Reference Architectural Model Industrie 4.0 (RAMI 4.0)

An Introduction

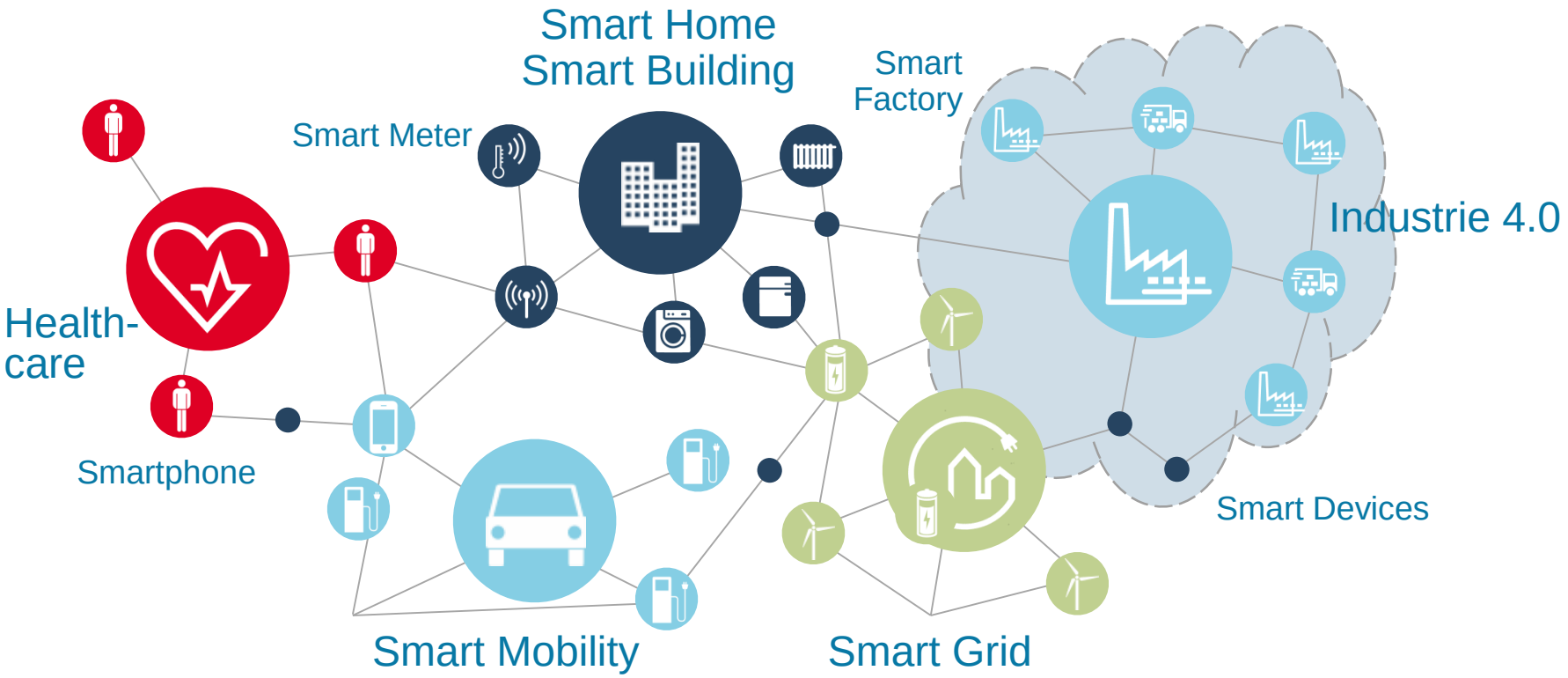
Dr. Karsten Schweichhart

Leader(act.) AG1 „Standardization & Reference Architecture“

Plattform Industrie 4.0

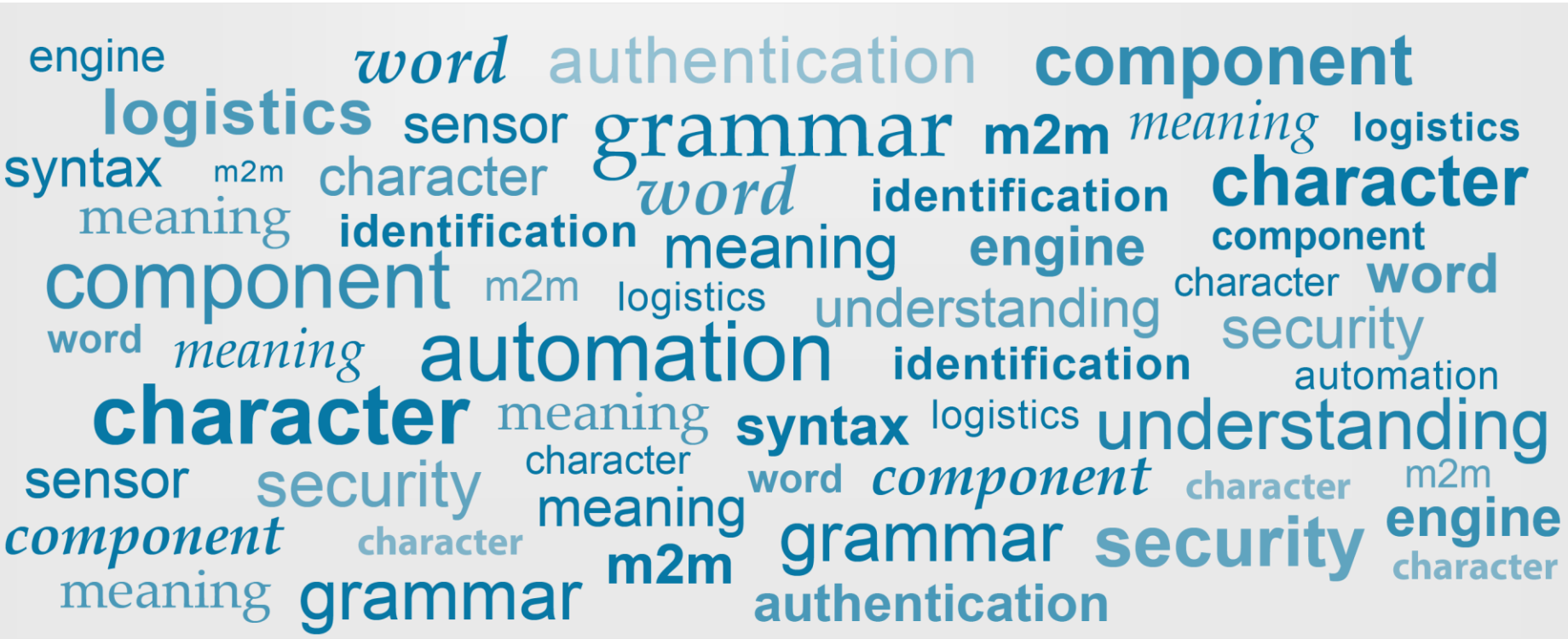
PLATTFORM INDUSTRIE 4.0

The Internet of Things and Services



Prerequisites

- Defining communication structures
- Development of a common language with its own signs, alphabet, vocabulary, syntax, grammar, semantics, pragmatics and culture

