smartFactory KL®
www.smartfactory-kl.de

Industry 4.0

The vision for advanced manufacturing

सत्यमेव जयते

Ubiquitous Information Availability

Our life is deeply affected by many new technologies which have reached a sufficient level of maturity!

WLAN, Bluetooth, UMTS…

SmartPhones, PDA´s, SubNotebooks…

Speech interaction, gesture control…

From telephone to VoIP…

The Internet of Things…

Information will be available
anywhere, anytime, with any content, for any user using any device and any access

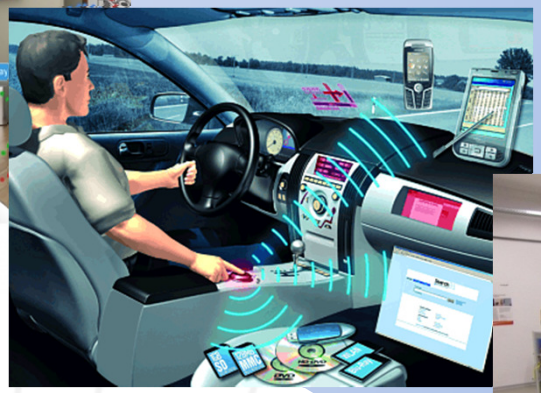
The factory
of tomorrow will be smart

Everything gets smart

Smart phones

Smart Homes

Smart Cars

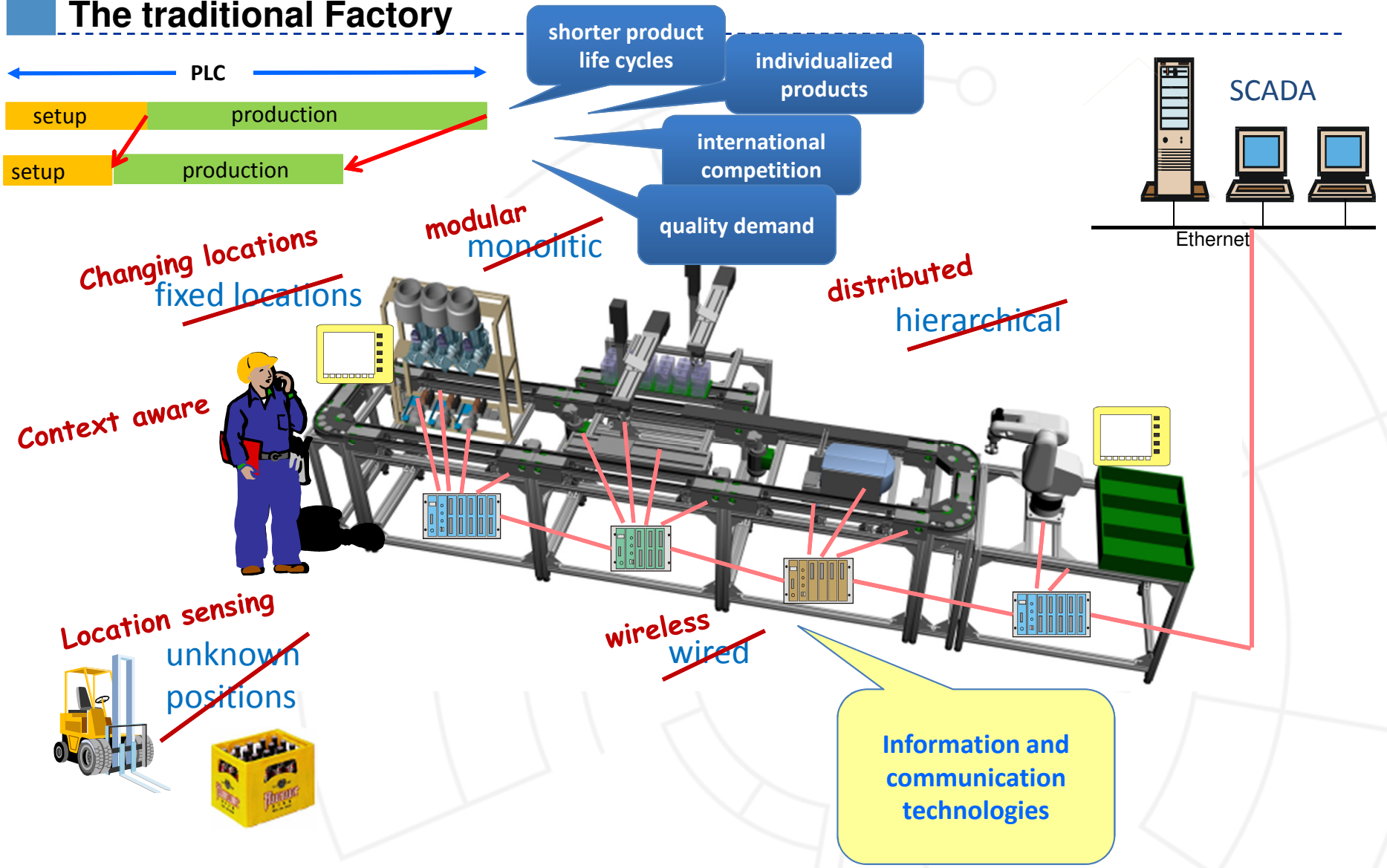


Smart Factories

Market Pull

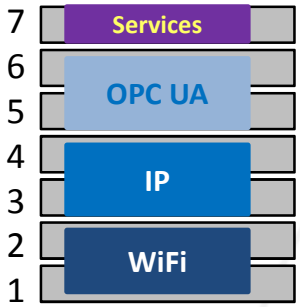
Technology Push

The traditional Factory



Future Products must…

…have a standardized network interface

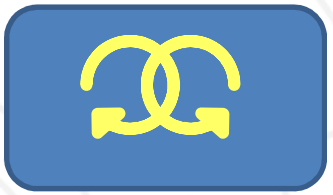


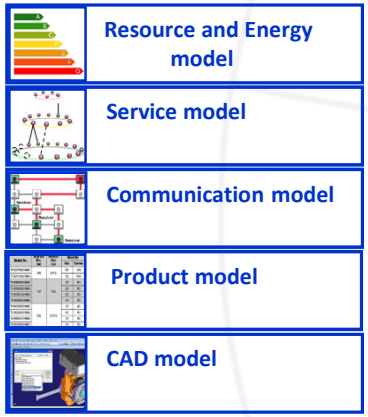
…have a unique identity and memory (by birth)

IP_{V6} [2001:0db8:85a3:08d3:1319:8a2e:0370:7344]

