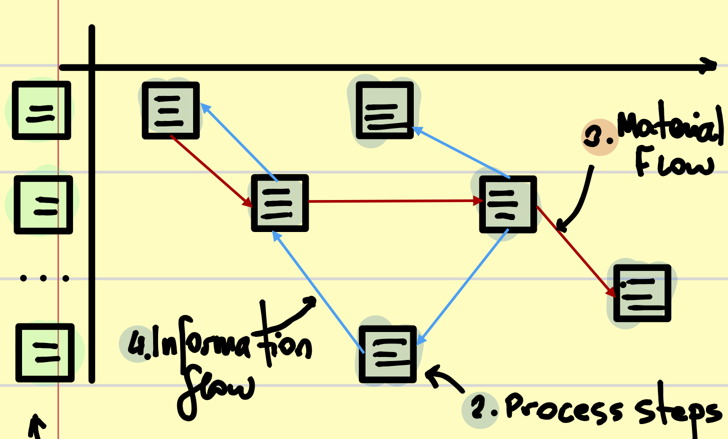
20211021
Supplier_Management_MBW7

Global Supply Chain Networks

CASE STUDY. Michigan-based company. Supplier for Automobile Windshield-Wipers

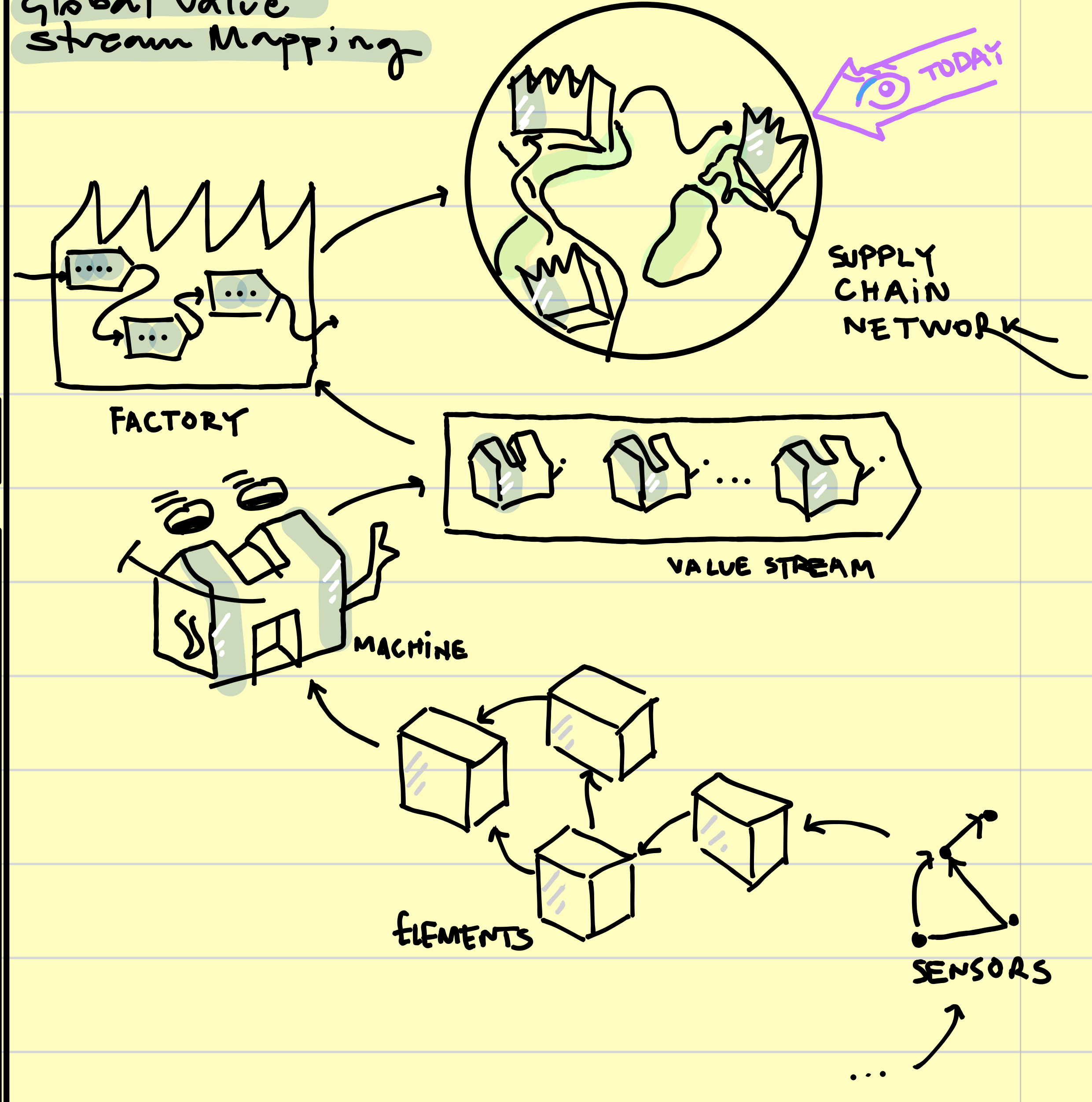
CURRENT STATE ......> IDEAL STATE

Mapping Processes:



(anyone "touching" material and/or information flow)

Global Value Stream Mapping

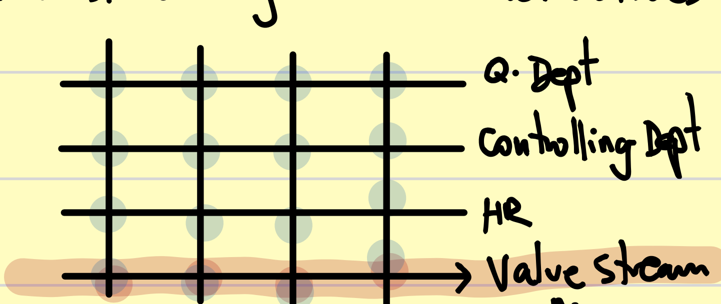


Excercise: Map one day of your life with this method.

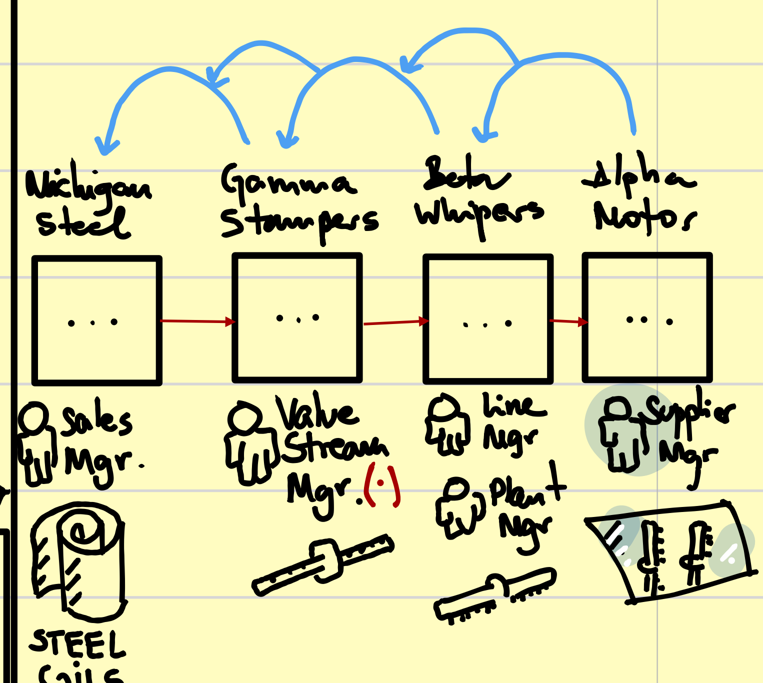
Case study:

- 4 Factories. We try to first map the current state.
- We need one Value Stream Team with at least one responsible for each facility.

(·) Value Stream Mgr.



We play the role of the supplier manager @ Alpha Motors.



We are going to map the GLOBAL VALUE STREAM of the entire process we deal with.

- The leader of the Value Stream Team is the Customer (S.M. @ α-Motors).
- You need to go to the facilities physically! (GO and SEE)

- In order to map the process activities you'll need approximately one month.
- List of

# TOTAL STEPS	# VALUE CREATING STEPS (·)	# TOTAL TIME	# VALUE CREATING TIME
...	...	...	...

- **Summary:**

	Total	Value Creating
Steps	73	8
Time	44'3 d	54'7 min

Distance: 53000 Miles
#Transport links: 7

(·) Value Creating: Whatever the customer is ready to pay for.
(Wertschöpfend)

