Industrial Process Development, PPU413

2018-04-03

San Giliyana

Agenda

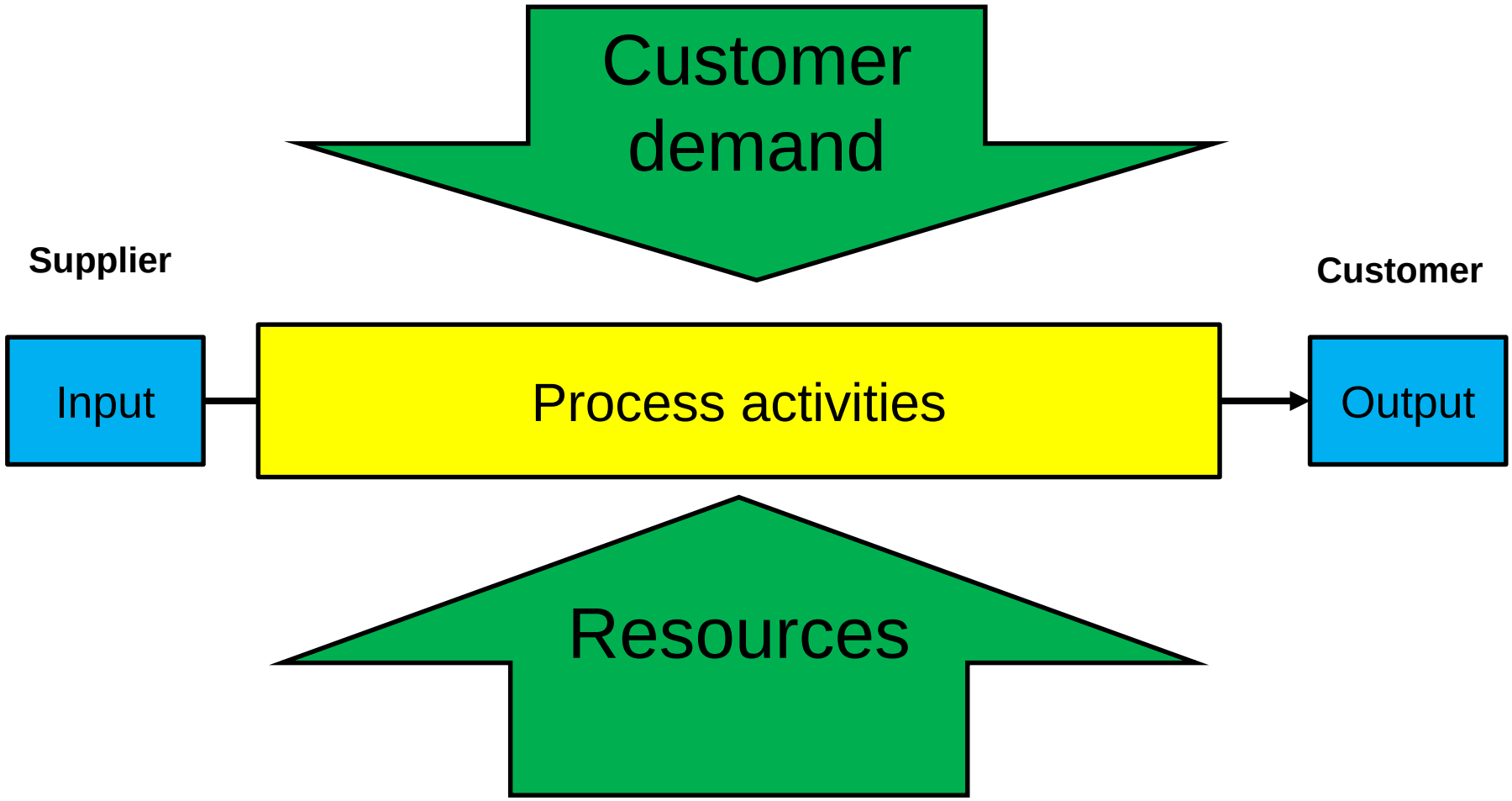
- Some types of processes
- Process mapping
- Some tools for process mapping
- Value adding activities in processes
- Process improvement
- Some tools for process improvement

So, what is a process?

What is a process?

- **According to Bergman and Klefsjö (2003, p.416) is a process:**
  - a network of activities repeated in time.
  - a network of activities that creating value for an external or internal customers in a production system.

Overview


Customer demand
Supplier
Customer
Input
Process activities
Output
Resources

Some types of processes

- Main process
- Supporting process
- Management process

Some types of processes

- **Main process**
  - Have external customers.
  - Should complete the demand from external customers.
  - Should add value to the products that organization presents.

- **Supporting process**
  - Have internal customers.
  - Supports the main process with resources, for example preventive and corrective maintenance.

- **Management process**
  - Have internal customers.
  - Develops the organization’s goals and strategies.
  - Improves the main process and supporting process.

Some types of processes

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  - The Production process
  - ffers
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- **Supporting process**
  - The Maintenance process
  - preventive and
- **Management process**
  - The Strategic planning process

So, how do we improve a process?

