IoTWeek

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Challenges for future food production

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Growing demand

- World population growth: 10 billion in 2050
- Increasing demand from developing countries

Limited resources

- >25% of food is wasted in production, processing and consumption
- Water and arable land are becoming scarce resources

Lack of consumer trust

- Missing transparency in food production and processing
- Insufficient food safety in some regions

Lack of integration along value chain

- Fragmented market

Food production and processing must become more …


… efficient


… sustainable


… transparent


… personalized


… integrated

Industrie 4.0 - The next level of manufacturing

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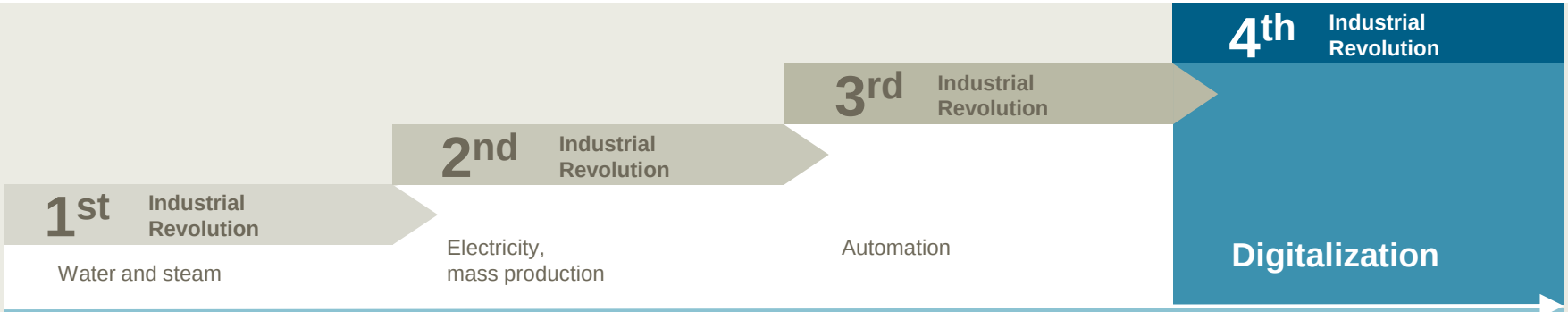
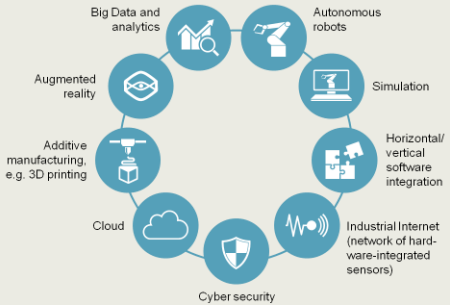


- Humans, devices and systems are connected along the entire value chain
- All relevant information are available in real-time – across suppliers, manufacturers and customers
- Parts of the value chain can constantly be optimized with respect to different criteria, e.g. cost, resource utilization, customer needs



