

# The Smart Paint Factory

Digitalize the coatings industry, make it sustainable end-to-end, and keep it competitive

Dr. Wolfram Keller

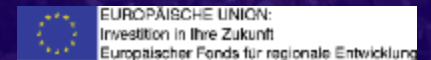
12.05.2022



**Process<sup>4</sup>  
Sustainability**

**Cluster for climate-neutral  
process industries in Hesse**

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# The Smart Paint Factory

Digitalize the coatings industry, make it sustainable  
end-to-end, and keep it competitive

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4th International Workshop on Innovation and

Production Management in the Process

Industries (IPM2022)

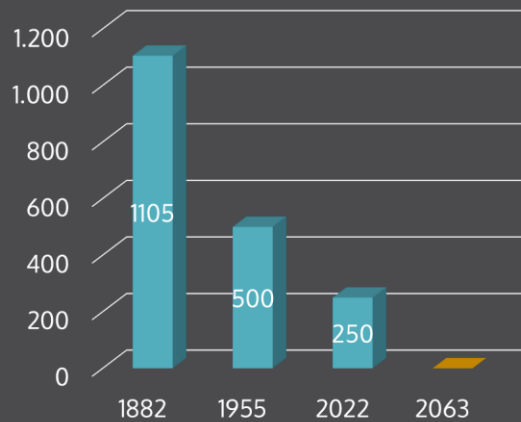
May 12-13, Industriepark Höchst, Frankfurt

[www.smartpaintfactory.com](http://www.smartpaintfactory.com)

# The German coatings industry is *still an important segment* of the process industry



Number of coatings companies in Germany



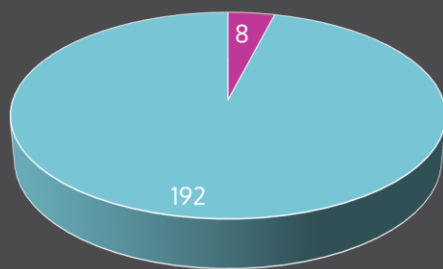
## Number of independent coatings companies in Germany (acc. to VDL)

- Surprisingly few data available at all
- Decrease of 6 companies year for year

## Coatings industry in Germany today (acc. to VCI)

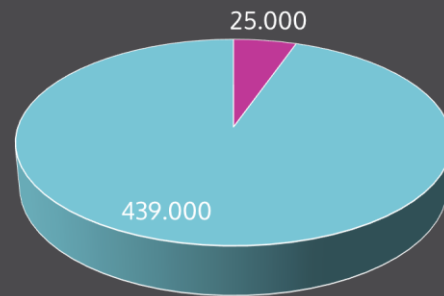
- 4.0% of total chemical industry revenue
- 5.4% of total chemical industry employees
- 74.2% per capita sales compared to entire chemical industry

Revenue (bn EUR; 2020)



