Internet Industrial de las cosas

IIOT

Webinar   Software y Tecnologías

Agenda

➢ Qué es el IoT

➢ Qué es el IIoT ?

➢ Segmentos Industriales factibles

➢ Casos de éxitos

IoT

DEFINICIONES DE LA INTERNET DE LAS COSAS

Por lo general, el término Internet de las Cosas se refiere a escenarios en los que la conectividad de red y la capacidad de cómputo se extienden a objetos, sensores y artículos de uso diario que habitualmente no se consideran computadoras, permitiendo que estos dispositivos generen, intercambien y consuman datos con una mínima intervención humana. Sin embargo, no existe ninguna definición única y universal.

Karen Rose, Scott Eldridge, Lyman Chapin

OCTUBRE DE 2015

Internet Society

Internet of Things

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IoT

ORÍGENES, IMPULSORES Y APLICACIONES

El término "Internet de las Cosas" (IoT) fue empleado por primera vez en 1999 por el pionero británico Kevin Ashton para describir un sistema en el cual los objetos del mundo físico se podían conectar a Internet por medio de sensores.[12] Ashton acuñó este término para ilustrar el poder de conectar a Internet las etiquetas de identificación por radiofrecuencia (RFID)[13] que se utilizaban en las cadenas de suministro corporativas para contar y realizar un seguimiento de las mercancías sin necesidad de intervención humana. Hoy en día, el término Internet de las Cosas se ha popularizado para describir escenarios en los que la conectividad a Internet y la capacidad de cómputo se extienden a una variedad de objetos, dispositivos, sensores y artículos de uso diario.

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MODELOS DE CONECTIVIDAD

Las implementaciones de la IoT utilizan diferentes modelos de conectividad, cada uno de los cuales tiene sus propias características. Los cuatro de los modelos de conectividad descritos por la Junta de Arquitectura de Internet incluyen: *Device-to-Device* (dispositivo a dispositivo), *Device-to-Cloud* (dispositivo a la nube), *Device-to-Gateway* (dispositivo a puerta de enlace) y *Back-End Data-Sharing* (intercambio de datos a través del *back-end*). Estos modelos destacan la flexibilidad en las formas en que los dispositivos de la IoT pueden conectarse y proporcionar un valor para el usuario.
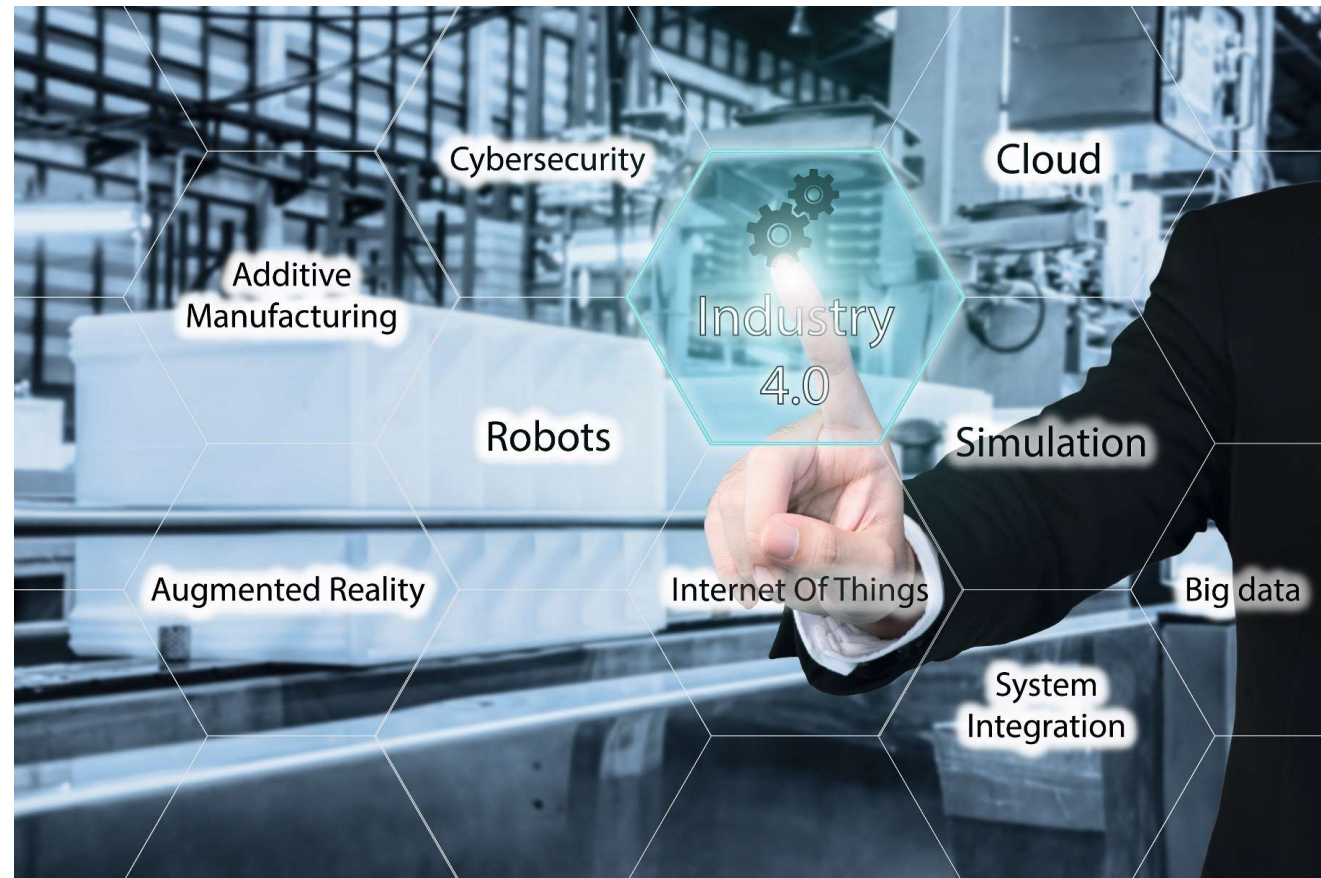
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¿Amenaza o ayuda?

Qué es el internet de las cosas

¿Qué es la Internet industrial de las cosas (IIoT)?

Technology

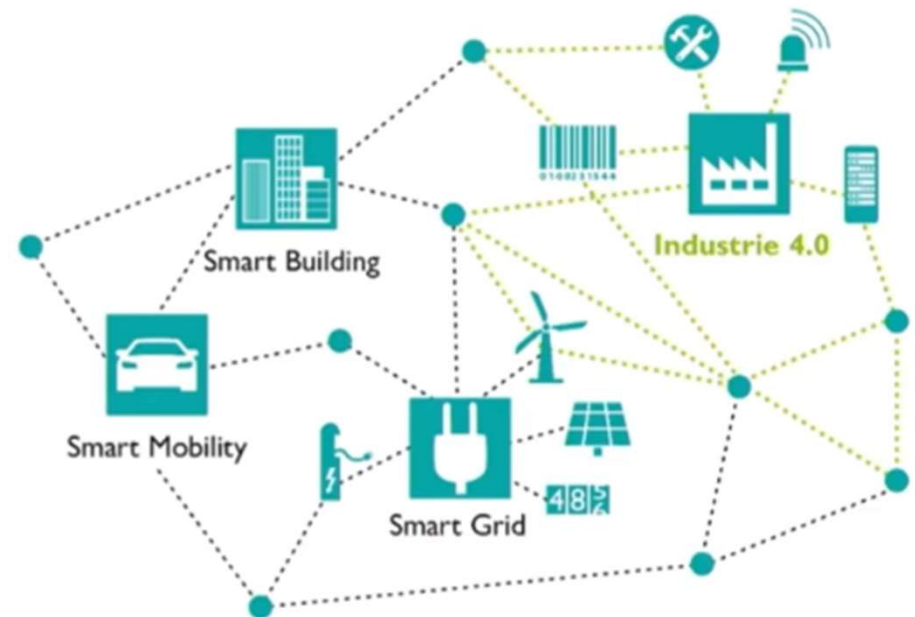# Industrie 4.0

Industrie 4.0

- ... stands for the digitization of production and product life cycle

- ...stands for the technical integration of cyber-physical systems and the Internet of Things and Services in production and logistics

