

# AI and Industrie 4.0: Business Models in the German Mittelstand

MÜNCHNER KREIS -  
THE ORIENTATION FOR THE  
DIGITAL TRANSFORMATION

The MÜNCHNER KREIS is the leading independent platform providing orientation for decision makers in the digital world.

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**MÜNCHNER KREIS**

- 1. What is the Mittelstand?**
2. What are Industrie 4.0 Business Models?
3. Impact of AI and Examples
4. Case Study: BHS Corrugated

# What is the German Mittelstand?



- More than **99% of all German firms** belong to the “German Mittelstand.”
- Almost all of Germany’s Mittelstand firms are **family-owned**, many are managed by their owner, and their business policies tend to be especially long-term.
- Characteristics:
  - Family ownership or family-like corporate culture with generational continuity
  - Long-term focus
  - Investment into the workforce
  - Lean hierarchies
  - Innovativeness
  - Customer focus
  - Social responsibility
  - Strong regional ties

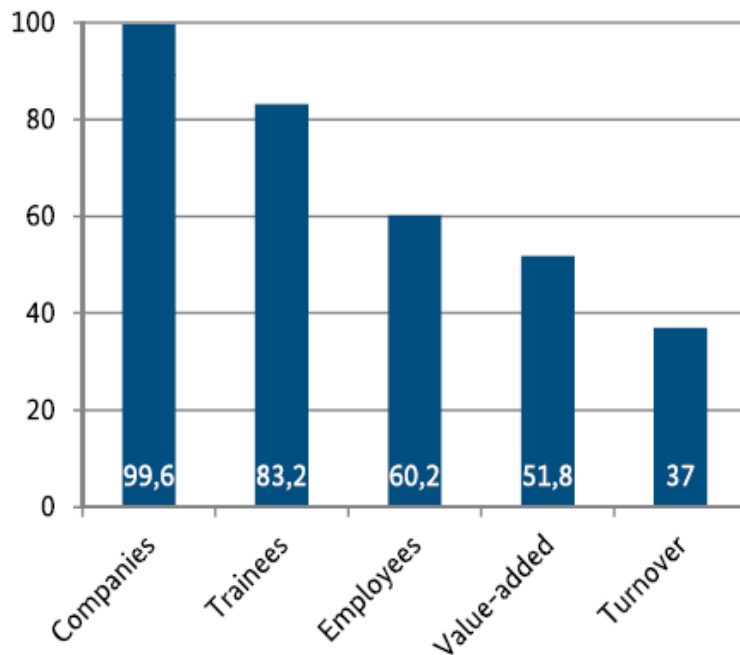




# The Mittelstand is the Backbone of the German Economy



Proportions accounted for by the German Mittelstand  
Percentages, 2010/2011 figures



- 99.6% of all companies
- 60.2% of all employees
- 52% of the value-added
- 37% of turnover
- 83 % of all trainees

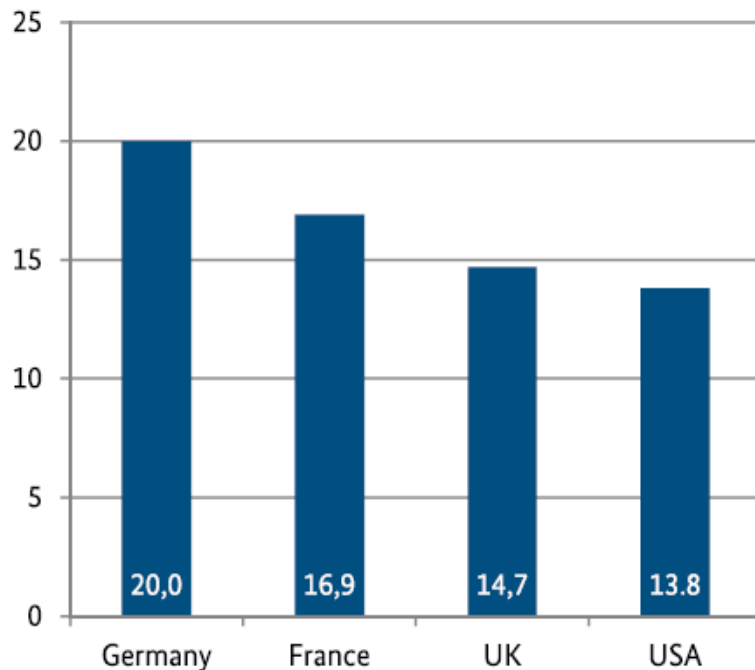
Source: Federal Ministry of  
*German Mittelstand: Engin*



# The Mittelstand is Strong in Manufacturing

## Employees of Mittelstand in industrial sector

Figures in percent, 2012 figures\*



- The Mittelstand is very important in the manufacturing sector
- Mittelstand companies are global players

