



LANXESS

Energizing Chemistry

Digitalization in the Chemical Industry

Opportunities and Threats

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LANXESS – A globally operating specialty chemicals company



**Specialty
chemicals
company**



- Spin-off from Bayer in 2004
- Specialty chemicals portfolio: chemical intermediates, specialty chemicals and plastics

**Global
success
story**



- 60 sites worldwide
- Approximately 15,400 employees in 33 countries
- Global sales of EUR 7.2 billion in 2018

**Strategy of
profitability
and resilience**



- Strengthening of leading position in medium-sized markets
- Consolidation in Europe, expansion in USA and Asia

LANXESS with new strategic focus: Building a more balanced company

Business unit set up fosters dedication and entrepreneurship

Advanced Intermediates



Advanced Industrial Intermediates (AII)

Saltigo (SGO)

Specialty Additives



Additives (ADD)

Rhein Chemie (RCH)

Performance Chemicals



Material Protection Products (MPP)

Inorganic Pigments (IPG)

Leather (LEA)

Liquid Purification Technologies (LPT)

Engineering Materials



High Performance Materials (HPM)

Urethane Systems (URE)

More resilient

Strong cash generation

Solid platform for growth

LANXESS well diversified

LANXESS group – Sales by industry*



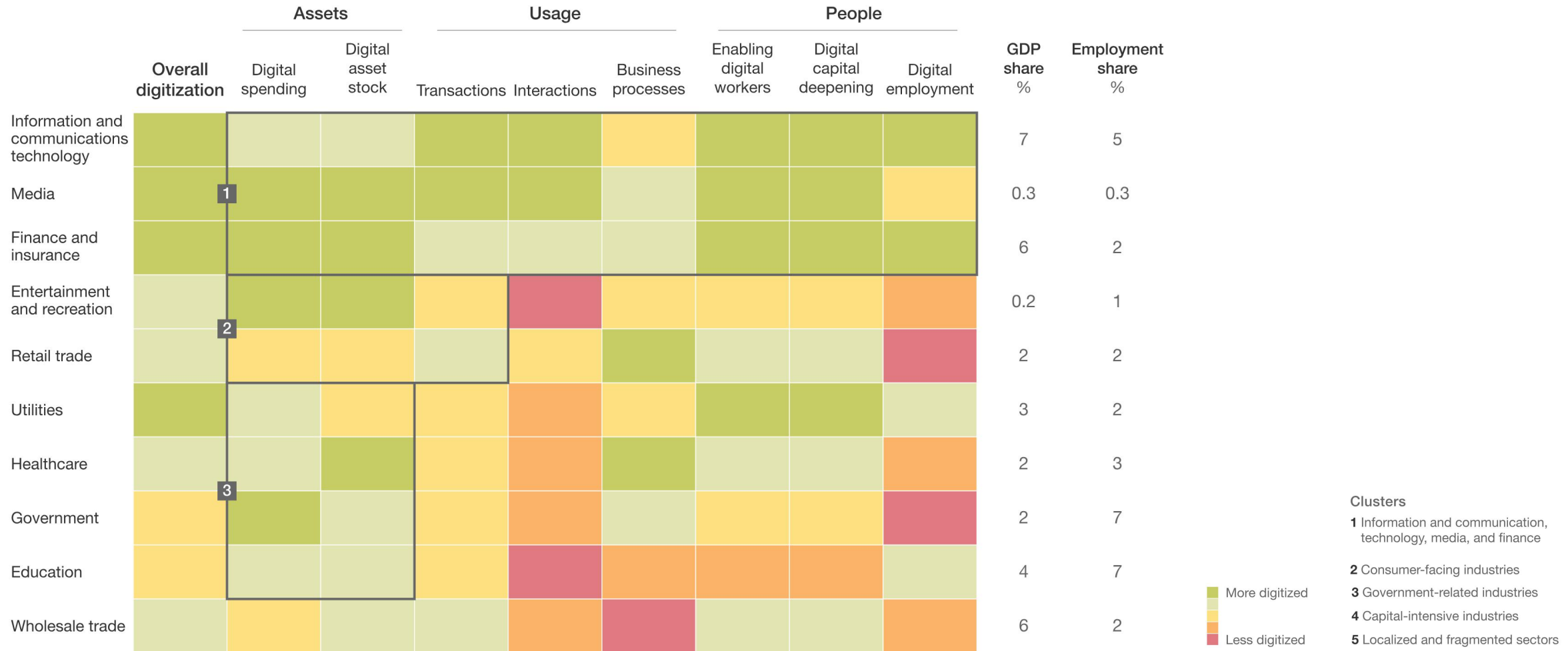
New LANXESS sales by industry*



* Numbers as of 2016

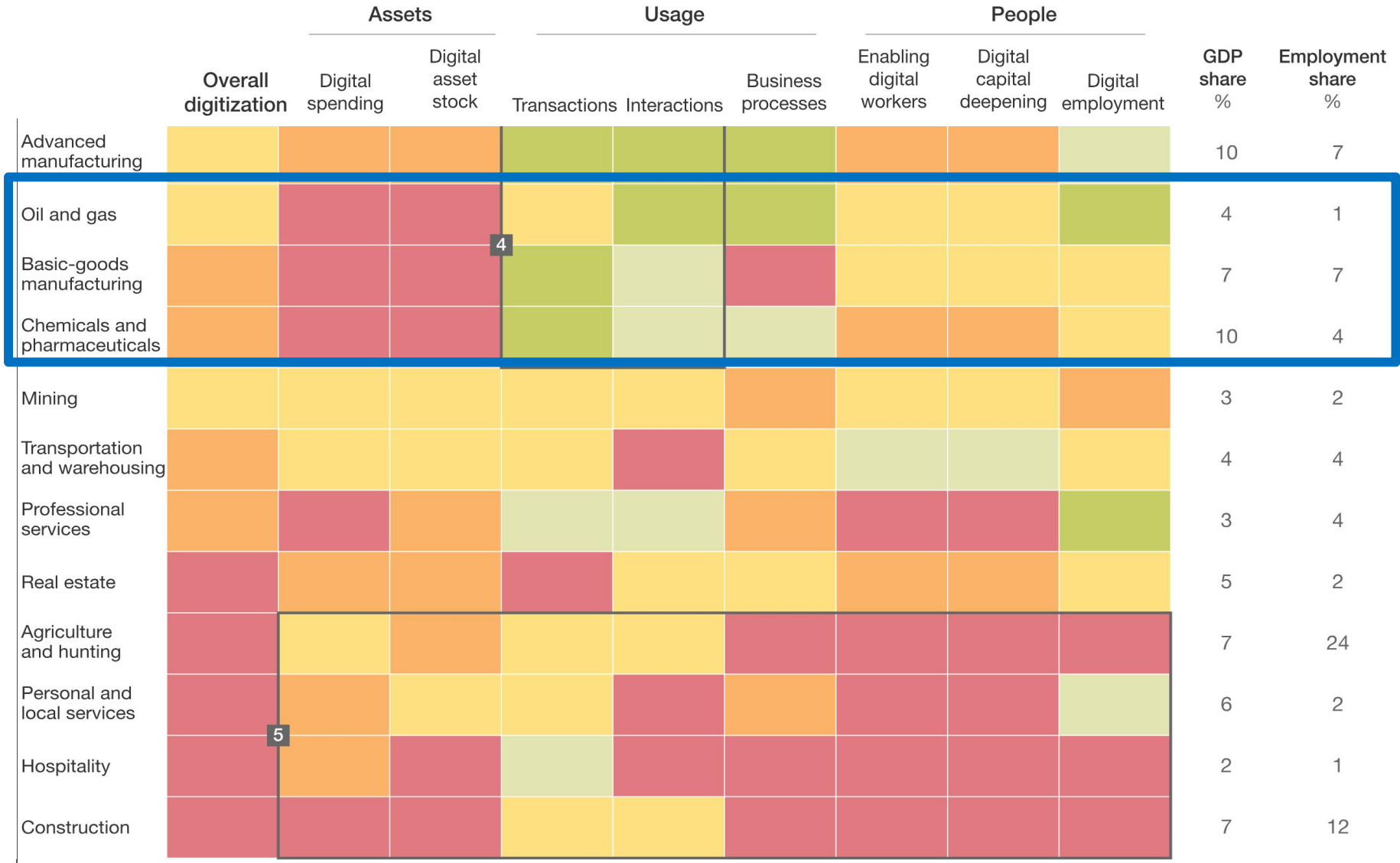
**Amongst Other - consumer, chemicals, construction

Digitalization widely adopted by Chinese consumers...



