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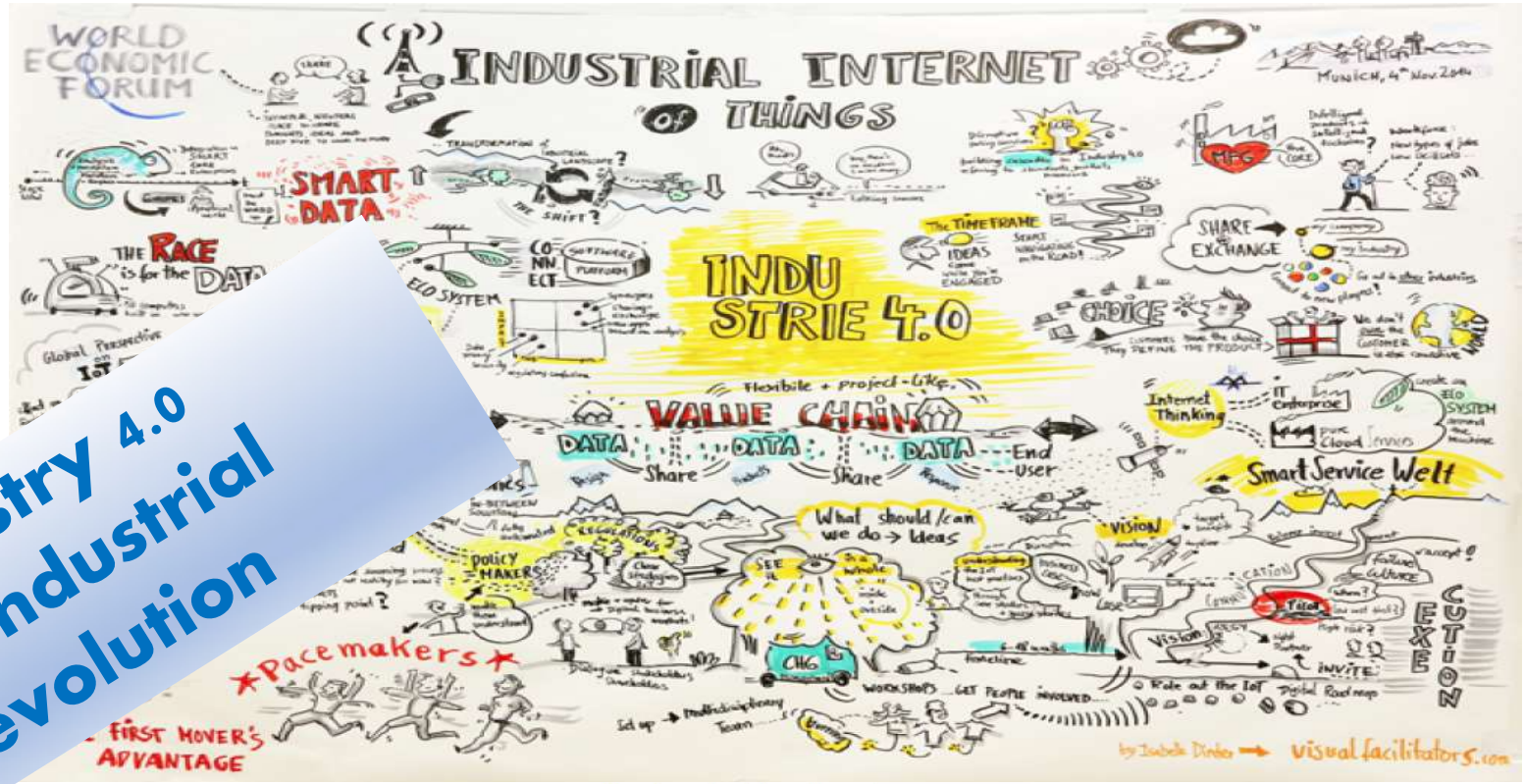
Cyber-Physical Industrial Systems

Module 1 Session 1

Introduction – concept of CPS, basics, model

Lecture

Introduction to Industry 4.0



Industry 4.0
4th Industrial Revolution

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Introduction to Industry 4.0