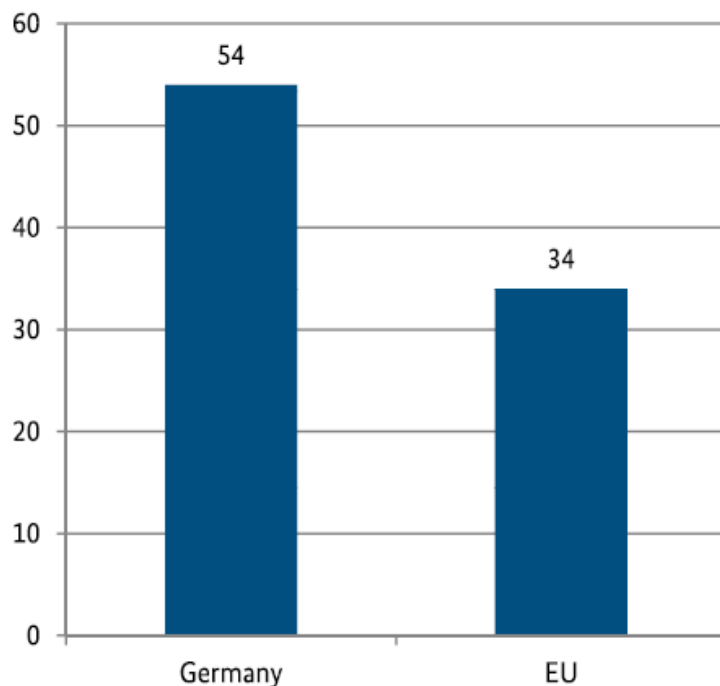
Source: Federal Ministry of Economics and Technology,  
*German Mittelstand: Engine of the German economy*

# The Mittelstand is very innovative!



## Innovative SMEs

Figures for 2010 in %



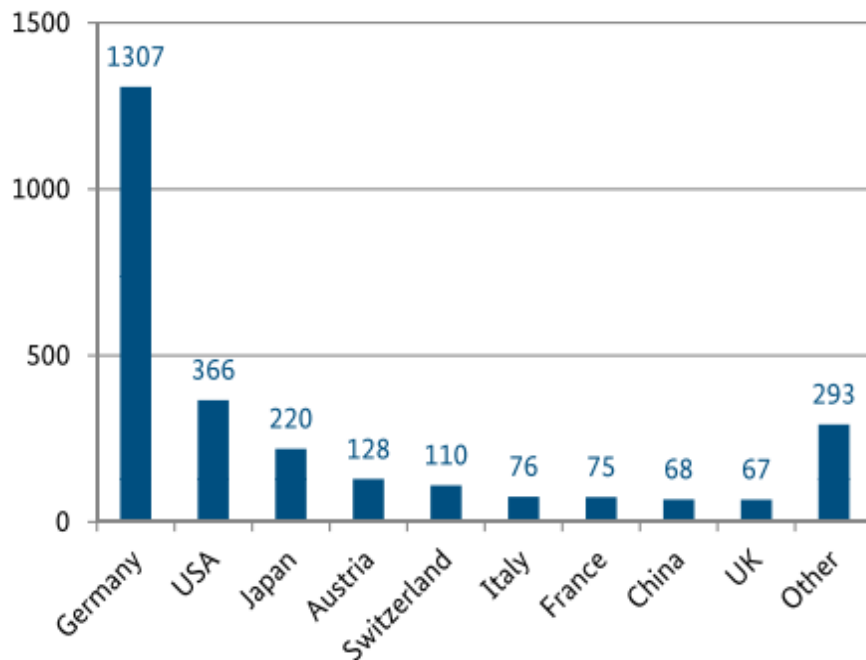
- 54% of Mittelstand companies have brought new products or processes to the market in the last two years.
- Mittelstand companies spend significantly on R&D

Source: Federal Ministry of Economics and Technology,  
*German Mittelstand: Engine of the German economy*