We can start with mapping a process

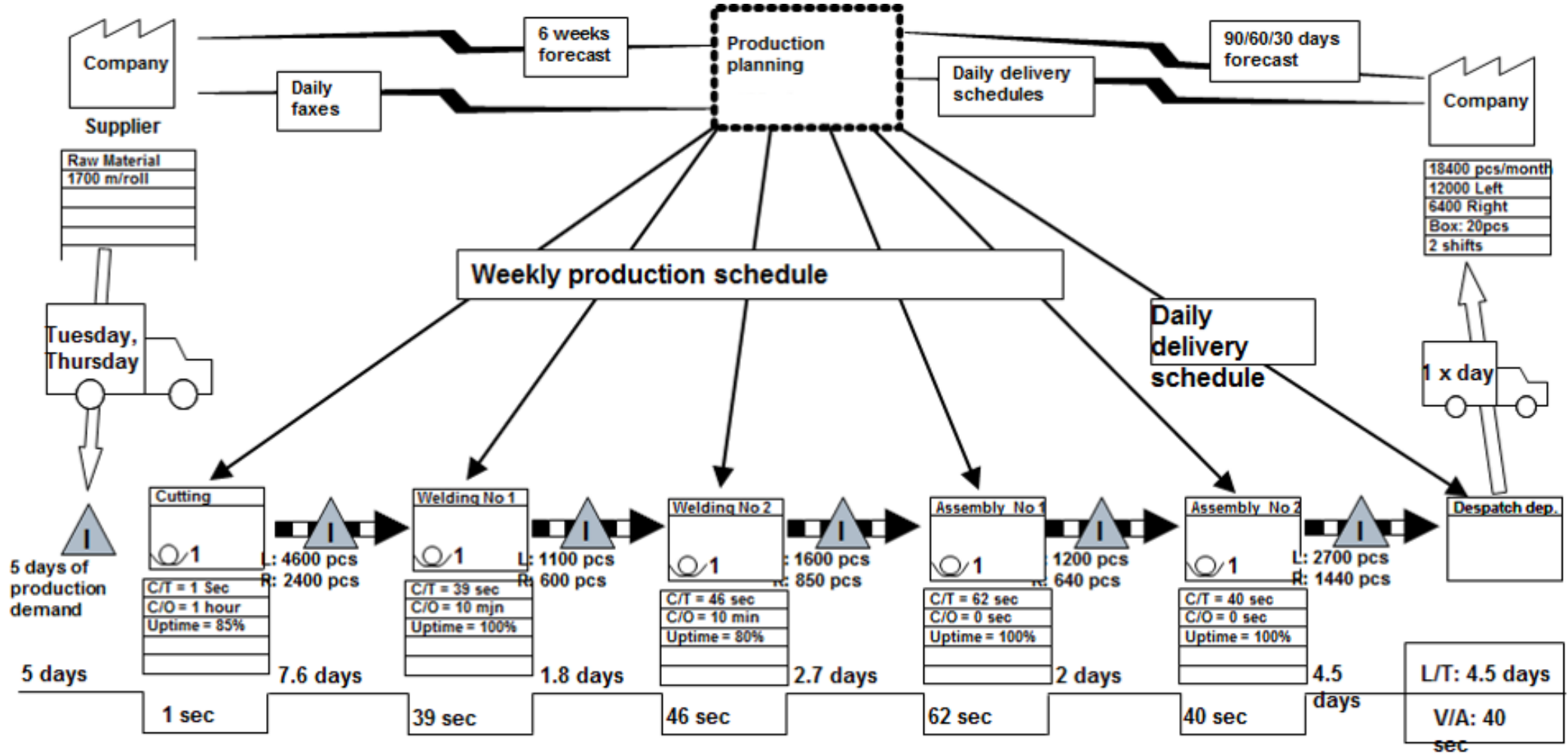
Process mapping

How do we map a process?