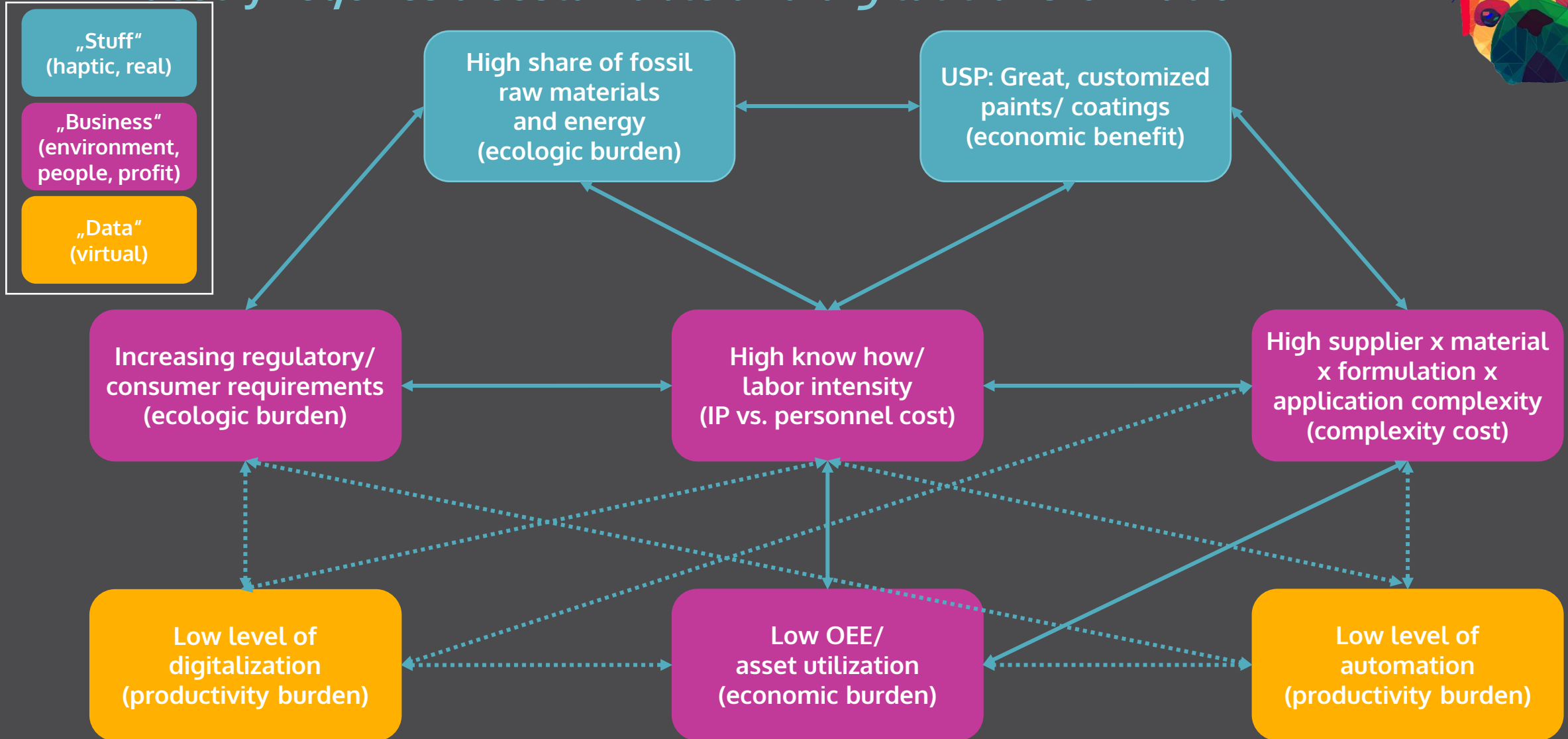
■ Coatings industry  
■ Remaining chemical industry

Employees (2020)



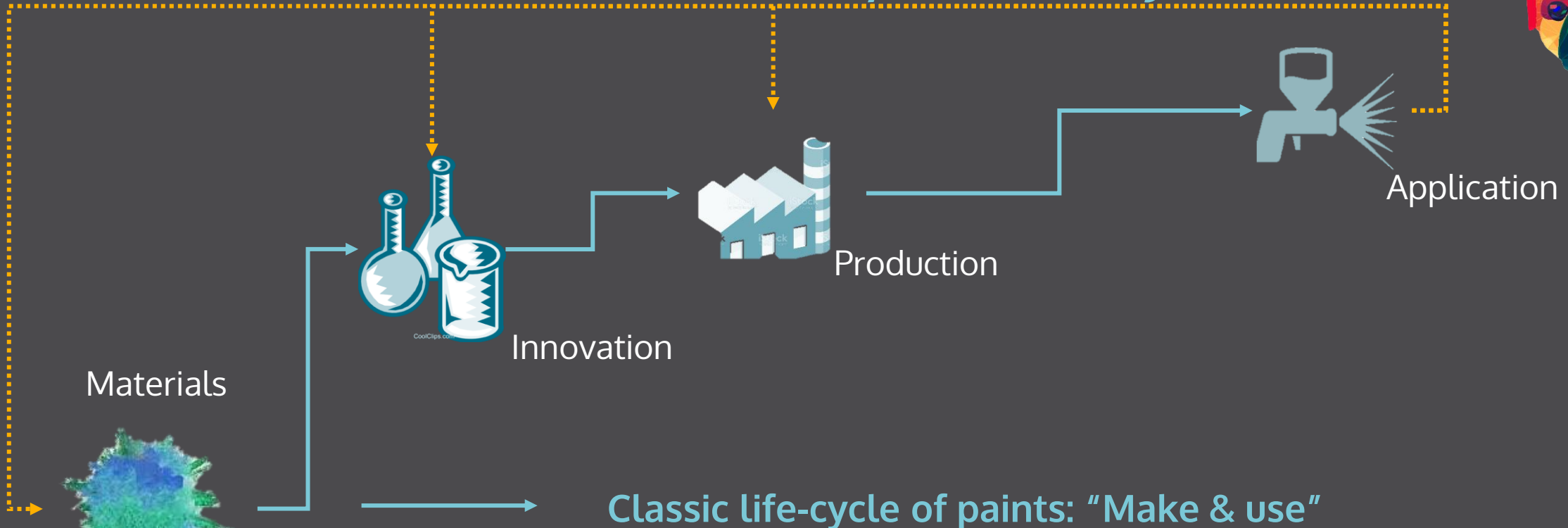
■ Coatings industry  
■ Remaining chemical industry