Smart Building

Industrie 4.0

Smart Mobility

Smart Grid

source: Umsetzungsempfehlungen für das Zukunftsprojekt Industrie 4.0, Forschungsunion, acatech

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Worldwide organization: Basis for a consistent and reliable framework

International Initiatives

Cooperation between Plattform Industrie 4.0 and the Industrial Internet Consortium

Referenzarchitekturen angleichen für mehr Interoperabilität

RAMI4.0 — IIRA

Plattform Industrie 4.0 and the Industrial Internet Consortium have [...] to analyse how their architecture models, namely RAMI (Reference Ar[...] Industrie 4.0) and IIRA (Industrial Internet Reference Architecture) ca[...] ensuring that the two systems will be interoperable in the future.

More information about the cooperation with the IIC can be found u[...] links:

Interplay of the two architectural models

Joint action plan adopted by Plattform Industrie 4.0 and Japan's Robot Revolution Initiative

Germany and Japan are key partners when it comes to the digitalisation of indust[...] meeting was held in Japan in February 2016, Plattform Industrie 4.0 and its Japan[...] the Robot Revolution Initiative – have taken action and have signed a joint agreem[...] future cooperation. The Japanese initiative has also collected use cases, which can [...] here.

More information about the cooperation with Japan can be found under the follo[...]

Hannover Declaration (PDF, 220KB)

Joint publication: Facilitating International Cooperation for Secure Industrial Inte[...] Things/Industrie 4.0

Joint publication: The common strategy on international standardization in field [...] of Things/Industrie 4.0

Henning Banthien (left), Head of office Plattform Industrie 4.0, Tomoaki Kubo, Head of RRI office

© Plattform Industrie 4.0

Germany and China – De[...]

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Worldwide organization: Basis for a consistent and reliable framework
IIC and Plattform Industrie 4.0

Industrial Internet Consortium (IIC): Global not-for-profit partnership of industy, government and academia started in March 2014.

- World's leading organization transforming business and society by accelerating the Industrial Internet of Things (IIoT)

- Cross-domain oriented approach: deliver a trustworthy IIoT in which the world's systems and devices are securely connected and controlled to deliver transformational outcomes.

- https://www.iiconsortium.org/

Plattform Industrie 4.0: Started in April 2013 and is Germany`s central network of politics, science and industry for driving forward digitalization in manufacturing.

- Its goal is to understand trends, connect people and offer support.

- Coordinating the shaping of the digital structural shift of German industry.

- https://www.plattform-i40.de/PI40/Navigation/EN/Home/home.html

Worldwide organization: Basis for a consistent and reliable framework

Models for communication

Industrial Internet Reference Architecture (IIRA)

- Standards-based architectural template and methodology enables Industrial Internet of Things (IIoT) system architects to design their own systems based on a common framework and concepts.

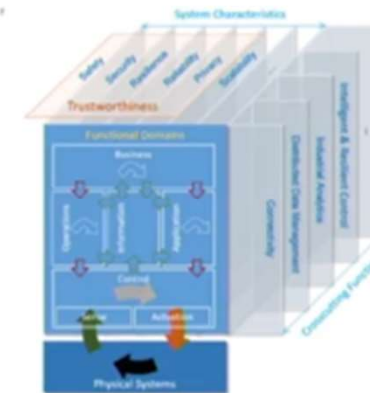- Common architecture framework to develop interoperable IIoT systems for diverse applications.

Figure 6-5: Functional Domains, Crosscutting Functions and System Characteristics

## Reference Architectural Model Industrie 4.0 (RAMI4.0)

- Guidance for Industrie 4.0

- Three-dimensional map showing the most important aspects of Industrie 4.0.

- Ensures that all participants involved share a common perspective and develop a common understanding.

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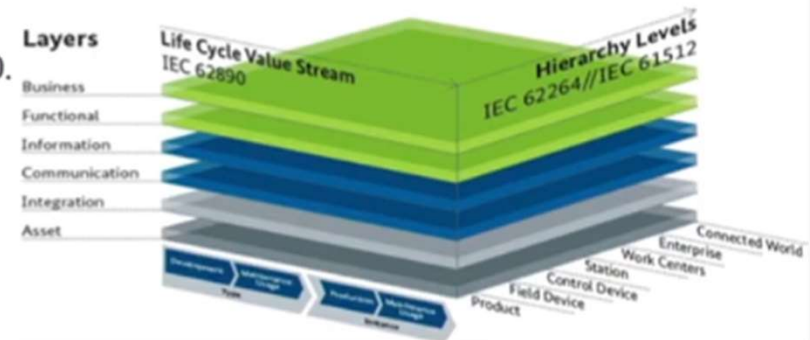
Reference Architectural Model for Industrie 4.0

- RAMI 4.0 is a three-dimensional map showing how to approach the issue of Industrie 4.0 in a structured manner.