# The Hidden Champions of Germany

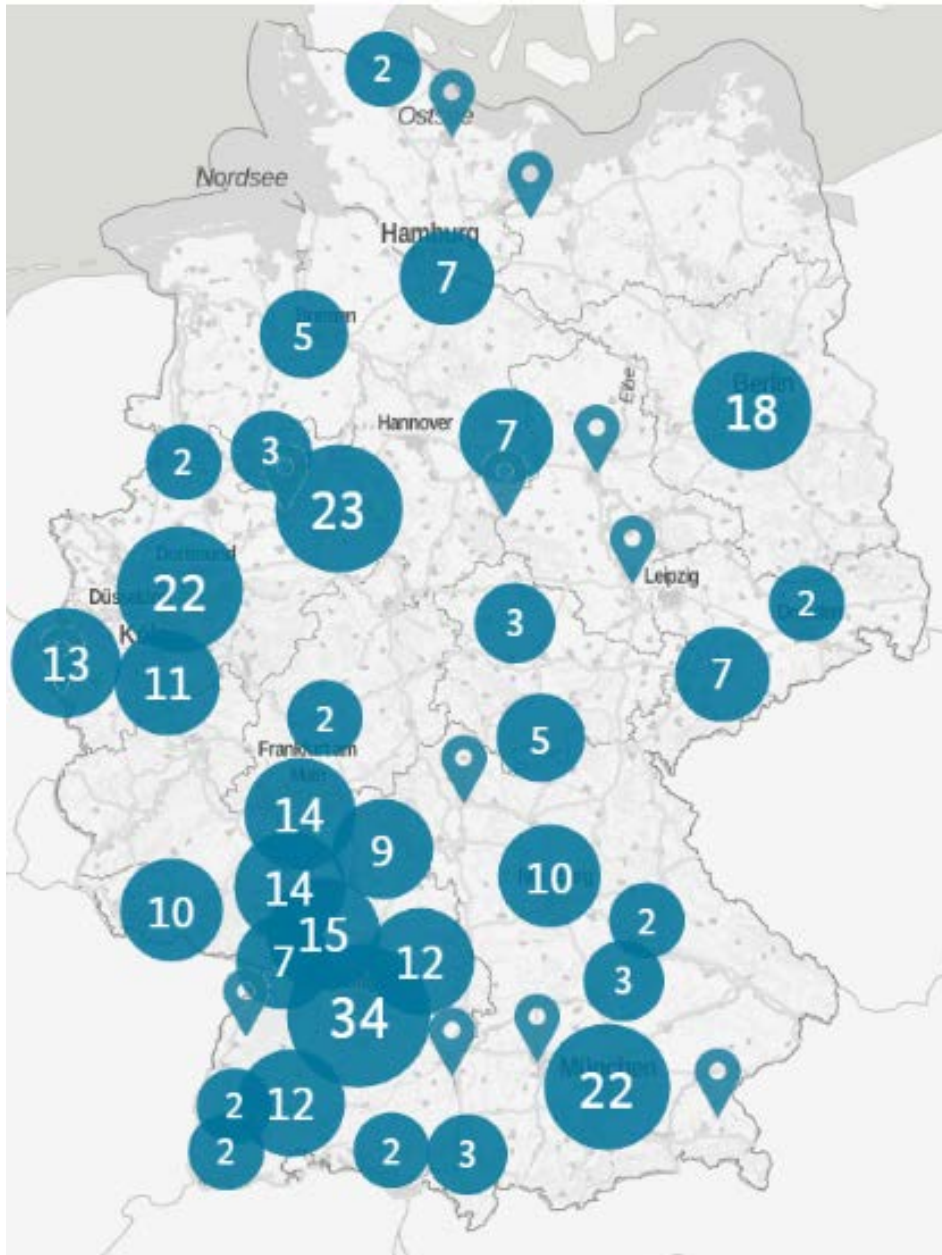


**“Hidden Champions” in the international comparison, 2012 figures**



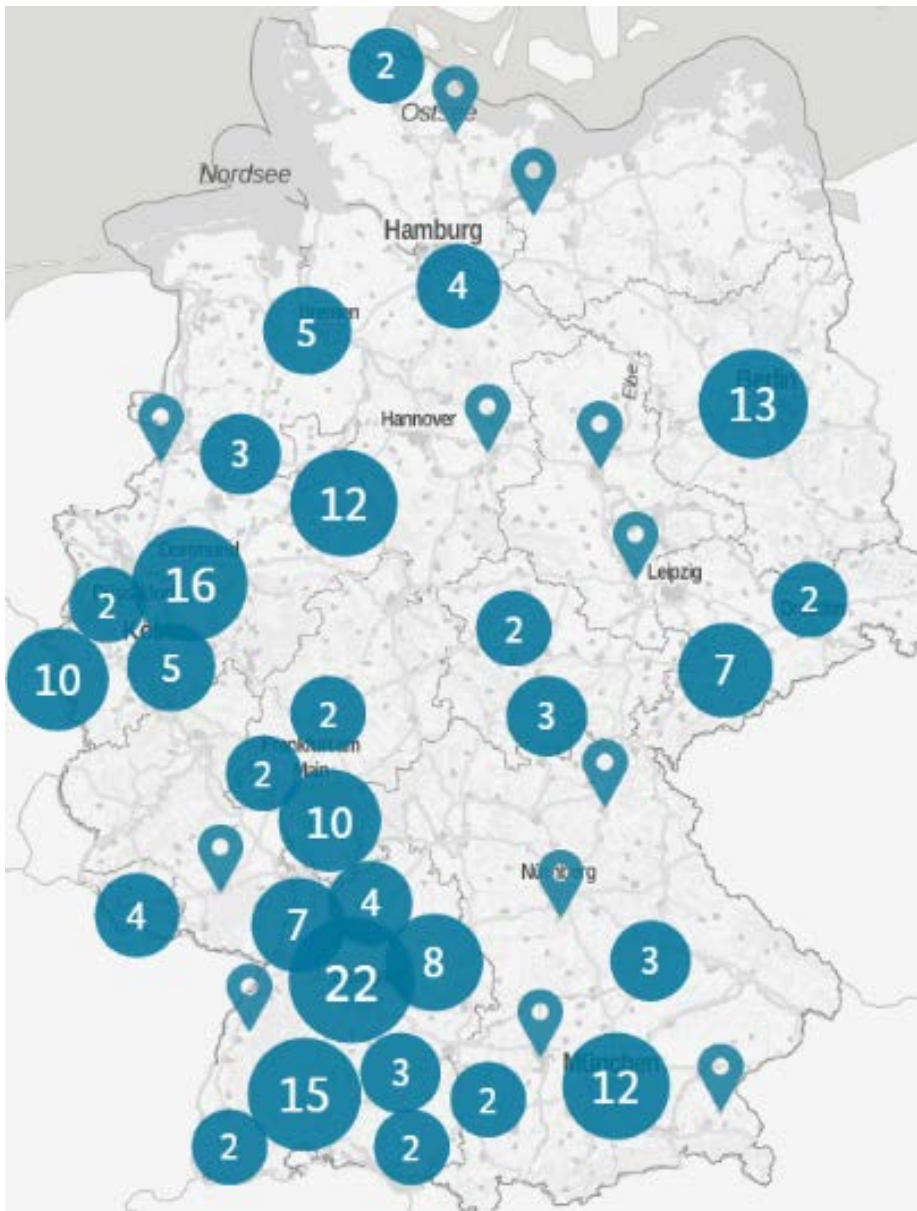
- Germany's Mittelstand has “Hidden Champions” with niche products serving world markets.
- Especially strong in manufacturing industries.