„Industrie 4.0“ impacts on every food company in 3 dimensions

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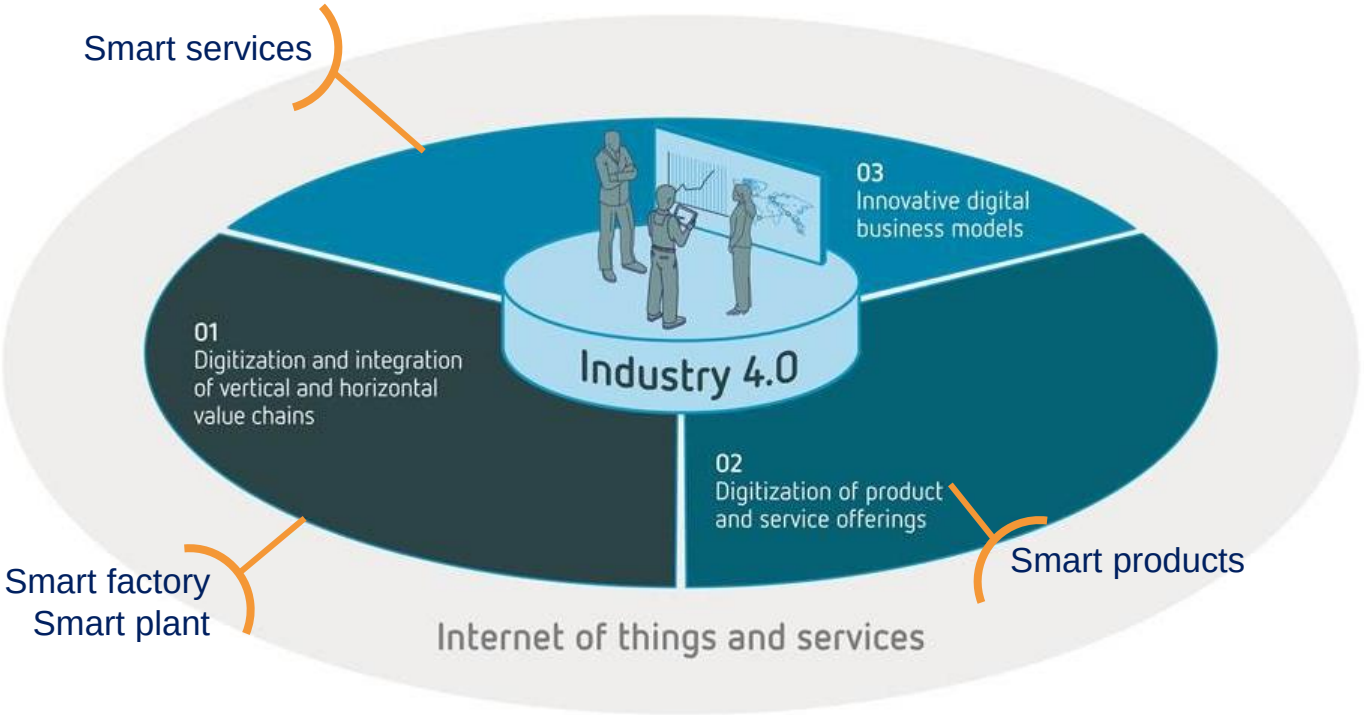

Source: ZVEI following PwC

The Digital Enterprise for the discrete and process industries brings the virtual and real worlds together

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Digital Enterprise

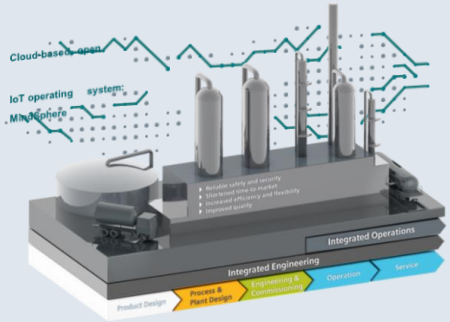
Discrete industry | **Process industry**

Product design | Production planning | Production engin. | Production execution | Service | Product design | Process design | Engineering | Operation | Service

Optimizing the entire value chain

- Industrial software and automation portfolio
- Industrial communication
- Industrial security
- Industrial services

From "Integrated Engineering" to "Integrated Operation"



The Digital Enterprise for the discrete and process industries brings the virtual and real worlds together

