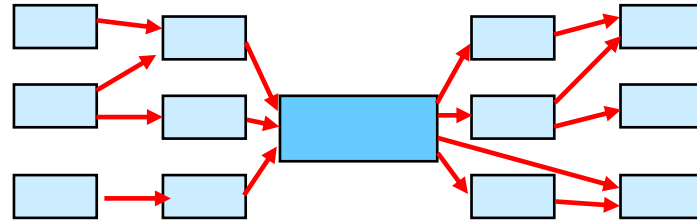


1



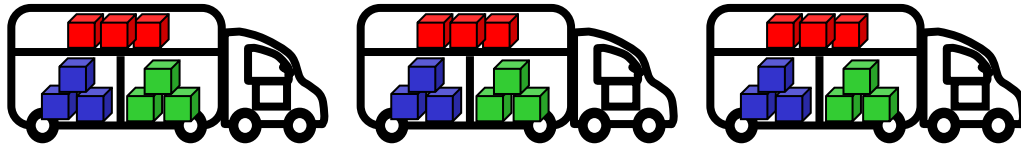
## Lecture **Planning and Control**

**14** Enterprise Resource Planning (ERP)

**15** Lean synchronization

**16** Project Management (zie andere sheets)

**17** Quality Management (zie andere sheets)



**Hessel Visser**

NCOI Les 6 A



