

# Production Management (ME-419)

## Module 1 – Introduction

Amin Kaboli

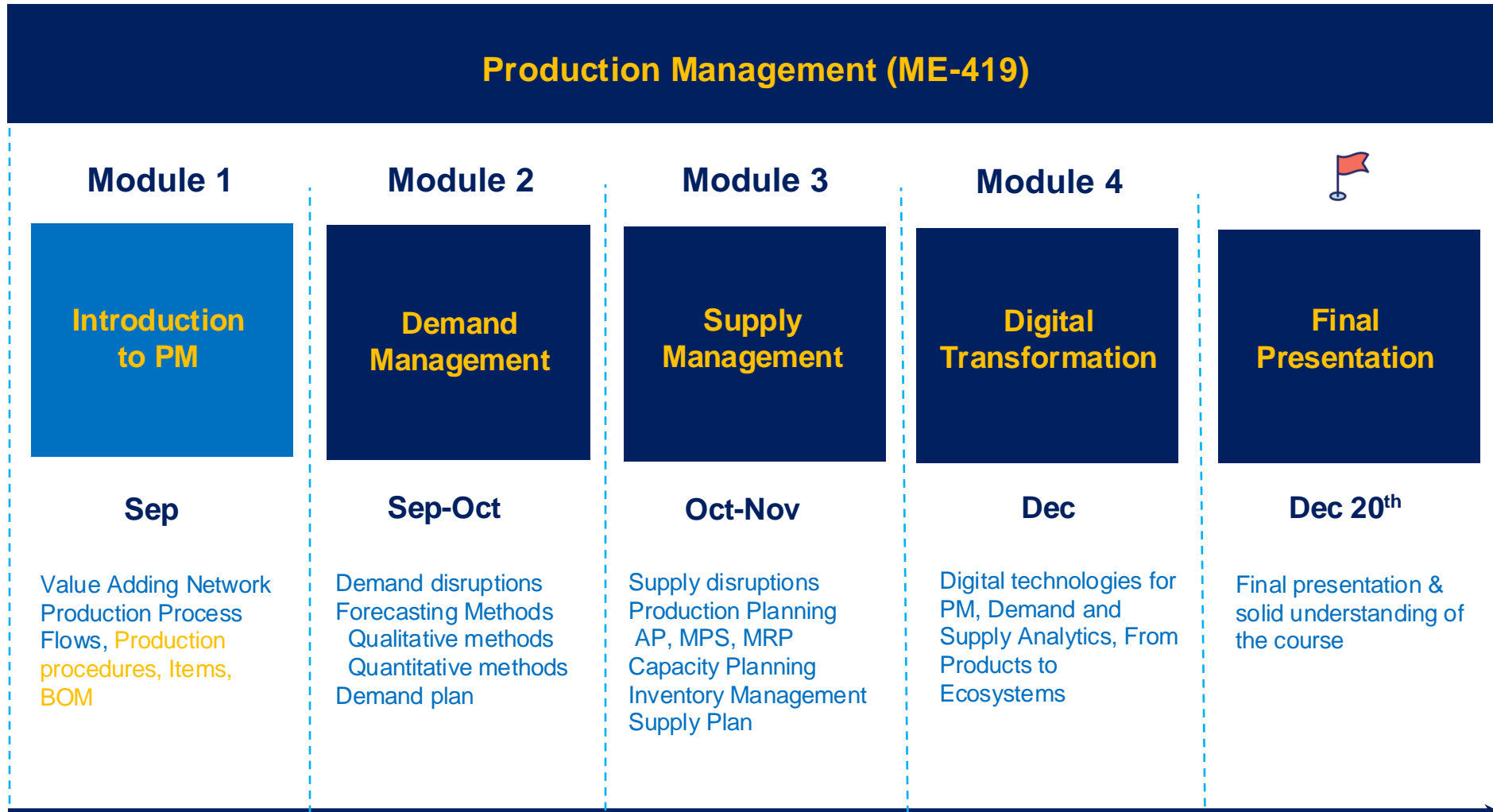
Week 2 – Session 1 – September 20<sup>th</sup>, 2024

# Course Framework



## Business plan

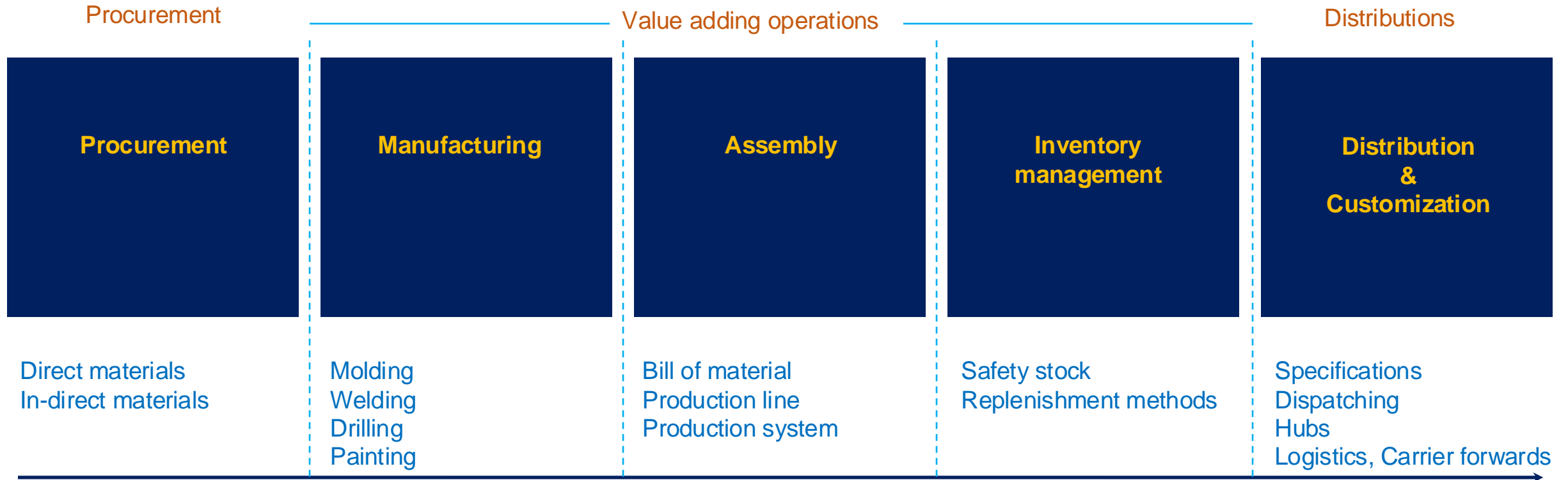
Strategic plan  
Financial plan



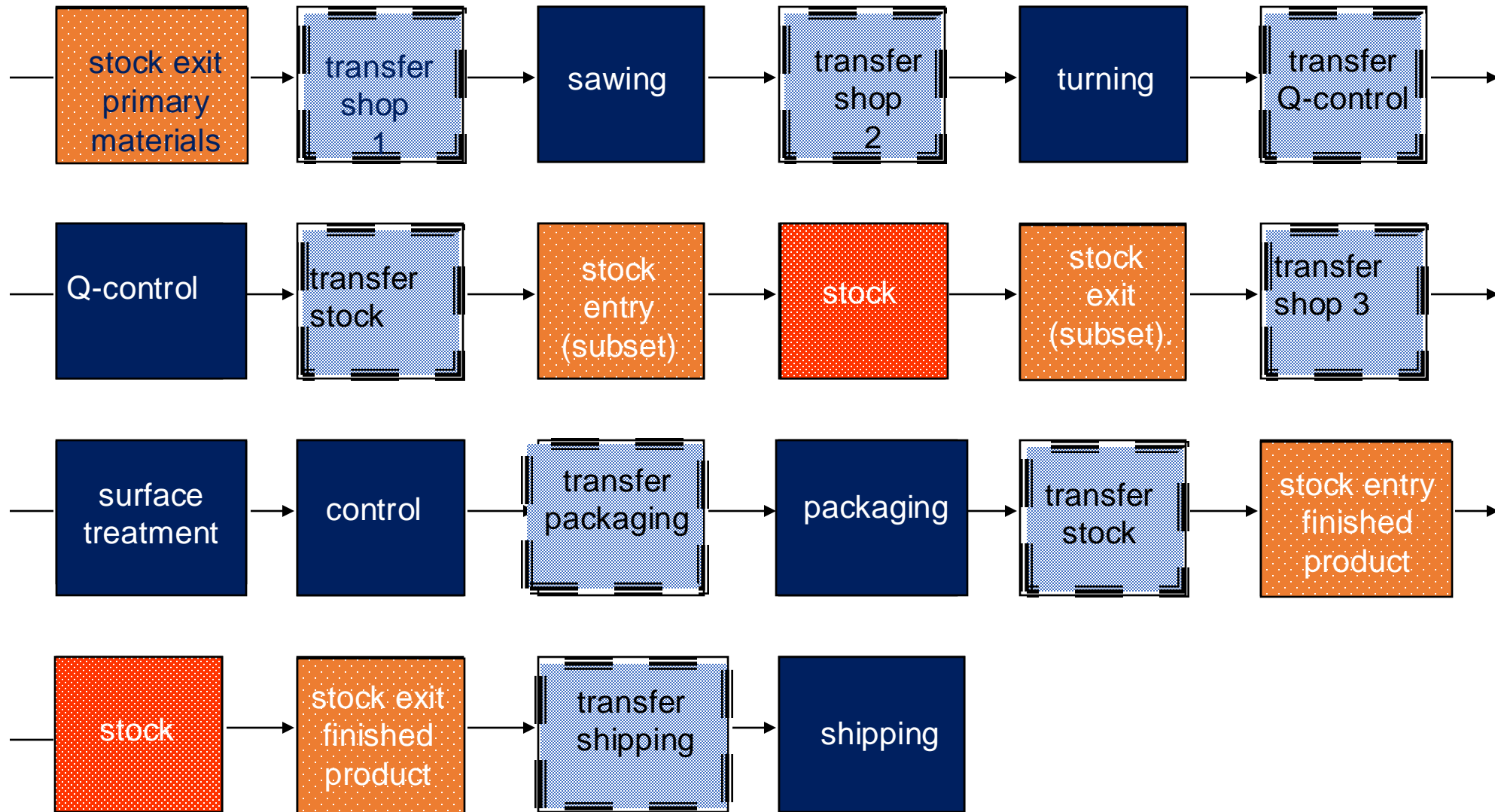
# Agenda of the session

- **13:15 – 15:00** Introduction to Production Management (PM)
  - Review of learning points
  - Value Adding Activities

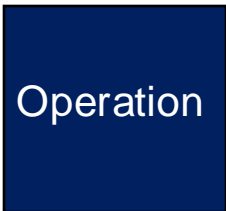
# Production Procedure – Value Adding Activities



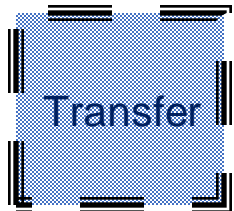
# Production Procedure – Series of Activities



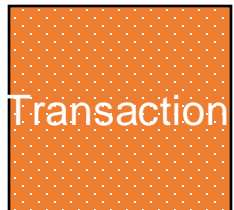
# Production Procedure – Value Adding Activities



Transformation activity, adding value and modifying the material characteristics.



Transportation activity, not adding any value but modifying the location of the material.

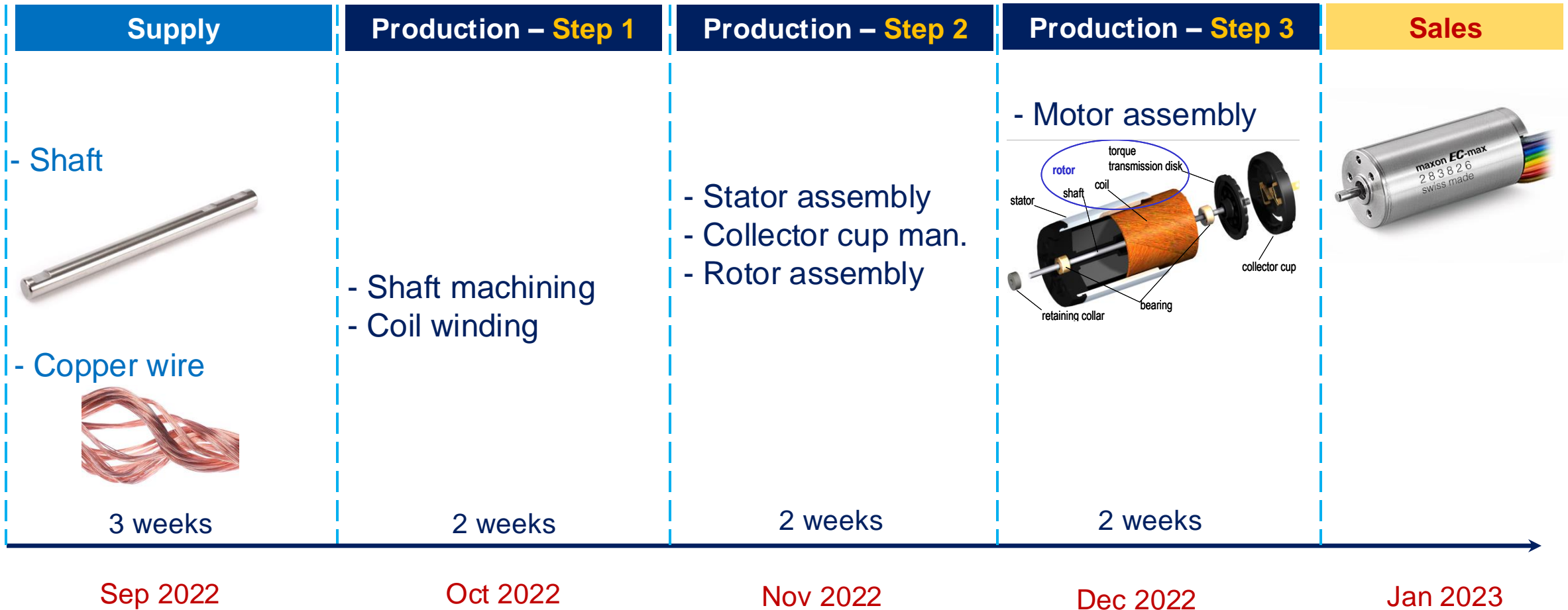


Data modification activity, not adding any value but acting on the administrative status of the material.