# For its mid- and long-term *competitiveness*, the coatings industry requires a sustainable and digital transformation





# The transformation towards more sustainability requires a *"new resource consciousness"* or *"haptic circularity"*

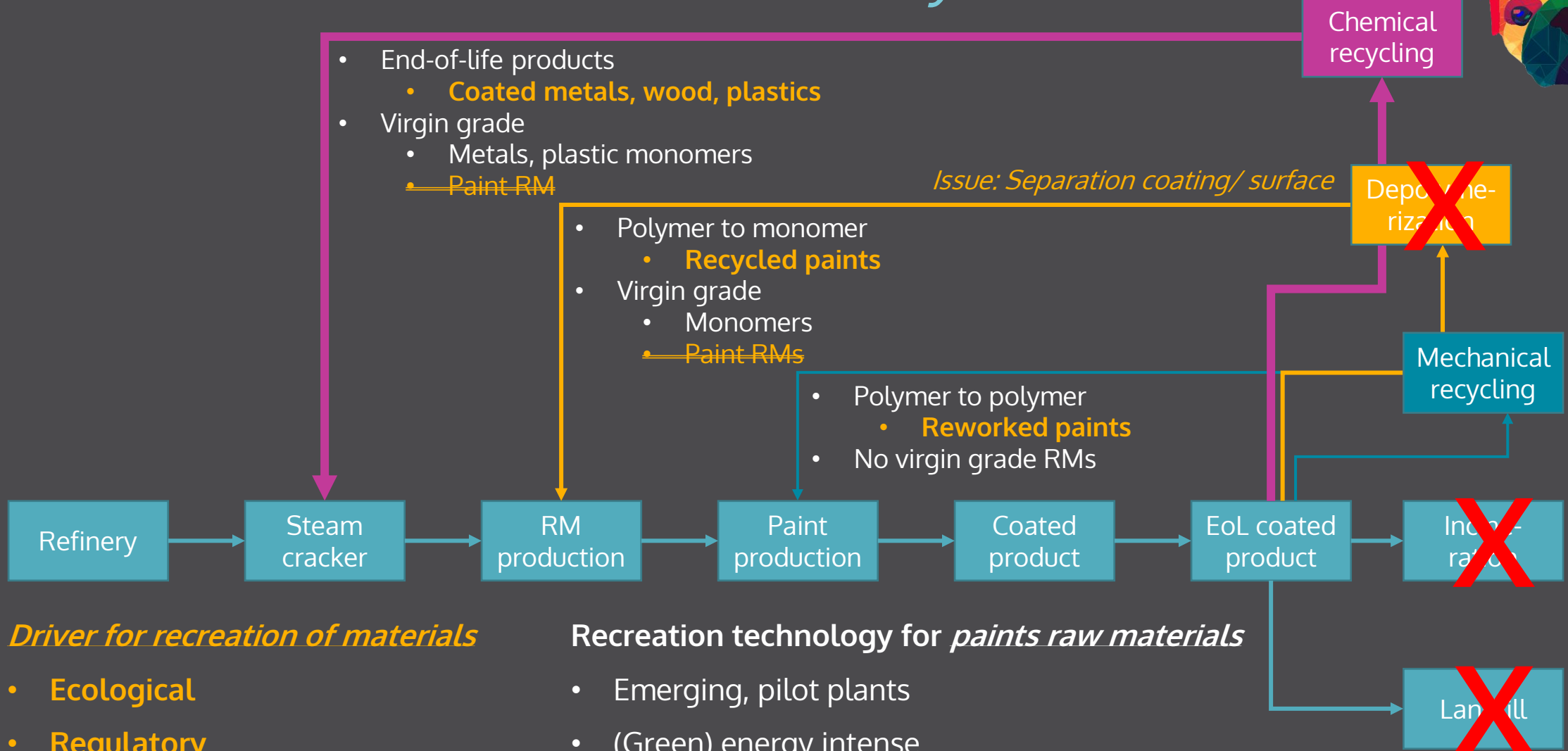


Classic life-cycle of paints: "Make & use"

**Circular life-cycle of paints: "Make, use & ..."**

- Reuse, e.g., excessive paints (simple)
- Rework, e.g., exceeded shelf-life, end-of-life paints (moderate)
- **Recycle, e.g., end-of-life (EoL) coated surfaces (complex)**

# Recreation of virgin grade raw materials out of EoL coatings will for the foreseeable time *economically not be feasible*



## *Driver for recreation of materials*

- Ecological
- Regulatory
