

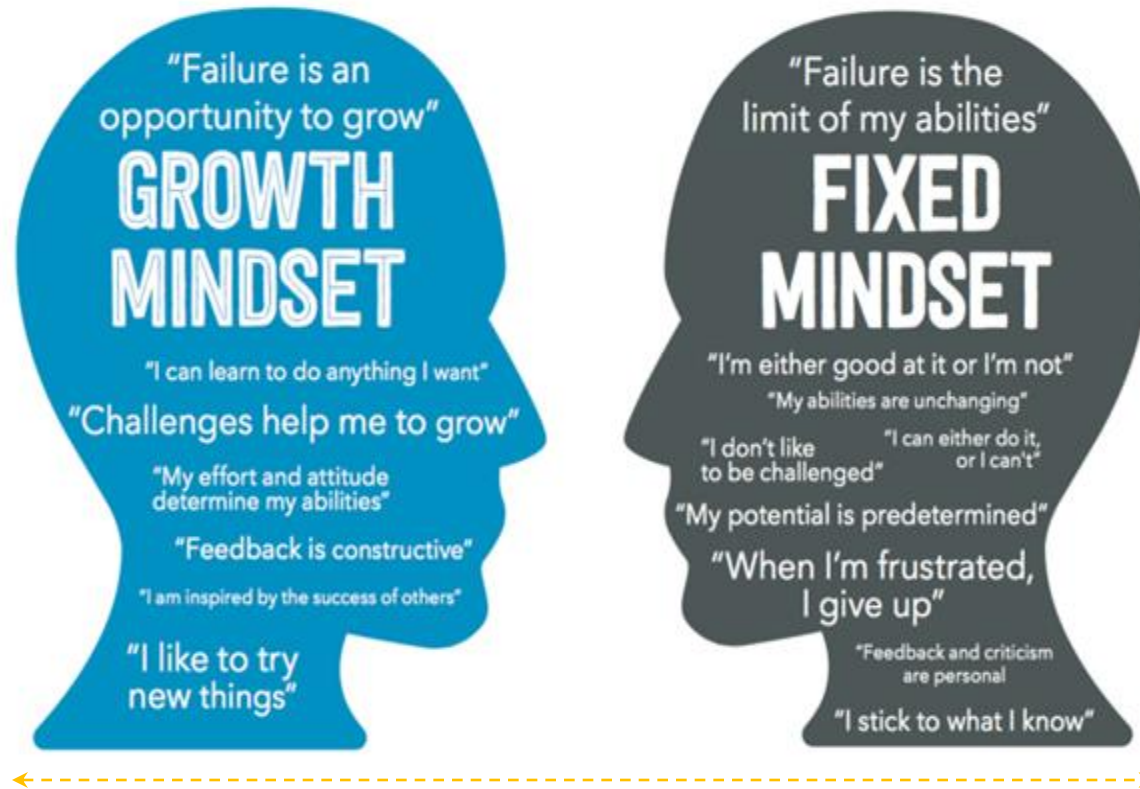
Production Management (ME-419)

Course Introduction

Amin Kaboli

Week 1 – Session 1 – September 12th, 2025

Agreement #1 – Cultivate Growth Mindset



We are here to learn, embrace setbacks and mistakes

Agreement #2 – Disconnect to connect



Turn off your phone
Or put it on silent mode



Penalty

Agreement #3 – Connect and Bond with Class



Listen twice
and speak once



Effective & Non-violent Communication
4-sentence rule



Question?
Raise your hand

Agenda

- **13:15 – 14:00** Introduction to Production Management (ME-419)
 - Class statistics
 - The course objectives, framework, structure, assessments, ...
 - Motivation and expectations
 - Assessment methods and success factors
 - Summary of seven Agreements

Course Objectives



Understanding how a production company works.



Recognizing the critical challenges that a production company faces with.



Analyzing production of a given product/service.



Knowing how to lead and manage a given product/service from A to Z.

The Learning Outcomes

By the end of the course, the student must be able to:



Understand fundamentals of production management



Evaluate and analyze a production system based on key performance indicators



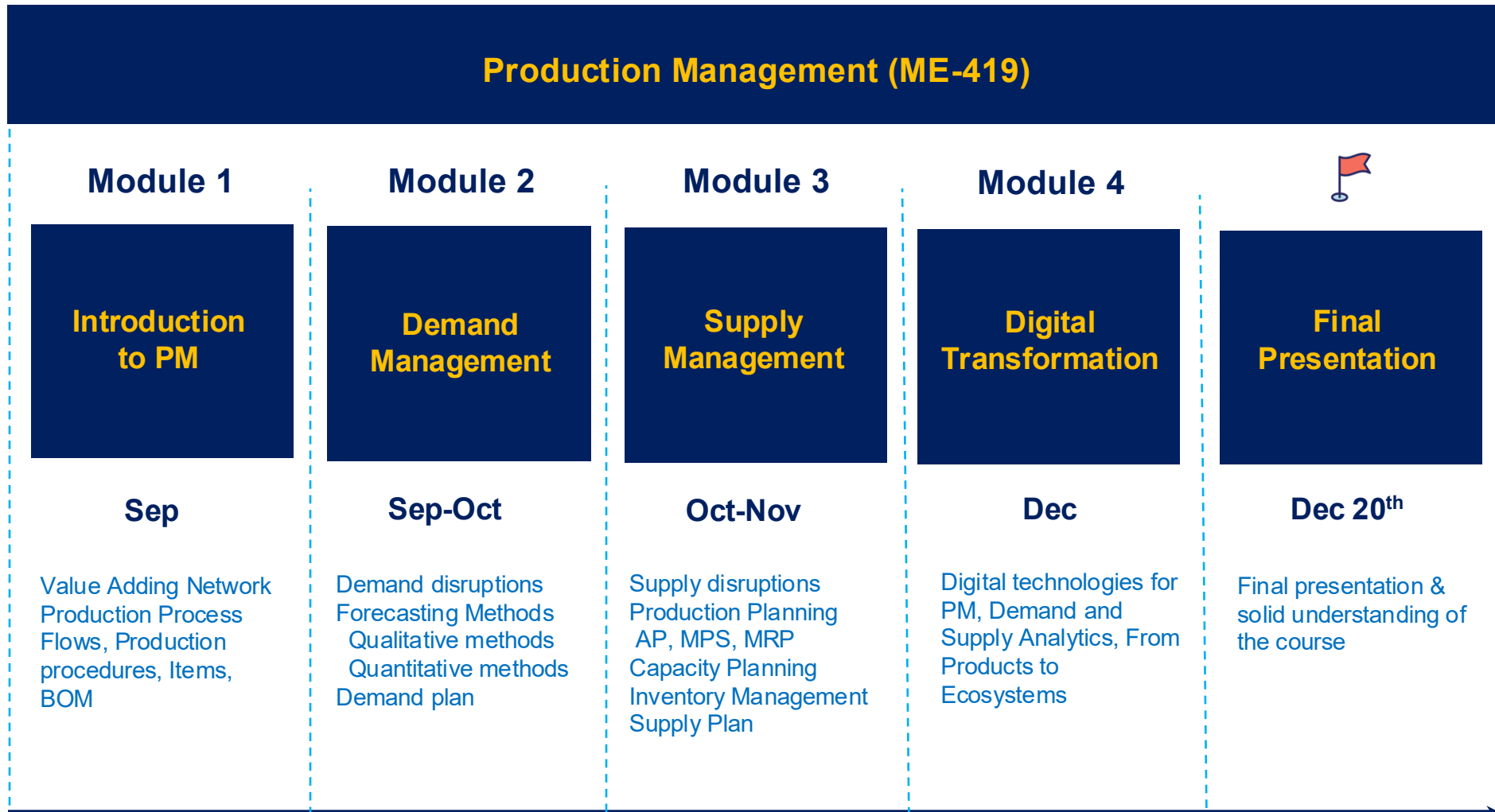
Design and execute a demand/supply plan and improvement a production system

Course Framework

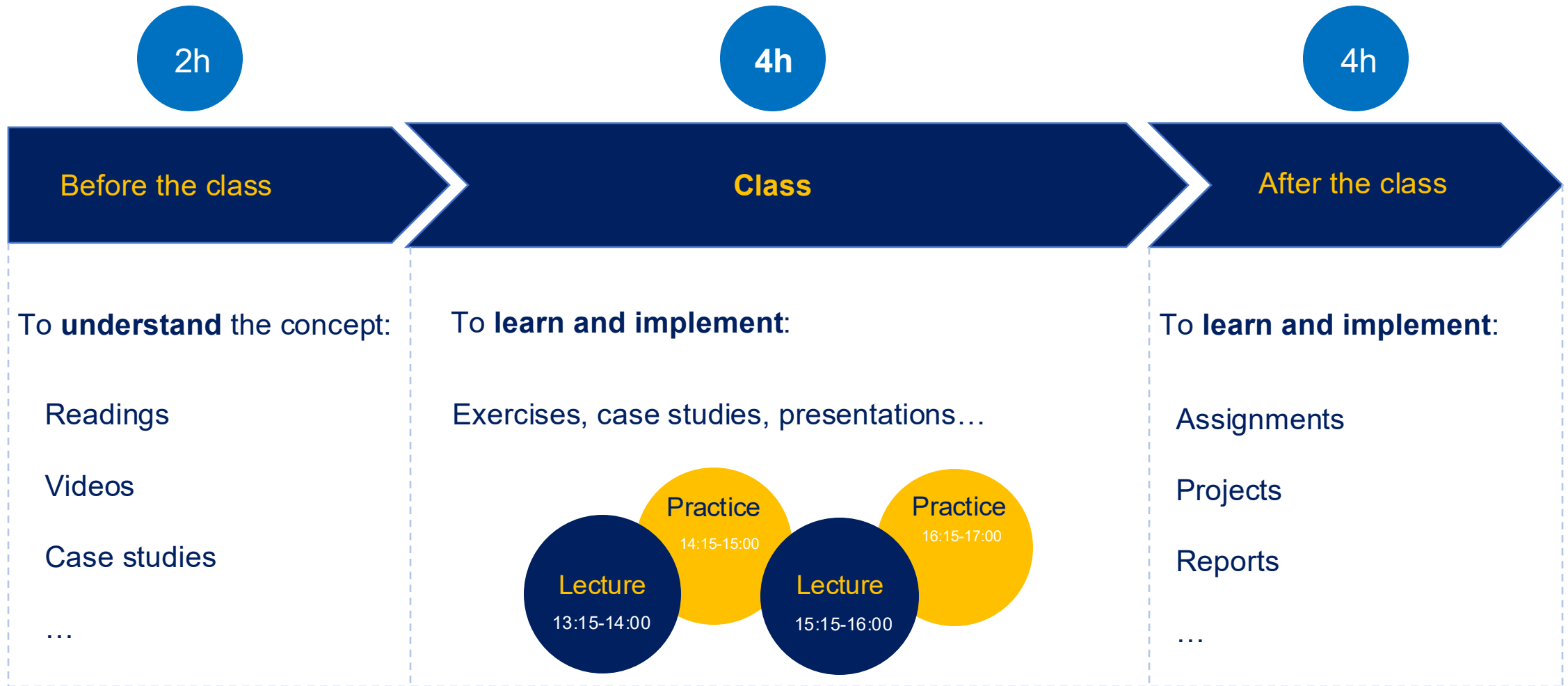


Business plan

Strategic plan
Financial plan



Class Structure (Min 10h/week required)



Assessments – Continuous Evaluation

30%

Final report
Final presentation

understanding of the course



25%

Presence
Participation
Class engagement

45%

Class assignments/projects/cases
Presentations
Reports

Diverse Learning Needs – Inform Me ASAP



Dyslexia

Affects reading and related language-based processing skills



Dyscalculia

Affects a person's ability to understand numbers and learn math facts



Other

Dysgraphia, Non-verbal learning disabilities, Oral/written language disorder, ADHD, ...

What Do We Expect From You?



