



What has made us strong in the analog world
makes us even stronger in the digital world.
We pioneer motion

Advantages and Challenges of Web of Things for Digital Twins

Schaeffler Technologies AG | Corporate IT - Data Science Solution | Digital Twin

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We pioneer motion

Abstract

As a leading global supplier to the automotive and industrial sectors, the Schaeffler Group has been driving forward groundbreaking inventions and developments in the fields of motion and mobility for over 75 years. With innovative technologies, products, and services for electric mobility, CO₂-efficient drives, chassis solutions, Industry 4.0, digitalization, and renewable energies, the company is a reliable partner for making motion and mobility more efficient, intelligent, and sustainable – over the entire life cycle. The technology company manufactures high-precision components and systems for powertrain and chassis applications as well as rolling and plain bearing solutions for a large number of industrial applications. In addition to the physical product, we are developing digital representations of our product, which we call Digital Twin. We believe that Digital Twins are the driver for optimizing and enhancing Schaeffler products in a data-driven manner. For this, a standardized interface to the data of our products is necessary. In this talk, we show how we utilize Web of Things Standards as a Data Model for the product's API. We highlight the advantages of using Web of Things and the challenges we have with the standard.

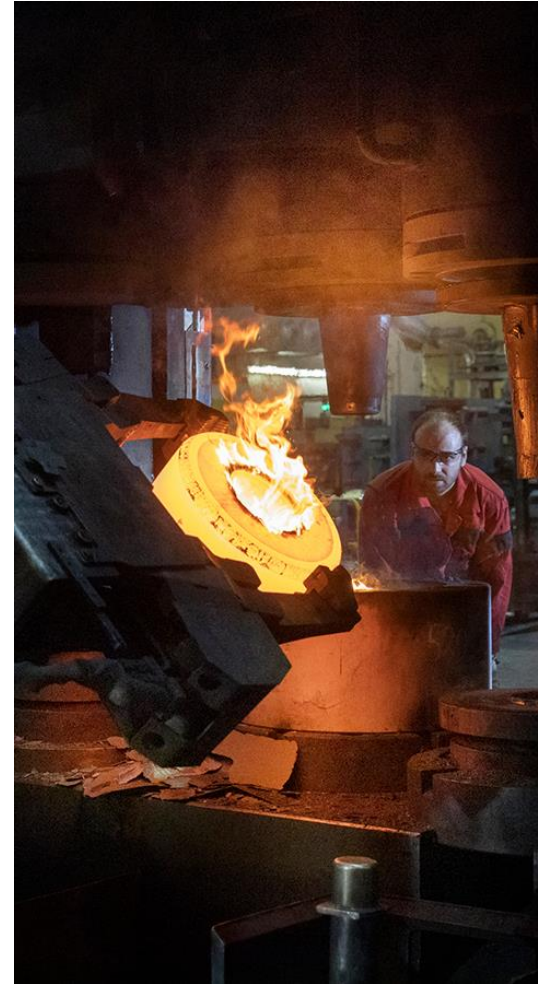
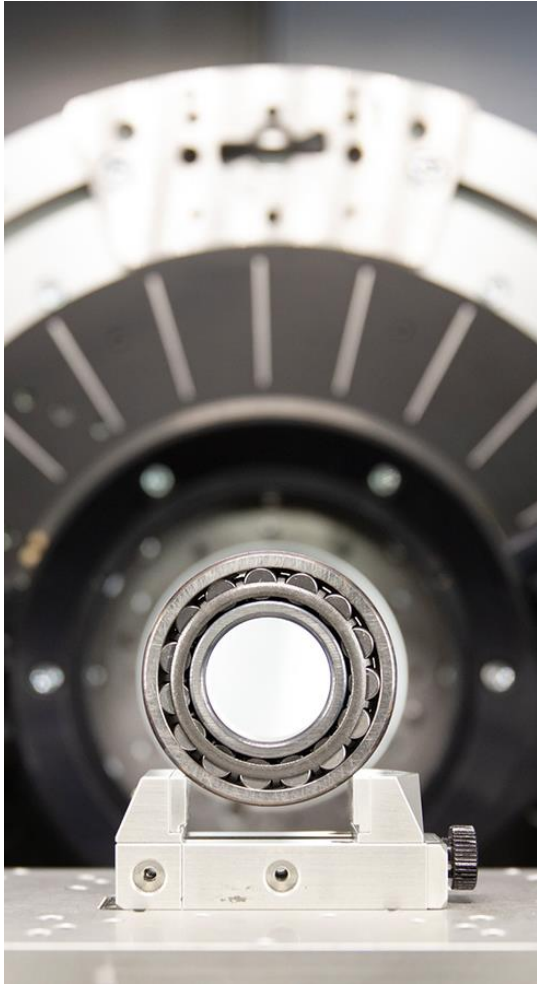
SCHAEFFLER