but, asset-heavy industries lagging behind in Digitalization **LANXESS**

Energizing Chemistry

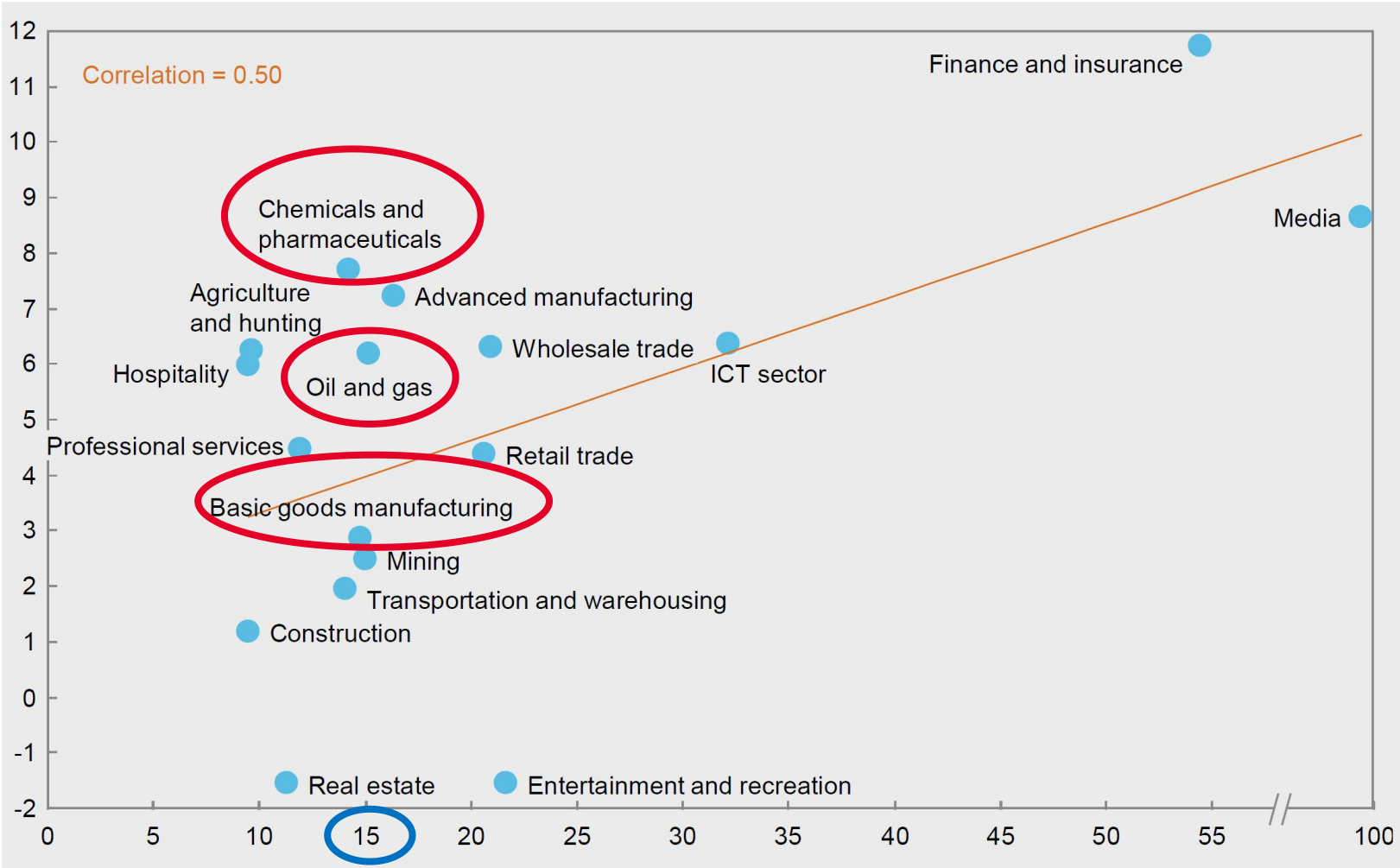


Oil, Gas, Petrochemicals, Chemicals, Pharmaceuticals lagging behind in Digitalization of assets, but they represent 21% of GDP

- Clusters**
- 1 Information and communication, technology, media, and finance
 - 2 Consumer-facing industries
 - 3 Government-related industries
 - 4 Capital-intensive industries
 - 5 Localized and fragmented sectors

Productivity growth in China's sectors is positively correlated to overall digitalization – Upside potential for chemicals

Labor productivity growth, 2011–16
Compound annual growth rate, %



Digitalization Score

While posing threats to the chemical industry, digitalization offers also significant opportunities to the chemical industry