- Not economical

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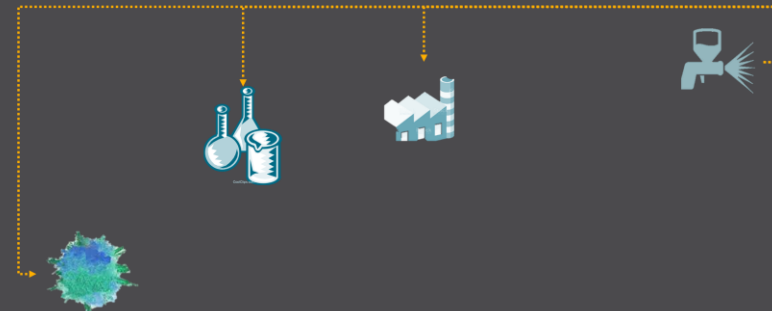
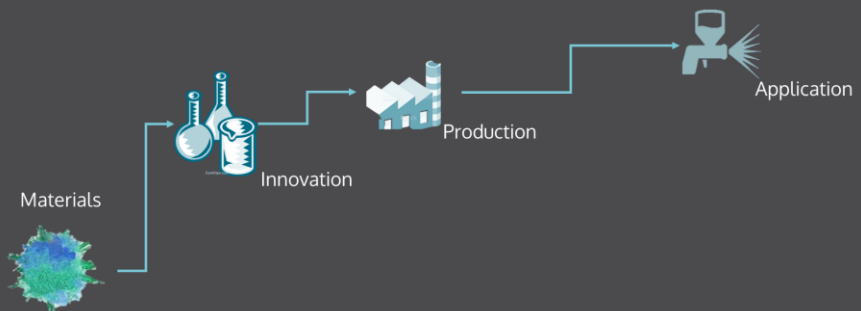
## *Recreation technology for paints raw materials*

- Emerging, pilot plants
- (Green) energy intense
- Economically not feasible for (10 to) 20 years

Transform the European Process Industries

May 12-13, 2022

# The transformation requires a new focus *on sustainability* and hence of existing *business models* and *financial objectives*



## Coatings linear business model: "Make & use"

- Primary/ virgin raw materials
  - Reputation
- Fossil energy
  - (Availability), reputation, cost
- Complex combinations of materials x formulations x applications
  - Custom-specific formulations (USP)



