A digitized web of food

Klaus Beetz
Siemens AG

Challenges for future food production

SIEMENS
Ingenuity for life

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

Unrestricted © Siemens AG 2017

Industrie 4.0 - The next level of manufacturing

SIEMENS
Ingenuity for life

1st Industrial Revolution
Water and steam

2nd Industrial Revolution
Electricity, mass production

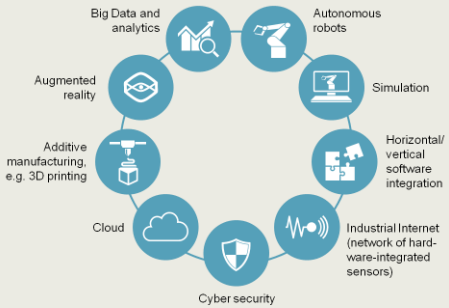
3rd Industrial Revolution
Automation

4th Industrial Revolution
Digitalization

Characteristics

- 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

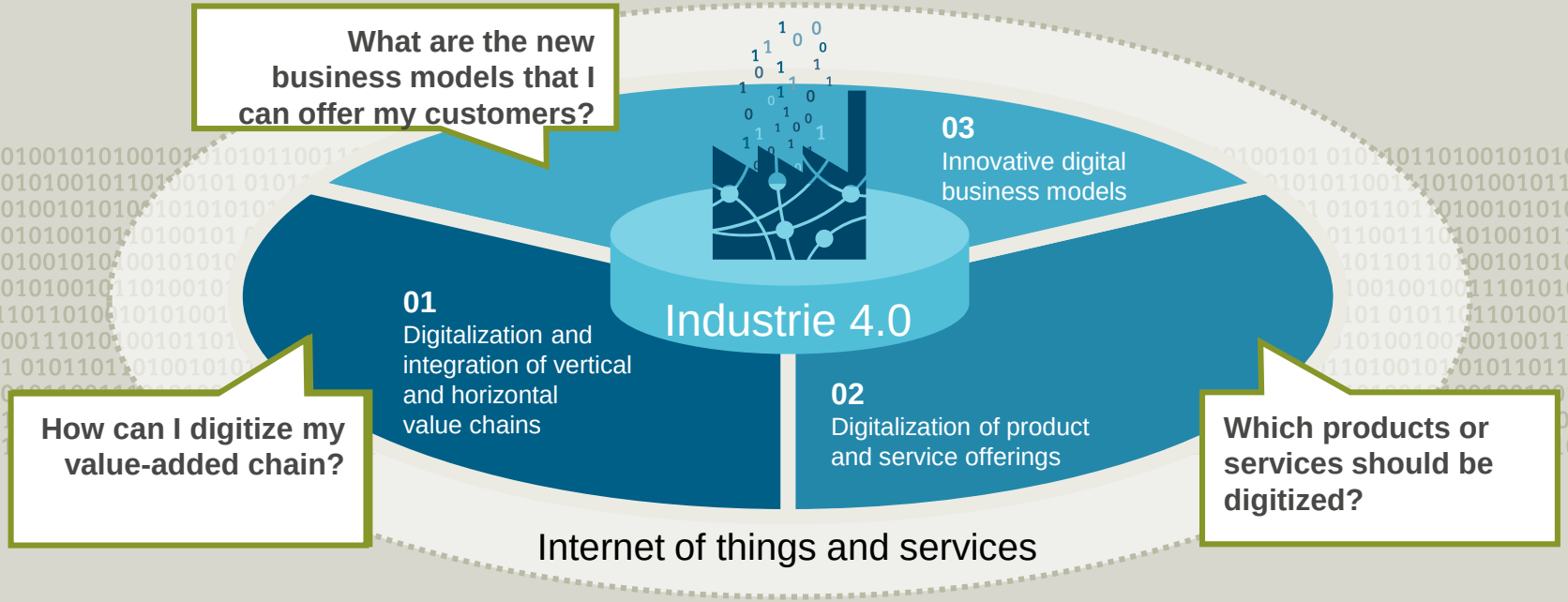
Technologies



Unrestricted © Siemens AG 2017

Digitalization affects the entire food industry: 3 questions every participant has to ask itself

