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Course #3: Smart Operations Management

Module 2: Smart Production in Planning and Controlling Company's Operations Integrated Production Planning and Shop-flow Control System Concept

Curriculum Development

of Master's Degree Program in

Industrial Engineering for Thailand Sustainable Smart Industry

Module 2 (Smart PPC)

Lesson 2-1: Implementation Forecasting Model under Real-time Situation:

> ➢ Tracking accuracy of forecasting model when data are updated and real-time.

> ➢ Adjusting forecasting model to match with the real-time demand.

> ➢ Advanced techniques to utilize real-time demand for demand forecasting.

Lesson 2-2: Inventory Management under Real-time Situation:

> ➢ Utilizing real-time data for inventory management and control.

> ➢ Control system and advanced technology in inventory management.

Lesson 2-3: Advanced Integrated Production Planning

> ➢ Intelligent ERP and integration of IoT, massive data analytics. Cognitive and process automation.

> ➢ Integrated planning system including aggregated planning, master production schedule (MPS), material requirement planning (MRP), and capacity planning (CRP) by utilizing real-time data.

Module 2 (Smart PPC)

Lesson 2-4: Advanced Shop Floor Control

➢ Advanced scheduling techniques when real-time data are updated.
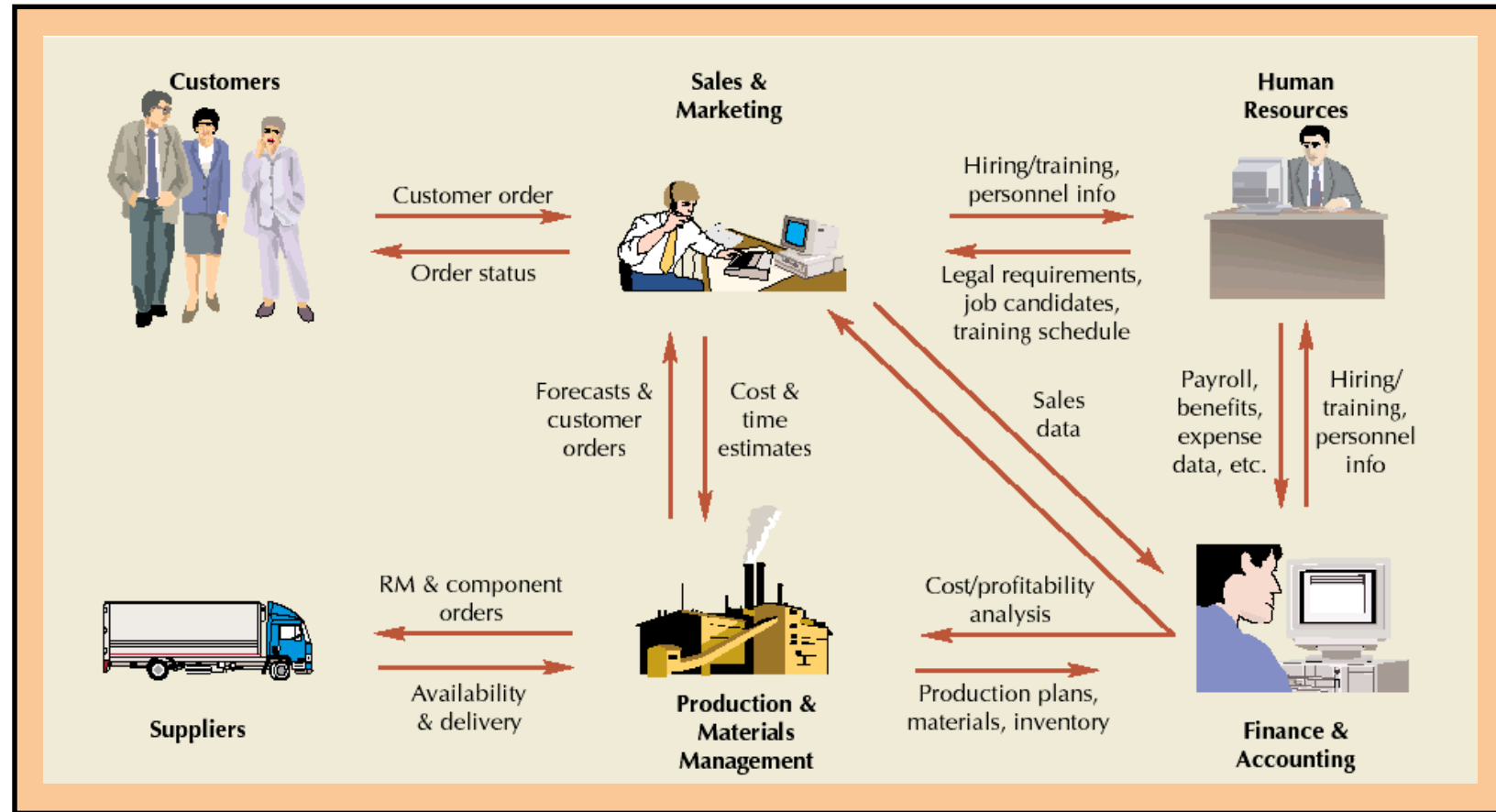
➢ Automated shop floor control system and technology.

