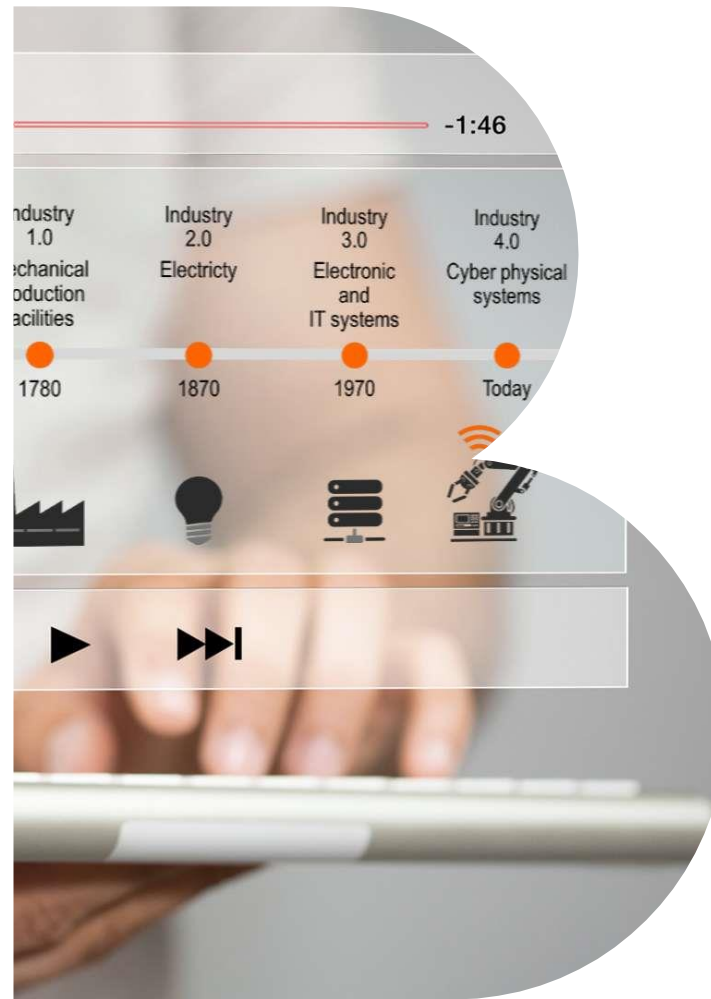


Industrie 4.0

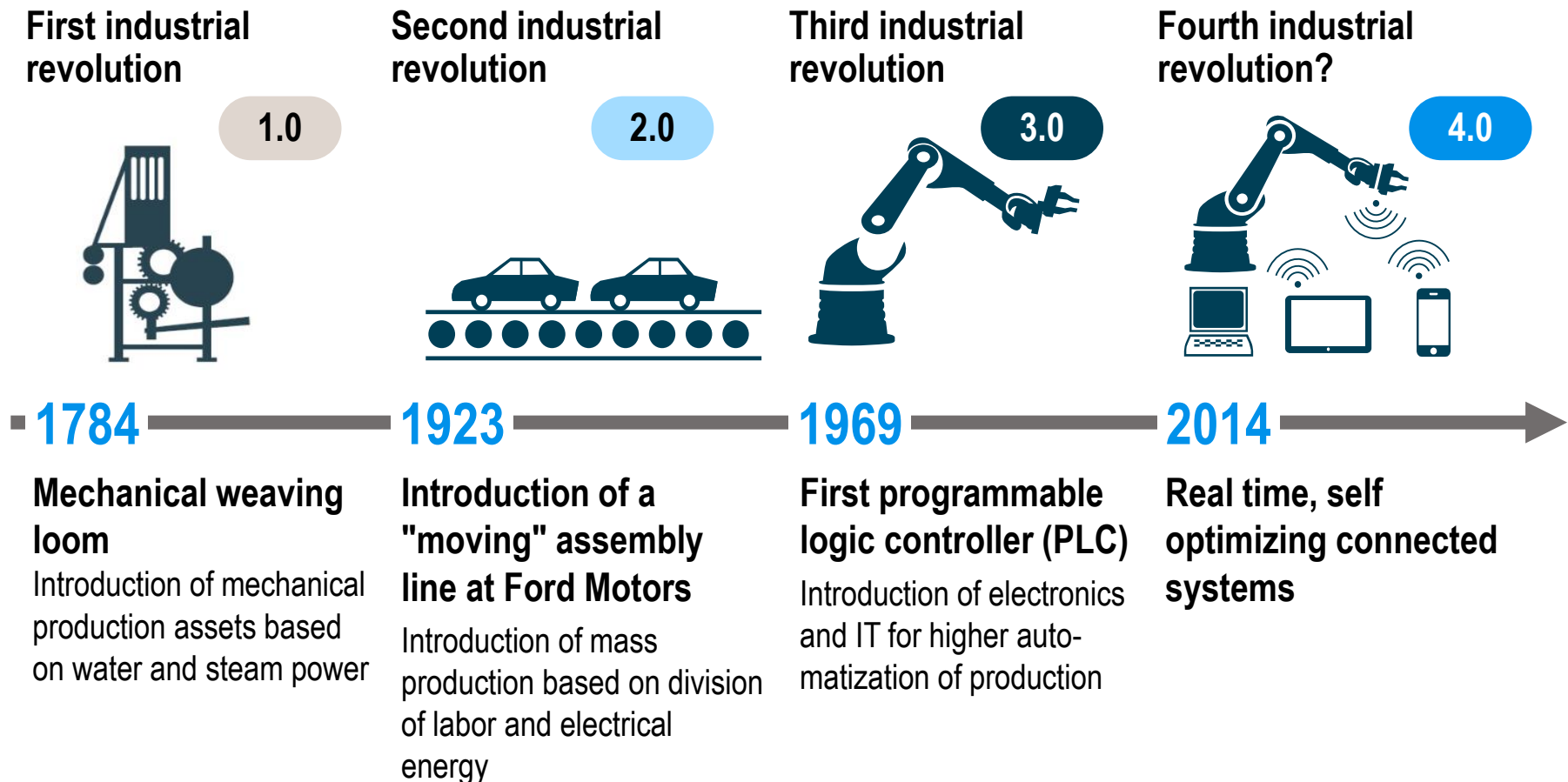
How it reshuffles the economic, social