SIEMENS
Ingenuity for life



Unrestricted © Siemens AG 2017

Siemens aims to support the Digital Enterprise for Food Industries

SIEMENS
Ingenuity for life

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

Unrestricted © Siemens AG 2017

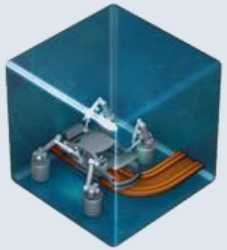
Digital Twin of a Food Product

SIEMENS
Ingenuity for life

Cyber-physical system (CPS)

Physical production facility

+



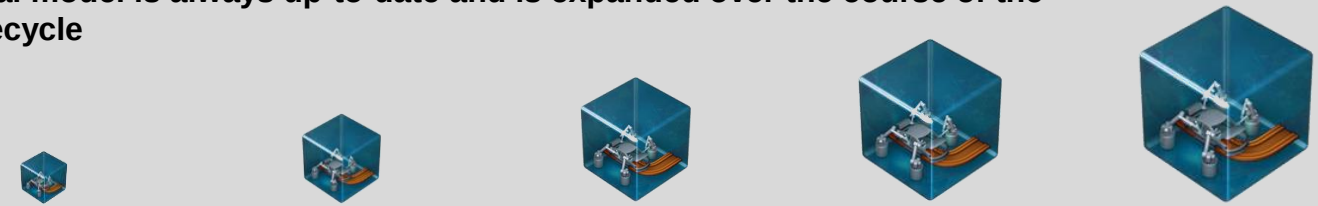
Digital model

Contains all the information about…

- Ingredients
- Receipts
- Production processes
- Safety, security
- Maintenance
- …

- Location, identity
- Status
- SW version
- Interfaces
- …

The digital model is always up-to-date and is expanded over the course of the entire lifecycle