…be treated as abstract objects

…offer autonomy

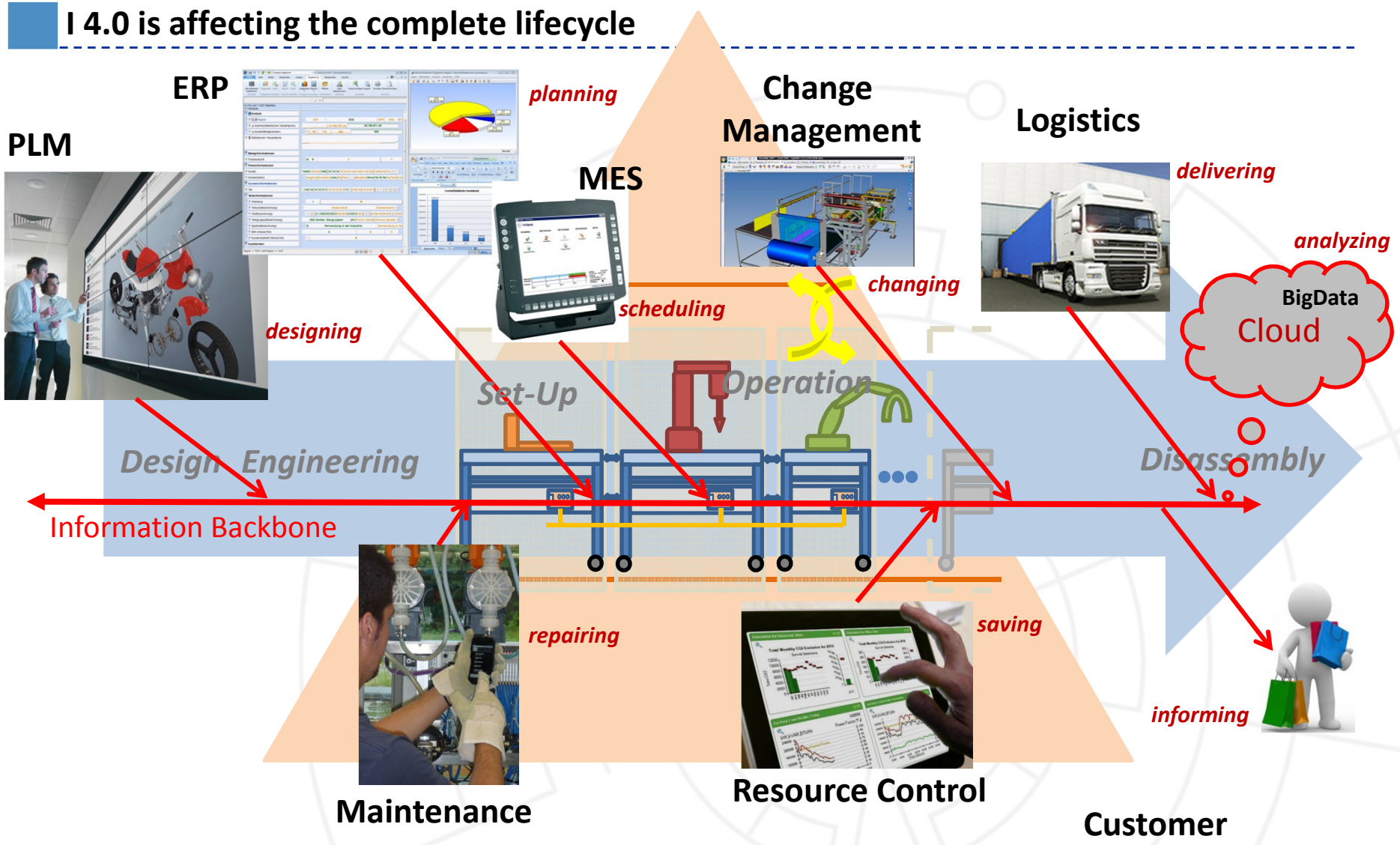




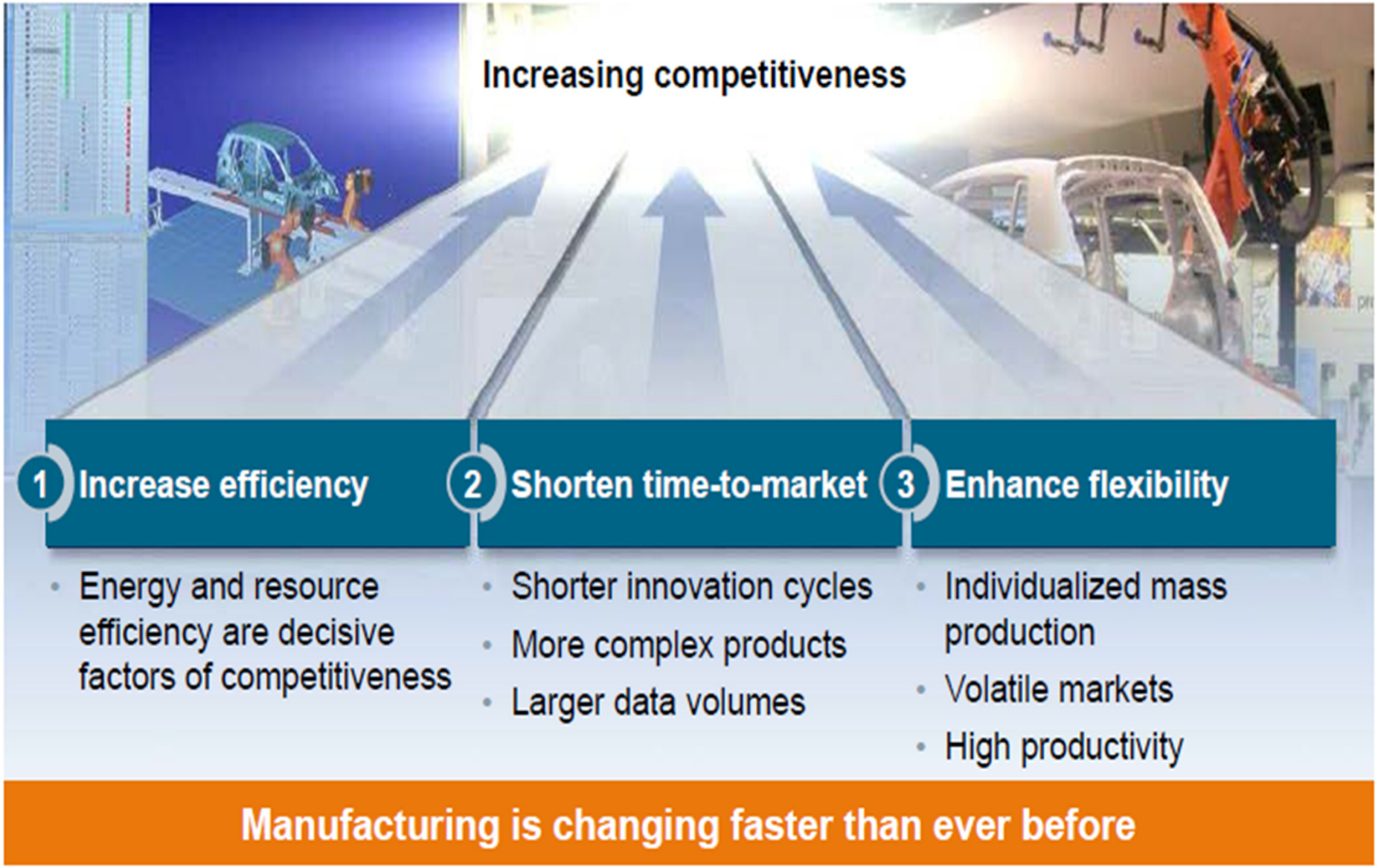
…be described by models

…be locatable at all times

I 4.0 is affecting the complete lifecycle



Challenges for industry are growing worldwide



Industrie 4.0

The 4th industrial revolution…

…or just another Hype?

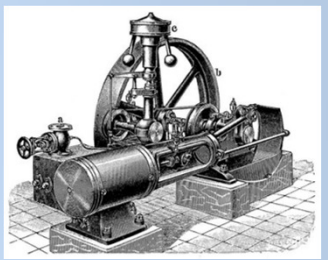
Industry 4.0 is smart devices turning into smart products turning into smart factories.

