

Sustainable & Resilient Digital Ecosystems

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Plattform Industrie 4.0: Global Representative & Advisor

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Shaping Digital Ecosystems Globally

The 2030 Vision for Industrie 4.0: Still Valid with Adapted Priorities



Interoperability

- Open Ecosystems
- Adaptable in 'Realtime'



Sustainability

- Circular Economy
- New Ways of Hybrid Working



Sovereignty

- Resilient Supply Chains
- Diversity and Self-Determination





EU Initiative: Circular Economy

Implemented Nationally a.o. by Industrial Associations



→ Circular Economy Integral for Green New Deal in European Union and Germany

The Circular Economy Initiative Germany 2019-2021

Decouple Economic Growth from Resource Consumption



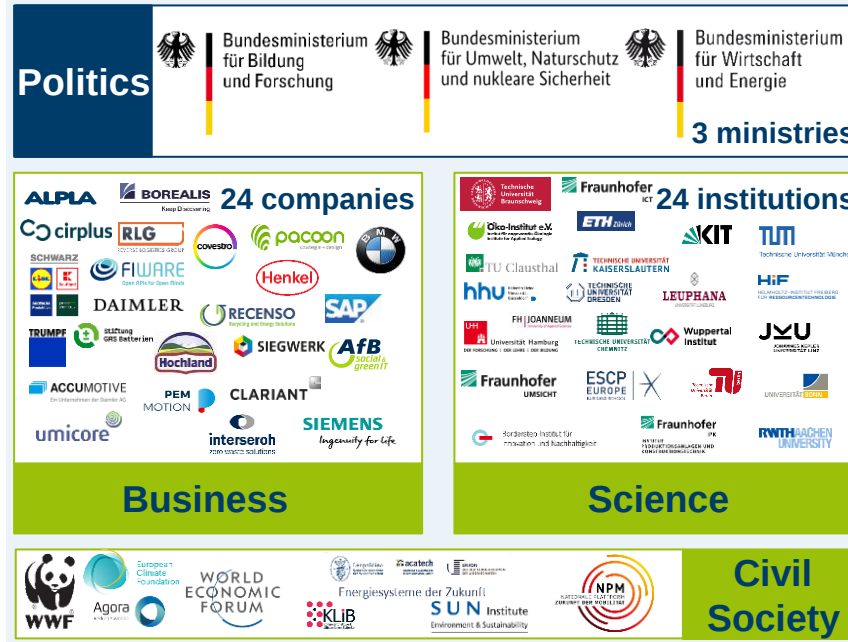
**Collaboration
along the
value chain**



**Circular Economy
Initiative
Deutschland**

Focus Areas

1. Circular Business Models
2. Packaging
3. Traction Batteries



Major Publication

**Circular Economy
Roadmap
for Germany**



acatech/Circular Economy Initiative
Deutschland/SYSTEMIQ (Eds.)

Update December 2021



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[Link](#)