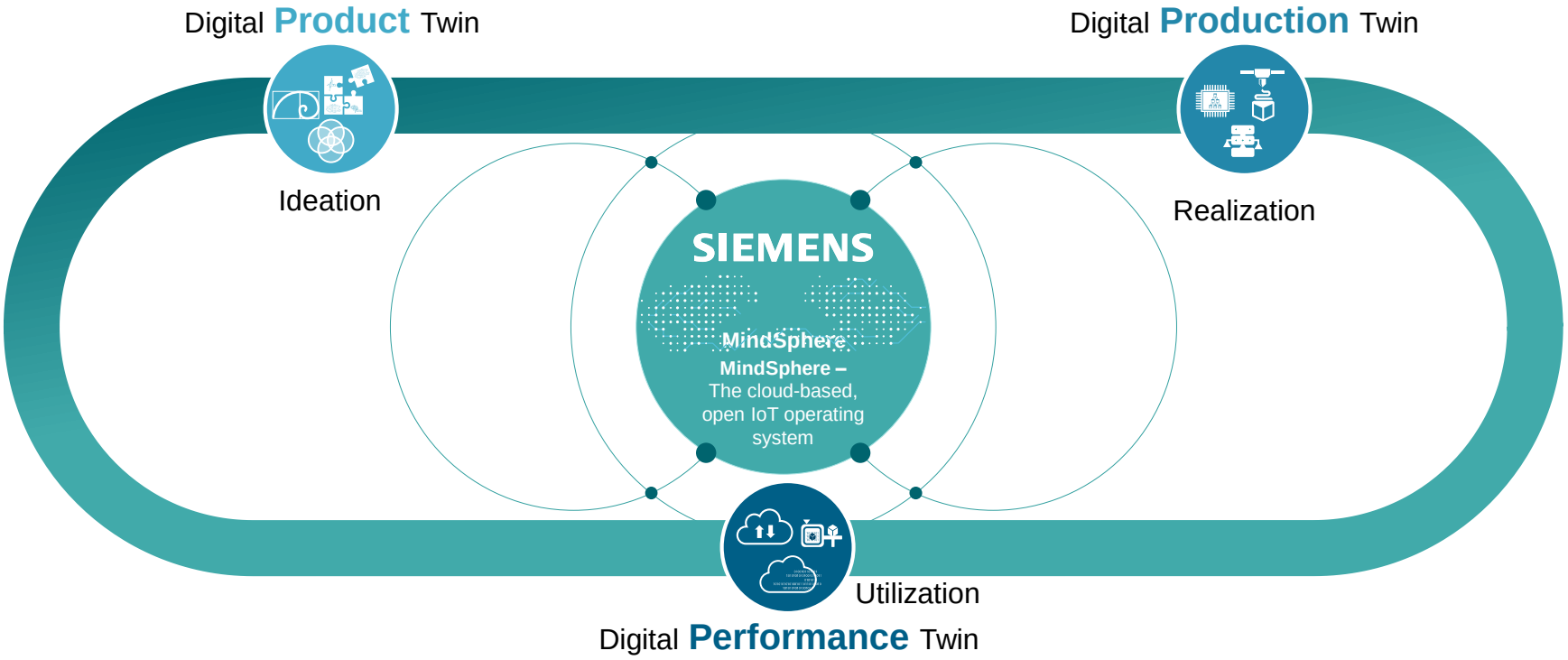


Product design → **Production planning** → **Production engineering** → **Production execution** → **Services**

Unrestricted © Siemens AG 2017

Simulation solutions are required for flexibility in design, production and process optimization

SIEMENS
Ingenuity for life



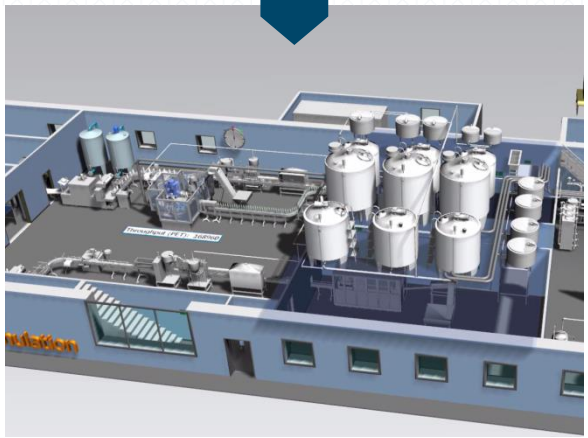
Unrestricted © Siemens AG 2017

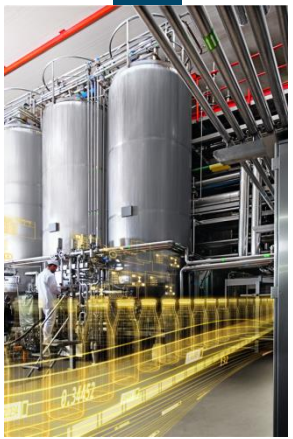
Digital Twin of a Food Product

SIEMENS
Ingenuity for life

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

Unrestricted © Siemens AG 2017

Siemens is partner at AIOTI

SIEMENS
Ingenuity for life

AIOTI
ALLIANCE FOR INTERNET
OF THINGS INNOVATION

Alliance Internet of Things Innovation (AIOTI)
WG06: Smart farming and food security

Vision:

To become the **key meeting point** of EU-based stakeholders interested in developing and exploiting the benefits of the **IoT** (technologies, ecosystem and infrastructure) in the domains of farming for **food production** and **food safety**, **from farm to fork**, addressing the big challenges of farming:

- Food security
- Decreasing environmental footprint
- Sustainability

Unrestricted © Siemens AG 2017

Siemens is partner at EIT Food

SIEMENS
Ingenuity for life

EIT Food is a Knowledge and Innovation Community (KIC) funded by the European Institute of Innovation and Technology (EIT)