# Lecture 6 Planning and Control

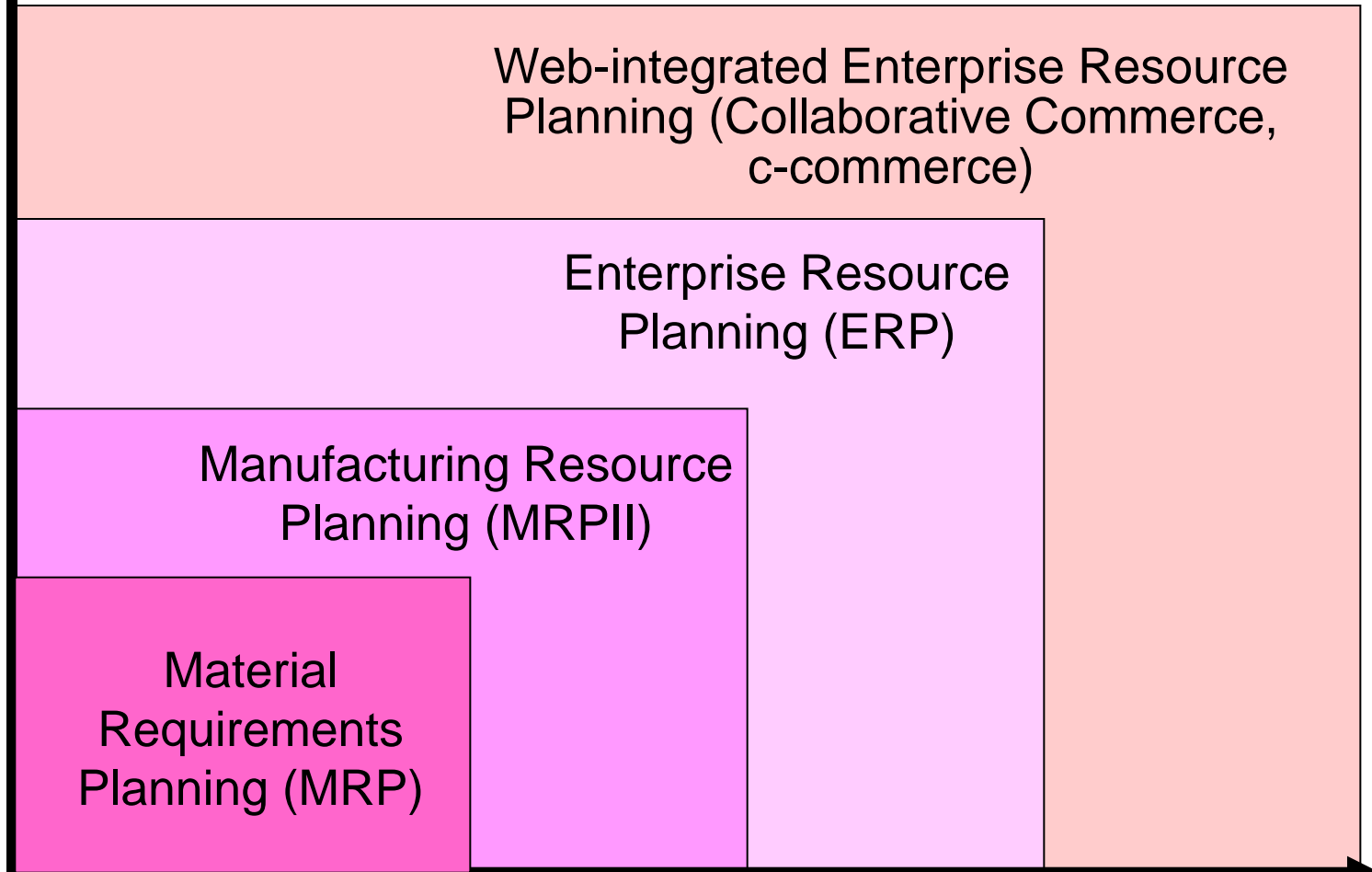


## 14 Enterprise Resource Planning (ERP)

# The development of ERP

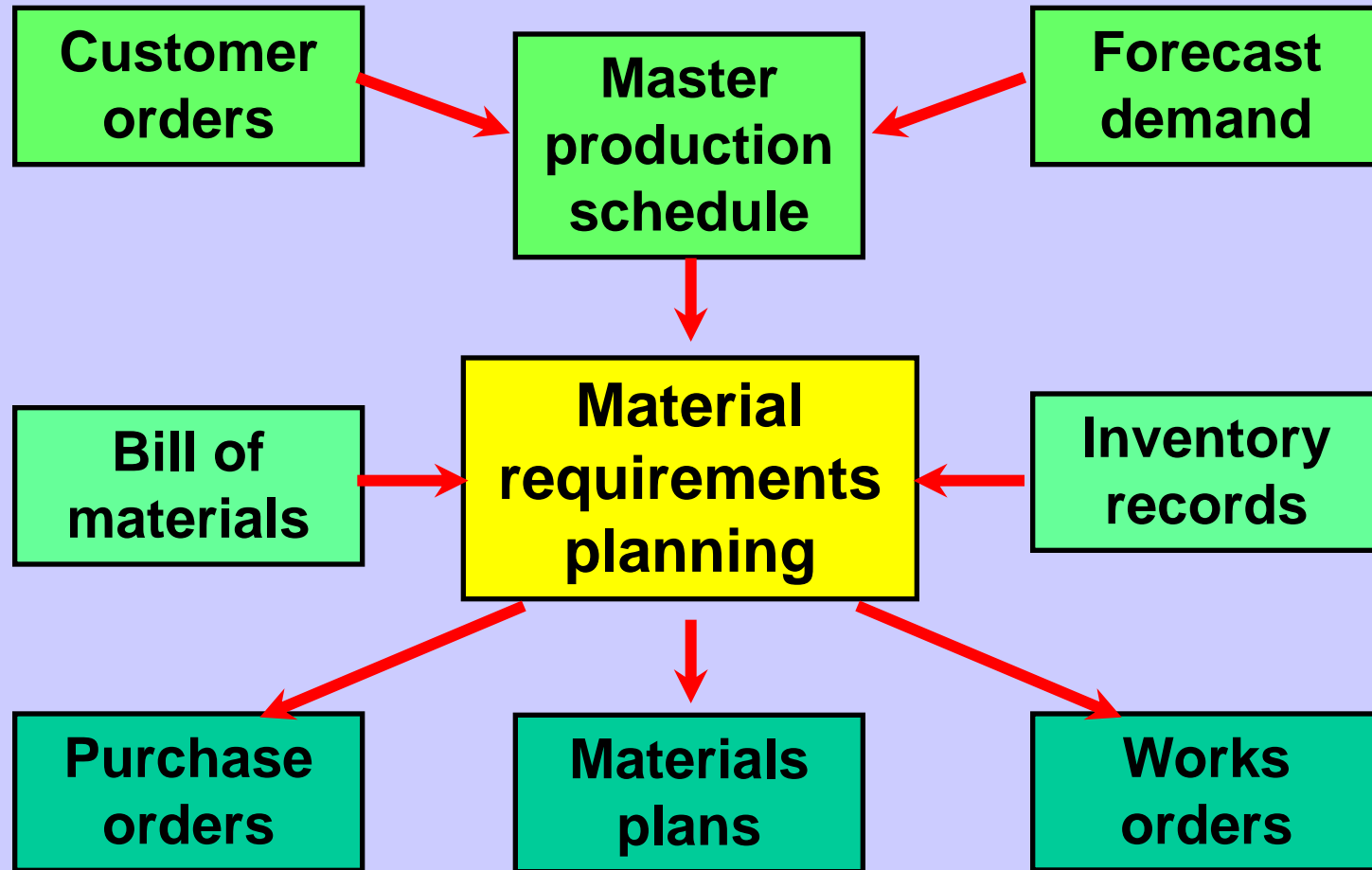
3

Increasing impact on the whole supply network



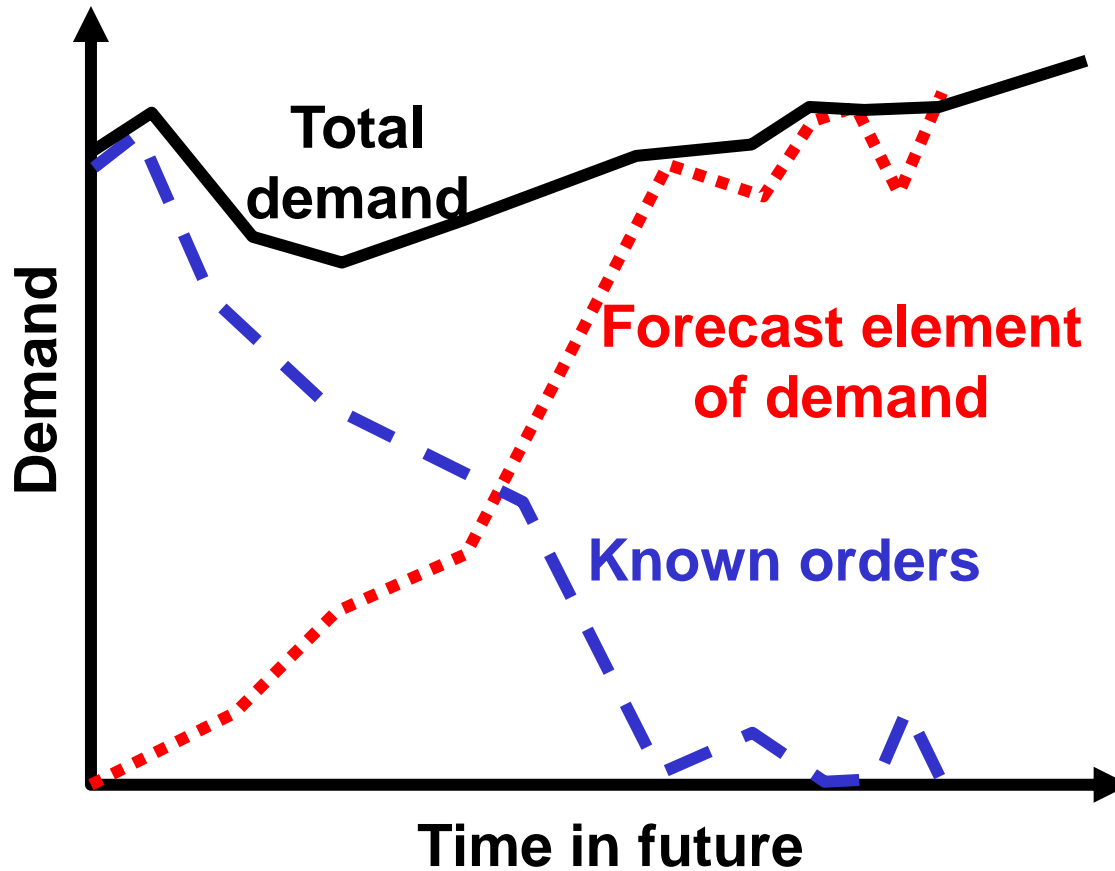
Increasing integration of information systems