Individual
Respect
Presence
Involvement



Team
Respect
Teamwork
Openness to learn

Key Success Factor – Attention



Self-learning

Reading slides

Hand-outs



Class learning

Play & Practice

Guest speakers



Group learning

Team work

Creating study groups

Resources



Slides



Hand-outs



Case Studies

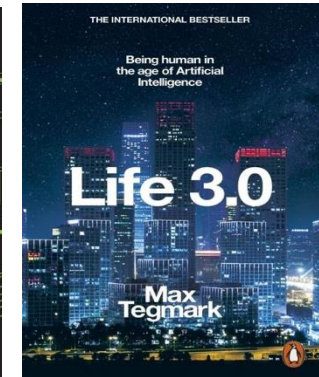
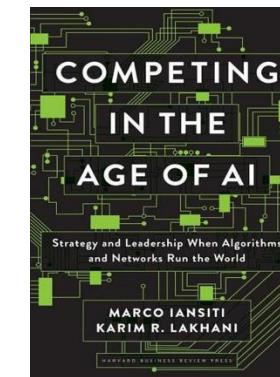
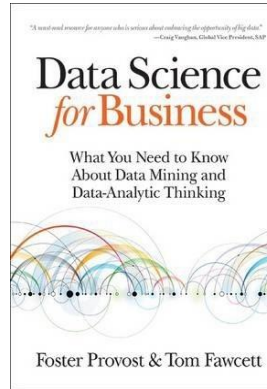
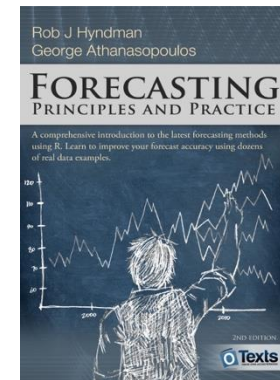
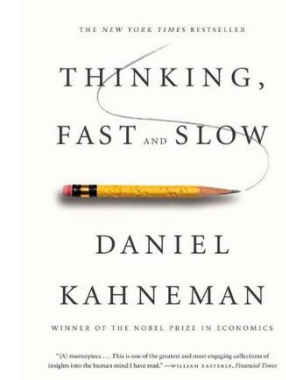
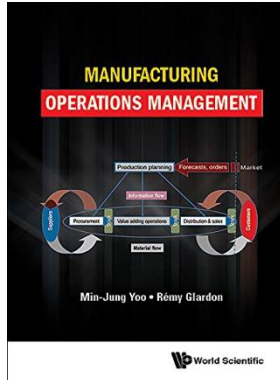
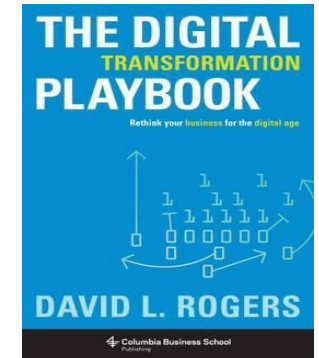
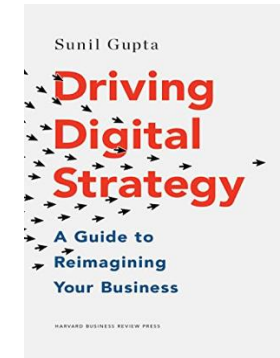
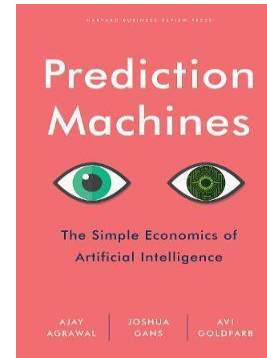
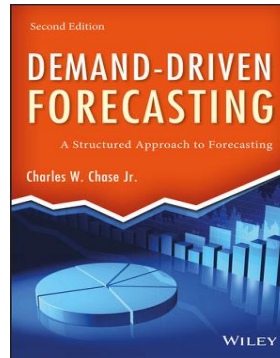
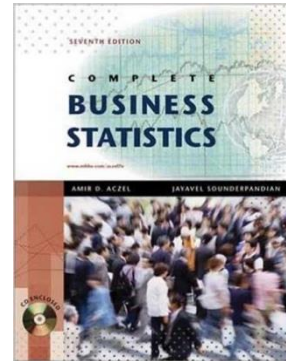
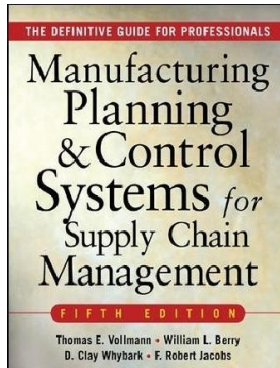
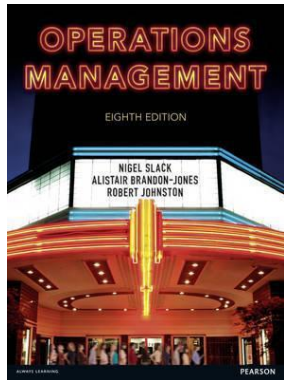


Videos



Books

Resources – Selected Books



Module 1: Introduction to Production Management

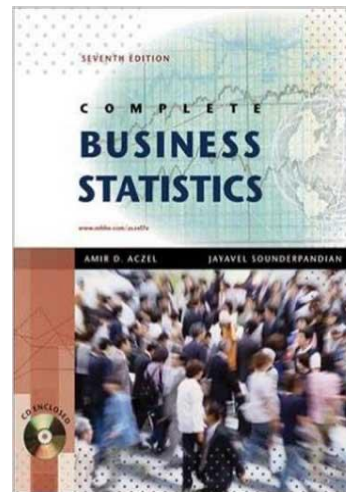
Module 2 & 3: Demand & Supply Management

Module 4: Digital Transformation

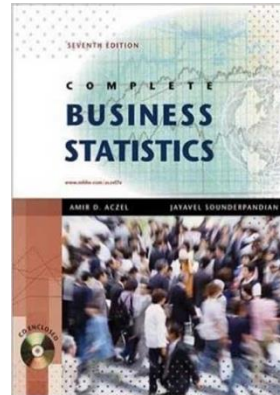
Learning Prerequisites – Required Courses

Required Courses

Probability & Statistics



Learning Prerequisites – Basic Statistics



Chapter 1

Descriptive
Statistics

Chapter 3

Random
Variable

Chapter 4

Normal
Distribution

Chapter 5

Sampling &
Distribution

Chapter 6

Confidence
Intervals

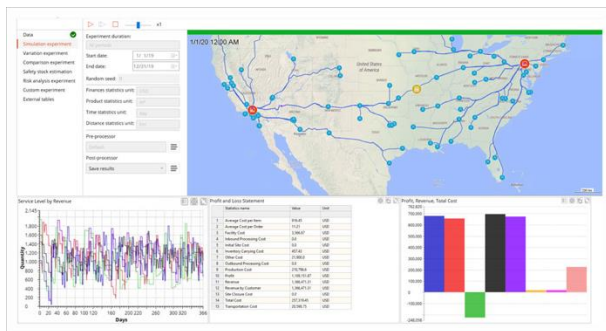
Chapter 10

Regression &
Correlation

- Chapters are shared on Moodle

Learning Opportunity – Simulation Software

AnyLogisticx

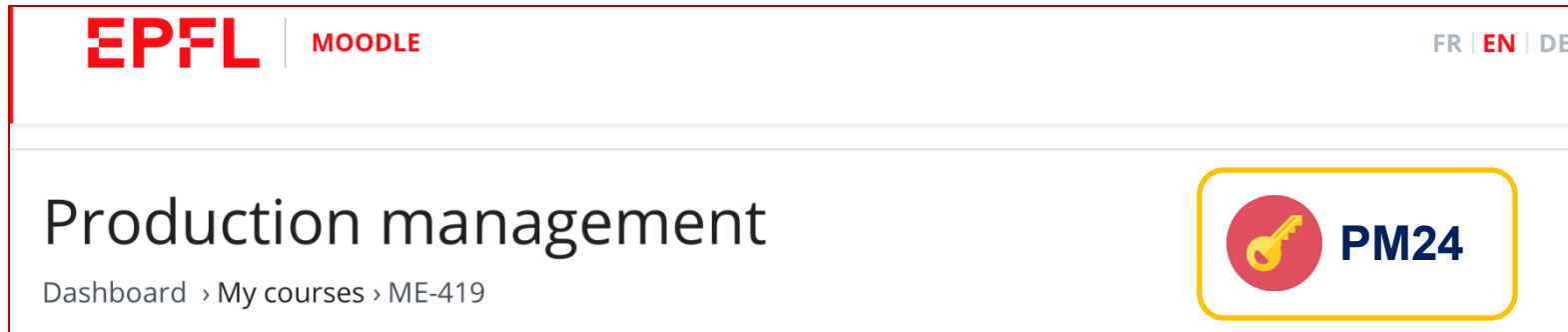


Videos & Q&A Lab session

Certificate of participation



Agreement #4 – Stay Connected/Communicate via Moodle



The screenshot shows the Moodle interface for the 'Production management' course. At the top left, the EPFL logo and 'MOODLE' are displayed. On the top right, language options 'FR | EN | DE' are visible. The main heading is 'Production management', with a breadcrumb trail 'Dashboard > My courses > ME-419'. A yellow-bordered box on the right contains a red key icon and the text 'PM24'.



Hand-outs



Plans



Data



Slides



Videos, ...

Agreement #5 – Report Professionally



Executive summary/abstract
Conclusion



Problem/Analysis/Outcome



Citation and referencing

Agreement #6 – Present Professionally



Structured, short,
concise, to the point



Visualize
Problem/Analysis/Outcome



Respect allocated time

Agreement #7 – Giving and Receive Effective Feedback



Feedback is a gift



Feedback/comments are
always welcome

Seven Agreements – Summary



Cultivate Growth mindset



Stay connected off-class (Moodle)



Disconnect to connect



Report Professionally



Give and receive effective feedback



Connect and bond with your team, coaches, class



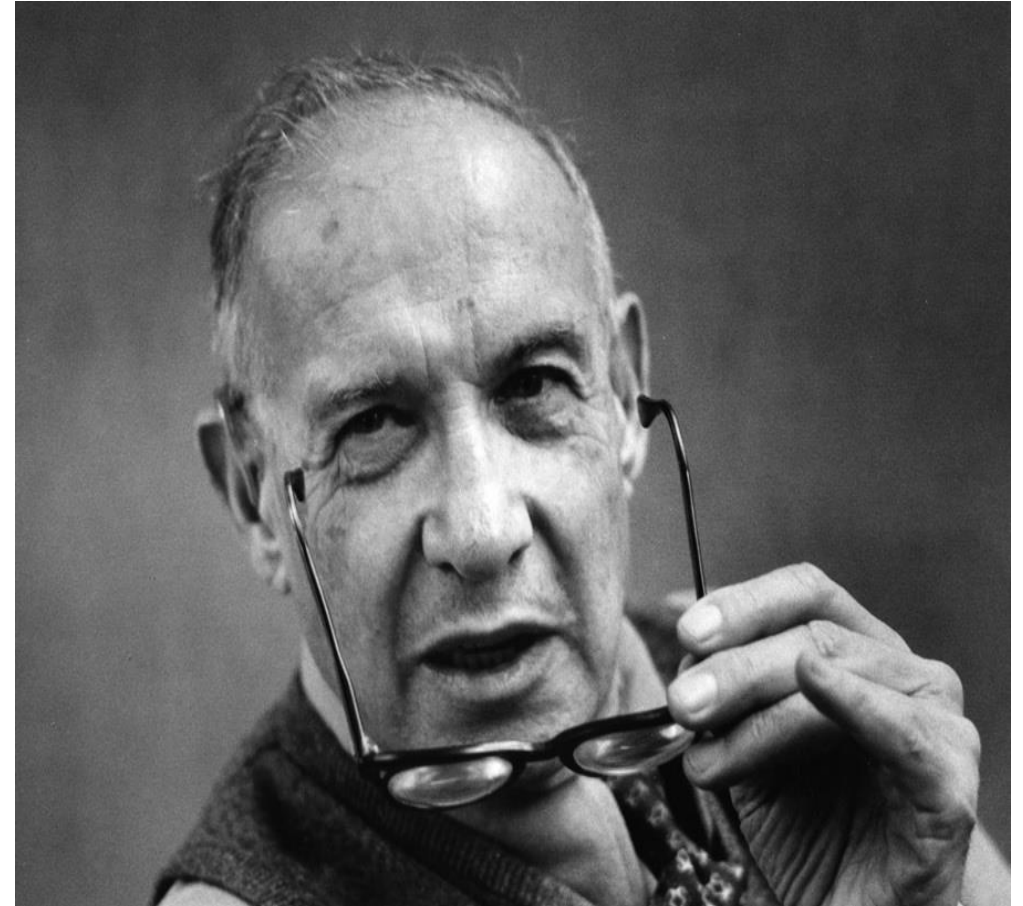
Present Professionally

You Have a Choice

... In a few hundred years, when the history of our time will be written from a long-term perspective, it is likely that the most important event historians will see is not technology, not the Internet, not e-commerce.