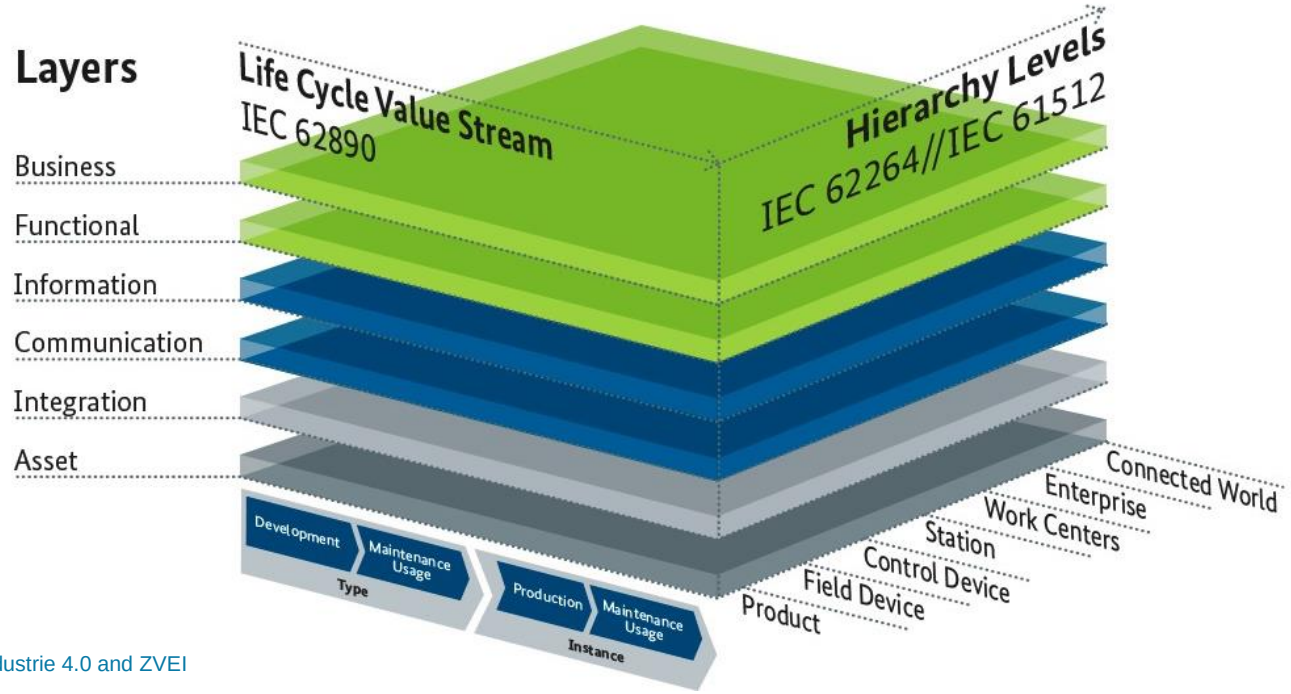


PLATTFORM INDUSTRIE 4.0

The Solution: RAMI 4.0 – The 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 participants involved in Industrie 4.0 discussions understand each other.