Source: Federal Ministry of Economics and Technology,  
*German Mittelstand: Engine of the German economy*



- A map of Industrie 4.0 shows 317 projects in Germany ....





**...and 196 (62%)  
are in companies  
with less than 5000  
employees.**

Source: <http://www.plattform-i40.de>

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# Technologies will Shape the Transformation of Business Models for Industrie 4.0



## Technology Fields



Data, Computing Capacity, Networks



Analytics and Artificial Intelligence



Human-Machine Interaction



Robotics and Additive Manufacturing

## Anticipated Business Models

**Value as a Service:**  
pay-by-usage services to satisfy needs



BM based on **process and status data** from production/product



**Platform as a Service:**  
for the development of software-, hardware, service modules



BM through **intelligent networking** of the market players



**Infrastructure as a Service:** Infrastructure landscape as the basis for platforms



**Digital refinement** of products and services



Emmrich et al. 2015; Becker/Knop 2015; Plattform Industrie 4.0 2016; BITKOM 2016; McKinsey & Company 2015



## Ibin Optical Ordering System:

the quantity, number, and ordering information for the bolts can be obtained via the built-in camera; this is then transmitted to the ERP system and more bolts are ordered automatically.





- Plans, develops and manufactures machines and complete lines for the fields of bottling and packaging technology
- **Established:** 1951
- **Offices worldwide:** 50
- **Employees worldwide:** 14,443
- **Employees in Germany:** 10,061
- **Sales (2016):** EUR 3.39 billion
- **Patents:** more than 2,750



## Krones AG in Regensburg: Barcodes and RFID Tags on Products

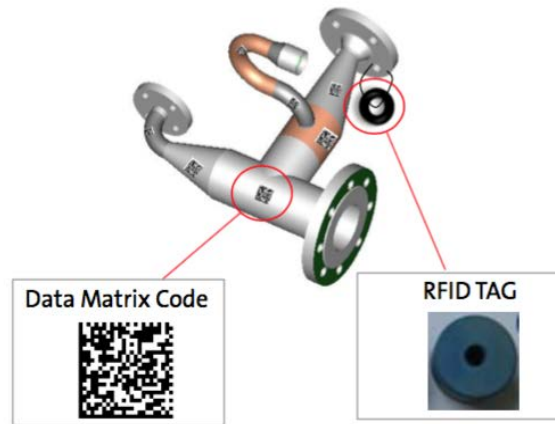
### Production data

#### Material data:

- Material number
- Parts list

#### Production program data:

- Temperature
- Machine Data



### Order data

- Order number
- Batch number
- Work plan
- Assembly sequence



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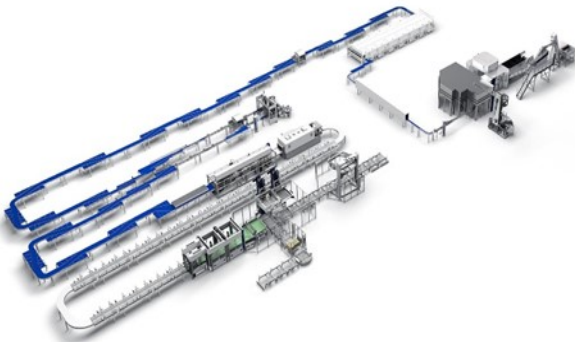
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## AI opportunities for Krones

- The world is changing very rapidly, major impact on today's business models
- **We see AI as an opportunity** for not only achieving quick wins, but to create real value in the future

