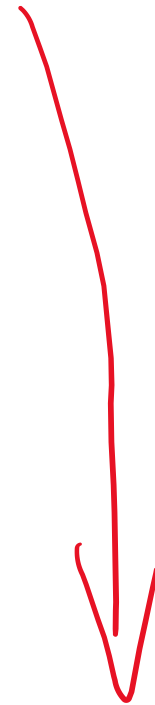


**Push**

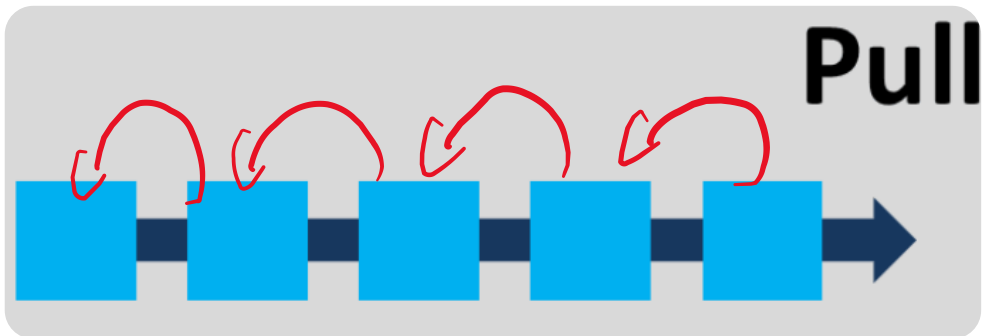


One of the LEAN  
approaches  
PULL