and industrial model

October 2017



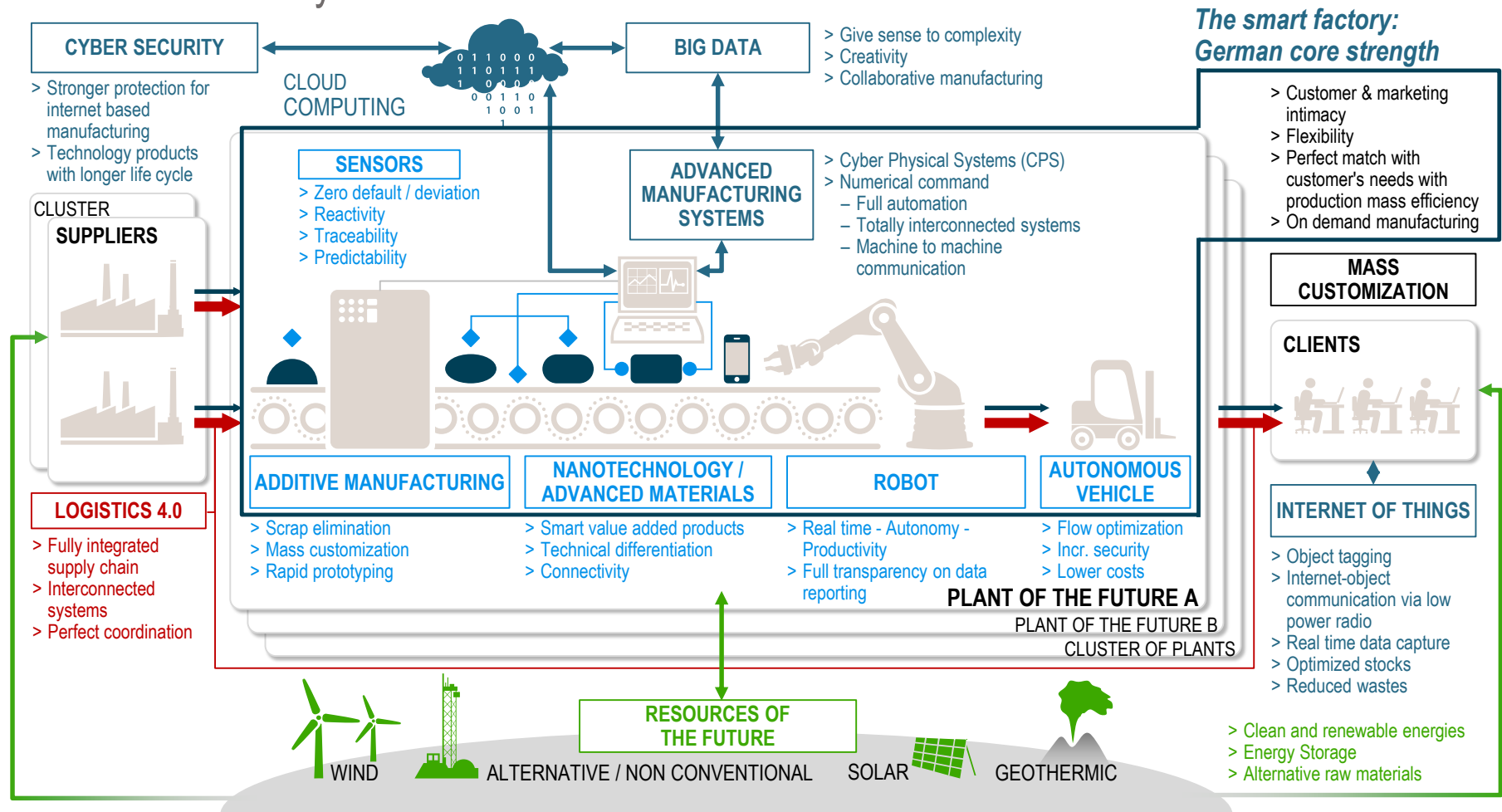
Industrie 4.0 is designating the 4th industrial revolution