- While Germany promotes **Industry 4.0** for the digitalization of asset-heavy industries, China focuses on **Made in China 2025**
- **Chemistry 4.0** is changing the markets, the competitive landscape, and the parameters the chemical industry is working in
- For the chemical industry – as a **provider** of materials, molecules, and services – development of new business models is a chance, but also a necessity to maintain and improve its value proposition
- Besides being often complex and with particular barriers, **new business models** still have to fulfill “normal” requirements
- **Business models** will be sometimes really new, but more often a (disruptive) evolution of existing ones

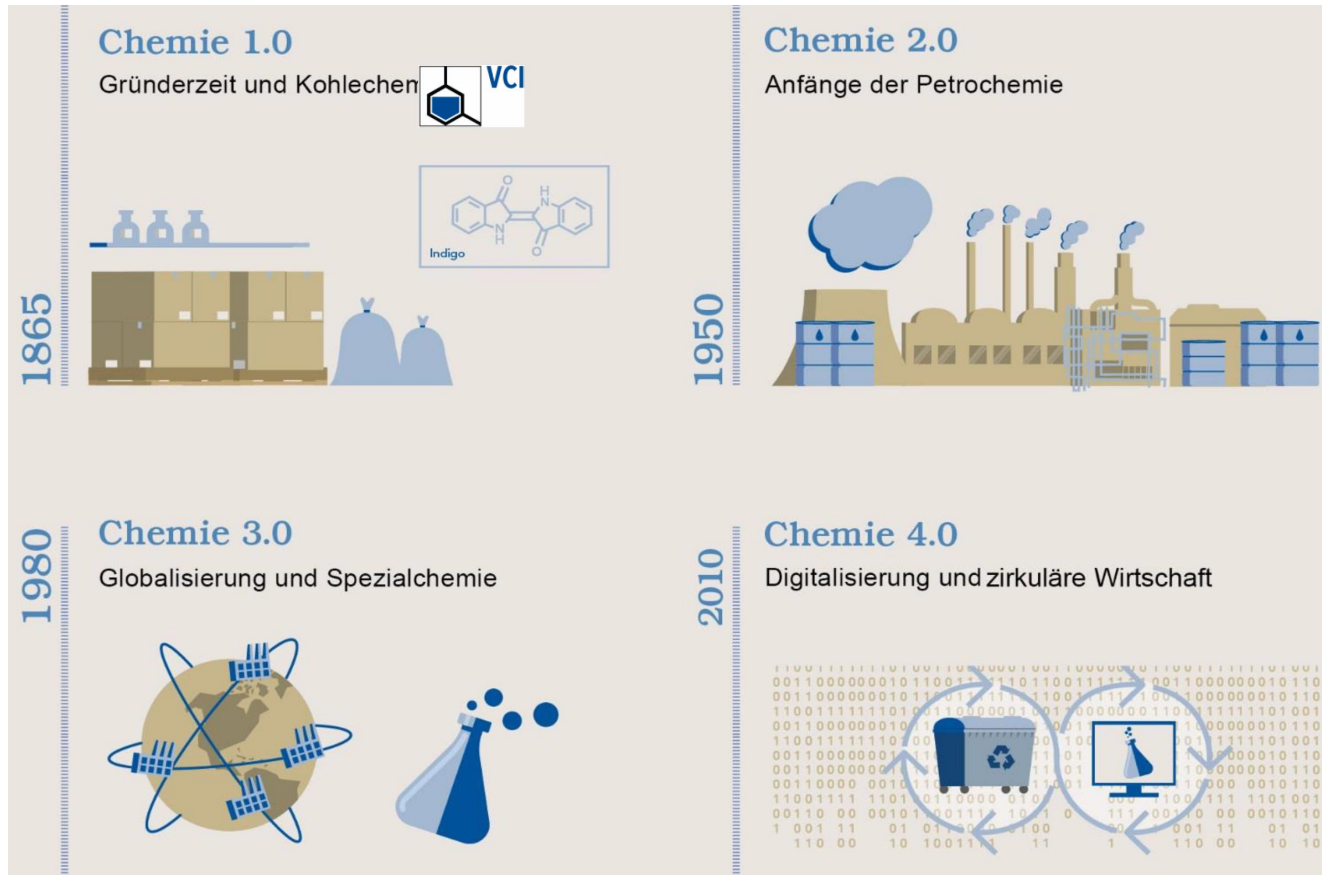
Chemistry 4.0 is changing the chemical industry landscape