The 4th Industrial Revolution - *„Industry 4.0“*

Drivers
Quality of life
Engineering Sciences

1st

steam engine



GB

1782

Power generation
Mechanical automation

Mobility

2nd

conveyor belt

US

1913

Industrialization

µelectronics

3rd

Computer, NC,PLC

US/EU

1954

Electronic
Automation

ICT

4th

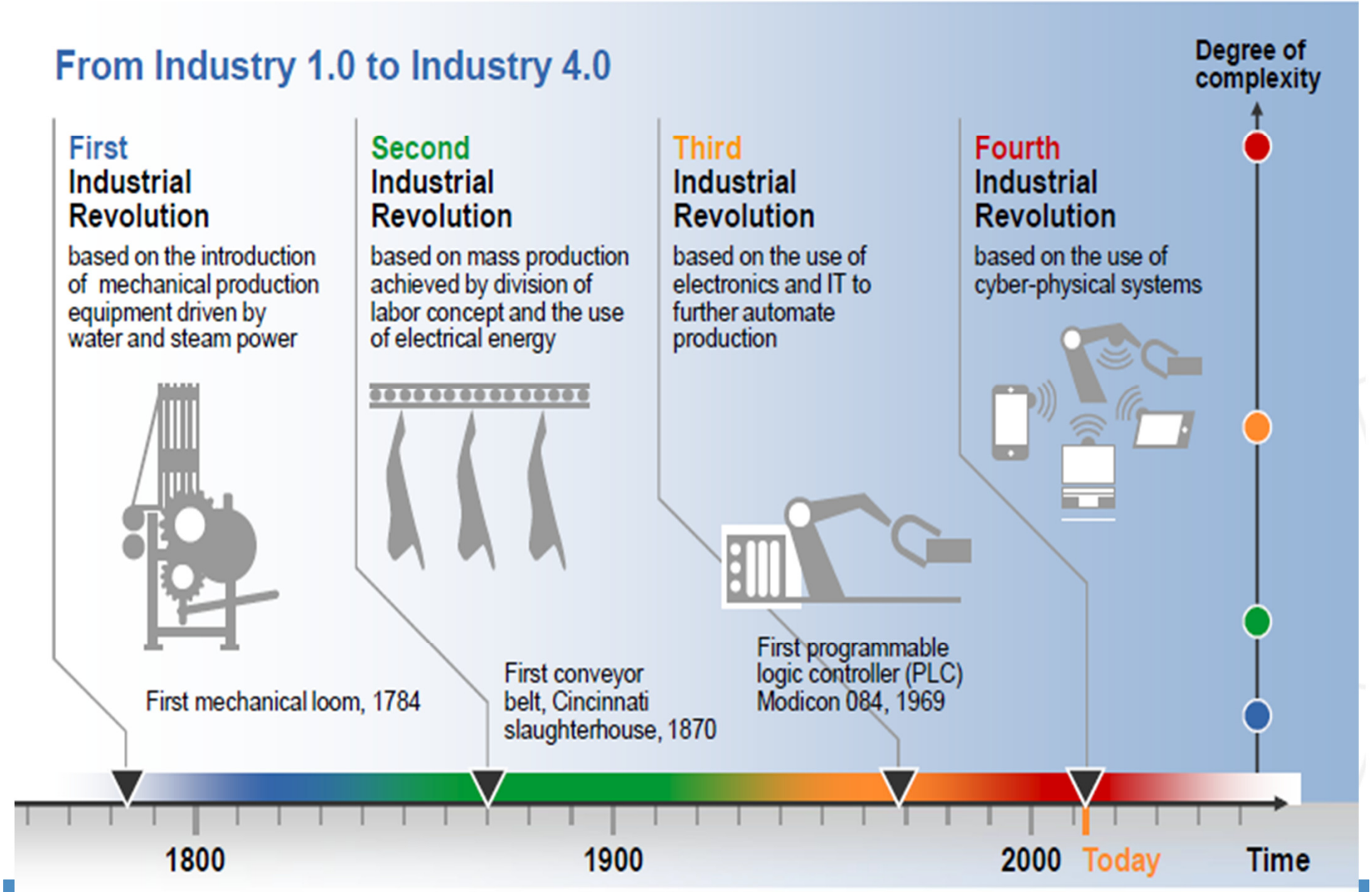
Cyber Physical Systems

EU

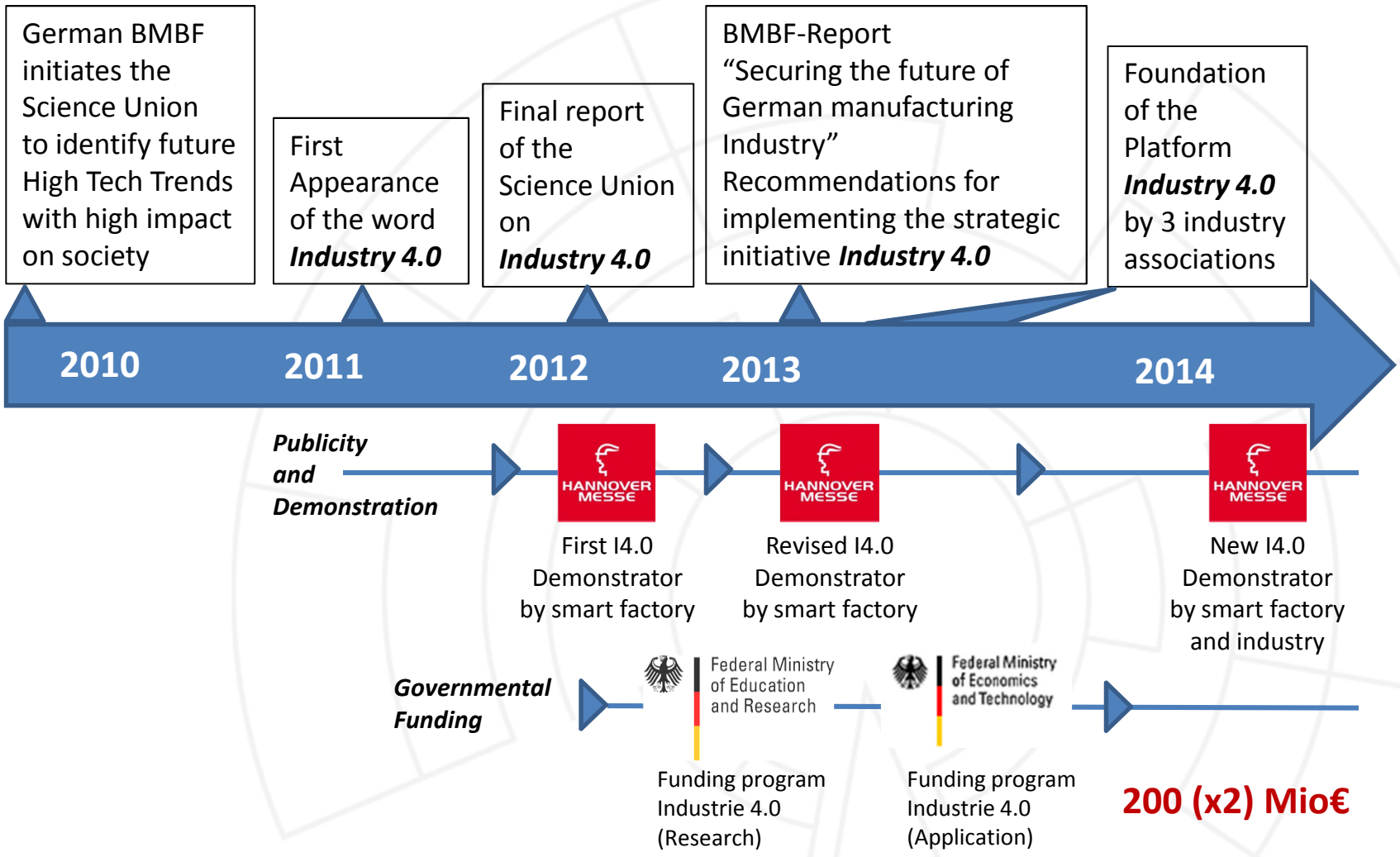
2015

Smart
Automation

The evolution to Industry 4.0 in production



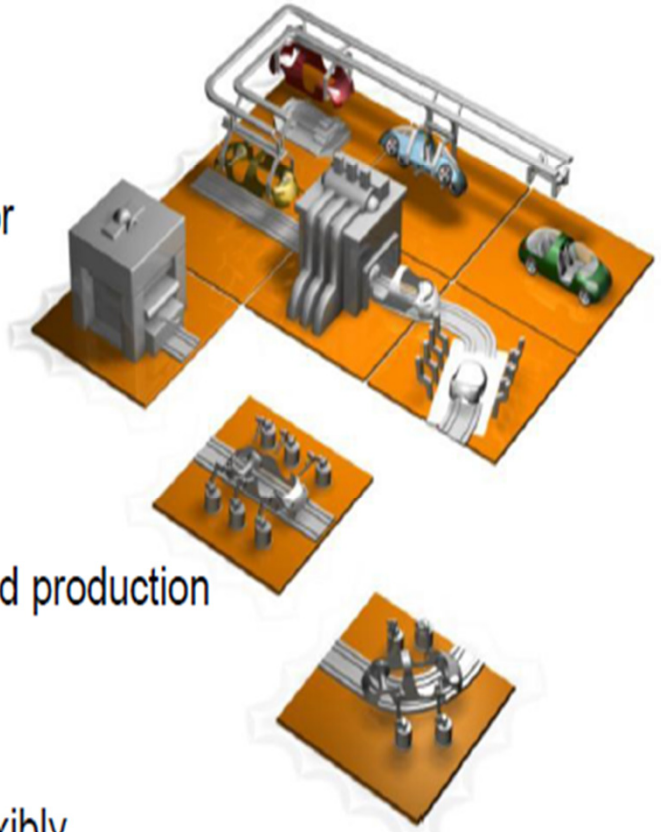
History Industrie 4.0



Digitalization creates new, efficient, fast and flexible networks

"Smart" products

- The product to be manufactured has all the necessary information for every step of its production.



Autonomous production facilities

- Optimized organization of networked production facilities taking into account the entire value chain
- Production steps are configured flexibly in response to changing situations

Reduction of complexity due to "smarter" structures.

Development phases	
1.0	Mechanical manufacturing and infrastructure
2.0	Mass production Semi-automated infrastructure
3.0	Electronics, PLCs, IT Intelligent infrastructure
4.0	Cyber-physical systems Fully integrated infrastructure

Why should India invest in this Program ?

India today is in a leading position in production of goods
as well as the production of equipment

We must stay ahead

The world market is undergoing rapid changes
Labor cost, quality demand, individualized products,
shorter product life cycles

We need smart solutions

India must keep production in India
or even get production back from low-cost countries

It´s essential for our economy

Manufacturers will be faced with key decisions on how they plan to compete in this new marketplace that favors competing on value over competing on price.