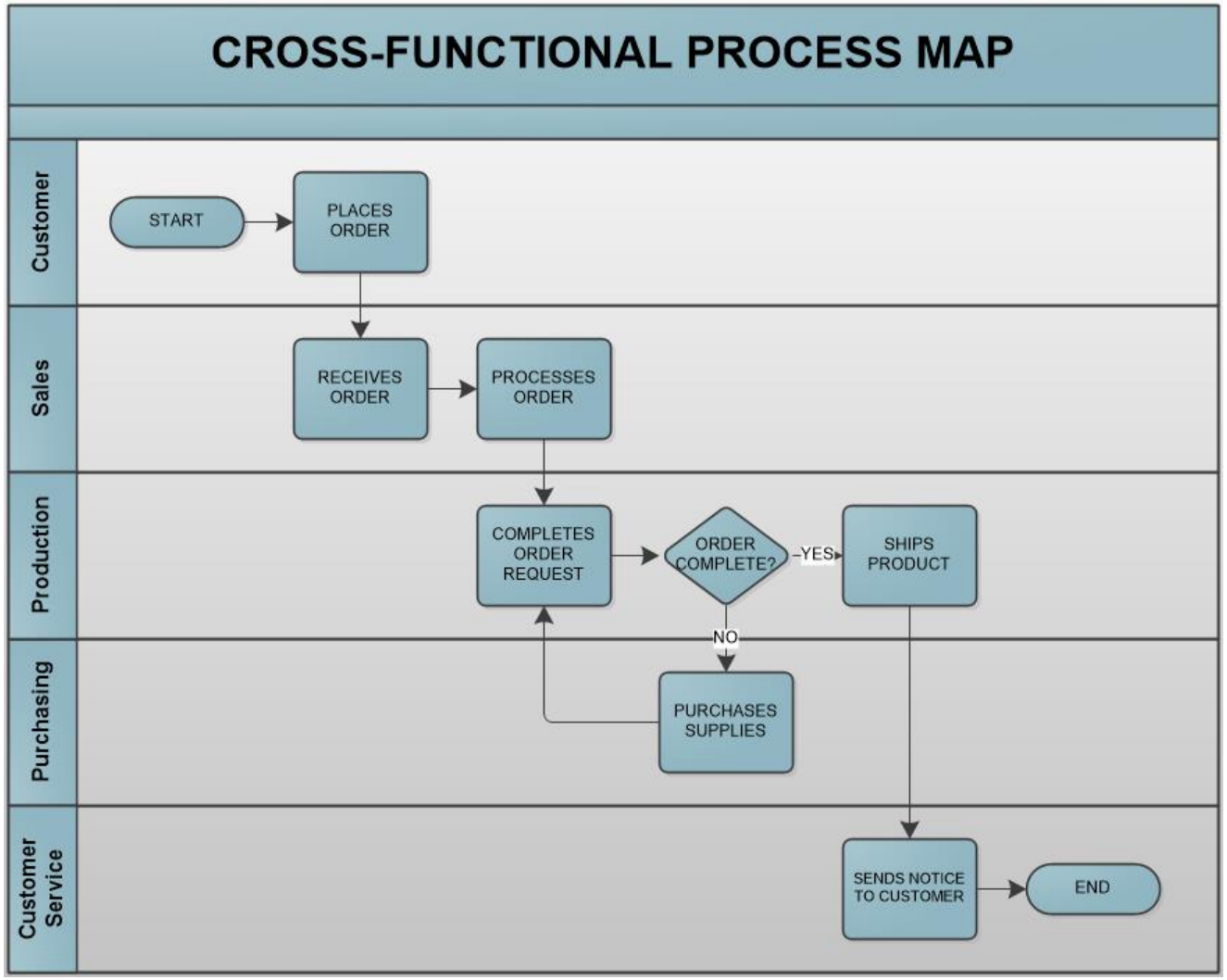
Tools for process mapping

- Value Stream Mapping
- Process Mapping
- Process Flow Chart
- SIPOC

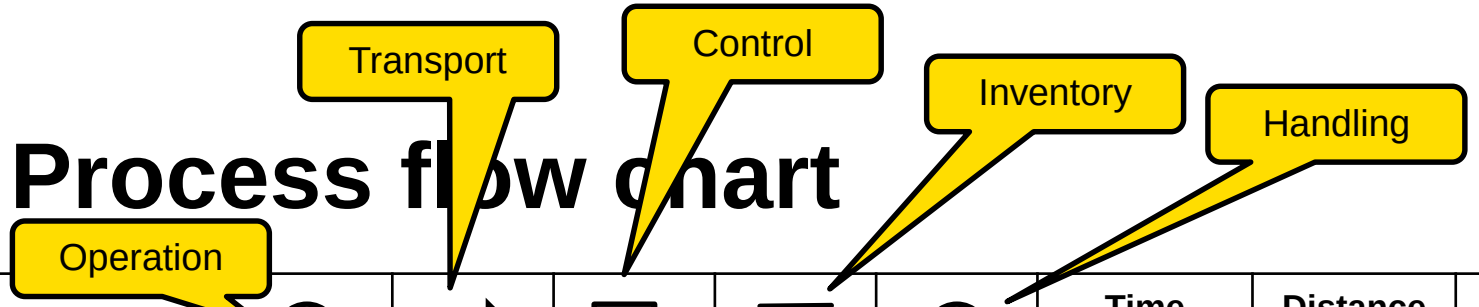
Value stream map



Process map


CROSS-FUNCTIONAL PROCESS MAP
Customer
Sales
Production
Purchasing
Customer Service
START
PLACES ORDER
RECEIVES ORDER
PROCESSES ORDER
COMPLETES ORDER REQUEST
ORDER COMPLETE?
YES
NO
SHIPS PRODUCT
PURCHASES SUPPLIES
SENDS NOTICE TO CUSTOMER
END

Process flow chart



Step	○	⇨	□	▽	◎	Time (hours)	Distance (m)	Value
To automated assembly		X					60	I
At automated assembly				X		6		I
Automated assembly	X					2		V
To control		X					70	I
At control				X		4		I
Control			X			4		S
To manual assembly		X					55	N
At manual assembly				X		8		N
Manual assembly	X					2		V
To control		X					70	N
At control				X		4		N
Control			X			4		
To wave soldering		X					70	
At wave soldering				X				
Wave soldering	X							
To additional assembly		X						
At additional assembly				X				
Additional assembly	X							
SUM:	4	6	2	6				

V = Value adding
N = Non Value adding
S = Supporting, Non Value adding
? = Value unknown

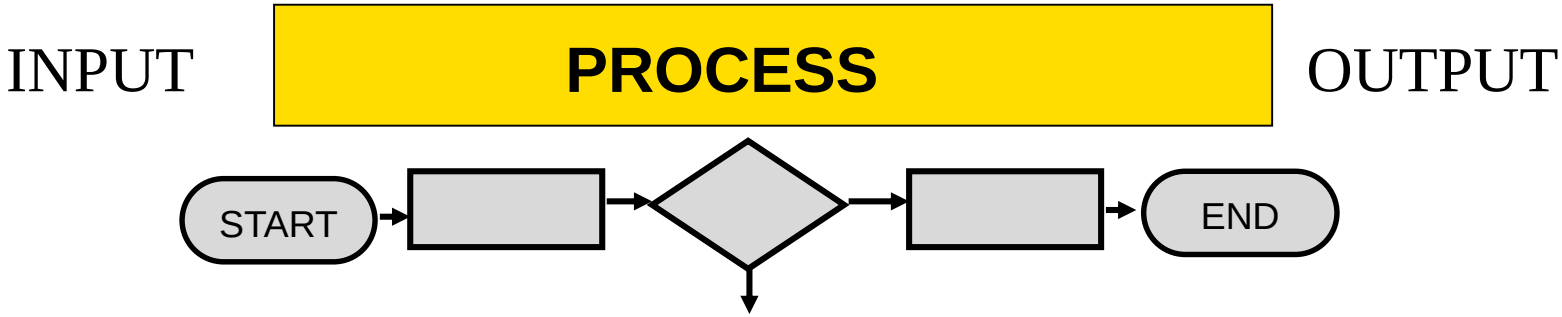
SIPOC

Suppliers	Inputs	Process	Outputs	Customers
• Storage • Sandvik • Fluid supplier • Power grid • Compressors	• Raw material • Tools • Cutting fluid • Electricity • Compressed air	Gear cutting	• Gears • Used tools • Metal chips	• Hardening dept. • Sandvik • Stena Recycling

