A digitized web of food
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Challenges for future food production

**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:
- Sustainable
- Efficient
- Transparent
- Personalized
- Integrated
Industrie 4.0 - The next level of manufacturing

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

01 Digitalization and integration of vertical and horizontal value chains

02 Digitalization of product and service offerings

03 Innovative digital business models

What are the new business models that I can offer my customers?

How can I digitize my value-added chain?

Which products or services should be digitized?

Internet of things and services
Siemens aims to support the Digital Enterprise for Food Industries

**Virtual World**
- Cloud platform and operating system
- (2D/3D) & commissioning

**Digital Twin & Simulation**
- Recipe, feedstock quality, ...
- Process & plant documentation
- Real Plant

**Integrated Engineering**
- Data analytics
- Asset Performance Management

**Real World**
- Secure Connectivity
- Digitally enhanced products
- Maintenance

1. Product design
2. Process & plant design
3. Engineering & commissioning
4. Operation
5. Service
Digital Twin of a Food Product

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

Digital **Product** Twin

**Ideation**

**MindSphere**
- The cloud-based, open IoT operating system

**Realization**

Digital **Production** Twin

**Utilization**

Digital **Performance** Twin
Digital Twin of a Food Product

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

Packaging
Formulation

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Siemens is partner at AIOTI

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
Siemens is partner at EIT Food

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.
Example from EIT Food
Flexible production system

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

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Summary

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

... efficient

... sustainable

... personalized

... transparent

... integrated
Your questions