Development stages of industrial manufacturing



Industrie 4.0 leverages new technologies across the entire value chain, from suppliers to customers

Industrie 4.0 ecosystem

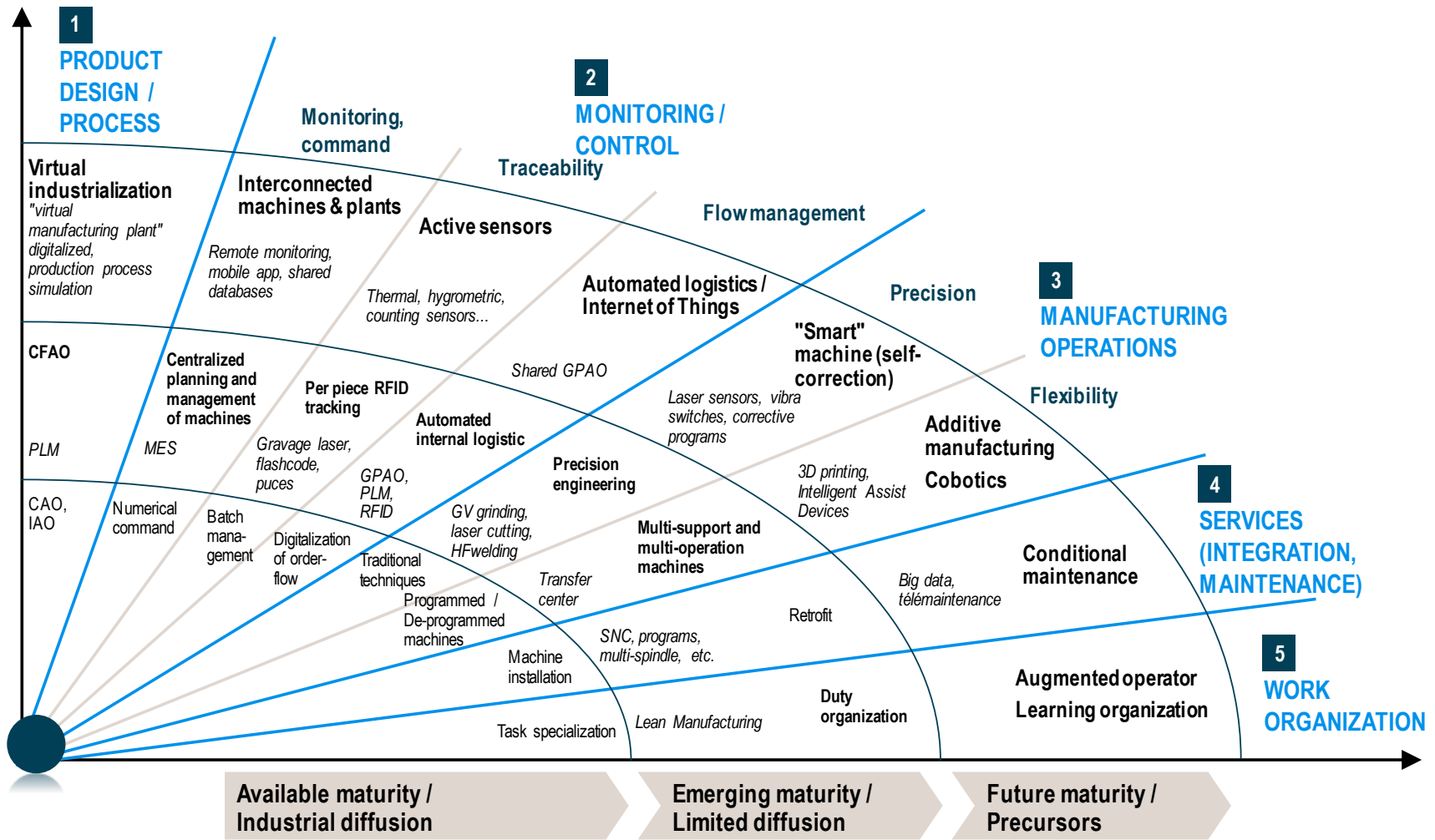


Industrie 4.0 is changing the paradigm of manufacturing strategy

Characteristics of new Industrie 4.0

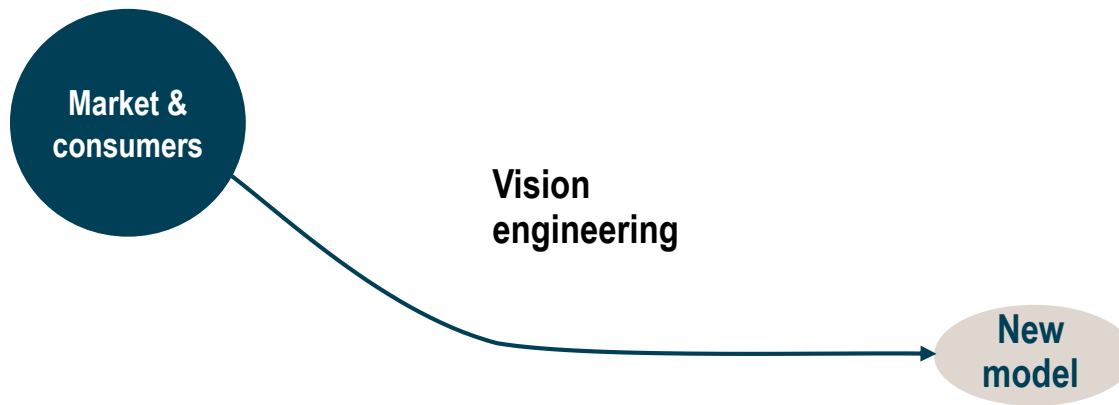
- | | |
|---|---|
| <p>1 FROM MASS PRODUCTION TO
MASS CUSTOMIZATION</p> | <p>Flexible production, short production lead time enabling new business models emergence and affordable customization</p> |
| <p>2 FROM VOLUME SCALE EFFECT TO
LOCALIZED & FLEXIBLE UNITS</p> | <p>From large factories specialized per product to smart factories with high technological equipment enabling to produce at competitive cost everywhere</p> |
| <p>3 FROM PLANNED MAKE TO STOCK TO
DYNAMIC MAKE TO ORDER</p> | <p>From an organized production, based on planning and forecast and supported by stocks, to dynamic production and yield management, on demand</p> |
| <p>4 FROM PRODUCT TO
USAGE</p> | <p>Integrated conception, services being a key element of the business model/decision factor</p> |
| <p>5 FROM COST DRIVEN TO
ROCE DRIVEN</p> | <p>Higher ROCE for lower capital employed</p> |
| <p>6 FROM TAYLORISM TO
FLEXIBLE WORK ORGANIZATION</p> | <p>Remote work (augmented reality, permanent connectivity), tasks parallelism, flexible organization and management</p> |
| <p>7 FROM HARD WORKING CONDITIONS TO
ATTRACTIVE WORK SPACE</p> | <p>Development of complex artisanal production, with clean/highly connected work space</p> |