SIPOC work order

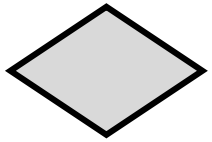
1. Name the process. (use verb/adjective.)
2. Define start and end of the process, or the aim of the process
3. Define the process output.
4. Define the customers of the process (Who recieves the various outputs of the process?)
5. Define the suppliers of the process. (Who feeds the process with its various inputs?)
6. Define the process input (What needs to be feed into the process in order to obtain the desired output?)
7. Define the 5-7 main activities.

Standard symbols



Oval – Indicates the start or end of a process.

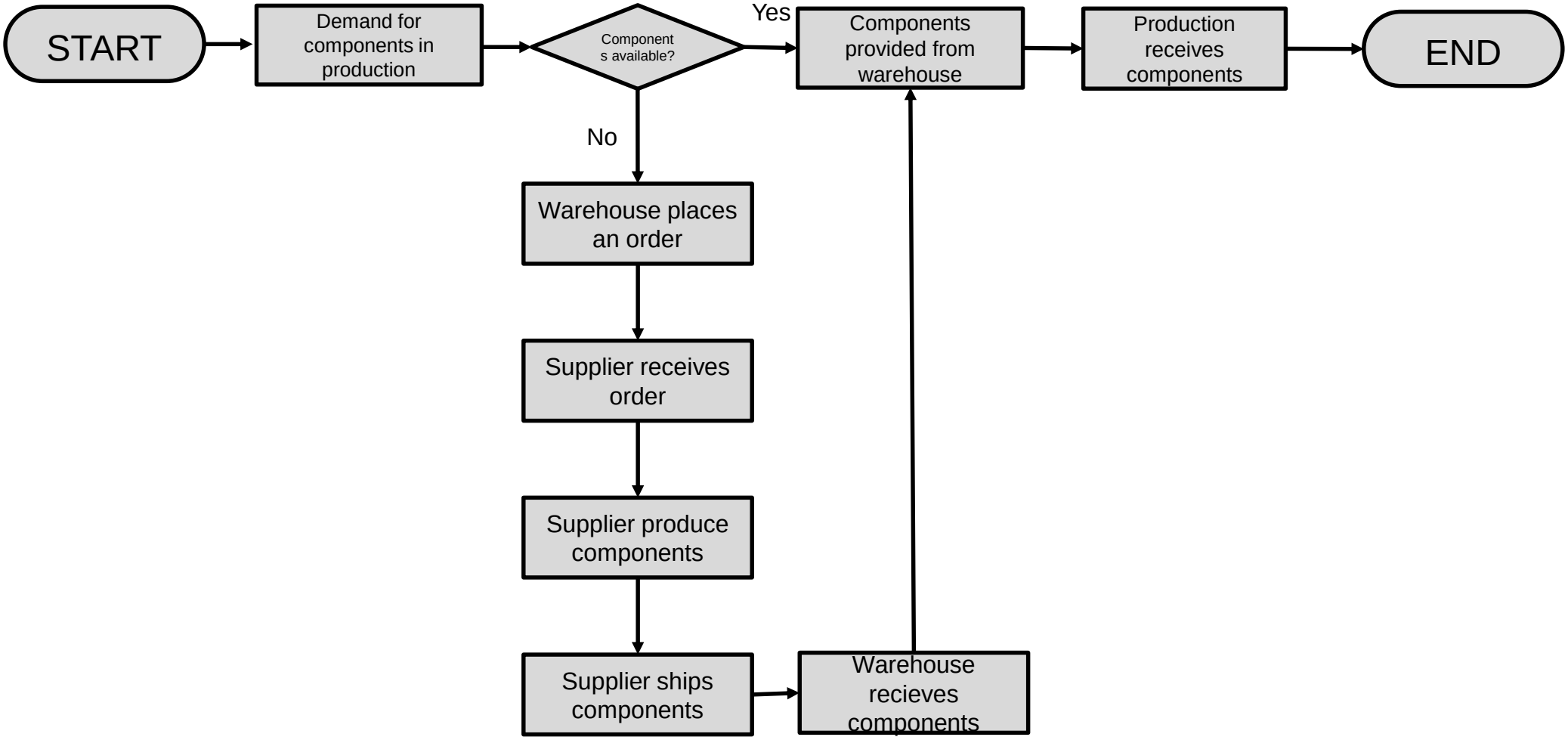
Rectangle – is a sub activity in the process



