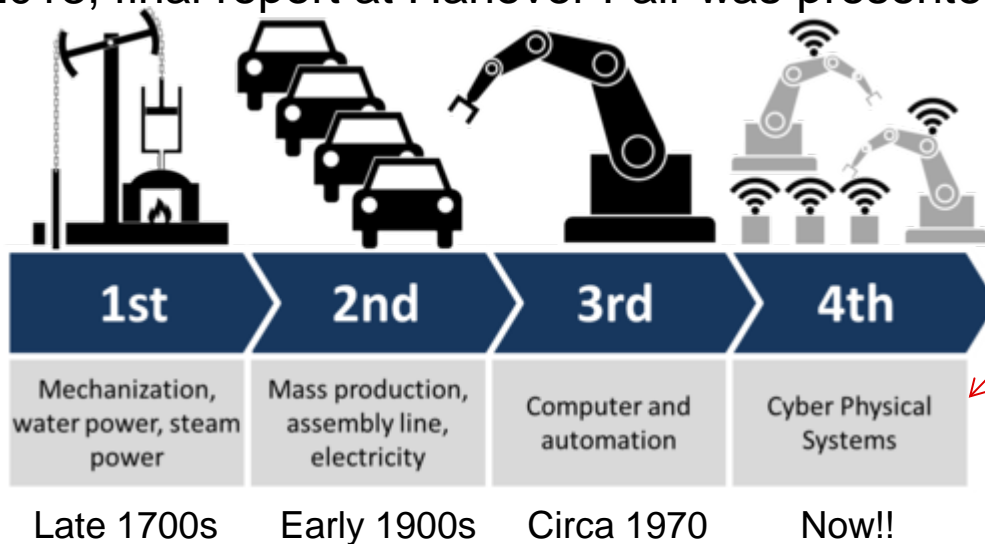


# Industry 4.0 Requirements

# Industry 4.0 background

- “Industrie 4.0” first used at 2011 Hanover Fair (Hannover Messe).
- In October 2012, working group presented recommendations to German government.
- April 2013, final report at Hanover Fair was presented.



Real-time  
Networked  
Analytics/sensors  
Autonomous decisions  
Increased efficiency

# Industry 4.0 design principles

- Interoperability

The ability of machines, devices, sensors, and people to **connect and communicate** with each other via the Internet of Things (IoT) or the Internet of People (IoP).

- Information transparency

The ability of information systems to create a virtual copy of the physical world by enriching digital plant models with sensor data. This requires the **aggregation of raw sensor data to higher-value context information**.

- Technical assistance

- First, the ability of assistance systems to support humans by aggregating and visualizing information comprehensibly for **making informed decisions and solving urgent problems on short notice**.
- Second, the ability of Cyber-Physical Systems (CPS) to physically support humans by conducting a range of tasks that are unpleasant, too exhausting, or **unsafe for their human co-workers**.  
NOTE: CPS are systems that integrate computation, networking, and physical processes.

- Decentralized decisions

The ability of CPS to **make decisions on their own** and to perform their tasks as autonomously as possible. In case of exceptions, interferences, or conflicting goals, tasks are delegated to a higher level.

# 4th Industrial Revolution (Industry 4.0)

... the next 'era' of the industrial modernization continuum

## Industry 4.0 describes:

- Real-time communication of manufacturing and value creation chain
- Intelligent, horizontal, and vertical networked systems
- Factories that adapt dynamically to variations in the supply chain
- Produced goods that define their own individual features
- Eurocentric initiatives

# Industrial Revolution in other parts of the world



## Smart Manufacturing Leadership Coalition (SMLC)

Based in the U.S., SMLC is an open smart manufacturing platform and marketplace that enables manufacturing companies of all sizes to gain easy, affordable access to modeling and analytical technologies that can be tailored to meet cross-industry business-case objectives without having to retrofit existing systems.



## Made in China 2025

- Chinese government strategy to reduce operating costs, boost efficiency, and encourage innovation in the manufacturing sector, while promoting intelligent manufacturing process to realize machine-optimized decisions using data management techniques
- Chinese factories still catching up with Industry 2.0 and 3.0, providing an opportunity to go directly to Industry 4.0



## Industrial Value Chain Initiative in Japan

Forum to combine manufacturing and information technologies

# What is the goal of all this?

Leverage global capabilities by use of internet and complex data management

Better link into enterprise and B2B systems

Improved traceability of resources and products

Smart processing and decision-making locally at the edge  
while keeping a full view in the cloud

Higher flexibility and adaptability in the production line  
=> Faster reconfiguration and addressing small lots

Higher product quality

Improved maintenance and reduced down time

Higher safety and security

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Improved  
Communications

Improved  
Reliability/Safety  
and  
Security



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