01

From Chemistry 1.0 to Chemistry 4.0 – 150 years of Chemical Industry



In the last more than 150 years, the chemical industry has gone through four major waves of change



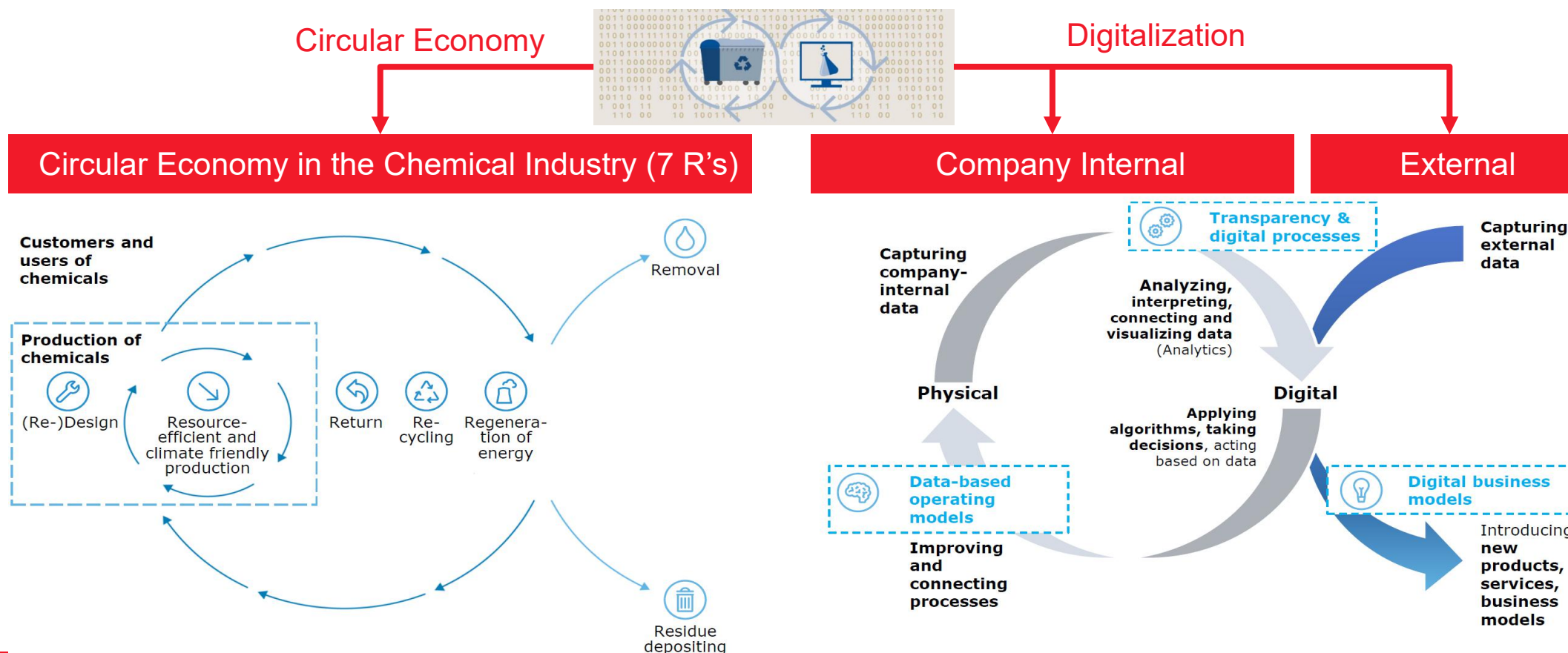
From Chemistry 1.0 to Chemistry 4.0

150 years of chemical industry

- The more than 150 year old history of industrial chemistry shows changes in raw materials, relocation of growth centers to emerging economies, and the call to make business more sustainable
- Following industrialization and coal chemistry (Chemistry 1.0), the emergence of petrochemistry (Chemistry 2.0), and increasing globalization and specialization (Chemistry 3.0), the industry is entering a new phase with **Chemistry 4.0**, in which
 - Digitalization
 - Circular economy & sustainability play key roles