Industrie 4.0 is the combination of a wide set of technologies that have gained attention and traction over the last few years



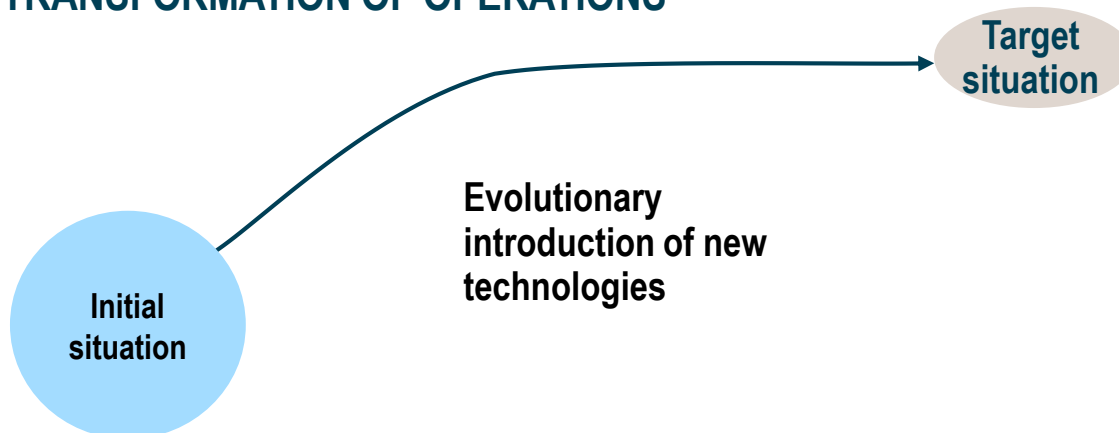
The Industrie 4.0 implementation path combines disruption with a transformation approach

NEW DISRUPTIVE OPERATIONAL MODEL



- > Mass-customization
- > Fast-fashion
- > Connected product
- > Small & flexible production unit close to customers
- > Time to market rupture