Benefits from Industry 4.0 for the Indian economy

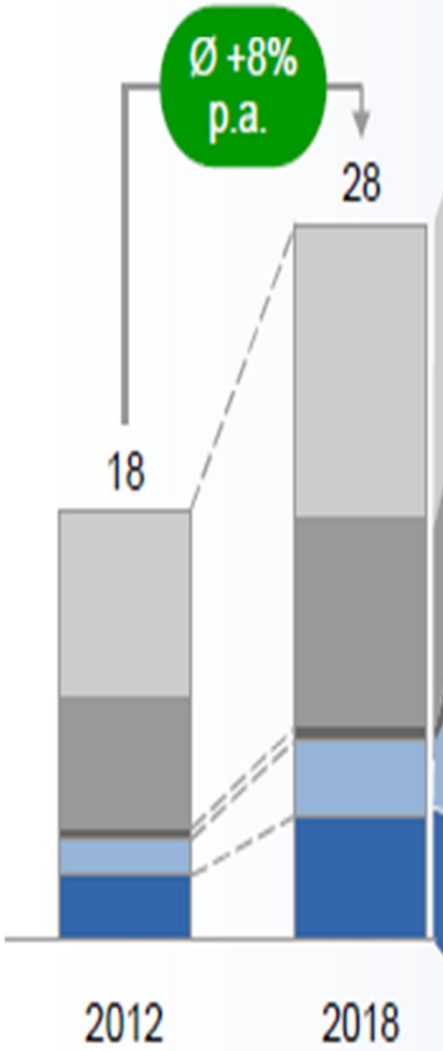
- Helps keeping production in India
- Helps Indian companies to compete successfully
- Brings leadership on world markets
- Needs skilled workers and gives employment
- Speeds up the production setup process
- A knowledge-based high-tech approach
- Reduces complexity

But…

- Needs a long term commitment
- Is a major upheaval and not a smooth change
- Is not a single industry solution but has widespread impact
- Needs new skills
- Needs interdisciplinary collaboration
- Is closely linked to *Cloud* and *Big Data*

The market for industrial IT and software is expanding by about 8% each year

Billion EUR



- CAx

- Collaborative Product Data Management

- Digital Manufacturing

- 2D-3D process design and engineering analysis tools

- Manufacturing Execution Systems
- Command and Control

Industry software for

Design and virtual production (PLM Software)

Real production

Industrie 4.0 will move the manifacturing industry towards a service business model.

Large german car manufacturers generate more than 50 percent of revenue from aftersales

Trend towards service

In Manufaturing there are two sucessful strategies, be the price leader or the quality leader.

Manufacturing Business Model is limited

Industrie 4.0 is the enabler for the transformation from a manufacturing to a service business model

Apple did the transformation:

What do Bosch, BMW or Gillette need to do this?

?

Industry 4.0

not just words but actions….

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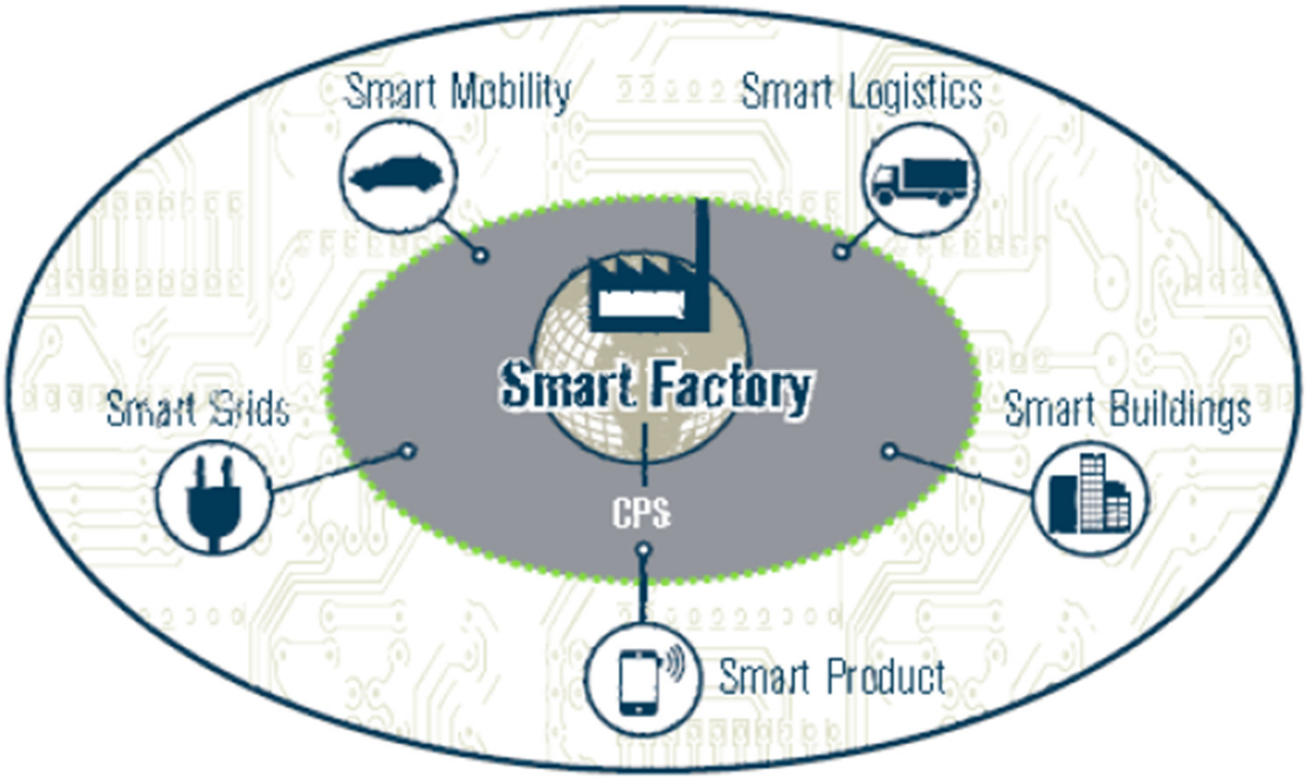
Industry 4.0 Smart Factory: Designed to sustainable and service-oriented business