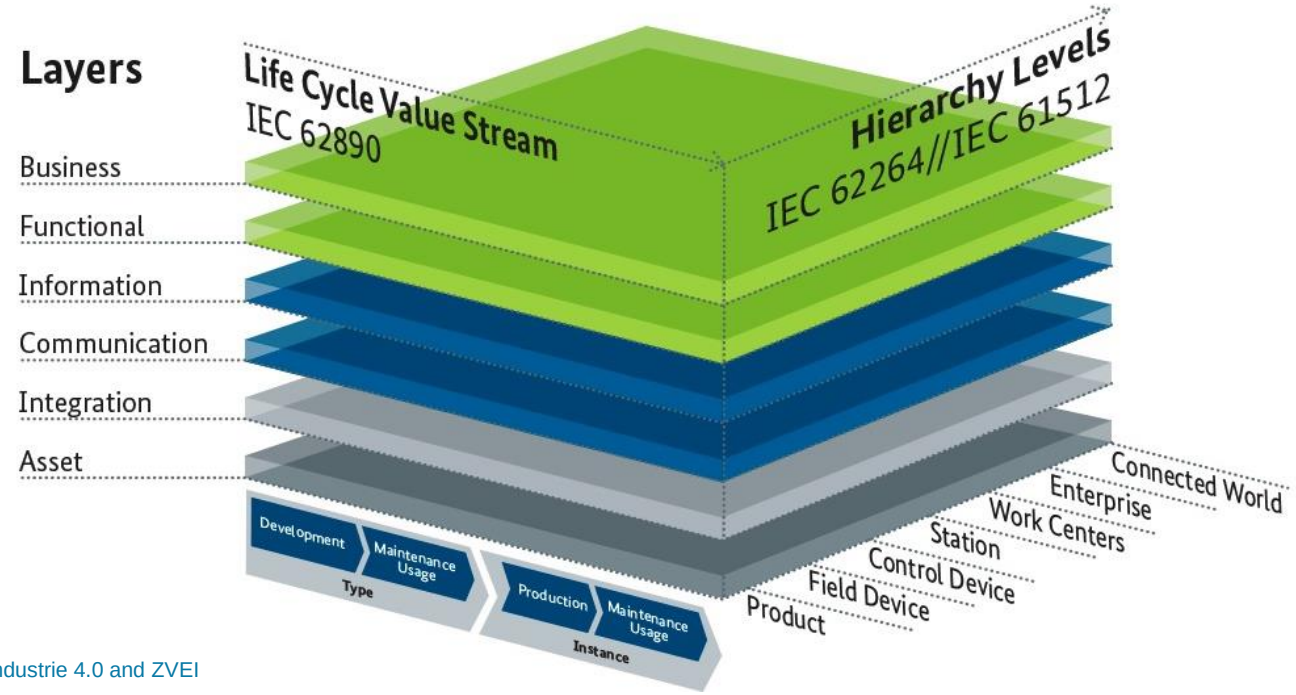


RAMI 4.0 - Benefits

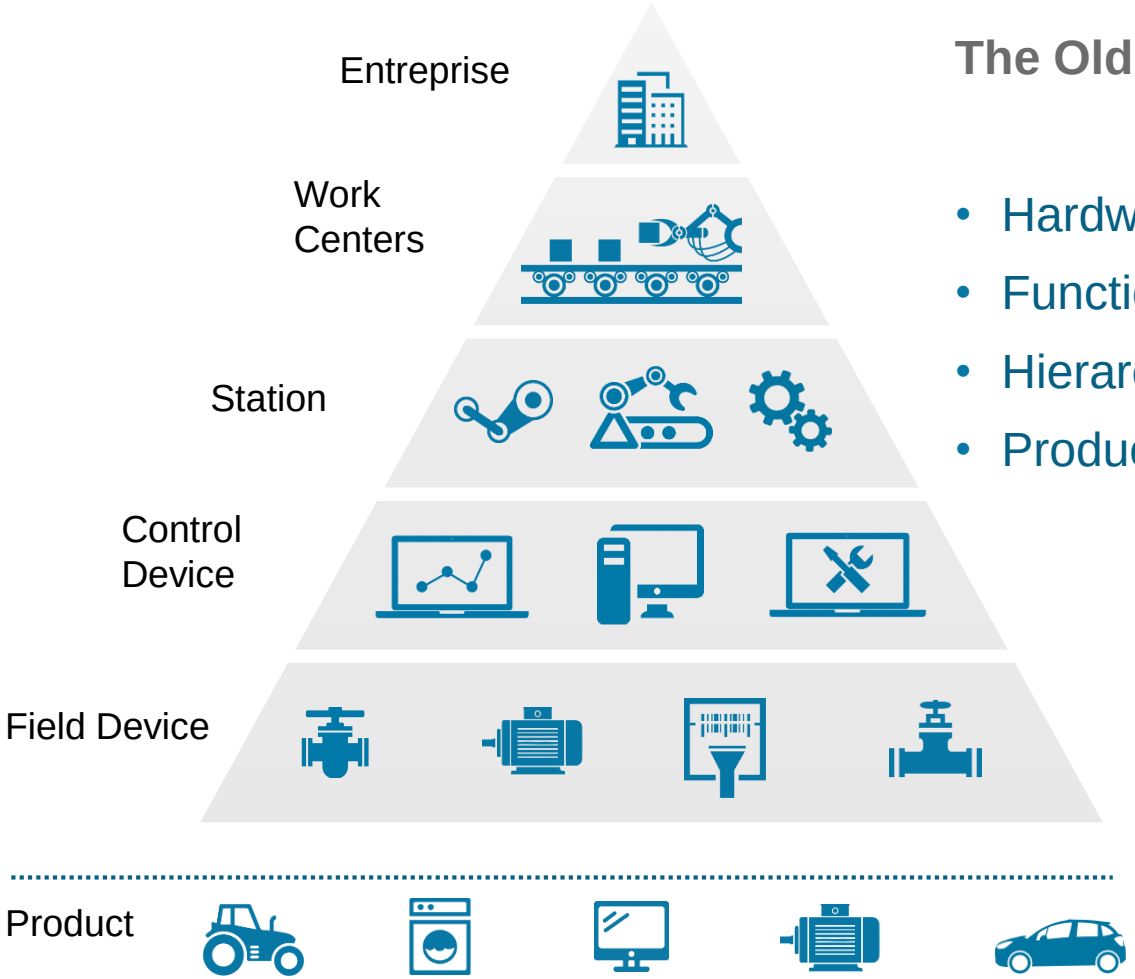
RAMI 4.0 is a **SERVICE-ORIENTED ARCHITECTURE**.

