Sameer Kumar

*Session 2 : 11 Oct, 3.15p – 5.30p session*

# IR 4.0 in Manufacturing

- What is the ultimate goal of technology?
- In the context of the manufacturing sector, the term "industry 4.0" denotes an advanced degree of development in the management of the complete value chain.
- 'internet of things', the 'internet of everything' or the 'industrial internet'.
- -> steam power -> electricity-> IT/Electronics-> cyber-physical .
- Question: revolution or evolution?
- Cyber-physical production systems (CPPSs) connect IT with mechanical and electronic components, which then communicate across a network.


Image courtesy: https://www.symmetryelectronics.com/blog/11-pillars-of-industry-4-0/

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# Interlinking of real (physical) and virtual (cyber) world will lead to so called cyber-physical systems that determine Industry 4.0 solutions

## Schematic interlinking of physical and virtual world - Examples

| Physical world | + | Cyber world | = | Industry 4.0 solutions |
|---|---|---|---|---|
| > Robotics<br>> Automation equipment | | > Advanced algorithms<br>> Machine learning<br>> High-performance hardware | |  **Self-learning robots** |
| > Traditional machinery<br>> Traditional & semiconductor based sensors | | > Advanced data analytics<br>> Database mgmt. systems<br>> Cloud computing | |  **Predictive maintenance** |
| > Traditional machinery<br>> RFID<br>> Automation equipment | | > Embedded systems<br>> Real-time image processing (e.g. OCR)<br>> Data storage hardware | |  **Self-reconfiguring machines** |
| > Camera & imaging systems<br>> Visual sensors<br>> Traditional sensors | | > Real-time image processing<br>> Advanced data analytics<br>> Advanced algorithms | |  **Smart environ-ment recognition** |

**Characteristics/Goals**

- **Connectivity** as the key factor **is linking both worlds** in each solution
- Enable
  - Individualized or **mass customized products**
  - Highly **flexible production**
  - **Integration** of customers and value adding partner **into value creation**
  - Coupling of **production and high-value services**
  - **Cost** and **efficiency** benefits and **quality** improvements