# Push - Pull production principle

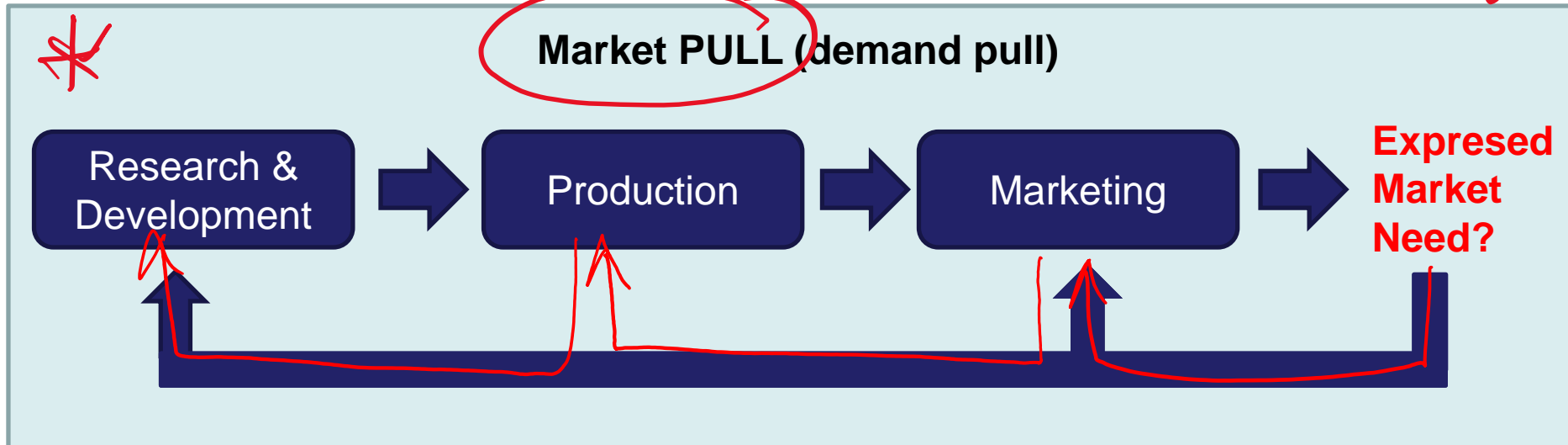
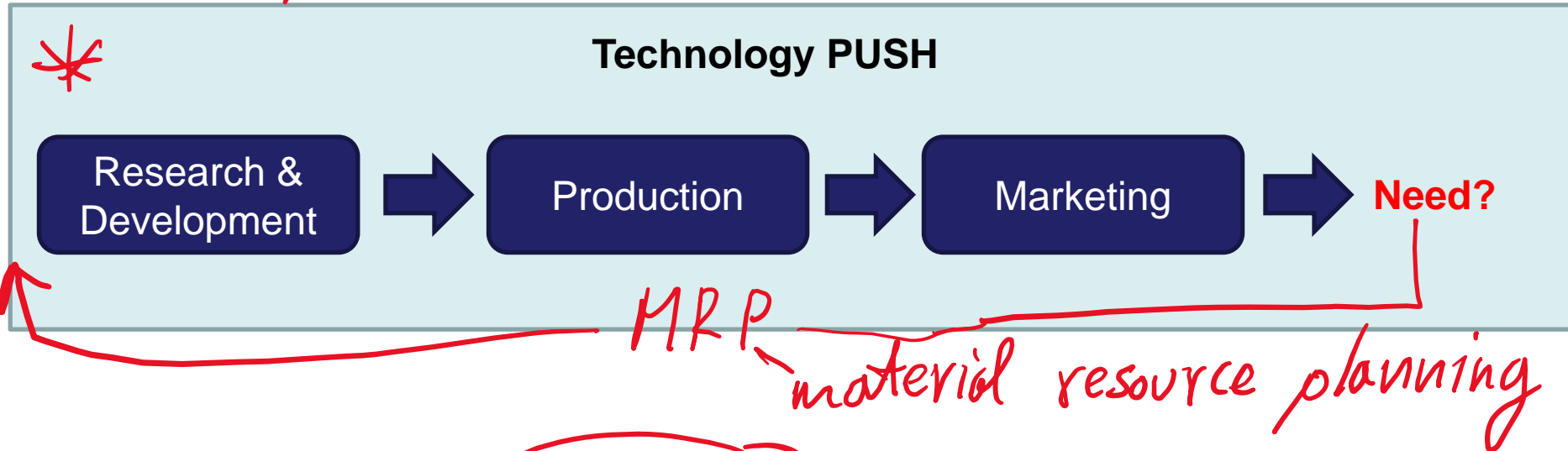
**Pull**