It is an unprecedented change in the human condition. **For the first time, literally, substantial and rapidly growing numbers of people have choices.** For the first time, they will have to manage themselves. And society is totally unprepared for it.

Peter Drucker 1909-2005



Production Management (ME-419)

- **Group Formation & Intros**
- **PM in Action**

Amin Kaboli

Week 1 – Session 2 – September 12th, 2025

Groups of Seung — Mobility Industry

BYD

TESLA

MONDRAKER

UrbanBiker

ETRIX
E-MOTOS

Vespa



BYD - SEAL

TESLA Model 3

MONDRAKER - DUNE XR

Urbanbiker - Mini PLUS

ETRIX - Silence S01

Vespa Primavera Elettrica 45 Euro

Badia Martí Alba

Faivre d'Arcier Maud
Marie Thérèse

Fiorito Chiara

Fleury Aude-Line Thérèse

Flocchini Giulia

Fromage Gaïane
Marie Alice Marc

Vildé Juliette Vergine

Yalcin Begüm

Collette Gilbert Robert
Habeb Jamil

Desaules Louis

Favre-Reguillon Mathelyo
Jacques Jean Lionel Chris

Karagoz Burak

Auzeau César
Marie Joseph

Bertrand Théo

Minghelli Alessandro
Giovanni Adriano

Dupertuis-dit-Neveu
Stéphane Gabriel

Ramseier Hugo

Ziti Youssef

Jacot Nathan Vincent

Rodriguez Jimenez
Luis Oscar

Calls Miras Sergi

Dequae Edward
Stefaan M.

Kim Tae Hwan

Zijderveld Willem Peter

Lanz Marius Thierry

Levy Baron Joshua
Charles Jean

Mrabet Amine

Nauche Paul Michel
Claude

Pinat Enzo Florent

Ribadeau Dumas
Arthus Roger Maurice

Groups of Maria — Watch Industry



Submariner

Lam Phi Yên Christelle
Rosset Tania
Sutyushev Valentin
Aaen Mark Alexandru
Stoilov Verter Emilov



Aquanaut

Gerart Emma Archana Aroquiam
Bonvin Maximilian Eduard
Mouakeh Abdul Karim
Nardo Orlando
Martenon Luca



Code 11.59

Heidaripour Sara
Deric Mateja
Klos Mikolaj Wojciech
Simon Arthur Gilles Thomas
Masclat Matthieu Martin Marie



Forerunner 970

Jovic Helena Jelena
Zemiti Myriam Amélie Lana
Duarte Boaventura Tomás
Schwabedal Georg Tilman Peter
Pascual Fernandez Manuel



Ultra 2

Gerani Camilla
Grange Rémy Alfred
De Nuccio Monteiro Luca
Pennings Tim Robin
Reboul Augustin Jean Maurice



Galaxy Watch 8

Shi Heling
Kelles Martin Jacques Jean
Paratte Noé
Punt Erik Karl-Johan
Ricard Luc Michel Daniel

Groups of Lucie — Phone Industry



iPhone Air

iPhone Air

Kombele Koumou
Alpheny Céline

Beneteau Sébastien
Charles Louis

Burberi Leonardo

Persson Axel
Lennart Magnus

Masclet Guillaume
Olivier Marie



Galaxy S24

Maalouf Rayane

Cheng Yo-Shiun

Besson Dorian

Li Chengzhi

Najjar Naël



Google Pixel 7

Pixel 7

Lampe Jeanine Alix
Maria Elisabeth

Debrot Nicolas

Leser Sebastian
Willem

Olivier Lucas
Etienne Armand

Parbez Mathieu
Kishan



Redmi Note 14 Pro

Redmi Note 14

Tazi Sarah

Farinelli Michaël
Flavio

Usseglio-Polatera
Gaspard

Quku Arsid

Petrov Viktor Ivaylov



NOTHING Phone (3)

Phone(3)

Mantel Emma
Pascale

Zghary Chaimae

Hebraud Samuel
Pierre Francis

Abela Michel

Stoyanov Iliya
Ignatov



FAIRPHONE 5

Fairphone 5

Meijer Anastasia

Wancquet Julie
Arantxa

Kuntze Thomas
Roland Pierre

Alladin Elias

Sade Raphaël
Flavien Lucien

Case Studies – Summary

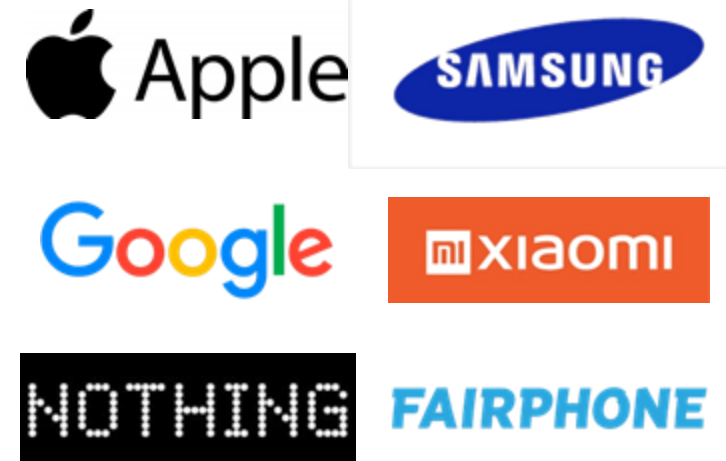
Seung
(Coaching Room: CM1100)



Maria
(Coaching Room: CM1106)



Lucie
(Coaching Room: CM1104)



Assignment 1 – Your Company and Case Study

Module I: Introduction to Production Management

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



- 1) Download the Assignment 1 from Moodle
- 2) Read and review the case study within your group
- 3) Get to know your company and the product that you will manage over the upcoming 14 weeks

Production Management (ME-419)

Module 1 – Introduction Coaching Rooms

Amin Kaboli

Week 1 – Session 3 – September 12th, 2025

Assignment 1 – Your Company and Case Study

Module I: Introduction to Production Management

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



- 1) Download the Assignment 1 from Moodle
- 2) Read and review the case study within your group
- 3) Get to know your company and the product that you will manage over the upcoming 13 weeks

The Art of Giving and Receiving Effective Feedback



Feedback is a gift



Feedback/comments are
always welcome

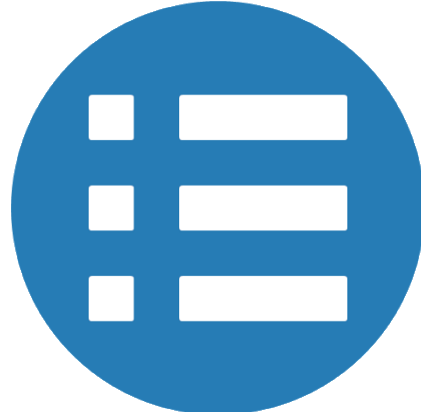
Giving Effective Feedback



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, ...

Production Management (ME-419)

Module 1 – Introduction

Amin Kaboli

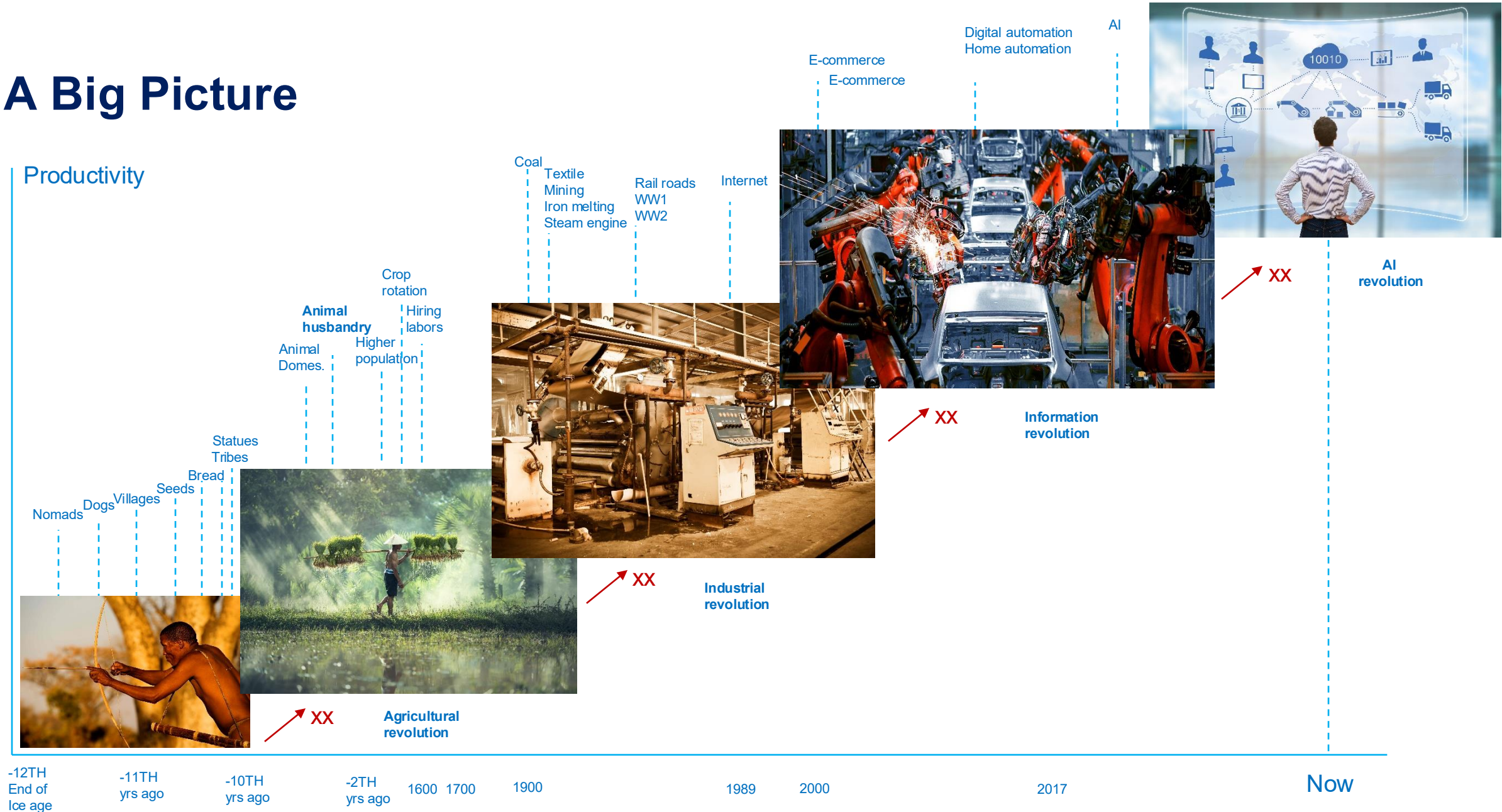
Week 1 – Session 3 – September 12th, 2025

Agenda of the session

- **15:15 – 16:00** Introduction to Production Management (PM)
 - A big picture
 - Production Process Strategy
 - Dynamics & Flows (material and information)
 - PM definition and examples
 - Product development
 - Bill of Materials (BOM)
 - Value Adding Activities
 - Value Adding Network (VAN)