## Coatings circular business model: "Make, use & re-use"

- Secondary/ re-processed raw materials
  - Ecological benefit vs. availability, cost
- Renewable energy
  - Ecological benefit vs. availability, cost
- Super complex combinations of materials x formulations x applications
  - Ecologic differentiation vs. complexity cost

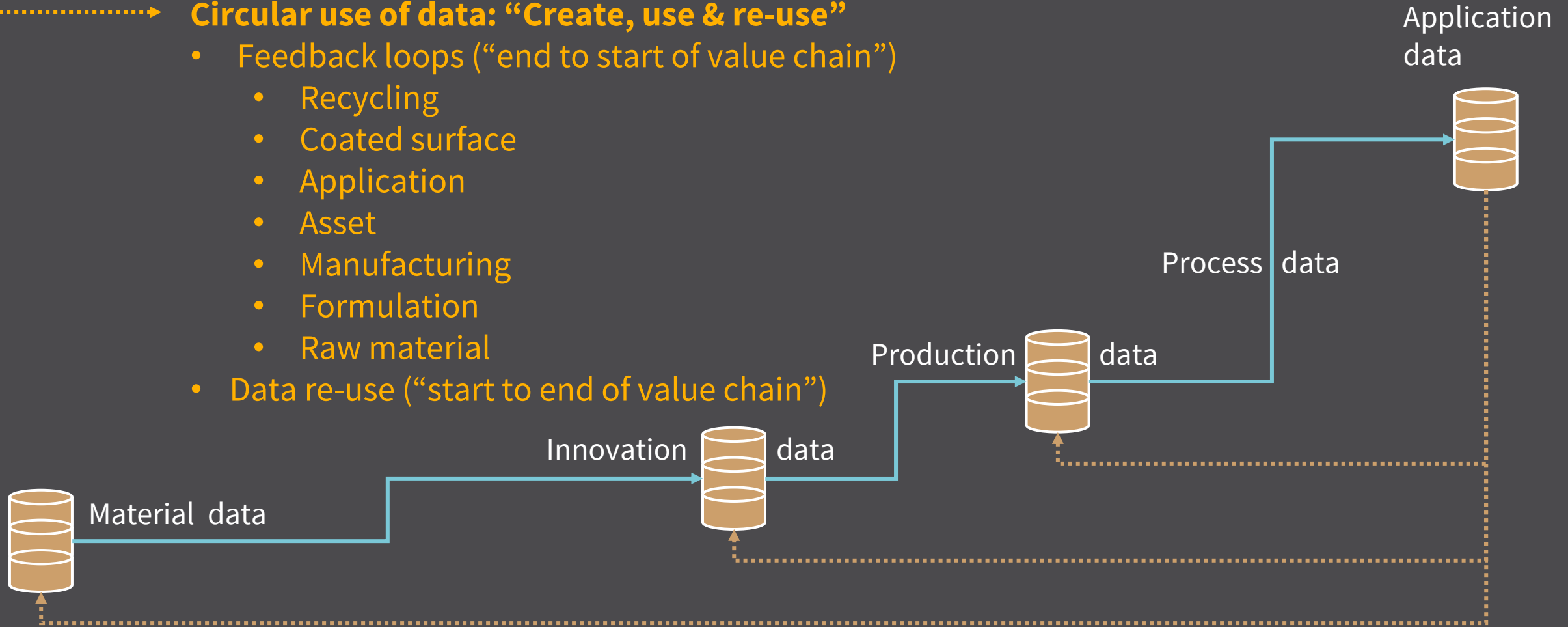
# The digital transformation requires the “*potentiation of data creation, application and reuse*” or “*data circularity*”