Enterprise Resource Planning (ERP)

- ERP is developed in order to organize and manage a company's business processes by *coordinating and integrating data flow across functional areas*

- ERP serves as master data and analytical systems for the entire enterprise


MRP — Material Resource Planning

CRM — Customer Relationship Management

SCM — Supply Chain Management

ERP

FRM — Financial Resource Management

HRM — Human Resource Management

Purchasing Inventory Product Sale …

Organizational Data Flows

Reference: Russell & Taylor, Operations Management-Along the Supply Chain: 7th Edition, Wiley, New Jersey, 2011.

Smart Production Planning
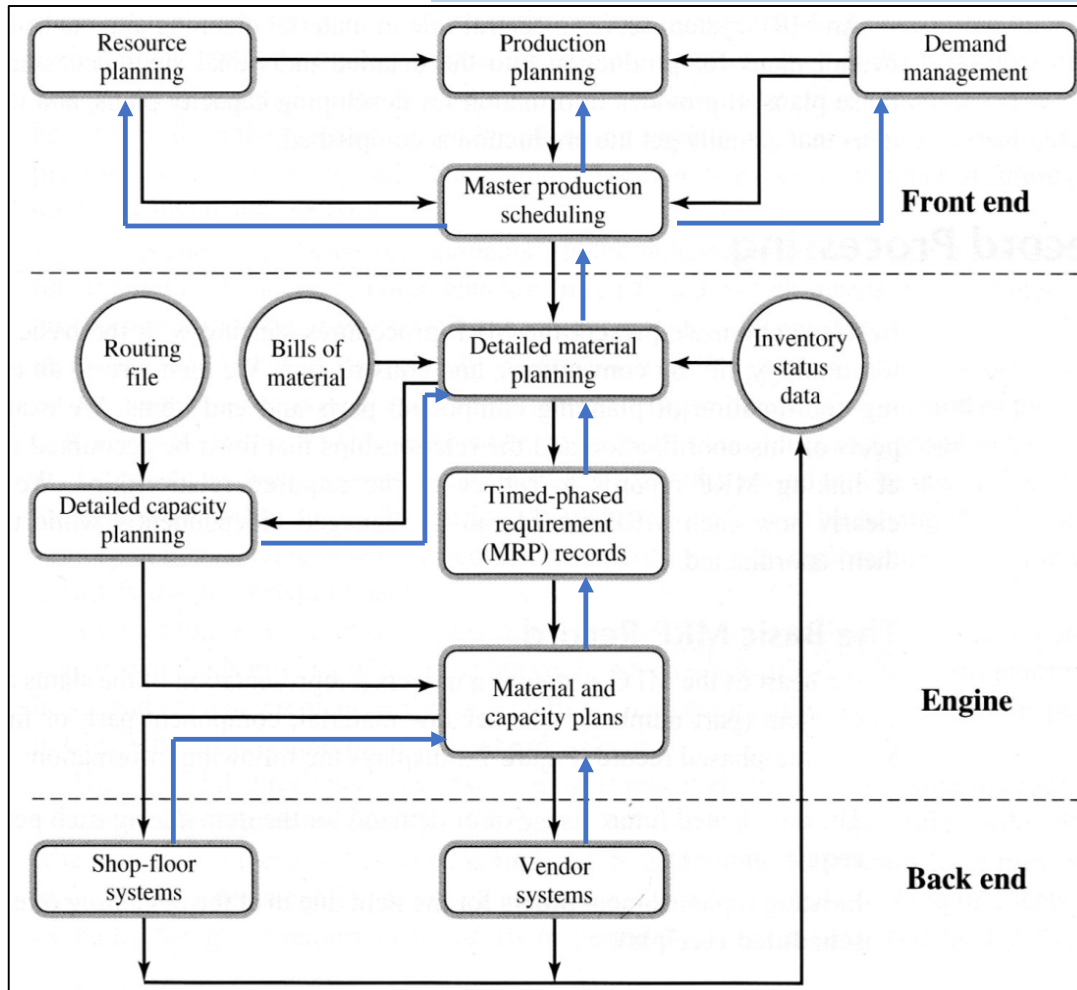
- Transformation of sequential to simultaneous production planning
- Integrated all production planning steps for both directions, top-down and bottom-up.
- Strong connection between higher and detailed steps must be respectd.
- Real-time data is required and made accessible to all involved stakeholders at any time.