Industrial Revolution
1760 – 1840

Using water and steam energy

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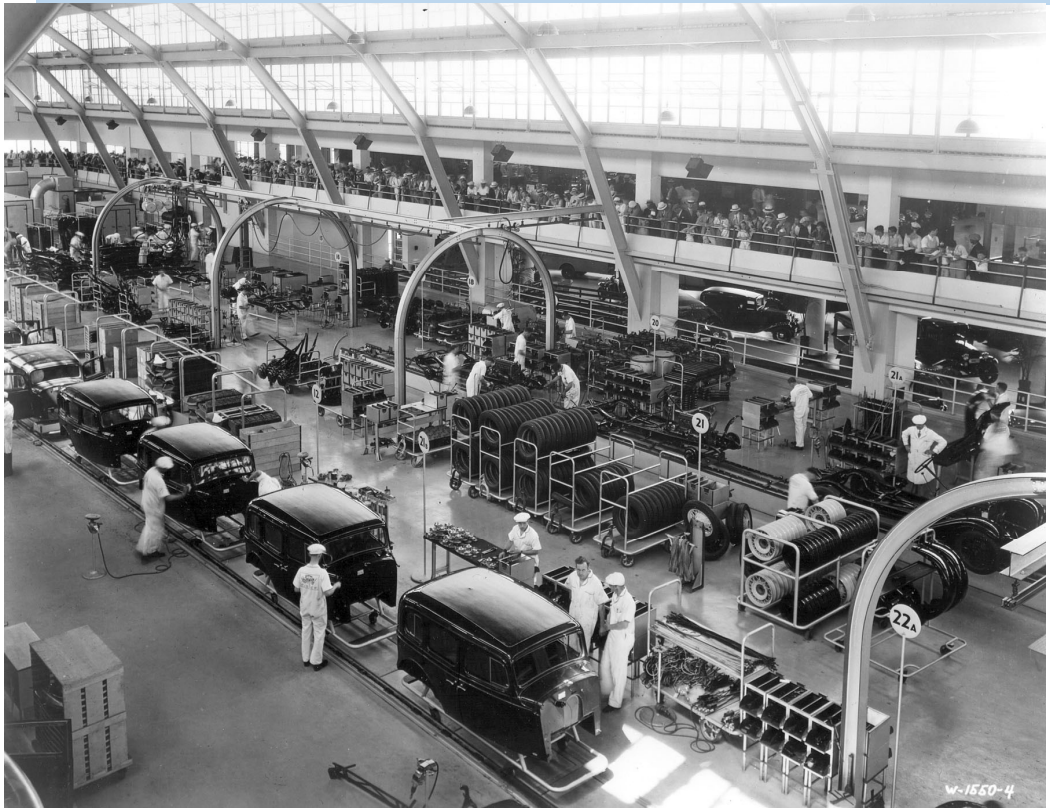