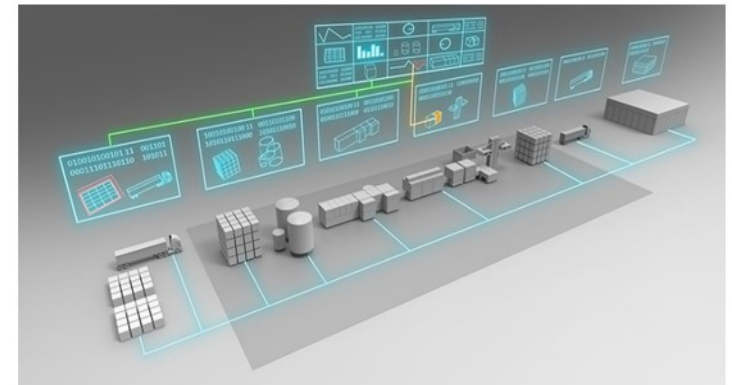
2019



Digital Transformation



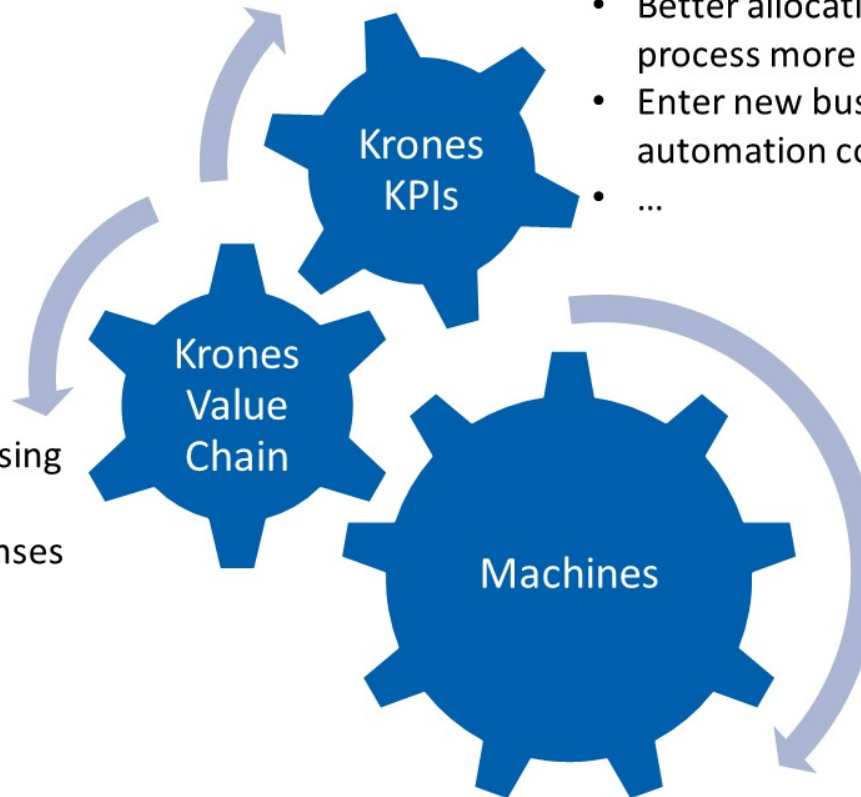
202X+



## AI opportunities for Krones

### Reduce costs and waiting periods:

- More efficient processing of orders
- Lower warranty expenses
- ...



### Increase revenue and EBT margin:

- Better allocation of capacities in order to process more orders
- Enter new business domains, e.g. by providing automation concepts
- ...



### New concepts that enable our customers to produce new products, increase their OEE and reduce costs:

- Generic bottling lines for batch size 1
- Self-X
- Reduce ecological footprint
- ...

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# Case Study of AI Usage by BHS Corrugated: A German Mittelstand Manufacturing Firm