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Key observation

Considerable Structural Waste in Current Value Chains



Only **5%**
of raw material
restored after first use



Only **2%**
of plastic packaging waste
recycled into quality materials



25%
Of battery costs attributed
to metallic materials

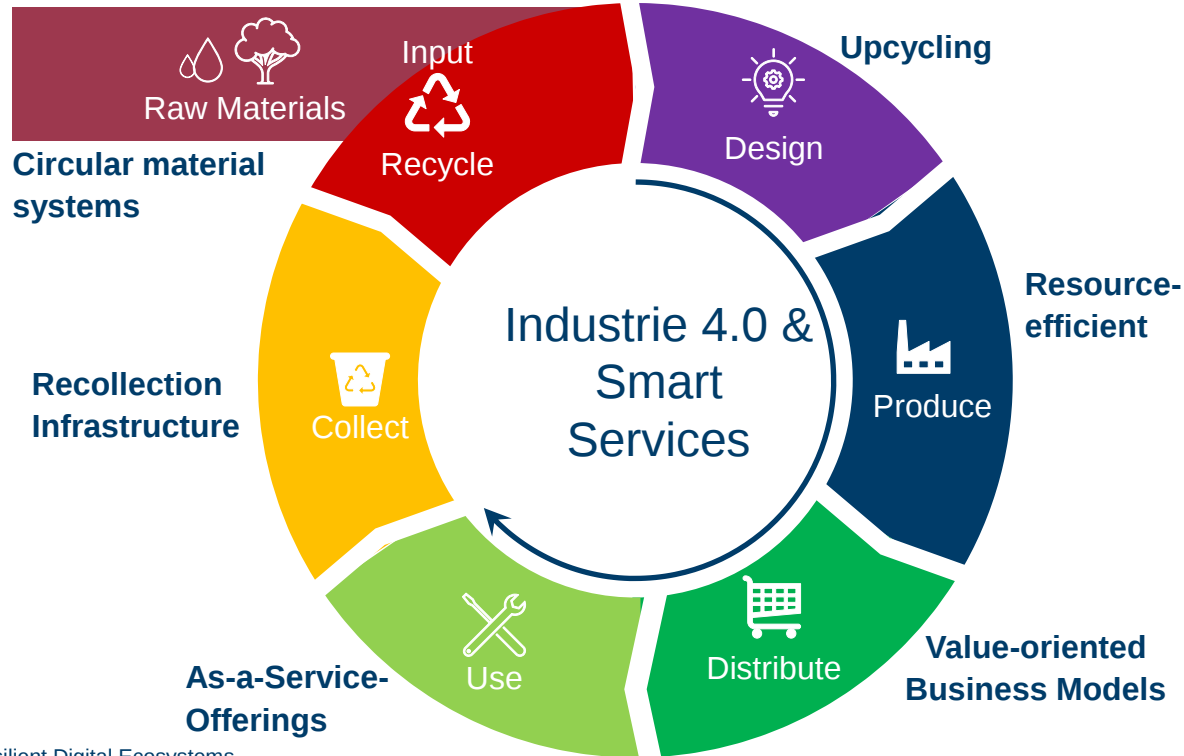
**Holistic Lifecycle
Approach**

~ 95% of value
(€ 70-105 billions) are lost
every year

Follow-Up Initiative
Battery Passport

Circular Economy

Holistic Product Lifecycle Approach is Needed