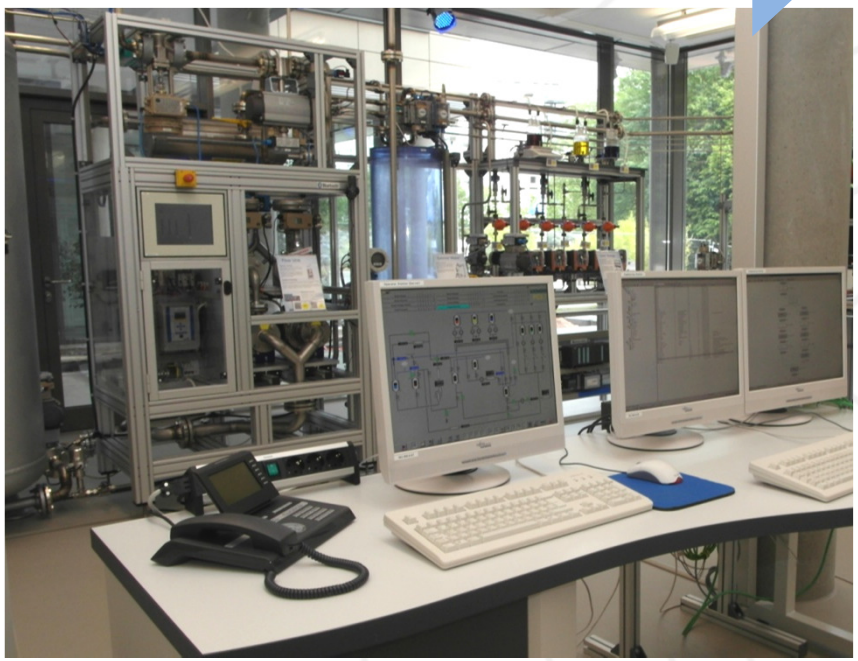
Smart factory are characterized by cyber-physical systems; providing significant real-time quality, time, resource, and cost advantages in comparison with classic production systems. Intelligent operations are through the self-optimization, self-configuration, Self-diagnosis, cognition and intelligent support of workers