RAMI 4.0 combines all elements and IT components in a layer and life cycle model.

RAMI 4.0 breaks down complex processes into easy-to-grasp packages, including data privacy and IT security.



Axis 1 – Hierarchy: The Factory



The Old World: Industrie 3.0

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

Axis 1 – Hierarchy: The Factory

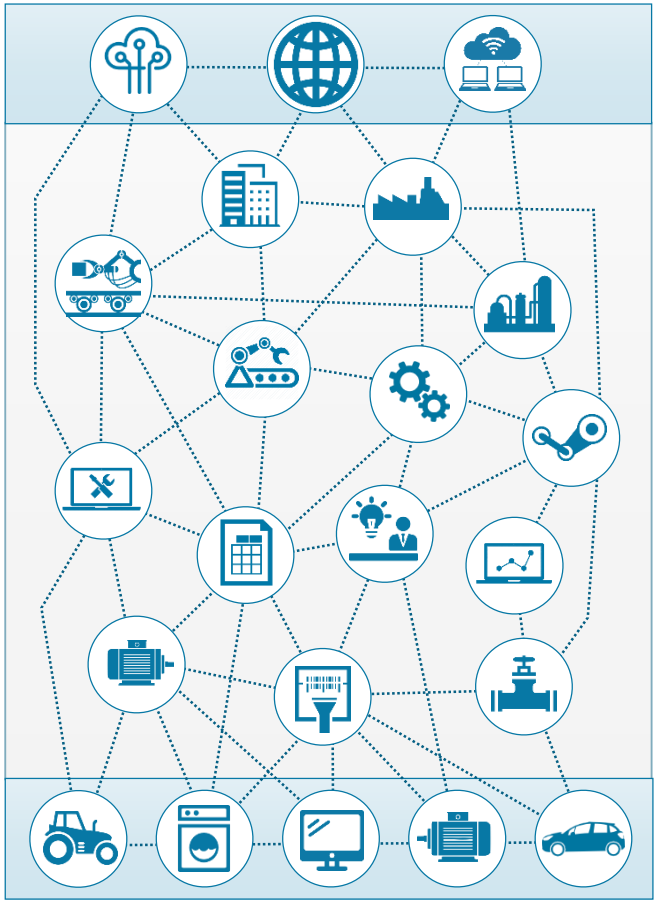
The New World: Industrie 4.0

- Flexible systems and machines
- Functions are distributed throughout the network
- Participants interact across hierarchy levels
- Communication among all participants
- Product is part of the network

