FIT5101 Enterprise Systems

Lecture 06

- Sales Forecasting
- Production Planning (Plan/Make)
- MPS
- MRP
- Supply Chain

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Unit Topics (Subject to change)

Week	Date (W/C)	Lecture	Tutorial	Assessment
1	1/3	Introduction	Introduction	
2	8/3	Business Functions & Processes	Business Functions	
3	15/3	ERP Structures	SAP Introduction	Ass 1 Rel
4	22/3	Materials Management & Procurement	Materials Management	
5	29/3	Sales & Distribution	Procurement	
	5/4	BREAK		
6	12/4	Production Planning	Sales & Distribution	Ass 1 Due 16/4
7	19/4	Financials	Production Planning	
8	26/4	Process Integration & Modelling	Financials	
9	3/5	ERP Implementation	Process Modelling	Ass 2 Due 7/5
10	10/5	Current Technologies	Work on Assignment	
11	17/5	Future Trends	Sample eExam / Review	
12	24/5	Review	??	Ass 3 Due 28/5

SAP WORKSHOPS

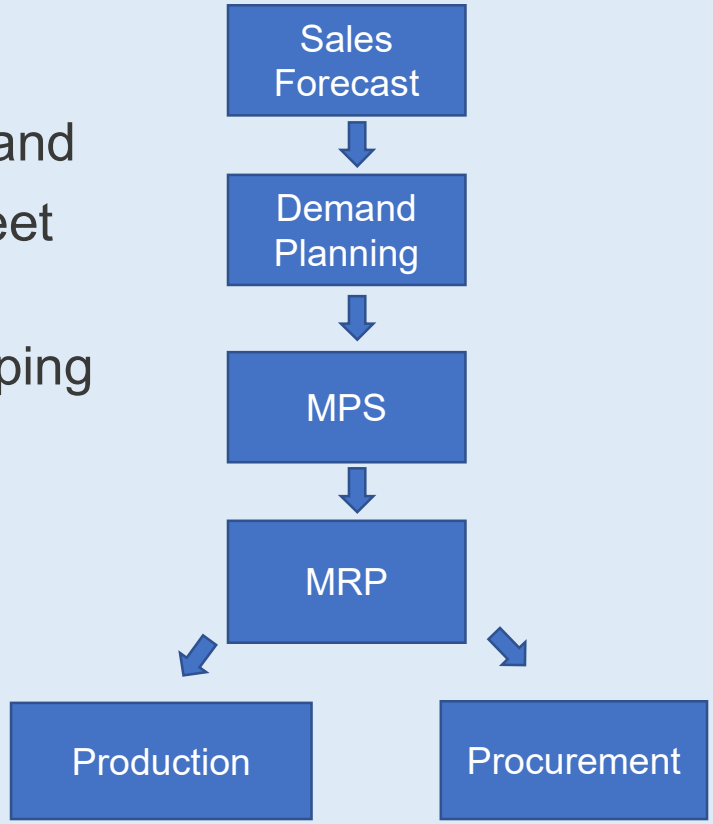
Overview

To meet customer demand efficiently, a company must:

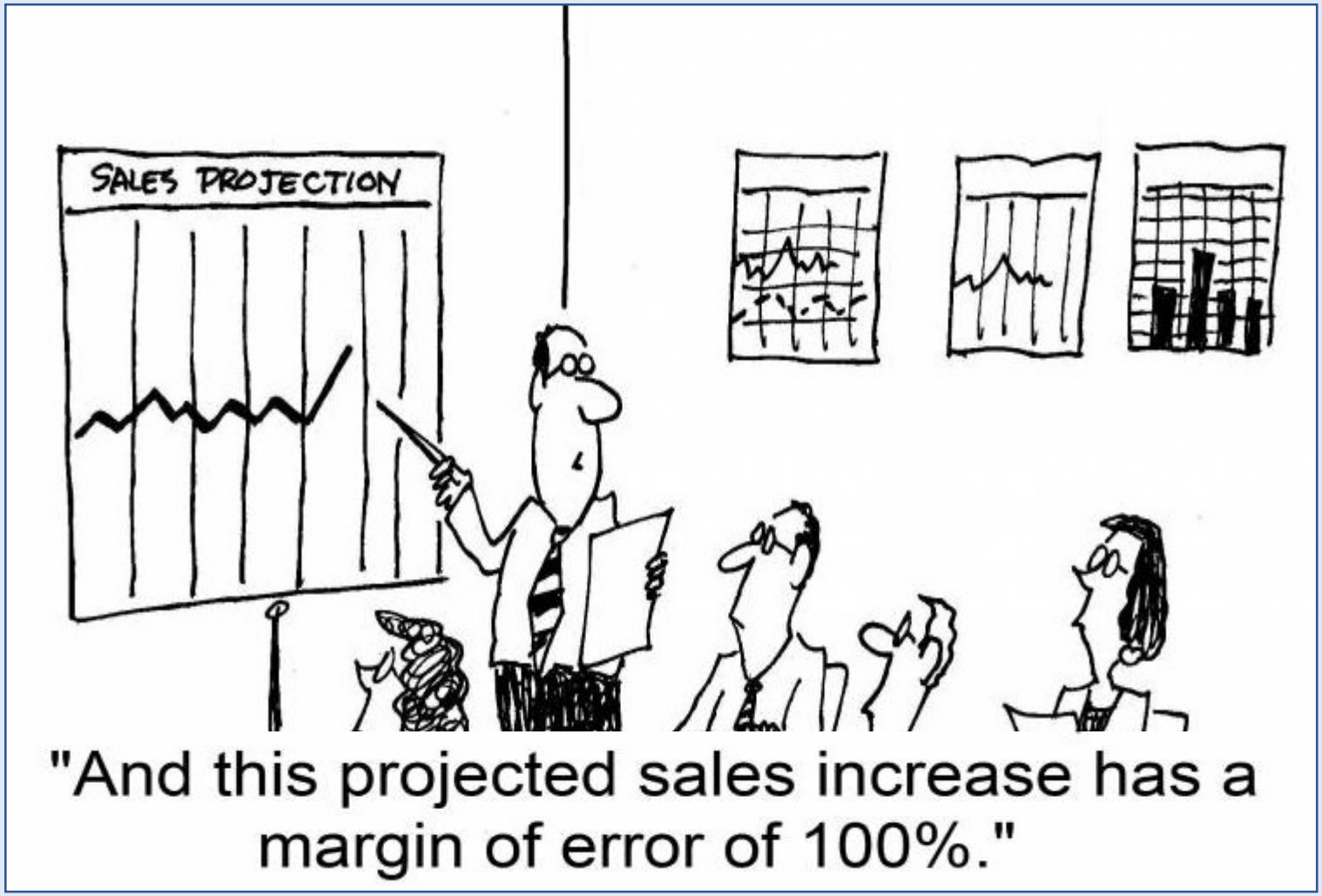
- Develop a forecast of customer demand
- Develop a production schedule to meet the estimated demand.

An ERP system is a good tool for developing and executing production plans.

The goal of production planning is to schedule production economically.



Sales Forecasting



Sales Forecasting

What is sales forecasting?

Sales forecasting is the process of estimating future revenue by predicting the amount of product or services a sales unit (which can be an individual salesperson, a sales team, or a company) will sell in the next week, month, quarter, or year.

Why is sales forecasting important?

Sales forecasting adds value across an organization. Finance, for example, relies on forecasts to develop budgets for capacity plans and hiring. Production uses sales forecasts to plan their cycles. Forecasts help sales ops with territory and quota planning, supply chain with material purchases and production capacity, and sales strategy with channel and partner strategies.

Sales Forecasting

- SAP's ERP system takes an integrated approach
  - Whenever a sale is recorded in Sales and Distribution (SD) module, quantity sold is recorded as a consumption value for that material.
- Simple forecasting technique
  - Use a prior period's sales and then adjust those figures for current conditions
- In SAP ERP, sales forecast can be made using:
  - Historical sales data from the Sales and Distribution (SD) module
  - Input from plans developed in Controlling (CO) module
- CO module
  - Profit goals for company can be set
  - Sales levels needed to meet the profit goals can be estimated