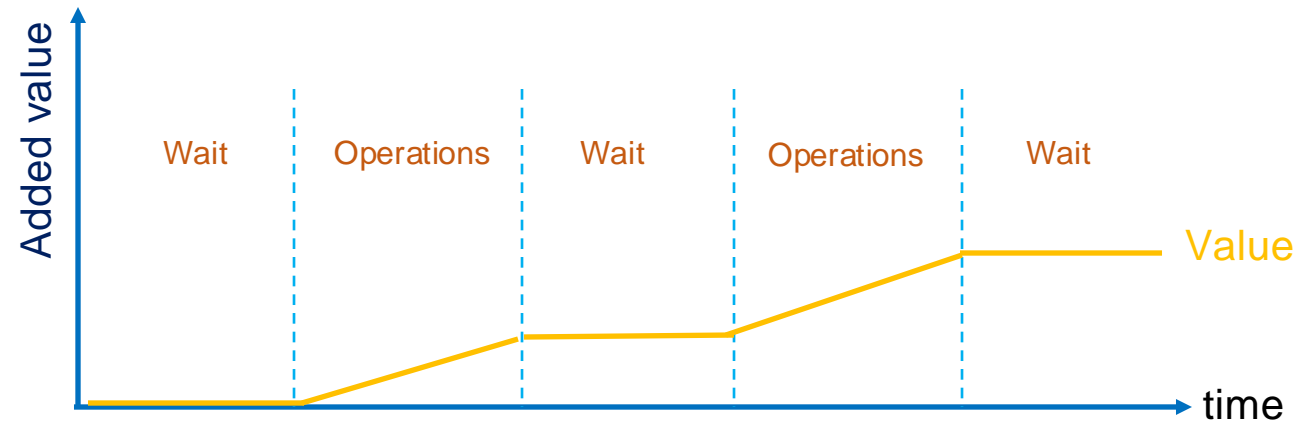


Waiting activity, not adding any value; no modification of the material characteristics, location or administrative status.

# Production Procedure – Micro Motor

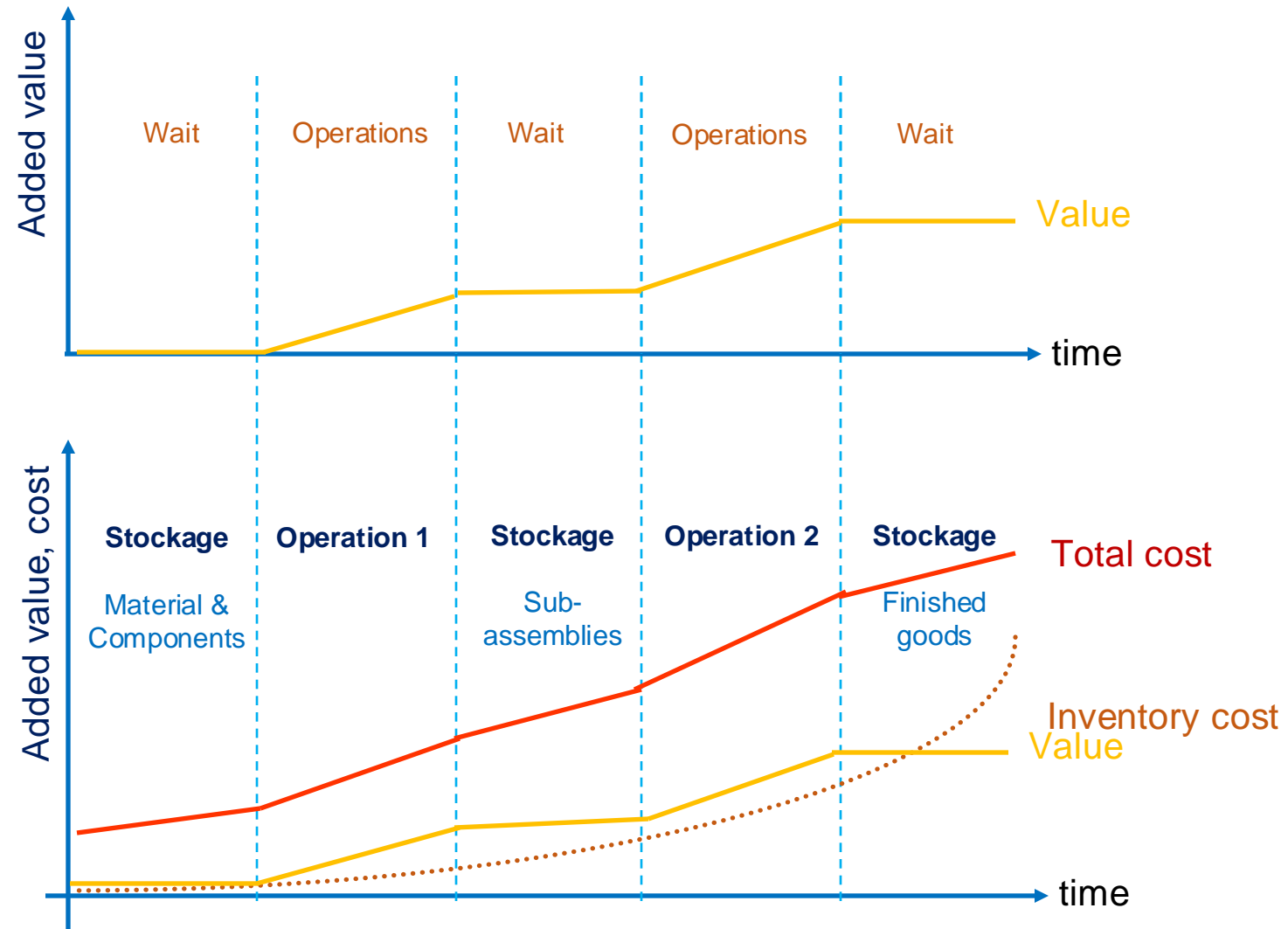


# Production Procedure – Value Adding Activities





# Production Procedure – Value Adding Activities



# Exercise 2: Cold-pressed Juicing Production Process



5 Min

What would be the production process diagram (value adding activities) of cold-pressed juicing production based on added value and time?

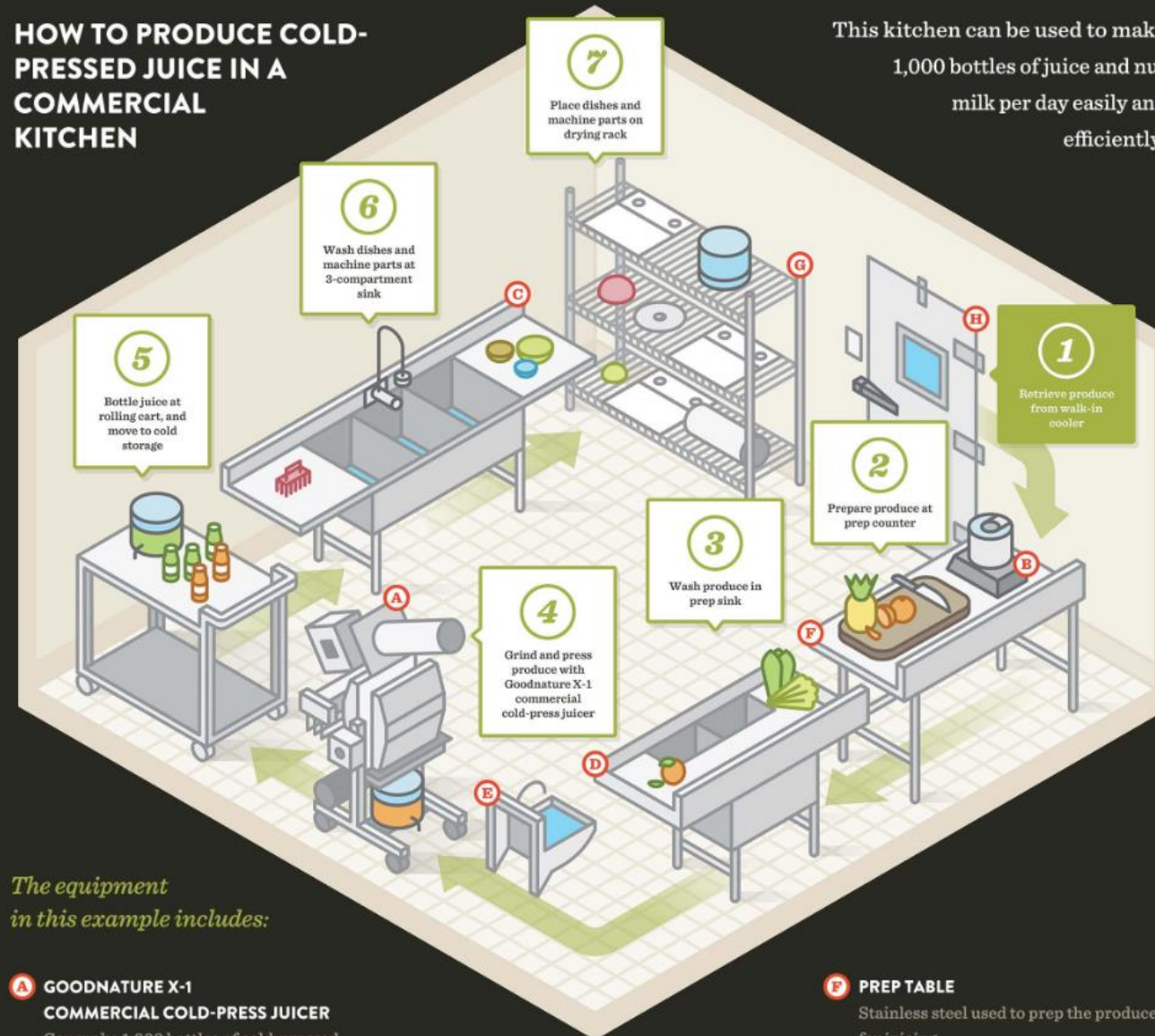
Hint: production steps are marked on the photo.



# Exercise 2:

## HOW TO PRODUCE COLD-PRESSED JUICE IN A COMMERCIAL KITCHEN

This kitchen can be used to make 1,000 bottles of juice and nut milk per day easily and efficiently.