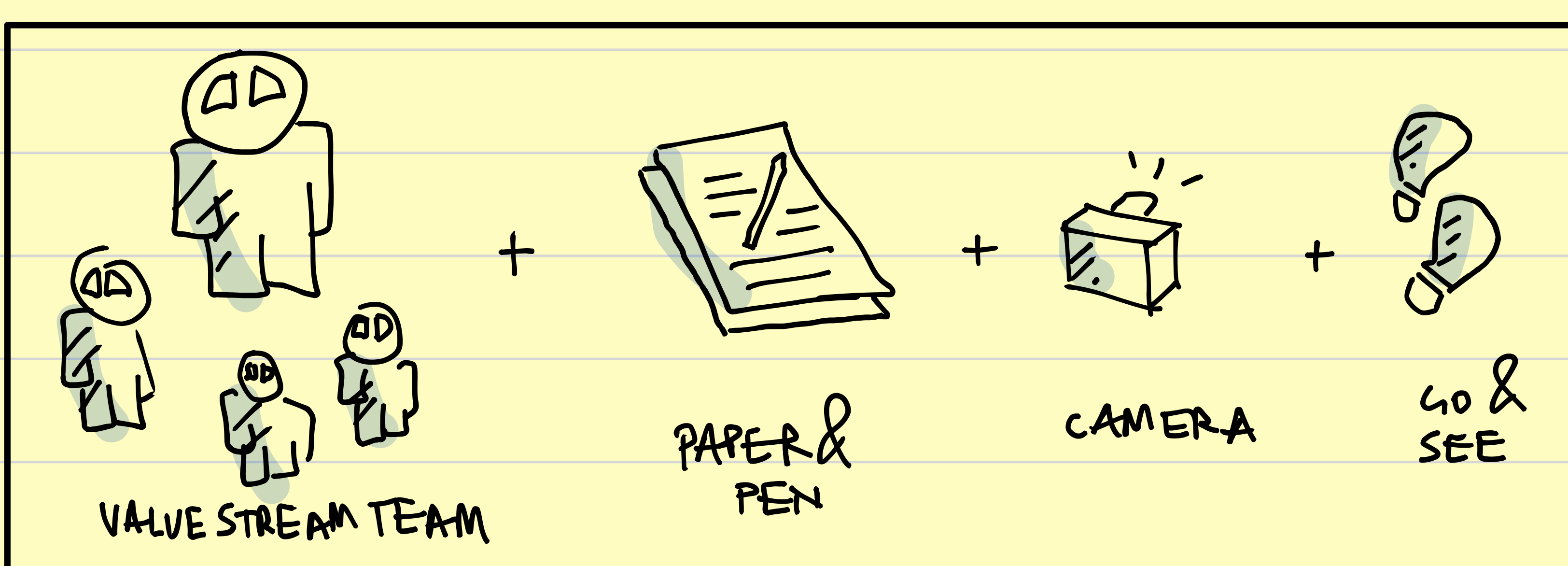
$$\frac{54'7 \text{ min}}{44'3 \text{ d}} \sim \frac{1/24 \text{ d}}{44'3 \text{ d}} \sim \frac{1}{10^3}$$