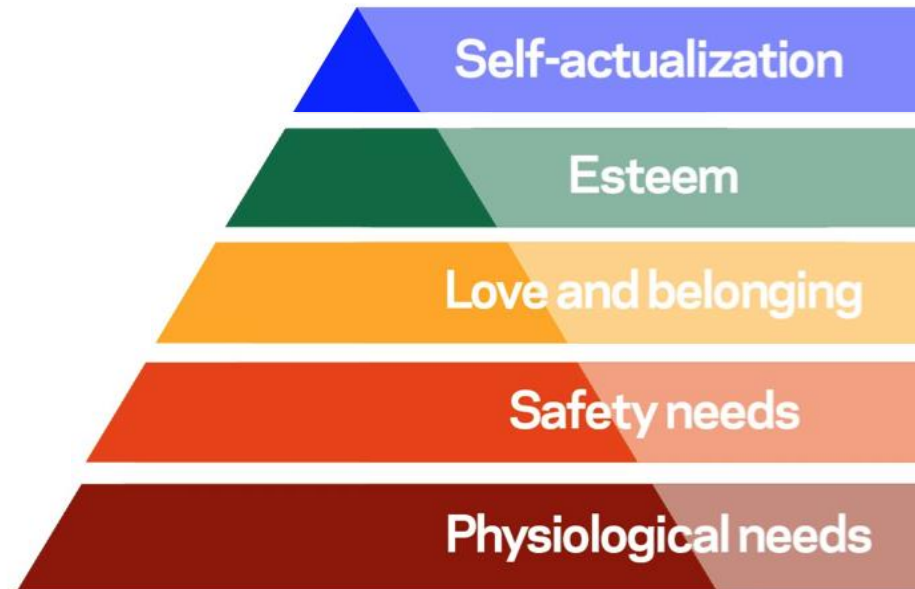
A Big Picture

Productivity



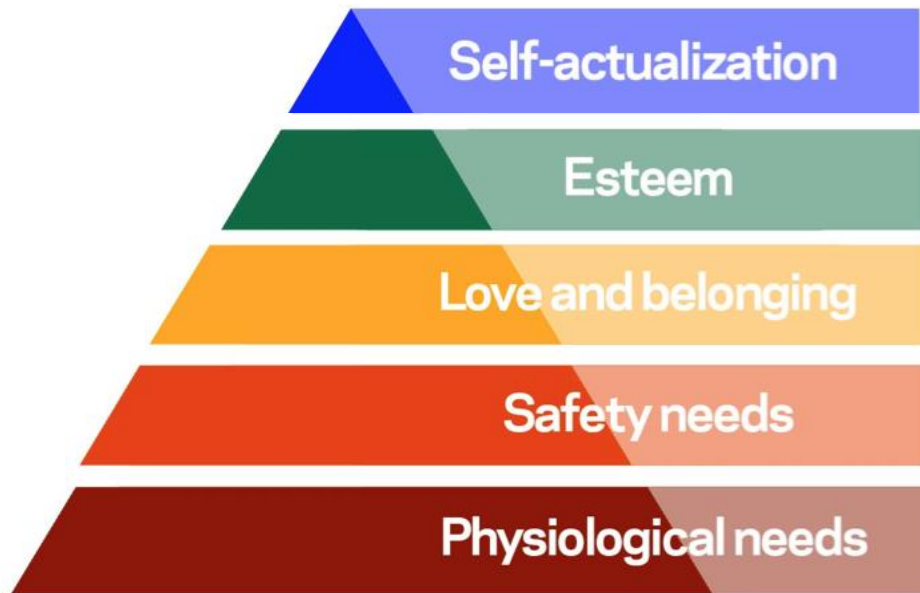
Value & Needs

Human Needs



Source: A. Maslow, A Theory of Human Motivation, 1943.

The Elements of Value



Source: 2015 Bain & Company - The Elements of Value, Harvard Business Review, 2015

SOCIAL IMPACT



Self-transcendence

LIFE CHANGING



Provides hope



Self-actualization



Motivation



Heirloom



Affiliation/belonging

EMOTIONAL



Reduces anxiety



Rewards me



Nostalgia



Design/aesthetics



Badge value



Wellness



Therapeutic value



Fun/entertainment



Attractiveness



Provides access

FUNCTIONAL



Saves time



Simplifies



Makes money



Reduces risk



Organizes



Integrates



Connects



Reduces effort



Avoids hassles



Reduces cost



Quality



Variety



Sensory appeal



Informs

What Are Elements of Values?



Source: 2015 Bain & Company - The Elements of Value, Harvard Business Review, 2015

SOCIAL IMPACT



Self-transcendence

LIFE CHANGING



Provides hope



Self-actualization



Motivation



Heirloom



Affiliation/belonging

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Quality



Variety

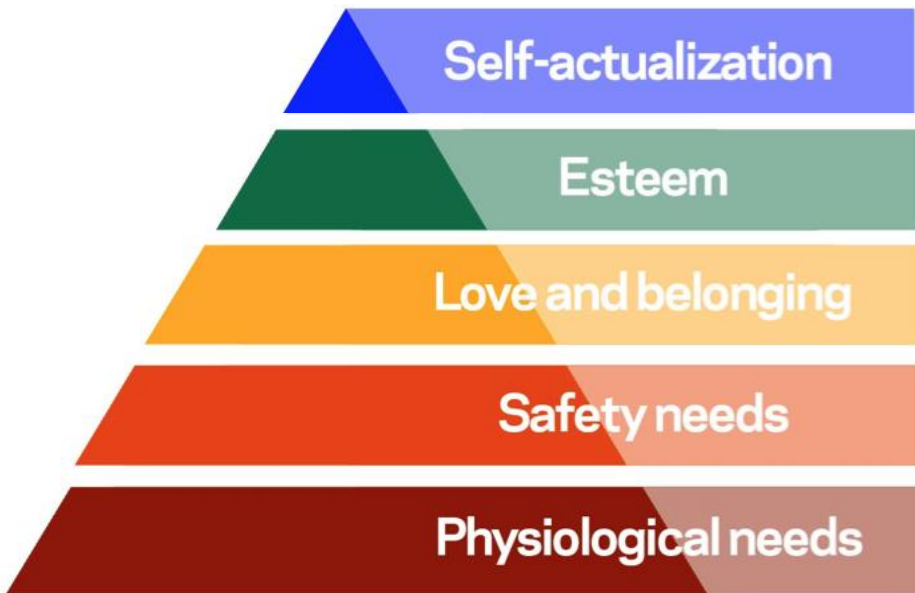


Sensory appeal



Informs

The B2B Elements of Value



Source: 2018 Bain & Company - The B2B Elements of Value, Harvard Business Review, 2018

INSPIRATIONAL VALUE

PURPOSE



INDIVIDUAL VALUE

CAREER



PERSONAL



EASE OF DOING BUSINESS VALUE

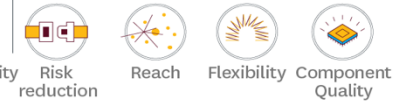
PRODUCTIVITY



ACCESS



RELATIONSHIP



OPERATIONAL

STRATEGIC

FUNCTIONAL VALUE

ECONOMIC



PERFORMANCE



TABLE STAKES



What Are B2B Elements of Value?



INSPIRATIONAL VALUE

PURPOSE



INDIVIDUAL VALUE

CAREER



PERSONAL



EASE OF DOING BUSINESS VALUE

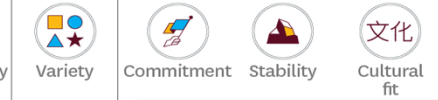
PRODUCTIVITY



ACCESS



RELATIONSHIP

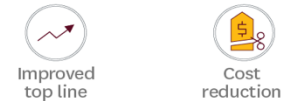


OPERATIONAL

STRATEGIC

FUNCTIONAL VALUE

ECONOMIC



PERFORMANCE



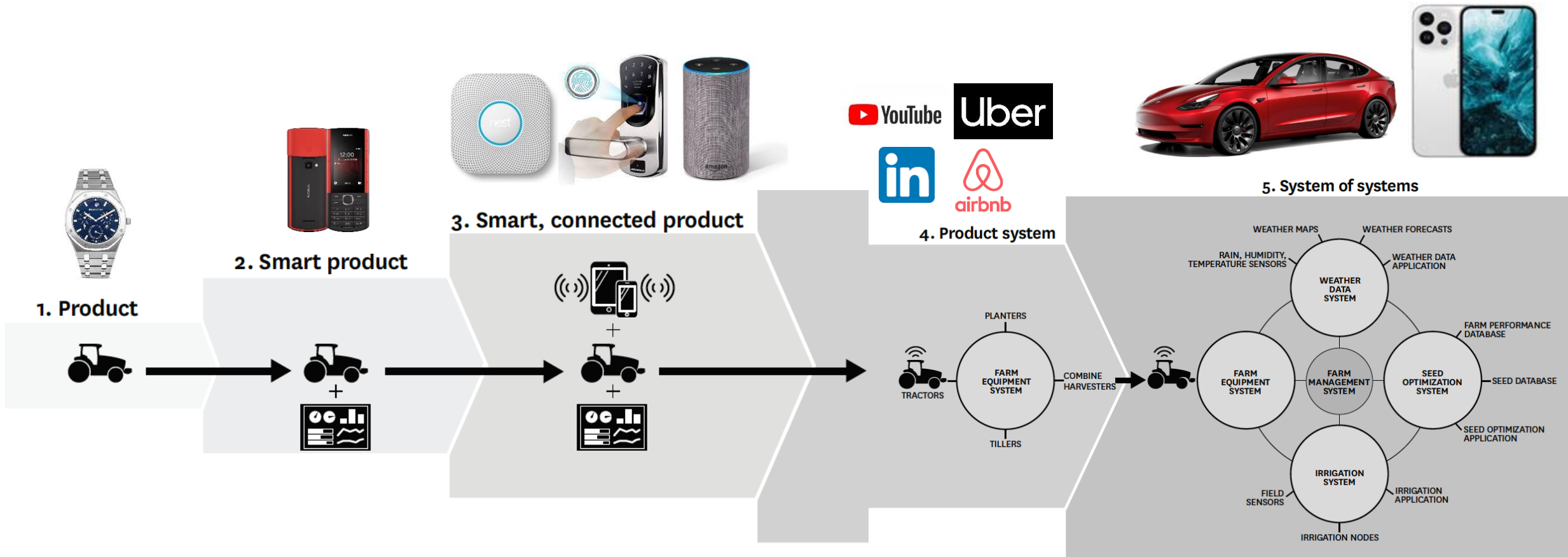
TABLE STAKES



Source: 2018 Bain & Company - The B2B Elements of Value, Harvard Business Review, 2018

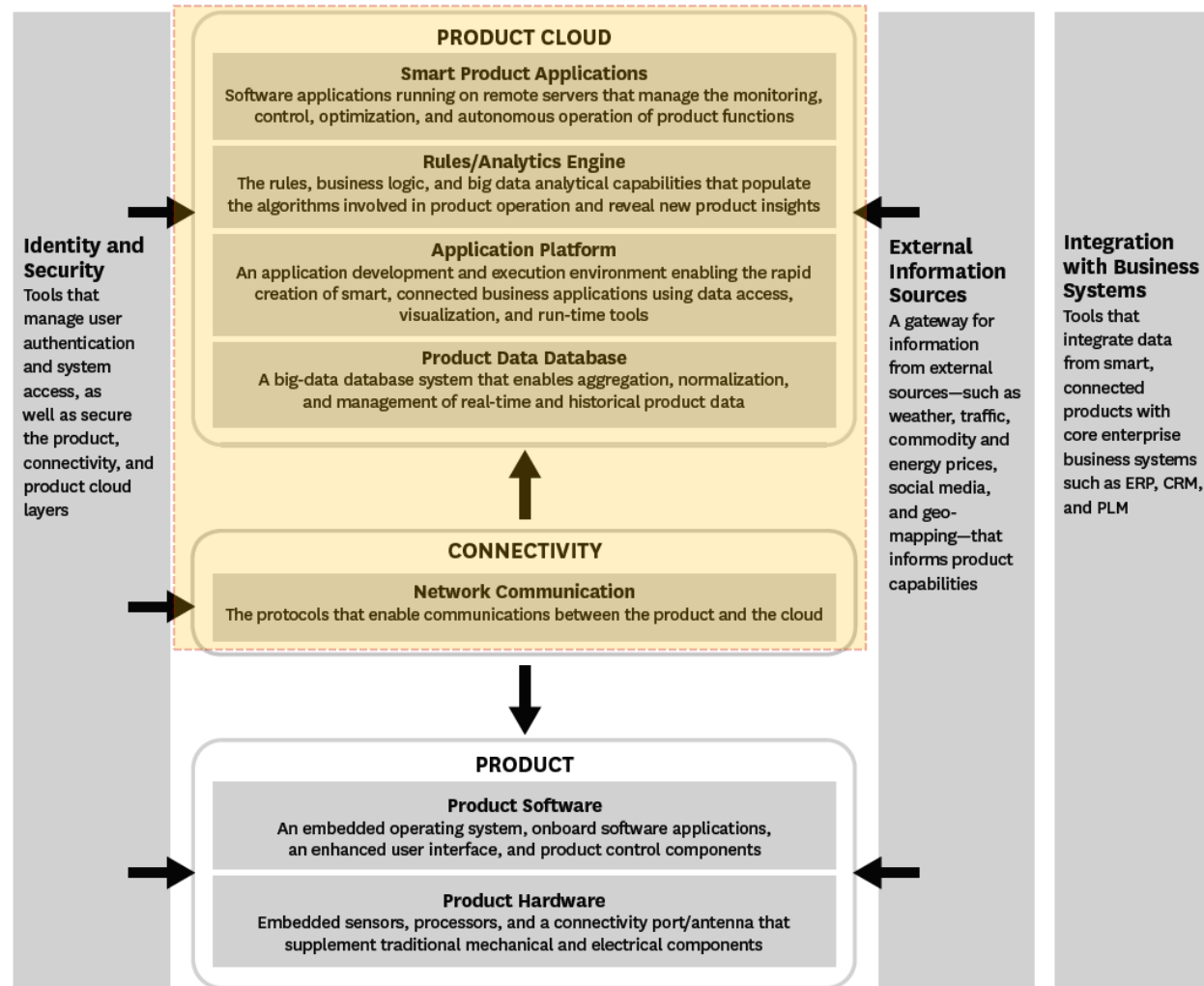
Creating Value with Data

From Product to System of Systems



Source: How Smart, Connected Products Are Transforming Companies, Harvard Business Review, 2014

The New Technology Stack



Source: How Smart, Connected Products Are Transforming Companies, Harvard Business Review, 2015.

