

# PPU231 – Production and Product Service Systems

7,5 Credits

## Course in Master Programme:

- Production Engineering
- Product Development

### ***Examiner***

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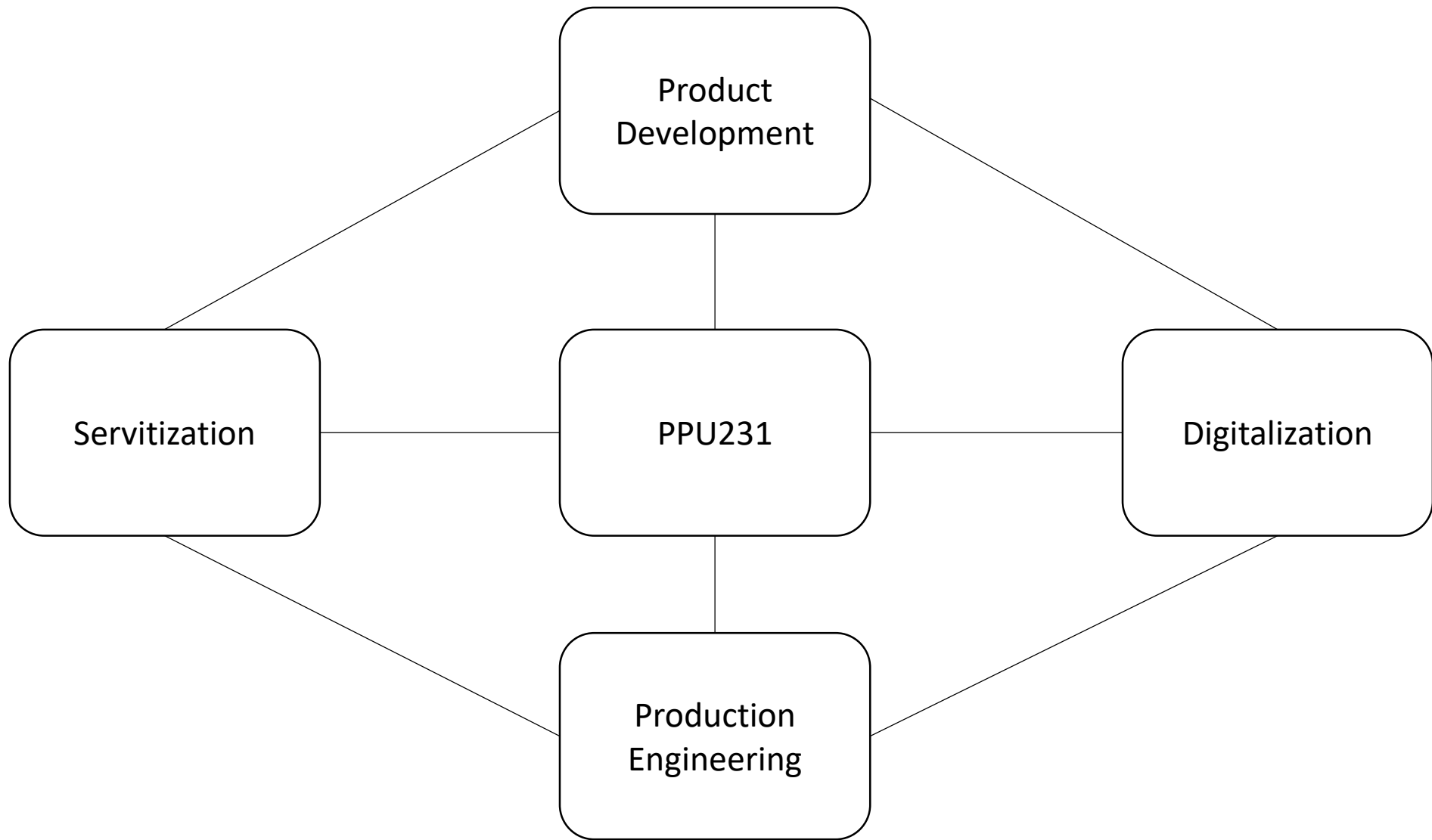
### ***Course assistant***