2.200  
employees

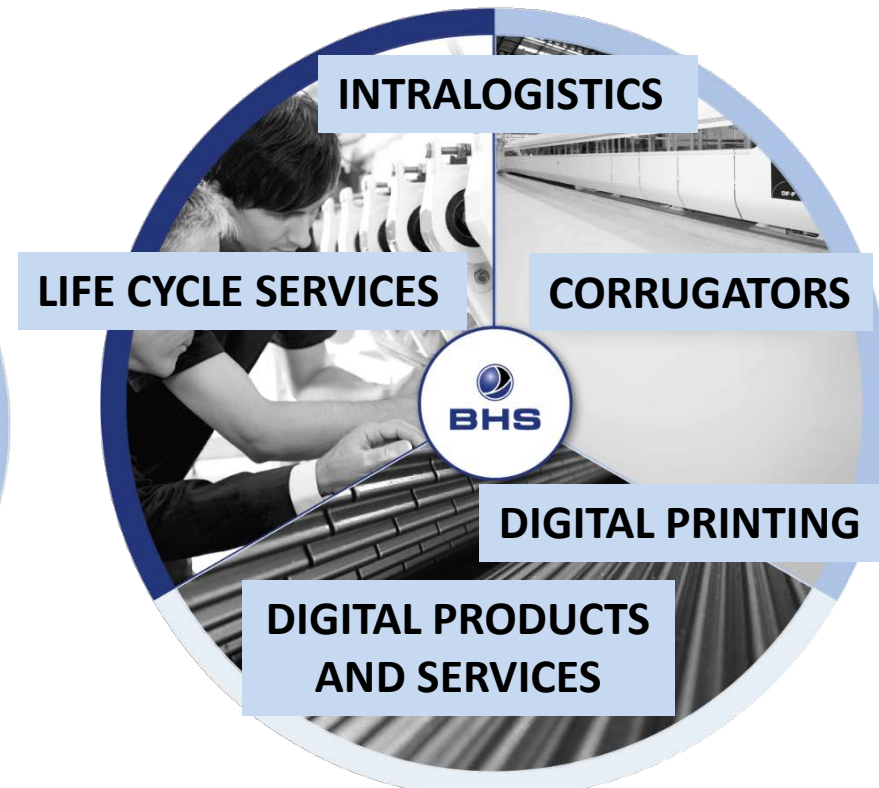


560 million euros  
in sales in 2018

7 production sites



>20 countries with their  
own service locations



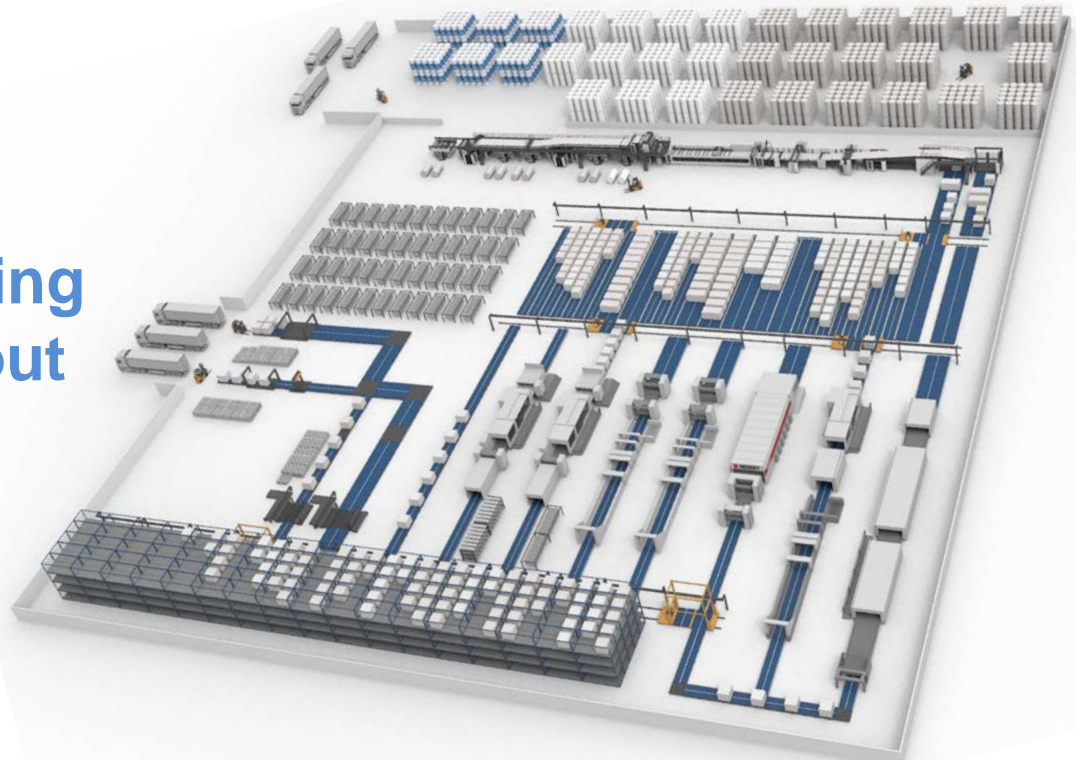
# Case Study of AI Usage by BHS Corrugated: a German Mittelstand Manufacturing Firm



AI and Industrie 4.0 leads to **changing workflows** in plants and to **changing relationships** between suppliers and customers

- Transformation from a transactional to a relational business and finally towards a **permanent network relationship**
- New and enhanced challenges in marketing these solutions to customers