The equipment in this example includes:

**A GOODNATURE X-1 COMMERCIAL COLD-PRESS JUICER**  
Can make 1,000 bottles of cold-pressed juice per day.

**B SAMMIC CKE-8 FOOD PROCESSOR**  
Food processor used to grind nuts to press

**D PREP SINK FOR PRODUCE**  
It's nice to have a separate sink for washing

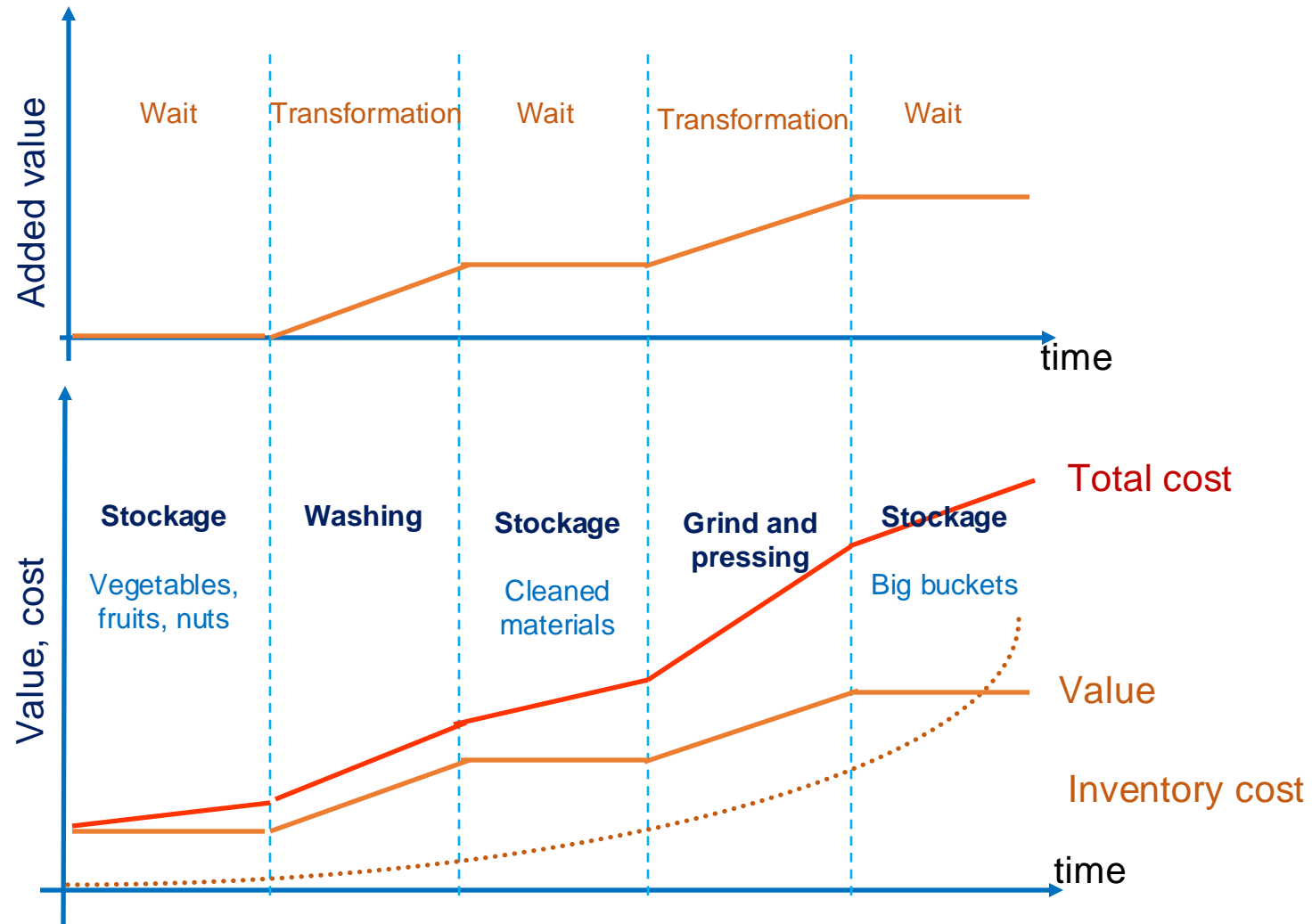
**F PREP TABLE**  
Stainless steel used to prep the produce for juicing.

**G DRYING RACK**  
This rack is used to air-dry dishes, machine parts, and press bags.



5 Min

# Cold Press Juicing – Value Adding Activities





# Learning Points – Summary

- Value Adding Network
  - Big picture
  - From product to system of systems
  - Supply Chain Network Design
  - Dynamics & Flows (material and information)
- Product development
  - Production Procedure
  - Bill of Materials (BOM)
  - Value Adding Activities

# Assignment 2 – Your Case Study + Complimentary Information

## Module I: Introduction to Production Management

- Production Management (Definition and examples)
- Value Adding Network, Value adding activities, Bill of Materials, ...

  Assignment 1: Your Company and Case Study

**1)** Download the Assignment 2 from Moodle

**2)** Work within your group

**\* Submission deadline (report):** Sep 27<sup>th</sup>; 11:55 AM.

# Review of Assignment 2 – Goal & Tasks



**5 Min**

**Goal:** To better

- Understand your company, the value that it generates and captures, the range of products, and more specifically the product you manage and produce during the next months (Sep-Dec 2022).
- implement feedback and comments of your coach on your report 1, and update your next report based on provided information by your coach.
- use the complimentary information that your coaches will provide to update your report 2.

# Production Management (ME-419)

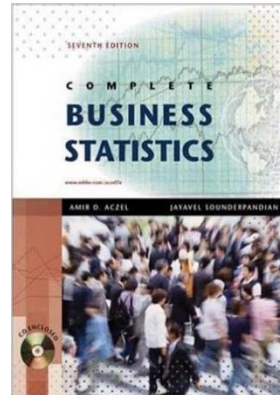
- **Play & Practice**
- **Re-grouping**

Amin Kaboli

Week 2 – Session 2 – September 20<sup>th</sup>, 2024



# Quiz (Self-Check) of Basic Statistics – Sep 27<sup>th</sup> Session 2



## Chapter 1

Descriptive  
Statistics

## Chapter 3

Random  
Variable

## Chapter 4

Normal  
Distribution

## Chapter 5

Sampling &  
Distribution

## Chapter 6

Confidence  
Intervals

## Chapter 10

Regression &  
Correlation

- Chapters are shared on Moodle

# Your Coaches & Groups

## Coaches

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Saria



Joao



Xavier

# Production Management (ME-419)

## Module 2: Demand Management

Amin Kaboli

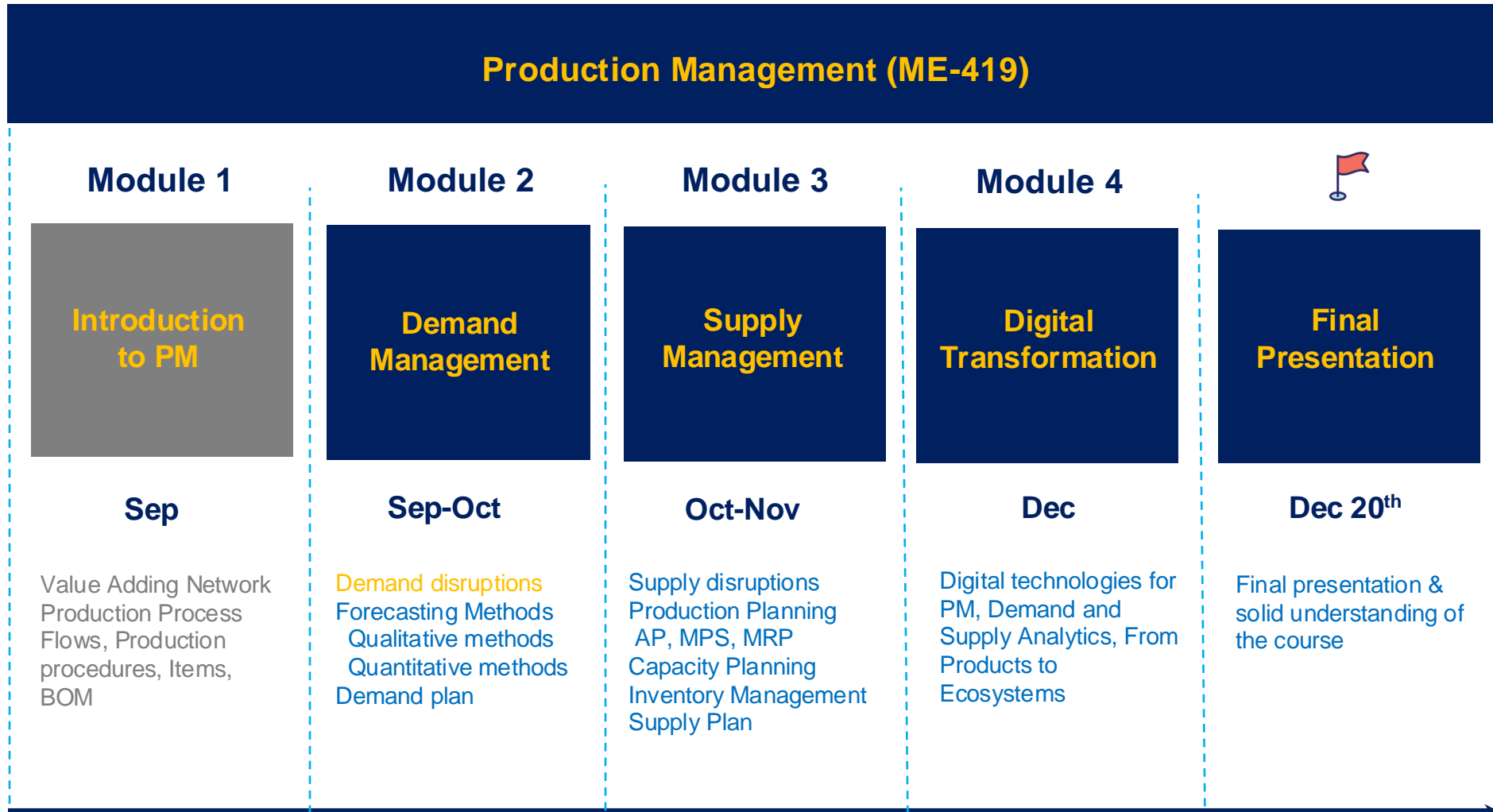
Week 2 – Session 2 – September 20<sup>th</sup>, 2024

# Course Framework



## Business plan

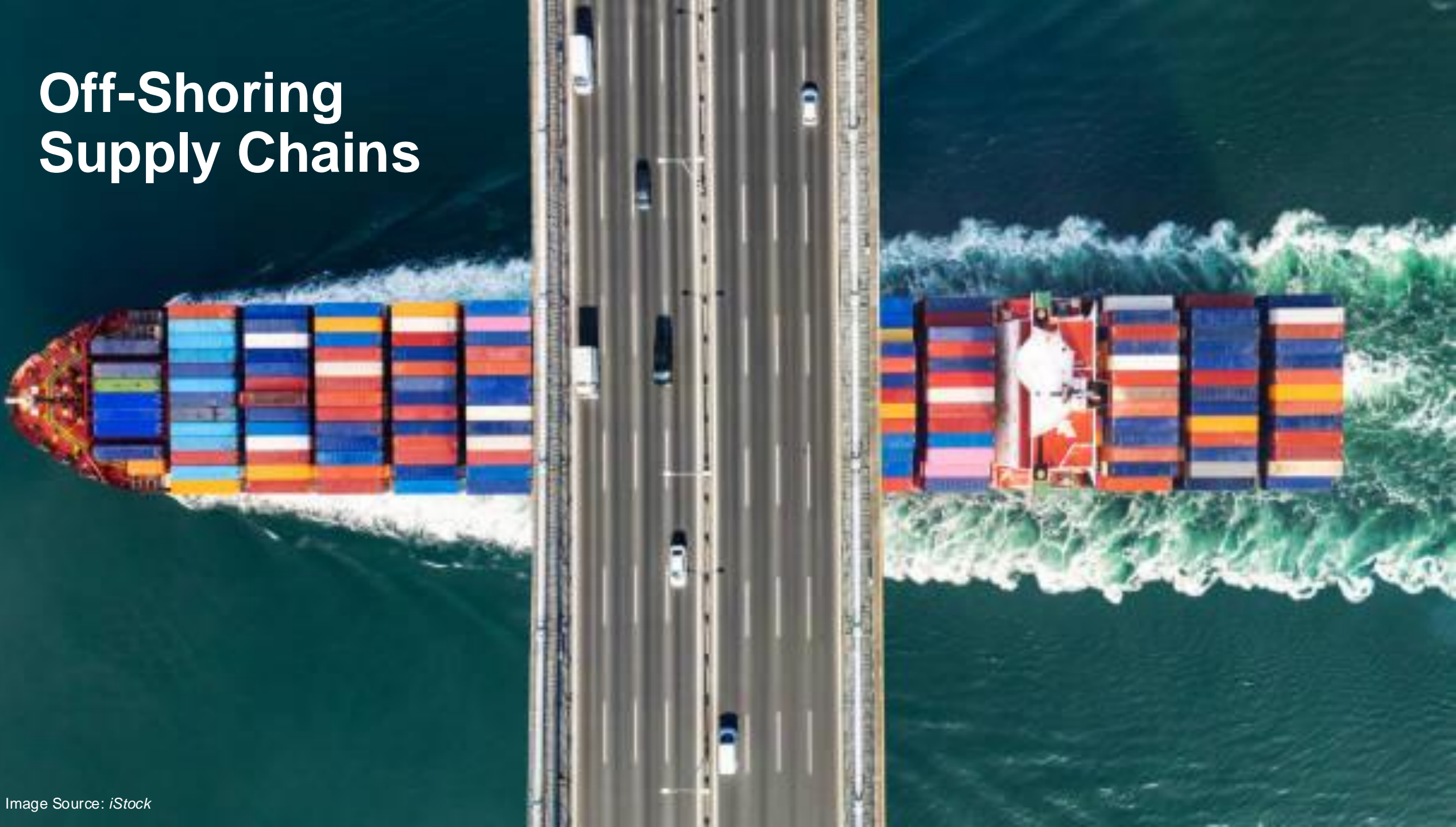
Strategic plan  
Financial plan



# Agenda

- **15:15 – 16:00** Module 2: Demand Management
  - Demand Disruptions
  - Forecasting methods
  - Demand plan