## Material requirements planning (MRP-1)

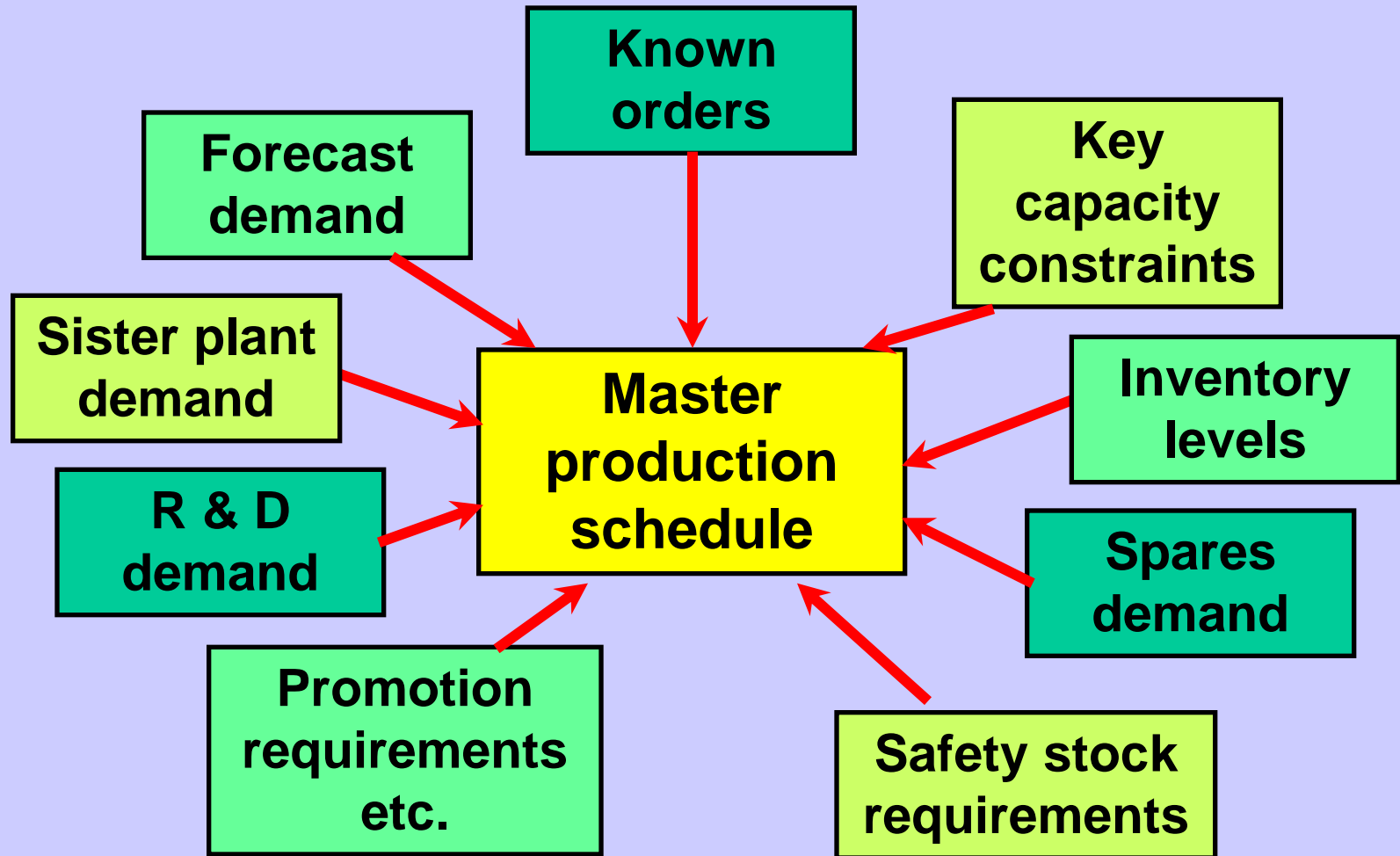


5

# Total future demand is made up of known and forecast demand

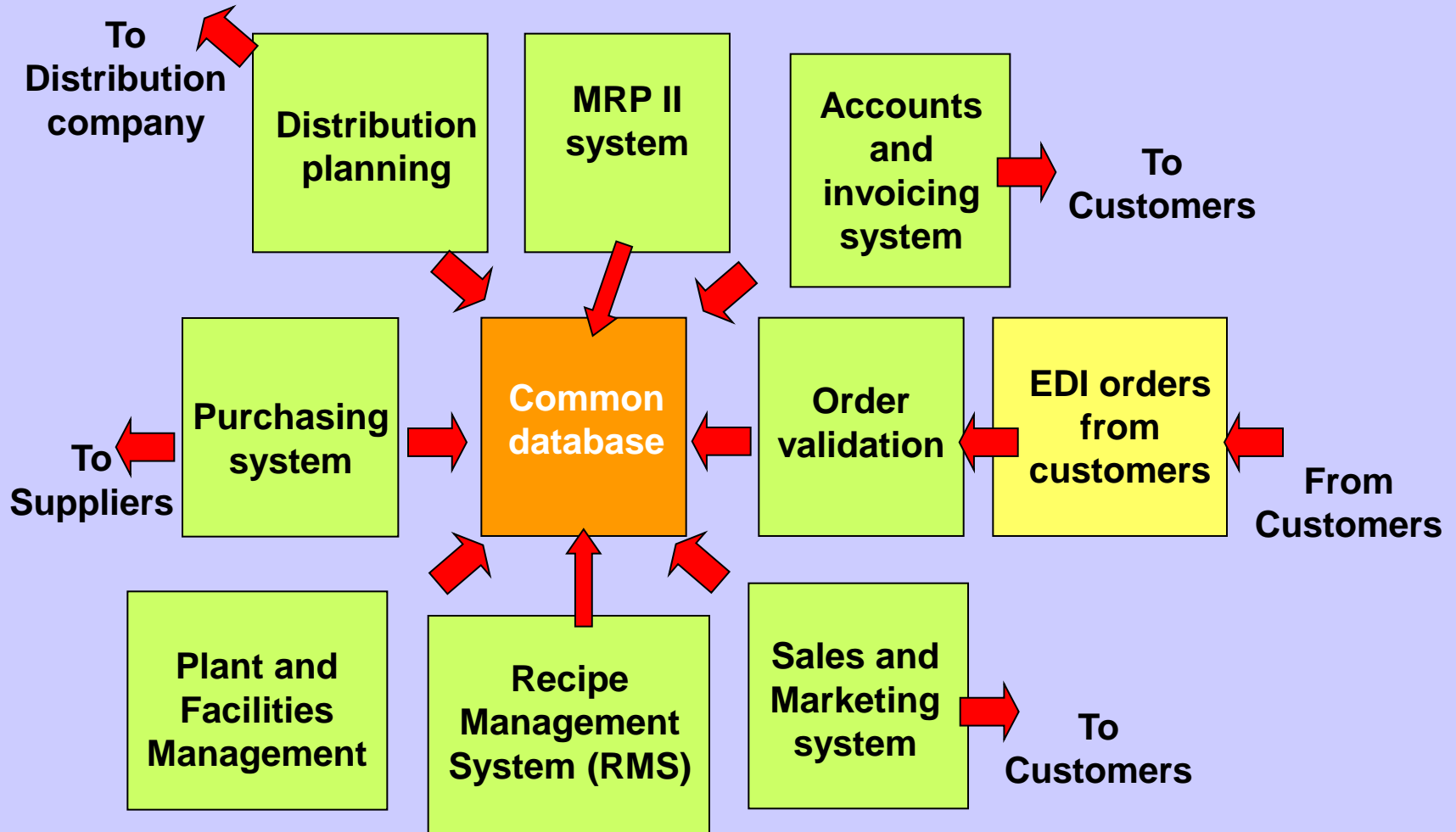


# Master production schedule (MPS)





7

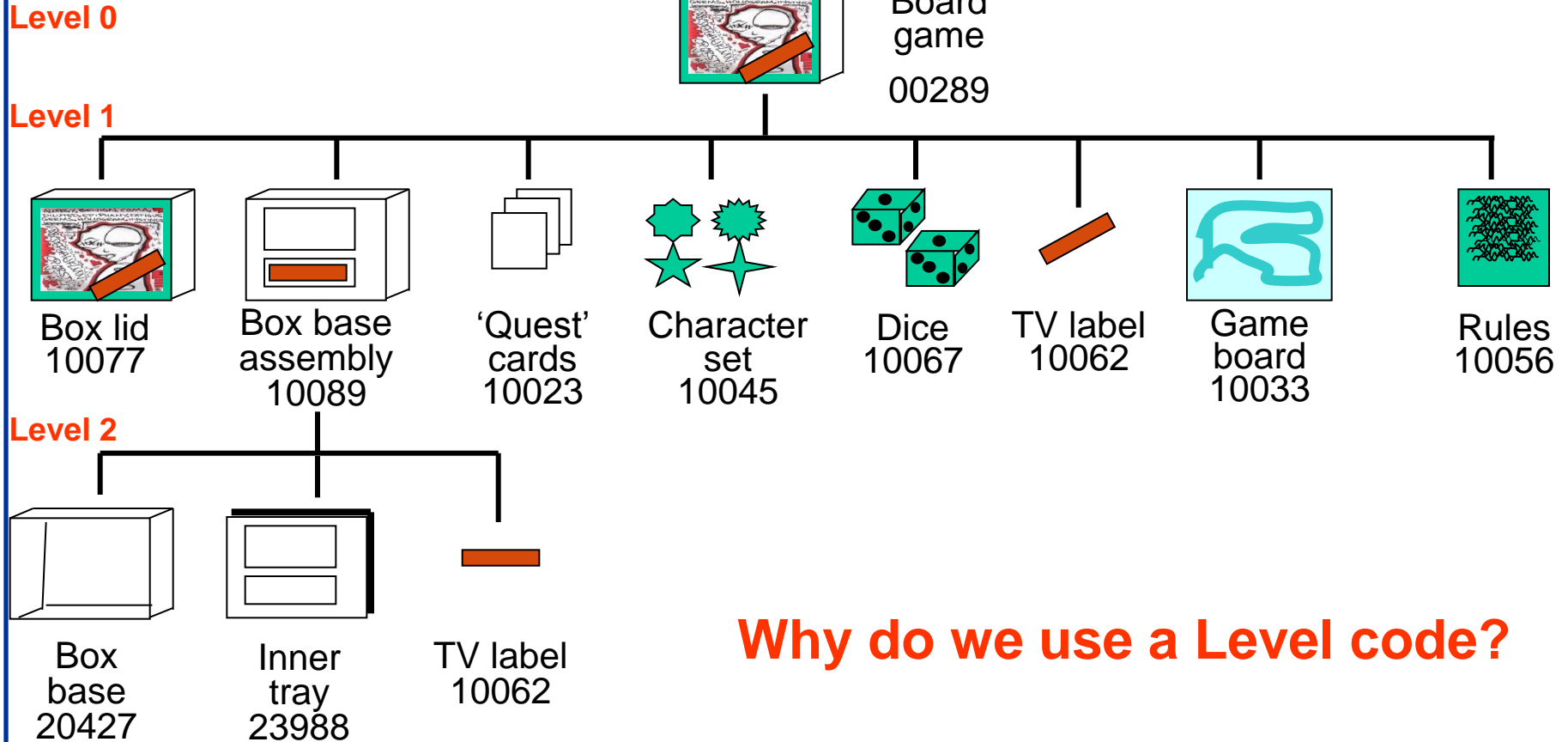


## ERP structure for the sandwich company



8

# Product structure for a simple board game



**Why do we use a Level code?**



# Lecture 6 **Planning and Control**



## **15 Lean synchronization**



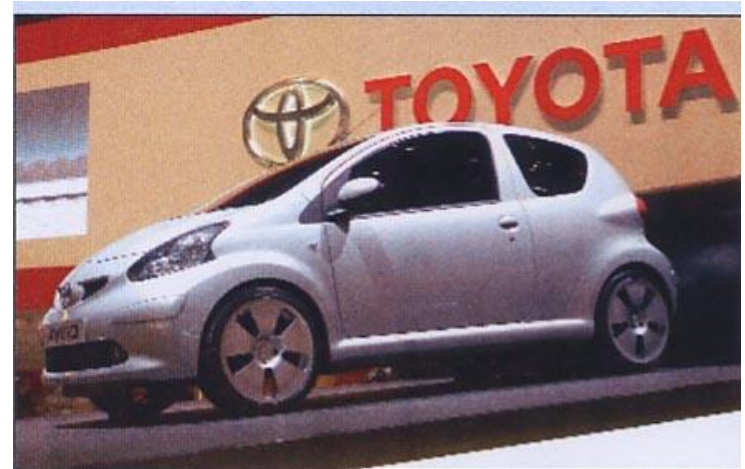