Agenda

- 1 Schaeffler in a Nutshell**
- 2 Digital Twins at Schaeffler (Advantages)**
- 3 Challenges with Web of Things**
- 4 QnA**

Schaeffler's Products – Some examples



Schaeffler facts and figures – One of the world's largest family-owned companies

~83.000

employees
worldwide

~200

locations in
~50
countries

76 plants

and **20**
R&D centers

Sales of
**~€15.8
billion**
in 2022

6.6%

EBIT Marge
in 2022¹

>1.250

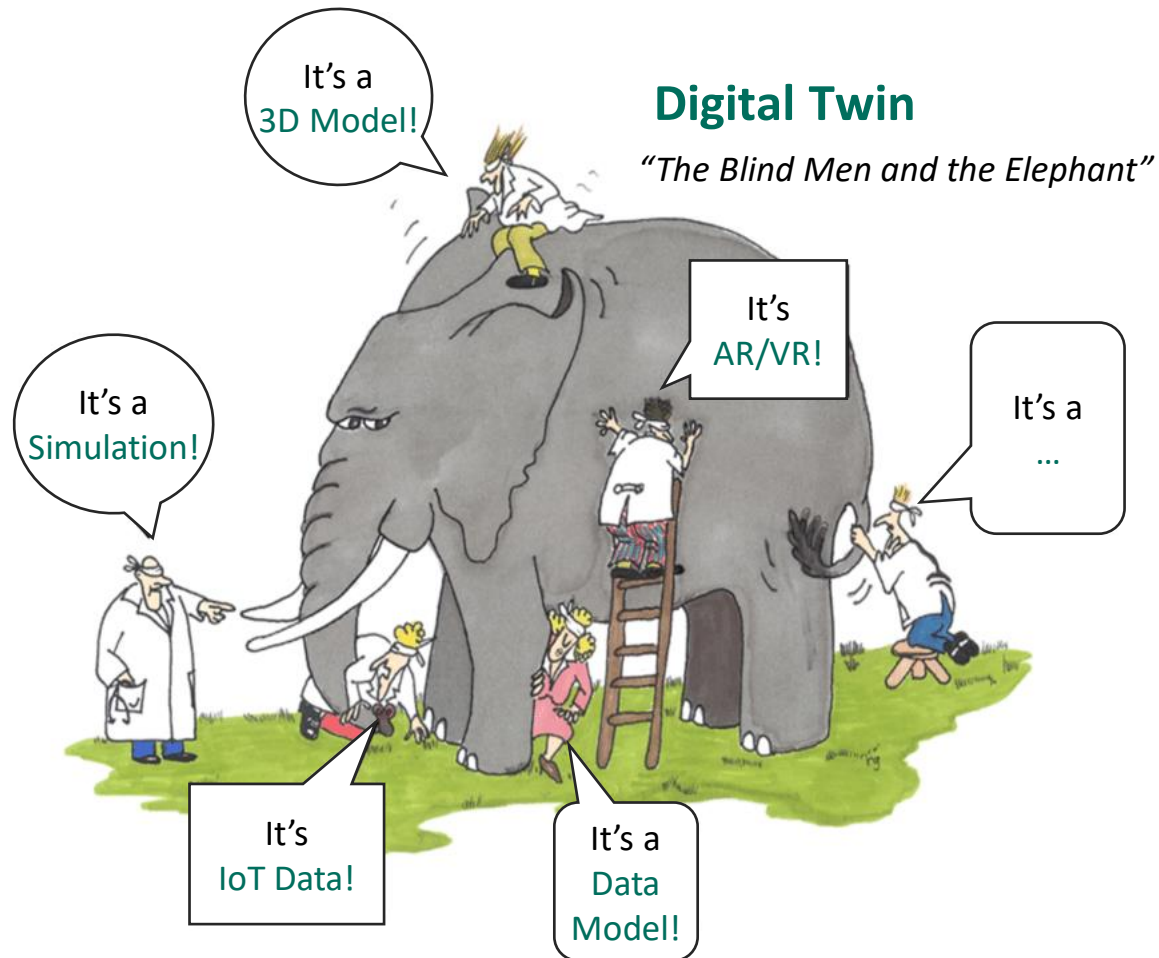
patents
registered
in 2022

As of December 31, 2022 | ¹ Before special items

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Digital Twin is often differently interpreted, but the goals are the same