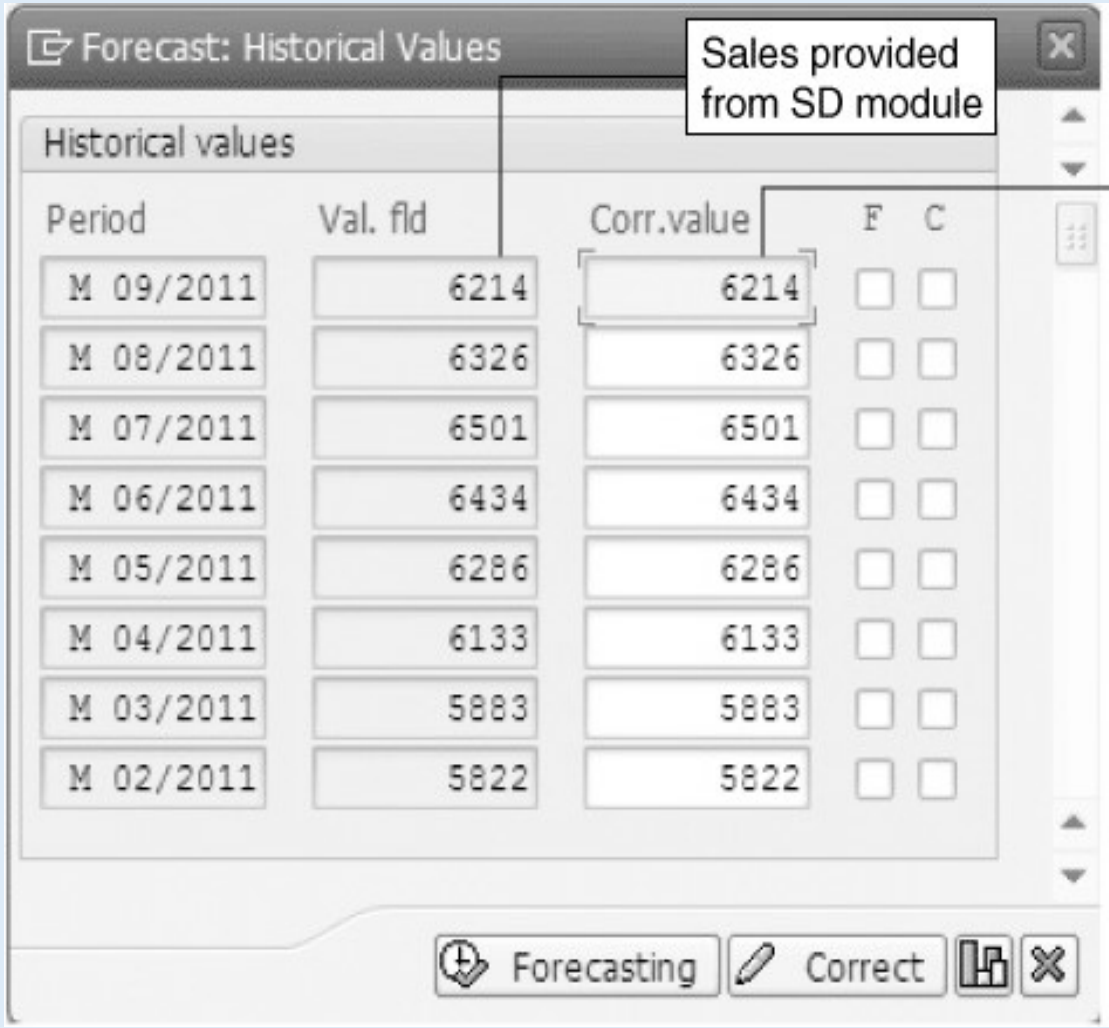
Sales Forecasting – An example

Sales forecasting		Jan.	Feb.	March	April	May	June
Previous year (cases)		5734	5823	5884	6134	6587	6735
Promotion sales (cases)						300	300
Previous year base (cases)		5734	5823	5884	6134	6287	6435
Growth:	3.0%	172	175	177	184	189	193
Base projection (cases)		5906	5998	6061	6318	6476	6628
Promotion (cases)							500
Sales forecast (cases)		5906	5998	6061	6318	6476	7128

To make a forecast:

The previous year's sales data is used in combination with marketing initiatives to increase sales

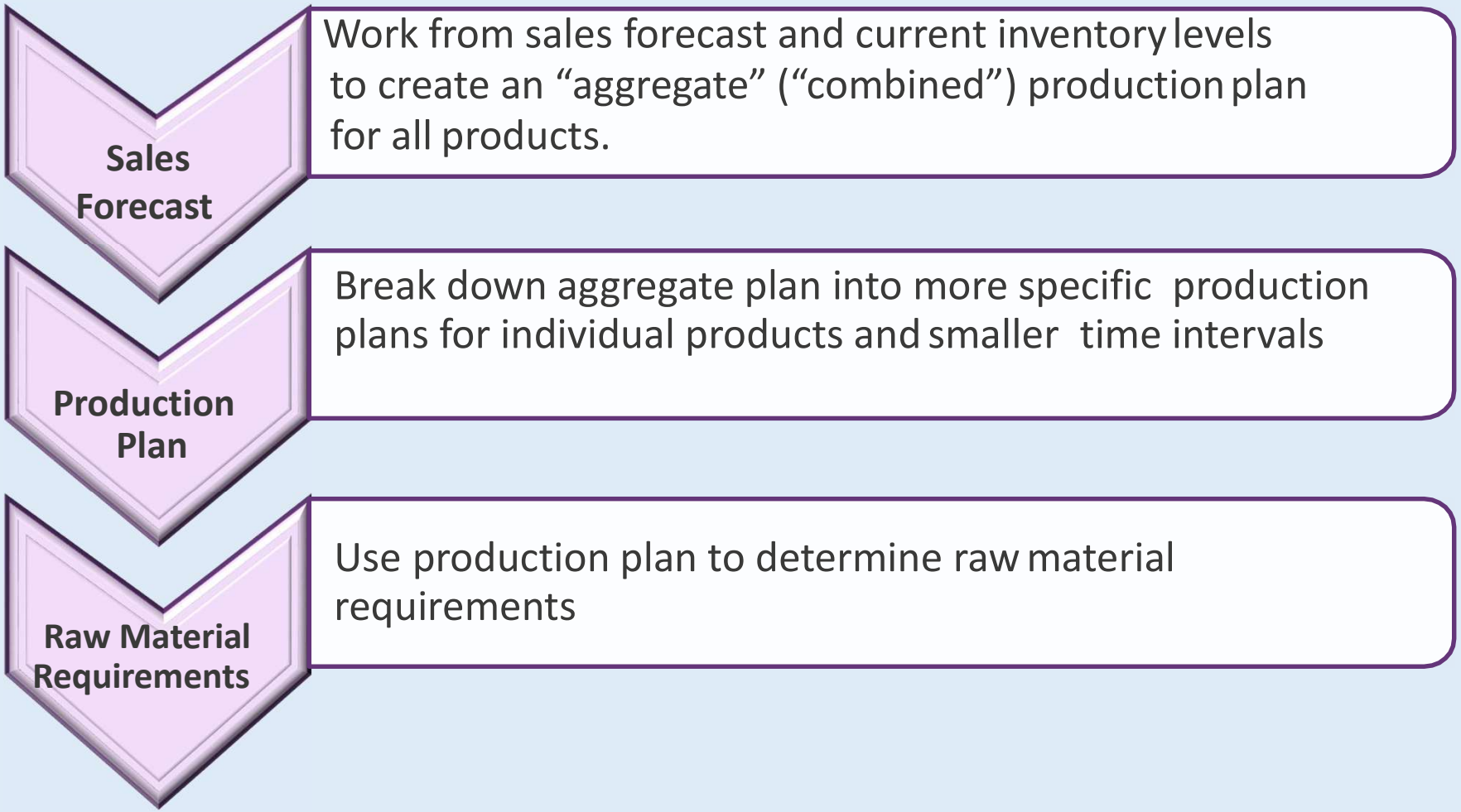
Historical Sales Figures in SAP



- Historical sales screen allow planner to correct sales values
- Do not account for external factors, such as unusual weather
- Sales figures forecasting represent best estimate of demand

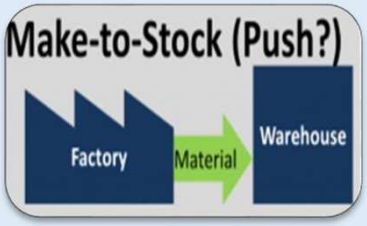
The Production Planning Process

Three important principles for production planning:

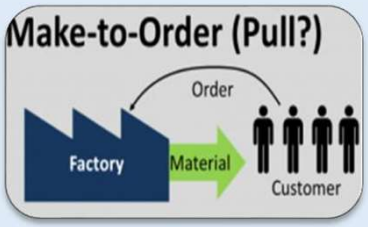


The Production Planning Process

Three general approaches to production



Make-to-stock items: made for inventory (the "stock") in anticipation of sales orders



Make-to-order items: produced to fill specific customer orders

Assemble-to-order items: produced using a combination of make-to-stock and make-to-order processes

SAP PP – Production Planning

- **It is the process of aligning forecasting and customer demand with manufacturing facility to create production and procurement schedules for finished products and component resources.**