—————> **Classic use of data: “Create & use, save and forget”**

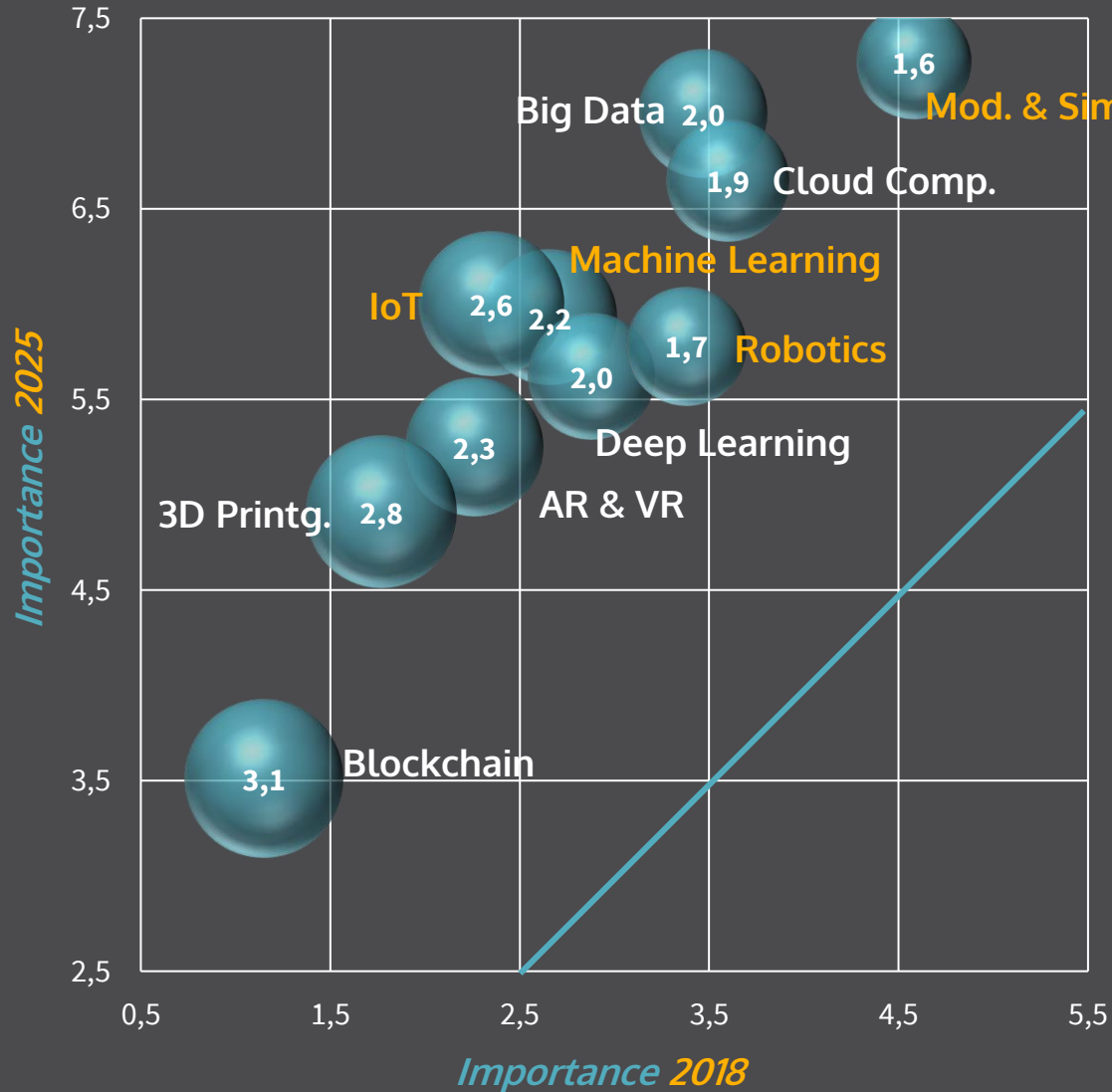
.....> **Circular use of data: “Create, use & re-use”**

- Feedback loops (“end to start of value chain”)
  - Recycling
  - Coated surface
  - Application
  - Asset
  - Manufacturing
  - Formulation
  - Raw material
- Data re-use (“start to end of value chain”)






# Automation and digitalization are increasingly important triggers for "data circularity" in the entire process industry