Digitalization and Circular Economy are the core elements of Chemistry 4.0

Chemistry 4.0 – Circular Economy and Digitalization

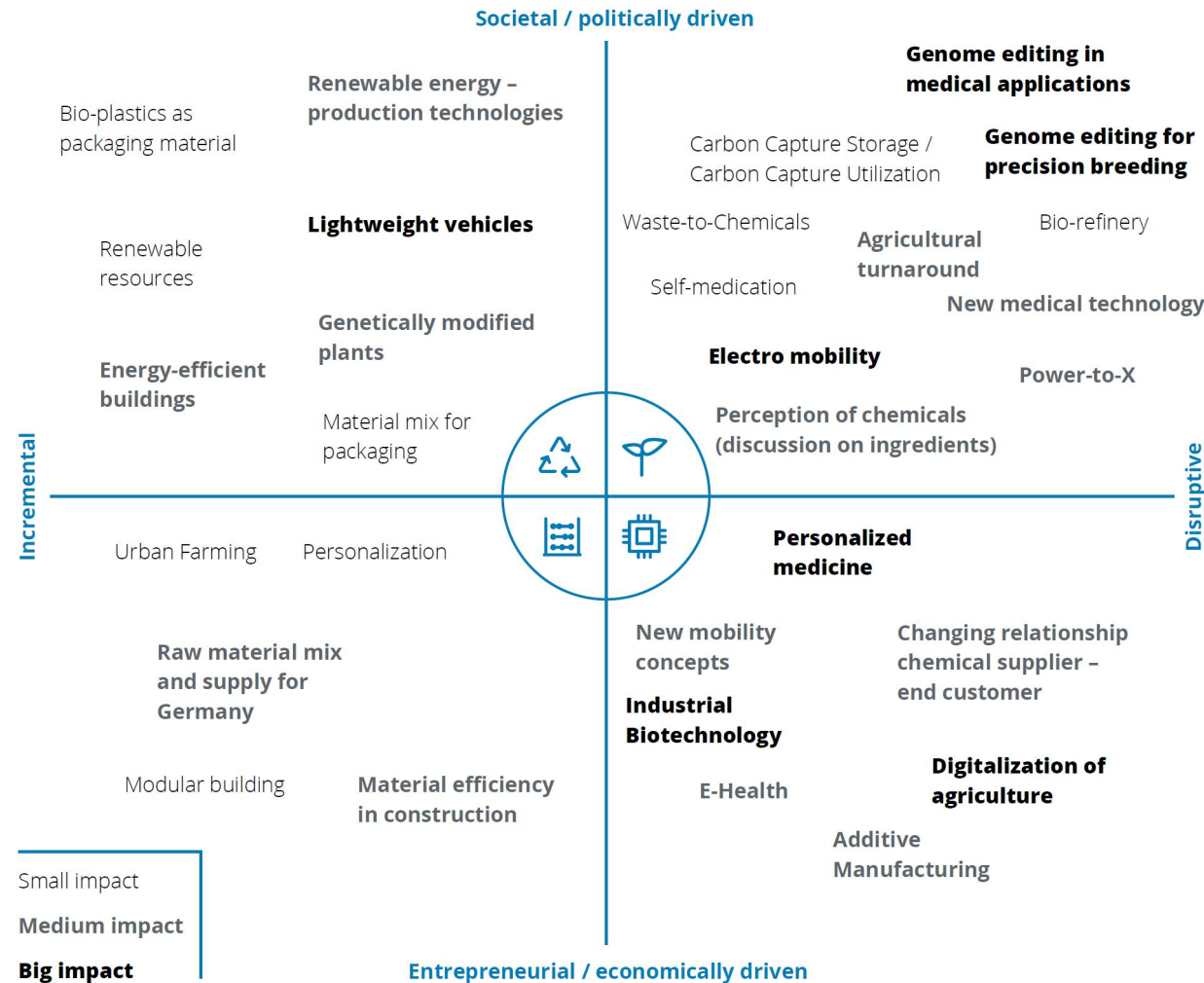


02

Disruptive Changes from Chemistry 4.0



The chemical industry is facing incremental innovations and disruptive changes which will impact the industry until 2030



Disruptive changes impact processes, products, and business models in the chemical industry

- **Process technologies**
- **Product portfolios**
 - An example of fundamental change in demand structures is the increase in **electro mobility**, which causes demand to **decline for many chemical products from catalysts to heat, oil, and gasoline-resistant plastics**, as well as oil and fuel additives. At the same time, new business segments are opening around electric engines such as **battery technology and battery recycling**. Additionally, the demand for **lightweight materials increases**.
- **Business models**
 - The digital transformation can also change whole value creation structures. Depending on the scope of the disruptive change, **chemical companies will then need to redefine their customer relationships or business models**

Driven by Circular Economy, new technologies will result in achieving the same/better impact with less material