**Product-
centric view**
**Whole
Lifecycle**



Revenue
New business opportunities



Costs
Internal optimization

See also:

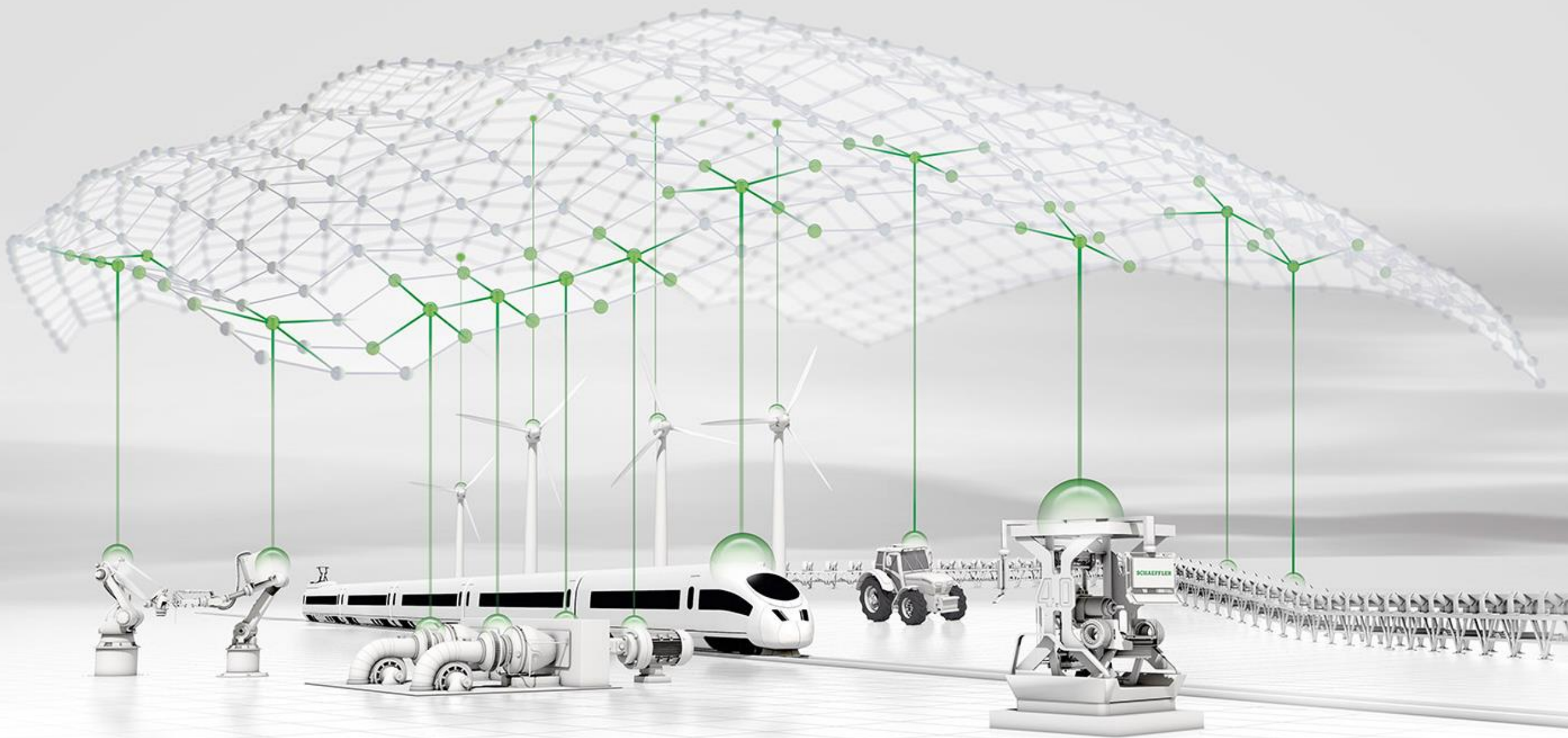
- [Rieves \(2002\) - Conceptual ideal for PLM](#)
- [NASA \(2012\) - Graphical Representation of the Digital Twin Paradigm](#)
- [Digital Twin Consortium](#)