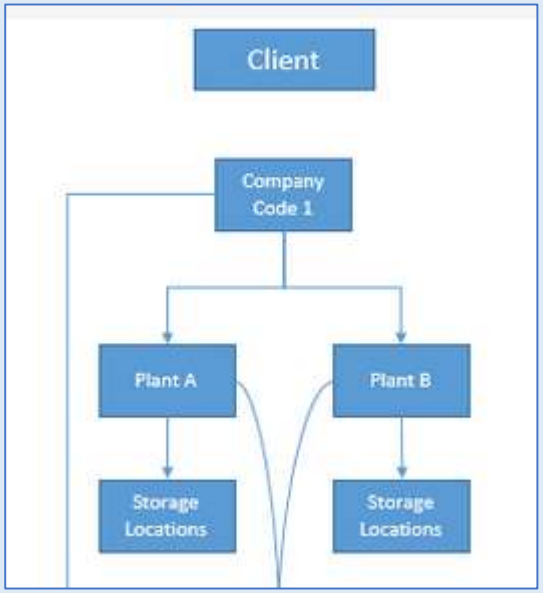
SAP PP Overview:
https://youtu.be/U9iVngVK5bA

Organizational Structures

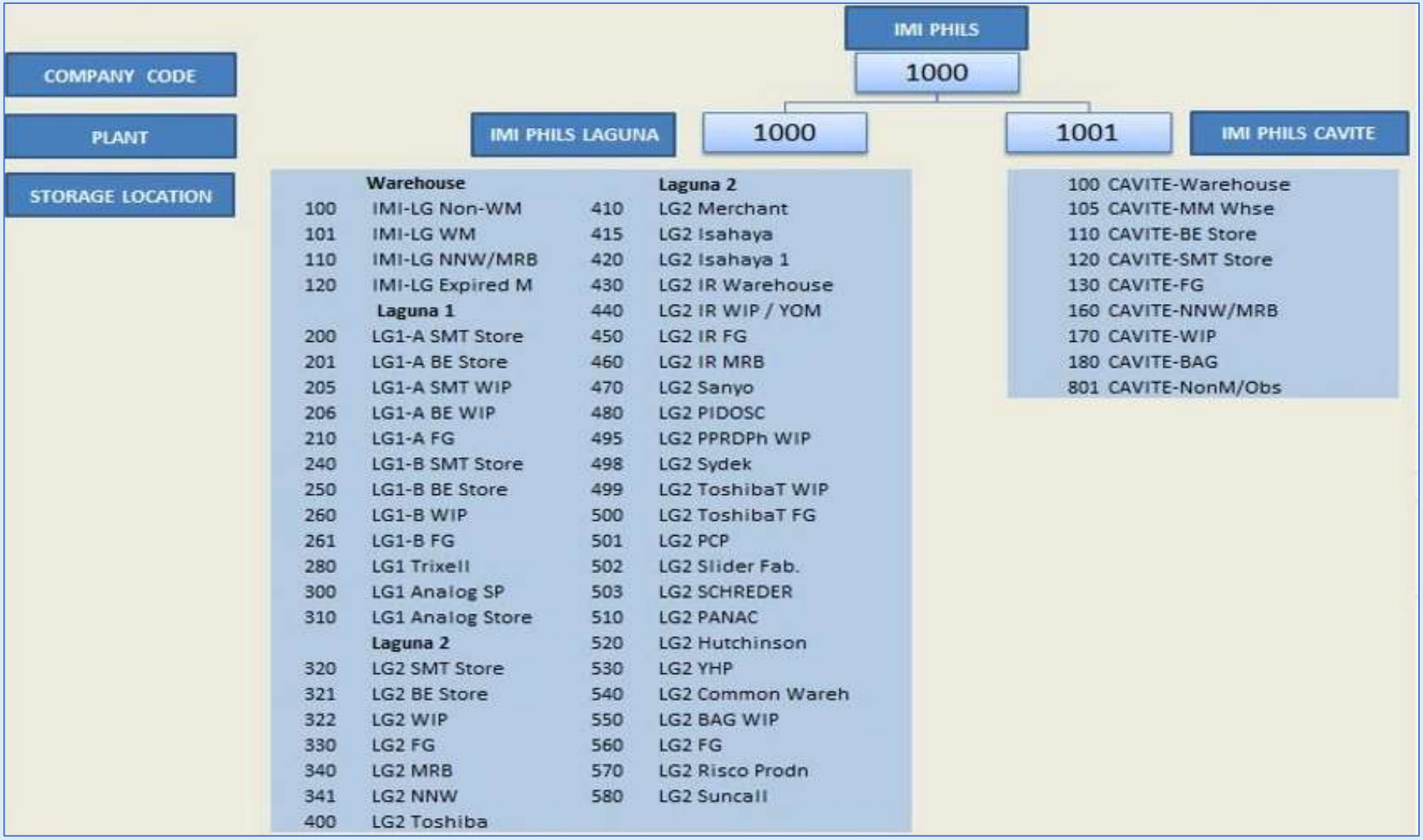
Definition:

Representation of the reporting structure and the distribution of tasks using organisational units in an enterprise.

- Client
- Company code
- Plant
- Storage location



Organizational Structures



Organizational Structures

Company Code

Smallest organizational unit of external accounting for which a complete, self-contained set of accounts can be created. This includes the entry of all transactions that must be posted and the creation of all items for legal individual financial statements, such as the balance sheet and the profit and loss statement.

Plant

An organizational unit serving to subdivide an enterprise according to production, procurement, maintenance, and materials planning aspects.

Storage Location

An organizational unit that allows you to differentiate between various types of stock in a site.

Master Data

Definition

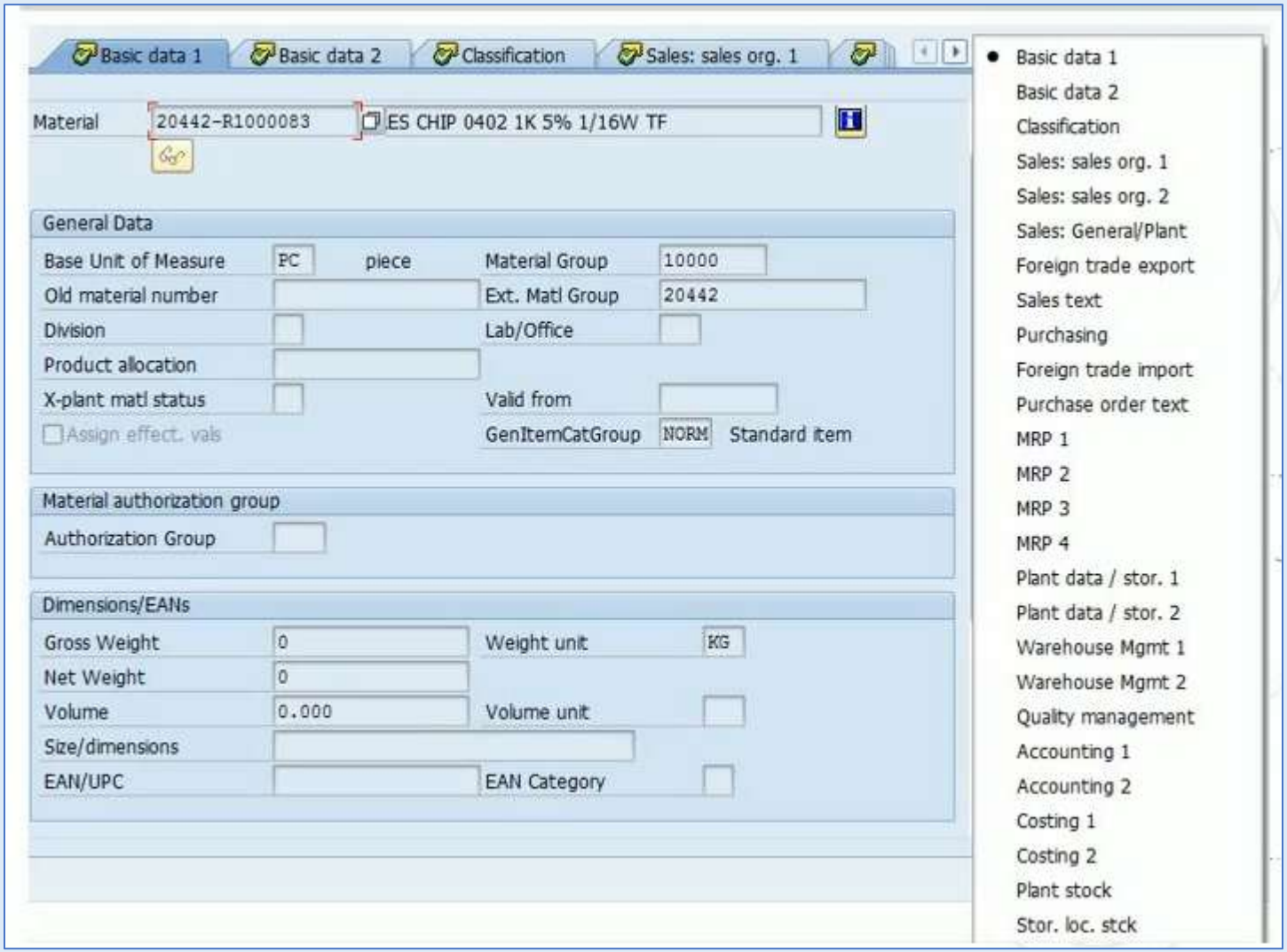
Master data is the core data that is essential to operations in a specific business or business unit.