New technologies lead to 30-65% less chemicals & material usage

3D-Printing



In-mould electronics



Packaging



Precision farming

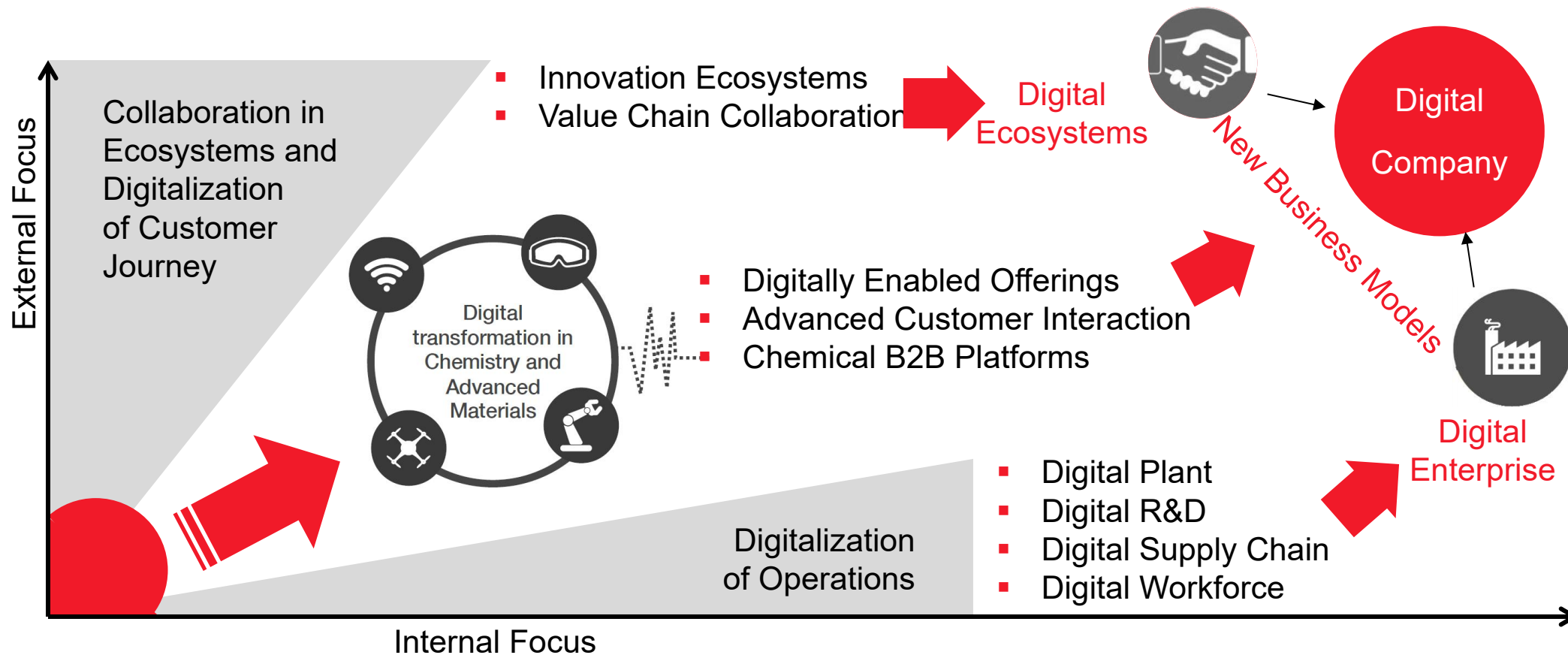


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Digitalization in the Chemical Industry



The journey to become a digital company in the chemical industry



Digitalization opens opportunities for improvements in the efficiency of processes and operating models, and to develop new business models