Vision:

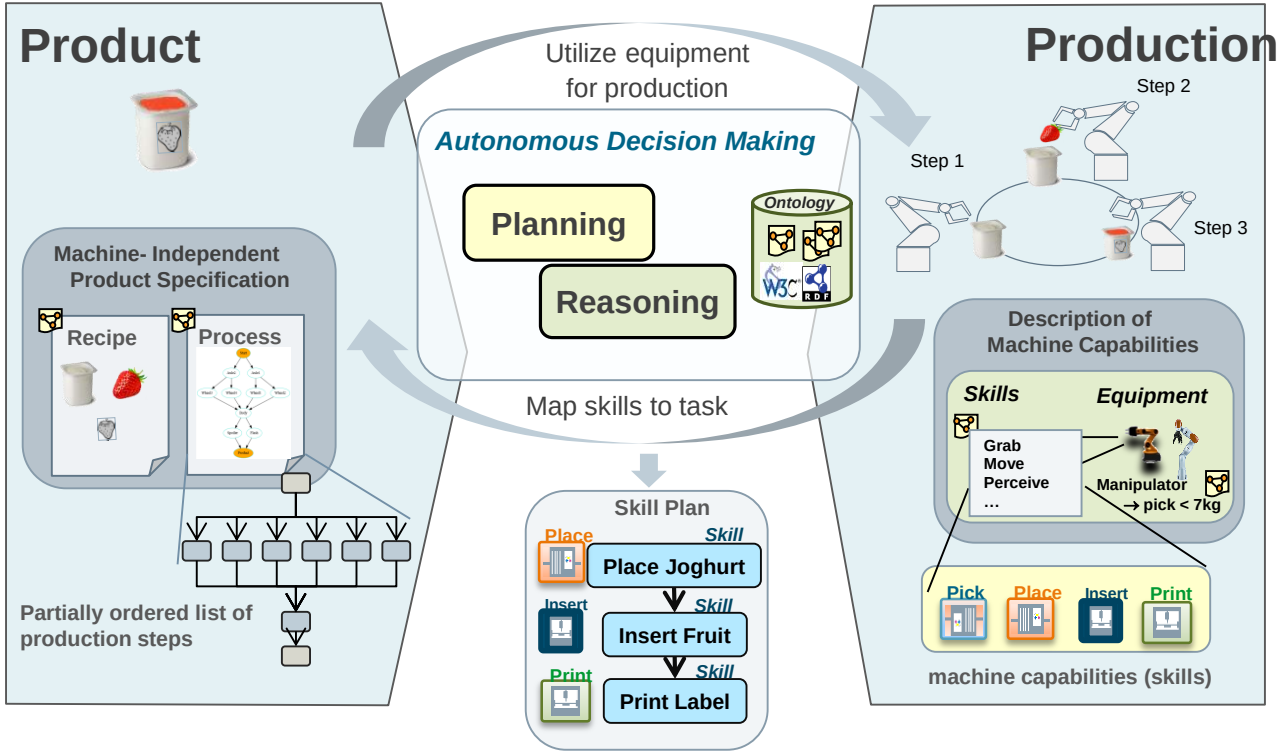
To put Europe at the centre of a global revolution in how food is innovated, produced and valued in society. EIT Food will foster a sense of ‘collective stewardship’ in which industry, government, science and education commit to supporting individuals in their right to enjoy a sustainable, safe and healthy diet.

Unrestricted © Siemens AG 2017

Example from EIT Food
Flexible production system

SIEMENS
Ingenuity for life

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



Unrestricted © Siemens AG 2017

Summary

SIEMENS
Ingenuity for life

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

… efficient

… sustainable

… transparent

… personalized

… integrated

Unrestricted © Siemens AG 2017

Your questions

Unrestricted © Siemens AG 2017