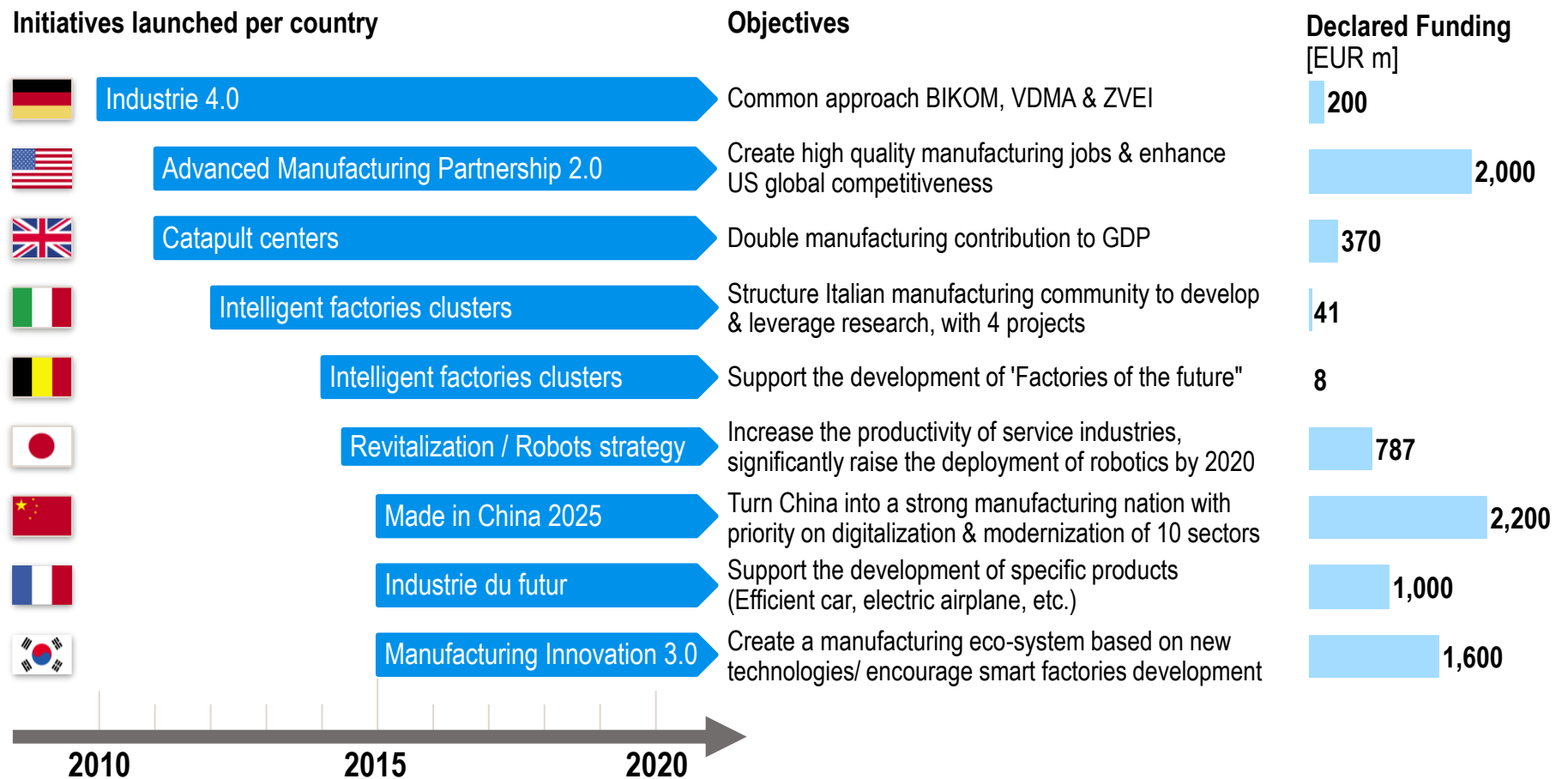
TRANSFORMATION OF OPERATIONS



- > Traceability / securitization
- > Rapid prototyping & 3D
- > Obsolescence / scrap / yield
- > Plant of the future (automation, smart machines, IoT, Cobots, ...)
- > Predictive maintenance

All countries have launched Industrie 4.0 initiatives, Germany and US first, followed by China, Japan and rest of Europe

Worldwide initiatives & related investments announced



Industrie 4.0 solutions interlink the physical and cyber world to "cyber-physical systems"

Examples

Physical world

- > Robotics
- > Automation equipment

- > Traditional machinery
- > Traditional & semiconductor based sensors

- > Traditional machinery
- > RFID
- > Automation equipment

- > Camera & imaging systems
- > Visual sensors
- > Traditional sensors



Cyber world

- > Advanced algorithms
- > Machine learning
- > High-performance hardware

- > Advanced data analytics
- > Database mgmt. systems
- > Cloud computing

- > Embedded systems
- > Real-time image processing (e.g. OCR)
- > Data storage hardware

- > Real-time image processing
- > Advanced data analytics
- > Advanced algorithms



Industry 4.0 solutions

Self-learning robots



Predictive maintenance



Self-reconfiguring machines



Smart environment recognition







Characteristics

- > **Connectivity** as the key factor is linking both worlds in each solution
- > Only **solutions** which **combine both elements** can succeed
- > The **degree of both worlds** will **vary significantly** in each solution