- RAMI 4.0 ensures that all parties involved in Industrie 4.0 communication understand each other.
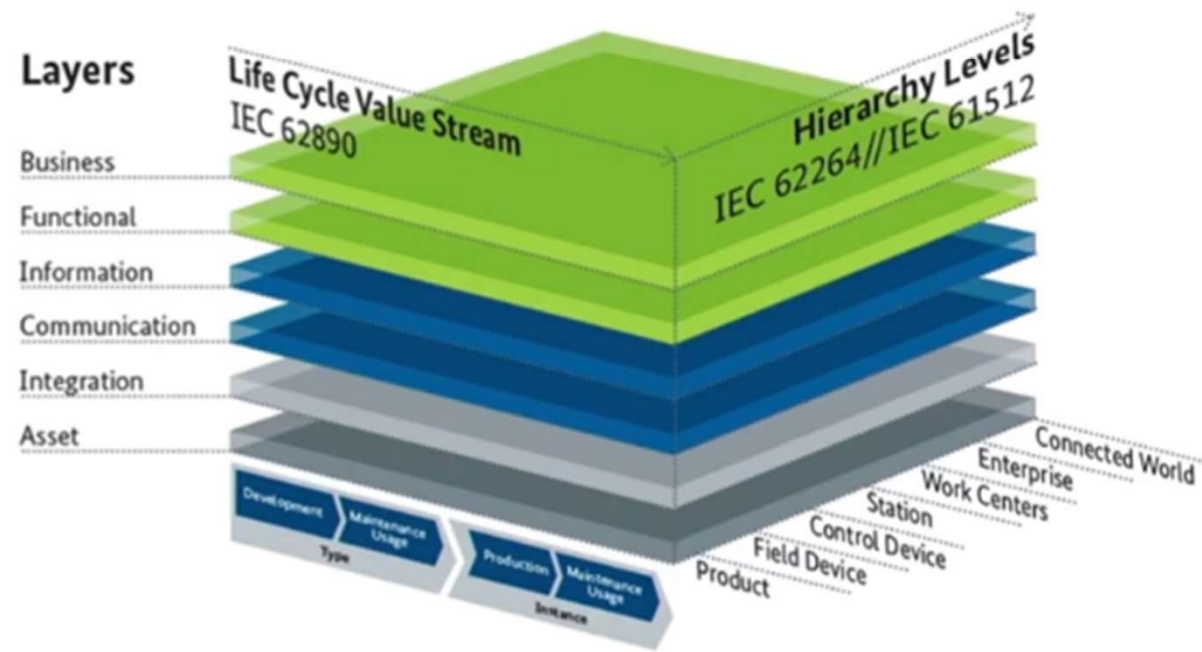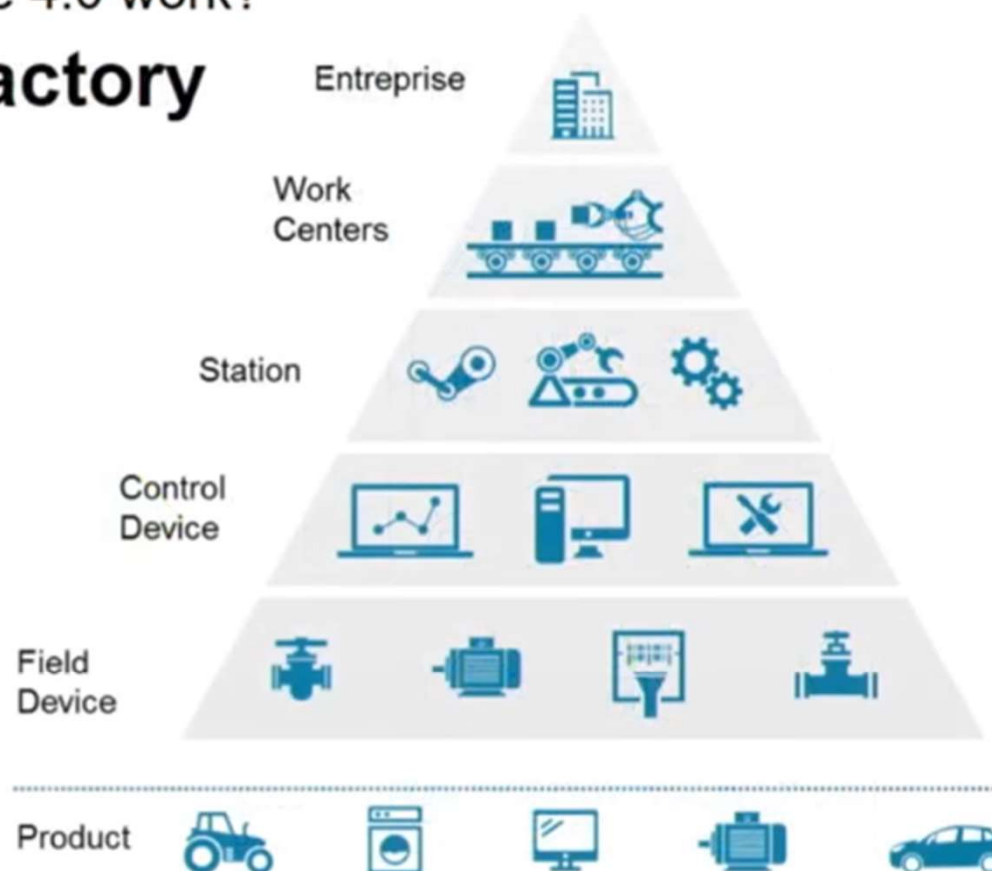
Technical basics – How does Industrie 4.0 work?

Axis 1 – hierarchy: the factory

Industrie 3.0:

- Hardware-based structure
- Functions are bound to hardware
- Hierarchy-based communication
- Product is isolated

Entreprise

Work Centers

Station

Control Device
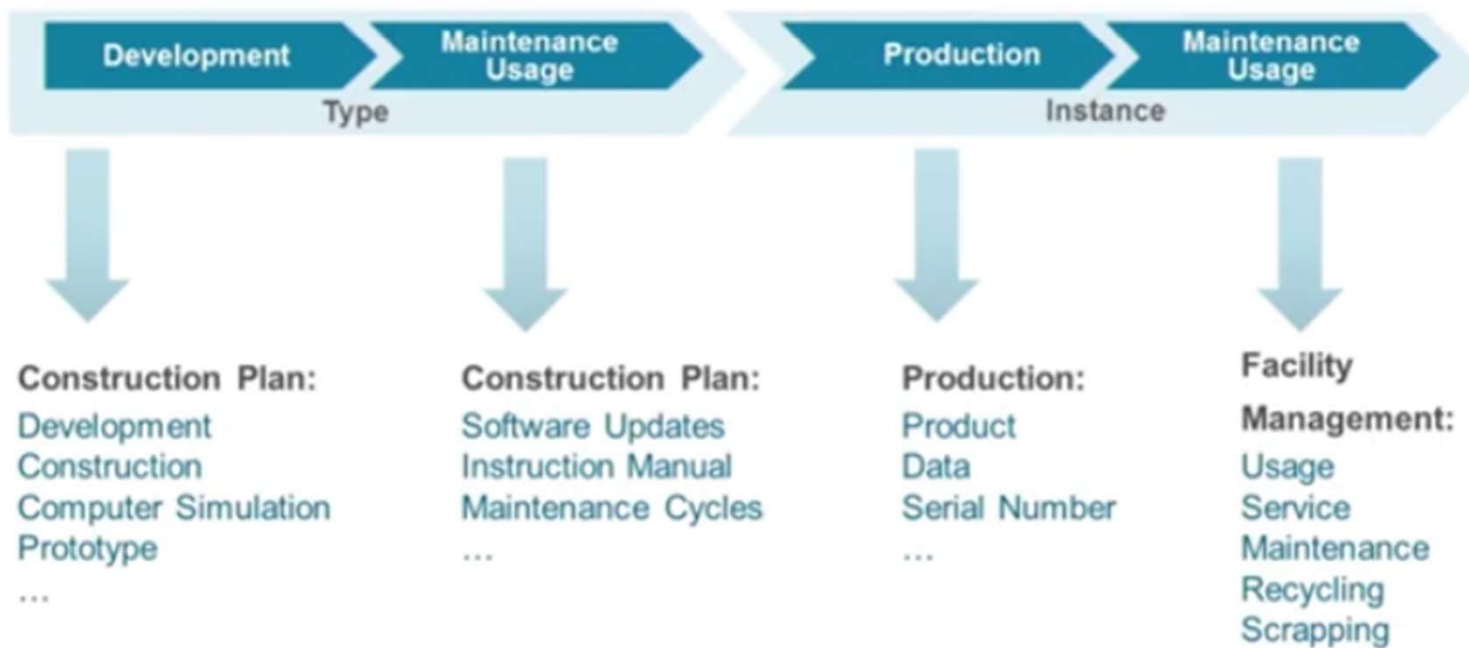
Field Device

Product

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Technical basics – How does Industrie 4.0 work?

Axis 2 – IT-architecture

Business	Organization – Business
Functional	Functions of the Asset
Information	Necessary Data
Communication	Access to Information
Integration	Transition from Real to Digital World
Asset	Physical Object in the Real World

Technical basics – How does Industrie 4.0 work?