# Comparison of production principles Push and Pull

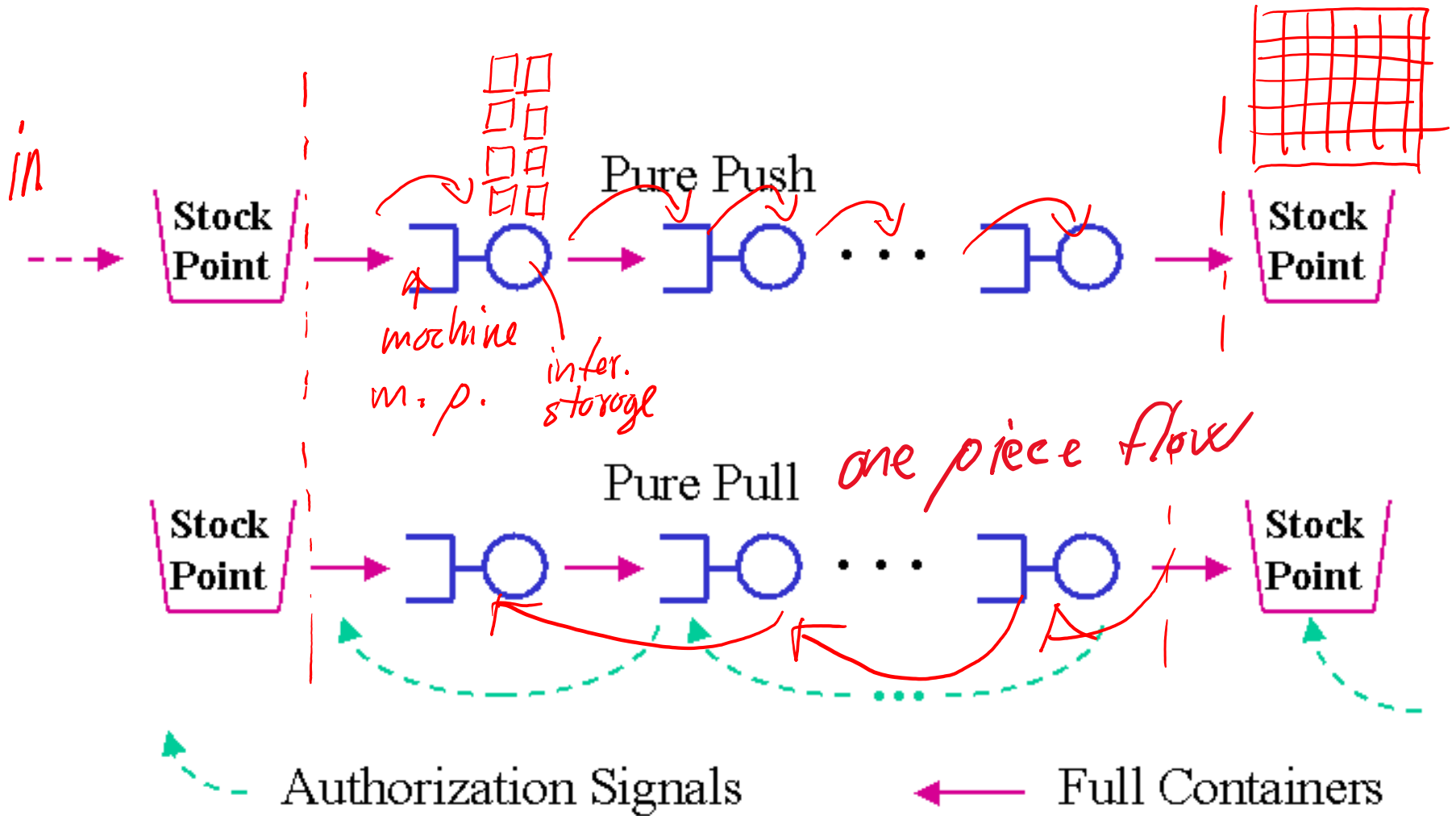
*main principle*

*Important*



# Push – Pull and Kanban

*Important*



# Basic definitions *Important*

- **MRP (Material Requirements Planning)**. MRP is the basic process scheduling process (PLAN) for *PUSH* manufacturing a finished product (MPS or Master Production Schedule) to determine the time-dependent requirements for all subassemblies and components required to assemble the finished product.
- **JIT (Just-in-Time)**. It comes from the original *PULL* Japanese word *Kanban* - a system developed by Toyota. JIT guarantees the delivery of the right amount of products at the right time. The goal is to reduce *WIP* (*work-in-process*) inventory to a minimum

# Why Push and Pull?

*Important*

- **MRP is a classic push system.** The MRP system calculates a production plan for all levels based on the forecast of the sale of finished products. When subassemblies are manufactured, they are pushed to the next level, whether or not there is a need for them.
- **JIT is a classic pull system.** The basic mechanism is that production runs at one (lower) level only when a request is made from a higher production level. This means that units are pulled through the system as required.

# Comparison MRP - JIT

*Important*

- Both methods offer two completely different approaches to production planning. Each method offers advantages and disadvantages.
- Main advantage of MRP compared to JIT: MRP takes into account the assumptions made for the needs of the finished products. In environments where significant fluctuations in sales are expected (and can be predicted accurately - seasonal products), the MRP principle offers a significant advantage. *PUSH*
- Main advantage of JIT compared to MRP. JIT minimizes inventory (inventory) to improve the quality and efficiency of the business. *PULL*  
*in real 1 combination of PUSH, PULL*

# Comparison (continuation)

*Important*

Advantages

Weaknesses

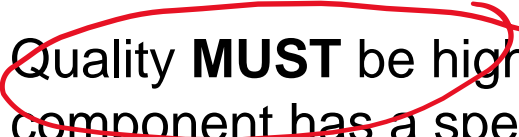

## JIT -- PULL

Limited and known final stocks, inventory

Every job is under some stress – in expectation of an order

The worker spends his time & raw materials on what is really urgent

We **MUST** have a **BALANCED**  system

 Quality **MUST** be high - each component has a specific path - otherwise feedback is given immediately 