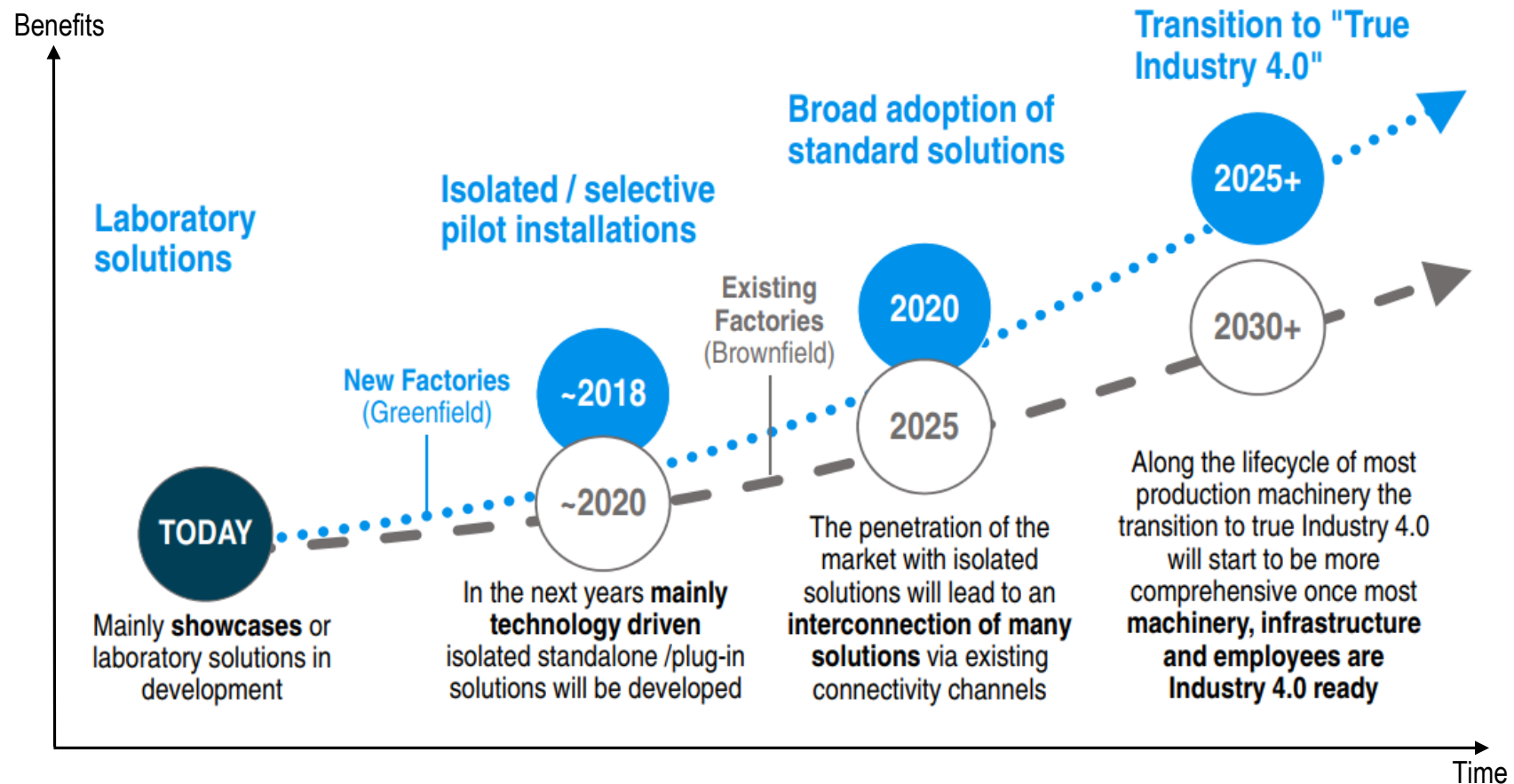
Getting prepared for Industrie 4.0 requires addressing key challenges

Risks / Challenges Industrie 4.0

	COMPETENCES DEVELOPMENT	New competencies emerging : data scientist, developers, data managers, etc. Education of people at all level
	LABOR FLEXIBILITY	Flexible labor environment Entrepreneurial contract
	SKILL EVOLUTION	New qualification of tasks (new tools and methodologies) Evolution of jobs : less repetitive tasks, more client oriented tasks
	CYBER SECURITY	Ensure protection of data and technologies
	LEGAL & STANDARDS ENVIRONMENT	Create standards/ norms to support disruption Develop common infrastructure

The future benefits of Industrie 4.0 are likely to arrive sooner and to be more significant for Greenfield operations

Industry wide transition is not expected before 2025



Roland
Berger