‘The key principle of **lean operations** is relatively straightforward to understand: it means moving towards the **elimination of all waste** in order to develop an operation that is faster and more dependable, produces higher quality products and services and, above all, operates at low cost.’



11

## Synonyms

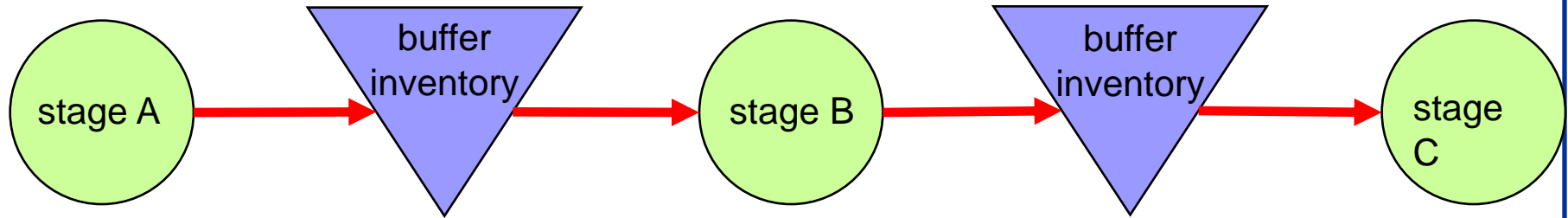
- continuous flow manufacture
- high value-added manufacture
- stockless production
- low-inventory production
- fast-throughput manufacturing
- lean manufacturing
- Toyota production system
- short cycle time manufacturing