**Corrugated paper  
board manufacturing  
and box plant layout**



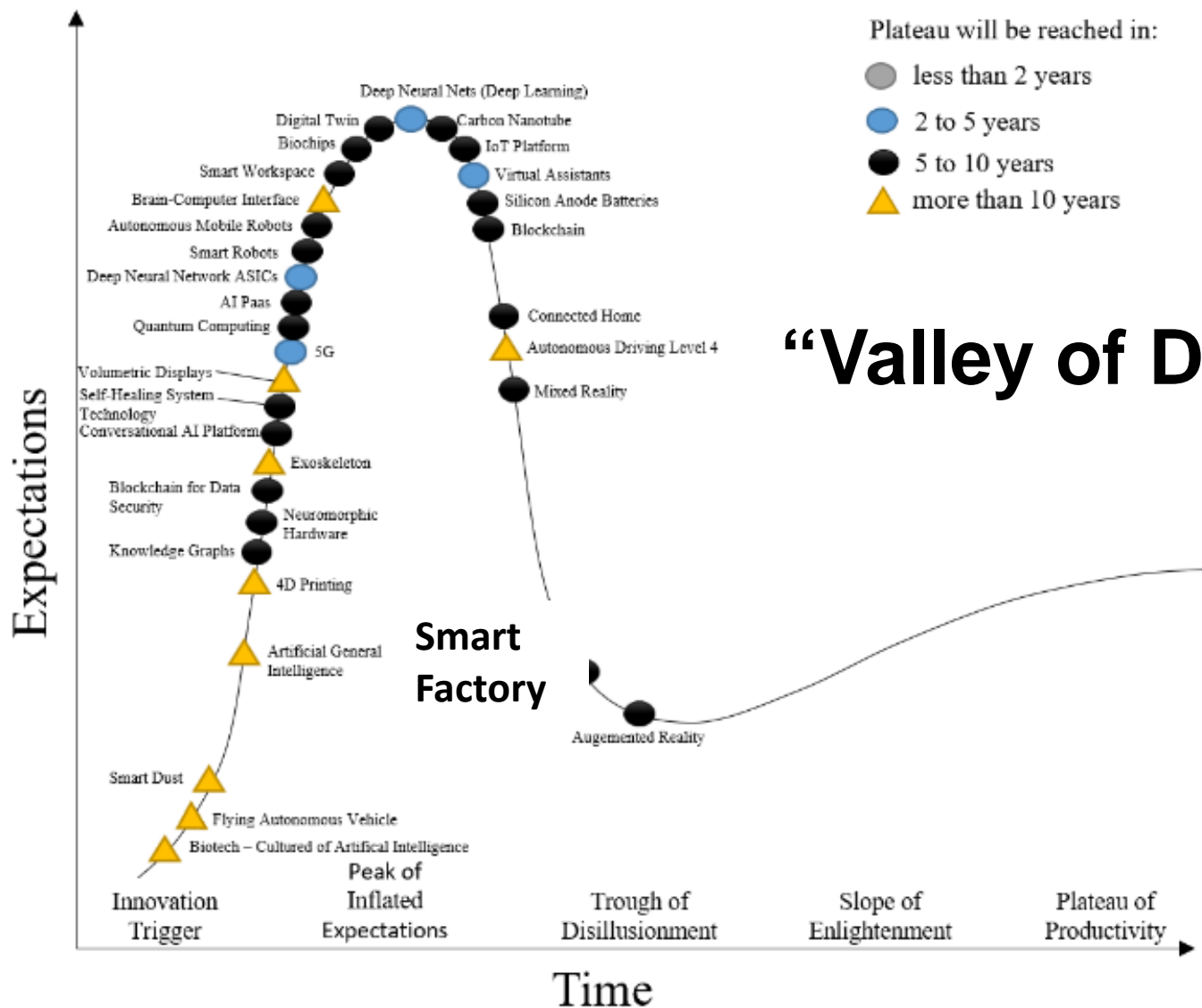




# **Case Study of AI Usage by BHS Corrugated: a German Mittelstand Manufacturing Firm**



# New and enhanced challenges in marketing AI solutions to customers in practice





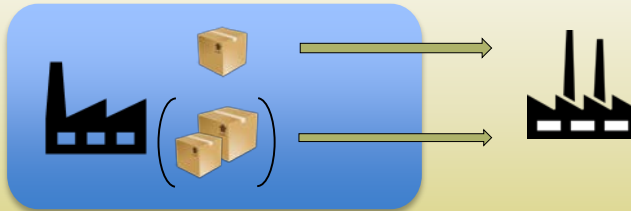
- **Implications from theory!**
  - High amount of credence attributes (hidden characteristics and hidden sellers' actions)—even in other industries!
  - Asymmetric information and opportunistic behavior
    - Leading to continuous higher perceived risk (not only when buying)
    - Leading to unilateral dependencies (lock-in)
- **Consequences:**
  - Contracts are not sufficient (incomplete)
  - Need for trust!

- **Trust**
  - can be “**bought**” by using network partners with high reputation
  - can be **built up** by keeping promises over time
  - Own specific **investments**
  - Third party **certification** processes
- There is an **evolution** from:
  - a **simple supplier** of products (and maybe services)
  - to a **fully integrated** Industrie 4.0 supply **network**
- This **evolution** of business models leads to **internalized experiences** in marketing these products and **increased trust** from customers

# The Overall Business Development (Trust Building) Process

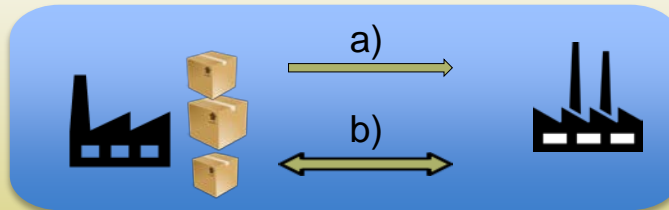


Phase 1



Sales of individual products and services or even hybrid products

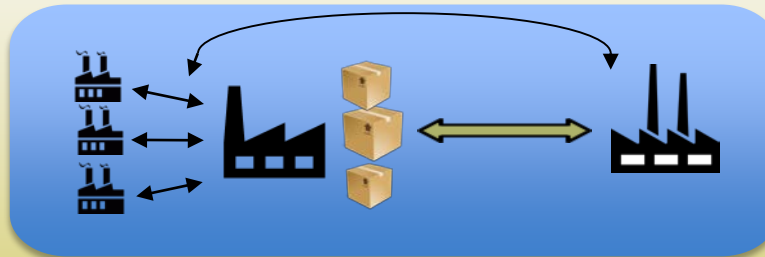
Phase 2



Sales of Digital Services

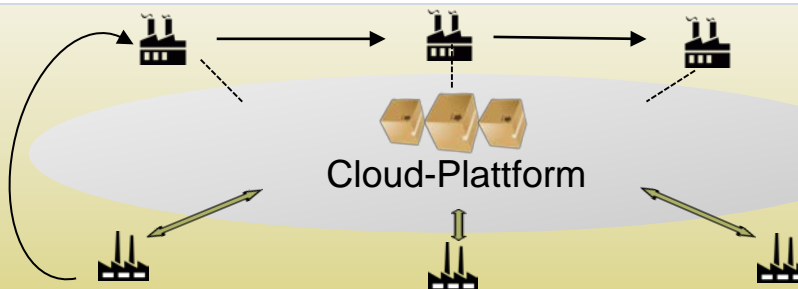
- a) Without exchange of data
- b) With exchange of data