- **Material Master**
- **Bill of Materials**
- **Work Center**
- **Routing**

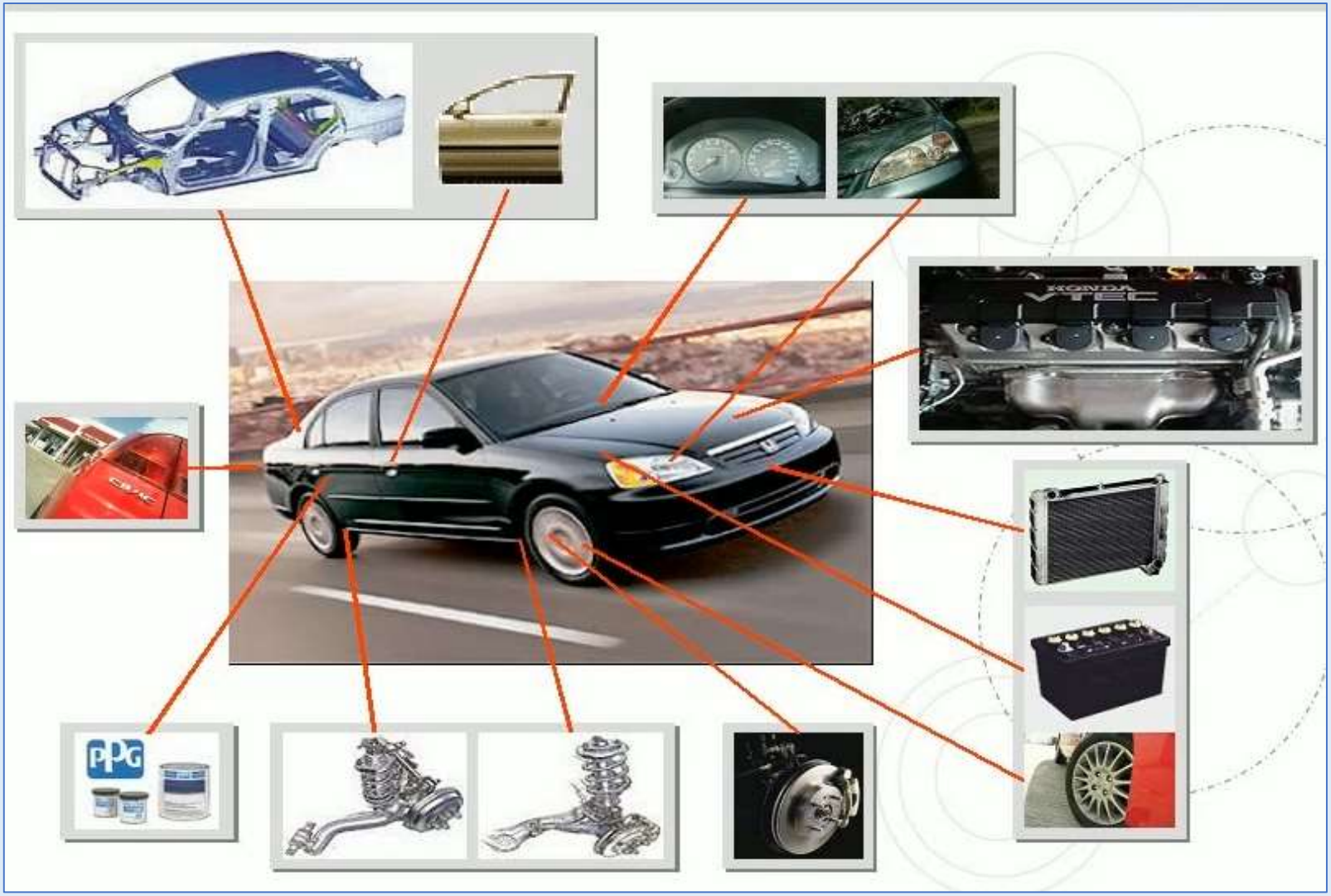
Material Master

Material Master
contains descriptions of the materials a company procures, produces, and stores. The material master is the central repository of material information (such as stock levels) for the company.

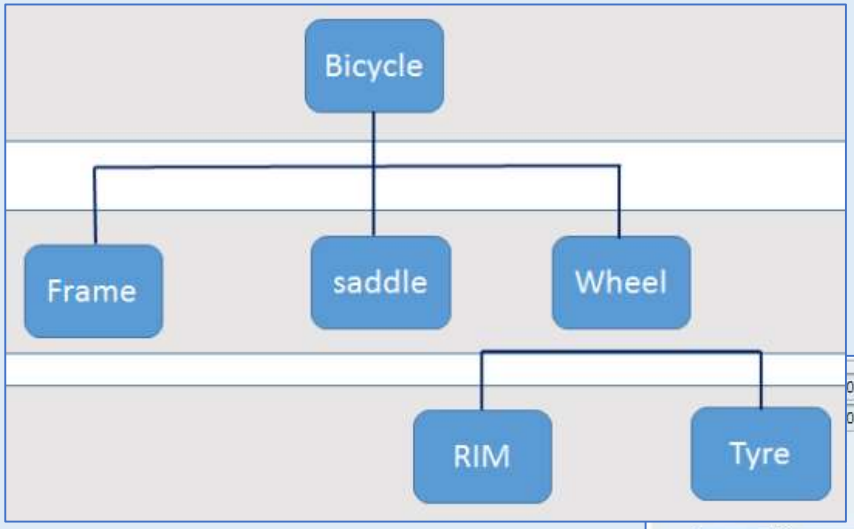
Material Master



Bill of Materials (BOM)



Bill of Materials (BOM)



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Material | Document | General

Item	ICt	Component	Component description	Quantity	Un	A...	SIs	Valid From	Valid to	Change No.
0010	L	20002-R1000507	CRYSTAL CHIP 27.12MH...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0020	L	20002-R1001099	CONN SMT 20 HEADER, ...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0030	L	20002-R1001582	IC ASIC MULTI PROTOC...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0040	L	20002-R1001100	IC SMT PIC18F67J11-I/P...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0050	L	20002-R1001581	IC SMT MCP1801T-3302I...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0060	L	20002-R1000727	IND 470nH 5% 1008 AL...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0070	L	20002-R1001164	IND SMT FE 0603 1000 ...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0080	L	20002-R1001102	CAP CHIP 0603 10uF 20...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0090	L	20002-R1001103	CAP CHIP 0402 0.1uF 10...	400	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0100	L	20002-R1000205	LED CHIP 3.0X1.0MM RE...	200	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0110	L	20002-R1000548	IC DIGTAL POT AD516...	100	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0120	L	20002-R1001178	RES CHIP 0402 332R 1%...	200	PC			12/19/2013	12/31/9999	LEGACYUPLOAD
0130	L	20002-R1000499	RES CHIP 0402 4.75 KO...	600	PC			12/19/2013	12/31/9999	LEGACYUPLOAD

Work Center

Work Center is a physical location at which an operation is carried out.