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Integrated Engineering

Cloud platform and operating system

(2D/3D) & commissioning

Data analytics

Asset Performance Management

Digital Twin & Simulation

Recipe, feedstock quality, …

Process & plant documen-tation

Real Plant

Secure Connectivity

Integrated Operations & Services

Maintenance

Digitally enhanced products

1 Product design

2 Process & plant design

3 Engineering & commissioning

4 Operation

5 Service

The digital twin is the “heart” of the smart factory

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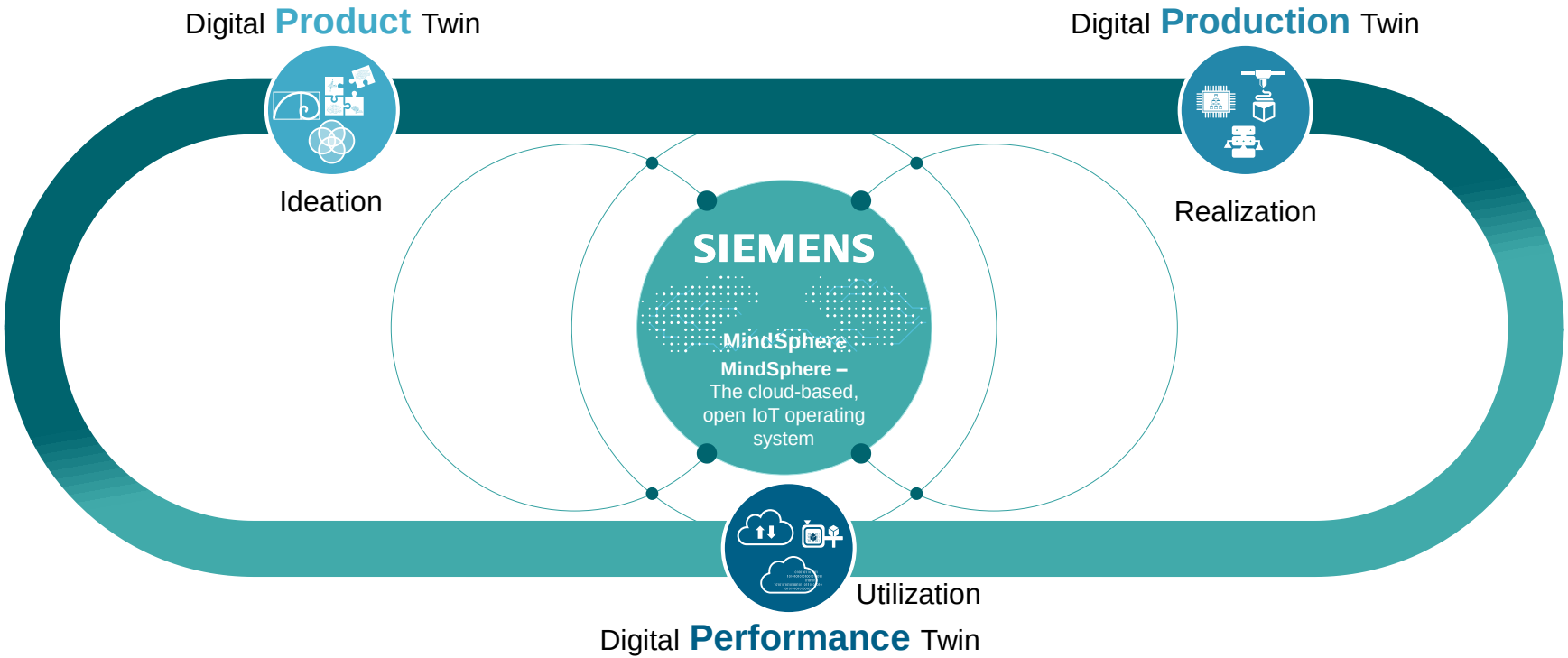

Digital Twin of a Food Product

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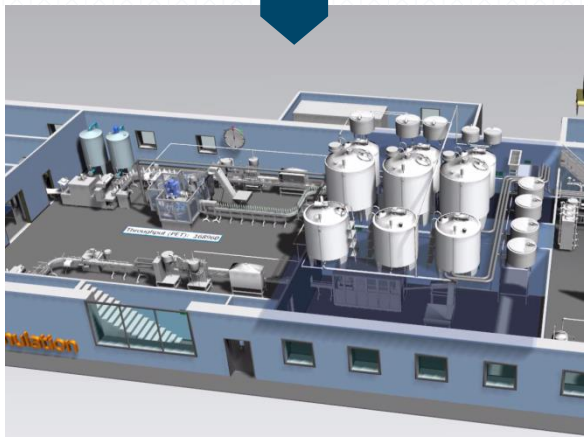
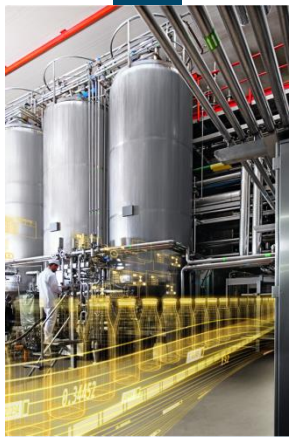
MindSphere