# Off-Shoring Supply Chains

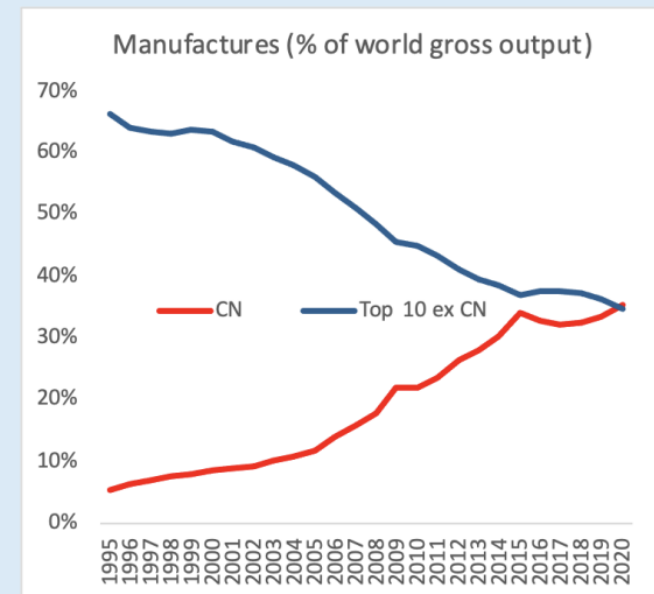
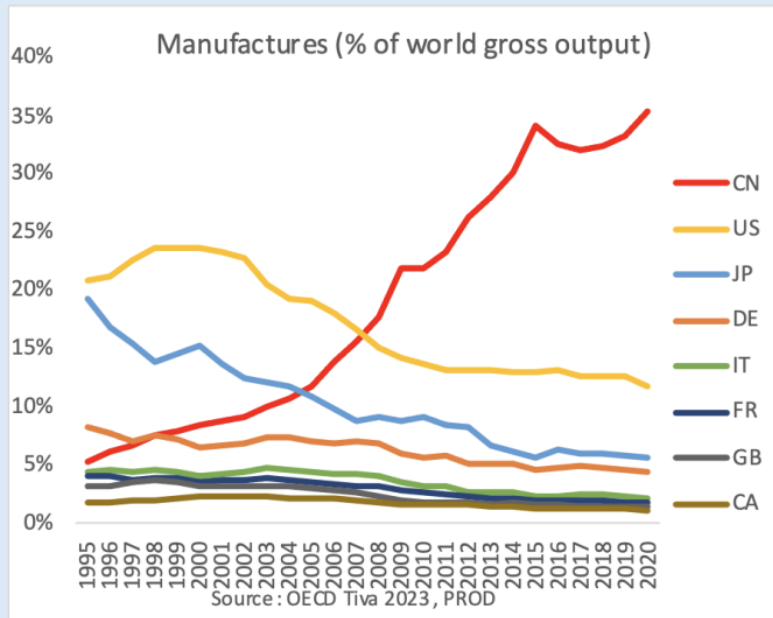


# The Rise of the Factory of the World – China

## World shares of gross production

G7 shares declined sharply (gross production)

China's share rose sharply (gross production)



2

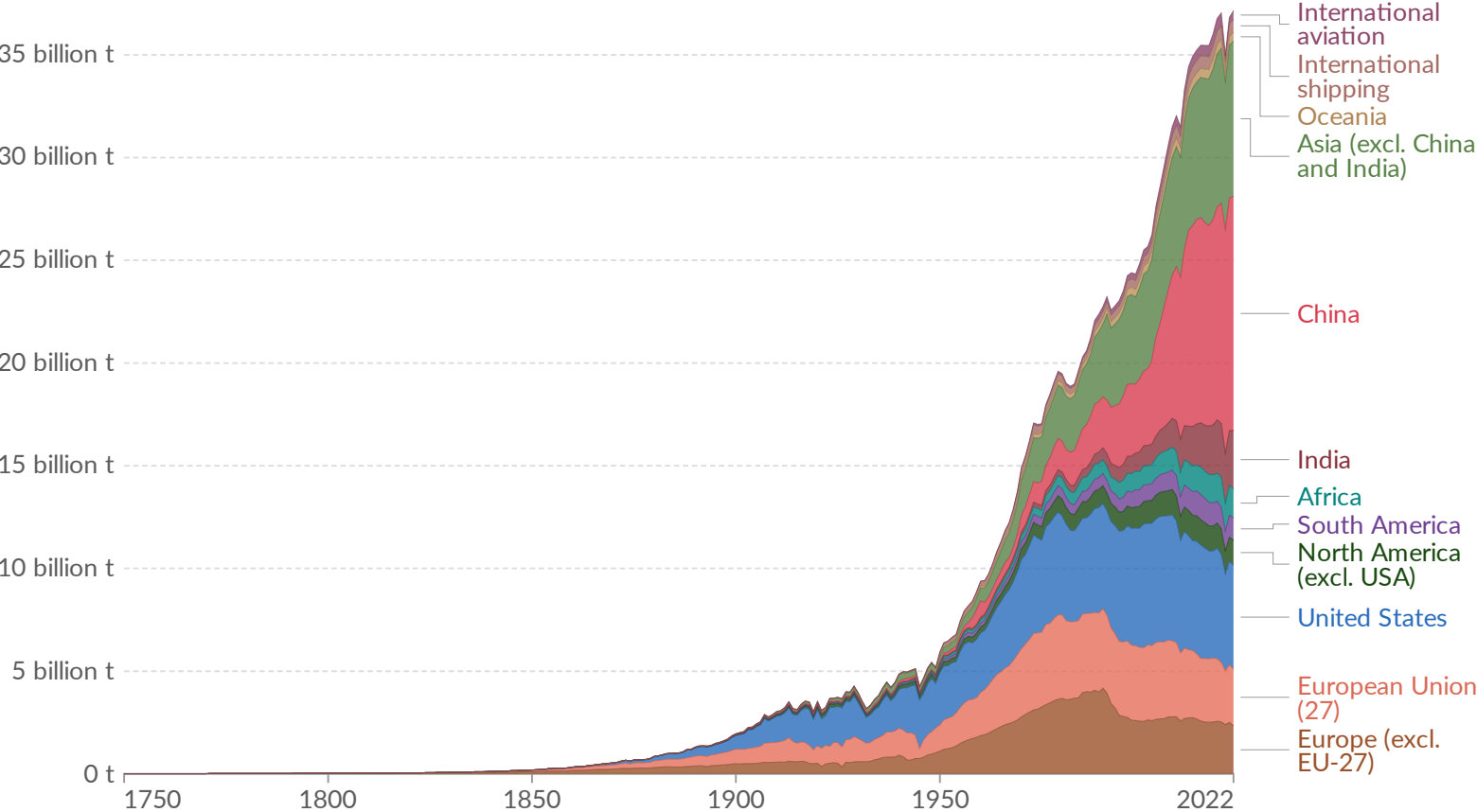
Source: Author's elaboration of OECD TIVA database 2023, charts based on PROD for all manufacturing sectors.

IMD

Source: <https://cepr.org/voxeu/columns/china-worlds-sole-manufacturing-superpower-line-sketch-rise>

# Annual CO<sub>2</sub> emissions by world region

Emissions from fossil fuels and industry<sup>1</sup> are included, but not land-use change emissions. International aviation and shipping are included as separate entities, as they are not included in any country's emissions.



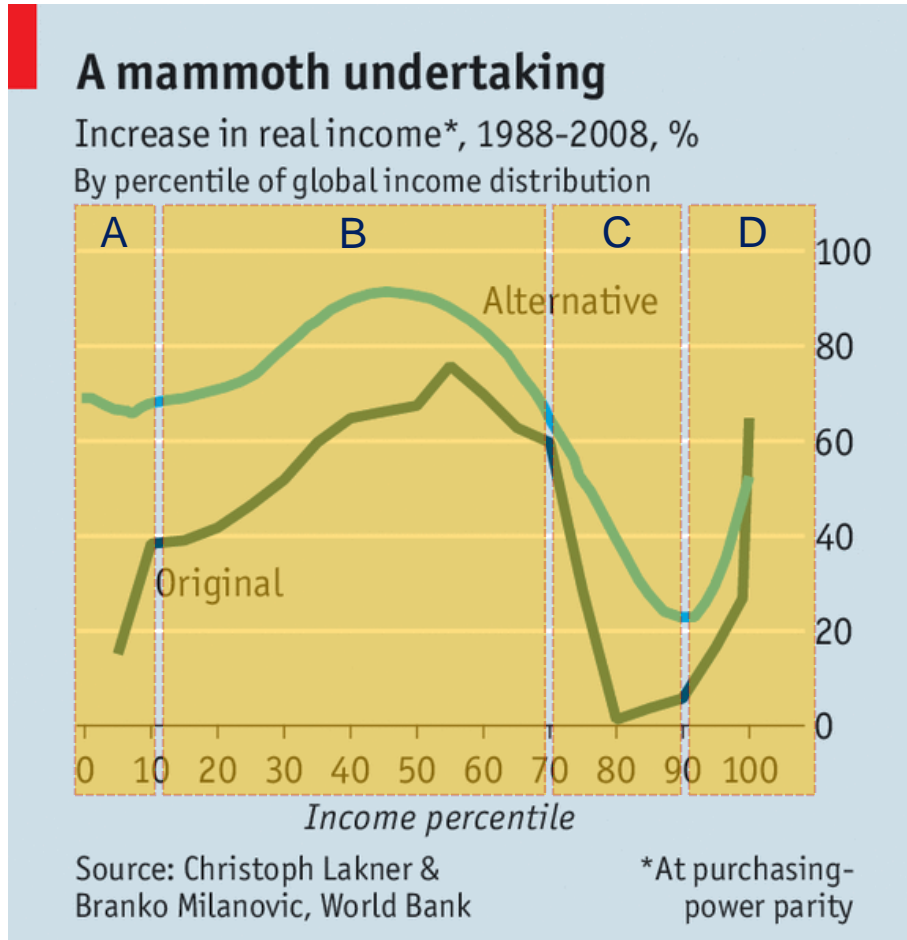
Data source: Global Carbon Budget (2023)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

1. **Fossil emissions:** Fossil emissions measure the quantity of carbon dioxide (CO<sub>2</sub>) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO<sub>2</sub> includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.



# Global Income Growth – From 1988 to 2008



- **A:** Poorest locked out of growth
- **B:** Rising incomes in emerging economies – mainly China
- **C:** Decline of developed-world middle class
- **D:** Booming global elite

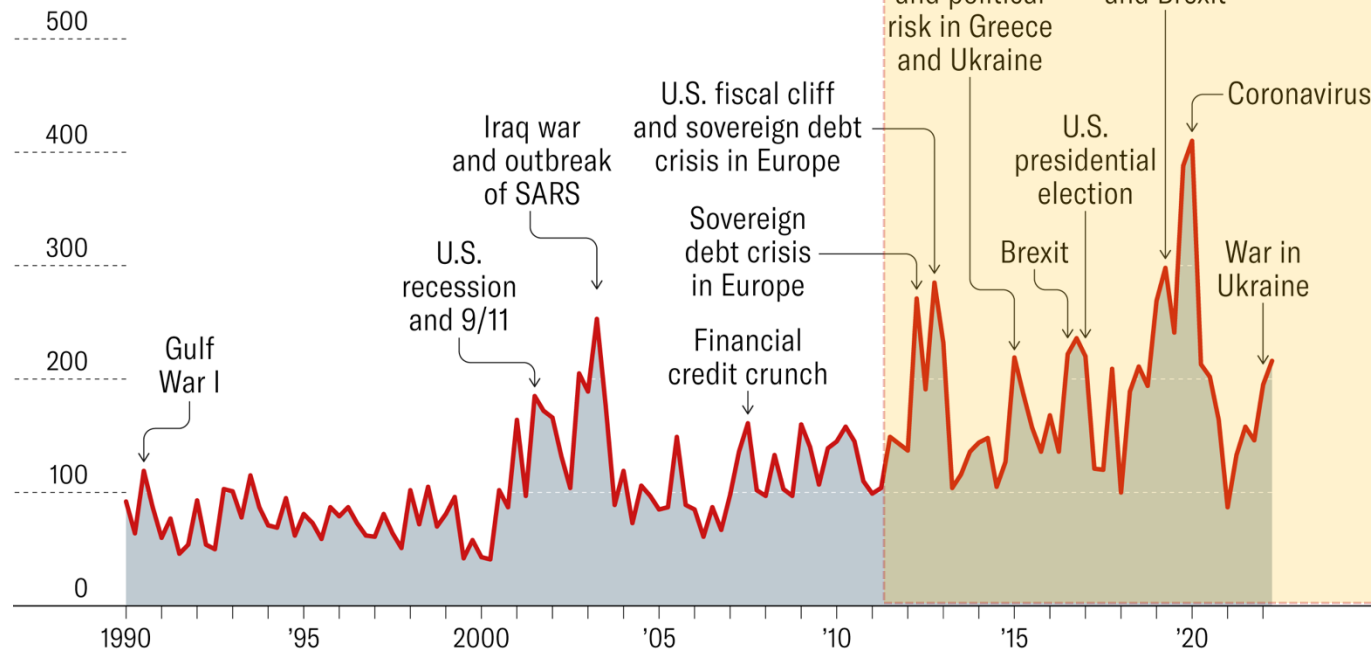
Economist.com

Source: *The Economist*, 2016 (<https://www.economist.com/finance-and-economics/2016/09/17/shooting-an-elephant>)