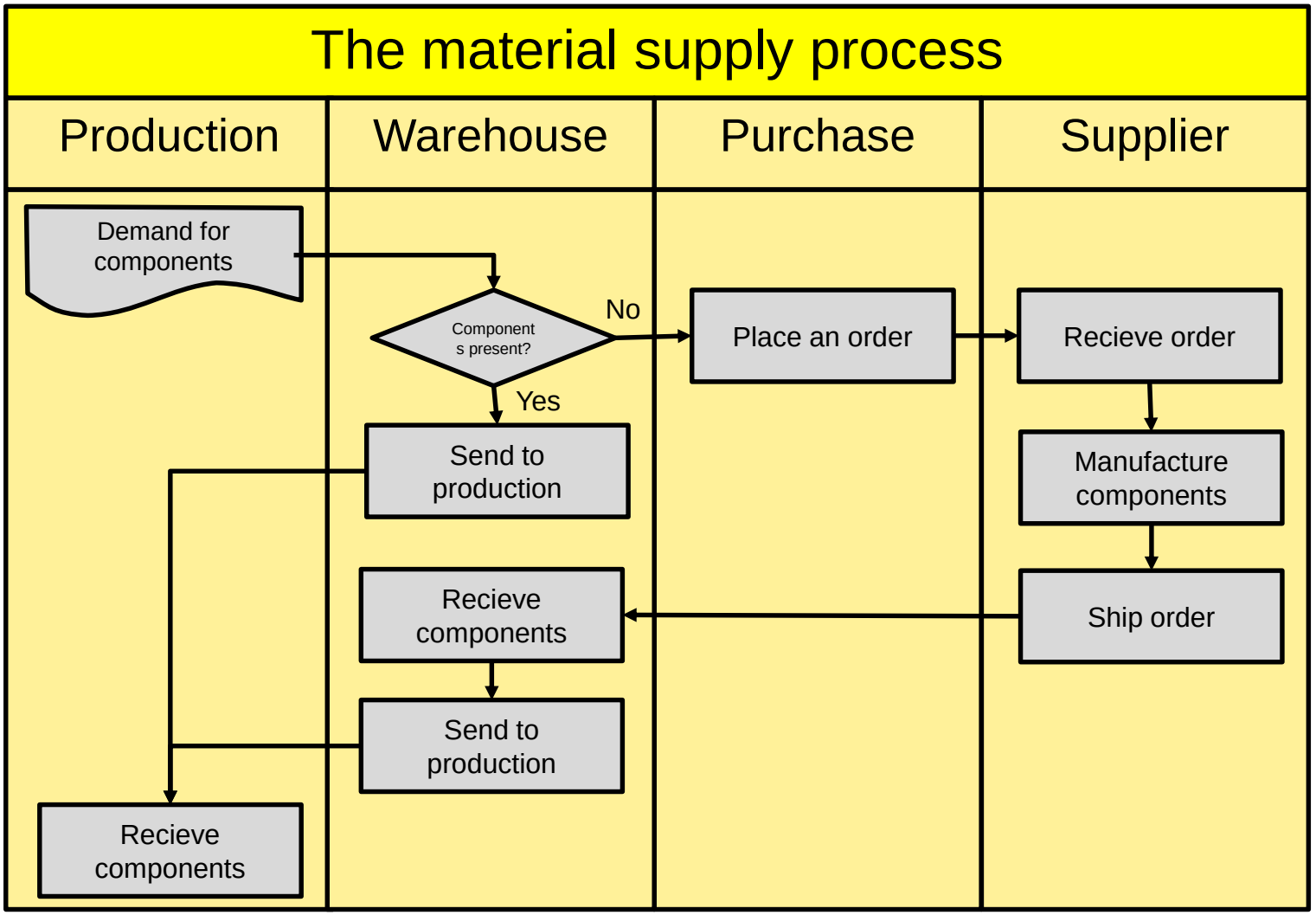
Diamond – Choice and decision. Often conditional, depending on Yes/No.

Arrow – Indicate the flow direction in the process

Example with standard symbols



Example with functional areas



Process mapping

Why should we map a process?

Process mapping

- Provides an overview of the process.
- Provides a common view of the process.
- Indicates wich parts of the process that add value.
- Helps us identifying weaknesses in the process
- Helps us defining process times
- Helps us identifying bottlenecks

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Which parts and activities add value?

Logistics

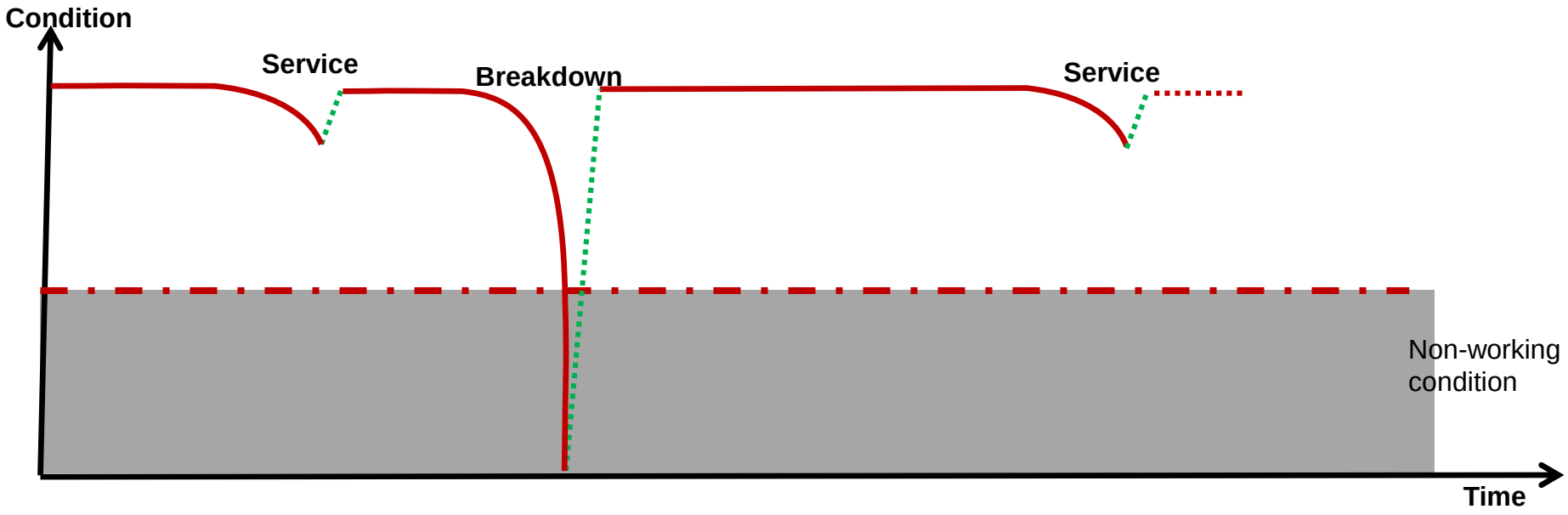
Is logistics a value adding activity?