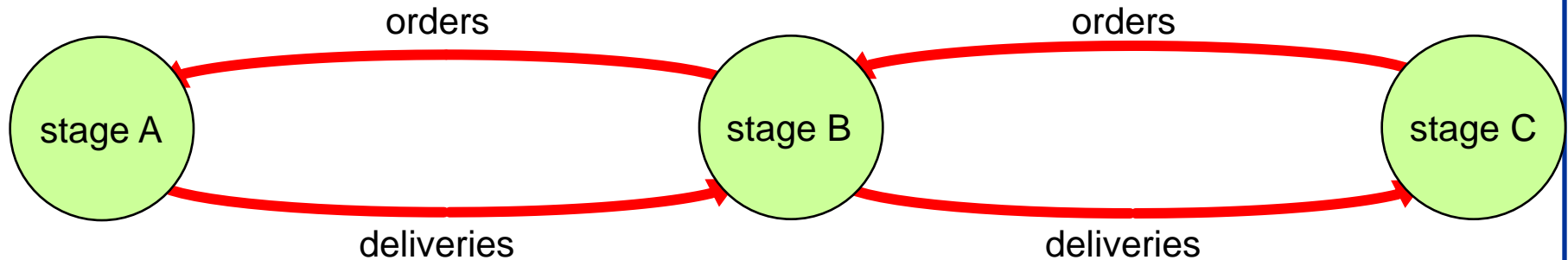
Source: Corbis/Denis Balihouse

# JIT material flow

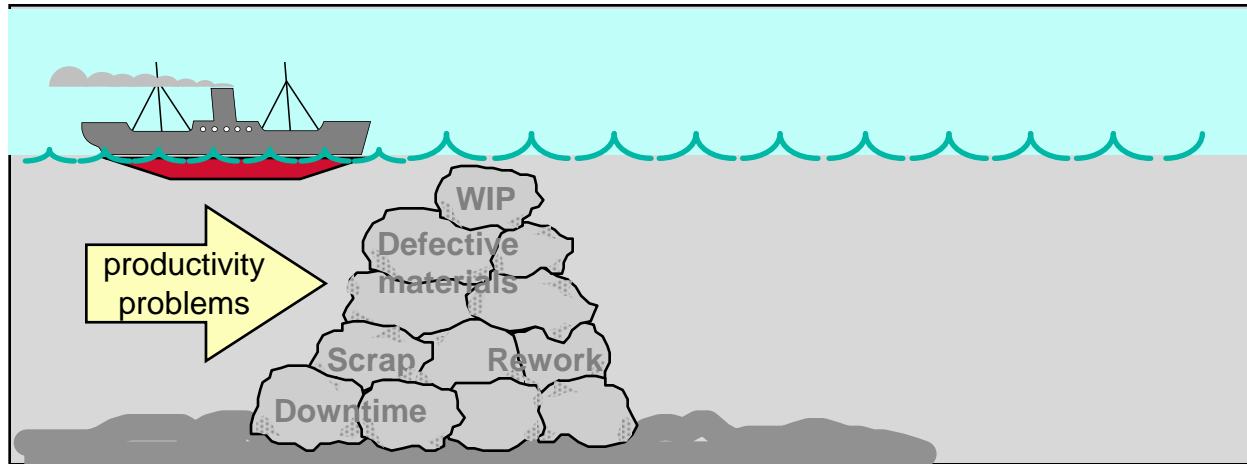
Traditional approach



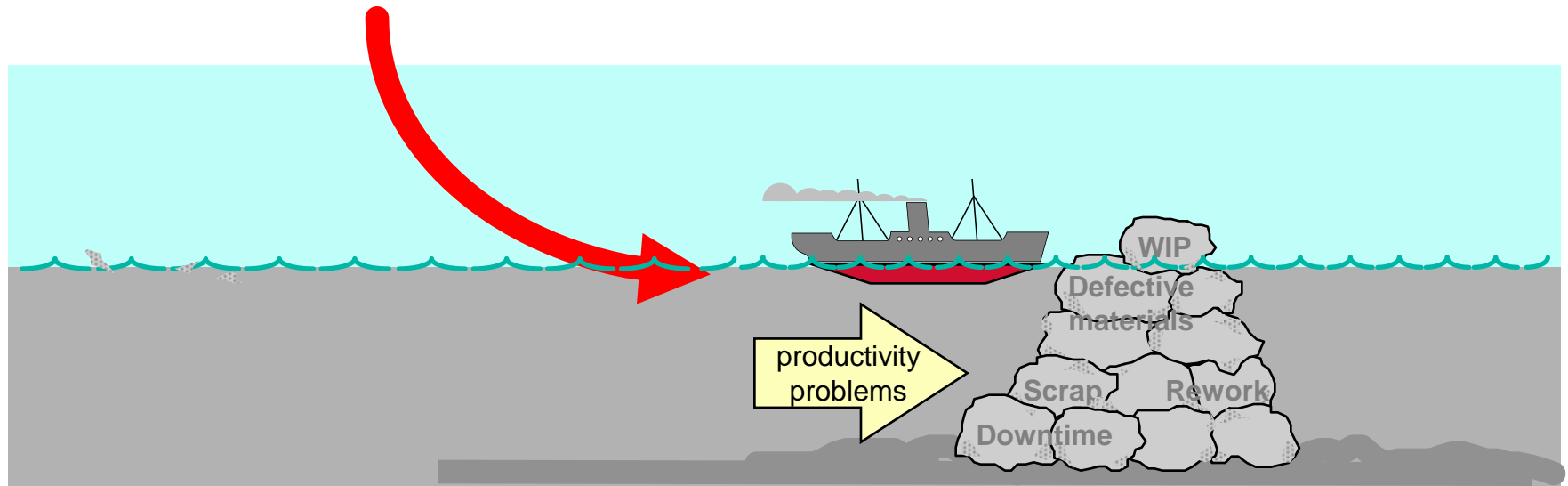
JIT approach



# The problem with inventory

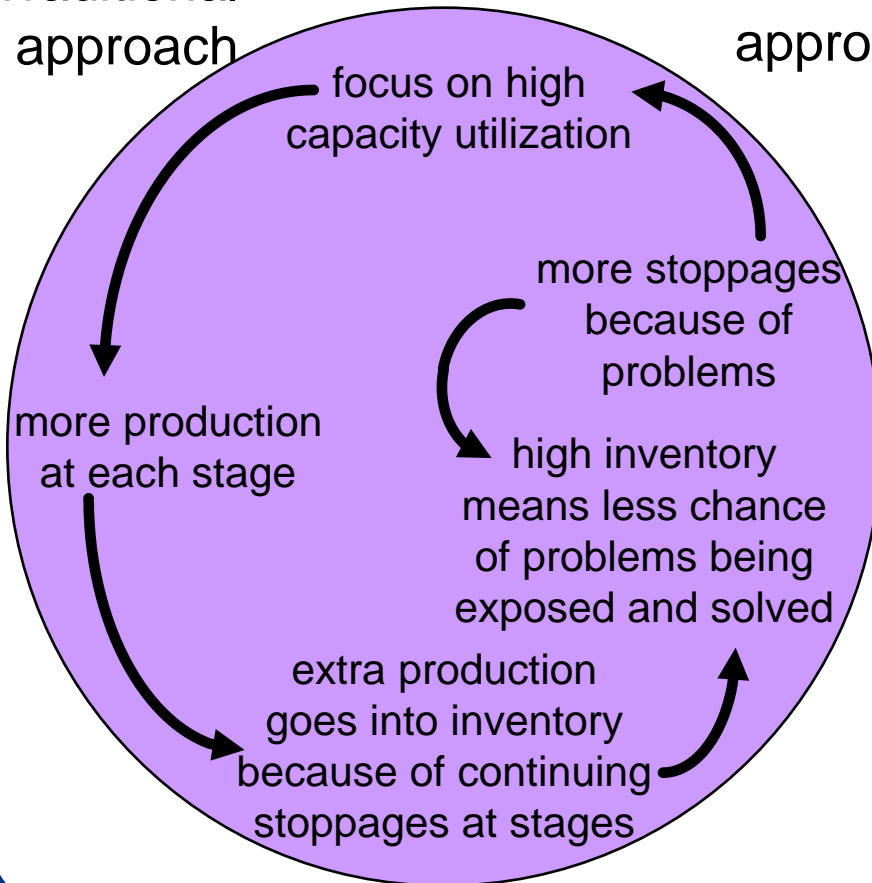


Reduce the level of inventory (water) to reveal the operations' problems

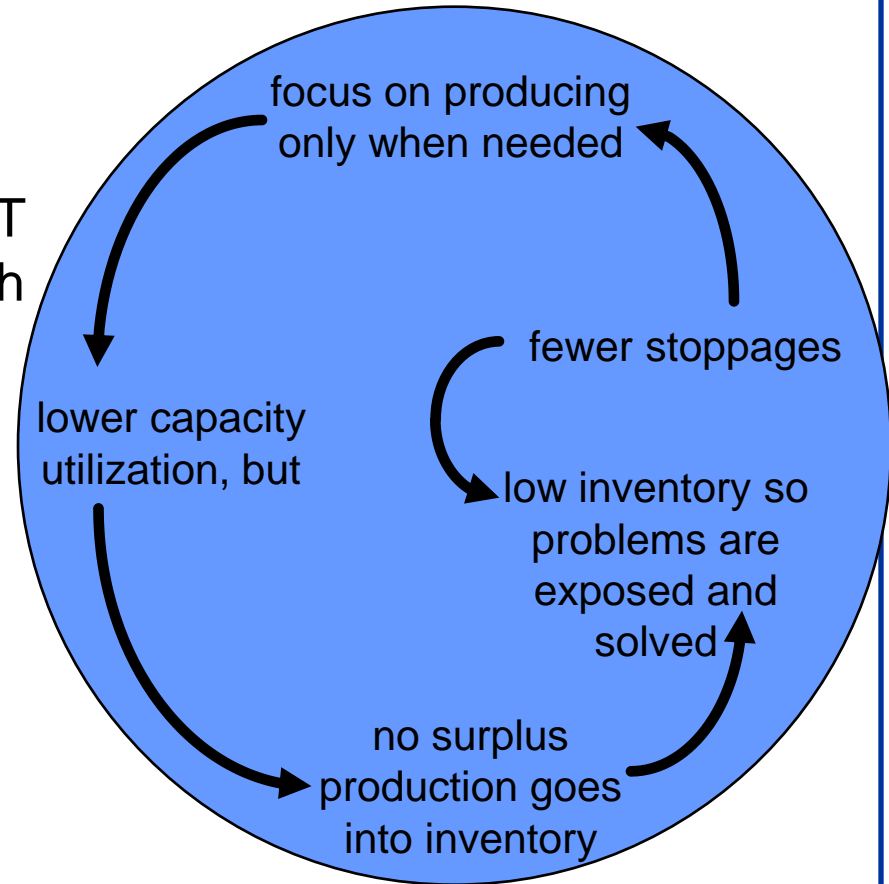


# JIT and capacity utilization

Traditional approach



JIT approach










15

## Waste (*muda*)

Which of these symbols signify non-value-adding activities?

### Activities:

-  operation
-  movement
-  inspection
-  delay
-  storage

### Types of waste:

-  over-production
-  waiting time
-  transport
-  process
-  inventory
-  motion
-  defective goods