Costing

Basic Data

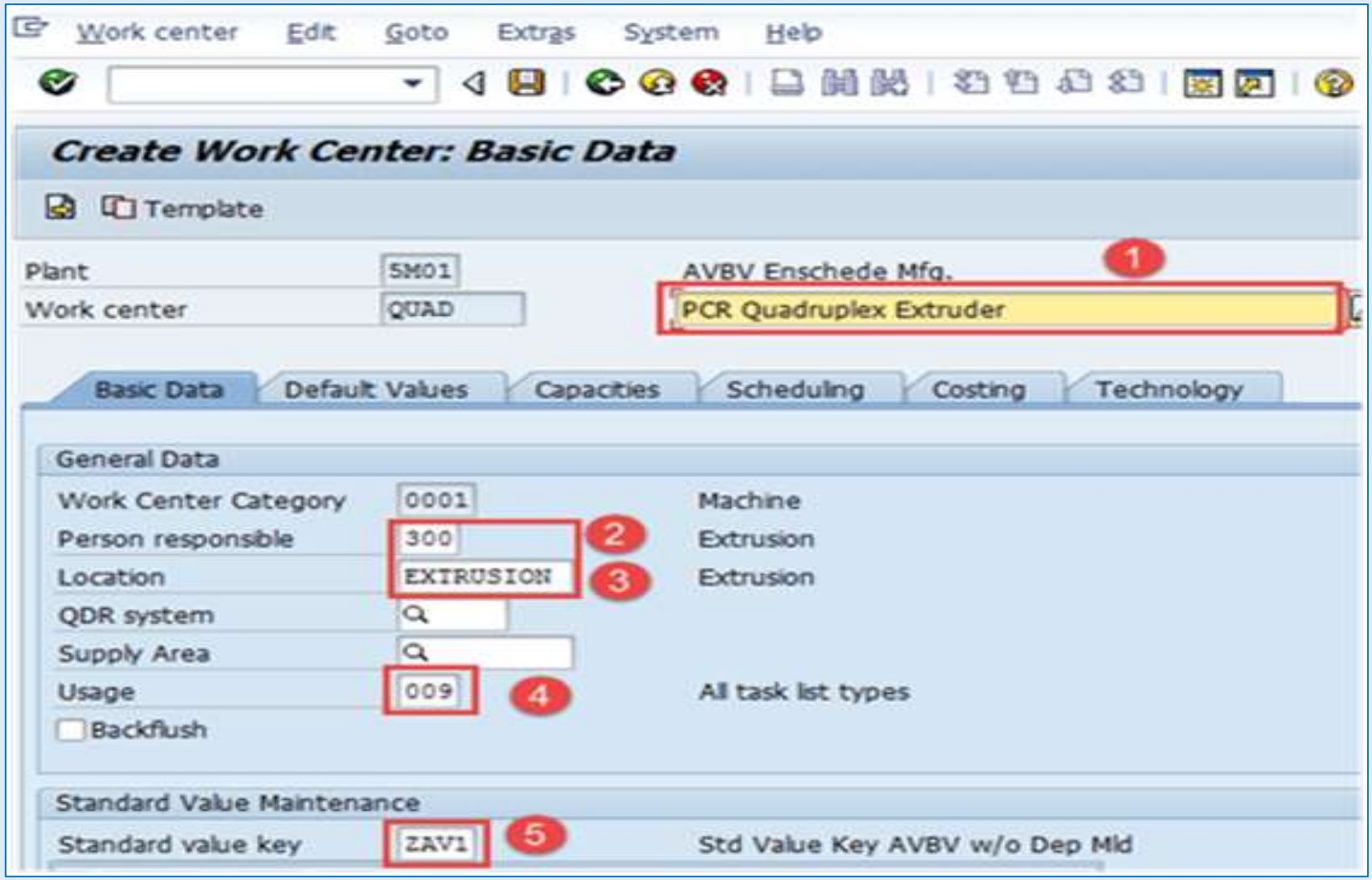
Work center Views

Scheduling

Defaults

Capacity

Work Center


Work center
Edit
Goto
Extras
System
Help
Create Work Center: Basic Data
Template
Plant
5M01
AVBV Enschede Mfg.
1
Work center
QUAD
PCR Quadruplex Extruder
Basic Data
Default Values
Capacities
Scheduling
Costing
Technology
General Data
Work Center Category
0001
Machine
Person responsible
300
2
Extrusion
Location
EXTRUSION
3
Extrusion
QDR system
Supply Area
Usage
009
4
All task list types
Backflush
Standard Value Maintenance
Standard value key
ZAV1
5
Std Value Key AVBV w/o Dep Mld

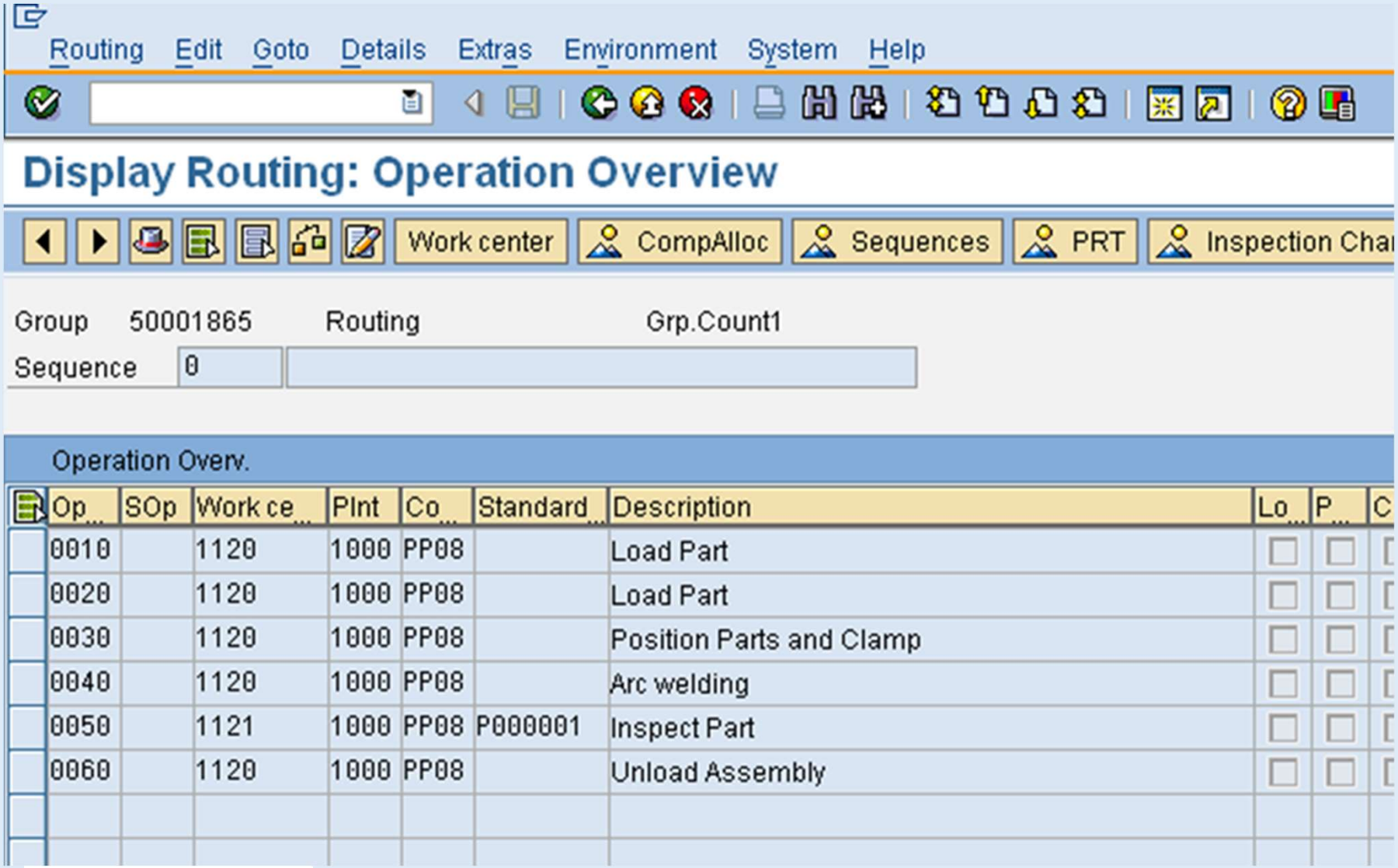
Routing

Routing

A representation of how you process work on your shop floor. Typically, a routing is made up of a series of operations, also called routing steps.

Work Center	Operation	
4DISP	10	Dispatch
4SPL03	20	Screen Print
4CML03	30	Chip mounter
4RFL03	40	Solder Reflow

Routing


Routing Edit Goto Details Extras Environment System Help
Display Routing: Operation Overview
Work center
CompAlloc
Sequences
PRT
Inspection Cha
Group 50001865 Routing Grp.Count1
Sequence 0
Operation Overv.
Op SOp Work ce Plnt Co Standard Description Lo P C
0010 1120 1000 PP08 Load Part
0020 1120 1000 PP08 Load Part
0030 1120 1000 PP08 Position Parts and Clamp
0040 1120 1000 PP08 Arc welding
0050 1121 1000 PP08 P000001 Inspect Part
0060 1120 1000 PP08 Unload Assembly