The value adding in logistics

- Inventory = time value
- Transportation = place value

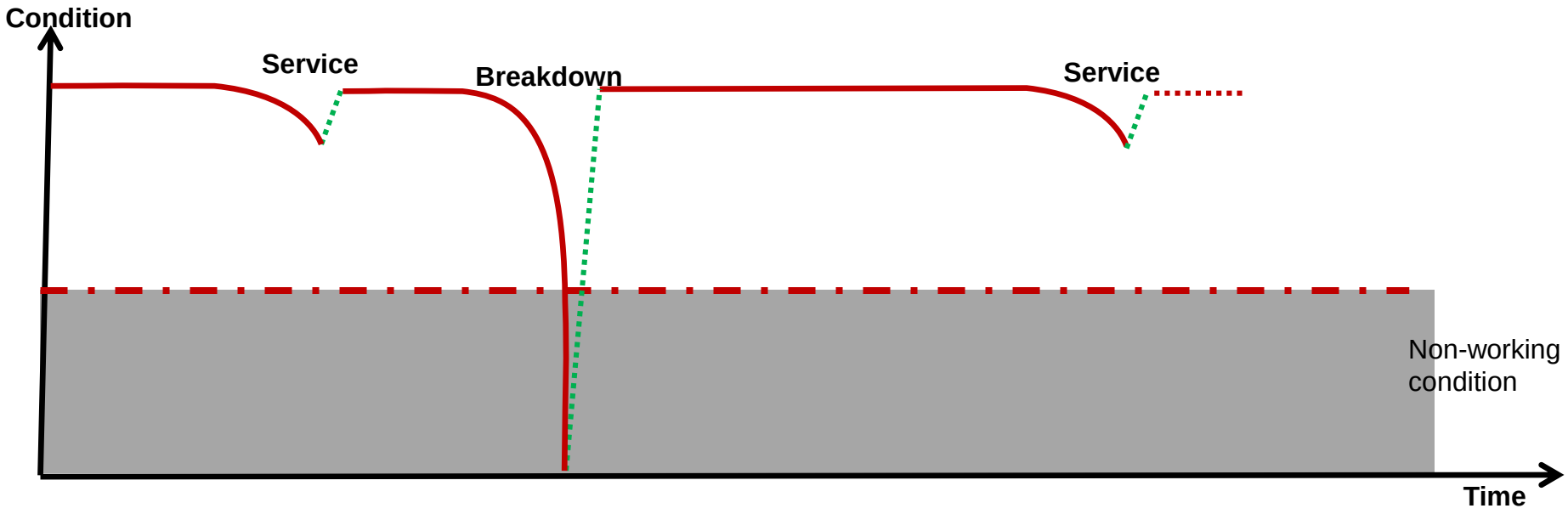
Maintenance

Is maintenance a value adding activity?



Maintenance

- Maintenance restores availability
- Maintenance is benefit for the customer, for example production/assembly
- Maintenance not adding new value, just restores the availability, so we can contiue produce



Quality

Is quality a value adding activity?

Quality

- ”Quality is free. It’s not a gift, but it’s free. The ”unquality” things are what cost money”.

(Phil Crosby)

Process mapping

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The improvement potential!

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How do we improve a process?