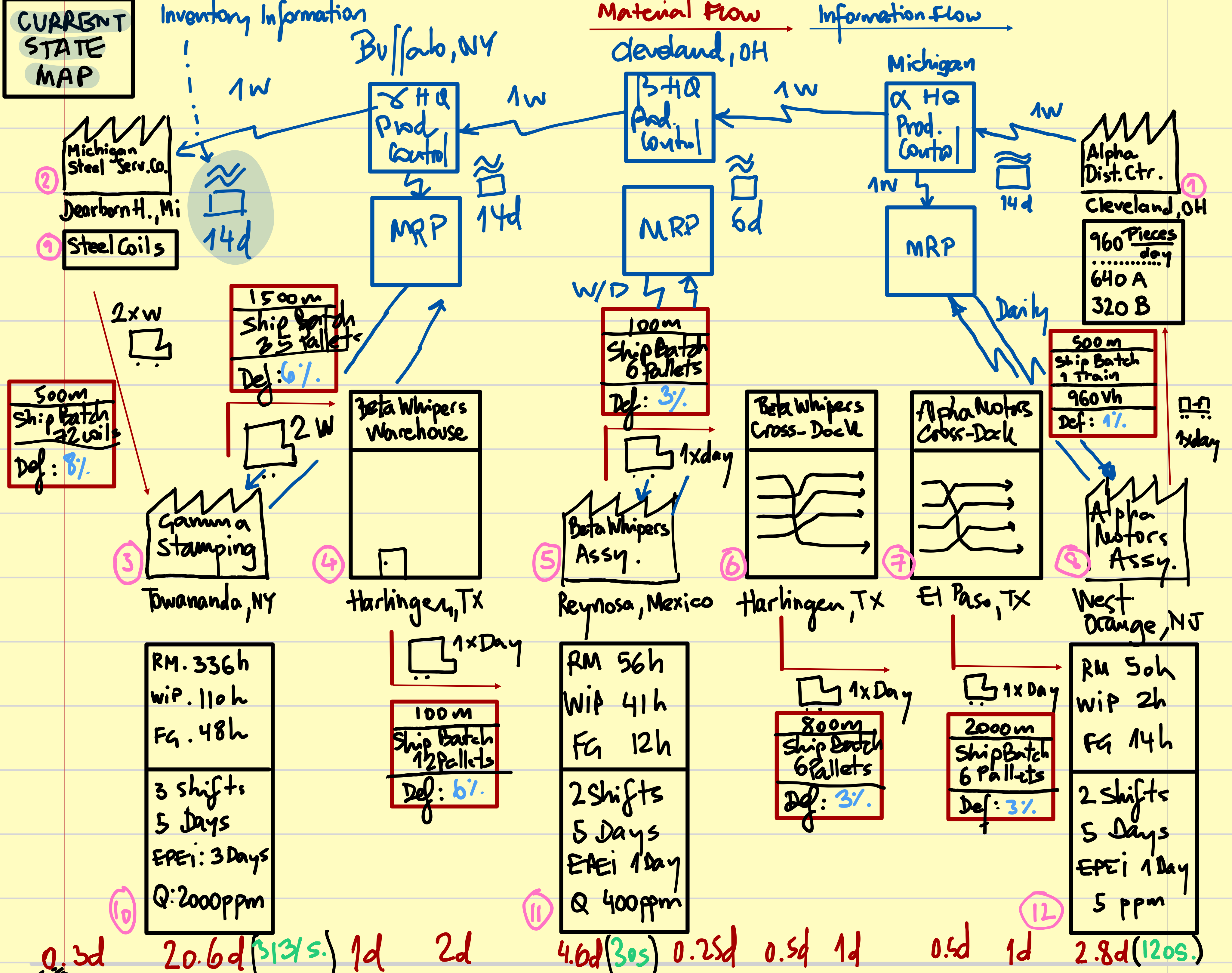
- The managerial interpretation is that for every value creating minute we have 1000 non-value creating minutes.

- The customer pays for 10^3 units of time while they are only getting one unit of time in value creation!

Benchmark: TOYOTA $\frac{1}{300}$

The information is useful but not not actionable.
We need to map the process (current state) so that managers can act on it!





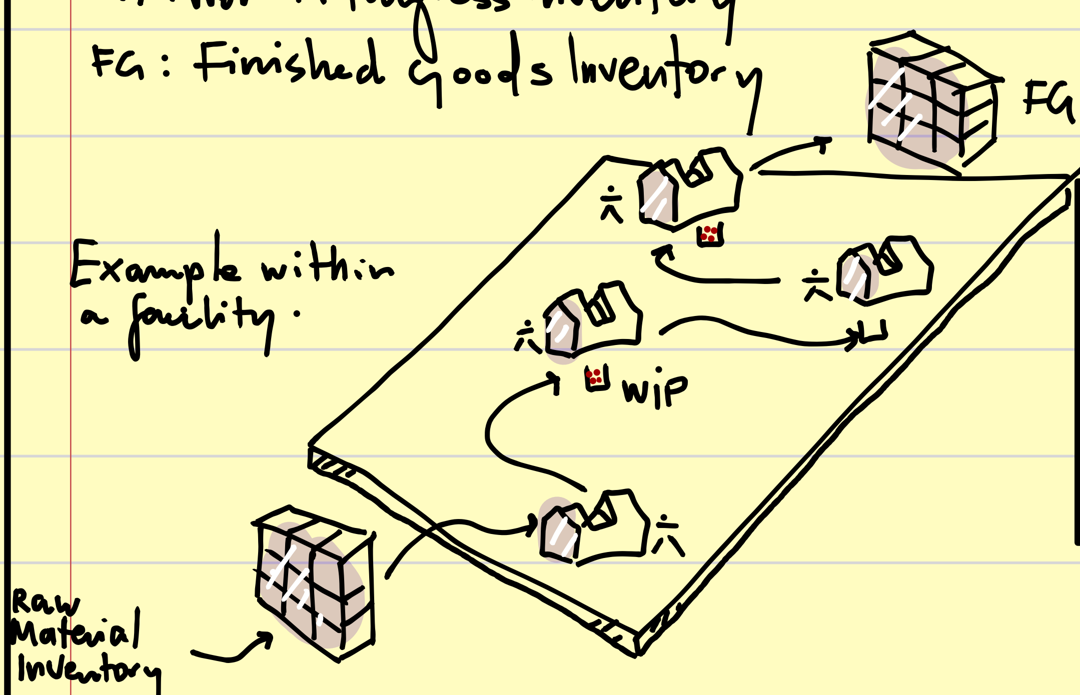
$$\rightarrow \frac{\Sigma \text{VALUE ADDING}}{\text{TOTAL TIME}} = \frac{\Sigma \text{V.A.}}{\Sigma \text{N.V.A.} + \Sigma \text{V.A.}} = \frac{0'03544\,d}{44.3\,d} = \boxed{0'08\%\ \text{RATIO V.A./TOTAL}}$$