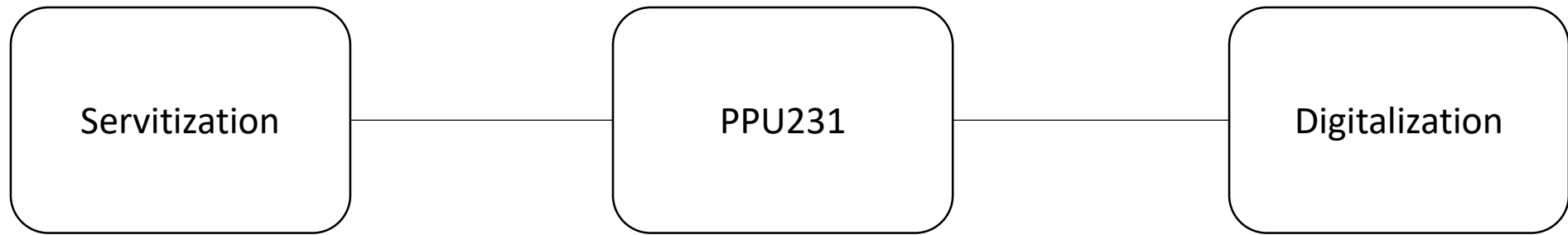
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# Introduction to Servitization and Digitalization



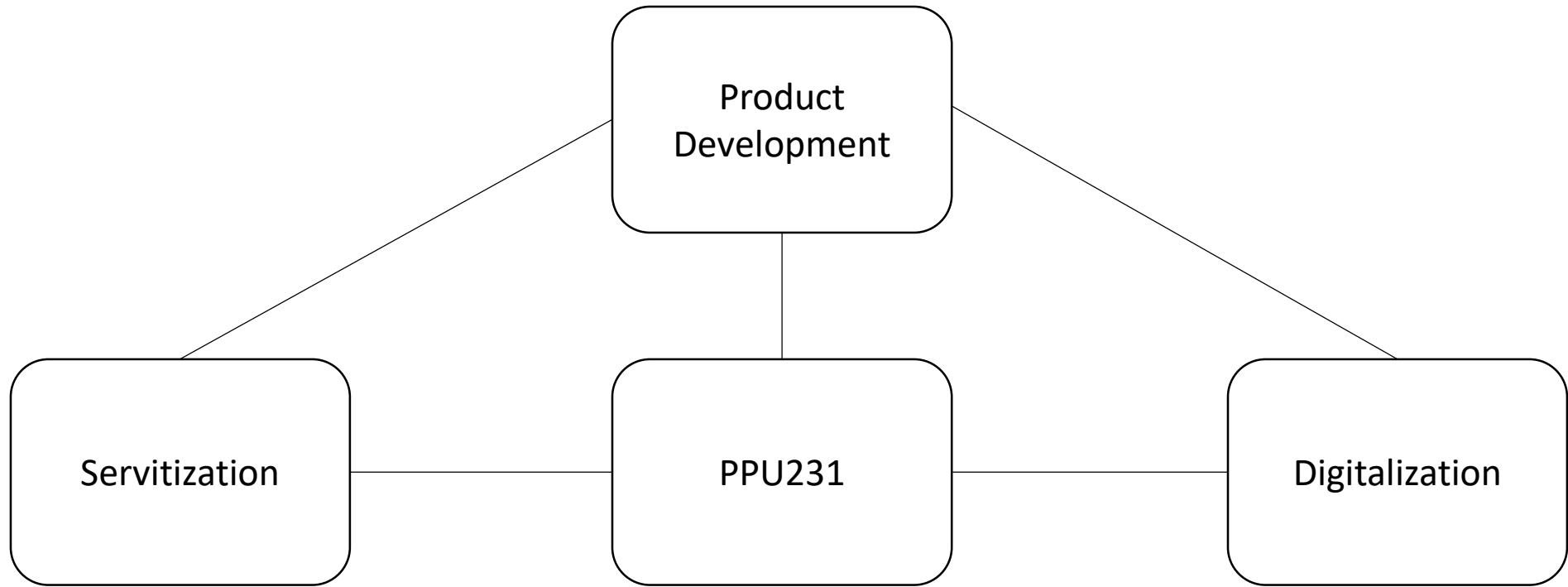


# ”Servitization”?

- Creating value by **shifting** from selling products to providing product-services
- A “product-service” is a **mix** of tangible products and intangible services that **jointly** fulfills **customer needs**
- A “product-service system” (PSS) is the **organizational structure** that provides the product-service to customers