Set-up times (machines, lines, jobs) affect flow times

Consequently, *every problem* is reflected in customer dissatisfaction (internal or external)

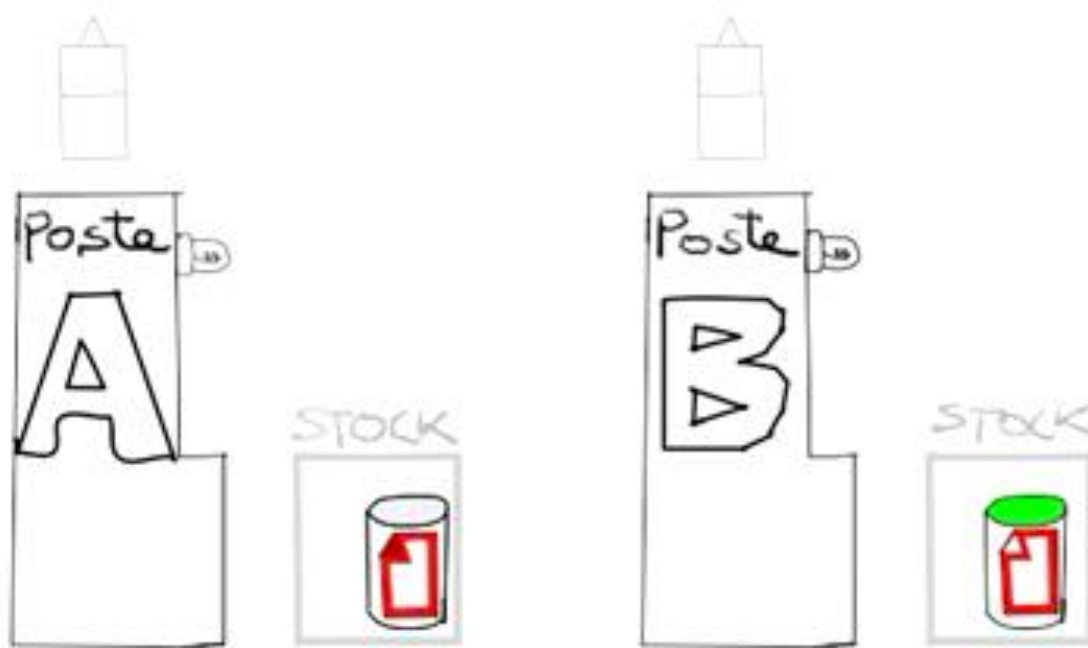
# Comparison (continuation)

*Important*

Advantages	Weaknesses
<b>MRP -- PUSH</b>	
Allows managers to manage - plan and control processes	It can lead to large stocks
It requires a complex knowledge of production times and material flow	It can generate large quantities of scrap before an error is detected
It can lead to big economies in procurement (buying) and production	It requires diligence and constancy to maintain the effective flow of the material
It allows the planning and assembly of complex assemblies - because the components are delivered as planned	It requires the maintenance of large and complex databases