RM: Raw Material Inventory [h] (coverage Time)

WIP: Work in Progress Inventory

FG: Finished Goods Inventory

Example within a facility.

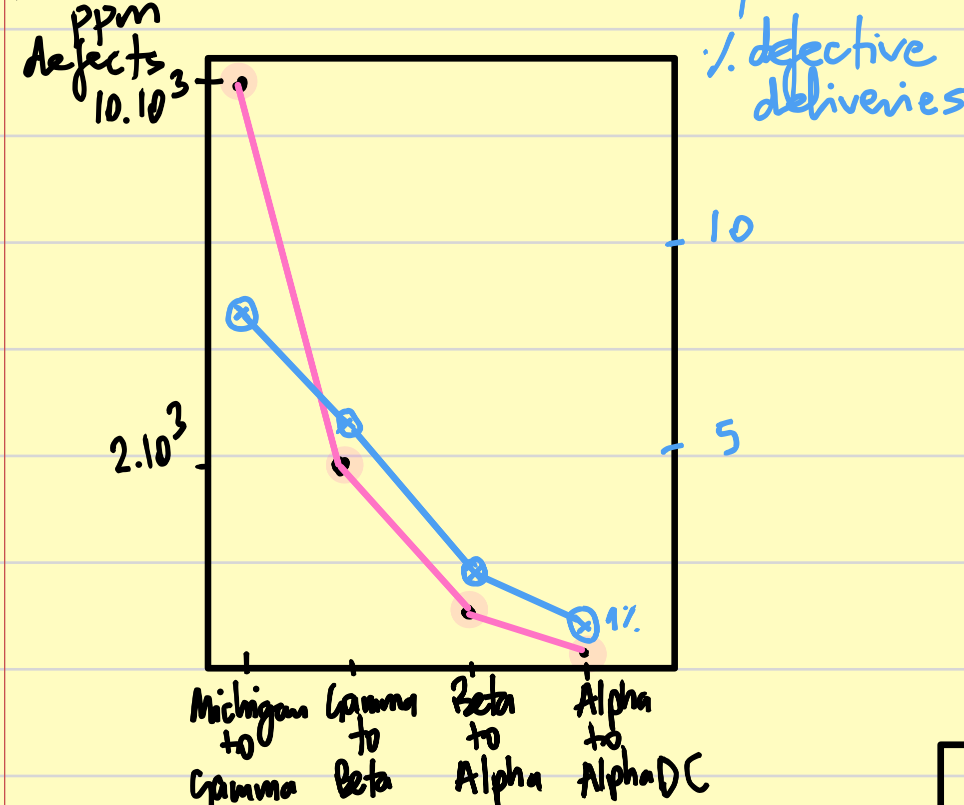


Raw Material. Time that you can run your process with.

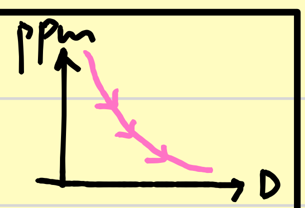
$$RM[\text{time}] = \frac{RM[\text{parts}]}{\text{Demand}[\text{parts}/\text{Time}]}$$

$$\text{wip [time]} = \frac{\text{wip [parts]}}{\text{Demand [parts/time]}} \quad ; \quad \text{FG [time]} = \frac{\text{FG [parts]}}{\text{Demand [parts/time]}}$$

(*) Q-Screen Delivery-Screen



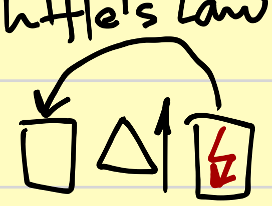
$$\text{defects} = \frac{k}{D}$$



- We observe in the Q-Screen that we have a bullwhip effect, and we can therefore infer that we do not have a PULL-Process in place.
- We have a PUSH-Process that does not take customer demand into consideration. Neglecting customer demand means worse quality.