PP Business Process

Demand Planning →
- Demand Planning

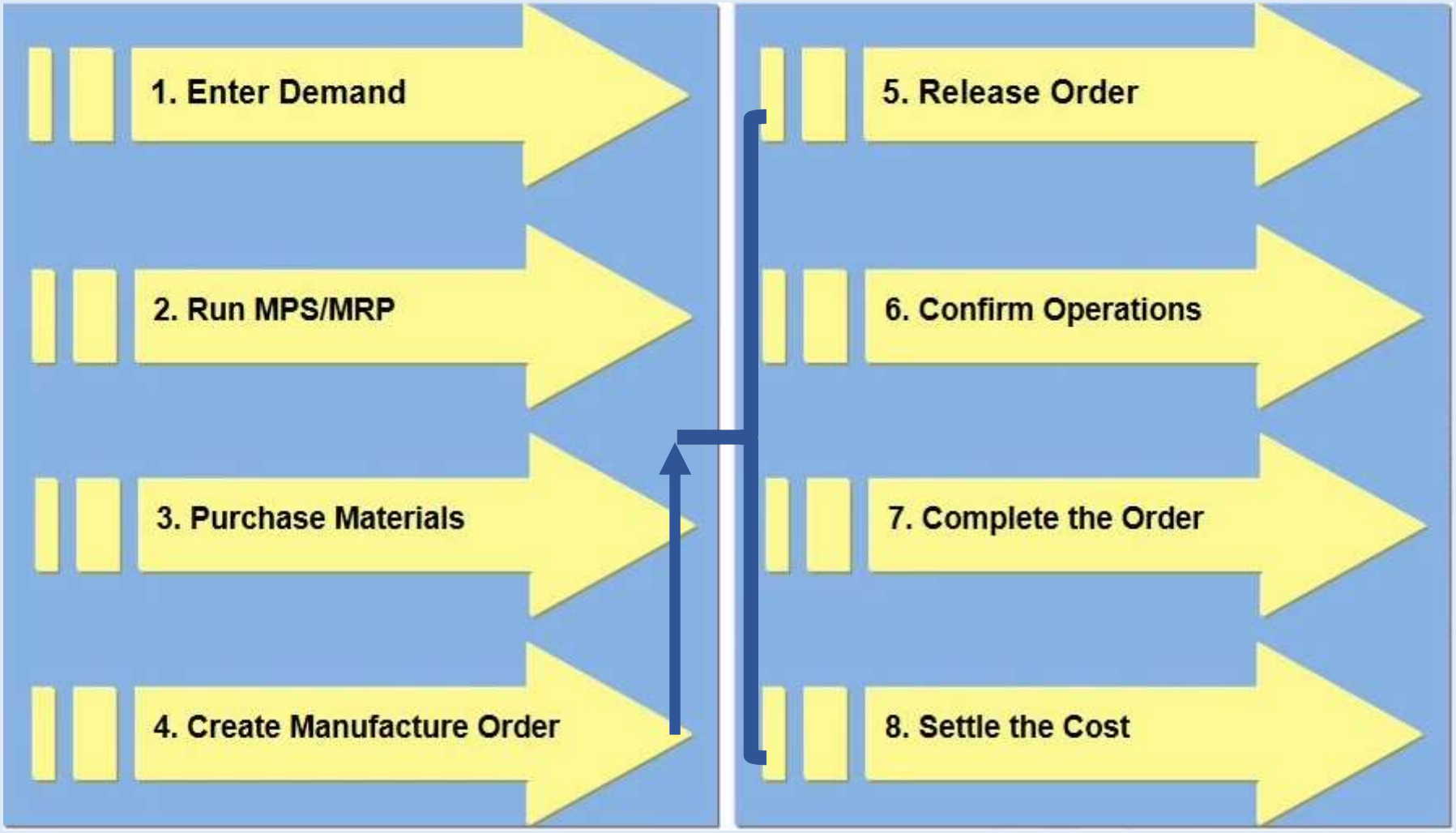
Material Requirements →
- Master Production Scheduling
- Material Requirements Planning

External Procurement →
- Local Parts
- Subcontracted Parts
- Imported Parts

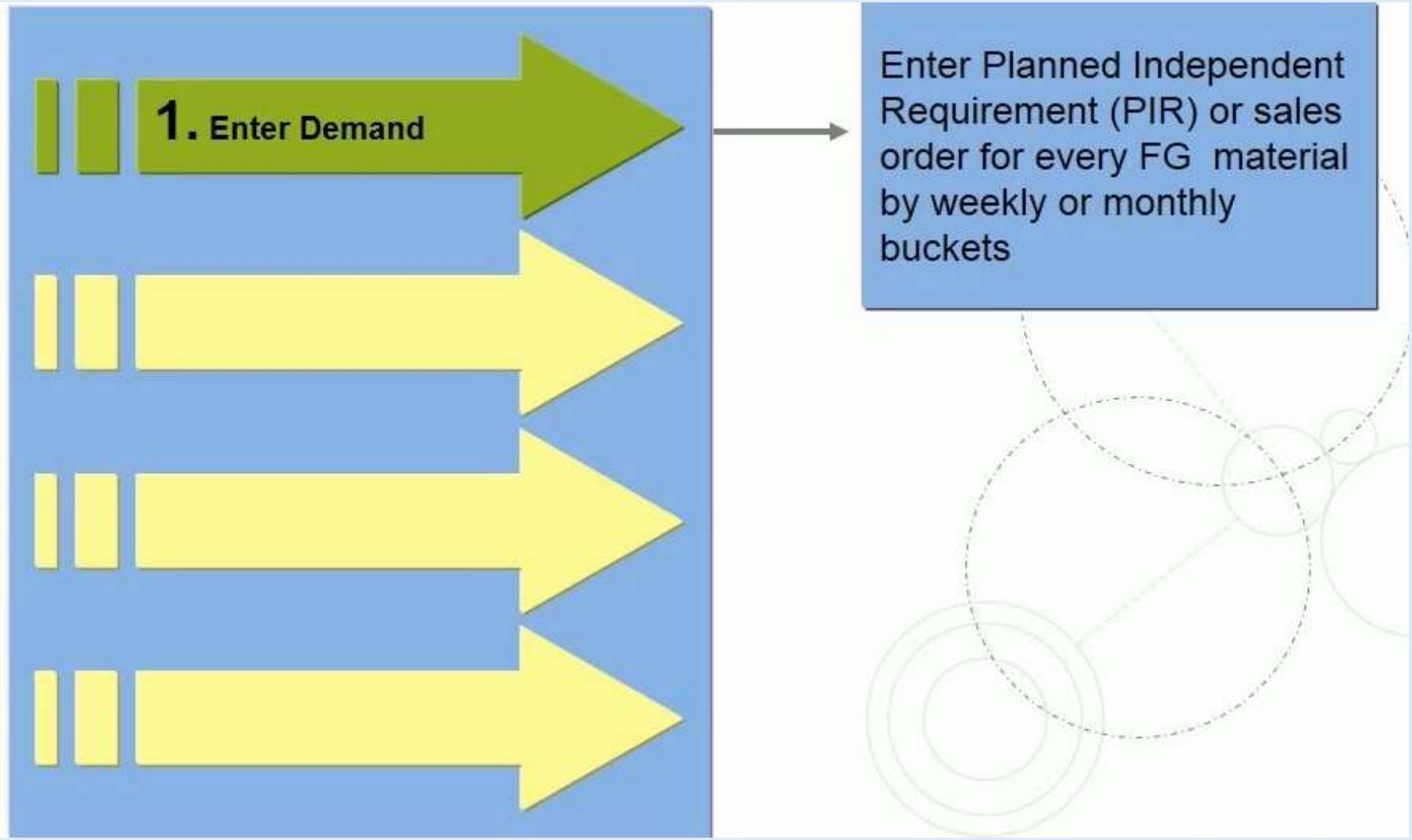
Internal Processing →
- Material Staging
- Order confirmation
- Rework
- Goods Receipt from Order

Product Costing →
- Direct Materials
- Indirect Materials
- Mat Overhead
- Labor Component