Circular Material Systems

Inspired by the Circular Nature of Biological Systems



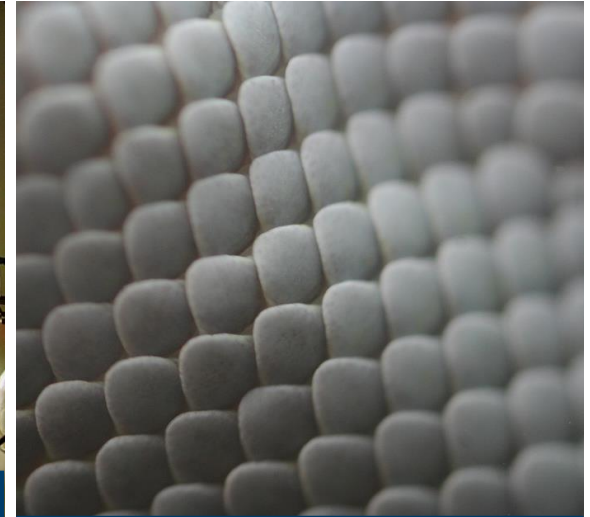
Organic

e.g. insulation materials



Biosynthetic

e.g. chemical precursors
out of renewables

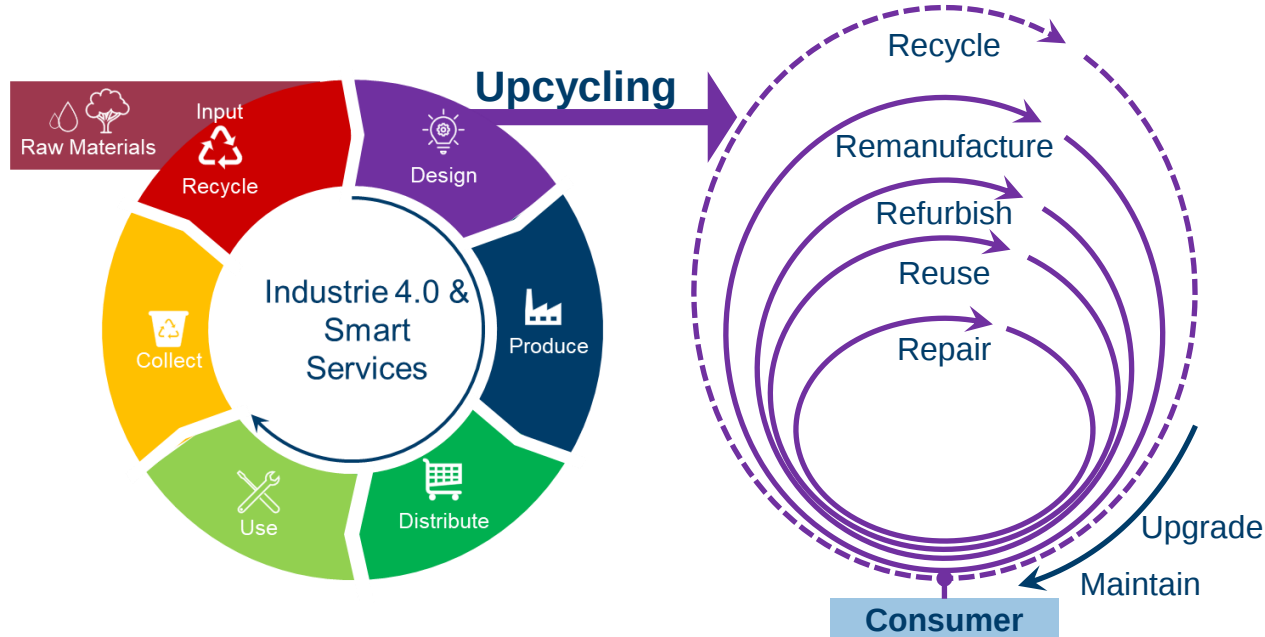


Bio-Inspired

e.g. Gekkotan adhesive system

Eco-Design

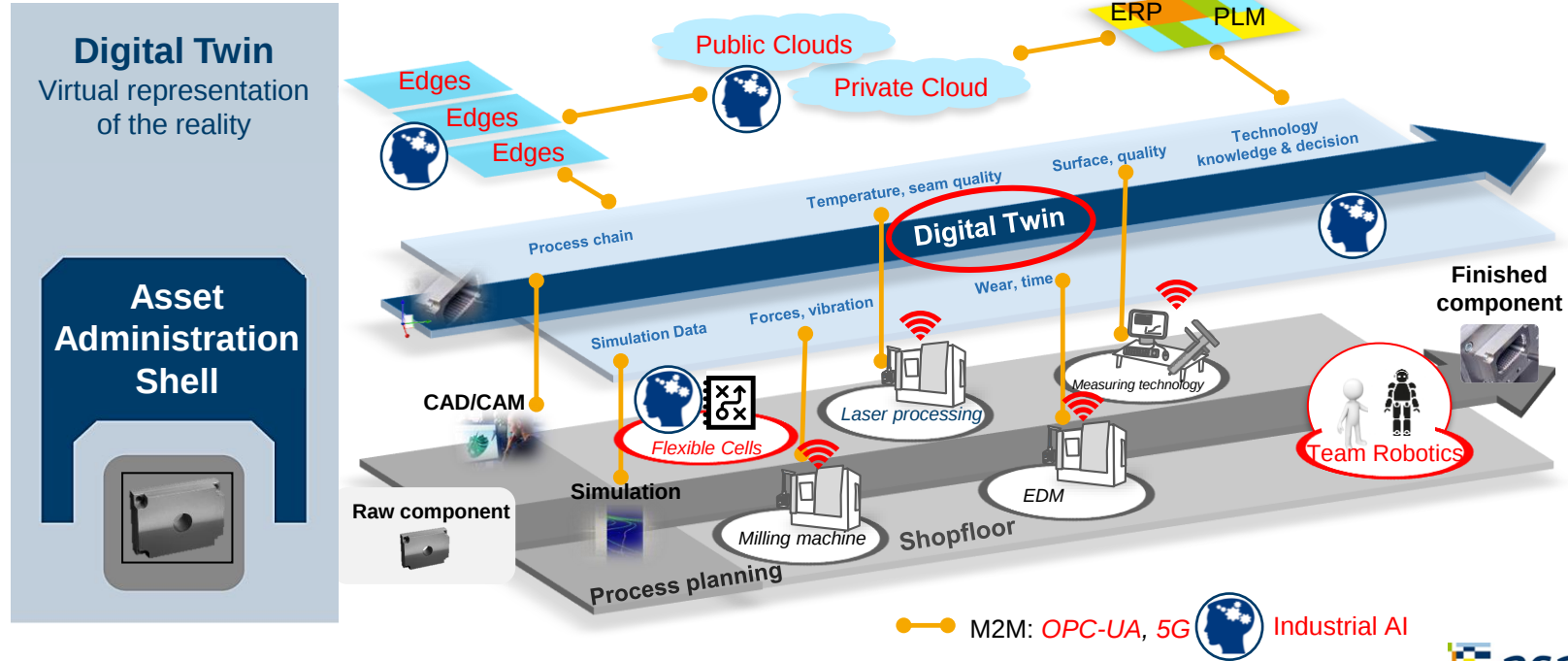
Circular Economy by Design



1. **Understand** what makes a product sustainable
2. **Design** for circular business models
3. **Develop** sustainable manufacturing solutions