# Additional material video



# Additional material video



**Colossus**  
Go Make Your Own



**MESTEK, INC.**

*Additional material*

**Kanban**

**Supermarket**



**MESTEK, INC.**

*Additional material*

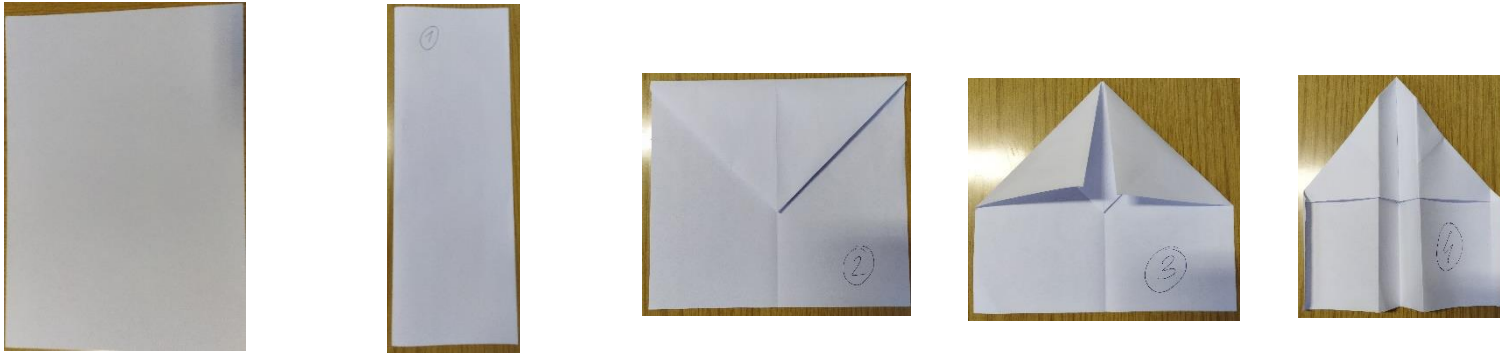
**Kanban**

**Pull System**

Additional material

**INTRODUCING**

# Lean Game: paper plane production

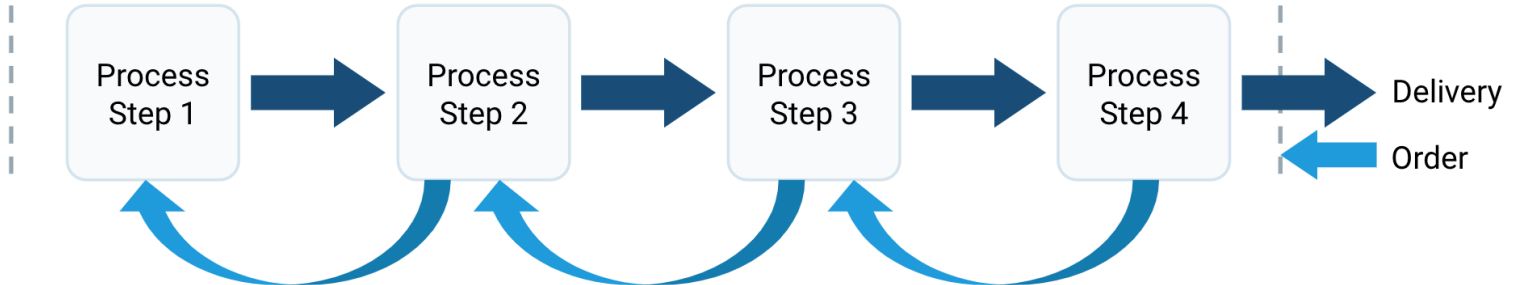