1. Quality feed back loops
2. Little's law

$$LT = \frac{WIP}{Output}$$



WIP↑ → QFL takes longer

↓

ppm↑ ← Q takes longer to fix

(*)

ppm : parts per million

If we produce 1 Million parts, how many defects do we have?

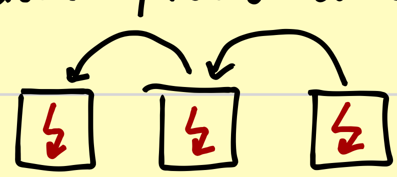
i.e.

$1000 \frac{\text{Parts}}{\text{day}}$ 30 defects

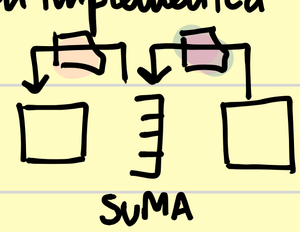
$$ppm = \frac{10^6}{1000} \cdot 30 = 30.000 \text{ ppm}$$

- The reason why we find a D^{-1} decay in the defects along the value stream is that we have:

1. Quality Feedback loops



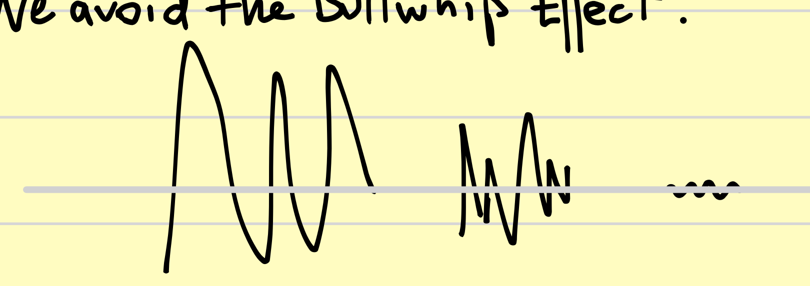
2. WIP Inventory leads to a process variability reduction when implemented in PULL:



LITTLE'S LAW

$$\text{Lead Time} = \frac{\text{wip (Parts)}}{\text{Output (Parts/Time)}}$$

We avoid the Bullwhip Effect:

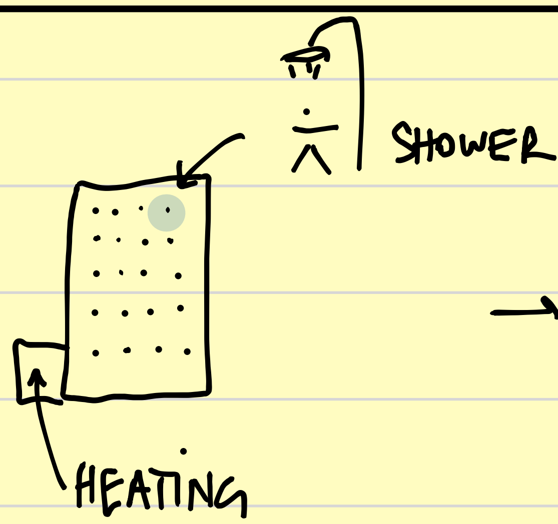


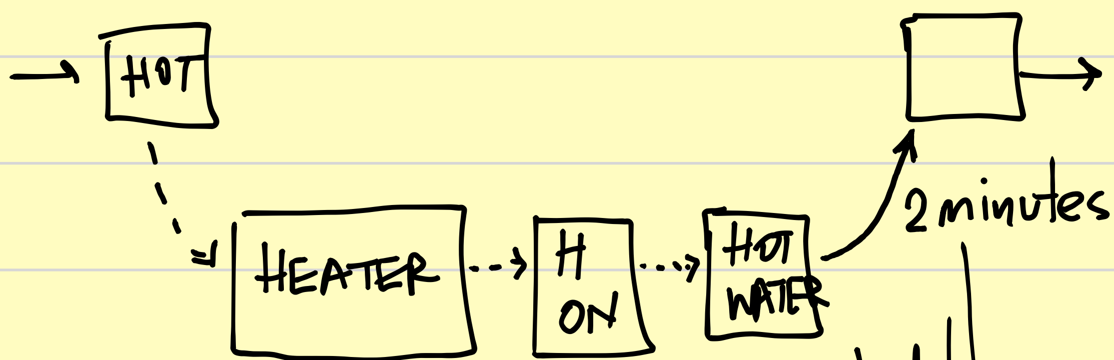
Variability increases when we go further from customer.