Production Management

Production Process Strategy

- Company's overall approach for manufacturing/producing goods/services.
- Production process strategy defines two major factors:

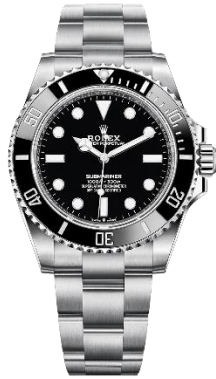


Capital intensity
(machines, automation, labor resources)



Process flexibility
(responsive to demand, technology, resource fluctuations)

Production Management – From Watch to Air-condition



Rolex
Submariner



iPhone 14 Pro

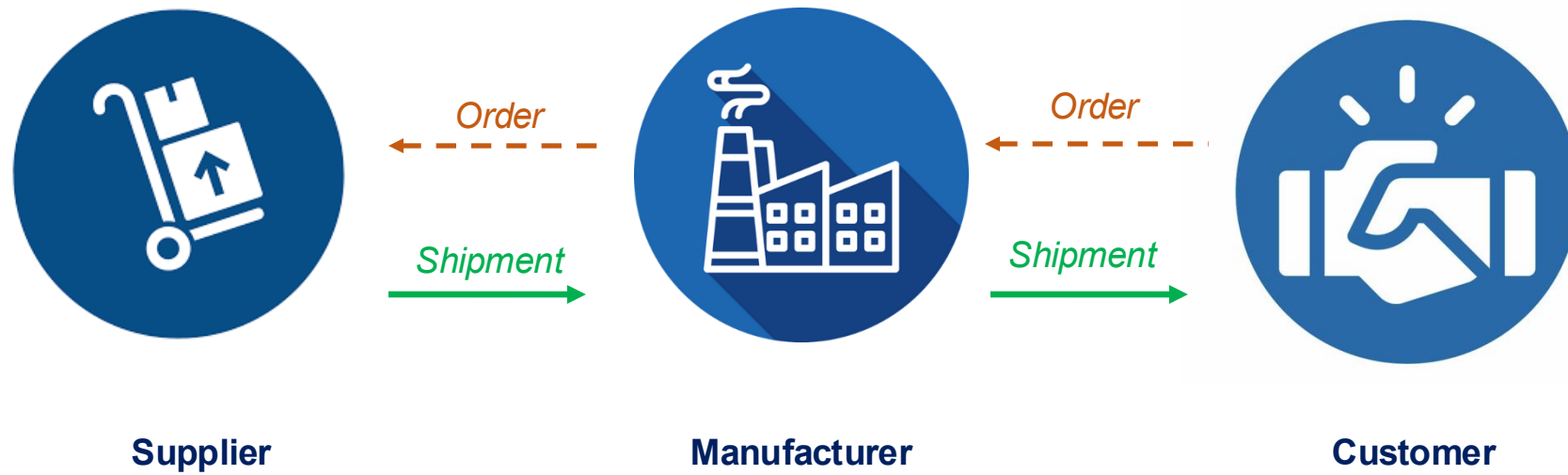


Giant

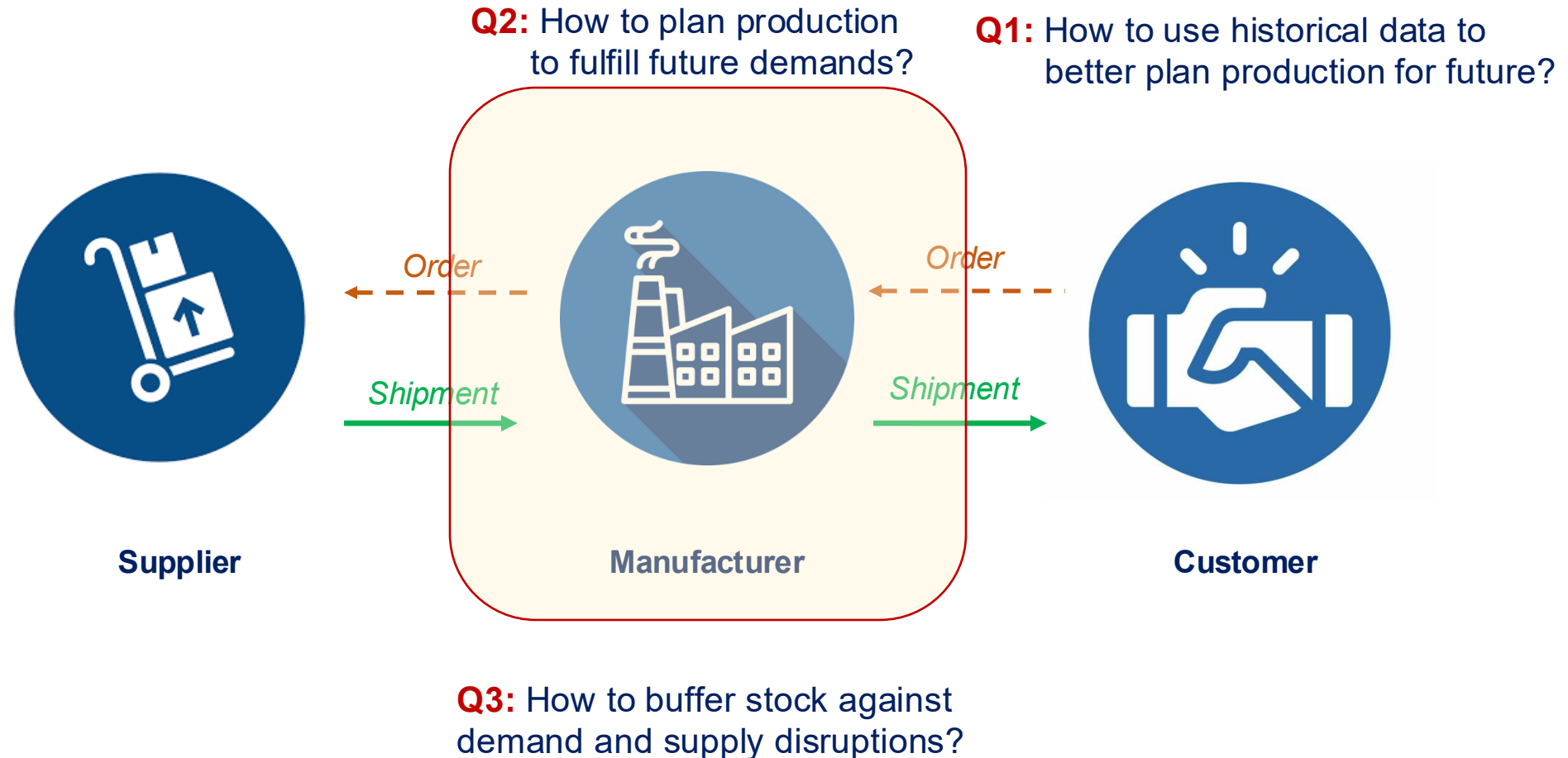


Dyson

Material & Information Dynamics & Flows

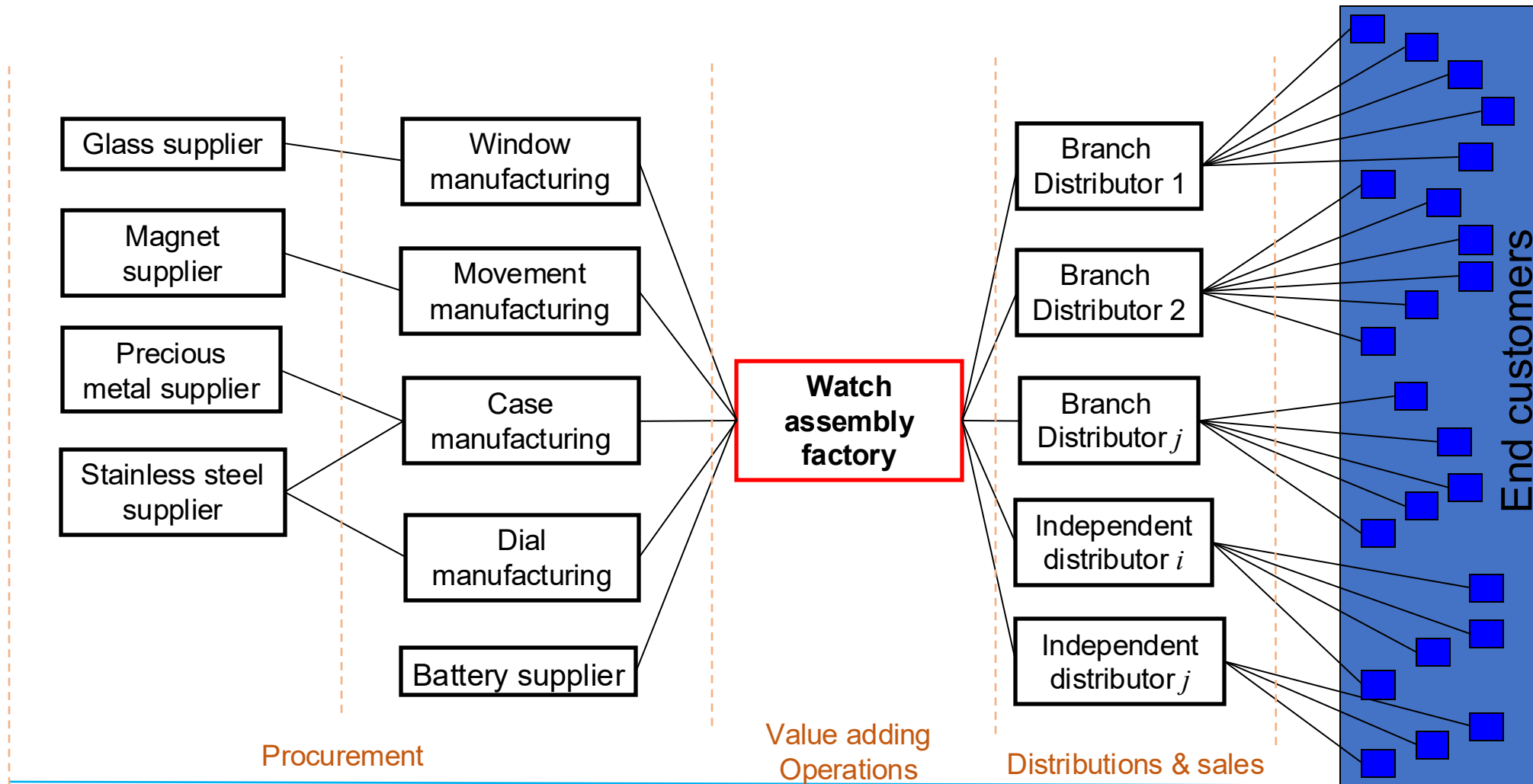


Material & Information Dynamics & Flows – The Focus of PM

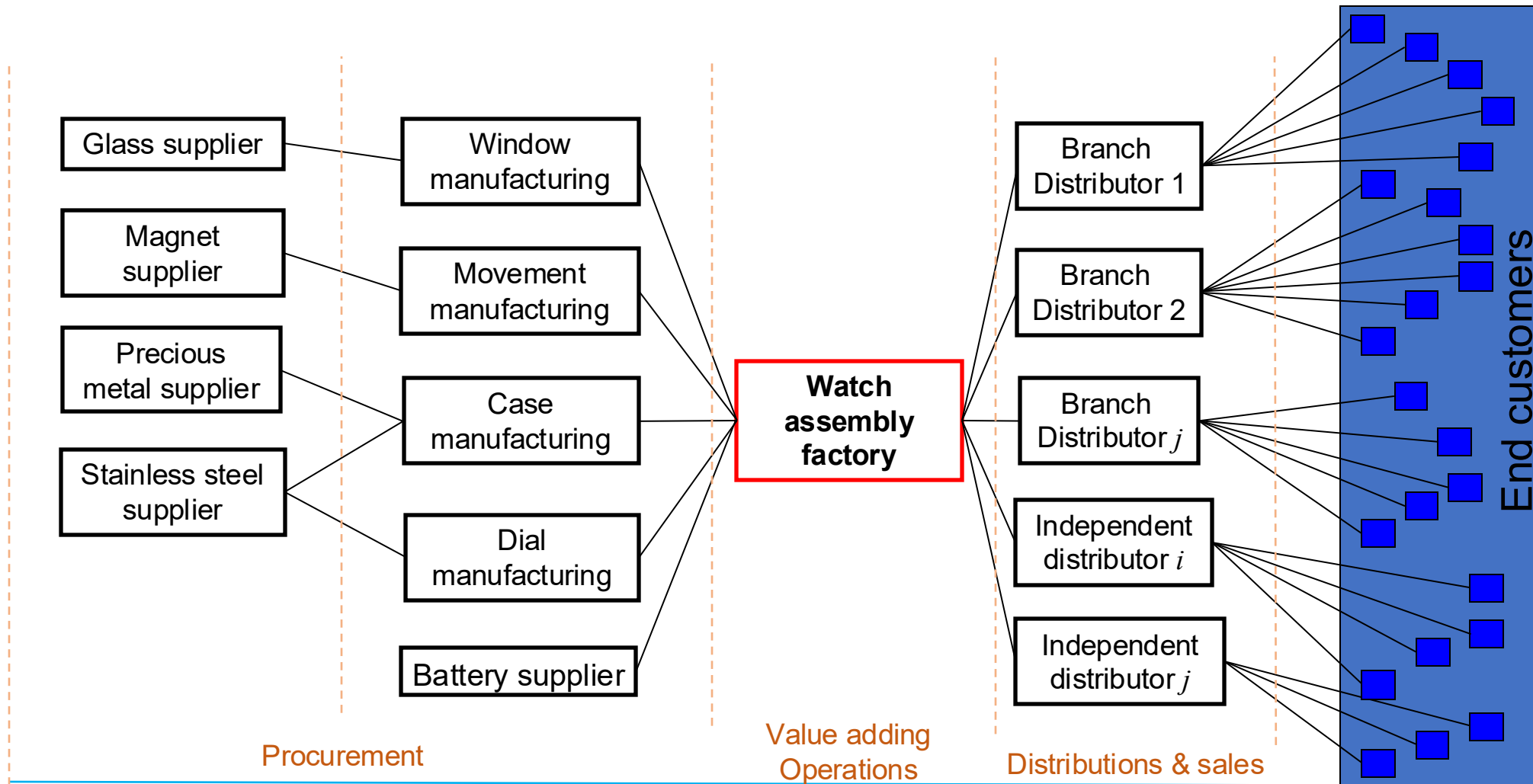


Value Adding Networks

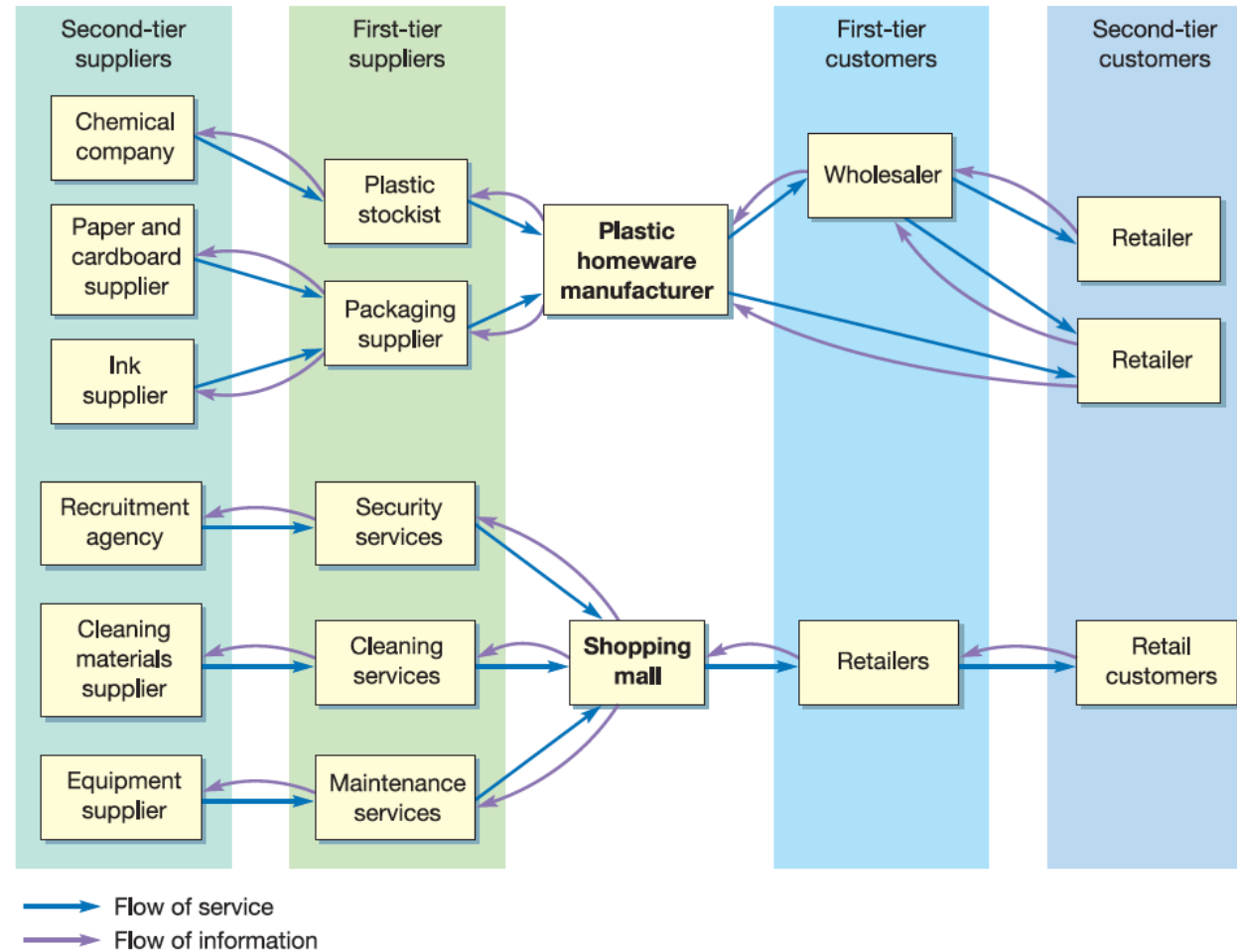
Value Adding Network (VAN) – Watch Manufacturer



Value Adding Network (VAN) – Watch Manufacturer

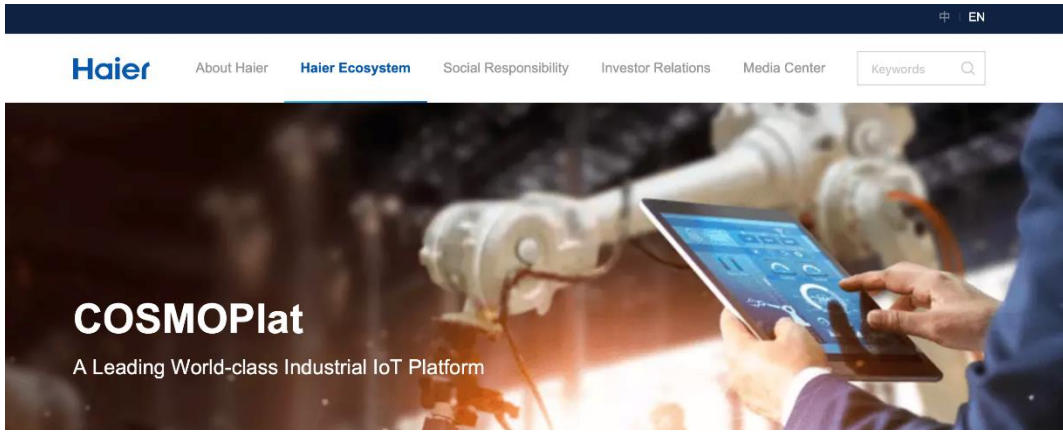


Supply Chain Network Design – More Examples