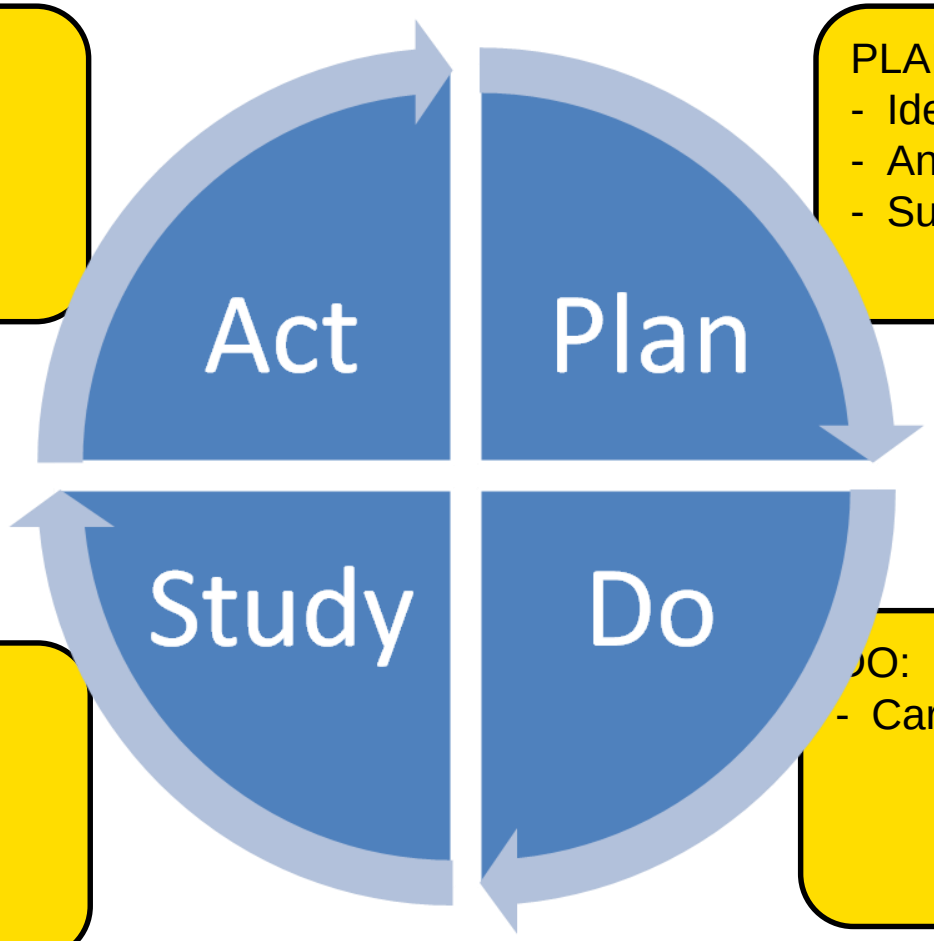
Tools for process improvement

- PDSA
- DMAIC

PDSA

ACT:
- Standardization and improvement.

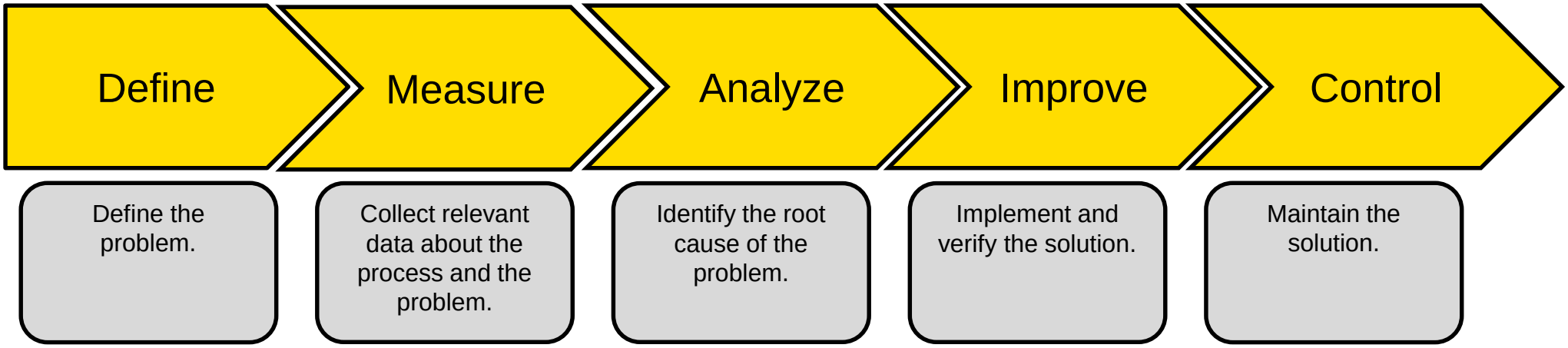
PLAN:
- Identify the problem.
- Analyze the problem.
- Suggest solutions.



STUDY:
- Collect data.
- Analyze data.

DO:
- Carry out the solution.

DMAIC


Define
Measure
Analyze
Improve
Control
Define the problem.
Collect relevant data about the process and the problem.
Identify the root cause of the problem.
Implement and verify the solution.
Maintain the solution.