**PUSH**

Order



**PULL**



Additional material



# Lean vs. Batch Manufacturing: *An Overview of Lean Production*

Velaction Continuous Improvement, LLC

Presented by Jeff Hajek,  
author of *Whaddaya Mean I  
Gotta Be Lean?*



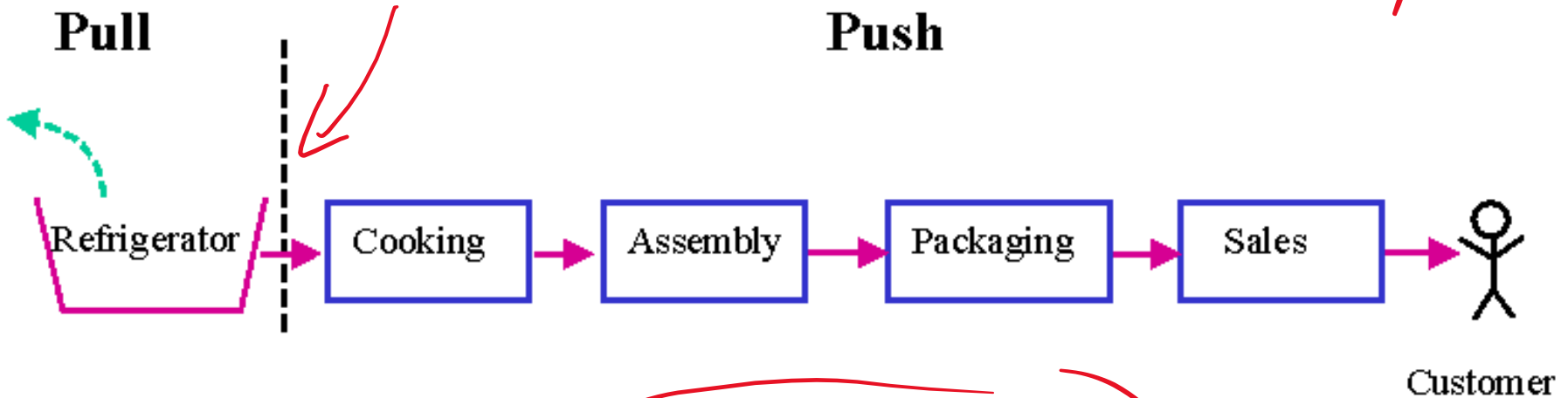
# Pull – Push system in practice

*One example*

**Push/Pull Interface**

**Pull**

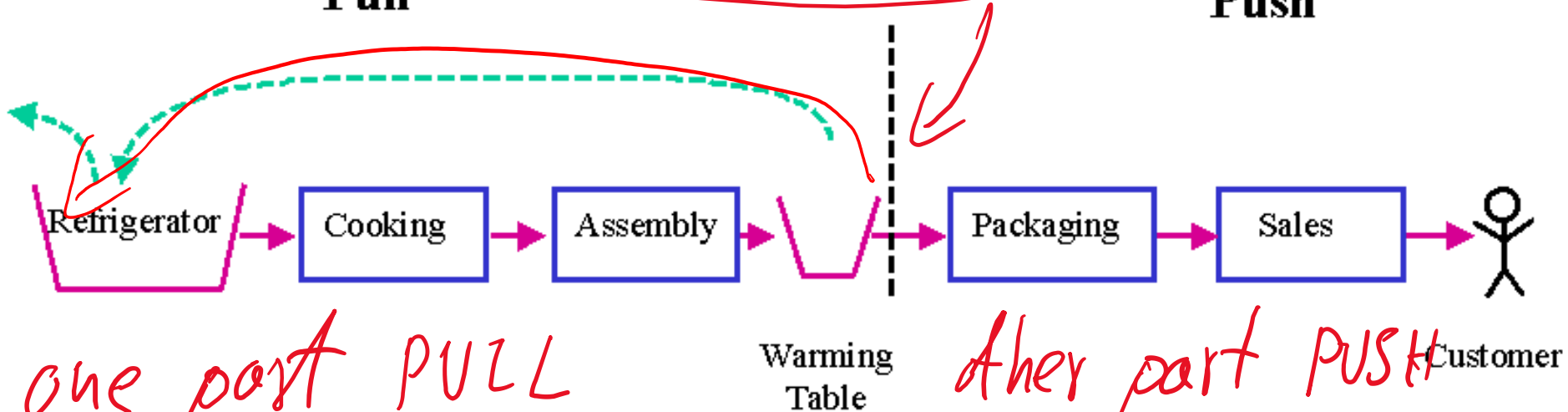