Axis 3 – product life cycle

The Product: From the First Idea to the Scrapyard

Development	Maintenance Usage	Production	Maintenance Usage

Type

Instance

Construction Plan:
Development
Construction
Computer Simulation
Prototype
...

Construction Plan:
Software Updates
Instruction Manual
Maintenance Cycles
...

Production:
Product
Data
Serial Number
...

Facility Management:
Usage
Service
Maintenance
Recycling
Scrapping

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Who is responsible for interpreting?
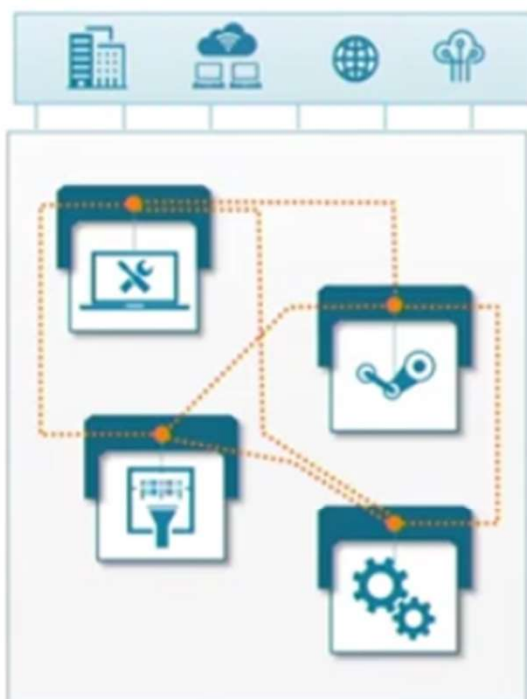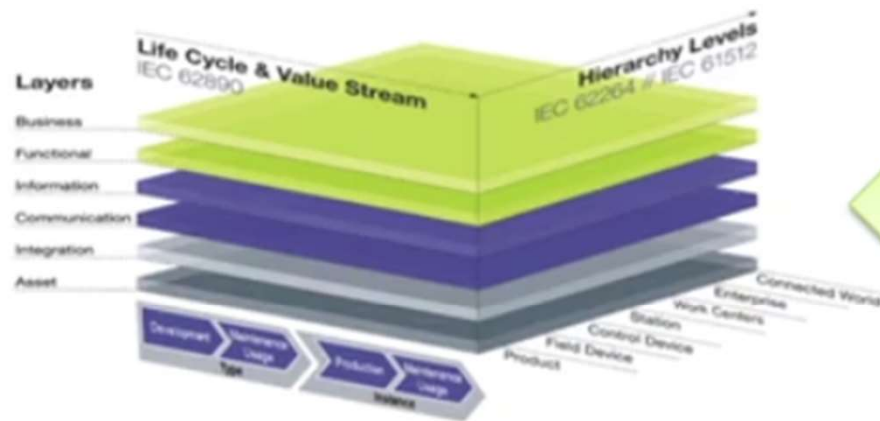

The administration shell

- … is the interface connecting I4.0 to the physical object

- … stores all data and information on the asset

- … serves as the network's standardized communication interface

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Technical basics – How does Industrie 4.0 work?

Data of the product lifecycle

Industrie 4.0 communication

Administration shell ◇

Item, e.g., a sensor

Type:
- Manufacturer; Order No.
- Data sheet
- eC@ss classification
- 3D graphic image
- Engineering information
- Functions/services
- …

Instance:
- Serial No.
- Production information
- …
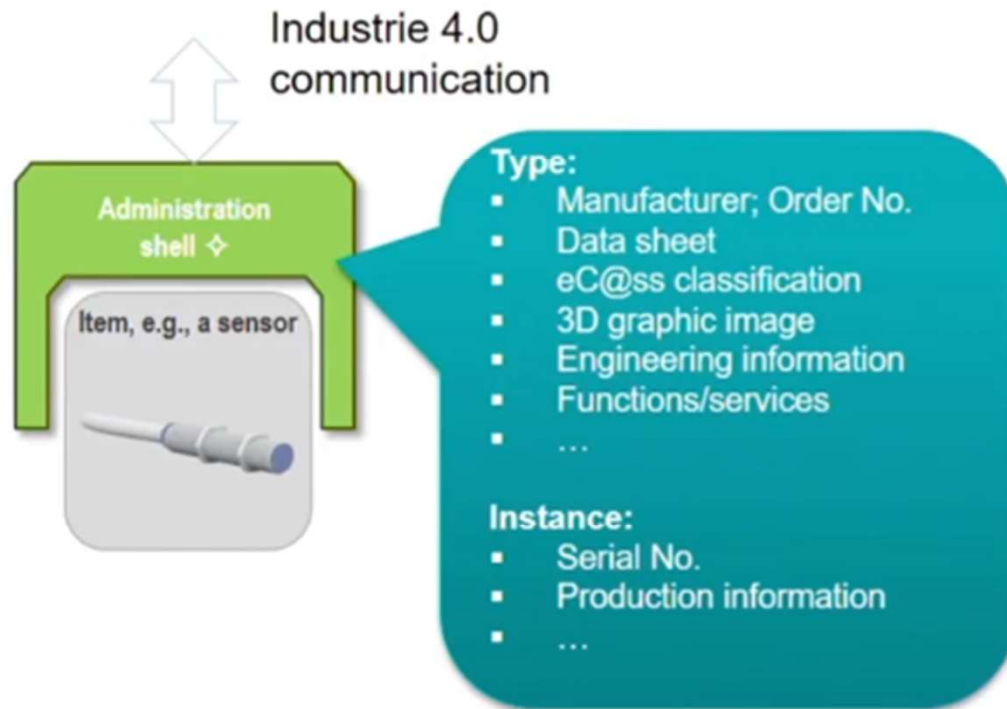
- An Industrie 4.0 system consists of Industrie 4.0 components

- These consist of the actual item and an **administration shell**, together forming a **cyber physical system** (CPS)

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Technical basics – How does Industrie 4.0 work?

Industrie 4.0 system

Added value is created by data collected in the administration shel

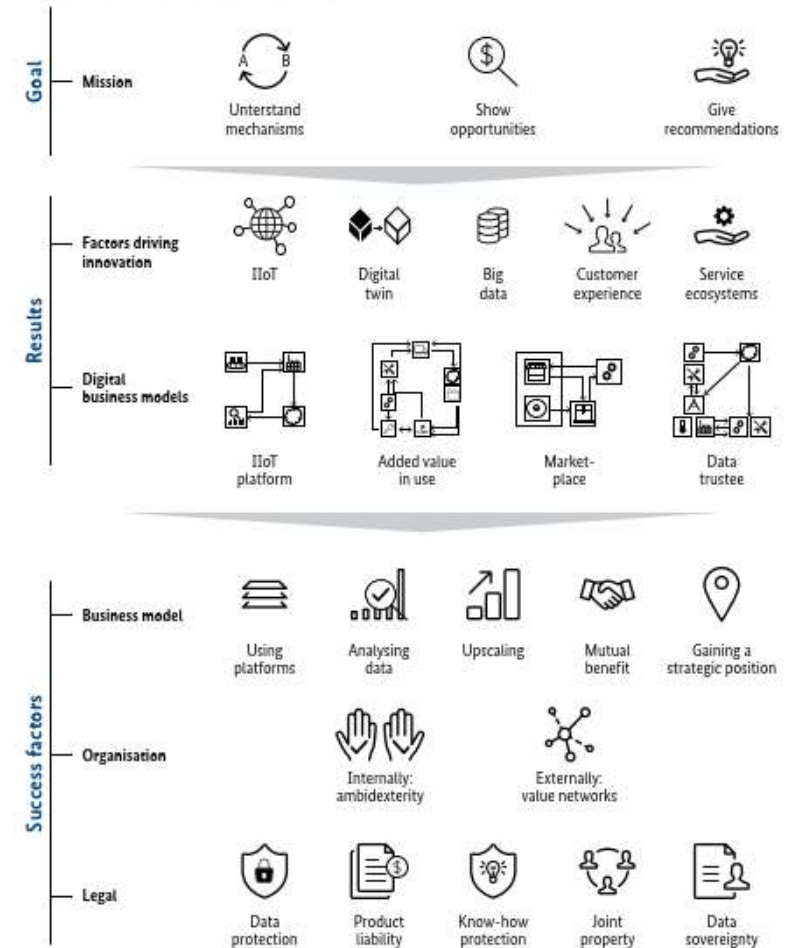For example, runtime data can provide the data basis for optimizing maintenance intervals or predictive maintenance