Transformation system

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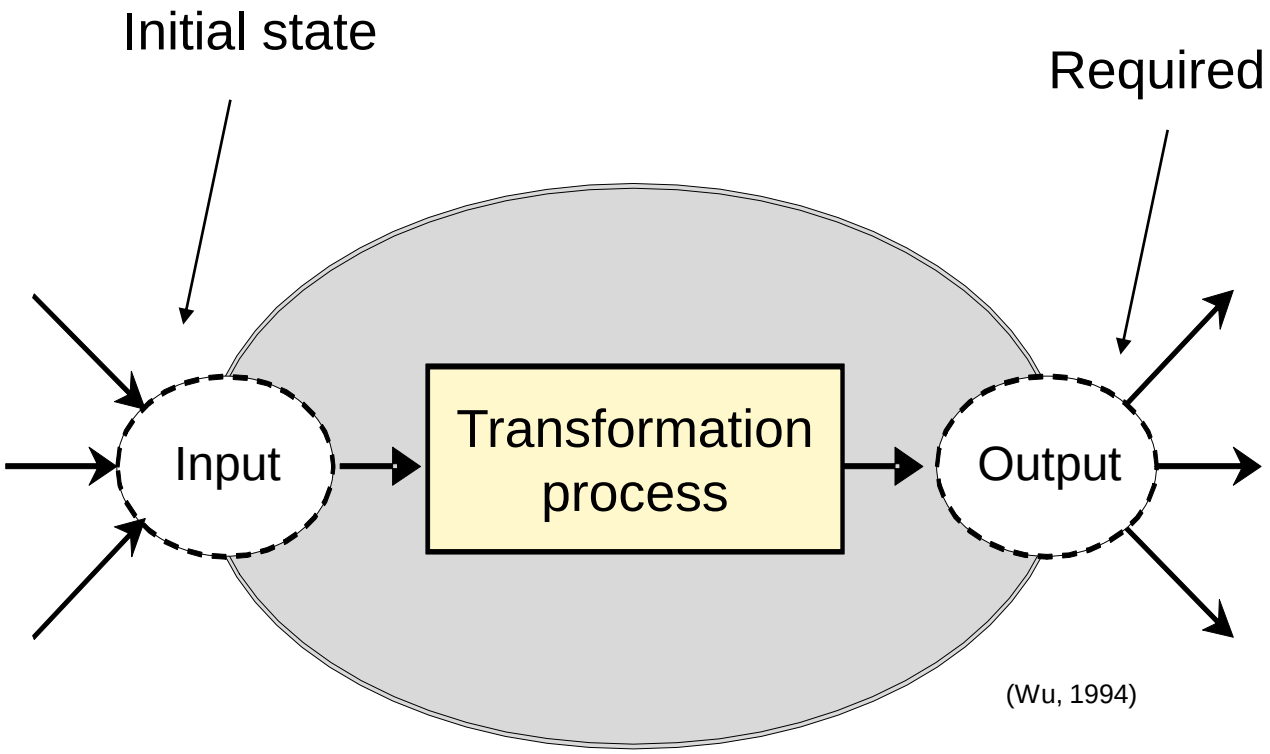
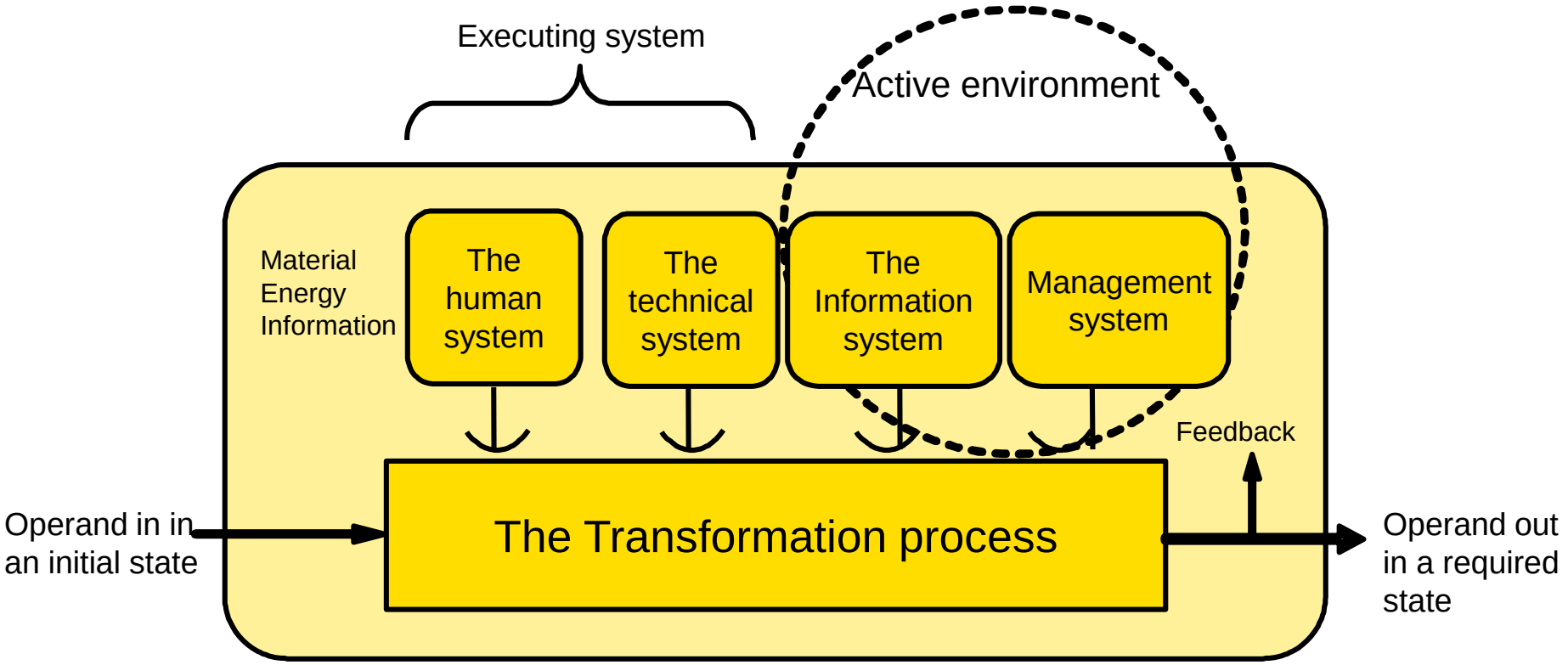
A production system is a transformation system

Transformation system



(Wu, 1994)

A model of a transformation system



Transformation system

(Hubka och Eder, 1988)

Five ways of transformation

- Separation
- Joining
- Removal
- Shaping
- Change of properties

(Mattsson and Jonsson, 2003)

Five ways of transformation

- **Separation**
  - Separation is about producing different items from one article, for example producing of gasoline and kerosene from crude oil.

Five ways of transformation

- **Joining**
  - Several items are joined to become one larger product, for example gearbox assembly.

Five ways of transformation

- **Removal**
  - Shape change on the article by removing material, for example manufacturing of shafts by turning.

Five ways of transformation

- **Shaping**
  - Shape change of the article by transformation of the material mass, for example casting.

Five ways of transformation

- **Change of properties**
  - Changing an article’s properties without changing its shape, for example hardening.

Questions/Comments?