**Push**



**Push/Pull Interface**

**Pull**

**Push**



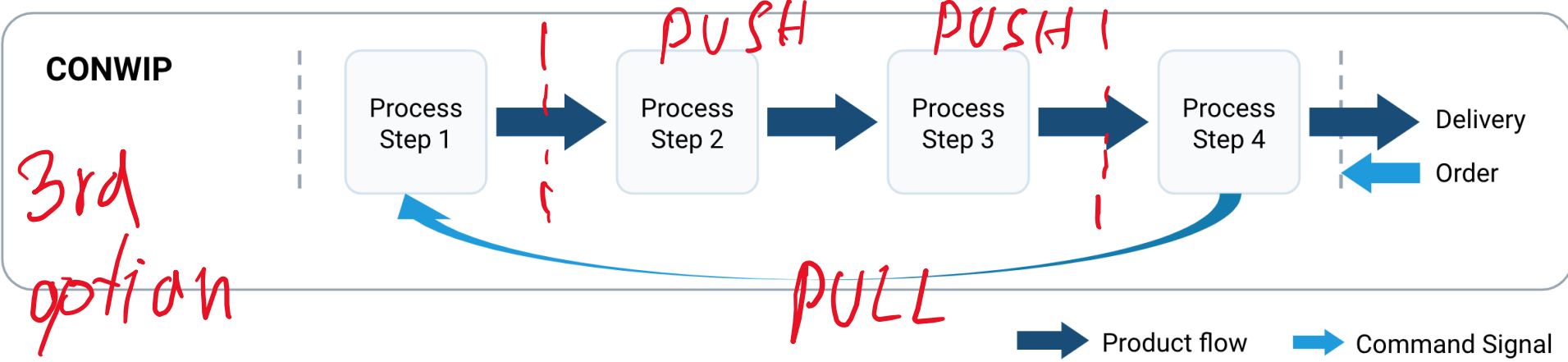
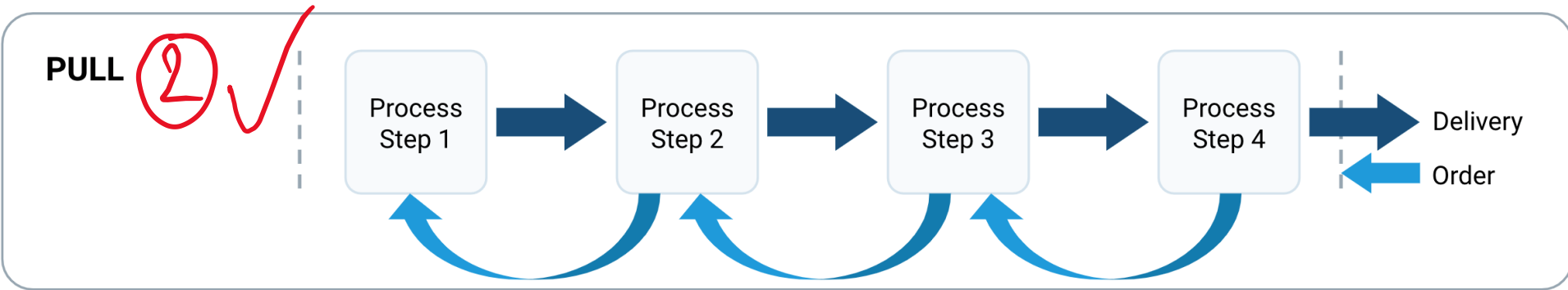
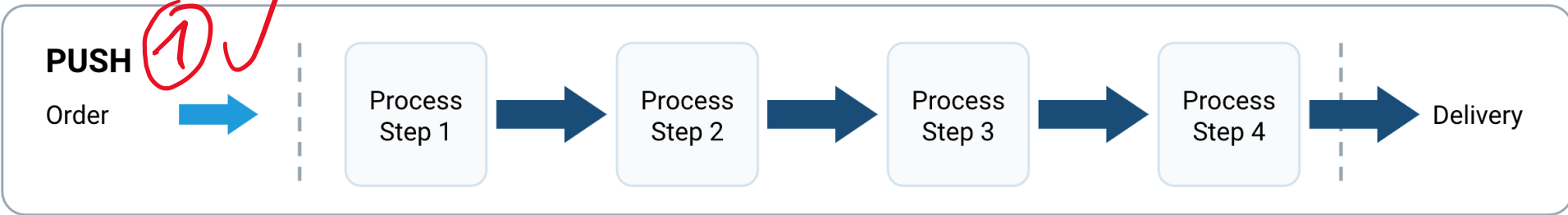
*one part PULL*

Warming Table

*other part PUSH*



# Pull, Push and CONWIP system in practice



CONWIP: [https://www.youtube.com/watch?v=vNsZOUe\\_yoo](https://www.youtube.com/watch?v=vNsZOUe_yoo)