# The Rise of Economic Uncertainty – The World Uncertainty Index

## World Uncertainty Index

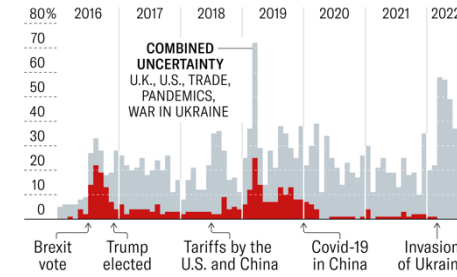
Normalized, 1990-2010 is 100 on average



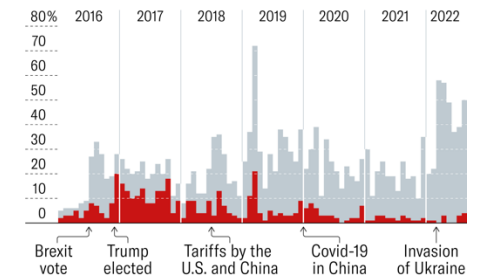
Source: Hites Ahir, Nicholas Bloom, and Davide Furceri, "World Uncertainty Index," Stanford mimeo, 2018



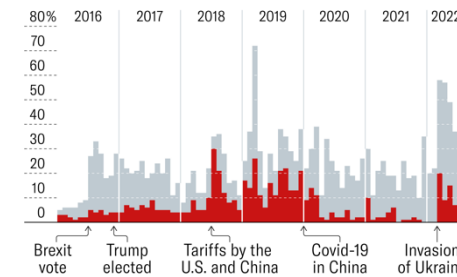
### 1. The U.K.



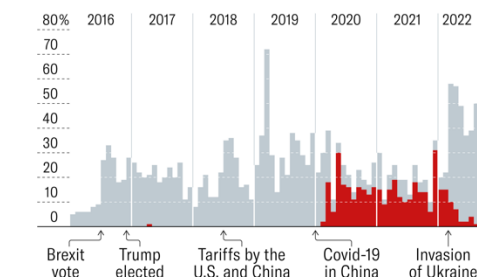
### 2. The U.S.



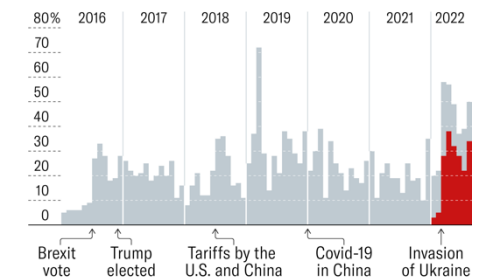
### 3. Trade



### 4. Pandemics



### 5. The war in Ukraine

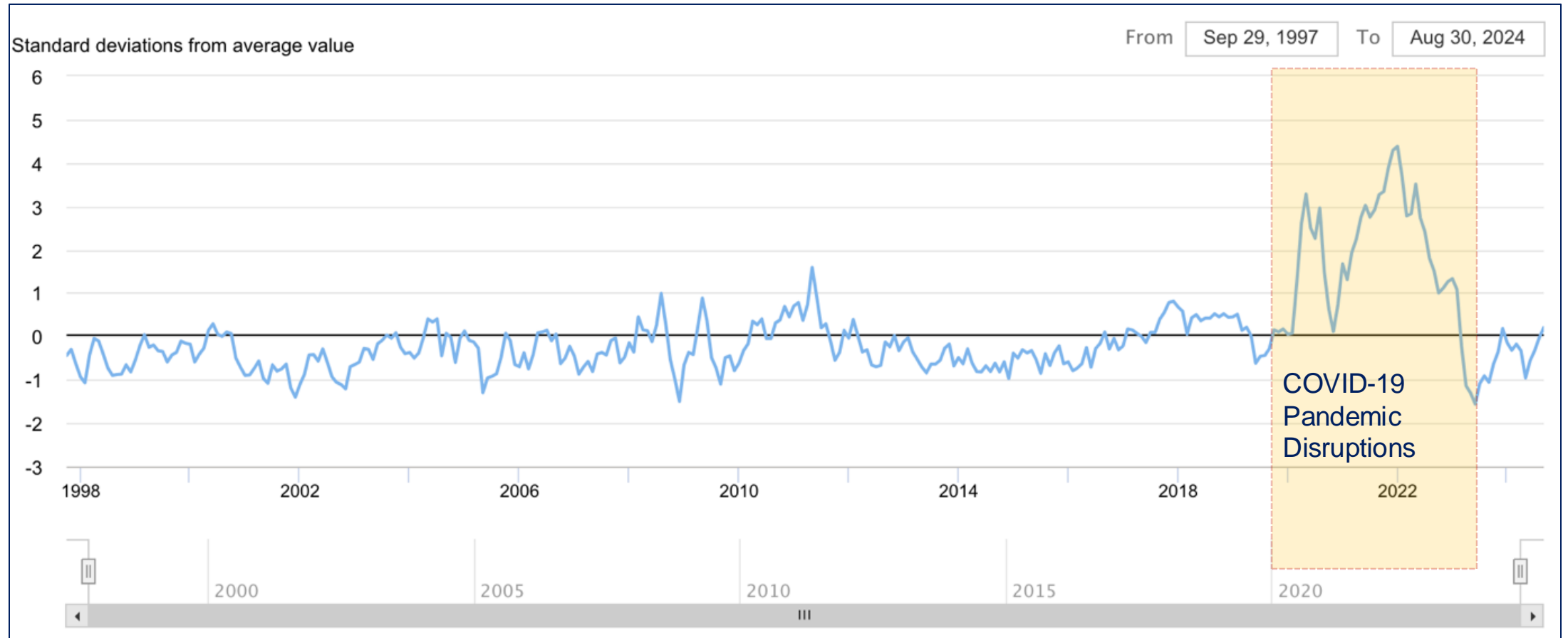


Source: Hites Ahir, Nicholas Bloom, and Davide Furceri, "World Uncertainty Index," Stanford mimeo, 2018



Source: Harvard Business Review, 2022 (<https://hbr.org/2022/09/visualizing-the-rise-of-global-economic-uncertainty>)

# Global Supply Chain Pressure Index (GSCPI)



Data Source: Bureau of Labor Statistics; Harper Petersen Holding GmbH; Baltic Exchange; IHS Markit; Institute for Supply Management; Haver Analytics; Refinitiv; authors' calculations.

Chart Source: Federal Reserve Bank of New York, 2024 (<https://www.newyorkfed.org/research/policy/gscpi#/overview>)

# Prediction – A Response to Change



Prediction: statement about the future event

## Non-Scientific (Prophecy)



Astrology



Numerology



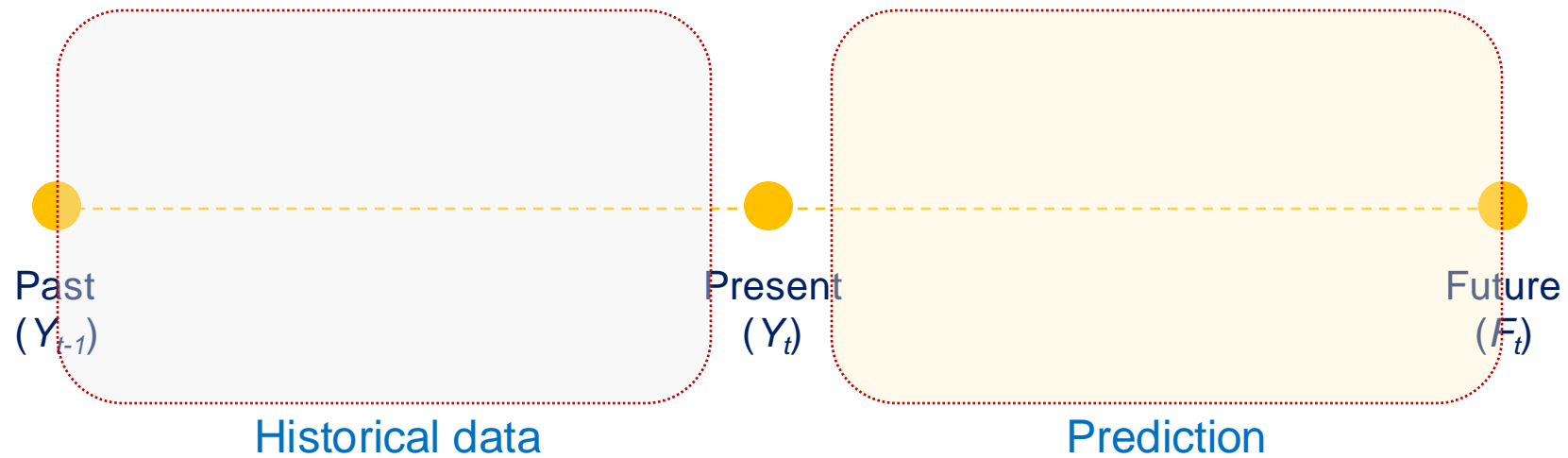
Symbols

## Scientific



Facts/Data-Driven

# Prediction – Data-Driven



**Assumption:** The future will be the same as the past!

- $F_t$ : demand forecast for period  $t$
- $Y_t$ : actual demand for period  $t$