Reference: André Picard and Reiner Anderl (2014) "Smart Production Planning for Sustainable Production based on Federative Factory Data Management", Proceedings of TMCE 2014, May 19-23, 2014, Budapest, Hungary

ERP and Industry 4.0 Integration

Discussion 1:

1. Do you think the emerging of Industry 4.0 will replace the ERP ?

2. If not, can ERP integrate with Industry 4.0 ?

Explain with rational reasons and provide the necessary characteristics when ERP integrated with Industry 4.0.

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ERP and Industry 4.0 Integration

- ERP with Industry 4.0 work complimentary to one another.
  - Data Utilization
  - Data Interpretation
  - Security

- Several ERP systems are already beginning to build IoT connectivity within their framework.

- Industry 4.0 utilizes real-time data and technologies for ERP so that the operational effectiveness is obtained.

The Readiness of ERP Systems for Factory of the Future

| ERP Readiness & Challenges	Organizational Challenges	FoF's Future
• Technically & operationally ready • Machine to machine and machine to ERP communication and integration challenges	• Economic feasibility of FoF is difficult to justify • BPR & change management • Management/employee awareness & technology transfer • Heavy reliance on HR in the supply chain & manufacturing cycles	• Might be more suitable to some industries than others • The switch from an existing traditional factory to a FoF is difficult • Full automation could be feasible for the "to be established" factories • Could be economically feasible and also dramatically decrease HR and employee turnover costs

Reference:

Summary results from 10 case study interview in Egypt

Moutaz Haddara, Ahmed Elragal (2015) "The Readiness of ERP Systems for Factory of the Future", Procedia Computer Science 64.