# ”Digitalization”?

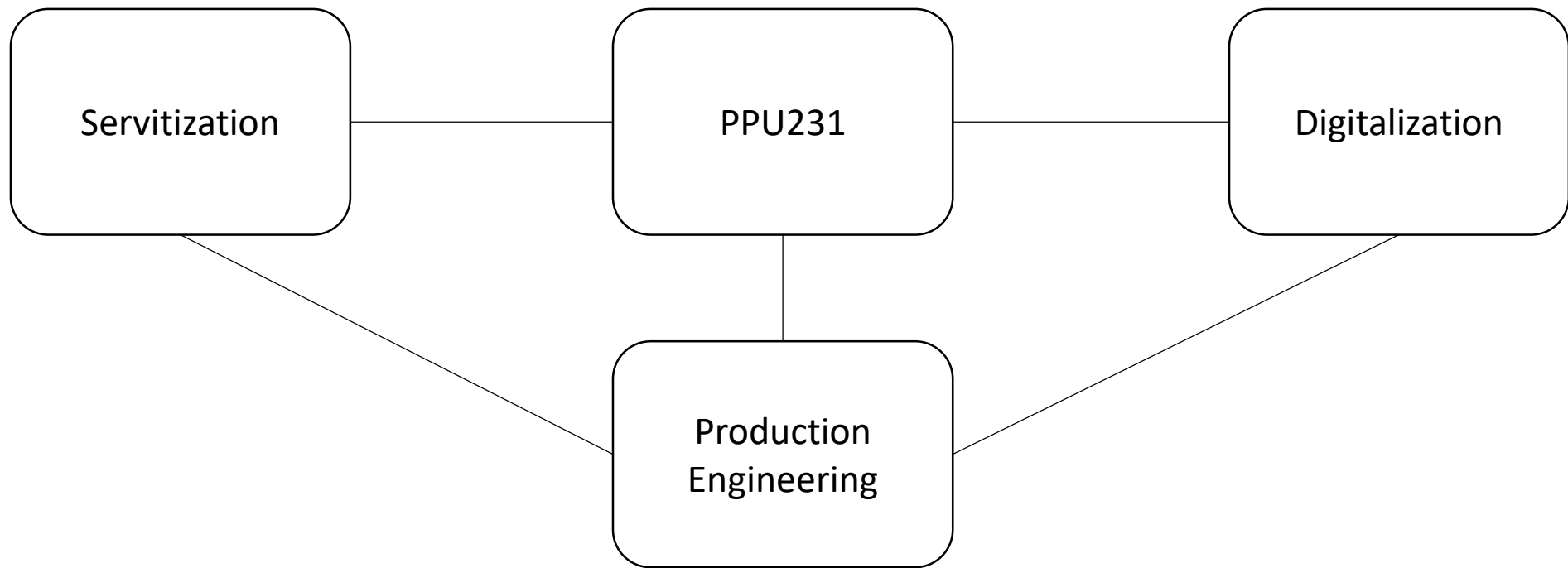
- Digitalization 1: From analog to digital (”digitization”)
- Digitalization 2: Impact on our business processes, services, economic models etc.
- Digitalization 3: Impact on our lives







What is required to develop these  
kind of product solutions?