"Berufe 4.0" survey for the chemical and coatings industry (2018)

 Increase of importance of digital technologies 2025 vs. 2018, (average 2.4)

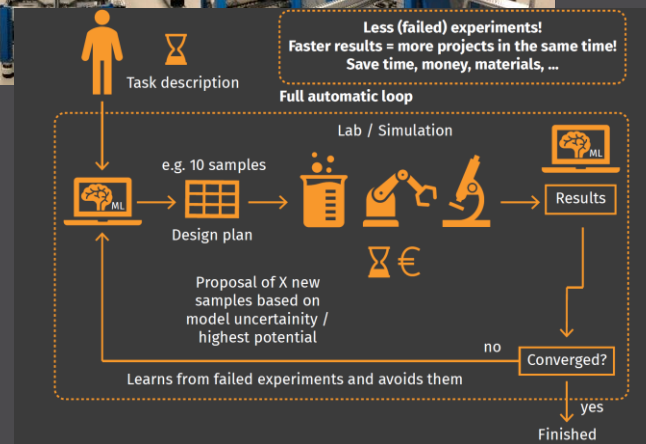
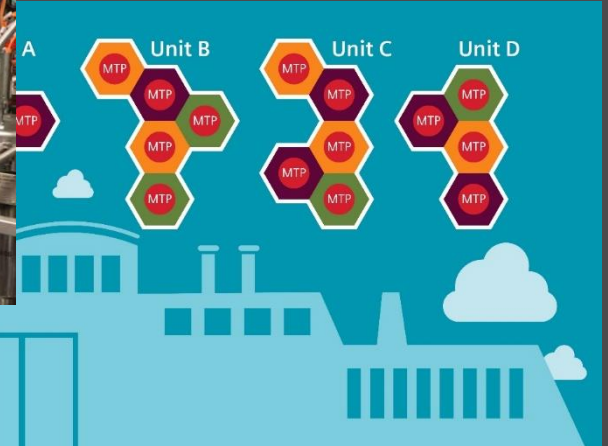
- 2022: Significant progress, halfway between 2018 and 2025 (examples)

- High-throughput formulation
- Machine learning for digital modelling
- Digital Models in R&D
- Modular production
- Digital Product Passports

- **High impact on sustainability**

- **TTM, material and energy consumption, waste**

# The impact of emerging digital technologies on sustainability is significant: *Reduction of TTM, material, energy, and waste*



## • High Throughput Experimentation & Machine Learning

### • Benefits (HSNR, Probaligence)

- In total **55** experiments instead of **1024** (100% manual experiments)
- **95%** time-to-market reduction (6 vs 103 days)

## • An integrated process control system for the modular production of materials and products

### • Benefits (Hemmelrath; Merck, Siemens)

- **75%** TTM reduction
- **90%** waste reduction
- **70%** energy savings

# The *most important enabler (or disabler?)* of the industry transformation is neither digital nor sustainable, but *“human”*



## DIY paradigm: “Traditional” or “conservative” mindset

- “We can fix everything on our own”
- “NIH” / “We are different”
- “Data sharing = loss of control over IP”

## Mindset change and additional expertise required

- Automation and digital technologies
- SDG and ESG targets/ practices
- Circular, cross-enterprise value chains

## Allies needed

- Competences
- Resources



# For a holistic transformation *allies from the entire coatings industry value chain and its periphery are needed*



## Extended coatings companies value chain

- **Front end:**
  - Mining, drilling, and exploration operations, raw material suppliers
- **Current core business:**
  - Raw material manufacturing, paint formulation and production, coatings applications
- **Back end:**
  - Industrial and private customers, retro logistics and recycling

## Coatings value chain periphery

- **Experts** for sustainability, digitalization and science
  - Circularity, modelling, simulations, AI ...
- Technical and commercial **services**
  - Energy efficiency, product passports, data base/ data lake provider ...
- Equipment **suppliers**
  - Disperser, measuring instruments, spraying systems ...



# The Smart Paint Factory Alliance: Feasible *synergies of scale* for coatings companies' and entire industry's transformation