$\boxed{\text{% defective deliveries} = -k \cdot D}$ $\boxed{\text{why?}}$

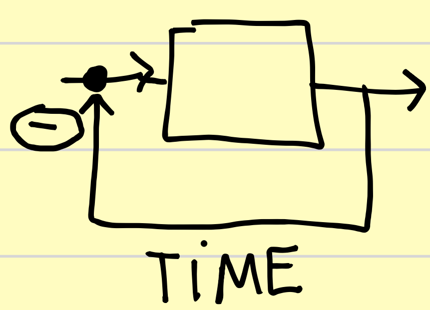
(·) 1 TAG = 24 h = 24 · 60' = 1440' = 86400''

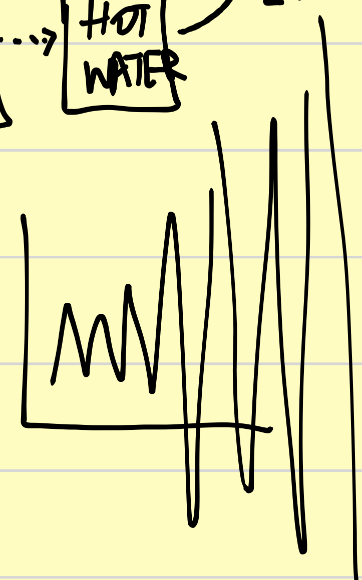
Go & see → Process Steps → Material Flow → Information Flow





- Delay in Information flow is the Nr. 1. reason why processes do not work!
- Nr. 1: Source of variability!





Current State Management Summary

44.3d	Total Lead Time
0.08%	Value Percentage Time (value creating to total time)
5	Inventory Turns (·)
400	Quality Screen (defects dowstream / defects upstream)
8	Delivery Screen (defective shipment dowstream / defective ship. upstream)
5300 m	Product Travel
	% change demand downstream

$\frac{2000}{5} = \frac{\text{@ Gamma Stamping}}{\text{@ Alpha Assy}}$

$\frac{8}{1}$

$\boxed{CO_2} \rightarrow$ 5300 m

7 — Demand Amplification Index (and %diang " upstream ")

(·) Inventory turns (Lagerumschlaghäufigkeit)

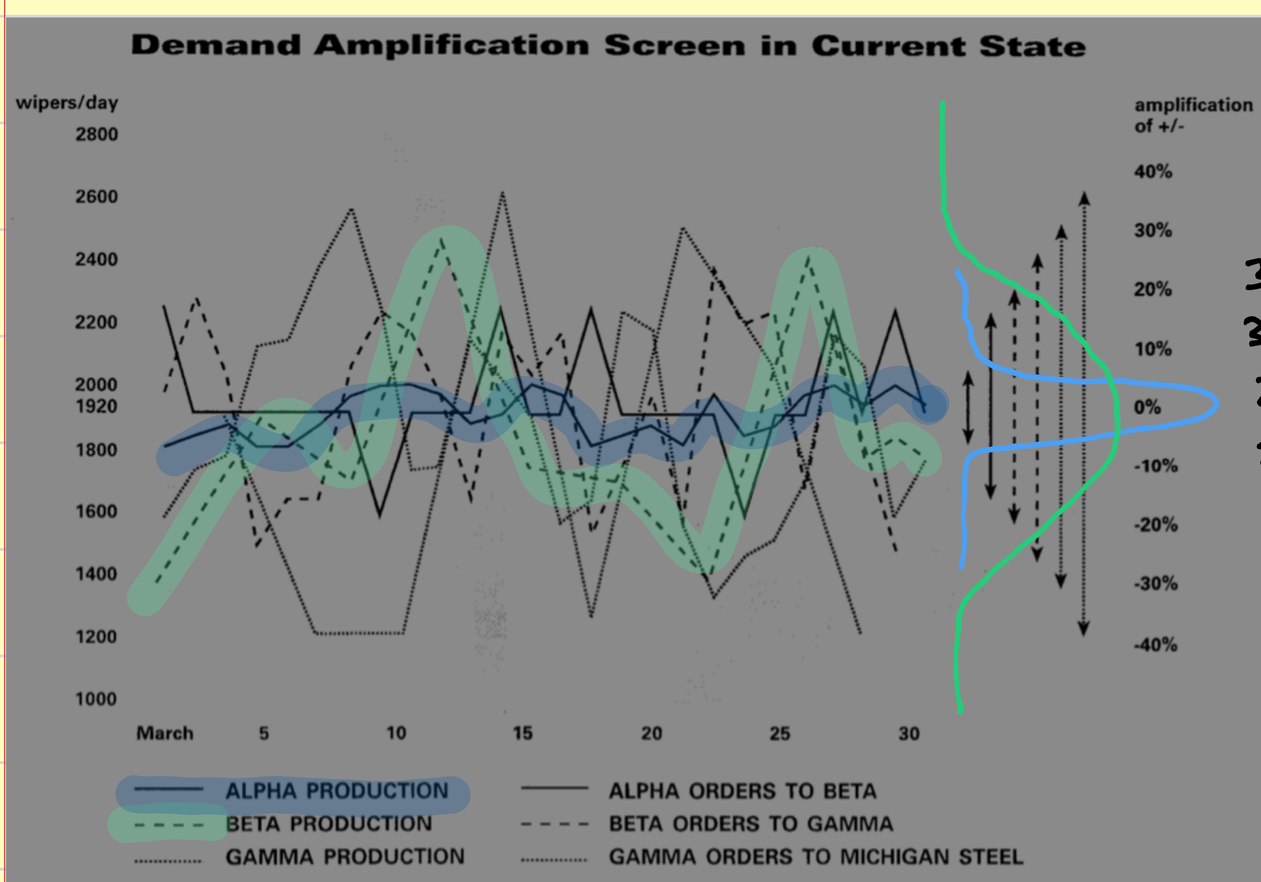
Mean value of inventory = Average of inventory level = ⌀ Inventory