Administration shell ✧

Item, e.g., a machine

Machine / system

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PLATTFORM Industrie 4.0

Plattform Industrie 4.0

Through Industrie 4.0, Germany has created a globally recognized brand. Numerous countries have built their strategies for the transformation of production on German standards. For example, Industrie 4.0 has inspired China to seek an "initiative to completely enhance Chinese industry" with its 'Made in China 2025' plan. In addition, 20,000 publications about Industrie 4.0 have been published in German-speaking countries alone since 2014, with well over 100,000 published internationally.[1] Authors include ministries, scientific and research institutions, academies, associations, companies, consulting firms, trade unions and foundations. A remarkable achievement!
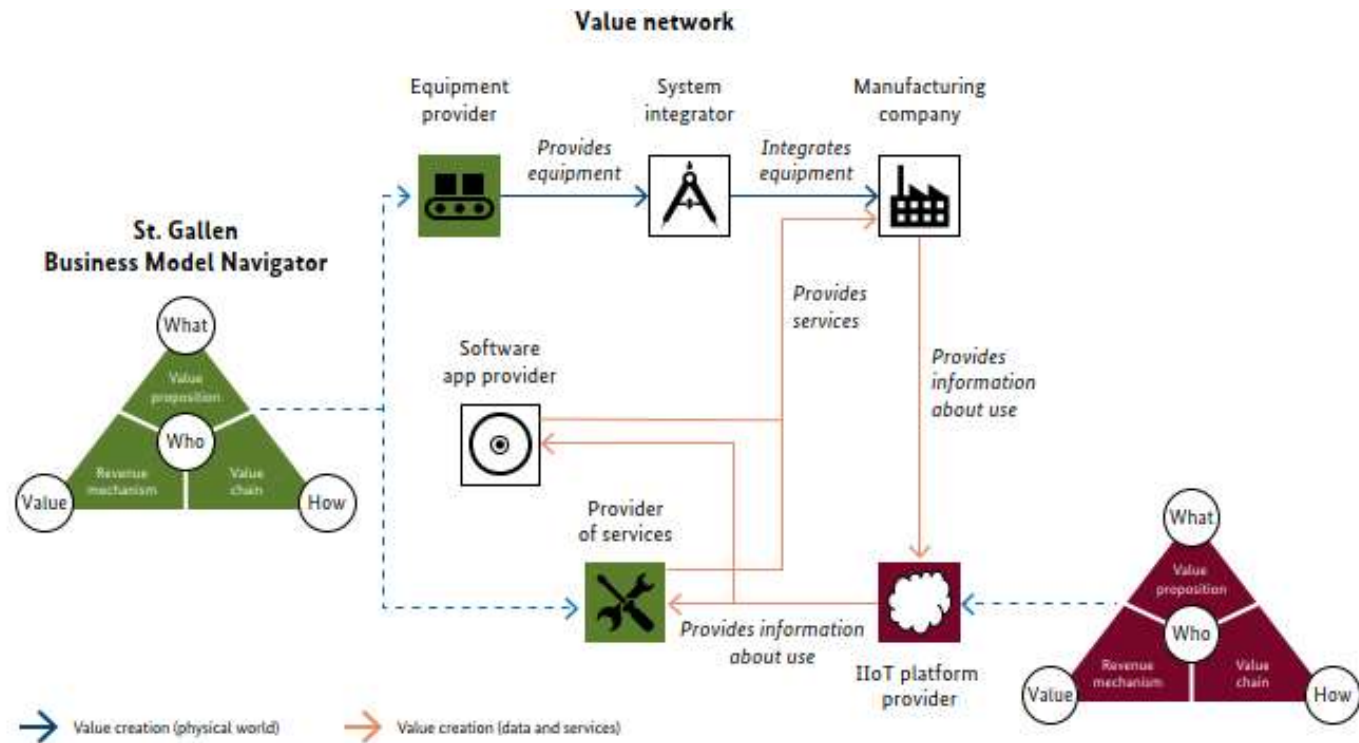

Figure 1: Digital business models for Industrie 4.0

Technology

Plattform Industrie 4.0

Source: Plattform Industrie 4.0

Technology

IIoT

INDUSTRIAL INTERNET OF THINGS

Figure 1: The first step in creating an IIoT application is to make sure that your devices – both legacy and new – can communicate with each other, so that you are getting the most out of all of your data.

Speaking a common language: Getting your devices ready for IIoT

IIoT platform provider

An IIoT platform provider is a business whose purpose is to run an IIoT platform. An IIoT platform is a technical system that has the following capabilities:

- It collects information about the use of (physical) things (sometimes called assets) that are installed, used and operated in a wide range of different contexts and can make this information available for further processing.

- Users can create IIoT applications.

- It can analyse information that has been collected and use this information to provide data-driven services

Value network

IIoT platform provider

The use of IIoT platforms is usually based on the value network shown below. Manufacturers not only want to sell a product to the user, they also want to collect information about the use of the product across its entire lifecycle so they can tap into additional sources of revenue by offering data-driven services and also obtain feedback on how to improve their product. IIoT platforms help with the technical implementation
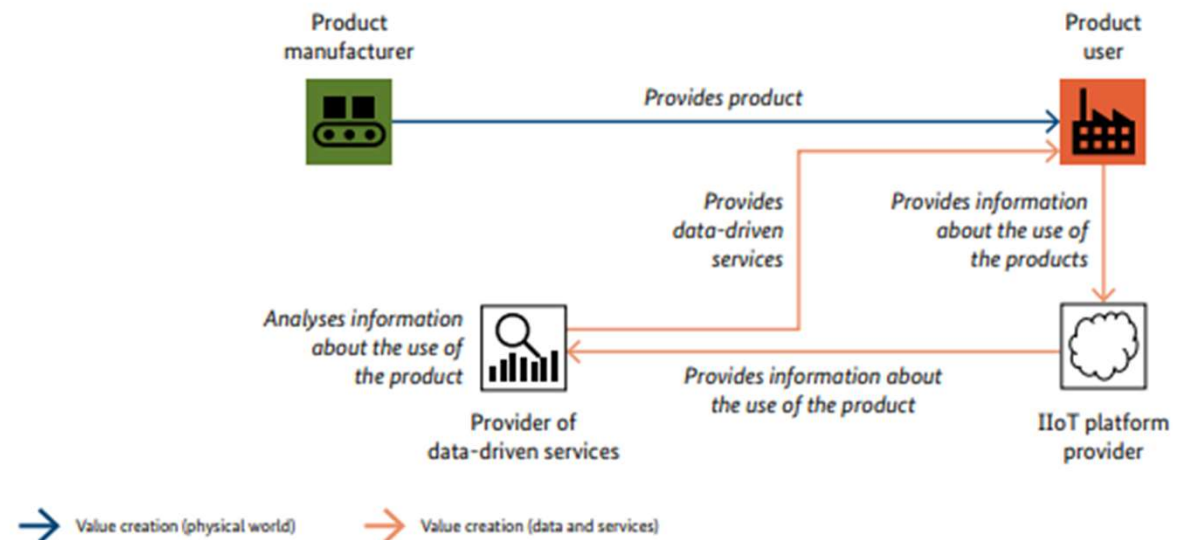
Source: Plattform Industrie 4.0