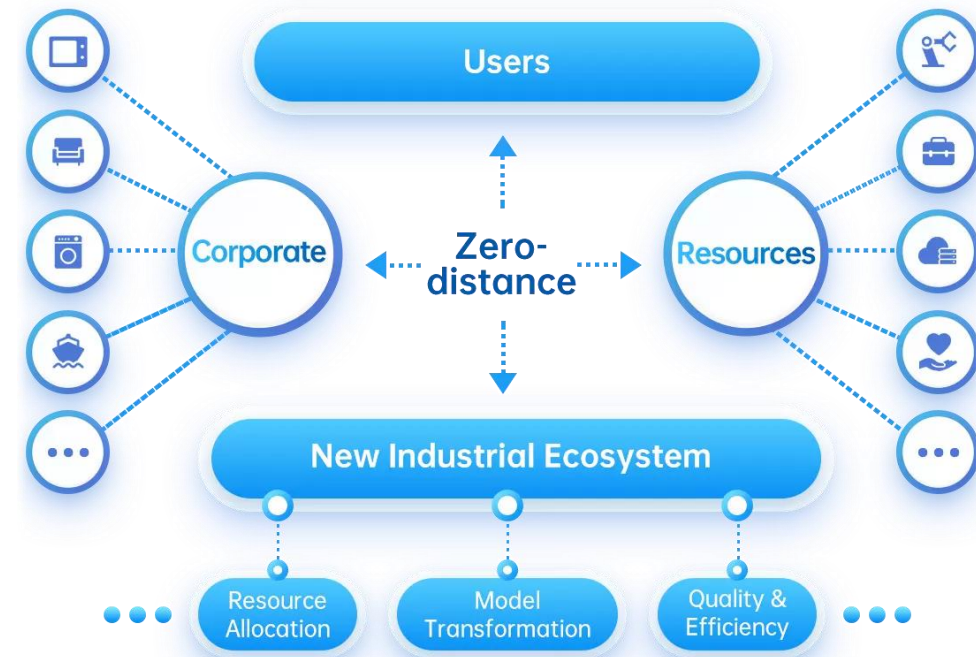
Supply chain network for a plastic homeware company and a shopping mall.

Value Adding Network (VAN) – The Best Supply Chain Platform



The screenshot shows the Haier COSMOPlat website. The header includes the Haier logo, navigation links for 'About Haier', 'Haier Ecosystem', 'Social Responsibility', 'Investor Relations', and 'Media Center', and a search bar. The main banner features a robotic arm and a person using a tablet, with the text 'COSMOPlat A Leading World-class Industrial IoT Platform'. Below the banner are three modules:

- Module 1: Cooperative innovation and design**
- Module 2: Production resources integration**
- Module 3: Distribution and service**



Supply Chain Network Design – Book Chapter



5 Min

6 Supply network design

Key questions

- › Why should an organization take a total supply network perspective?
- › What is involved in configuring a supply network?
- › Where should an operation be located?
- › How much capacity should an operation plan to have?