Based on [Digital Twin Value—Driving The Entire Product Life Cycle \(28 April 2021, Image Source: The Blind Men and the Elephant](#)

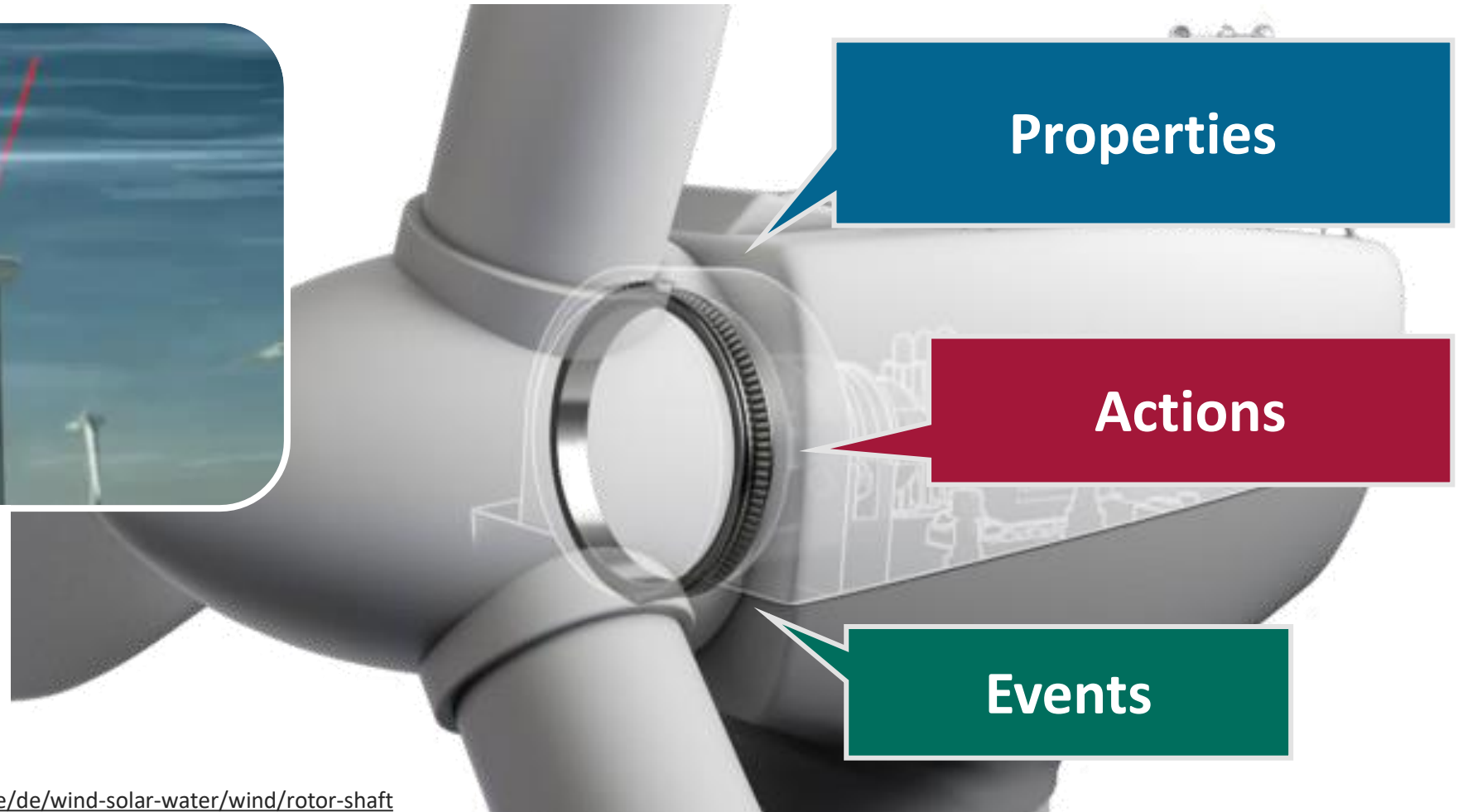


Di·gi·tal Twin /digitál/ /twin/
digital representation of a (physical) thing

We believe that **Digital Twins** are the driver to
optimize and enhance Schaeffler products!