Technical Revolution
1870 – 1920

Electric power
Line production
Mass production

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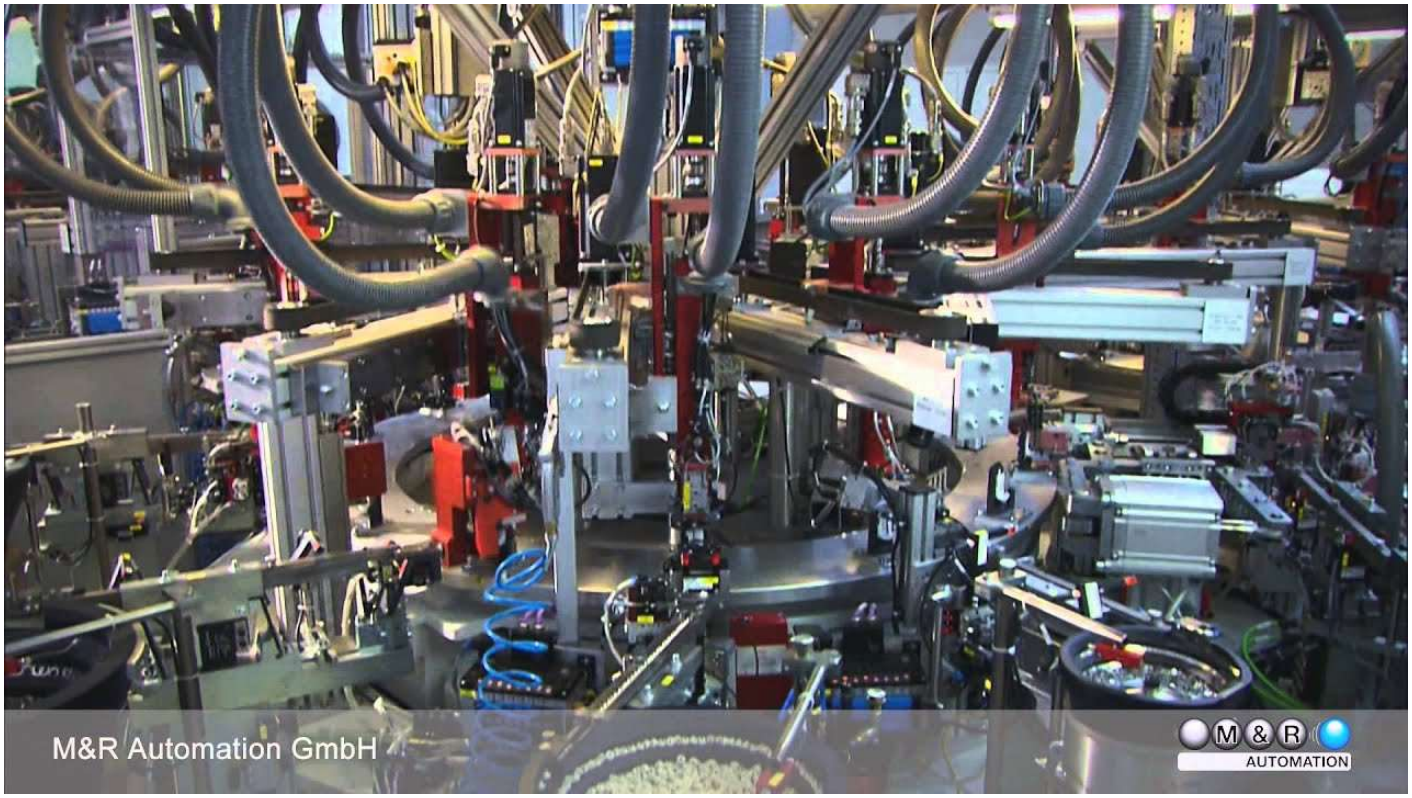

Digital Revolution
1975 – present

Computer control

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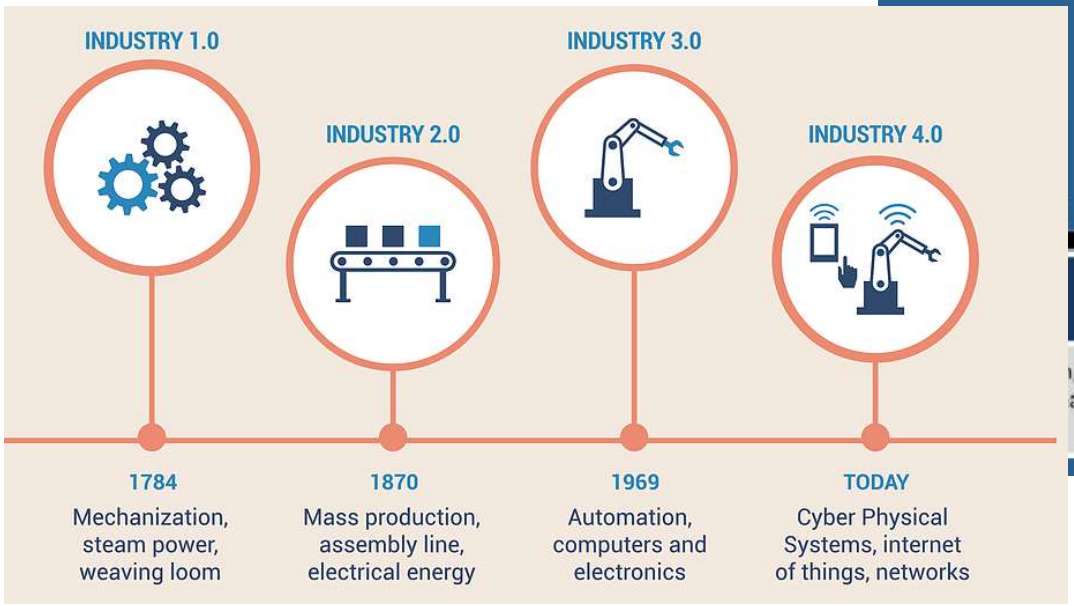