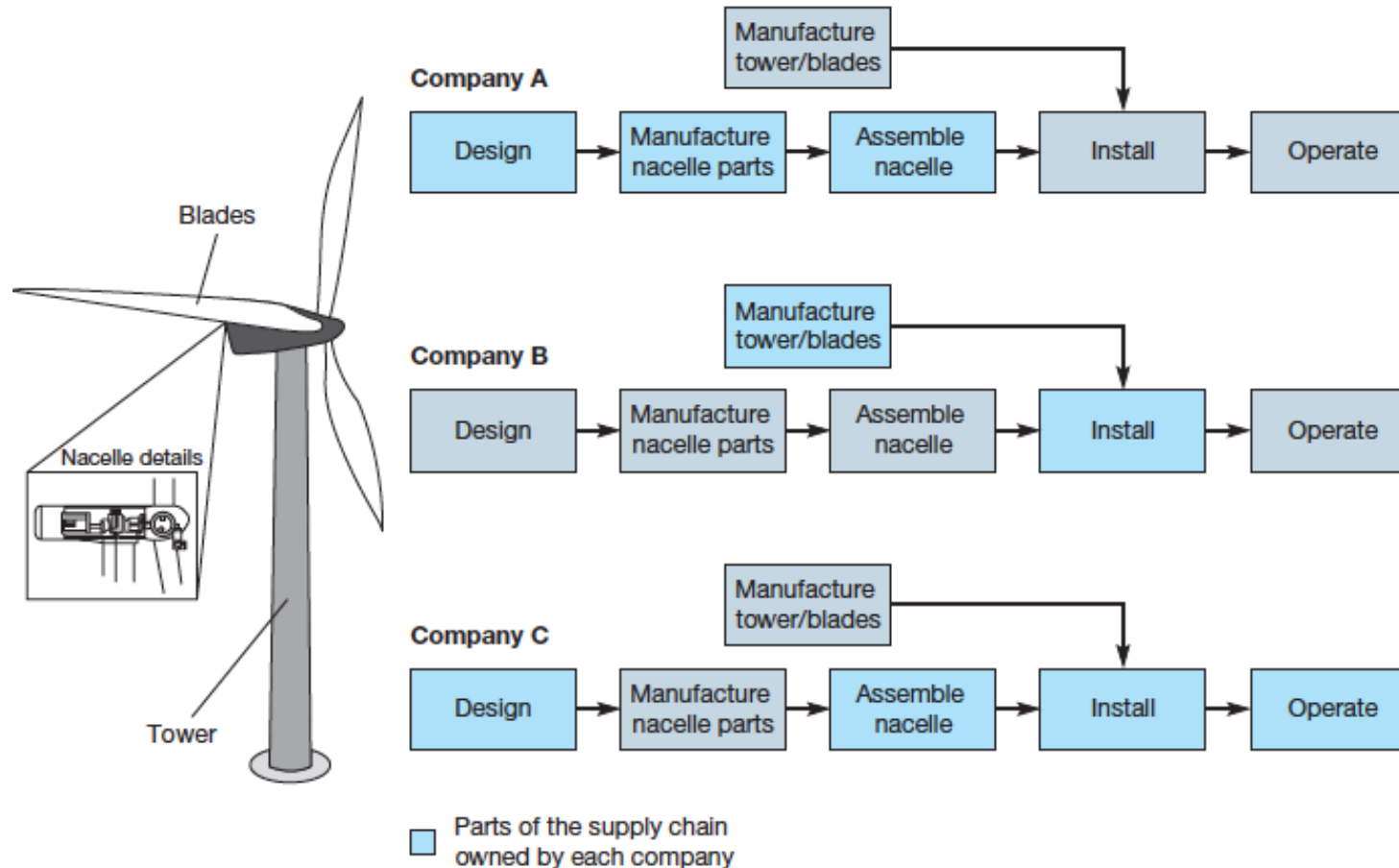
INTRODUCTION

No operation exists in isolation. Every operation is part of a larger and interconnected network of other operations. This *supply network* will include suppliers and customers. It will also include suppliers' suppliers and customers' customers, and so on. At a strategic level, operations managers are involved in 'designing' the shape and form of their network. Network design starts with setting the network's strategic objectives. This helps the operation to decide how it wants to influence the overall shape of its network, the location of each operation, and how it should manage its overall capacity within the network. Here we treat all these strategic design decisions in the context of supply networks (see Fig. 6.1).

Figure 6.1 This chapter covers supply network design

MyOMLab Check and improve your understanding of this chapter using self-assessment questions and a personalized study plan, a video case study, and an eText – all at www.myomlab.com.

Supply Chain Network – Vertical Integration



Three companies operating in the wind power generation industry **with different vertical integration positions.**

Review of Assignment 1 – Goal & Tasks



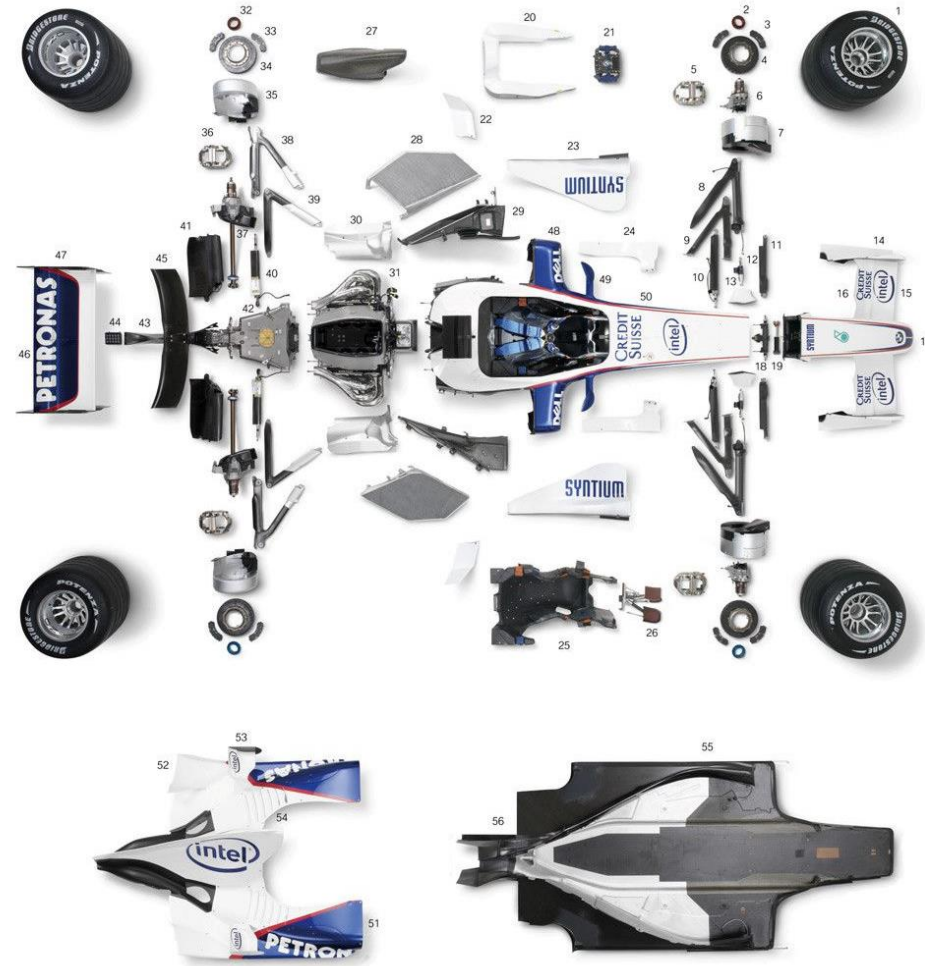
5 Min

Goal: To better understand the company you analyze and the product you manage during next 14 weeks.

- 1) What is your company history and background?
- 2) What are the products, product families, and services
- 3) What are your company's production site(s), suppliers, markets, warehouse, hubs, ...
- 4) What is the vertical integration level of your supply chain (value adding) network?
- 5) What are your company's primary competitors?
- 6) What are the current and future (next five years) challenges
- 7) Present the following important items:
 - Value Adding Network (VAN)
 - Material and information flows
 - Hierarchical description of the Bill of Material (BoM) of your product

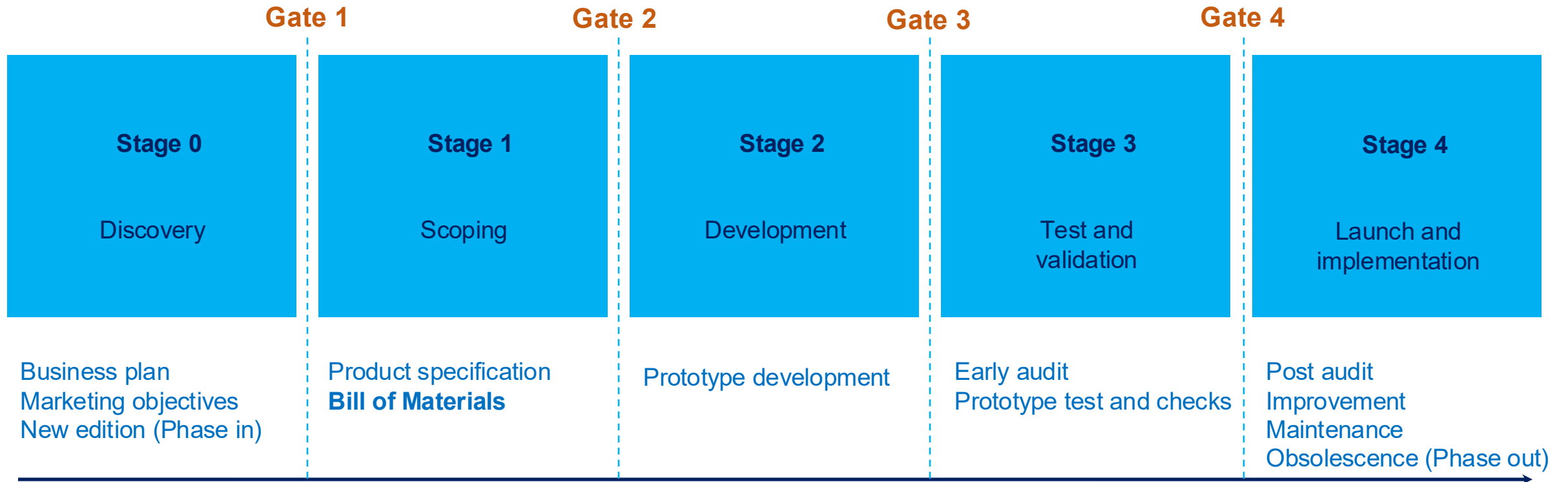
Bill of Materials (BoM)

Production Procedure – F1 Parts



- 1 Tyre / Rim.
- 2 Wheel Nut.
- 3 Brake Pads.
- 4 Brake Disc.
- 5 Brake Caliper.
- 6 Upright.
- 7 Brake Duct.
- 8 Front Lower Wishbone.
- 9 Front Upper Wishbone.
- 10 Front Pushrod.
- 11 Front Track Rod.
- 12 Side Damper.
- 13 Fairing.
- 14 Front Wing End Plate.
- 15 Front Wing Main Plane.
- 16 Front Wing Flap.
- 17 Nose Cone.
- 18 Steering Housing.
- 19 Front 3rd Element.
- 20 Headrest.
- 21 Steering Wheel.
- 22 Bullwinkle.
- 23 Main Turning Vane.
- 24 Forward Turning Vane.
- 25 Seat.
- 26 Pedals.
- 27 Airhorn.
- 28 Cooler.
- 29 Cooler Duct.
- 30 Engine Heat Shield.
- 31 Engine.
- 32 Wheel Nut.
- 33 Brake Pads.
- 34 Brake Disc.
- 35 Brake Duct.
- 36 Brake Caliper.
- 37 Drive Shaft / Upright.
- 38 Rear Lower Wishbone.
- 39 Rear Upper Wishbone.
- 40 Rear Pushrod.
- 41 Rear Toe Link.
- 42 Gearbox.
- 43 Rear Crasher.
- 44 Rain Light.
- 45 Rear Lower Main Plane.
- 46 Rear Upper Wing.
- 47 Rear Wing End Plate.
- 48 Sidepod.
- 49 Mirror.
- 50 Monocoque.
- 51 Engine Cover.
- 52 Batman.
- 53 Earwing.
- 54 Top Exit.
- 55 Floor.
- 56 Diffusor.