Revenue (Umsatz)

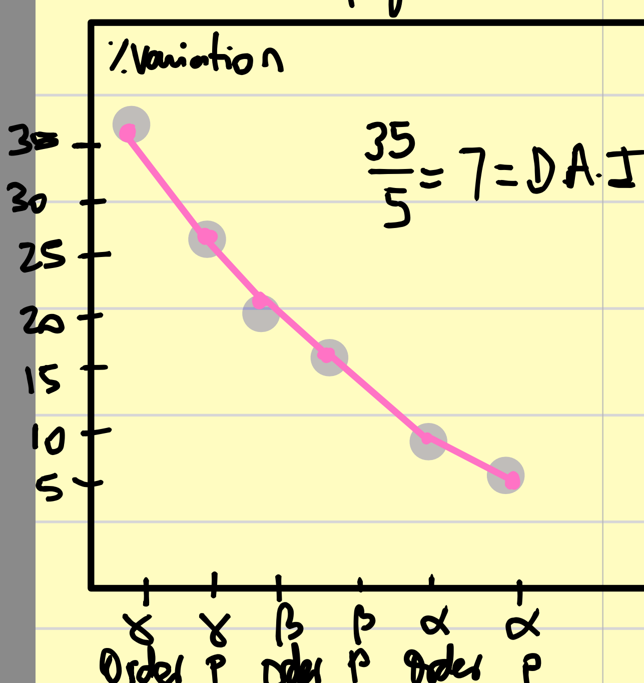
$$\boxed{\text{Inventory Turns} = \frac{\text{Yearly Revenue}}{\varnothing\,\text{Inventory}}}$$

↑ Inv.T.O.
≡
↑ Revenue
≡
↓ Inventory
≡
↓ EPEI ←

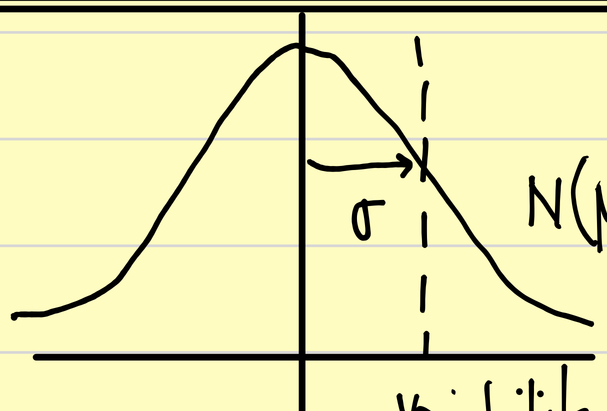
How often we renew our inventory.



Demand Amplification Screen



$\frac{35}{5} = 7 = \text{D.A.I.}$



$N(\mu, \sigma)$

Variability
≡

$$\sigma = \sqrt{\frac{(x_i - \mu)^2}{n-1}}$$

Variability in the information flow is reducing when we approach the customer = variability is increasing when we go further from the customer.

≡

BULLWHIP EFFECT