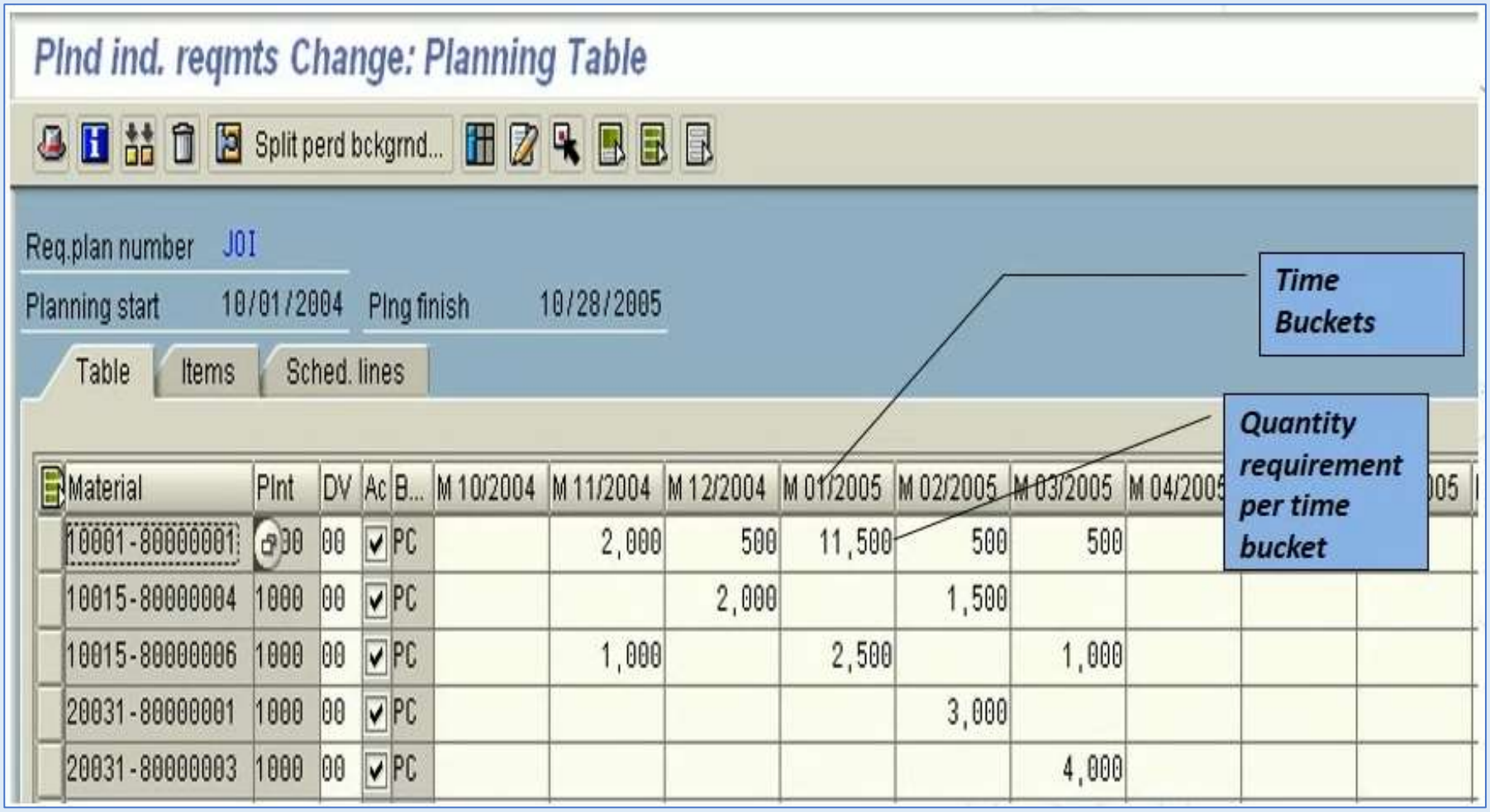
Business Process Summary



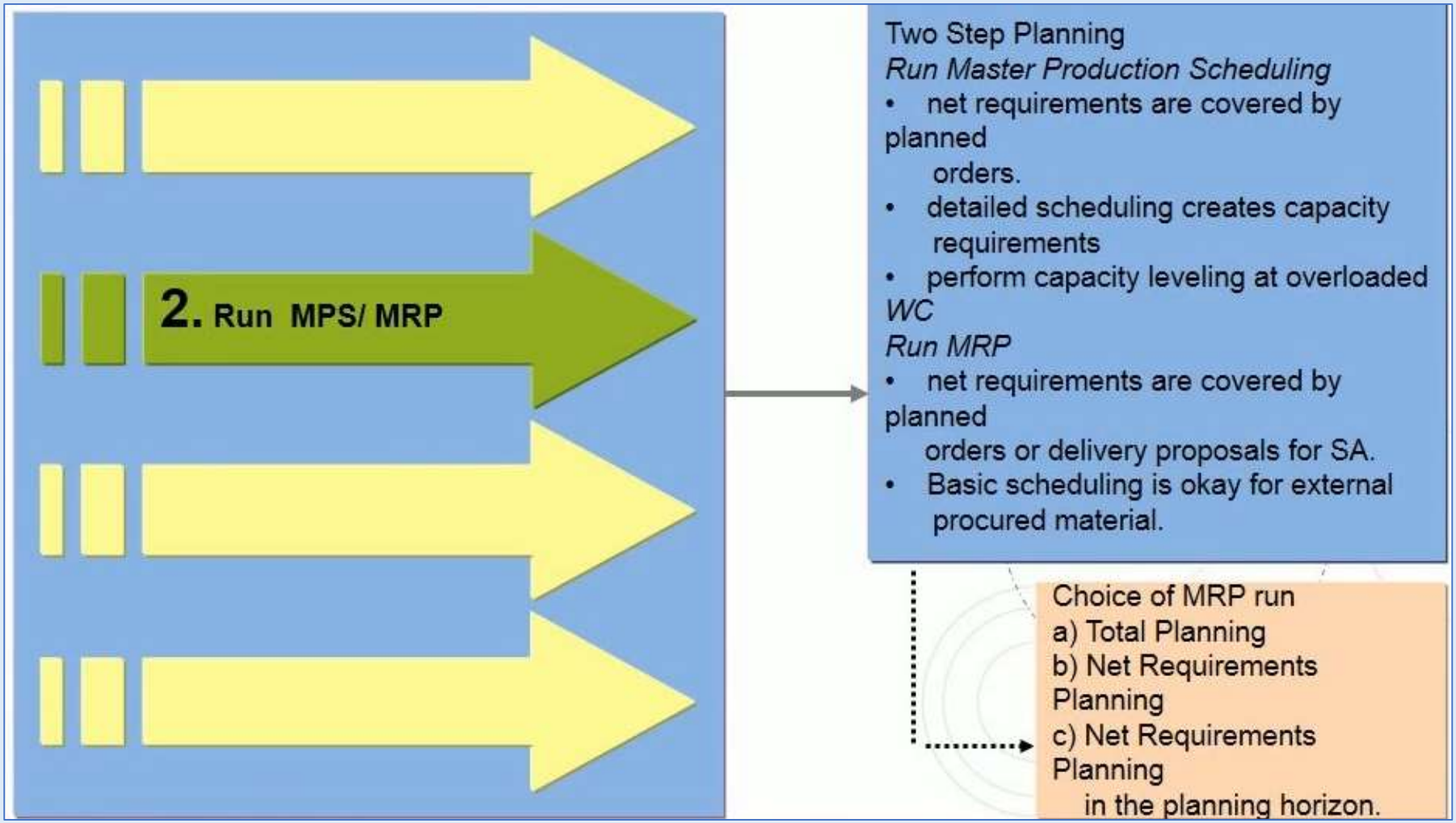
Demand Planning



Demand Planning

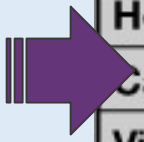


Material Requirements Planning



Materials Requirements Planning (MRP)

- Determines required quantity and timing of the production or purchase of subassemblies and raw materials needed to support MPS
- **Bill of material (BOM)**: list of the materials (including quantities) needed to make a product

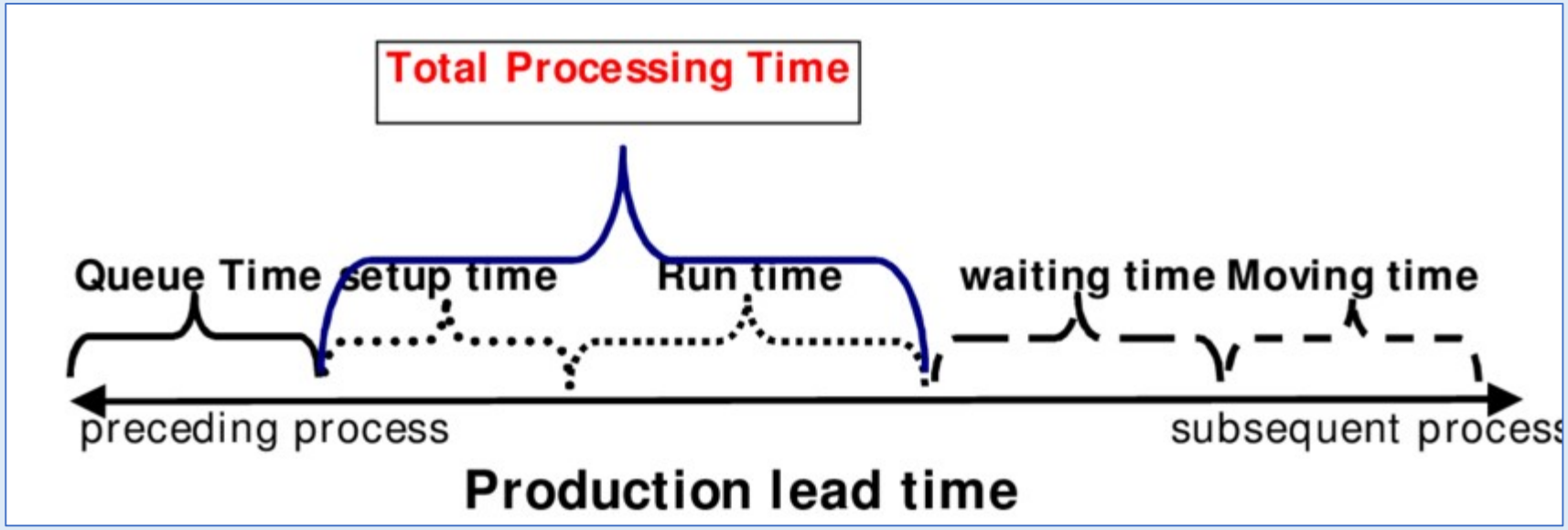


	Quantity	
Ingredient	NRG-A	NRG-B
Oats (lb.)	300	250
Wheat germ (lb.)	50	50
Cinnamon (lb.)	5	5
Nutmeg (lb.)	2	2
Cloves (lb.)	1	1
Honey (gal.)	10	10
Canola oil (gal.)	7	7
Vit./min. powder (lb.)	5	5
Carob chips (lb.)	50	
Raisins (lb.)	50	
Protein powder (lb.)		50
Hazelnuts (lb.)		30
Dates (lb.)		70

MRP : Lead time and Lot size

Purchasing lead time: cumulative time required for the supplier to receive and process the order, take the material out of stock, package it, load it on a truck, and deliver it to the manufacturer

Lot sizing: determining production quantities and order quantities



Master Production Schedule (MPS) - Example

Oats Lead time = 2 weeks		Week 1	Week 2	Week 3	Week 4	Week 5
MPS (cases)	NRG-A	984	984	984	984	1037
	NRG-B	422	422	422	422	444
MPS (500 lb. batches)	NRG-A	142	142	142	142	149
	NRG-B	61	61	61	61	64
Gross requirements (lb)		57,850	57,850	57,850	57,850	60,700
Scheduled receipts		44,000	44,000			
Planned receipts				88,000	44,000	44,000
On hand	29,650	15,800	1,950	32,100	18,250	1,550
Planned orders		88,000	44,000	44,000		

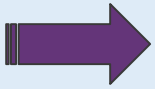
The Master Production Schedule (output from Demand Management) is used to calculate the Gross Requirements. The receipts from production orders and stock on hand are then included to calculate the planned orders.