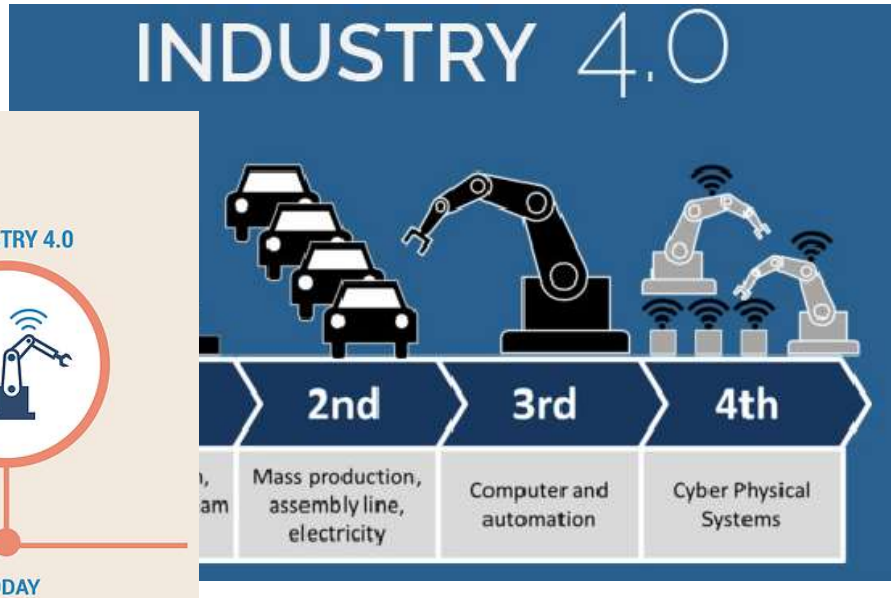

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Introduction to Industry 4.0

The fourth industrial revolution encompasses areas which are not normally classified as industry, such as smart cities for instance.

Industry 4.0 is the subset of the fourth industrial revolution that concerns industry.

Industry 4.0 refers to the concept of factories in which machines are augmented with wireless connectivity and sensors, connected to a system that can visualise the entire production line, control, and make decisions on its own.

In essence, industry 4.0 describes the trend towards automation and data exchange in manufacturing technologies and processes which include **cyber-physical systems** (CPS), the internet of things (IoT), **industrial internet of things** (IIOT), **cloud computing**, cognitive computing and artificial intelligence.

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What CPS means?

A cyber-physical system (CPS) refers to the combination of computer-aided, **software components** with **mechanical and electronic parts**, which can be accessed via a **data infrastructure**, such as data centers where the Internet communicates.

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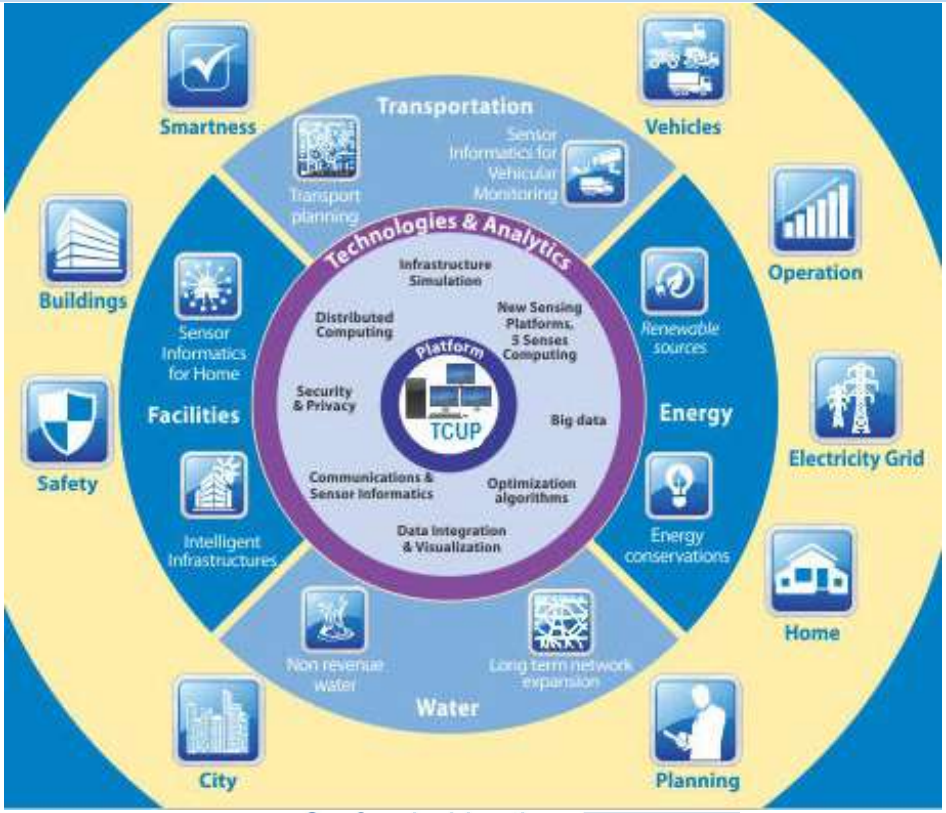
What CPS means?