Feed back insights to continuously optimize product and production





Digital Twin of the product

Digital Twin of the production

Digital Twin of the performance

Example
Flexible production system

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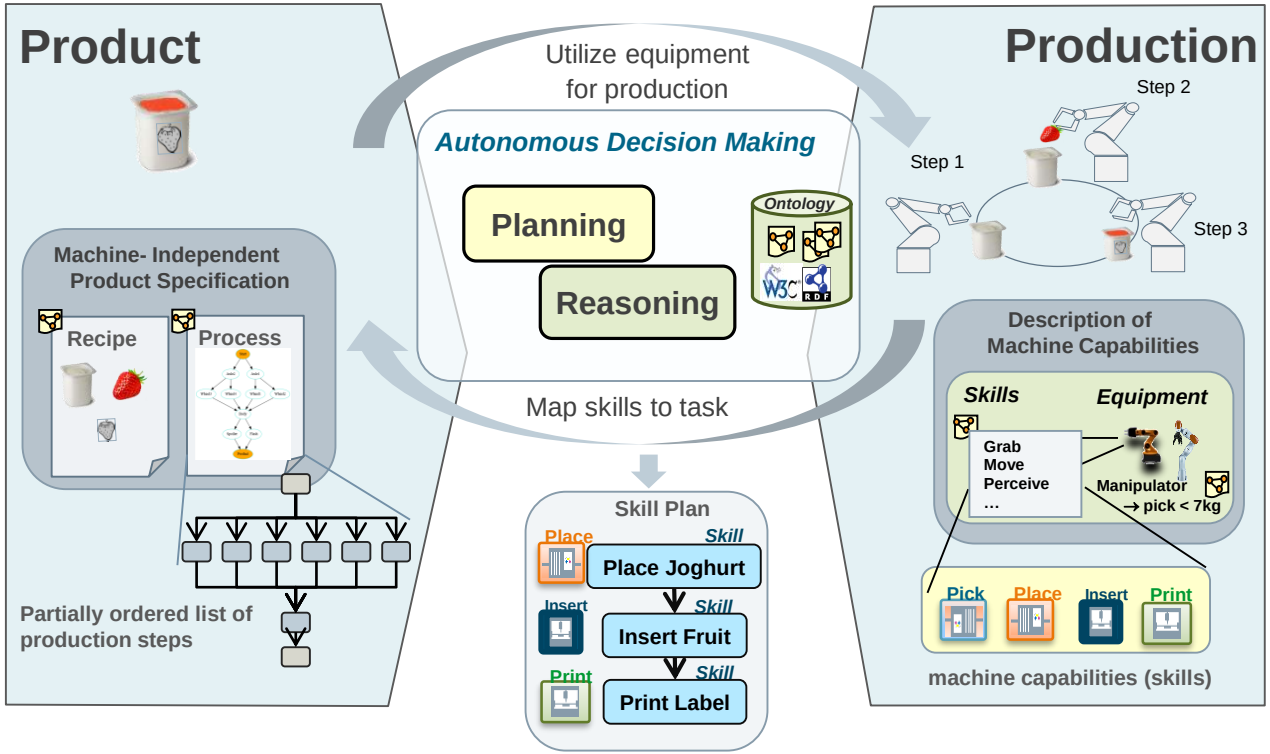
1. **Product specified independently from production equipment**
2. Production **equipment provides machine capabilities** (skills)
3. **System maps the production task to skills** provided by available equipment
4. **Sensor feedback** enables robust skill execution
5. **Skill plans** are determined using **artificial intelligence and reasoning** about assembly knowledge



Summary

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The Digital Twin and adjacent technologies transforms the whole food value chain to become more…

… efficient

… sustainable

… transparent

… personalized

… integrated

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Your questions