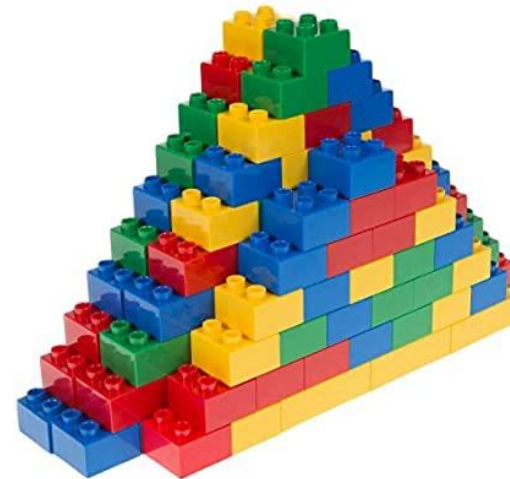
# Harnessing the Power of Data



Data



Sorted/Cleaned/Arranged

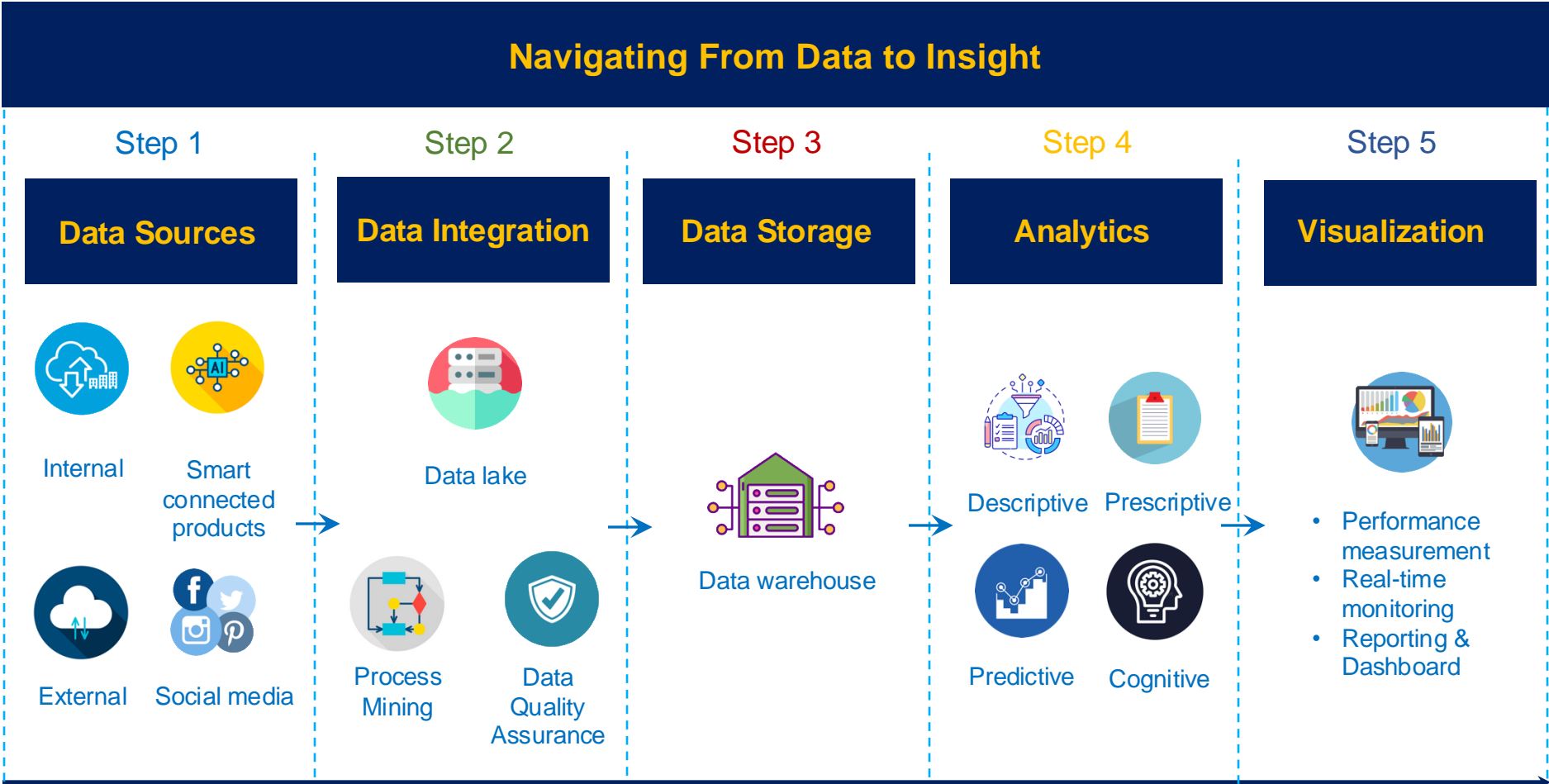


Modeling/Simulation/Optimization

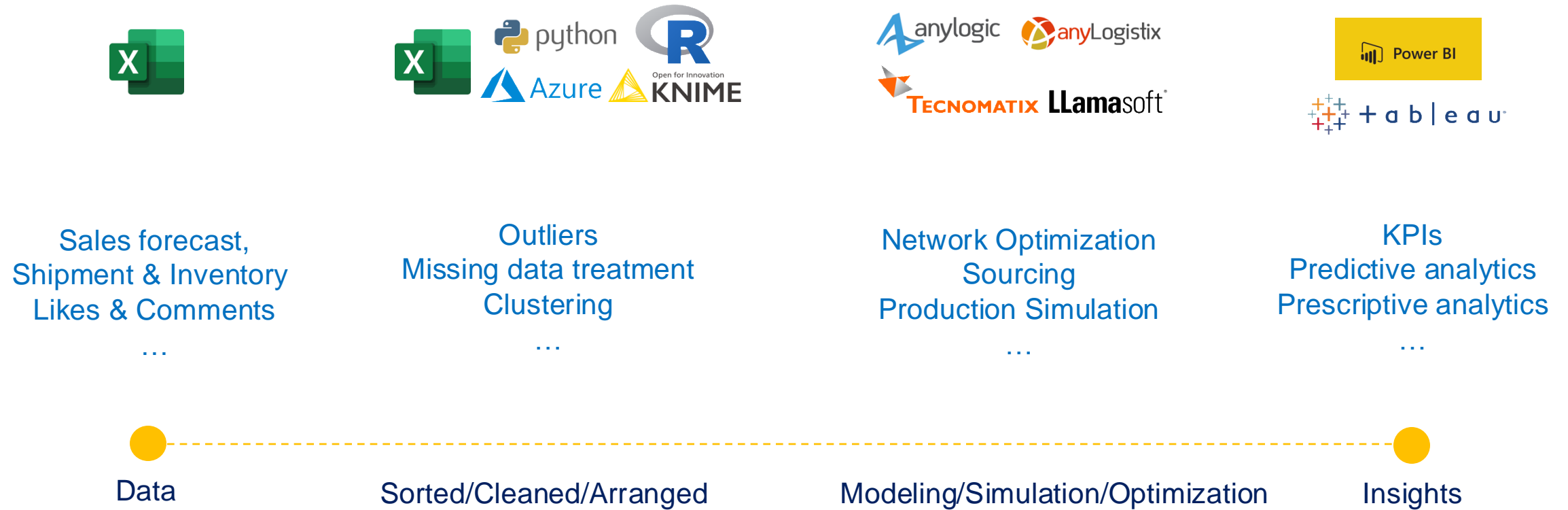


Insights

# The Journey



# From Data to Insights – Ranges

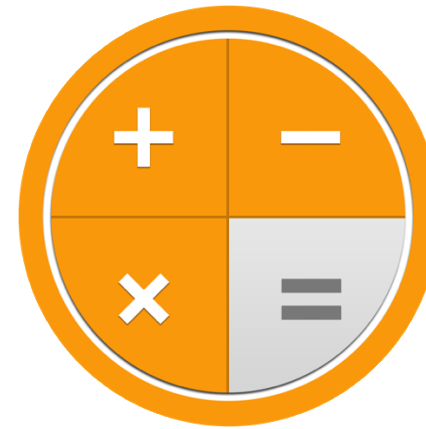




# Prediction – Other Scientific Equivalent



Forecasting



Estimation

# Prediction, Forecasting, Estimation – Some Implications



Weather



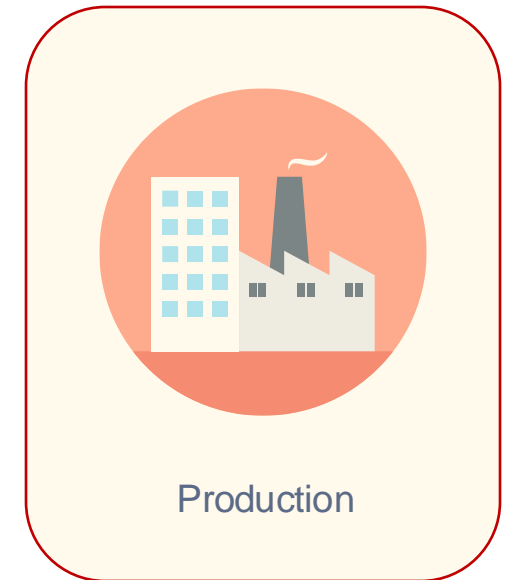
Finance



Travel



Retail

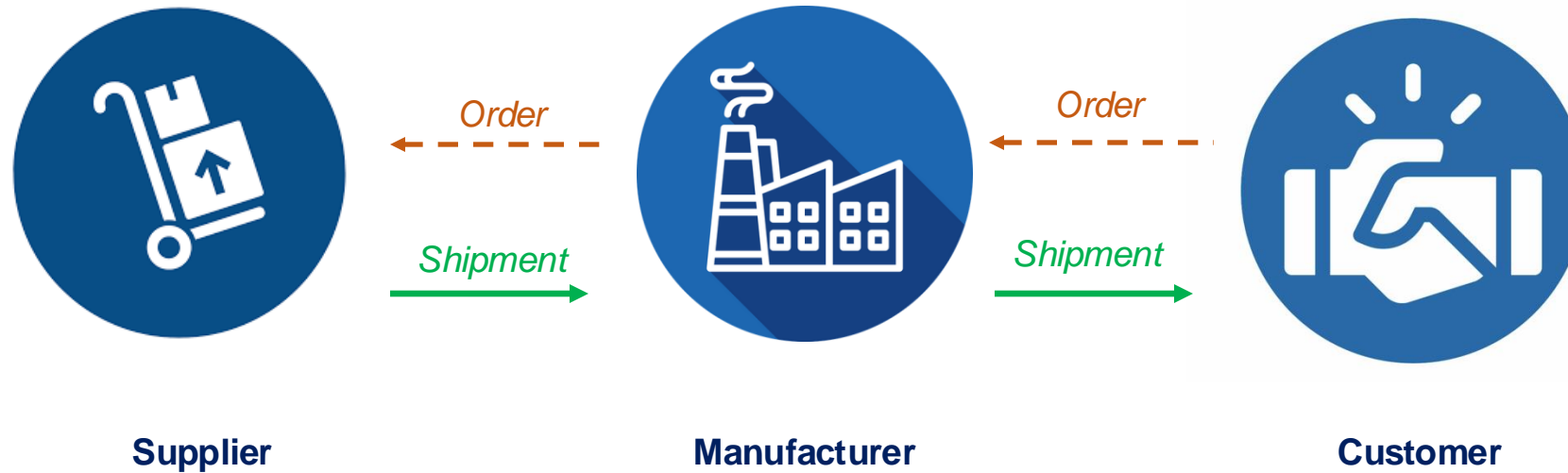


Production

# Module 2 – Demand Management

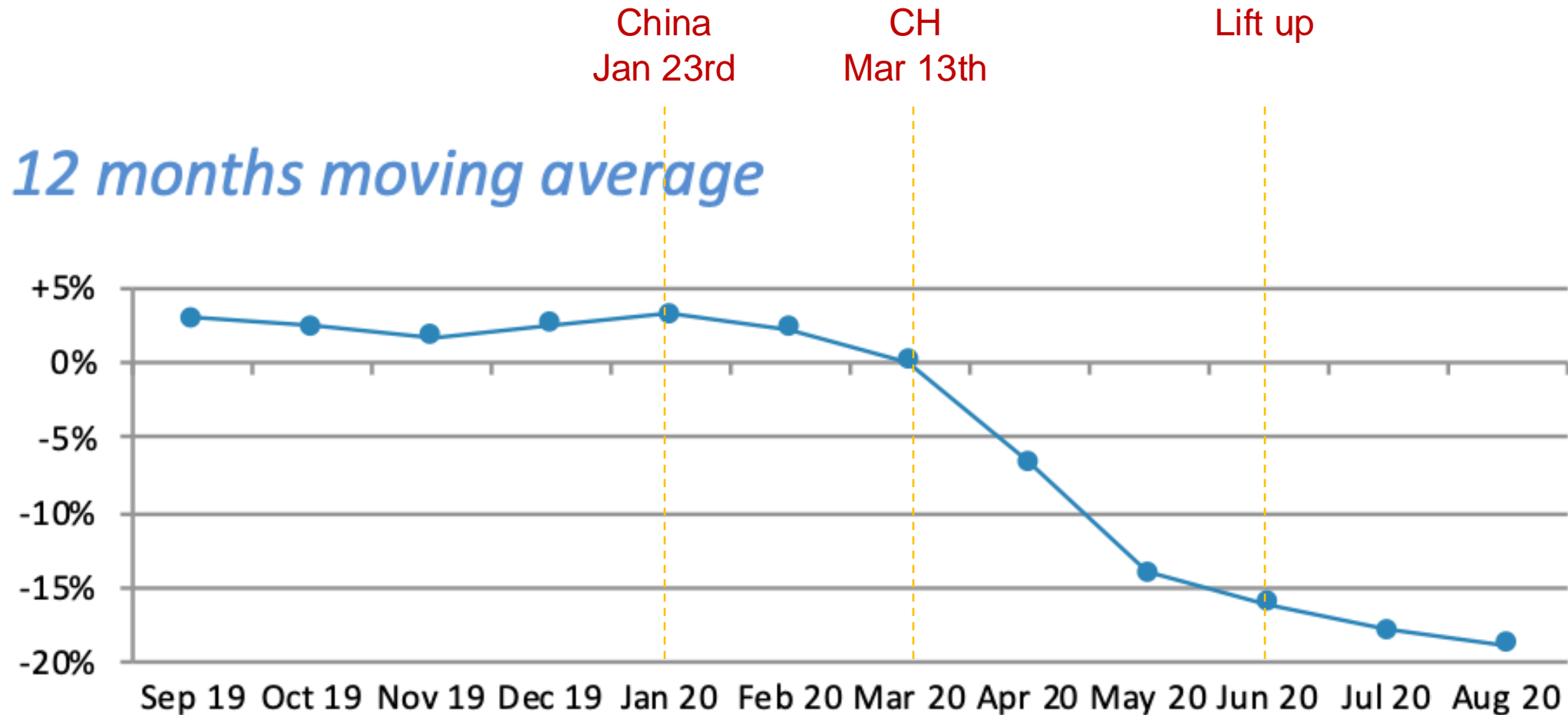
Q2: How to plan production to fulfill future demands?

Q1: How to use historical data to better plan production for future?



Q3: How to buffer stock against demand and supply disruptions?