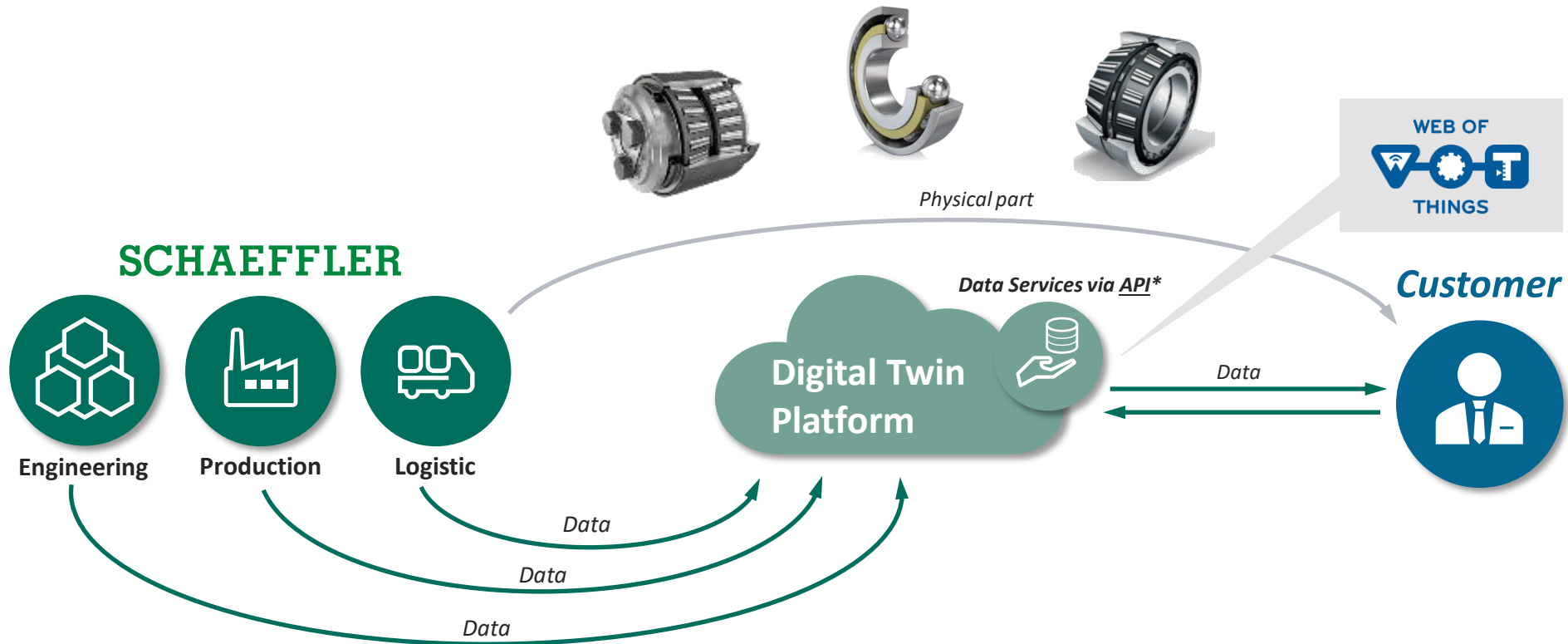


Why Web of Things (WoT)?