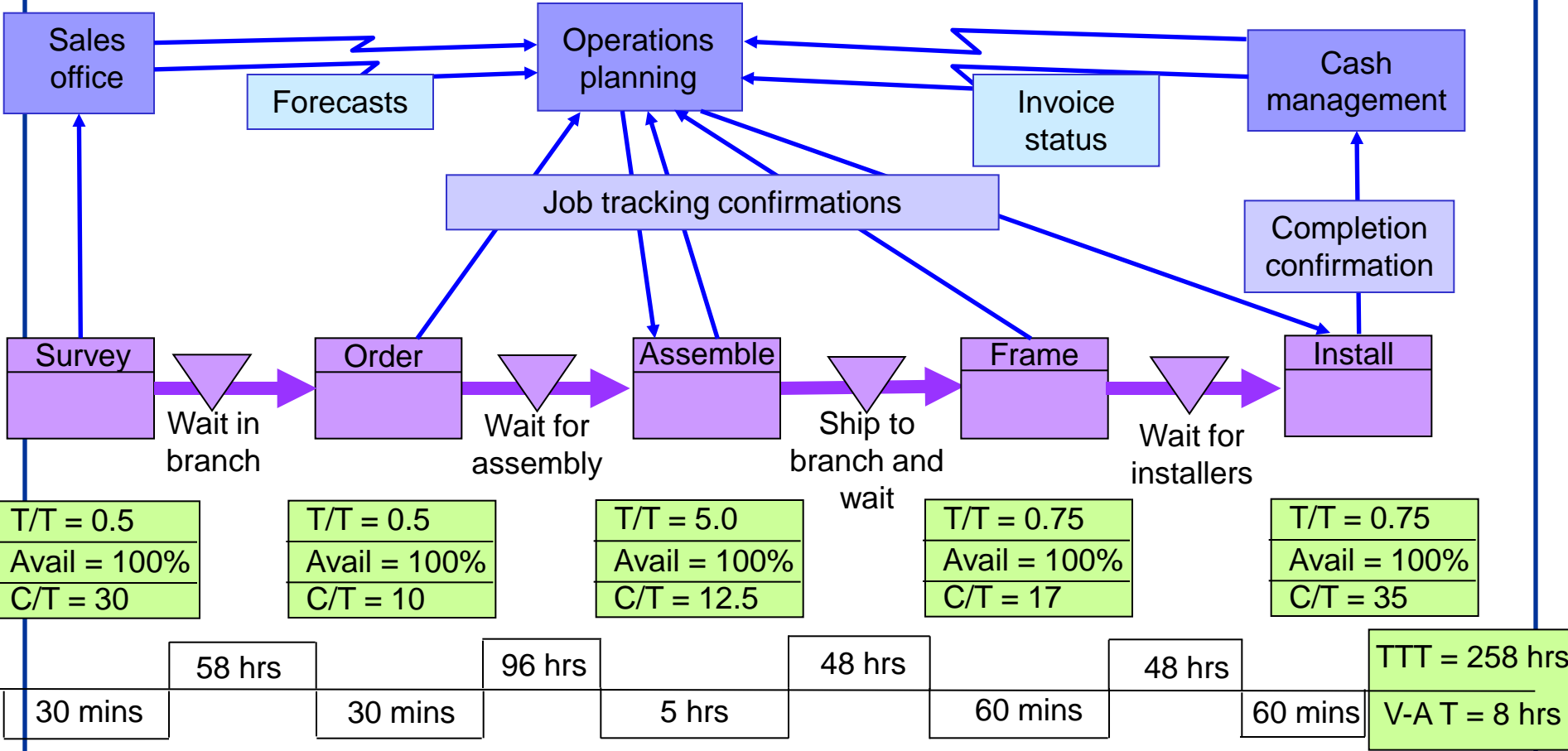
→ influencing the throughput efficiency



16

# 'Value stream' map for an industrial air-conditioning installation service

T/T = Task time  
 TTT = Total throughput  
 V-A T = Value-added time  
 C/T = Cycle time



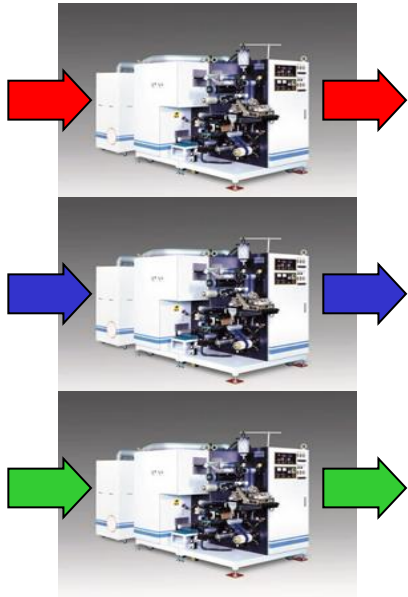




17

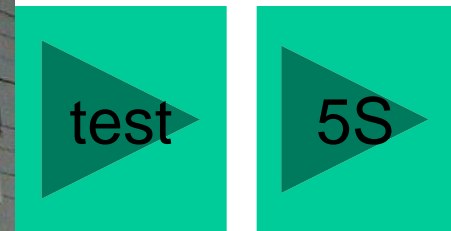


## Small machines



- easy to move (layout)
- quick set-up
- flexible scheduling options
- cheaper tooling
- planned maintenance easier
- fewer set-ups needed

**Using several small machines rather than one large one allows simultaneous processing, is more robust and is more flexible**

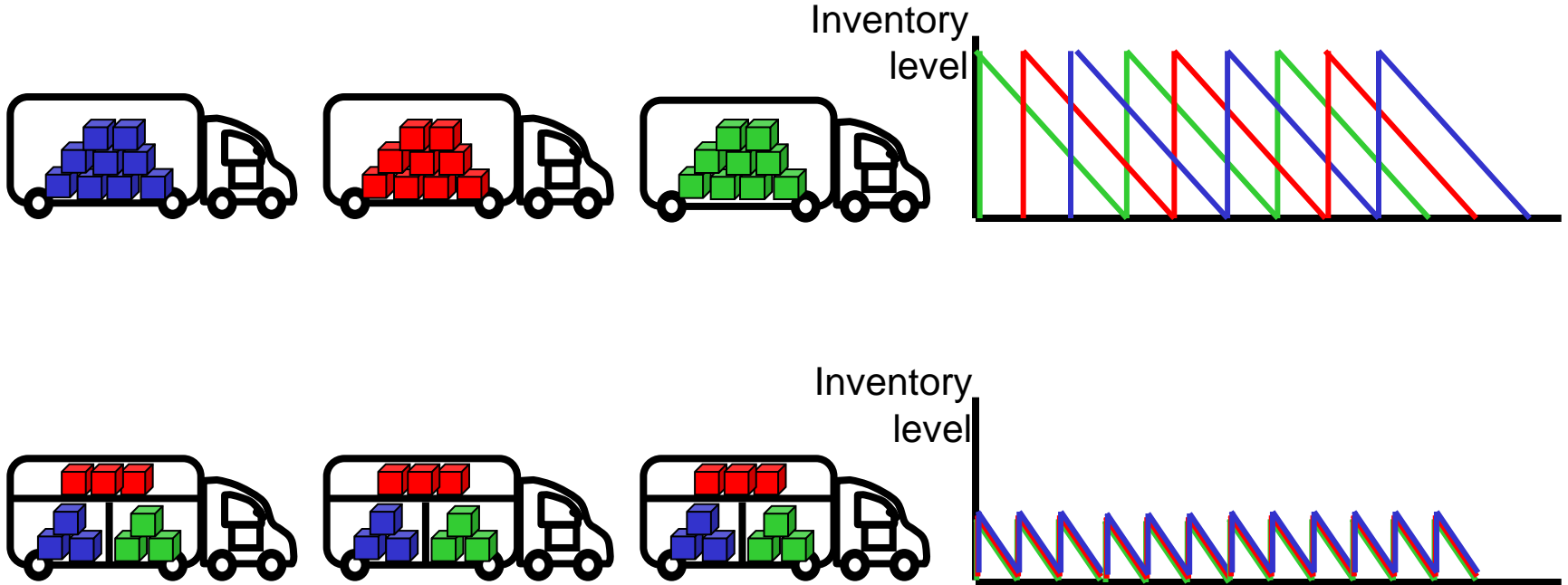


1. Sort (**Seiri**) Eliminate what is not needed and keep what is needed.
2. Straighten (**Seiton**) Position things in such a way that they can be easily reached whenever they are needed.
3. Shine (**Seiso**) Keep things clean and tidy; no refuse or dirt in the work area.
4. Standardize (**Seiketsu**) Maintain cleanliness and order – perpetual neatness.
5. Sustain (**Shitsuke**) Develop a commitment and pride in keeping to standards.