Calvatis

Ejemplo

Calvatis, one of the leading Detergent Suppliers in the world, was asked by one of its large customers in the Food & Beverage industry to supply dispensing units and the cleaning detergents for its washing lines, with a central monitoring and control system.

10 percent reduction in downtime
**6 percent reduction in the use of cleaning fluid.**

www.plattform-i40.de

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Value proposition New revenue model

- Automation Manufacturer is the IIoT platform provider. AM provides a new value proposition and a new revenue model for its client base orchestrating manufacturers and users of the product in a value network.

- For the meat-processing company, the only thing that changes through the inclusion of an IIoT service provider is the value network

- The cleaning agent supplier also continues to target the same customer. However, by offering data-driven services, it creates a new value proposition and a new revenue model and includes a new partner – the IIoT platform provider – in the value network.

Value network for the practical example: IIoT platform for optimising the use of cleaning agent
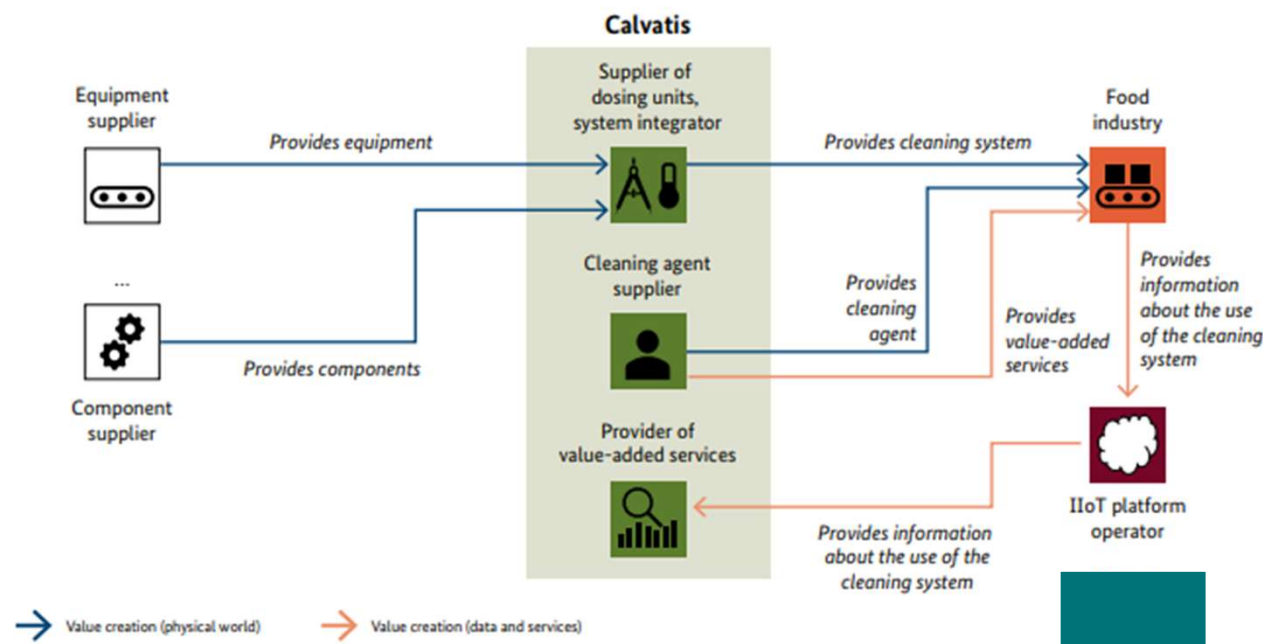
Source: Plattform Industrie 4.0

Value adding services in operation

- The term value adding in operation looks at a business model from the perspective of the customer.

- A manufacturer sells a product (generating one-off revenue for the manufacturer) to a third party (who becomes the owner of the product).

- The owner allows another company (service provider) to generate value through this product.

- The service provider ensures that the end customer (user of the product) can use the product at all times.

- The end customer's main benefit is that he can outsource activities that aren't part of his core business

IIoT

Example

Tire as a Service

A tire manufacturer sells tires to a service provider, who leases these to a fleet operator. In contrast to practical example 2, the company who is the owner also serves as the service provider. The service provider ensures that the fleet operator (user) is provided with fully functional tires as a service and with extensive tire management services.

The owner and service provider coordinate the procurement and installation of the tires and monitors their condition.

The owner and service provider use a maintenance network to provide maintenance services. The network allows the installation of tires from several different manufacturers. The work is commissioned directly by the owner and service provider who monitors the condition of the tires remotely using an IoT platform. The data on the cloud-based IoT platform is analysed by the owner and service provider and is used for invoicing and for coordinating service provision.

| Manufacturer | Service Provider | Fleet Operator |

Roles	– Tire-as-a-Service
Product user	Fleet operator
Service provider (orchestrates the service)	Service provider (Michelin Solutions)
Product manufacturer	Tire manufacturer (Michelin, Continental, …)
Maintenance network for the product	(Manufacturer's or external) maintenance network
Owner (buys and leases)	Service provider (Michelin Solutions)
IoT hardware integrator	Telematics provider
IoT solution provider	Software firm + cloud provider