Product Development – Stage Gate Concept



Bill Of Materials (BOM) – Handout



3 Min

Week number								
Item: X	1	2	3	4	5	6	7	8
Quantity				100				150

FIGURE 12.3
A master schedule for end item X

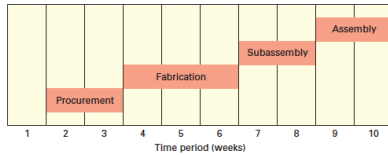


FIGURE 12.4
The planning horizon must cover the cumulative lead time

The quantities in a master schedule come from a number of different sources, including customer orders, forecasts, and orders from warehouses to build up seasonal inventories.

The master schedule separates the planning horizon into a series of time periods or time buckets, which are often expressed in weeks. However, the time buckets need not be of equal length. In fact, the near-term portion of a master schedule may be in weeks, but later portions may be in months or quarters. Usually, plans for those more distant time periods are more tentative than near-term requirements.

Although a master production schedule has no set time period that it must cover, most managers like to plan far enough into the future so they have some general idea of probable upcoming demands for the near term. It is important, though, that the master schedule cover the *stacked* or *cumulative lead time* necessary to produce the end items. This amounts to the sum of the lead times that sequential phases of the production or assembly process require, as illustrated in Figure 12.4, where a total of nine weeks of lead time is needed from ordering parts and raw materials until final assembly is completed. Note that lead times include move and wait times in addition to setup and run times.

The Bill of Materials

A *bill of materials (BOM)* contains a listing of all of the assemblies, subassemblies, parts, and raw materials that are needed to produce one unit of a finished product. Thus, each finished product has its own bill of materials.

The listing in the bill of materials is hierarchical; it shows the quantity of each item needed to complete one unit of its parent item. The nature of this aspect of a bill of materials is clear when you consider a *product structure tree*, which provides a visual depiction of the subassemblies and components needed to assemble a product. Figure 12.5 shows an *assembly diagram* for a chair and a simple product structure tree for the chair. The end item (in this case, the chair, the finished product) is shown at the top of the tree. Just beneath it are the subassemblies, or major components, that must be put together to make up the end item. Beneath each major component are the necessary lesser components. At each stage moving down the tree are the components (parts, materials) needed to make one unit of the next higher item in the tree.

A product structure tree is useful in illustrating how the bill of materials is used to determine the quantities of each of the ingredients (requirements) needed to obtain a desired number of end items. Items at the lowest levels of a tree often are raw materials or purchased parts, while items at higher levels are typically assemblies or subassemblies. Product-structure trees for items at the lowest levels are the concerns of suppliers.

Let's consider the product structure tree shown in Figure 12.6. End item X is composed of two Bs and one C. Moreover, each B requires three Ds and one E, and each D requires four Es. Similarly, each C is made up of two Es and two Fs. These *requirements* are listed by level,

Cumulative lead time
The sum of the lead times that sequential phases of a process require, from ordering of parts or raw materials to completion of final assembly.

Bill of materials (BOM)
One of the three primary inputs of MRP; a listing of all of the raw materials, parts, subassemblies, and assemblies needed to produce one unit of a product.

Product structure tree
A visual depiction of the requirements in a bill of materials, where all components are listed by levels.

FIGURE 12.5
Assembly diagram and product structure tree for chair assembly

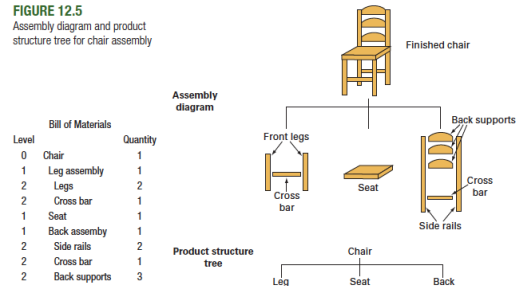
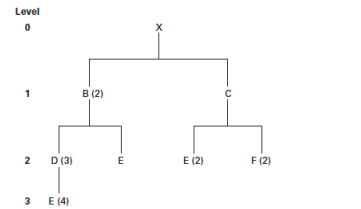


FIGURE 12.6
A product structure tree for end item X



beginning with 0 for the end item, then 1 for the next level, and so on. The items at each are *components* of the next level up and, as in a family tree, are *parents* of their respective components. Note that the quantities of each item in the product structure tree refer only to amounts needed to complete the assembly at the next higher level.

EXAMPLE 1

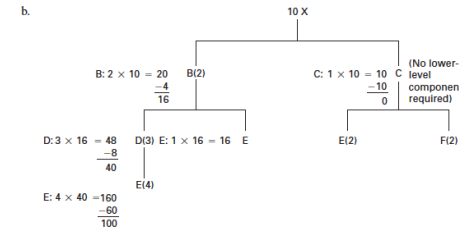
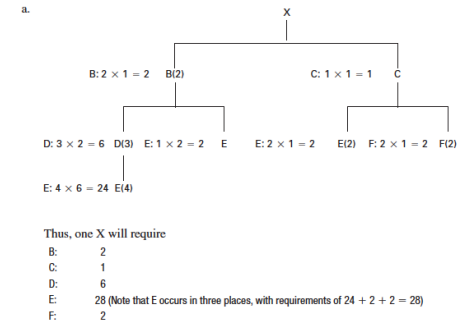
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Use the information presented in Figure 12.6 to do the following:

- Determine the quantities of B, C, D, E, and F needed to assemble one X.
- Determine the quantities of these components that will be required to assemble 10 X taking into account the quantities on hand (i.e., in inventory) of various components

Component	On Hand
B	4
C	0
D	8
E	60

SOLUTION

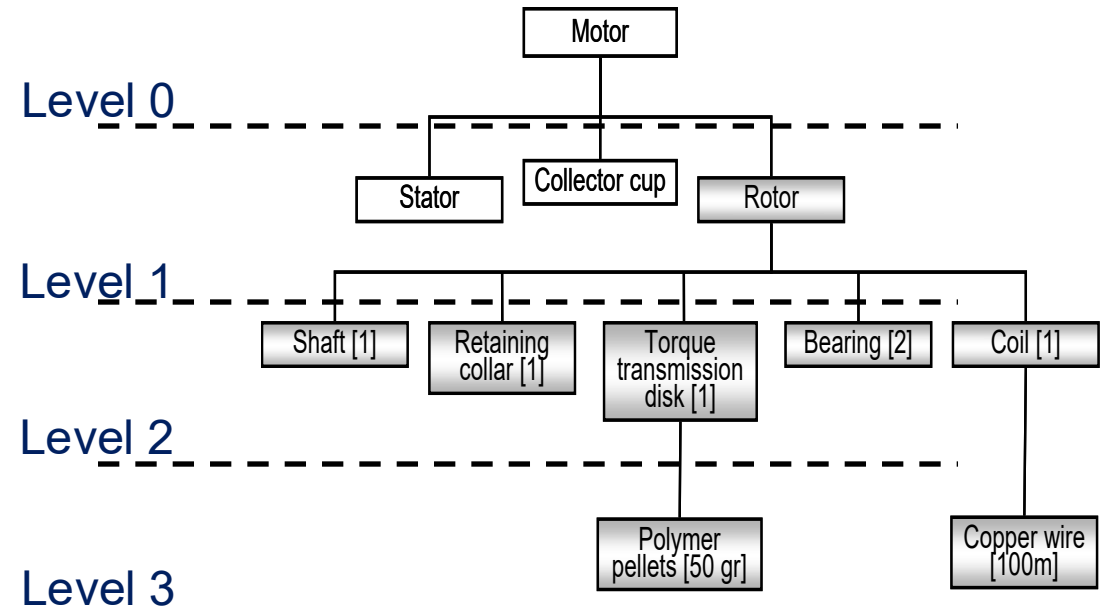
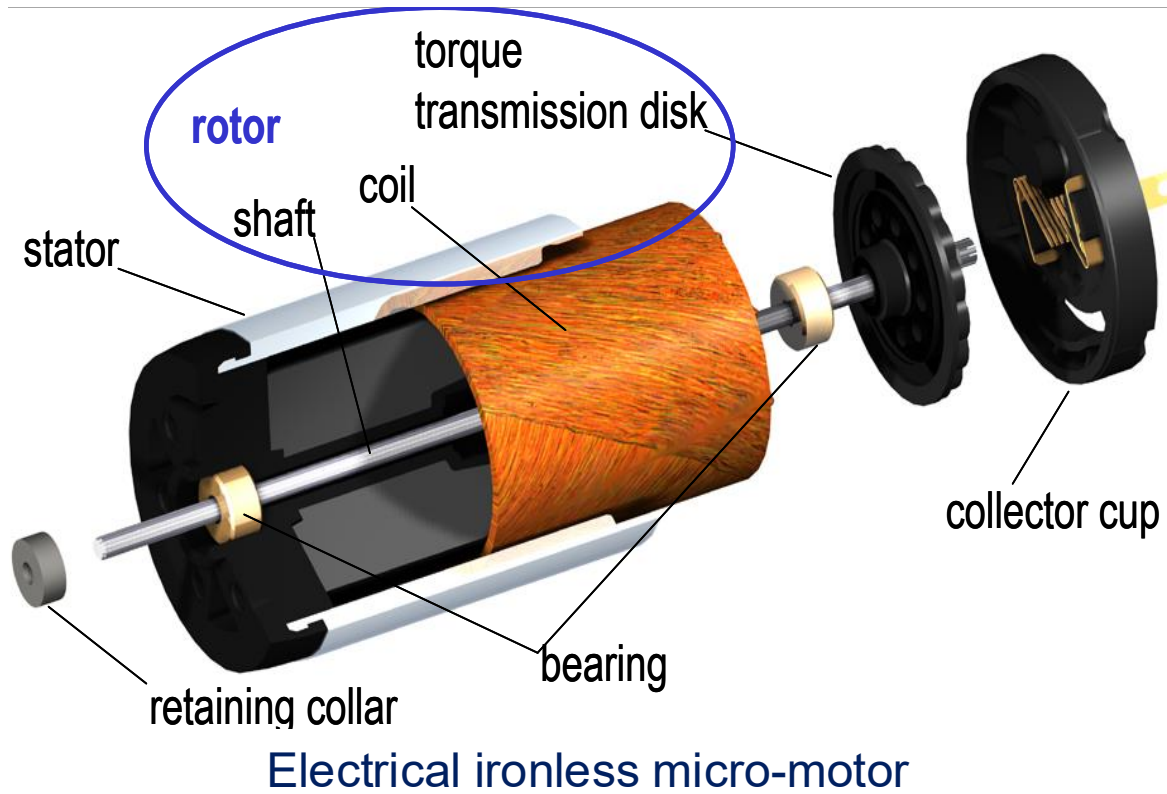


Determining total requirements is usually more complicated than Example 1 might suggest. For one thing, many products have considerably more components. For another, the issue of *timing* is essential (i.e., when must the components be ordered or made) and must be included in the analysis. Finally, for a variety of reasons, some of the components/subassemblies may be on hand (i.e., currently in inventory). Consequently, in determining total requirements, the amounts on hand must be *netted out* (i.e., subtracted from the apparent requirements) to determine the true requirements as illustrated in Example 1.

Bill of Materials (BOM) – Micro Motor



Bill of Materials (BOM)



Electrical ironless micro-motor

Bill of Materials (BOM) – Apple AirPods



Bill of Materials (BOM) – Apple AirPods



Ear bud

- Battery - 93mWh (2x)
- Microphone
- Audio Codec

Charging case

- Battery – 1.52mWh(1x)
- USB Cable
- Antenna



Review of Assignment 1 – Goal & Tasks



5 Min

Goal: To better understand the company you analyze and the product you manage during next 14 weeks.

- 1) What is your company history and background?
- 2) What are the products, product families, and services
- 3) What are your company's production site(s), suppliers, markets, warehouse, hubs, ...
- 4) What is the vertical integration level of your supply chain (value adding) network?
- 5) What are your company's primary competitors?
- 6) What are the current and future (next five years) challenges
- 7) Present the following important items:
 - Value Adding Network (VAN)
 - Material and information flows
 - Hierarchical description of the Bill of Material (BoM) of your product