Smart Production Planning Schema with Its Connections
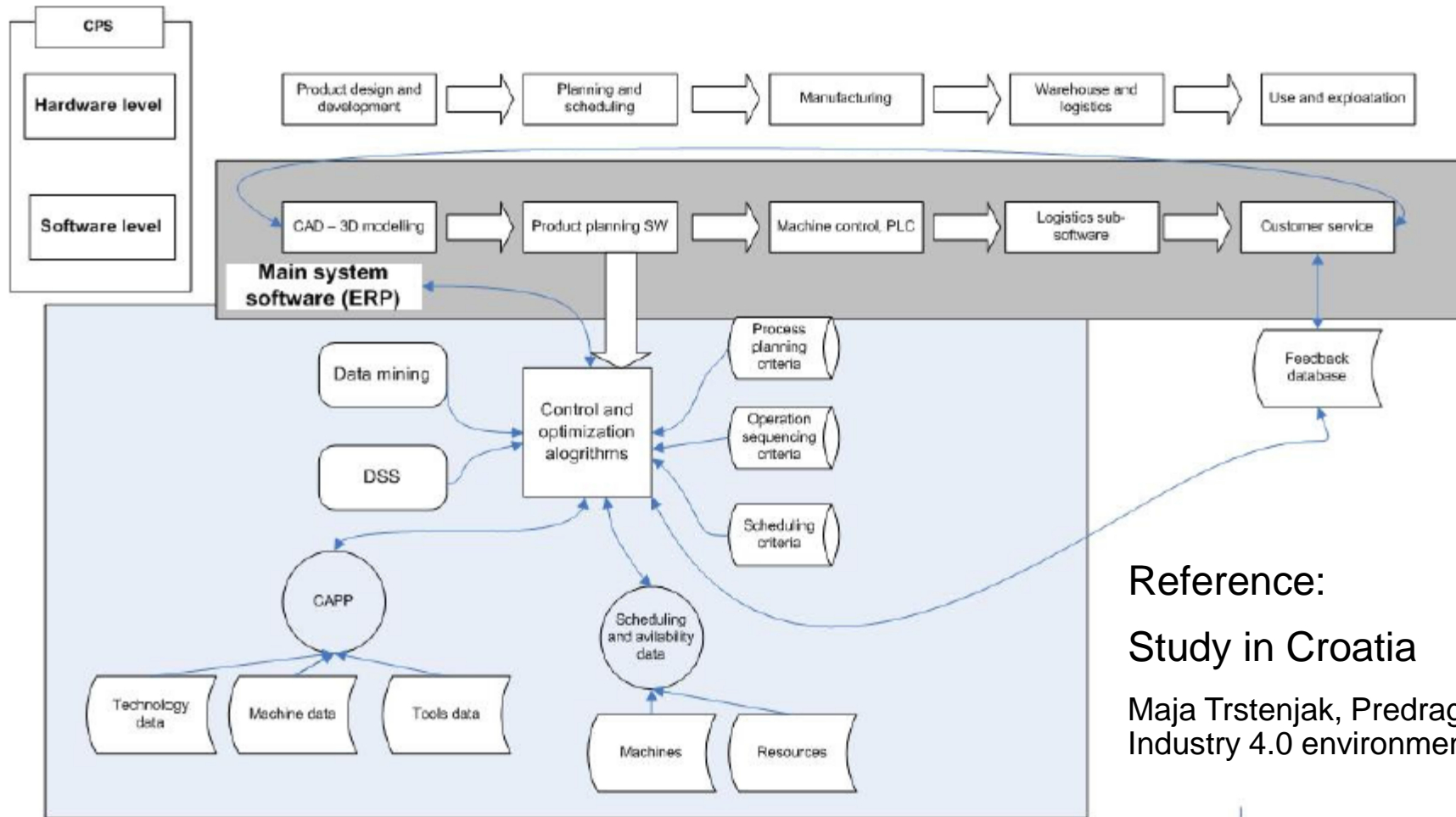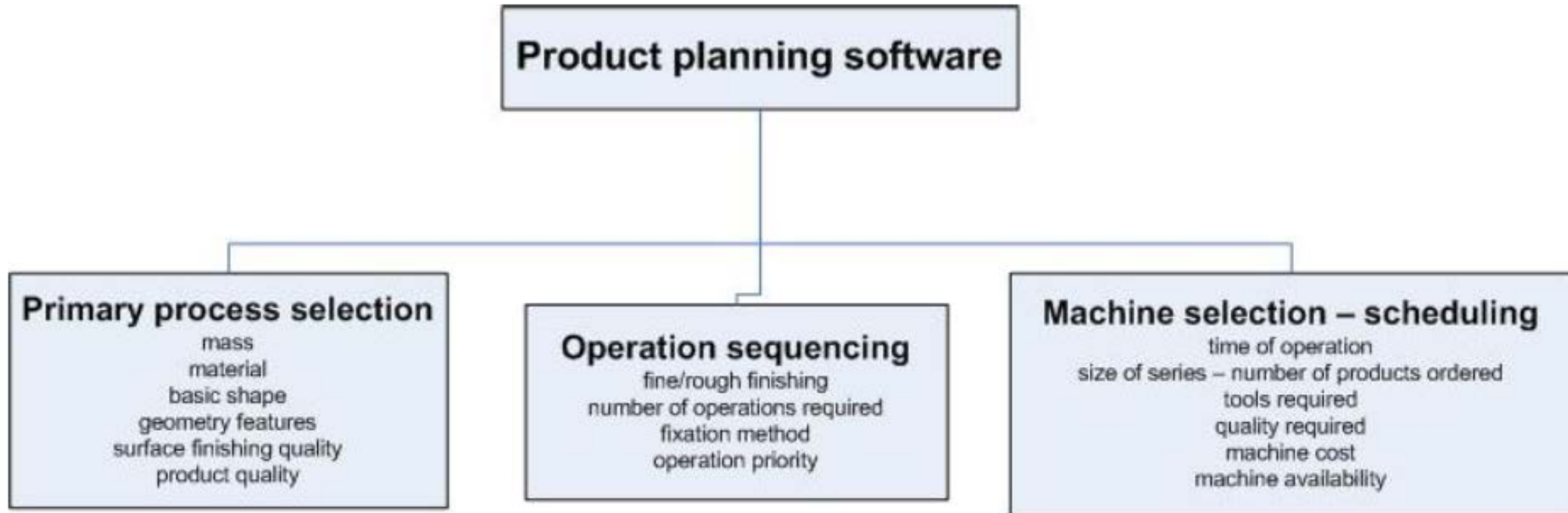
Reference:

Study in Croatia

Maja Trstenjak, Predrag Cosic, (2017), "Process planning in Industry 4.0 environment", Procedia Manufacturing 11.

Smart Production Planning Software Framework : Control and Optimization Criteria

Reference:

Maja Trstenjak, Predrag Cosic, (2017) "Process planning in Industry 4.0 environment", Procedia Manufacturing 11.