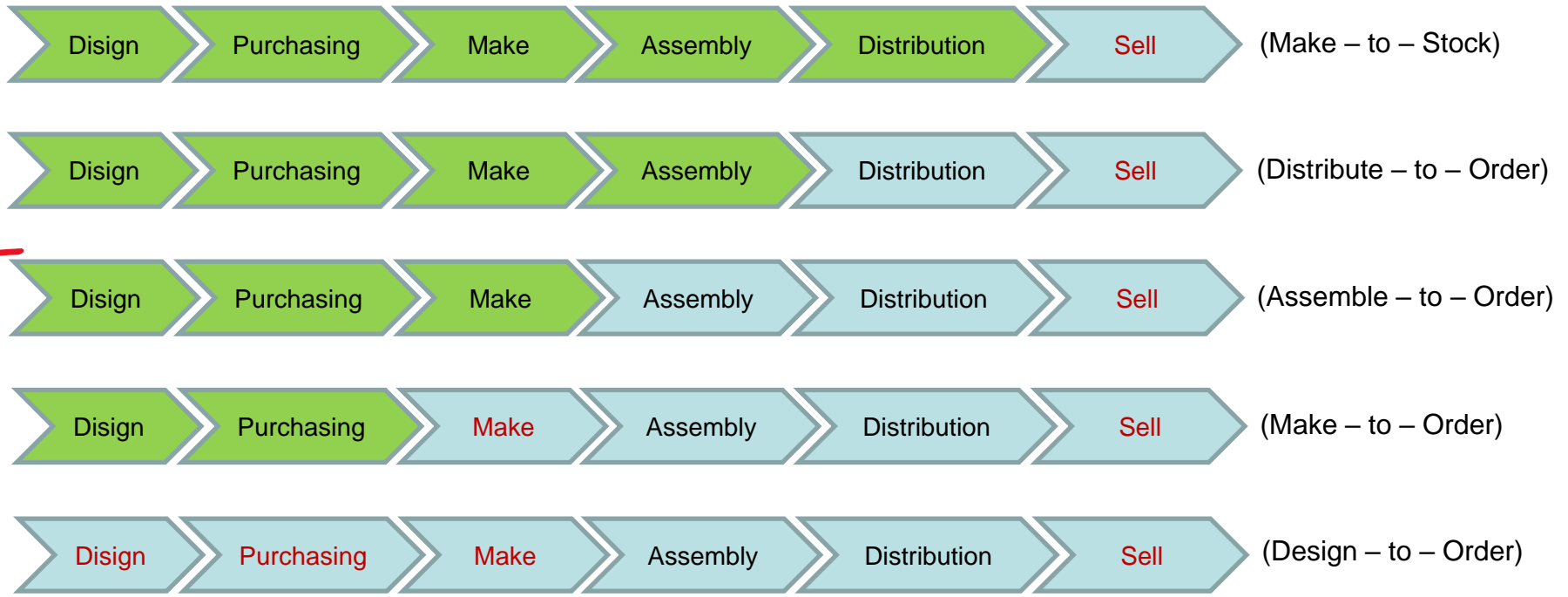
# Possible scenarios



Delivery time  
Inventory, storage costs  
Risk



## traditional



## Smart factory

[https://www.youtube.com/watch?v=ZqlxpPPo\\_jg&t=4](https://www.youtube.com/watch?v=ZqlxpPPo_jg&t=4)

# Videos

Lean Manufacturing - Pull Systems

<https://www.youtube.com/watch?v=9OL7BMBa4ys>

Best Kanban animation

<https://www.youtube.com/watch?v=bEcDzJt43ns>

Kanban and Pull Systems

[https://www.youtube.com/watch?v=ROi\\_2K-9gYw](https://www.youtube.com/watch?v=ROi_2K-9gYw)

Kanban Supermarket Demo

<https://www.youtube.com/watch?v=bK78YS9j51k>

Kanban Pull Simple Demo

<https://www.youtube.com/watch?v=Zlv2e61SH1A>

Lean Manufacturing – Kanban

<https://www.youtube.com/watch?v=ujBfXF5beo0>

Lean Manufacturing Overview: Lean vs. Batch Manufacturing Lean Training Video

<https://www.youtube.com/watch?v=QErGYCnhrZo>

CONWIP approach

[https://www.youtube.com/watch?v=vNsZOUe\\_yoo](https://www.youtube.com/watch?v=vNsZOUe_yoo)