Phase 3



Networking Products with external suppliers and exchange of data or information  
(hybrid digital product service systems)

Phase 4

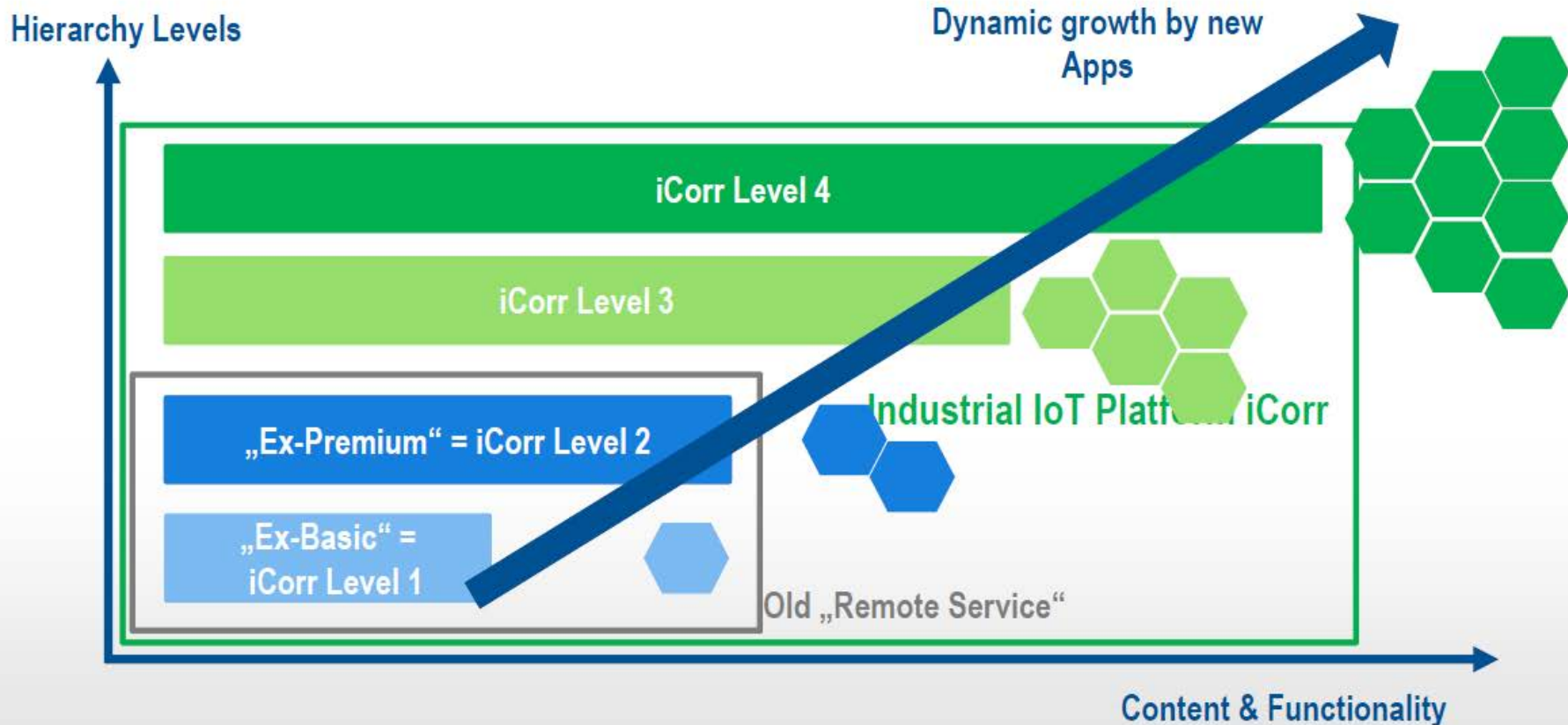


Intelligent coordination of the product offerings over a platform with AI analysis

1. Build up **more and more complex products** over time and sell them **successfully**
  - Divide products into smaller slices and earn reputation.
  - Customers learn about reliability.
2. Build up **partner networks** for offering **even more complex product** solutions
  - Confirm connectivity with established products and use reputation from others.
3. Develop a **value platform** where customers and solution providers can find themselves in a **self-selection process**
  - Use transparency and “being there” as a sign of success.
  - Develop an open platform to avoid perceived lock-in effects.

- Building on established functions and transforming them into a new environment (machine and plant related)

## iCorr IIoT Product Architecture





# “Lessons learned” from BHS Corrugated and Krones AG

- **Customer reluctance** results from
  - Error-free operation of AI solutions in established products
  - Degree of predictive accuracy
  - Possible immense negative consequences of failure in the value chain
- **Solutions**
  - Contact young earlier adopters at customer sites
  - Develop und customize together with customer
  - Citing former reference installations and long history as an innovator
  - Aggressive communication of the integration of supplying partners
  - Permanent communication of success stories of small slices
  - Trial-use up to two years with fall-back redundancy to previous systems

# Thank You!



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