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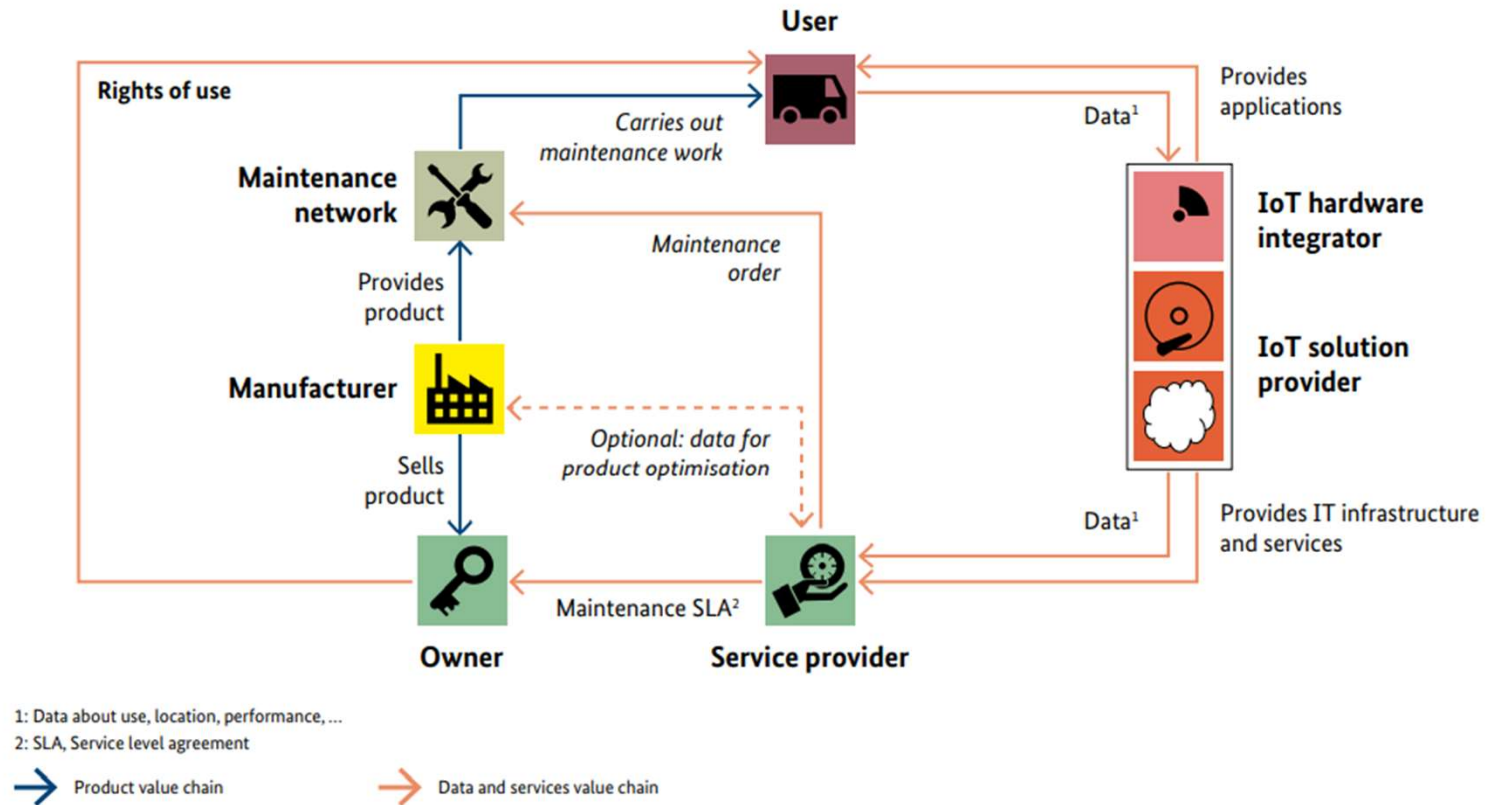
Tire as a service

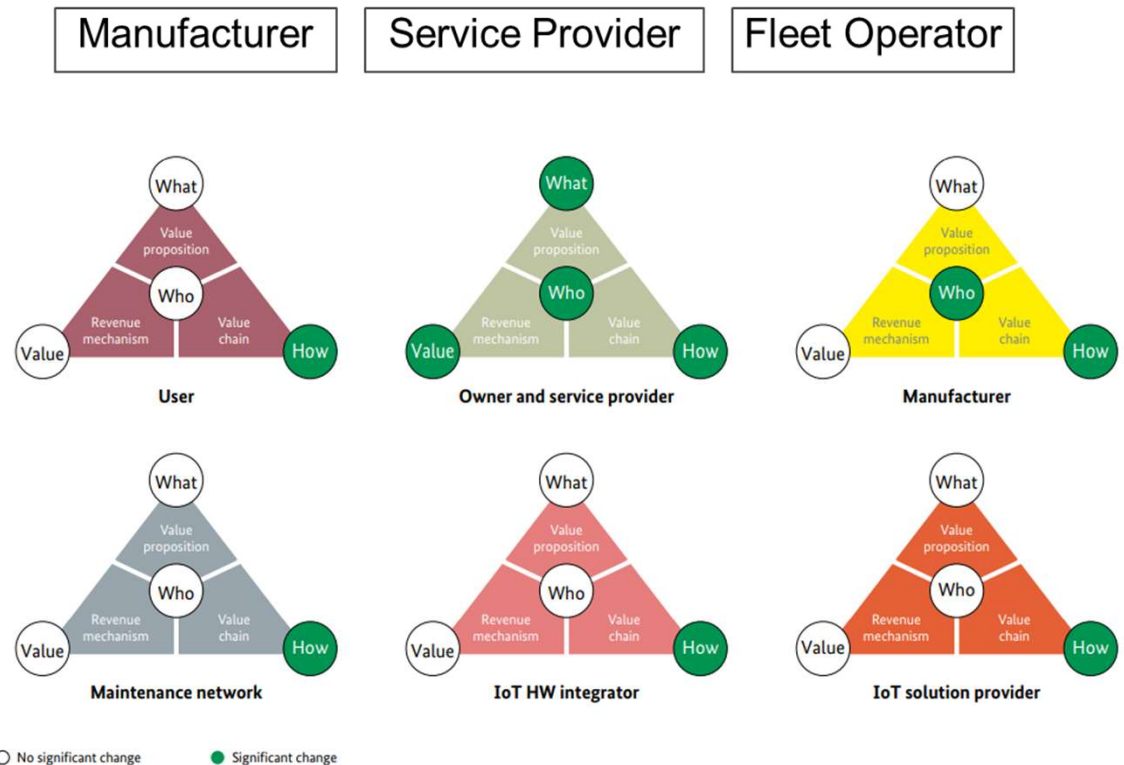Source: Plattform Industrie 4.0

Tire as a Service

Changes in the business models

- The user (fleet operator) is integrated into a new value chain. Instead of buying the actual tires for the fleet, the fleet operator acquires a value proposition promising fully functional tires.

- The owner and service provider positions itself as a new player in the market and includes additional companies in a value chain he coordinates.

- The service provider becomes the manufacturer's main customer.

- The service provider commissions all workshop services, which are provided via the maintenance network.

- The IIoT hardware integrator and the IIoT solution provider allow data about the use of the tires to be exchanged between the user and the service provider.

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Tire as a Service

- **Value proposition**: The owner and service provider provide the user with added value in use by providing it with a wide range of tire management services.

- **Value chain:** The owner and service provider position itself as a new player in the market and creates a new value network for companies that are already active in this market. He orchestrates both the physical activities and the data flow.

- **Revenue mechanism**: The owner and service provider charges the user a fee that is based on the actual use of the service. The revenue generated from this is used to pay the other player in the value network.

Manufacturer | Service Provider | Fleet Operator

User

Owner and service provider

Manufacturer

Maintenance network

IoT HW integrator

IoT solution provider

○ No significant change   ● Significant change

Source: Plattform Industrie 4.0

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Equipment as a Service

Equipment as a Service

The equipment manufacturer sells the product to a finance company (owner) who leases the equipment to the producer, charging a fee. In order to ensure that the service is used and priced in line with the terms of the contract, and that the equipment is properly maintained and repaired, the equipment is linked up to an IoT platform.

The service provider is responsible for carrying out maintenance and repair work and for providing spare parts. The finance company can access the data that is stored on the IoT platform remotely, which allows it to better assess the extent to which the equipment is being used. This allows a pay-peruse pricing model to be used, whereby the user only pays for the time he actually uses the equipment. It also allows the user to be provided with additional financial and warranty services

Roles	– Equipment-as-a-Service
Product user	Producer
Service provider (orchestrates the service)	Equipment manufacturer (Bosch)
Product manufacturer	Equipment manufacturer (Bosch)
Maintenance network for the product	Equipment manufacturer (Bosch) or external maintenance service providers
Owner (buys and leases)	Finance company (Munich Re)
IoT hardware integrator	IoT platform provider (Bosch and others)
IoT solution provider	IoT platform provider (Bosch and others)

Market Place

A digital marketplace coordinates supply and demand to facilitate transactions (two-sided market).