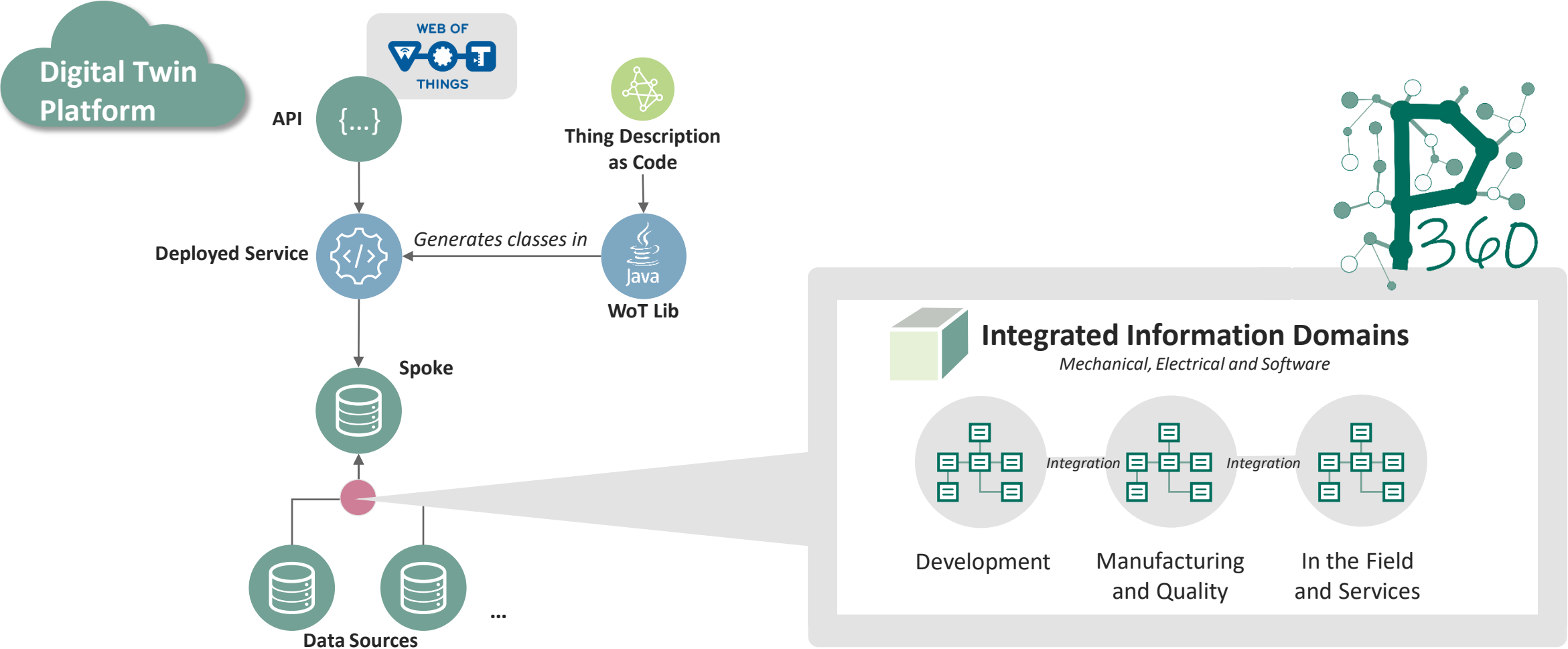
Video Source: <https://medias.schaeffler.de/de/wind-solar-water/wind/rotor-shaft>

The Digital Twin Data APIs are foundation for digital business and process as well as product optimization



*: Application Programming Interface

Web of Things API and Schaeffler’s WoT Lib



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Challenges with WoT



+ ID: AA-123
+ produced: 2023-01-28
+ bore: 13 [mm]



+ ID: BB-345
+ produced: 2023-04-27
+ bore: 12 [mm]

...



+ ID: YY-998
+ produced: 2023-05-01
+ bore: 12 [mm]

Multiple Things

Nobody wants gazillions REST calls for gazillions products

Search / Thing Identification

based on properties ranges instead of the thing ID
(e.g. date range or bore diameter range)

Analysis

based on properties of different products (e.g. tolerances of all products, which were produced on 2023-04-22)

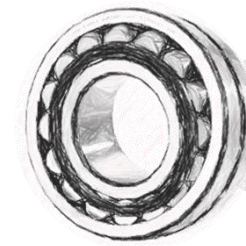
Many Properties

We have really many properties and many Things

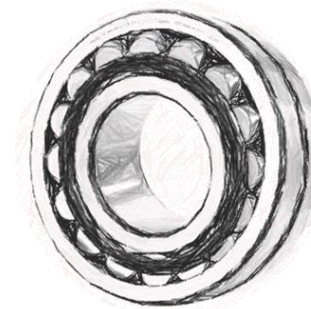
Thing Properties that don't change?

For nominal parameter of our products, the parameter will never change! (CONST) = virtual product. Does this fit to the way WoT is designed?

