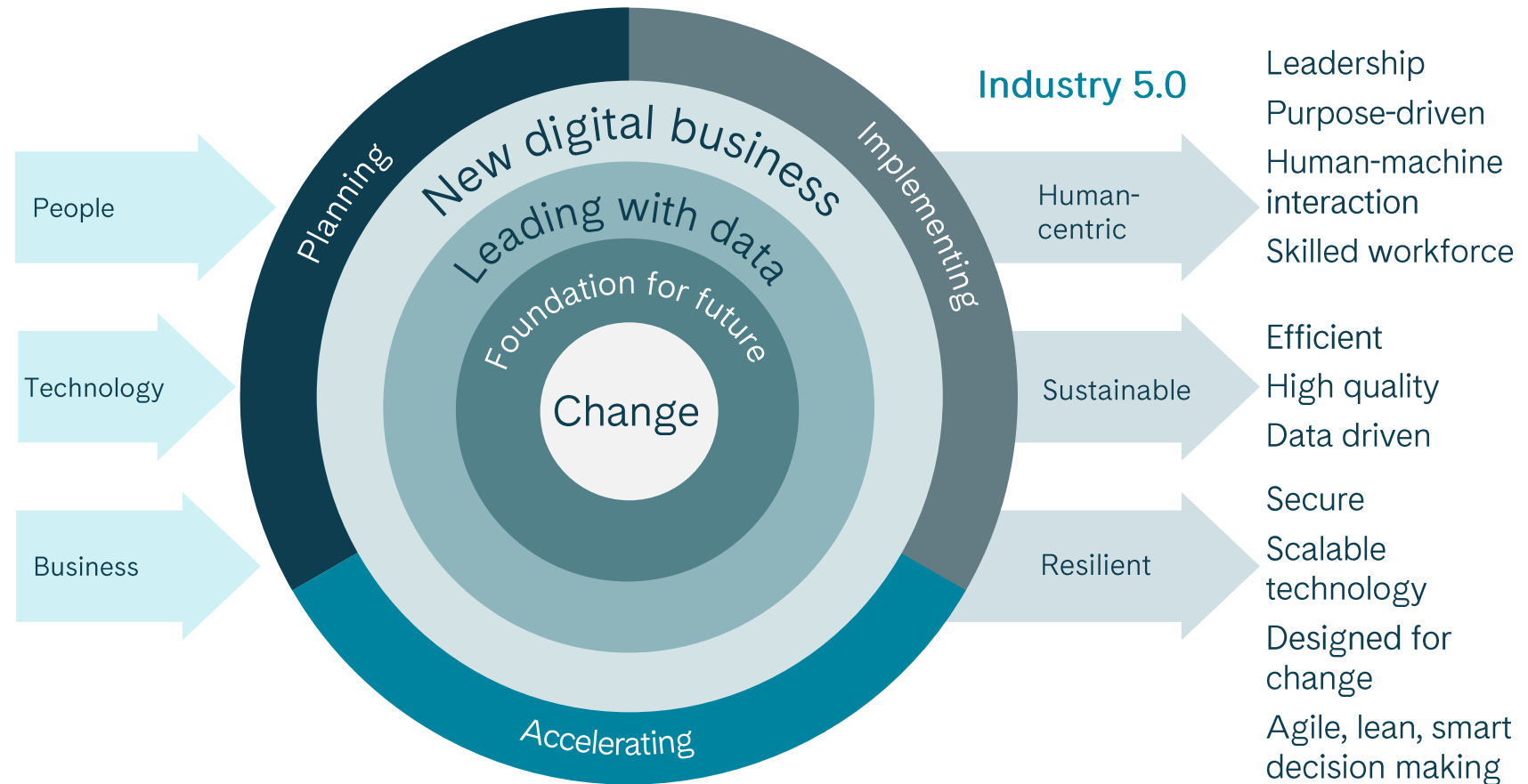
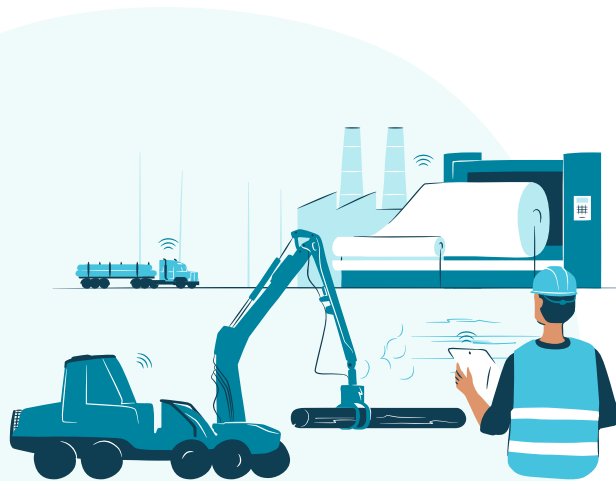
Key Enablers for Industry 5.0 innovation

Digital transformation is a must

Change is continuous

Intelligent Industry steps for unknown future

Industry 5.0 show the topics, where the value is created in coming years



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