**”Industrie 4.0”**



**”Smart Industri”**



**”Smart Manufacturing”**



**”Robot Revolution”**



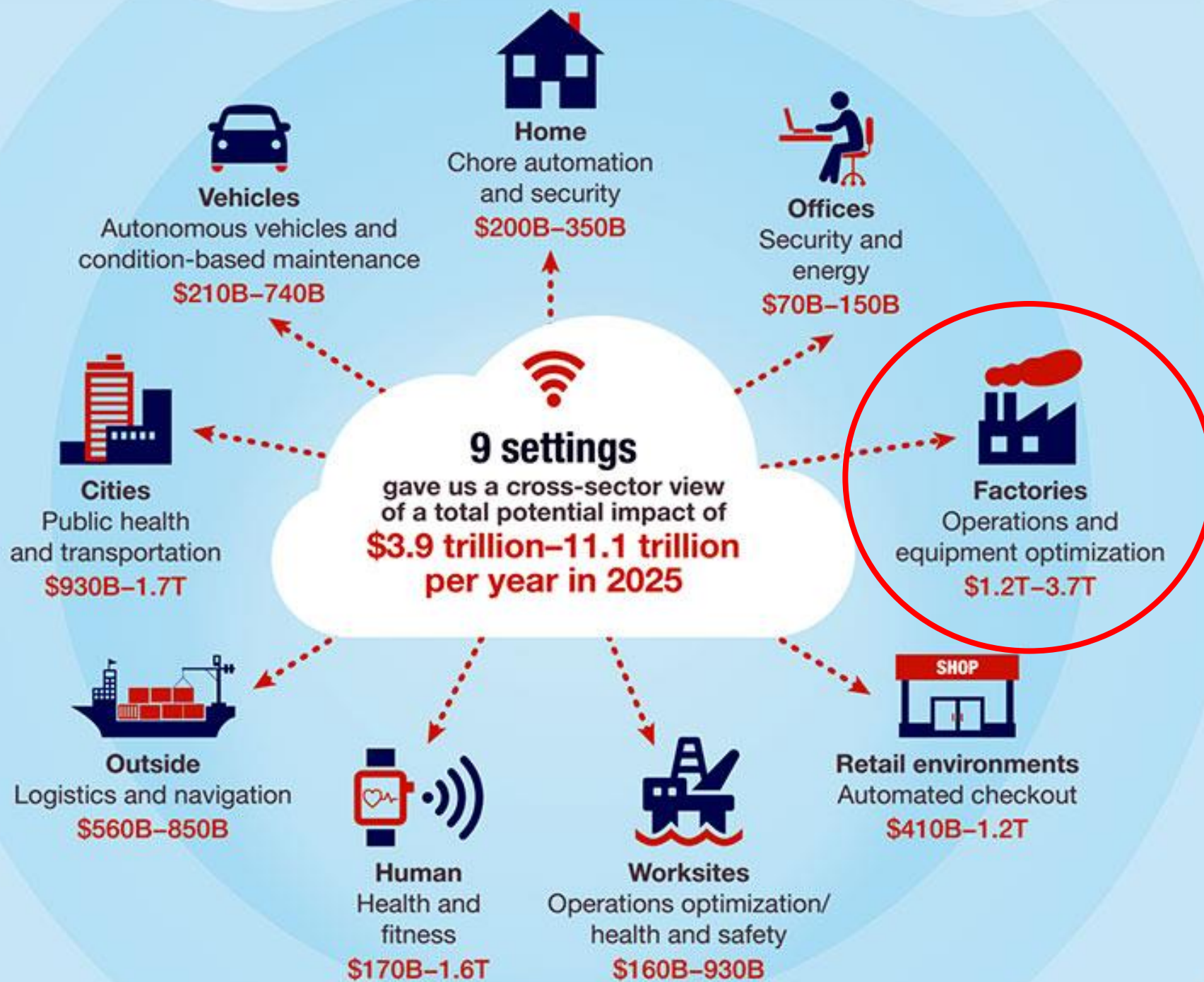
**”Smart Factory”**



**”Made in China 2025”**

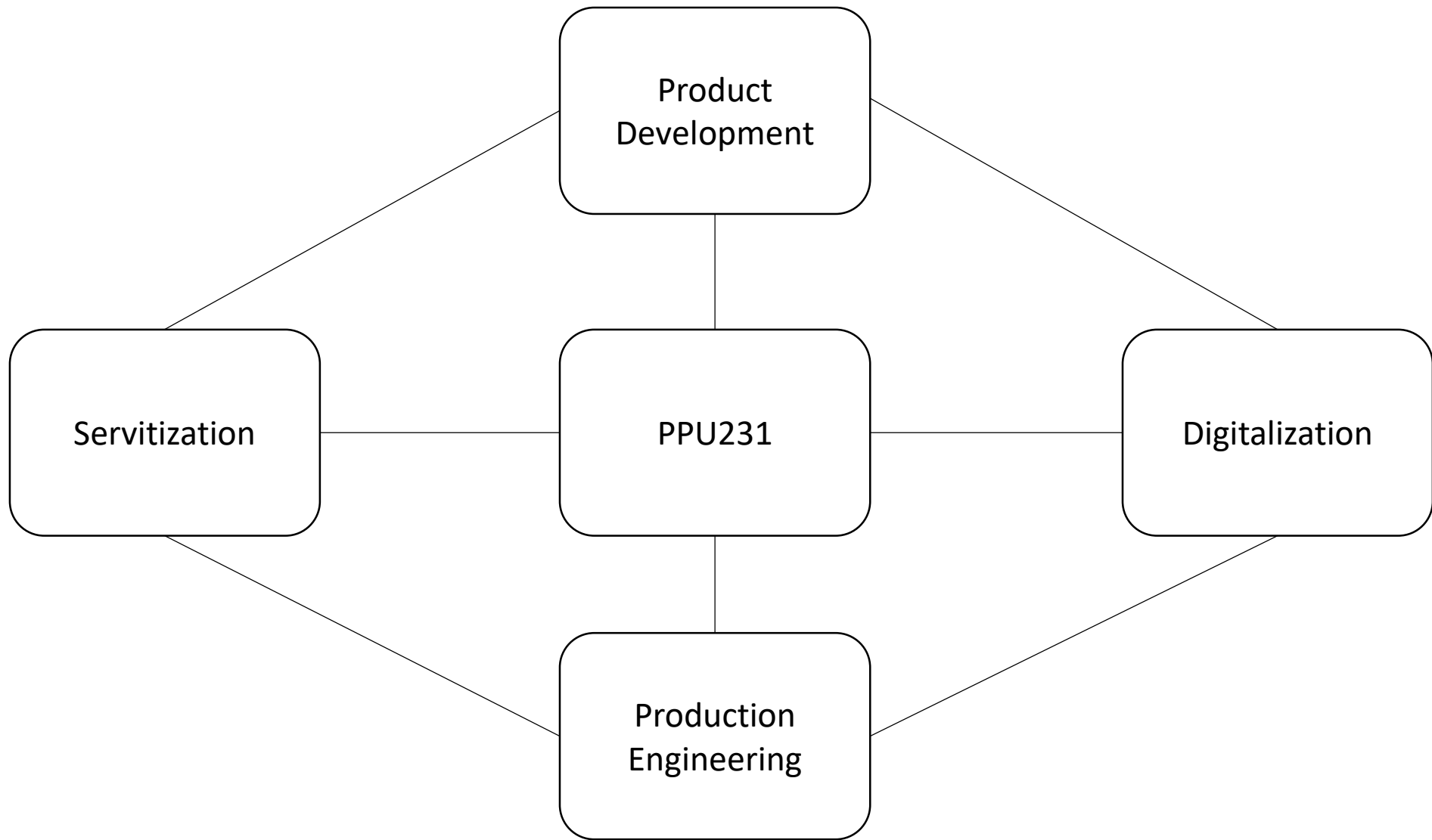


**”Digital Single Market”**





What is required to ensure that "Industry 4.0"  
production systems deliver as intended?



In what ways are product development and production engineering dependent on each other?

For a manufacturing company:  
who will be affected by these trends, and how?



# E-bike Inc.

PPU231 Case company

# Why a case company?

- Two primary orientations: Production Engineering and Product Development
- Typically seen and managed separately in industry, despite being highly interconnected
  - Decisions have impact on both products and production systems
  - Production Engineers must understand Product Development
  - Product Developers (Design Engineers) must understand Production
- Common agenda – transform company throughout the course
  - Close to the real-life scenario of working as an engineer in a manufacturing company, with challenges such as interdepartmental communication and trade-offs between product features and production capabilities

# Background to E-bike Inc.

- Manufacturer and provider of electrical bikes (E-bikes)
- Rapidly growing market
- Adapt to market changes to remain competitive

# Current state

- Product offerings (excluding aftermarket services)
- Typical market price of around 15.000 SEK