Transparency and digital processes



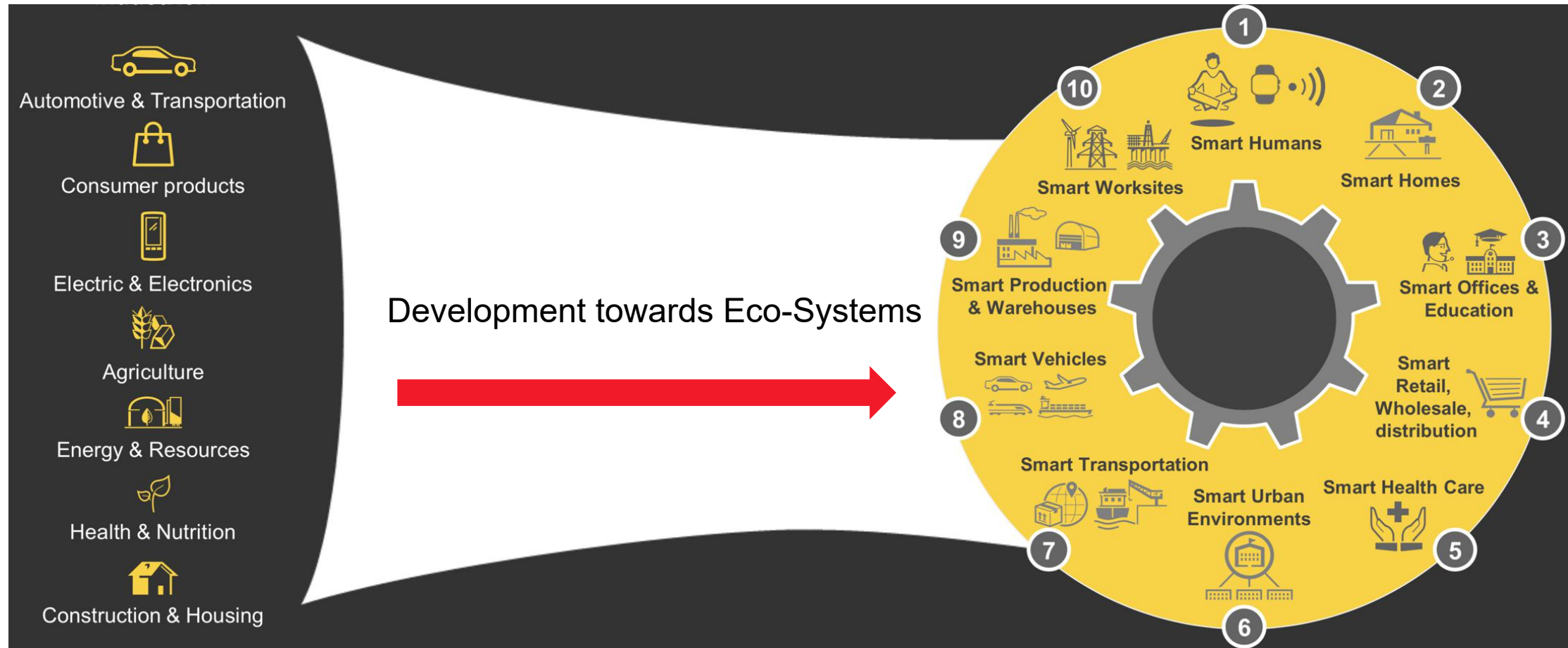
Data-based operating models



Digital business models

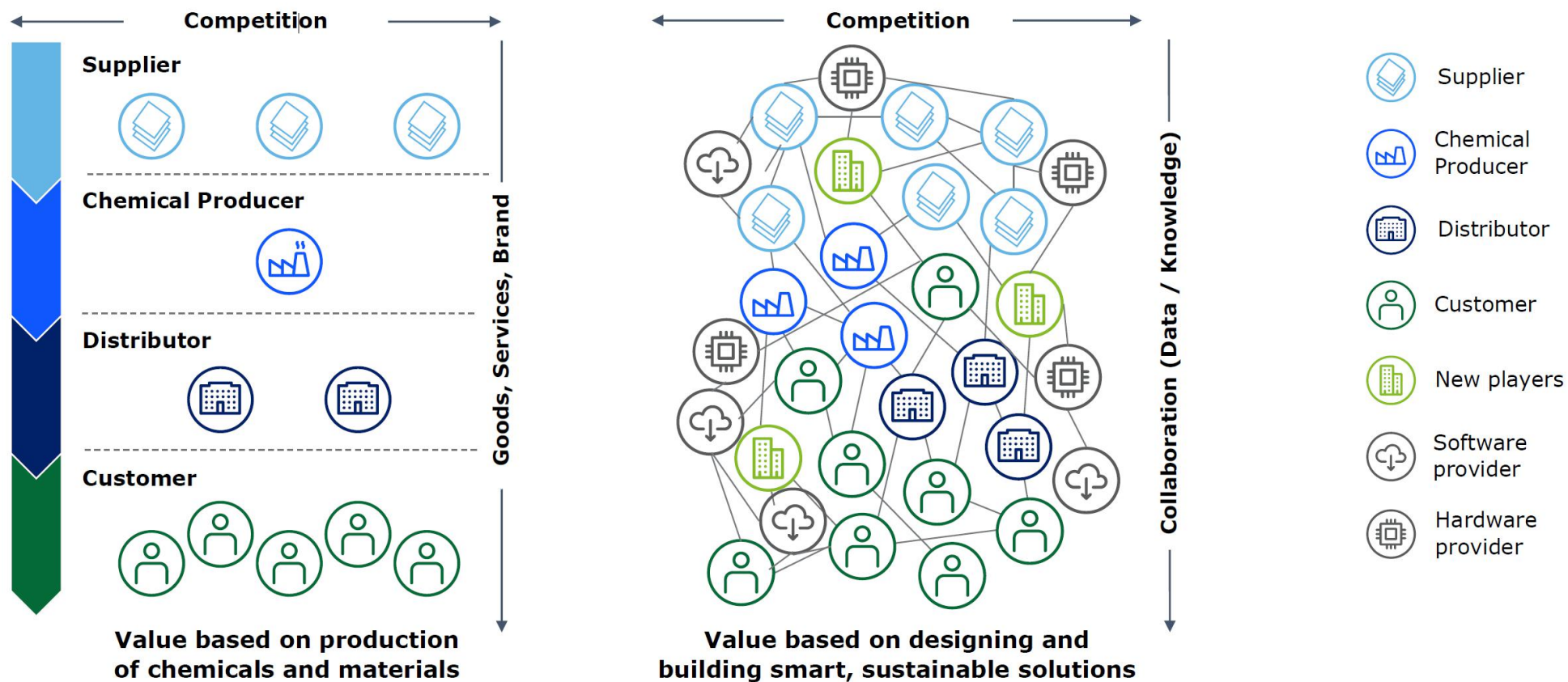


Digitalization blurs today's industrial borders towards customer-centric eco-systems