# The Swiss Watch Industry – Export During COVID-19 (Sep19-Aug20)



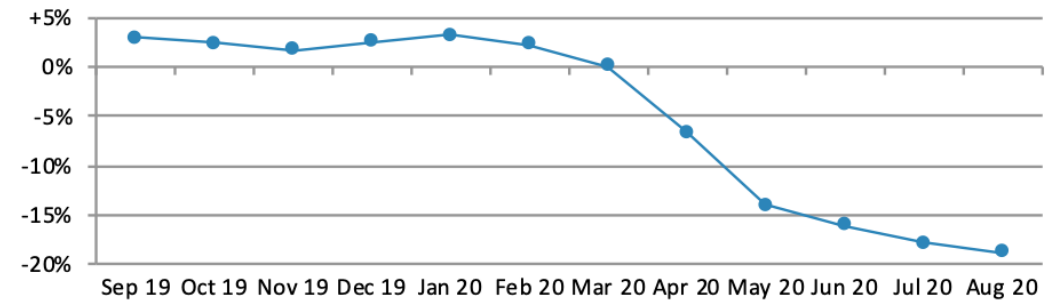
Source: Federation of the Swiss Watch industry FH: [https://www.fhs.swiss/scripts/getstat.php?file=comm\\_200808\\_a.pdf](https://www.fhs.swiss/scripts/getstat.php?file=comm_200808_a.pdf)

# The Swiss Watch Industry – Export During COVID-19 (Sep19-Aug20)

## Swiss watch exports in August 2020

Products	Units in mio.	Change in %	Mil. of CHF	Change in %
Wrist watches	1.1	-31.4%	1,284.5	-11.4%
Other products			59.4	-21.3%
<b>Total</b>			<b>1,343.9</b>	<b>-11.9%</b>

## 12 months moving average



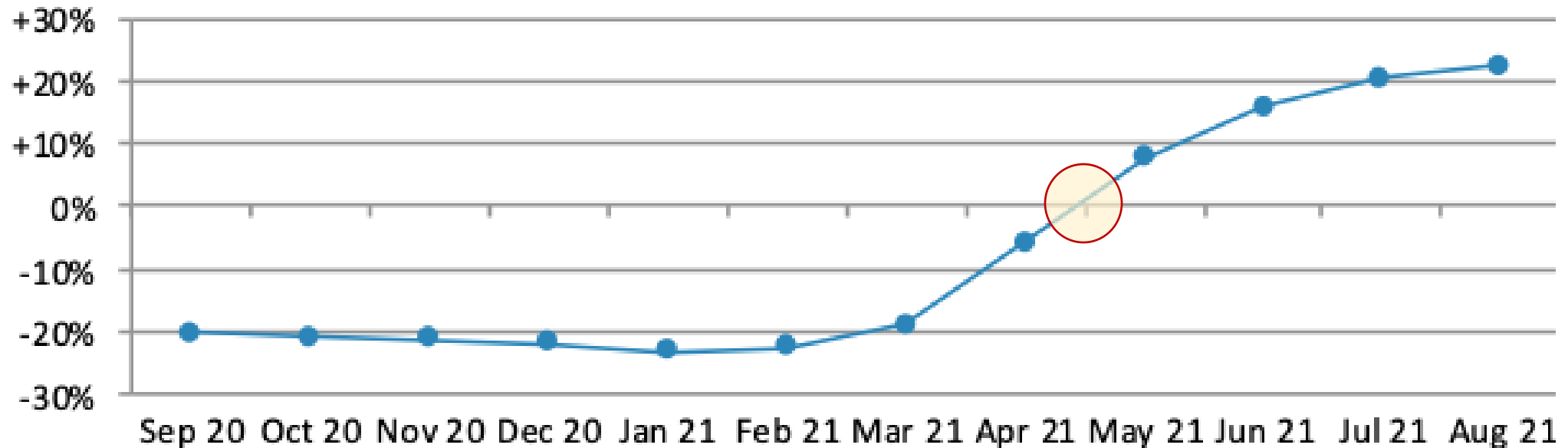
**31%:** Lower than same period in 2019

**-12%:** Lower than Aug 2019

Source: Federation of the Swiss Watch industry FH: [https://www.fhs.swiss/scripts/getstat.php?file=comm\\_200808\\_a.pdf](https://www.fhs.swiss/scripts/getstat.php?file=comm_200808_a.pdf)

# The Swiss Watch Industry – Export During COVID-19 (Sep20-Aug21)

## *12 months moving average*



Source: Federation of the Swiss Watch industry FH: [https://www.fhs.swiss/scripts/getstat.php?file=comm\\_200808\\_a.pdf](https://www.fhs.swiss/scripts/getstat.php?file=comm_200808_a.pdf)

# Supply Chain Disruptions

Bloomberg

• Live Now Markets Economics **Industries** Tech AI Politics Wealth Pursuits Opinion Businessweek Equality

Industries  
Cars

## VW Plant in Portugal to Suspend Production Due to Lack of Parts

- Production halt owed to lack of part from a Slovenian supplier
- Volkswagen's Autoeuropa plant exports 99% of its production



Employees work on the Volkswagen automobile assembly line in Palmela, Portugal. *Photographer: Thomas Meyer/Bloomberg*



By **Henrique Almeida**  
5 September 2023 at 19:11 CEST

REUTERS® World Business Markets Sustainability Legal Breakingviews Technology Investigati

Autos & Transportation | Workforce

## Portugal's VW plant to resume production in October, ahead of schedule

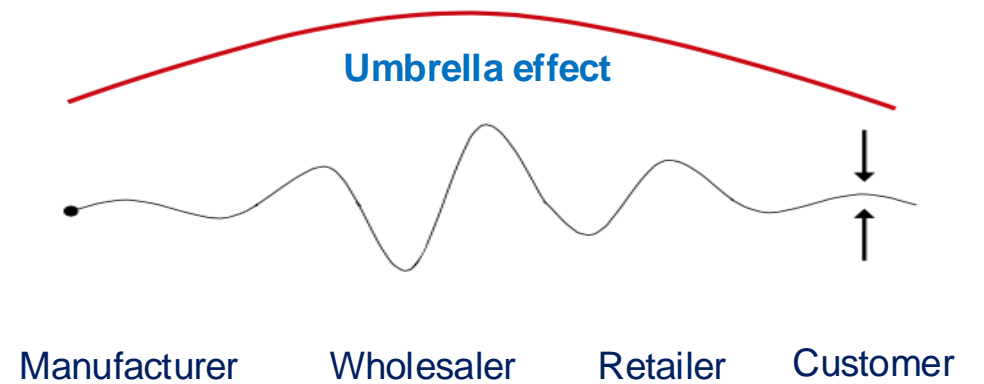
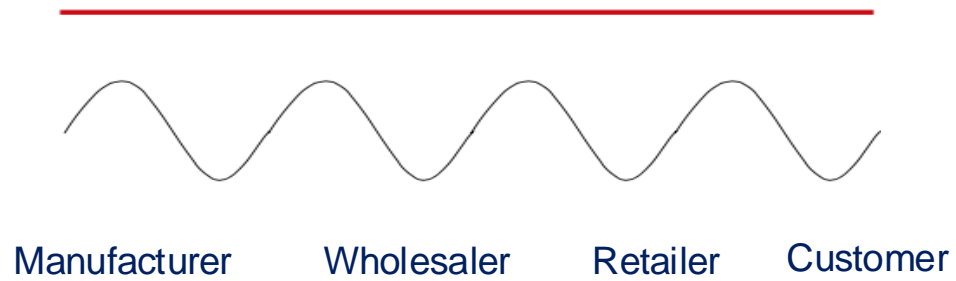
Reuters

September 15, 2023 7:18 PM GMT+2 · Updated 4 days ago



A Volkswagen logo is seen during the press day at the Los Angeles Auto Show in Los Angeles, California, U.S. November 17, 2022. *REUTERS/Mike Blake/File Photo [Acquire Licensing Rights](#)*

# Demand & Supply Variations





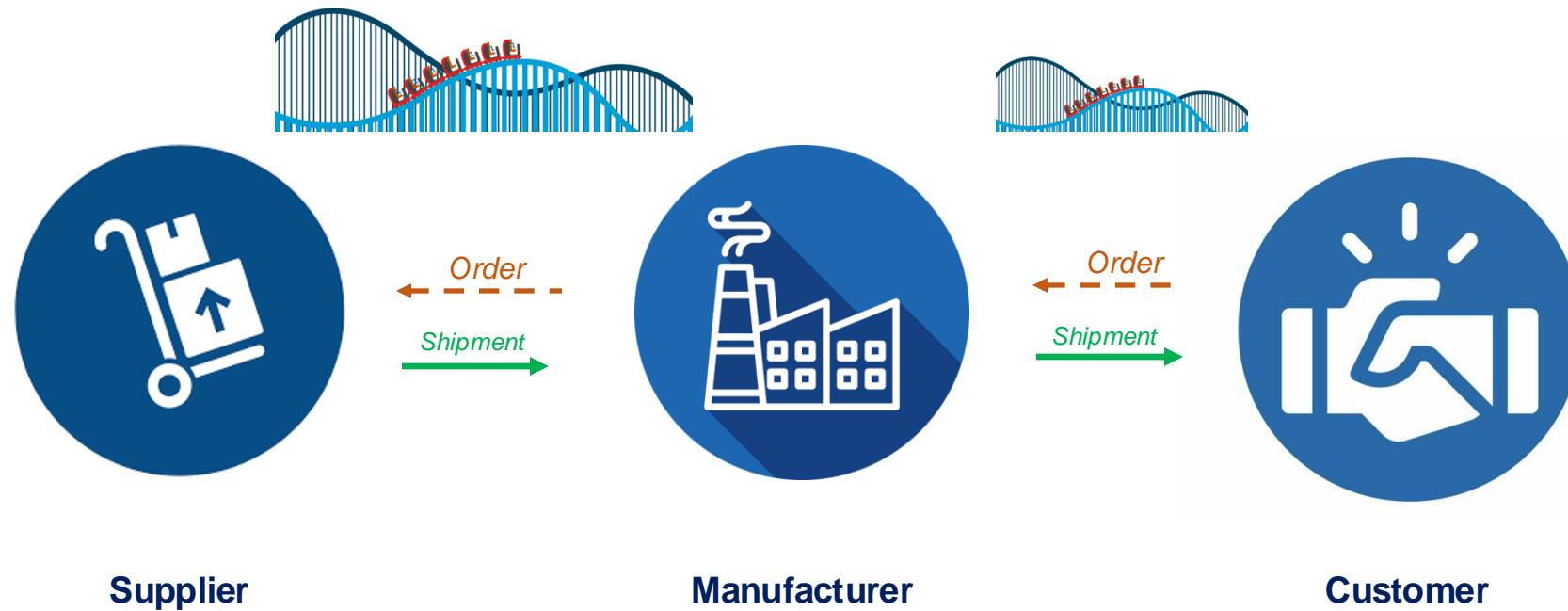
# Question?



5 min

How to manage demand variation in your manufacturing company?

# Demand Disruption – Order Variability & Amplification



# Demand Disruption – Bullwhip Effect



# Demand Disruption – Consequences of Bullwhip Effect



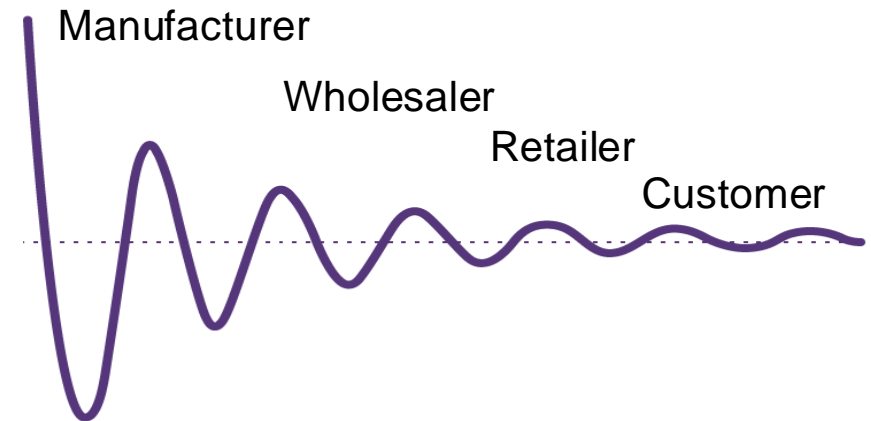
2 min

## Increases

- ...
- .....

## Decreases

- .....
- .....