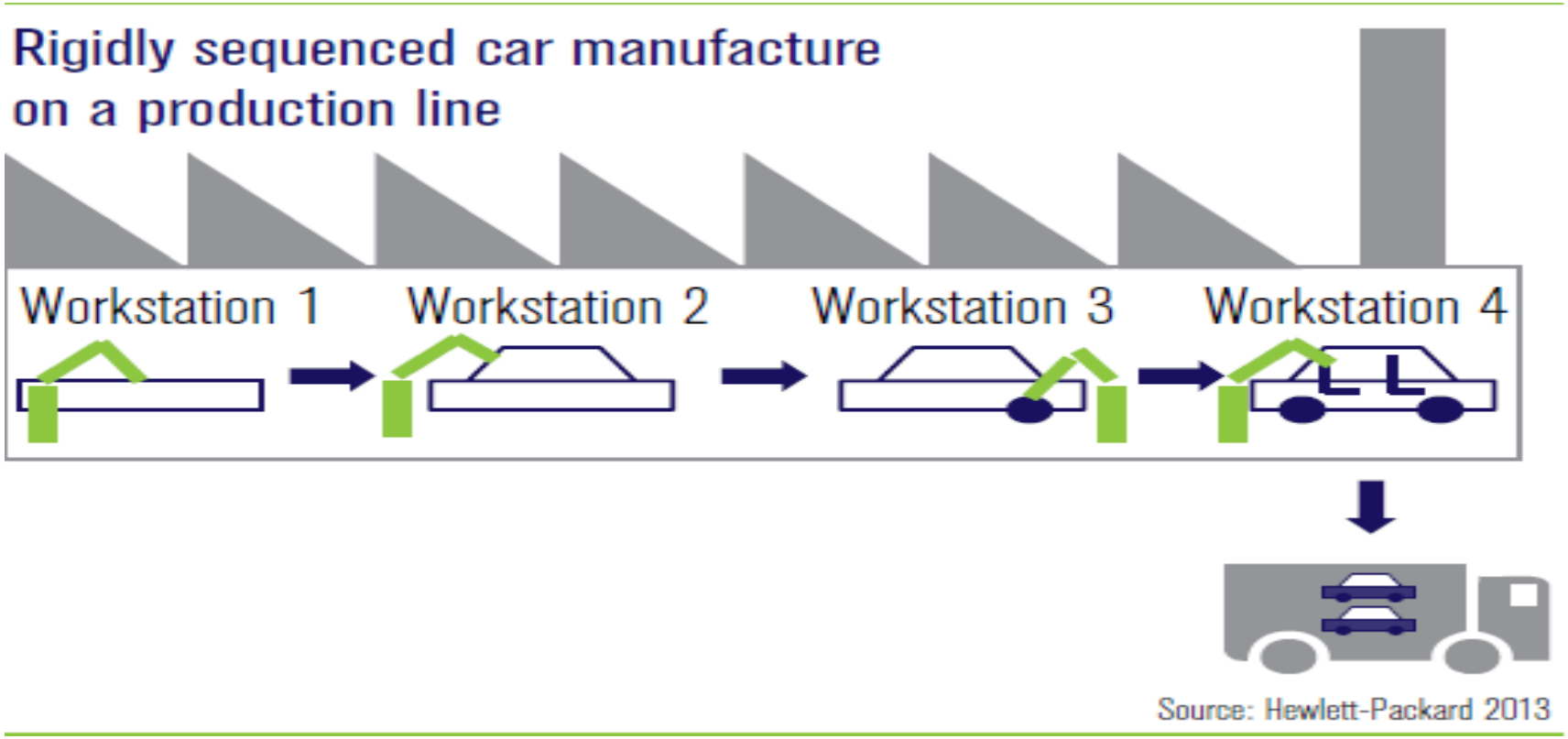
Source: Roland Berger

# Cyber-physical production systems (CPPSs)

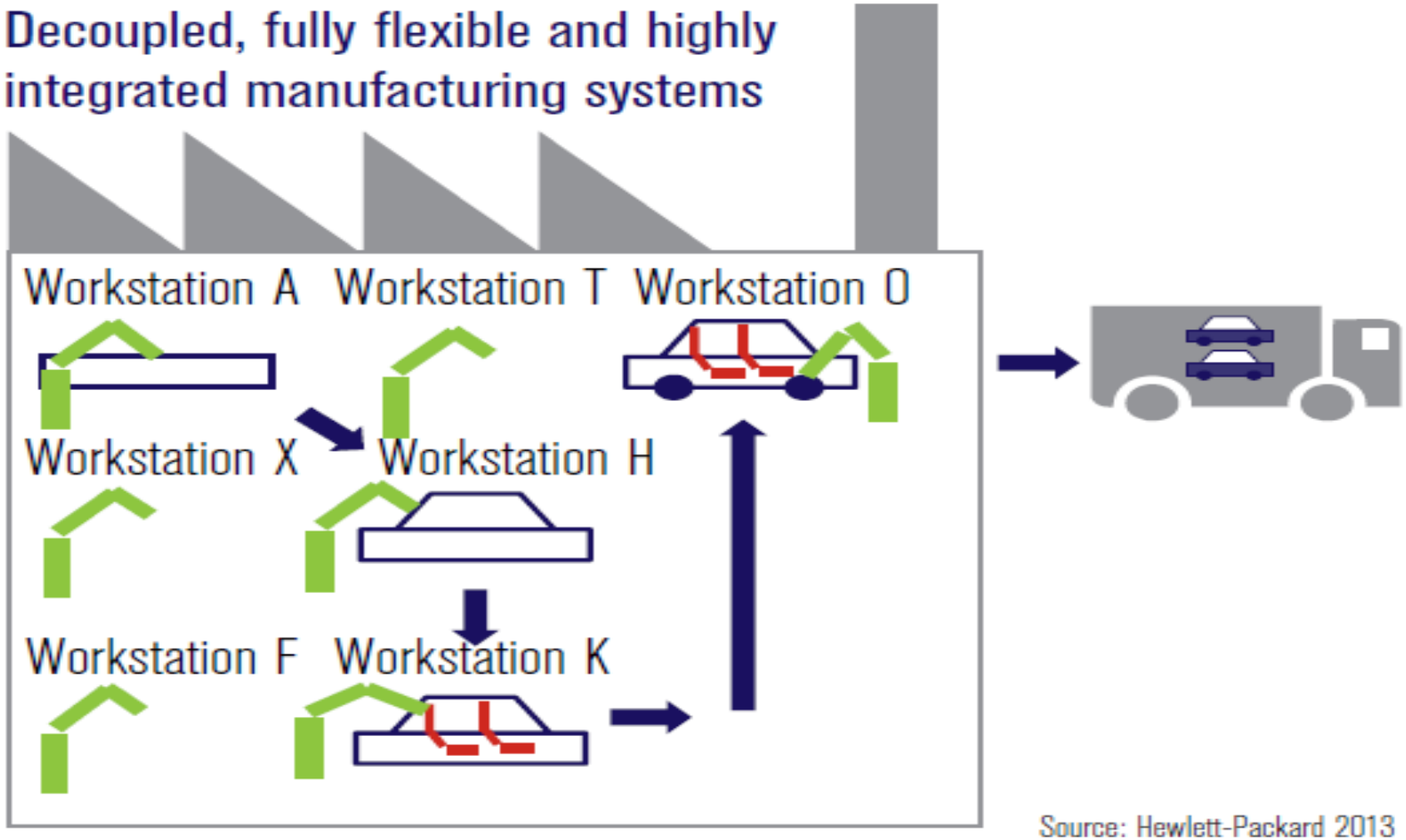
- In addition to connecting machines, CPPSs connect the entire value chain and all stages of a product's life cycle to one another via a smart network of machines, properties, ICT systems, smart products, and persons.
- Enables Vertical (customer-specific and individualized and responds rapidly to demand, stock levels and other faults) and Horizontal integration (from inbound logistics through warehousing, production, marketing and sales to outbound logistics and downstream services) – deloitte,2022
- Mass customization: Companies can now profitably cater to niche markets by tailoring production to meet the needs of specific customers thanks to intelligent, interconnected systems.
- “solving industry challenges to better serve human needs “

Image courtesy: https://www.facebook.com/FestoDidactic/

# Today’s Factory



# Tomorrow's Factory




Source: Hewlett-Packard 2013

# Paper Presenters

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- Speaker 1: Kiranjeet Kaur, K.S. Hemant K. and Rasiah, R. Title: Ecosystem for Promoting IR 4.0 Technologies in Textiles and Clothing Manufacturing
- Speaker 2: Shankaran, N. and Yip, T.M Title: Did Digitalization Help Manufacturers Cope with COVID19 Pandemic?
- Speaker 3: Abdul Latif and Saliza, S. Title: Government Initiatives to Promote Adoption of IR4.0 technologies in Manufacturing