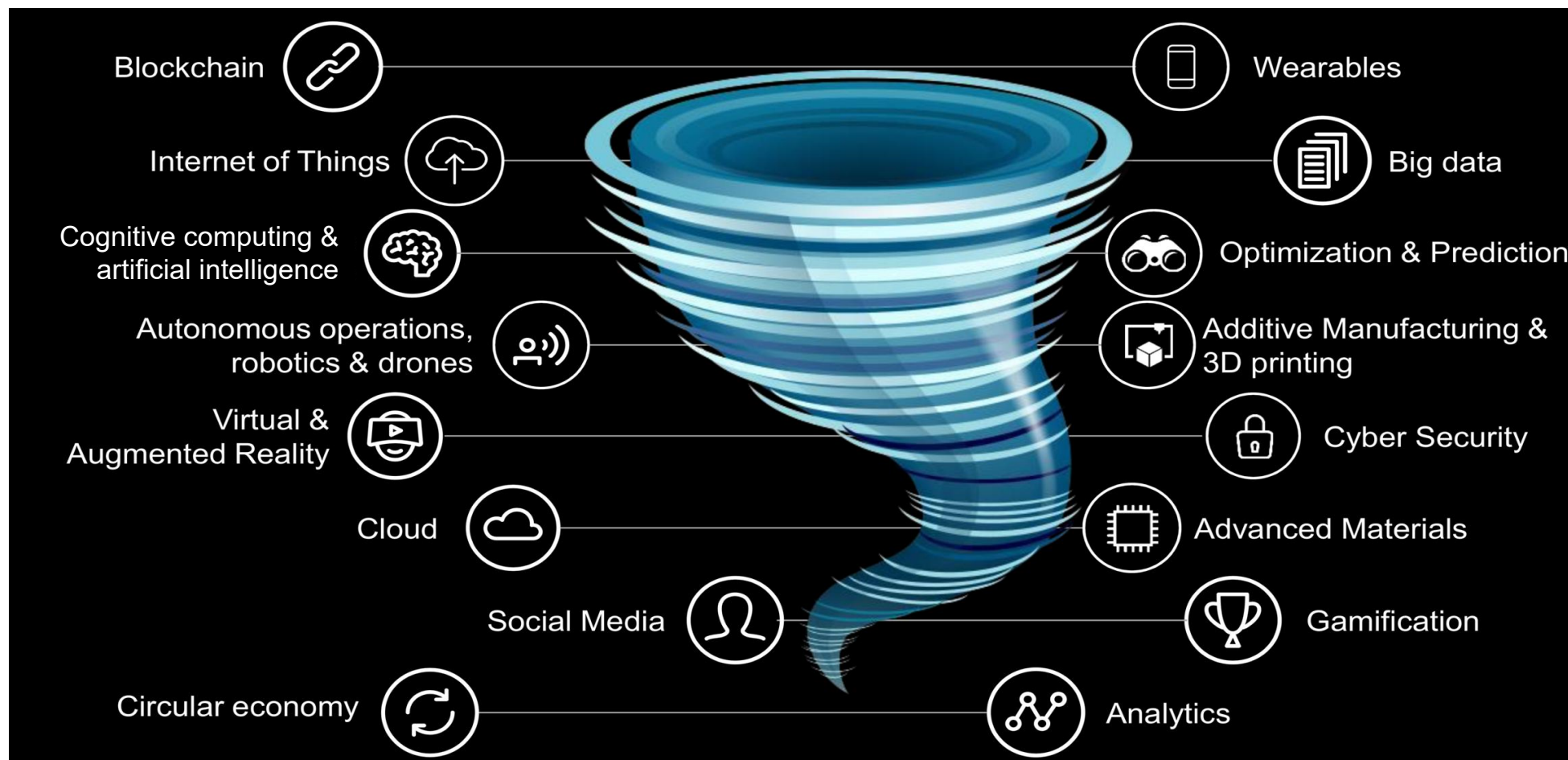


The consequence, but also the opportunity for the chemical industry: New non-linear business models

From linear economy to complex, often circular, ecosystems



Technologies enable new ways of working and of doing business



Digital trends will impact the chemical industry along the whole value chain

Key Digital Trends impacting the Chemical Industry

Digital Trends	R&D	Sourcing	Production	Sales and Service	Distribution
Internet of Things		Moderate Impact	Significant Impact		Moderate Impact
Big Data	Significant Impact	Significant Impact	Significant Impact	Significant Impact	Significant Impact
Advanced Robotics			Moderate Impact		Moderate Impact
Smart Plants	Moderate Impact	Moderate Impact	Significant Impact		Moderate Impact
Digital Engineering	Moderate Impact		Significant Impact	Moderate Impact	
3D-Printing 3D	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact
Mobile Apps	Moderate Impact	Moderate Impact	Moderate Impact	Significant Impact	Moderate Impact
Omnichannel				Significant Impact	Significant Impact

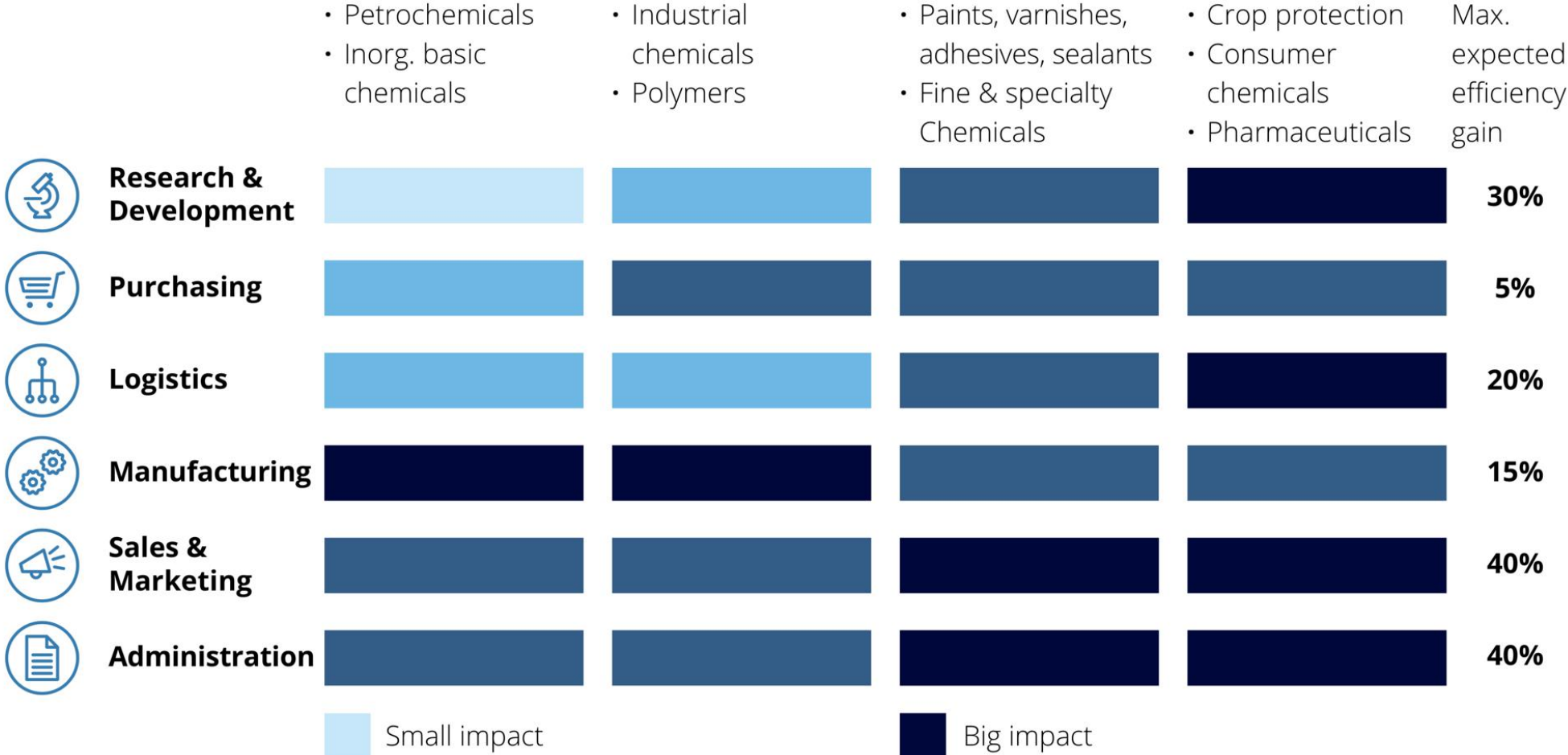


Significant Impact



Moderate Impact

Global chemical companies have to focus on the areas with big impact from Digitalization





THANK YOU

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