View into the Smartfactory

continuous flow process

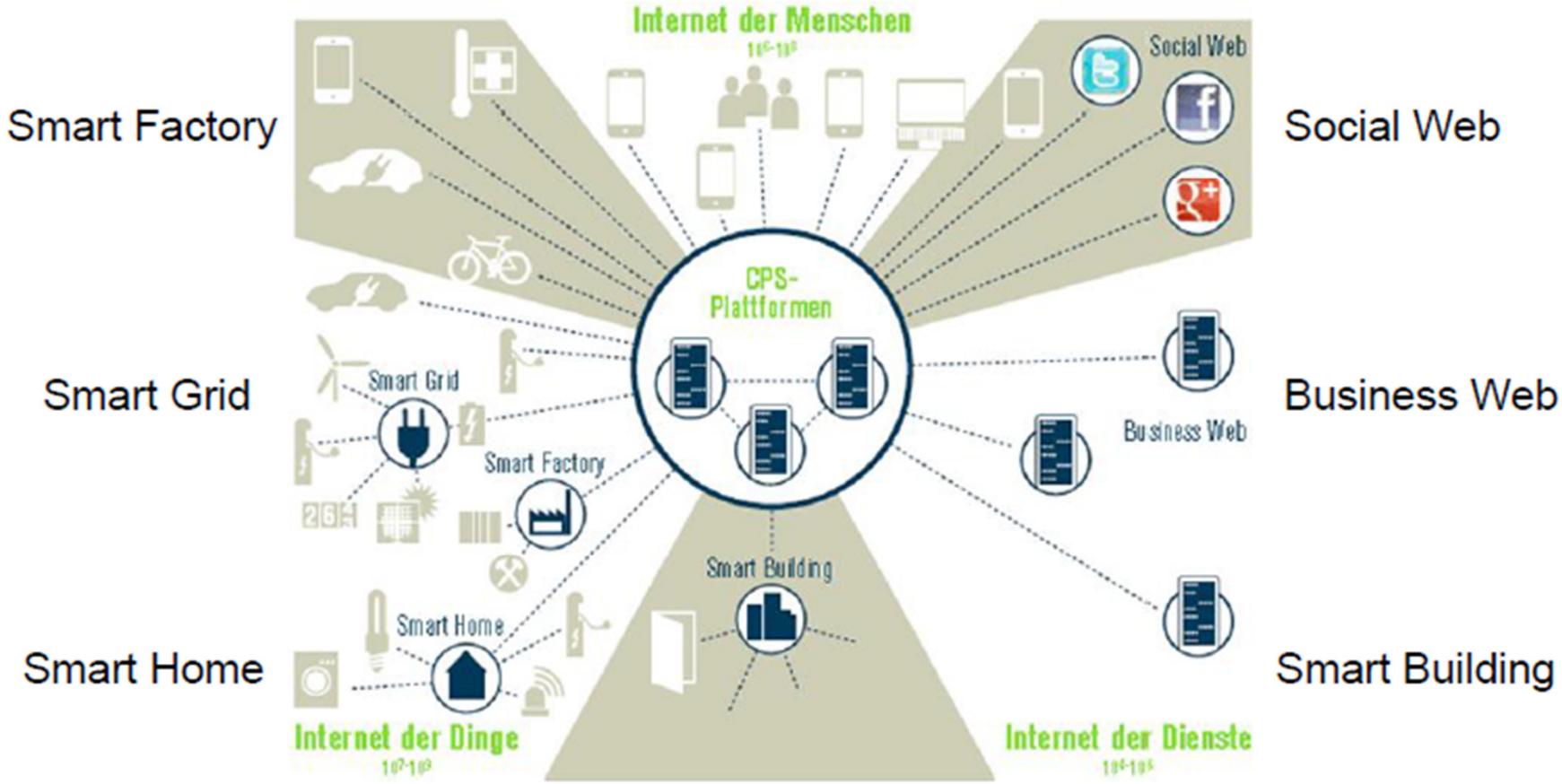
colored soap production



discrete handling process

bottling, handling, labeling, QC, packaging…

Opportunities of Industry 4.0: Based on cyber-physical systems and the Internet of Things



The ultimate goal of industry 4.0 is to establish a system with adaptability, resource efficiency and ergonomics as well as the integration of customers and supply chain partners in business and value processes. Technological basis are cyber-physical systems and the Internet of Things.

View into the Smartfactory

assembly process
Key finder production

augmented reality
Information, maintenance and control

What is Smart Manufacturing?

A future vision

Smart Manufacturing is:

…the integration of data…

…with process expertise…

…to enable “evidence based” management…

…of manufacturing.

The six elements that make “Smart Factories”

(1)Flexible manufacturing,
(2)Automation,
(3)Robotics,
(4)Computer- aided design and computer-aided manufacturing (CAD/CAM),
(5)Concurrent engineering, and
(6)Computer-integrated manufacturing.

Concurrent Engineering

Flexible Manufacturing

A flexible manufacturing system is a manufacturing system that can produce a variety of products on a single production assembly line.
The typical flexible manufacturing system has three components:
1. Several workstations and a computer that controls their operations;
2. A computer-controlled transport system that moves materials from one machine to another and in and out of the system;
3. Loading and unloading stations.

Computer-integrated Manufacturing

If there's one thing that sets the smart factory apart, it is computer-integrated manufacturing.

Computer-integrated manufacturing is a system that uses computers to control all phases of the manufacturing process and to coordinate manufacturing with ordering and shipping.

This type of manufacturing has become more important as firms have discovered that robots and automation aren't enough.

Barriers and Enablers

Barriers:

- incorporating and integrating customer intelligence and demand dynamics...
- the need for greater affordability...
- operator usability...
- protection of proprietary [company] data...
- systems interoperability...
- and security.

Enablers:

- In-house integration of business and manufacturing systems
- Smart tooling and factory floor systems (CNC/PLC, AIDC)
- Real time reporting and analysis: Business Information Management
- Smart resource metering / “the smart grid”
- Adding sensors and data gathering points (Raspberry Pi and Gadgeteer etc.)
- Dynamic modelling of supply chains/networks, dynamic planning and scheduling across SME/OEM supply chain networks
- Secure data exchange

Outcomes

- Ability to ***meet customer data demands*** (openness, visibility, traceability)
- Ability to participate in ***smart supply chain networks***
- Ability to ***model and optimise processes*** in company and across supply chains / networks (including resource use and energy use management)
- Ability to ***anticipate and schedule maintenance*** ("improved asset management")
- Improved use of ***automated monitoring*** (reduce abnormal and catastrophic events)
- Ability to ***improve safety*** monitoring and performance
- Ability to ***improve competitiveness*** through efficiency, optimisation and agility
- Manage through dashboard performance tools – **real time reporting of key performance indicators**, dynamic monitoring, dynamic visualization of critical data, like a car dashboard (including energy & resource management)

Any
Questions
?

Arigato
Mahalo
Grazie
Spasiba
THANK
YOU
Thoinks
Moite
Gracias
Merci
Danke
Shukran