Connected World

Smart Factory

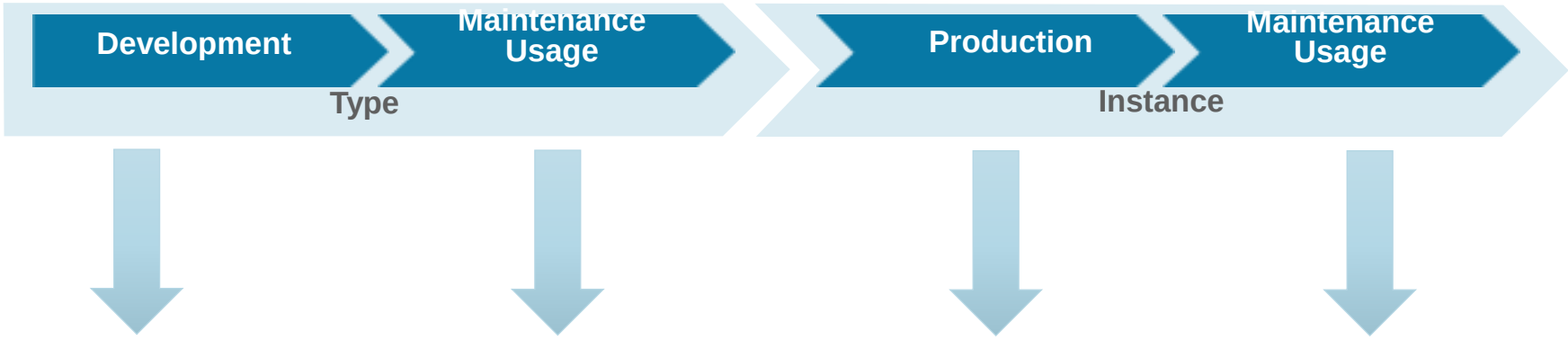
Smart Products



Axis 2 – Product Life Cycle

The Product: From the First Idea to the Scrapyard

.



Construction Plan:
Development
Construction
Computer Simulation
Prototype
…

Construction Plan:
Software Updates
Instruction Manual
Maintenance Cycles
…

Production:
Product
Data
Serial Number
…

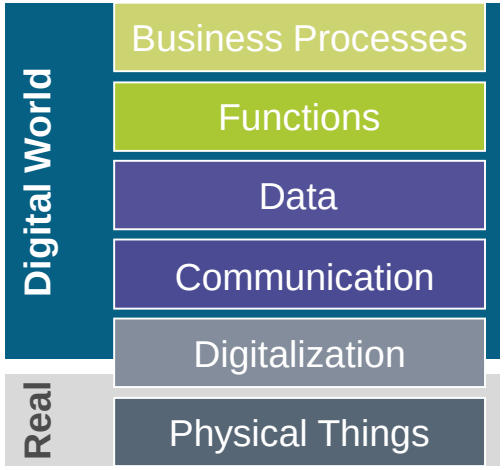
Facility Management:
Usage
Service
Maintenance
Recycling
Scrapping …

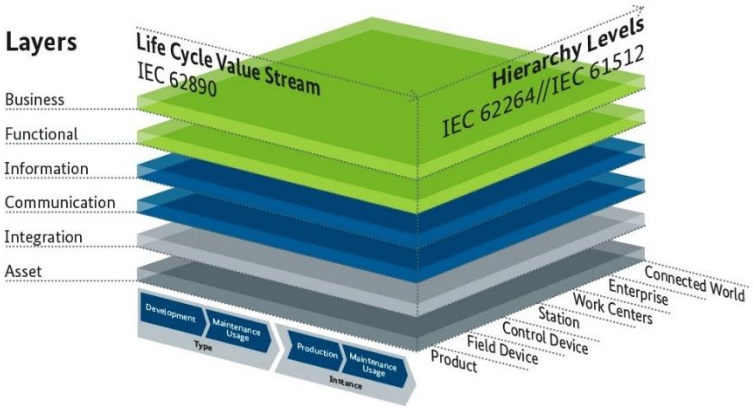
Axis 3 – Architecture

PLATTFORM INDUSTRIE 4.0

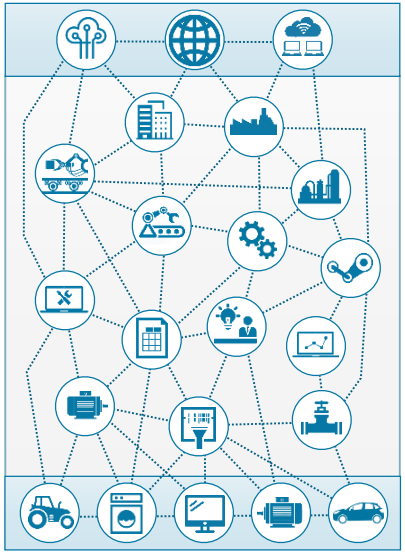
Reference Architectural Model Industrie 4.0 (RAMI 4.0)