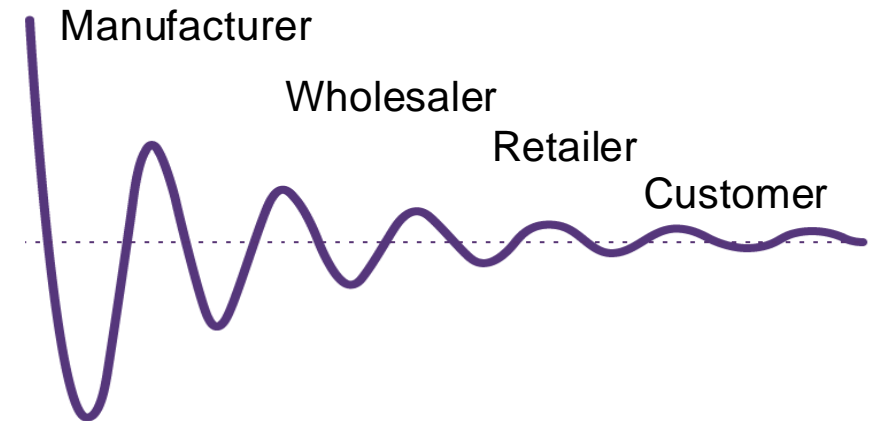
# Demand Disruption – Consequences of Bullwhip Effect

## Increases

- Manufacturing costs
- Inventory costs
- Inventory replenishment time
- Transportation costs

## Decreases

- Customer satisfaction
- Product availability
- Flexibility of the chain
- Profitability



# Demand Disruption – Causes of Bullwhip Effect



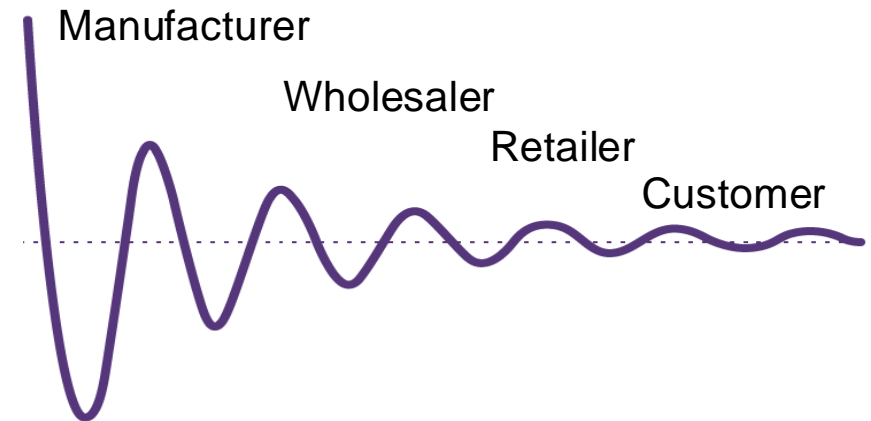
2 min

## Operational

- ...
- ...

## Behavioral

- ...
- .....



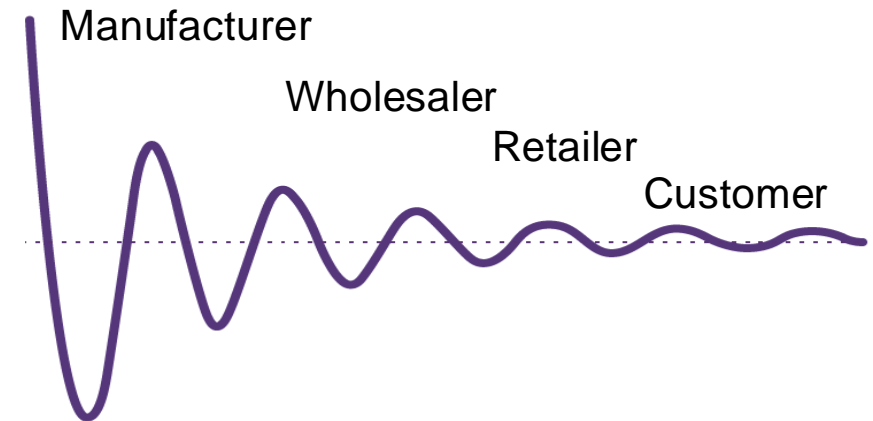
# Demand Disruption – Causes of Bullwhip Effect

## Operational

- Demand processing (forecast errors)
- Leadtime variability
- Lot-sizing
- Promotions and forward buying

## Behavioral

- Trust
- Mis-perceptions of feedback and time lags
- Panic ordering after unmet demand
- Perceived risk of bounded rationality of others

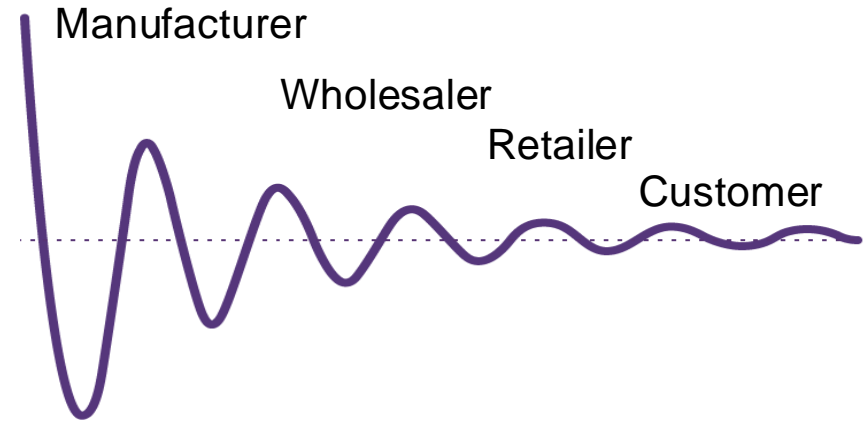


# Demand Disruption – Countermeasures of Bullwhip Effect



2 min

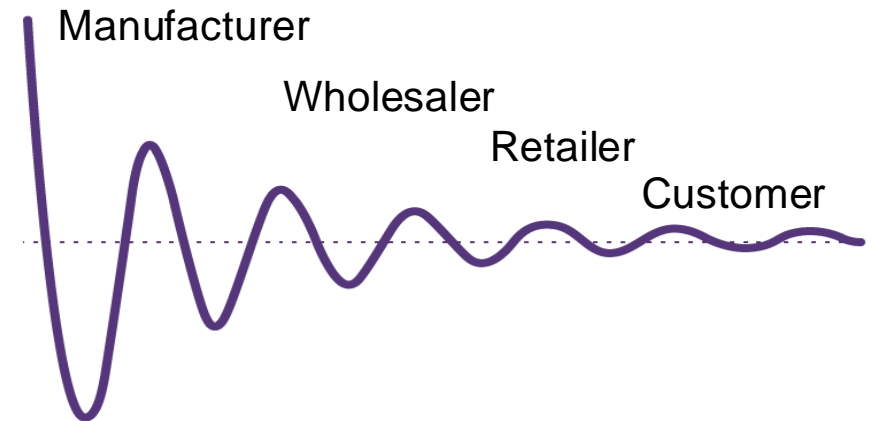
- ....
- ...
- ...





# Demand Disruption – Countermeasures of Bullwhip Effect

- Information sharing
- Vendor Managed Inventory (VMI)
- Just in Time replenishment (JIT)
- Avoiding price games, return restrictions



# Reactions to Demand Disruption



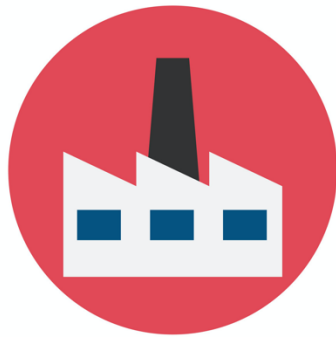
"I recommend our 'wild' expectations be downgraded to 'great.'"



**2 min**

**What are the best ways to  
tackle market demand?**

# Demand Management – Questions?



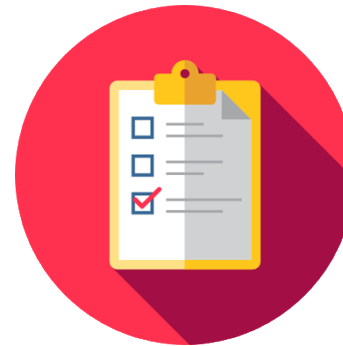
## Location:

Where should it be produced?



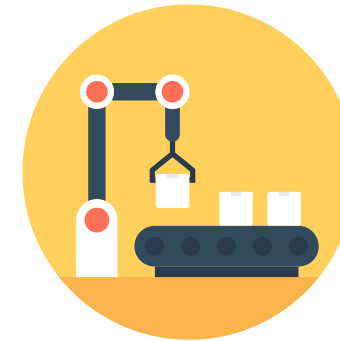
## Product:

What should it be produced?



## Time:

When should it be produced?



## Quantity:

When should it be produced?

# What Items Should Be Considered for Demand Forecast?



2 min

# Demand Management – Components



Customer orders



Inventory targets



Sales & marketing  
Plans



Product  
Commitments



New product  
development

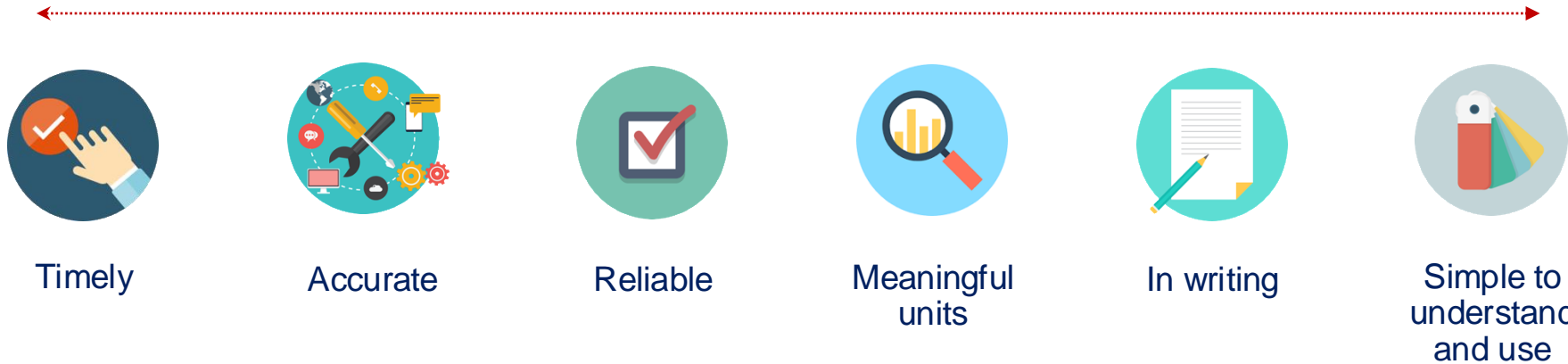


Demand forecast  
at the item and  
aggregate levels

# Demand Management – Elements of a Good Demand Forecast



Demand forecast  
at the item and  
aggregate levels



# Demand Management – Forecasting Steps



Demand forecast  
at the item and  
aggregate levels



**Goal:** What is the purpose of the forecast (Type of products, Granularity, Horizon)



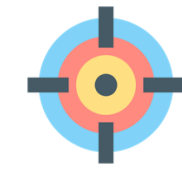
**Data:** Obtain, clean, and analyze appropriate data



**Method:** Select a forecasting method (Qualitative vs Quantitative)



**Forecast:** Make the forecast



**Performance:** Monitor the forecast errors



# Production Management (ME-419)

## Module 1 – Introduction Coaching Rooms

Amin Kaboli

Week 2 – Session 4 – September 20<sup>th</sup>, 2024

# Please Follow Your coaches to Your Designated Rooms

## Coaches

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Saria  
**GCA 330**



Joao  
**GCA 331**



Xavier  
**GRA 332**

# The Art of Giving and Receiving Effective Feedback



Feedback is a gift



Feedback/comments are  
always welcome

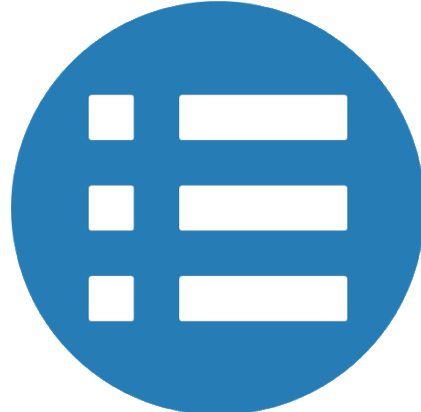
# Giving Effective Feedback



## Respectful

Ask for permission

May I share my observation



## Fact-based

Share facts/ your feelings

What I observed/felt is that ...



## Constructive

Stay focused on growth

What I suggest is that ...



## Concise

Be to-the-point and short

Max three key points



## Open

Be open to any reaction

I respect your feeling ...

# Receiving Effective Feedback



## Receive the gift

**Be open and receptive**

*I appreciate your feedback*



## Listen

**Listen to listen!**

The goal is to listen not to answer, no interruption (zip it)



## Understand

**Focus on THE message**

The goal is to understand, ask questions, clarify, repeat key points, ...



## Decide

**You always have a choice**

*Thank you, I have never seen it this way*  
OR  
*Thank you, let me reflect and get back to you?*



## Follow up

**Reach a common understanding**

There are many ways to follow up: revise the work, set up a meeting, ...