- Core business is frame design including drive system and battery
- In-house production of frames, components purchased from OEM
  - Cutting, welding, heat treatment, quality inspection etc.
  - Low production efficiency, approximately 50% OEE



# Competitive pressures

- Rapidly growing demand of high-end city E-bikes
- Market price commonly exceed 50.000 SEK
  - Limited market for traditional business models

How can E-bike Inc. manage this challenge?

# Product-service systems (PSS)

- Product-service Systems (PSS) appeals to a broader customer base
  - Mix of products and services
- Rapid rise in forecasted demand for E-bikes as PSS
  - Risks due to transfer of ownership from user to provider
  - Need to increase production volume and rate to meet demand
  - Energy storage is critical and expected to evolve (e.g. batteries)

# Desired future state

1. Developing PSS solutions for high-end E-bikes
2. Improving production efficiency to meet rapidly increasing customer demand





# E-bike Inc. in PPU231

- Lectures introducing supporting theories, methods and tools
- Workshop tasks on the company's products and production system
- Two alternative projects:
  - **Production-oriented project:** improve the performance of E-bike Inc.'s production system to meet increasing customer demand and ensure future productivity and profitability
  - **Product-oriented project:** designing and evaluating Product-service System solutions for E-Bike Inc.'s product line (mix of products and services)