Topic: virtual vs. physical product



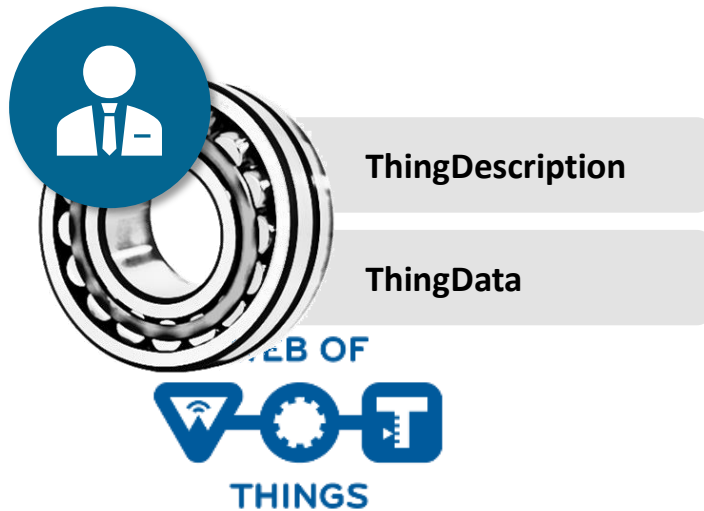
+ ID: AA
+ bore: 13.0 [mm]
+ outer: 25.1 [mm]



+ ID: BB
+ bore: 27.3 [mm]
+ outer: 40.2 [mm]

Challenges with WoT

Customer



Thing Description and Thing Data

Most of our customer barely use the Thing Description.

Thing Description vs. SWAGGER

Most of our customers ask for SWAGGER, not a Thing Description. There is no open and free tool to create an openAPI based on a Thing Description

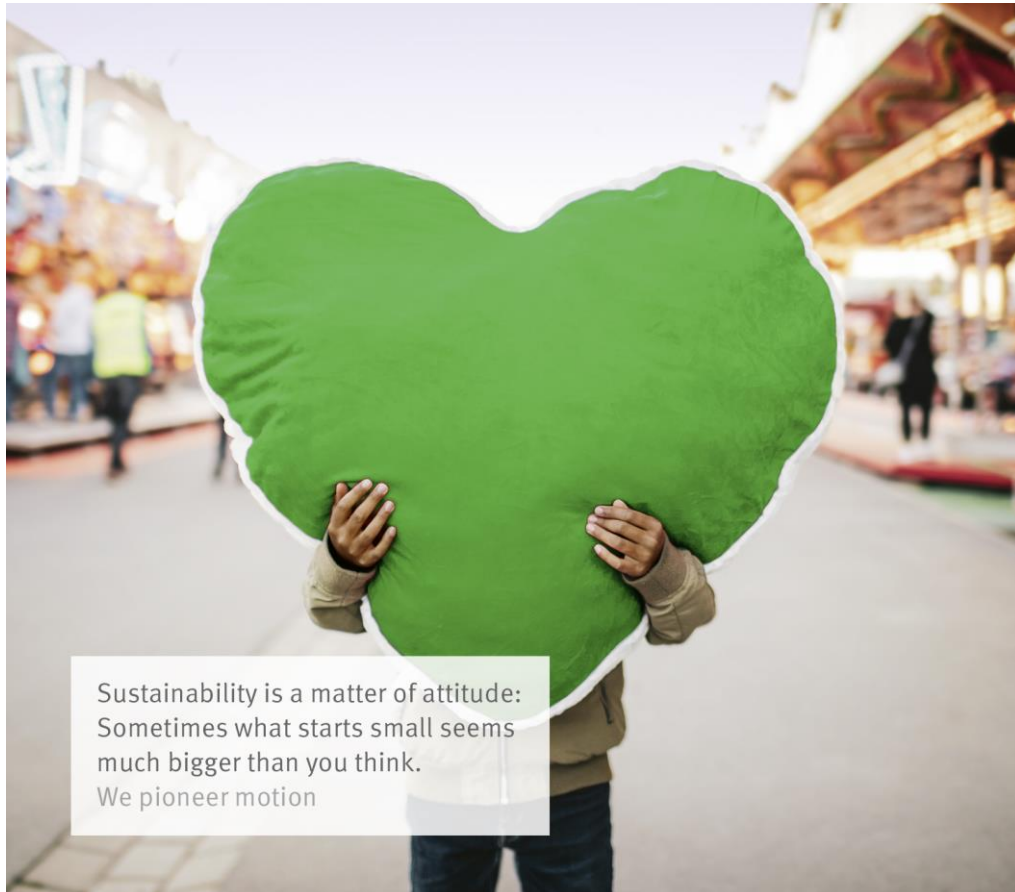
Web of Things Standard

Most of our customer never asked for WoT, but they can work with it.

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Thank you for your kind Attention – feel free to contact us 😊



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