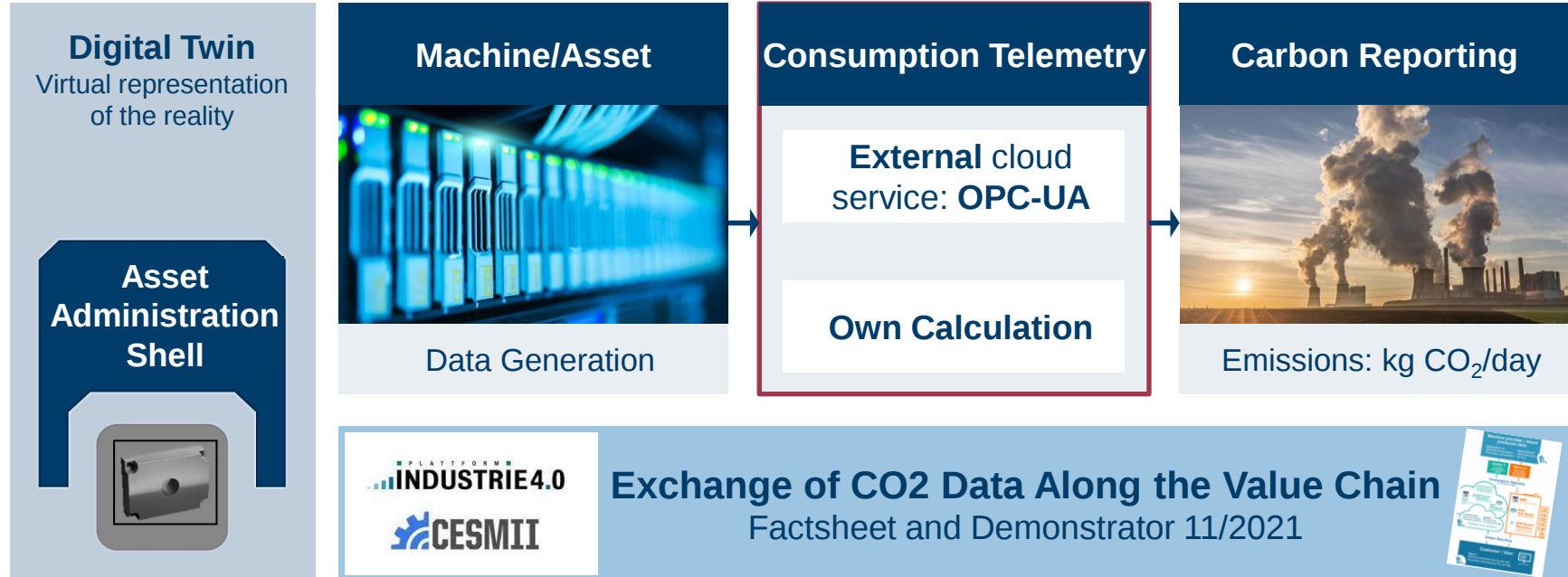
Transformation of Smart Manufacturing

Industrie 4.0: Resource-efficient and Adaptable Digital Factories



Digital Twin

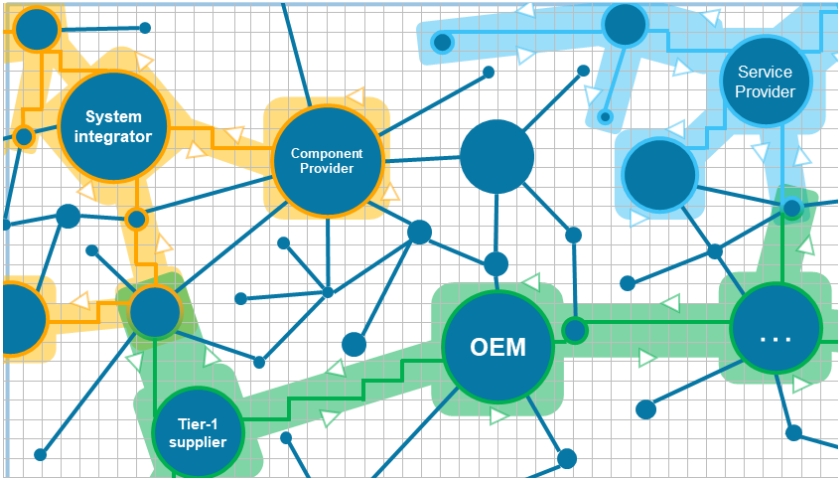
Foundation for Collaboration, Sustainability and Competitiveness





Data Spaces and Sharing Economy

Transparency and Collaboration in Digital Ecosystems

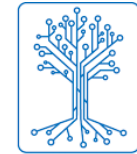


**Data Sharing Community
for Industry of the Future**

**DATA SPACE
INDUSTRIE 4.0**

**Data sovereignty
in a connected economy**

**Secure data exchange
across automotive
value chain**



GAIA-X
data-infrastructure.eu



Catena-X
Automotive Network

**across all companies
in manufacturing
value chain**

Manufacturing-X

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Supply Chain Resilience

Example: The Automotive Industry (acatech 2021)