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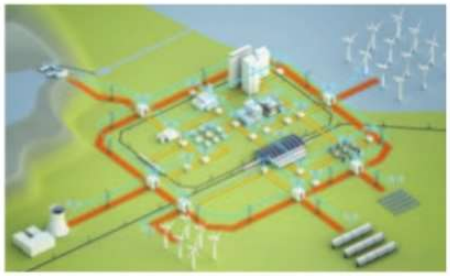
CPS examples

automated driving

source: Carnegie Mellon University

human-robot collaboration

source: Rethink Robotics



Smart grids

source: Siemens

automated farming

source: Kesmac

surgical robots

source: daVinci

Air traffic control

source: NASA

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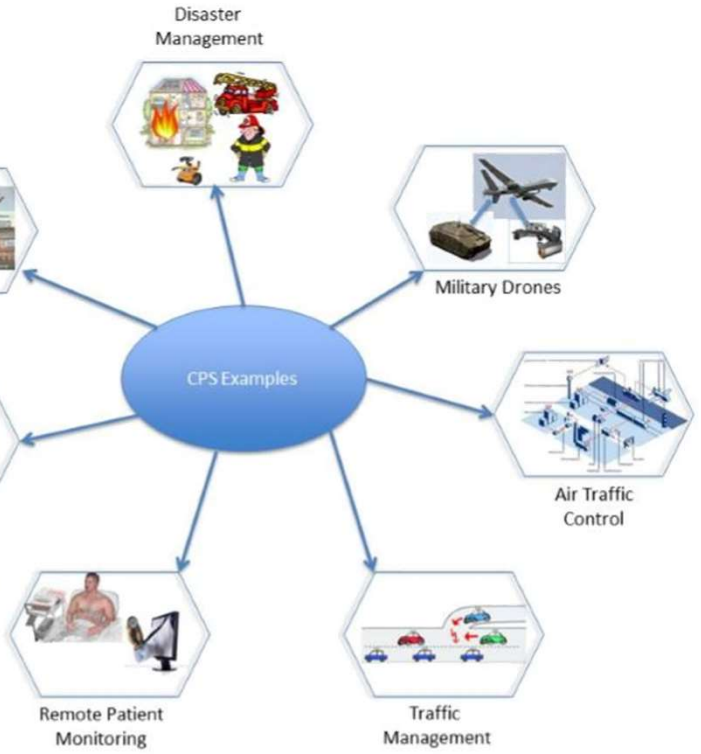
CPS examples

eHealth

Smart Home


Military



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Key functionalities

- Sensing;
- Processing;
- Physical Action;
- Communications;
- Energy;
- Coordination & Collaboration

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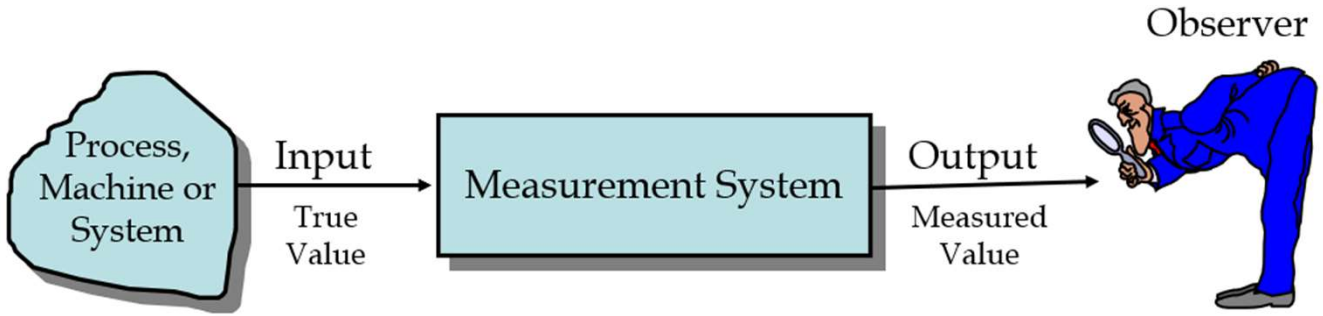
Sensing with CPS