Architecture





Hierarchy

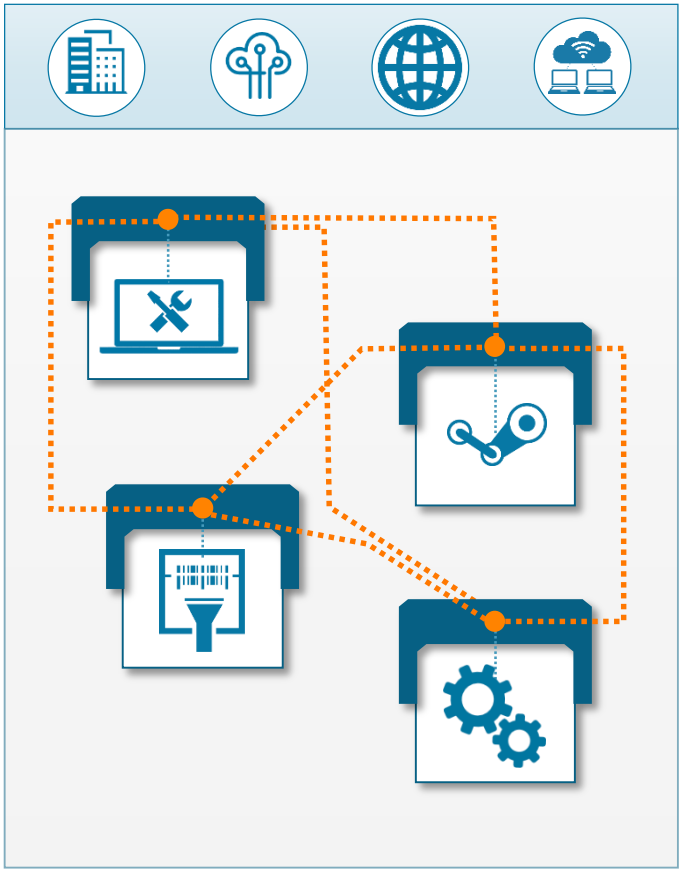


Product Life Cycle

Development, Production / Sales, Service

A Solution Space with a Coordinate System for Industrie 4.0

Who provides intepretation? The Administration Shell…



… is the interface connecting I4.0 to the physical Thing

... stores all data and information about the asset

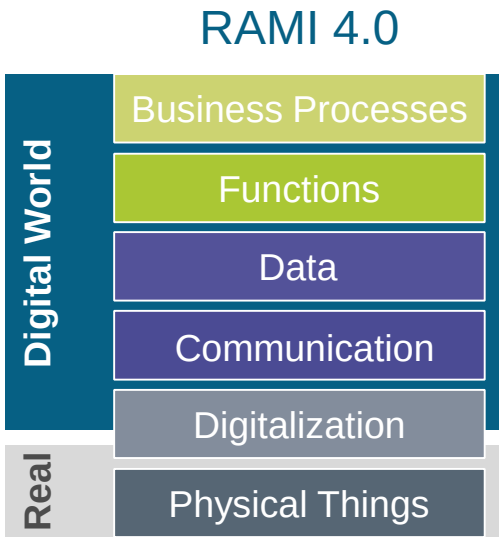
... serves as the network's standardized communication interface

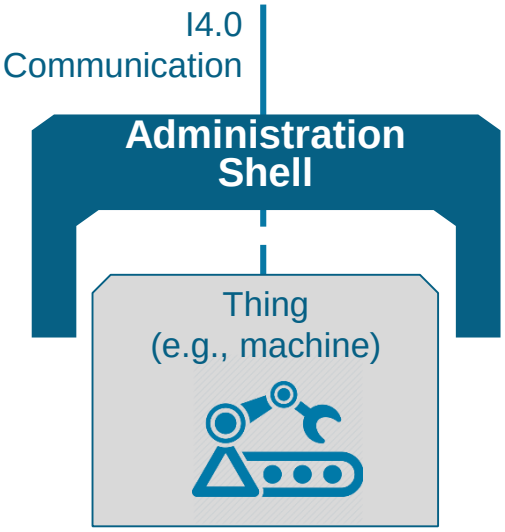
… is also able to integrate passive assets

The Roles and Responsibilities of the Administration Shell

- Each physical thing has its own administration shell.
- Several assets can form a thematic unit with a common administration shell, several thematic units ...