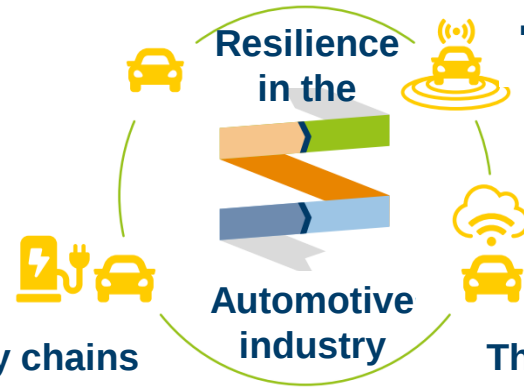


Increase adaptability

- Adaptable production systems: **Industrie 4.0**
- Simplify pre-competitive collaboration

Resilient European supply chains

- Strengthen the ecosystem: **Microelectronics IPCEI**



Trustworthy use of data

- Rapid implementation of **Data Spaces**
- Build trust, with government acting as mediator

Think circular for batteries

- Promote **circular economy**
- Establish supportive regulation

Scaling of Production: Need-oriented and Local

Example: Modular mRNA-Production Facilities of Biontech



Status Quo: Covid-19 in Africa

<15%

Vaccination rate
across African continent

~1 %

Of global vaccine production
capacity located in Africa

Task: Increase Capacities

Agreement on **installation of
production capacities in Africa**
with European technology