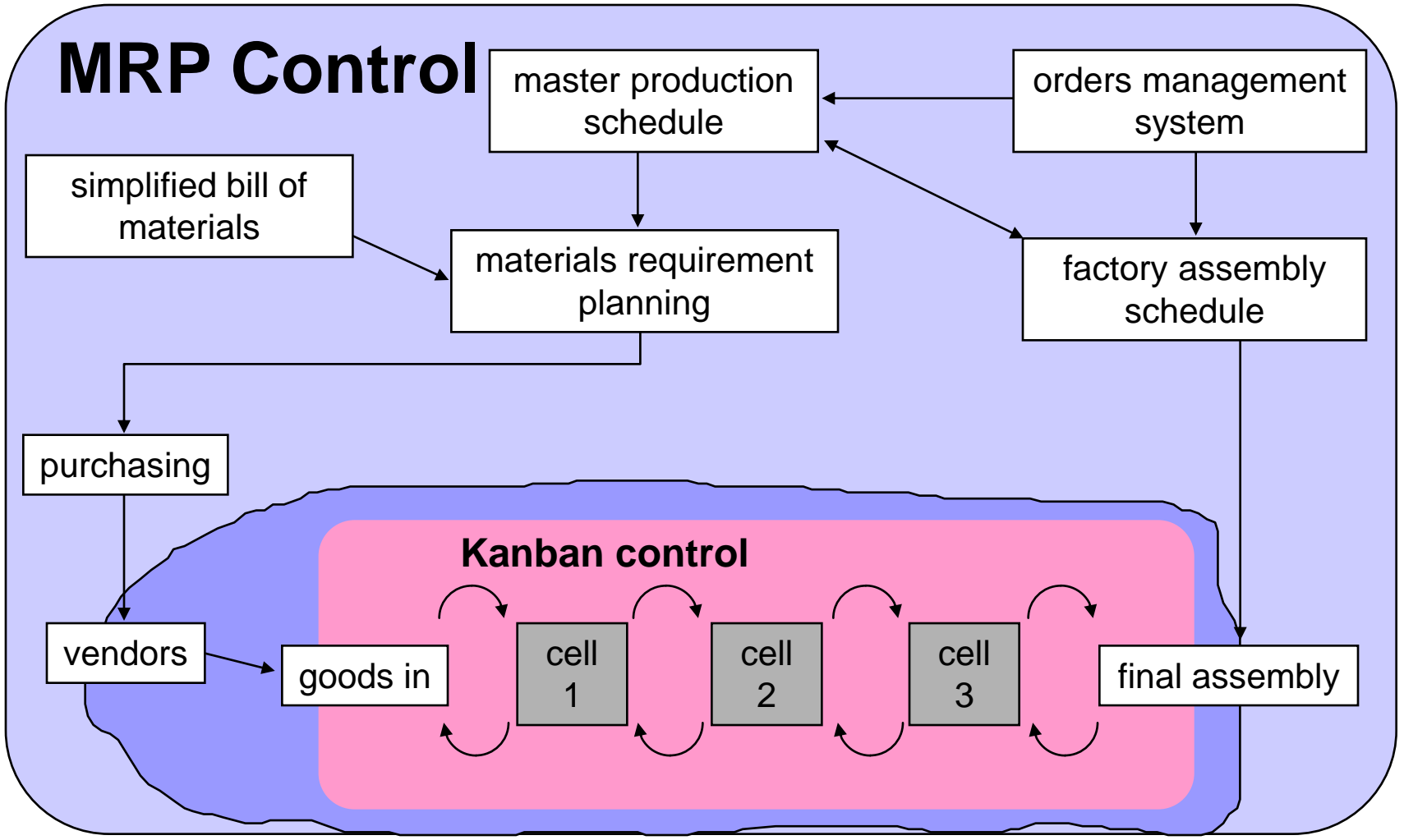
19

# Delivering smaller quantities more often can reduce inventory levels





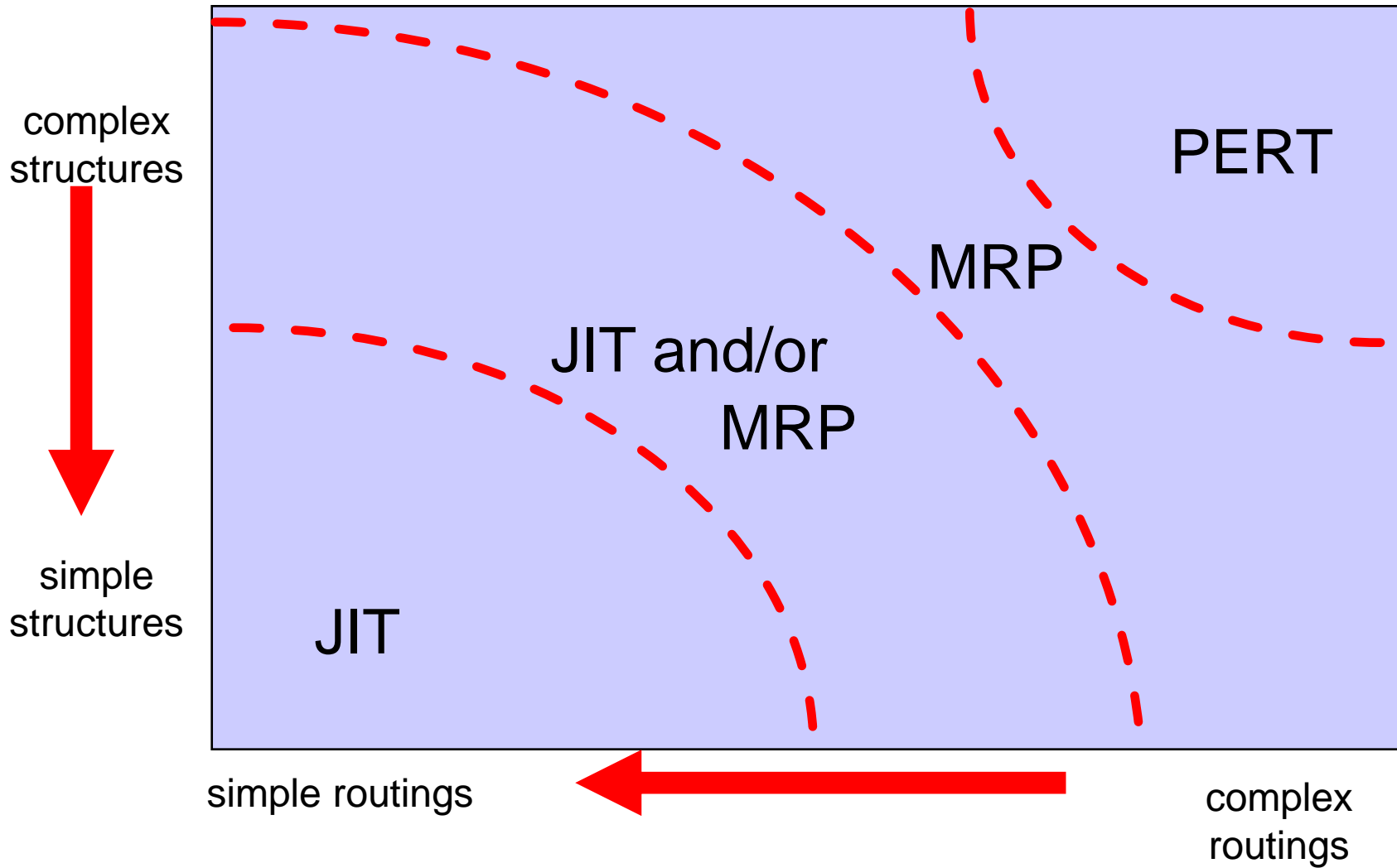
# JIT and MRP - control





21

# JIT, MRP, or both?

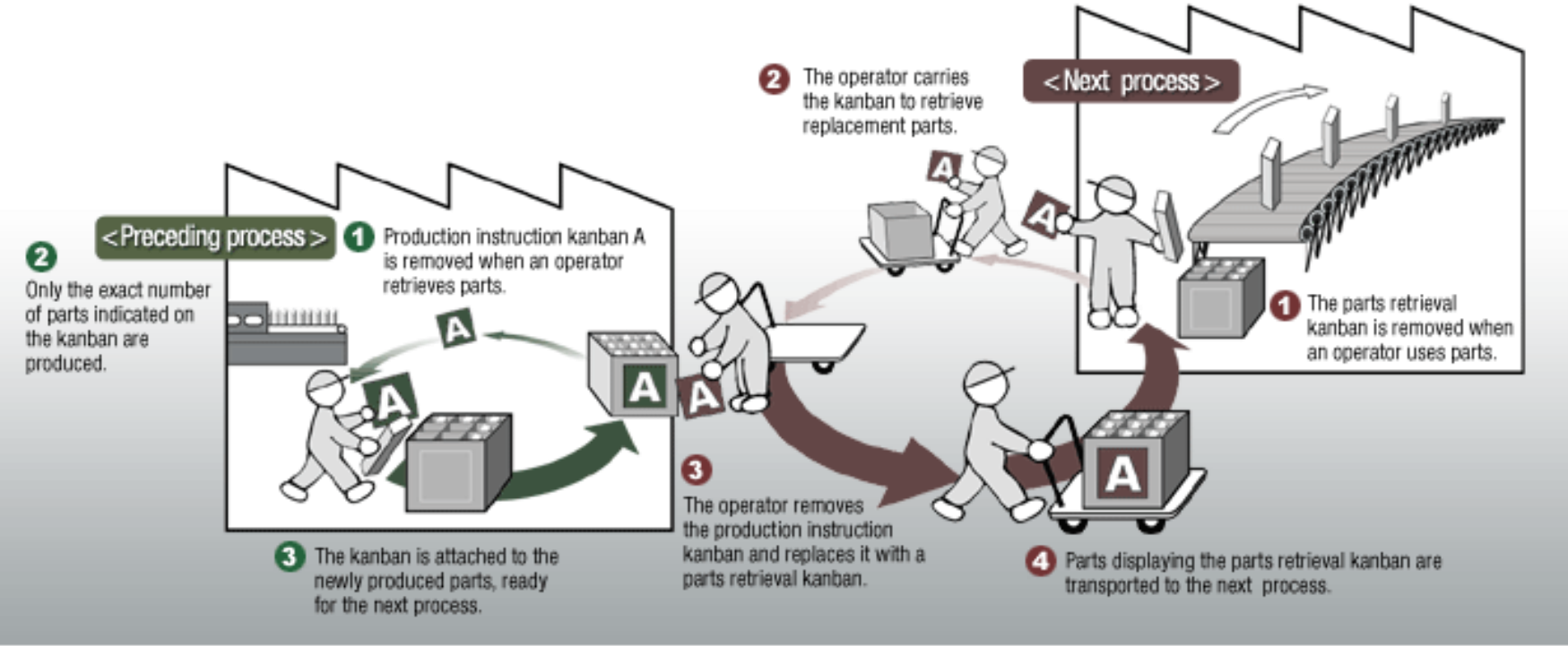


# Conceptual diagram of the kanban system

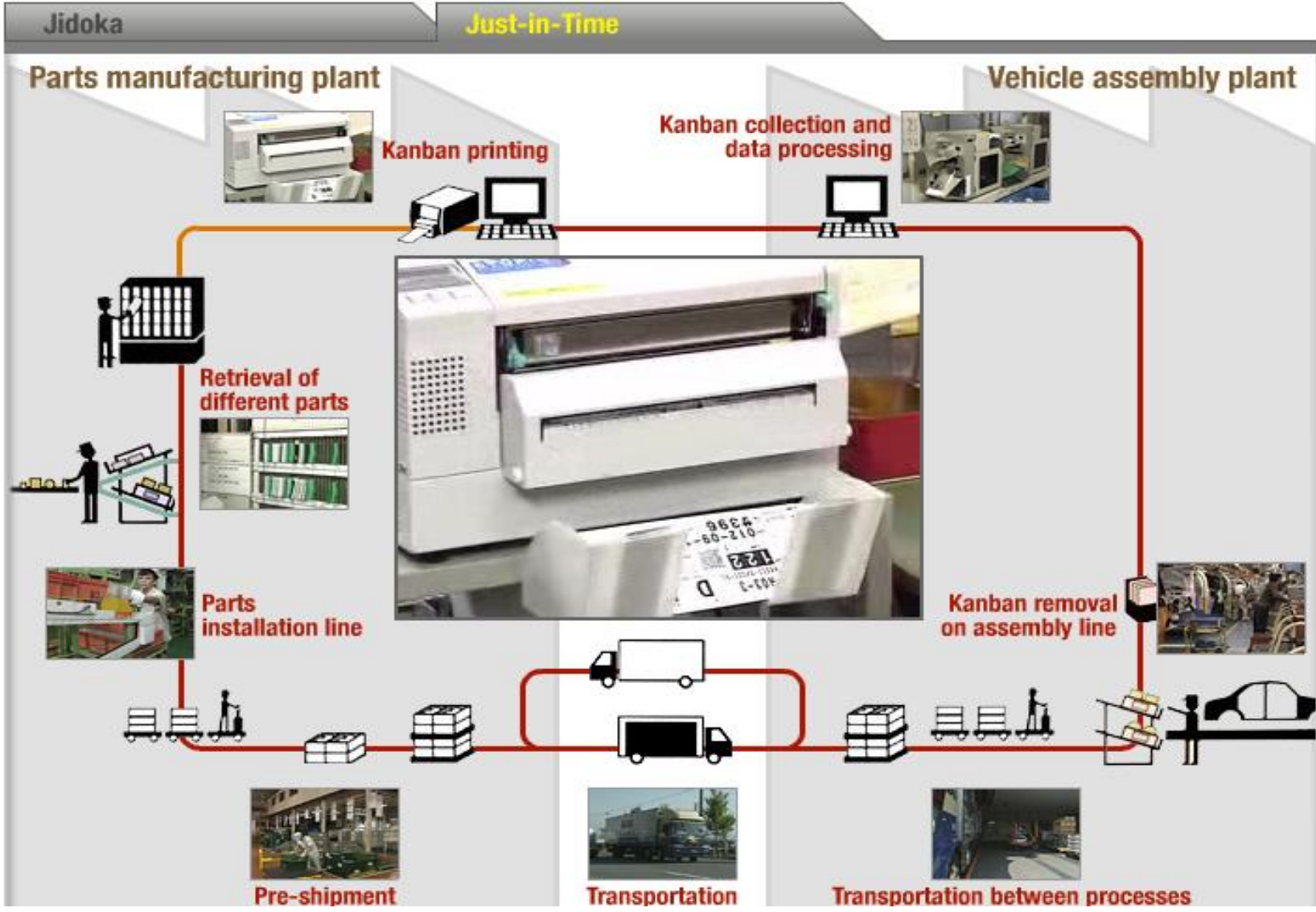
Conceptual diagram of the Kanban System

## Operational Flow of Production Instruction Kanban A

## Operational Flow of Parts Retrieval Kanban A







**Sakichi Toyoda (1867~1930)**

Toyoda Power Loom equipped with a new weft-breakage automatic stopping device (developed in 1896)

World's first automatic loom with a non-stop shuttle-change motion, the Type-G Toyoda Automatic Loom (developed in 1924)

**Kiichiro Toyoda (1894~1952)**

Drawing on his experience of introducing a flow production method using a chain conveyor into the assembly line of a textile plant (completed in 1927) with a monthly production capacity of 300 units, Kiichiro Toyoda also introduced this method into the body production line at Toyota Motor Co., Ltd.'s Koromo Plant (present day)



Type-G Automatic Loom assembly line



Toyota Standard Sedan Model AA announced in 1936

**Eiji Toyoda (1913~)**

By ensuring thorough implementation of jidoka and the Just-in-Time method, Eiji Toyoda increased workers' productivity in adding value and realized the Toyota Production System, which enabled Toyota to compete head-on with companies in Europe and the U.S.

**Taiichi Ohno (1912~1990)**

With strong backing from Eiji Toyoda, Taiichi Ohno helped establish the Toyota Production System, and built the foundation for the Toyota spirit of "making things" by, for example, creating the basic framework for the Just-in-Time method.