The Industrie 4.0 Component



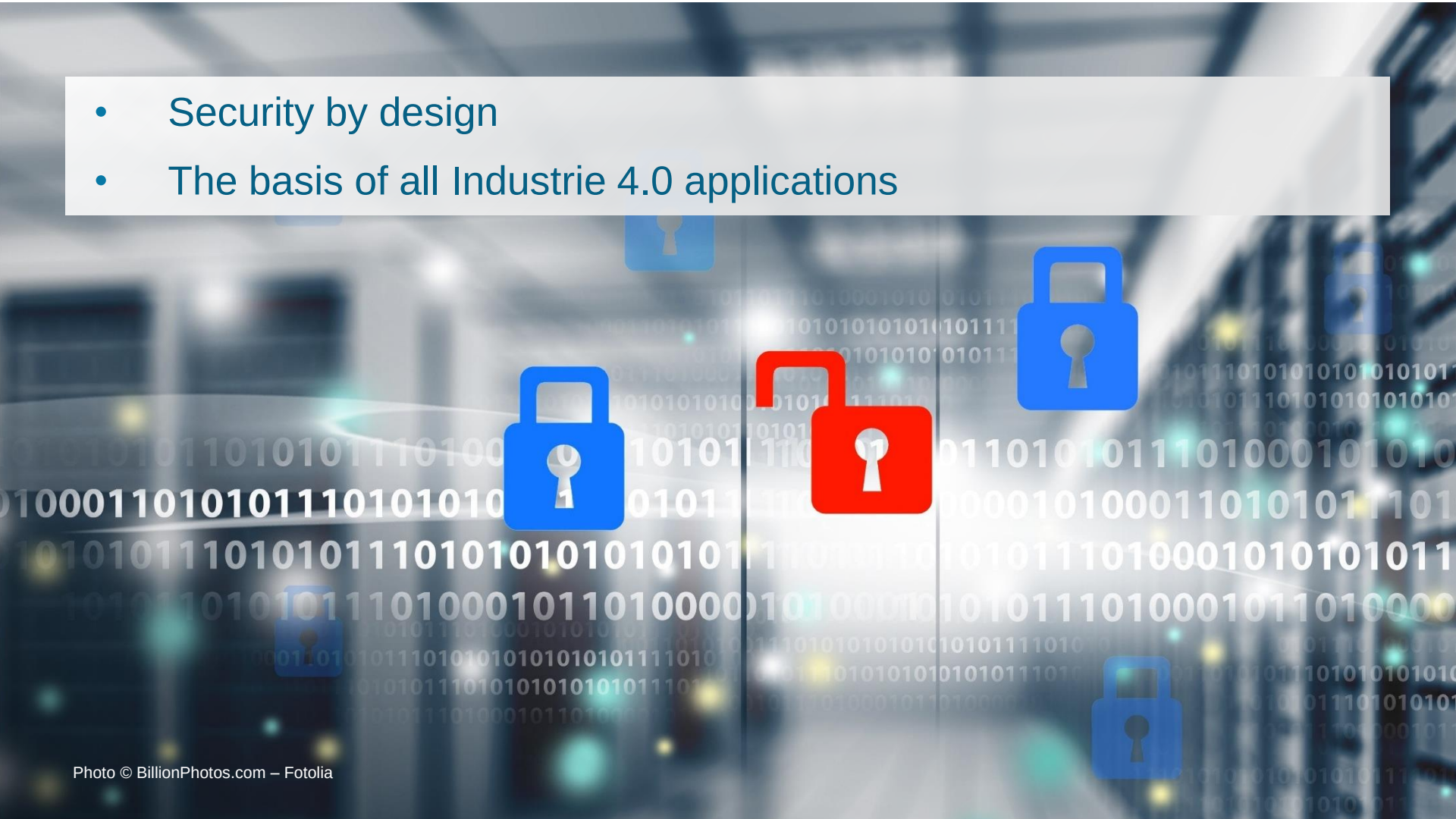


- The connection takes place over the I4.0 communication
- The administration shell forms the digital part
- The Thing forms the real part

Each object needs its own administration shell that allows its integration into Industrie 4.0

Security as a Precondition and Enabler

- Security by design
- The basis of all Industrie 4.0 applications



Publications of Plattform Industrie 4.0

More information:

http://www.plattform-i40.de/I40/Navigation/EN/InPractice/Online-Library/online-library.html