EU
with



Ghana



Senegal



SA



Rwanda

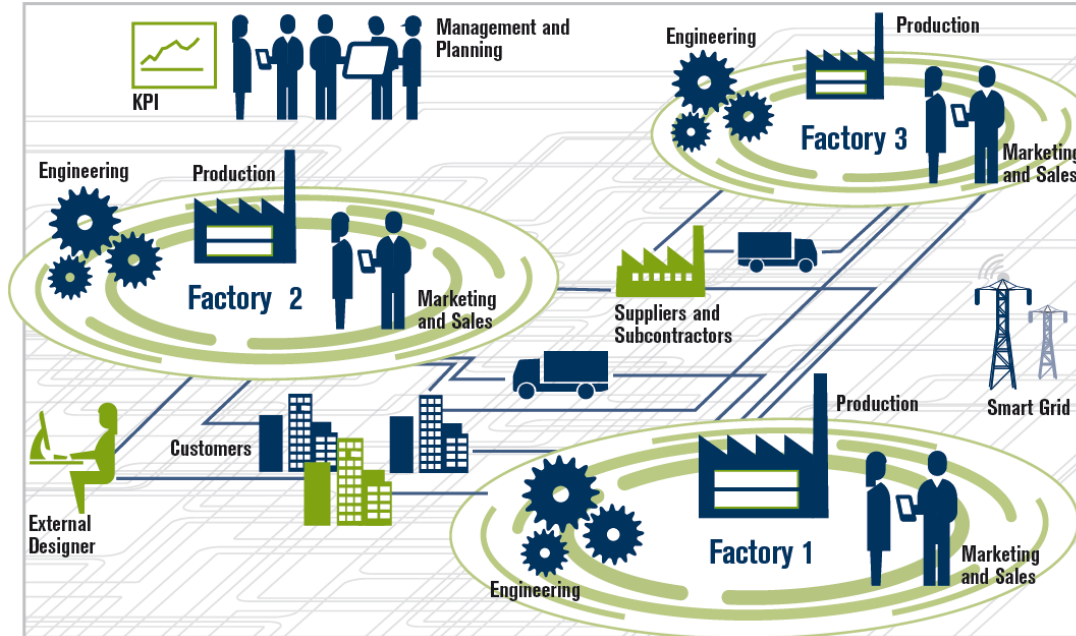
Action: Modular Facilities



- Modular **production facilities**
- annual production capacity of **50 mio. doses**

Adaptable Eco-systems: Connect and Transact in 'Real Time'

Implement the Industrie 4.0 Concept of Horizontal Integration



Semantic interoperability

- Technological, commercial & legal

Monitor, predict and act in 'real time'

- Digital twins
- Data spaces

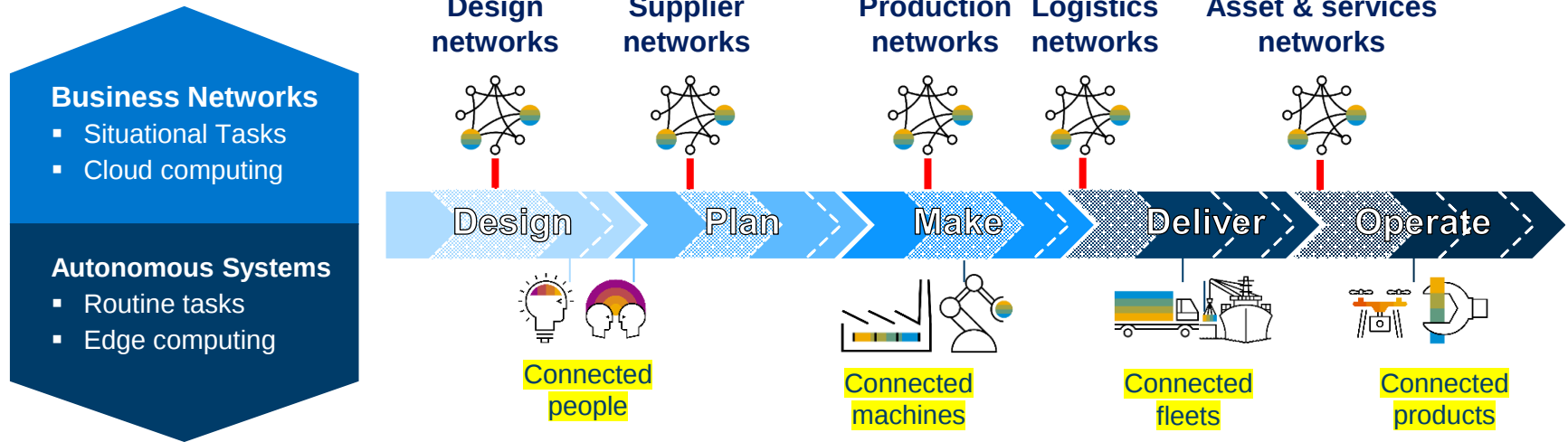
Ad hoc networking

- Seamless Onboarding
- Quality of service
- Automated contracting



Twin Transformation (Green and Digital)

Call to Action: Enterprises



→ Business Process Reengineering + Ecodesign + Business Eco-system Engagement

Source: SAP SE

Twin Transformation (Green and Digital)

Call to Action: Society



Industries: Rethink Product Lifecycle



**Circular Economy
Initiative
Deutschland**

Workforce: Upskilling & Demographics

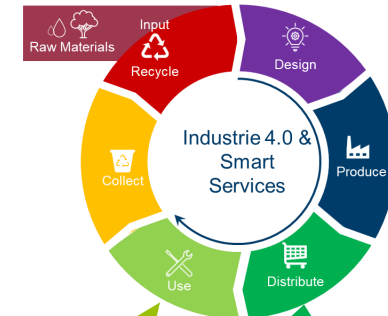


Advanced Robotics + HMI



Lifelong Learning

Consumer: Rethink Consumption



**As a Service
Offerings**

**Value-oriented
Business Models**

Social Innovation