Measurement System



Accurate and **Reliable**

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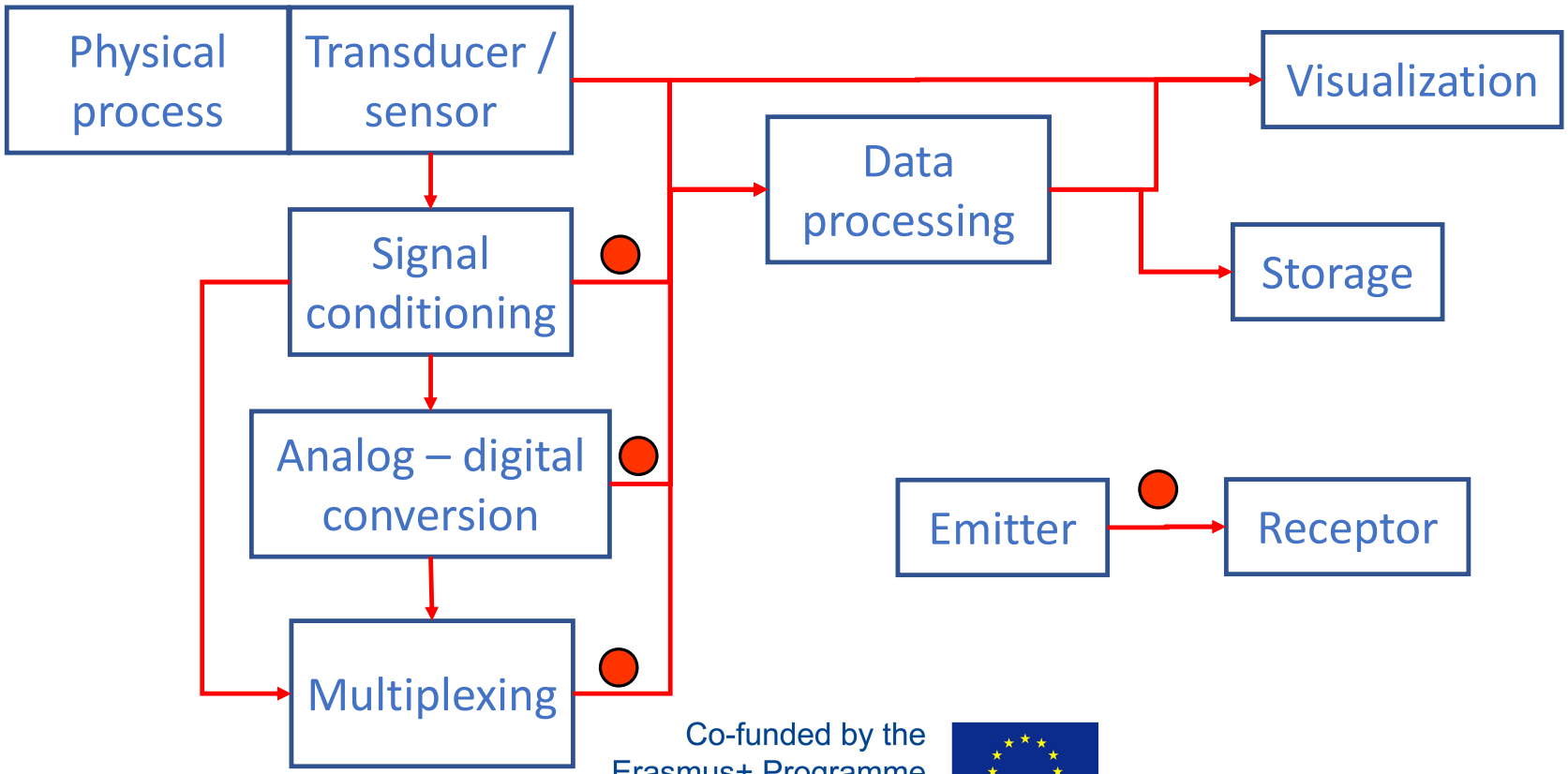
CPS general model



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