We can distinguish between **open** and **closed** marketplaces.

Open marketplaces are open to all service providers, whilst **closed marketplaces** are subject to a pre-selection of suppliers by the marketplace provider – in some cases, the provider might even be the only supplier on the platform.

Marketplace providers offer information and search functions, service provision, invoicing and assessment mechanisms.

They provide these by themselves or via an external
service provider. Access to and use of the services is subject
to a fee

Closed Marketplace value network
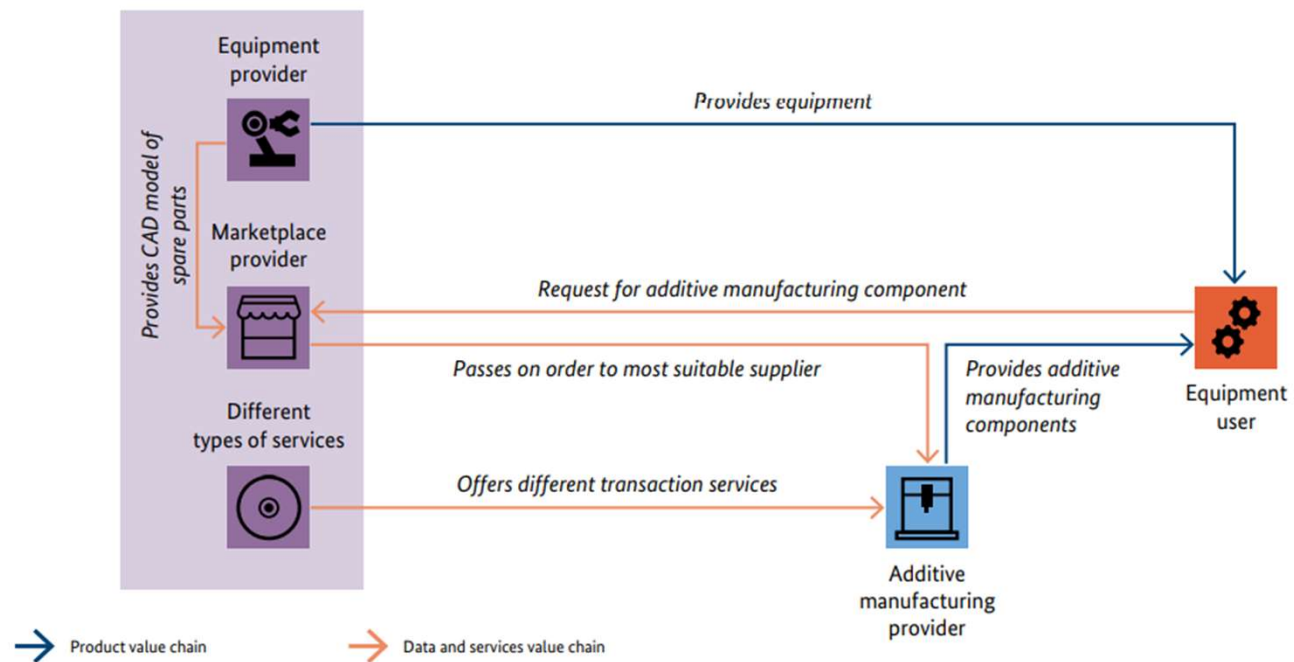
Source: Plattform Industrie 4.0

Closed Marketplace value network
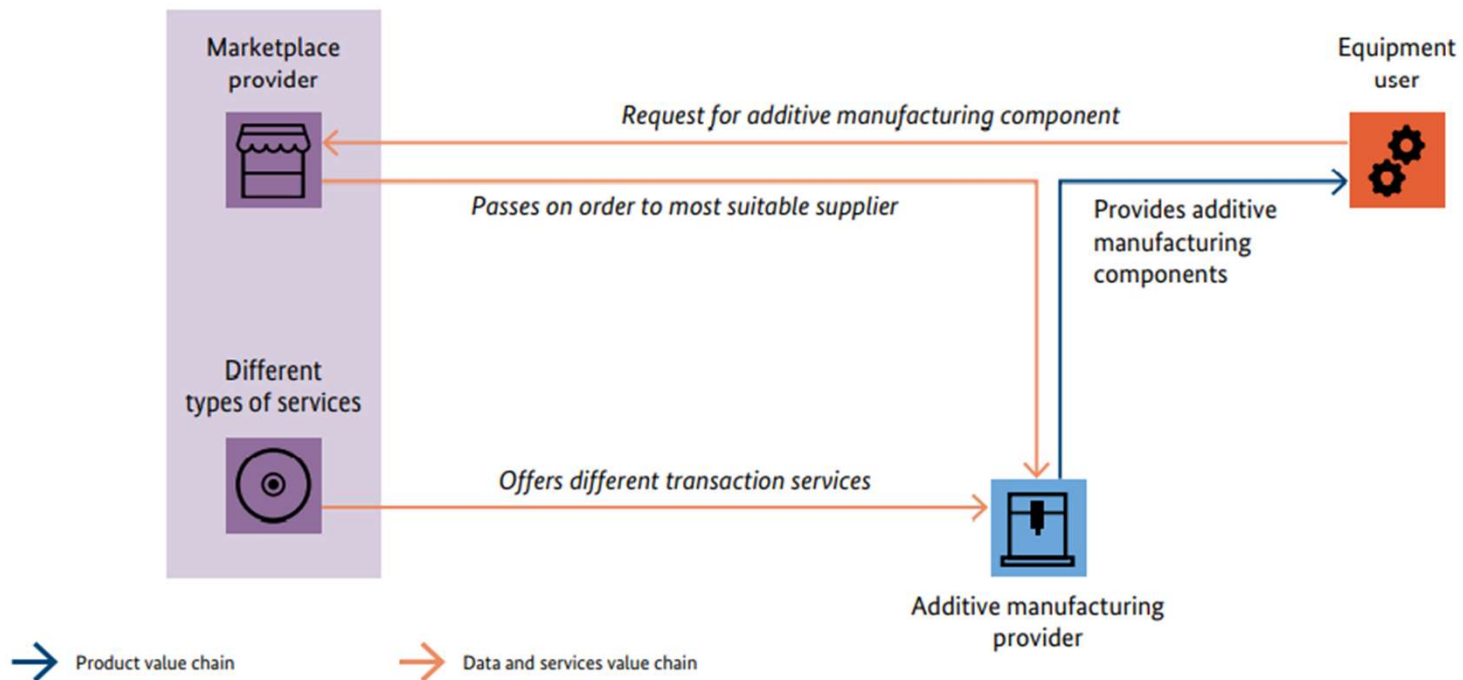
Source: Plattform Industrie 4.0

"Once again, it was an impressive selection and a difficult choice," said jury member Stephan Tromp, deputy Chief Executive Director of HDE, the German Retail Association.

He was impressed by the versatility, innovative spirit, and customer focus of the shops that were nominated.

The jury was really impressed by Protiq Marketplace, the platform operated by the 3D printing specialist from Ostwestfalen-Lippe, which earned Protiq first place in the category for "Most innovative business model". A total of 215 online shops competed for the awards this year.

Example IIoT Plattform Industrie 4.0

Machine Building Phoenix Contact

Webinar IMA 2020

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