Materials Requirements Planning in SAP ERP

- MRP process creates planned orders to meet dependent requirements
- The main purposes of an MRP system are:
  - Control inventory levels : “order the right quantity of the right part at the right time”.
  - Assign the correct priorities to items.
  - Plan the capacity.

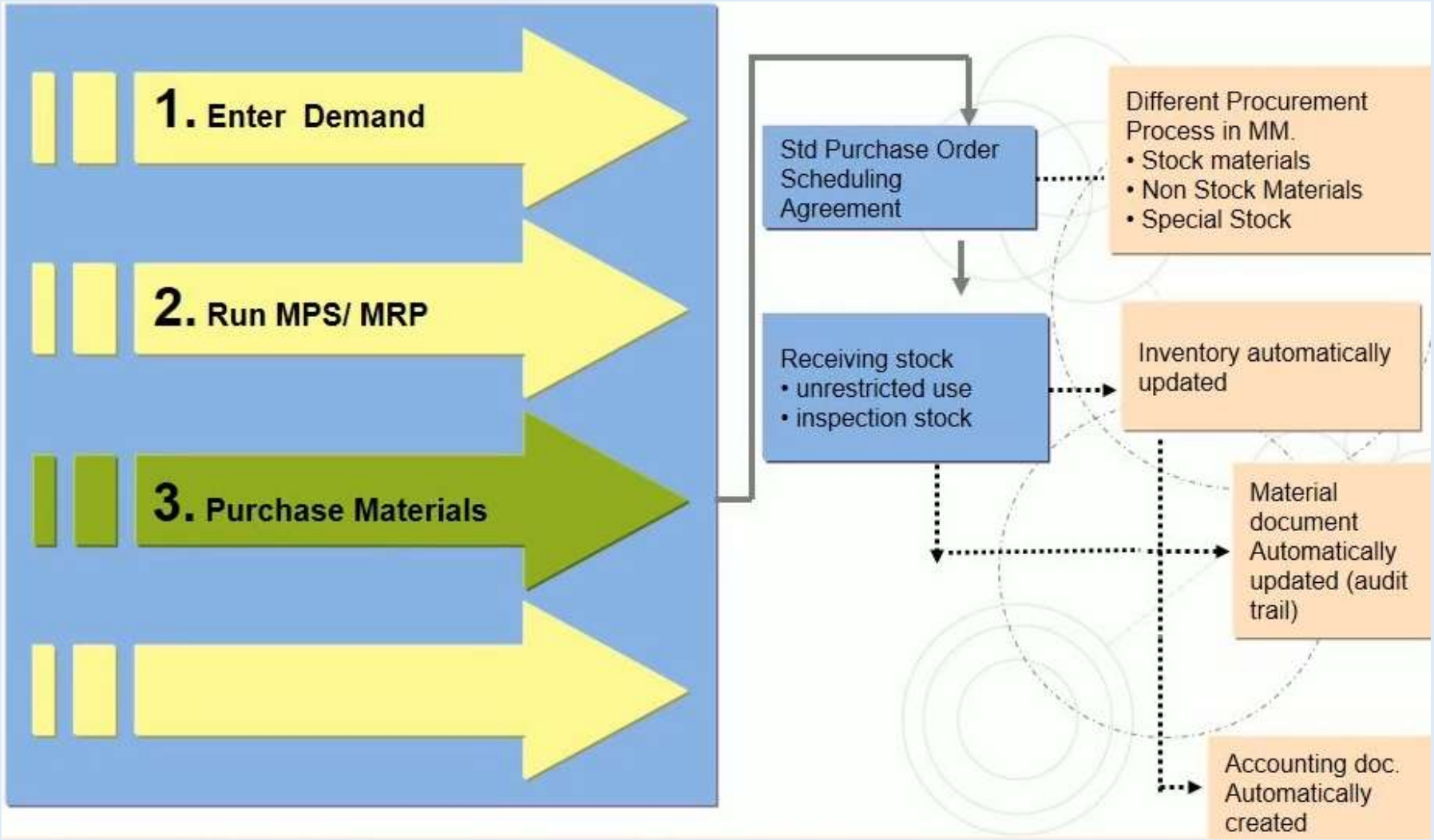
Stock/Requirements List shows:

- Planned orders
- Purchase requisitions (PurRqs)
- Purchase orders (POitem)

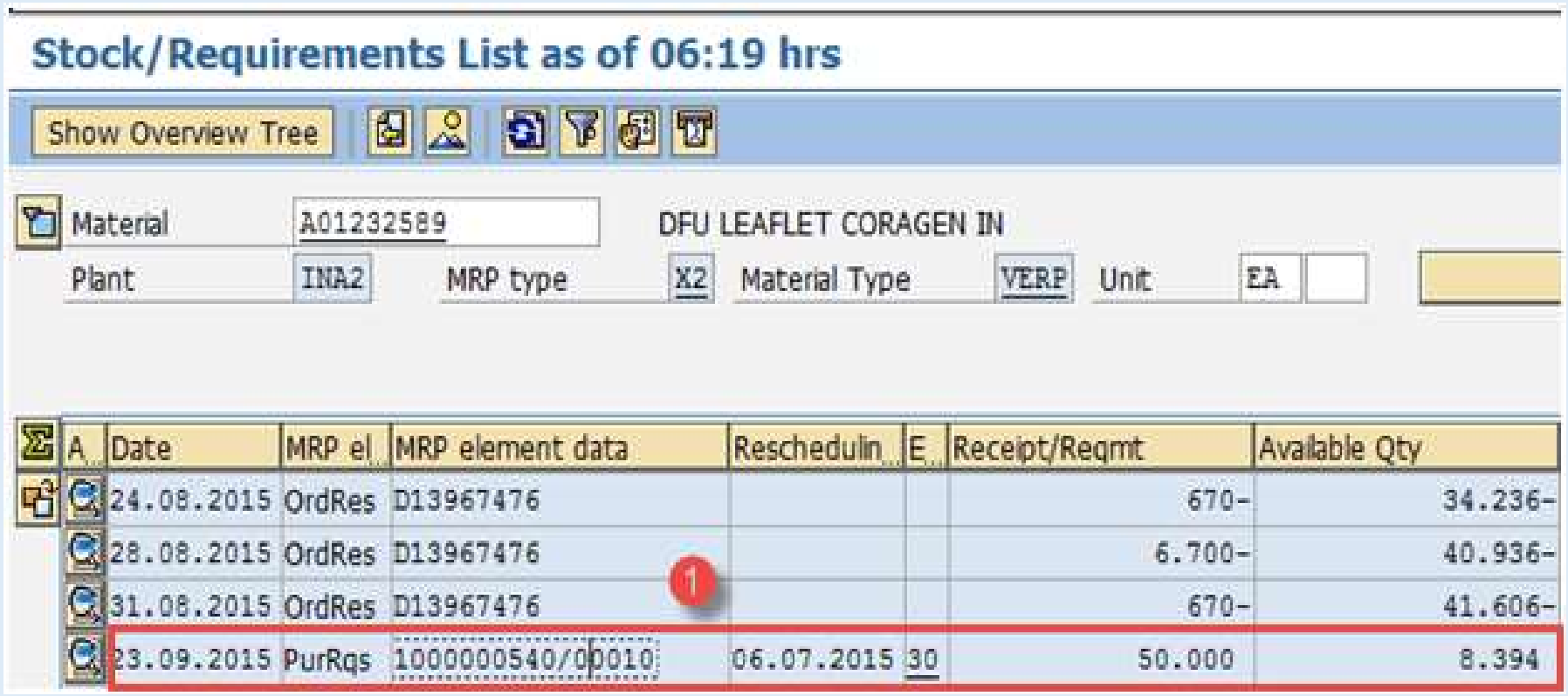


The output of MRP is either a *planned (production) order* or a *purchase order/requisition*.

External Procurement



Stock Requirements List : Purchase Order



Stock/Requirements List as of 06:19 hrs

Show Overview Tree

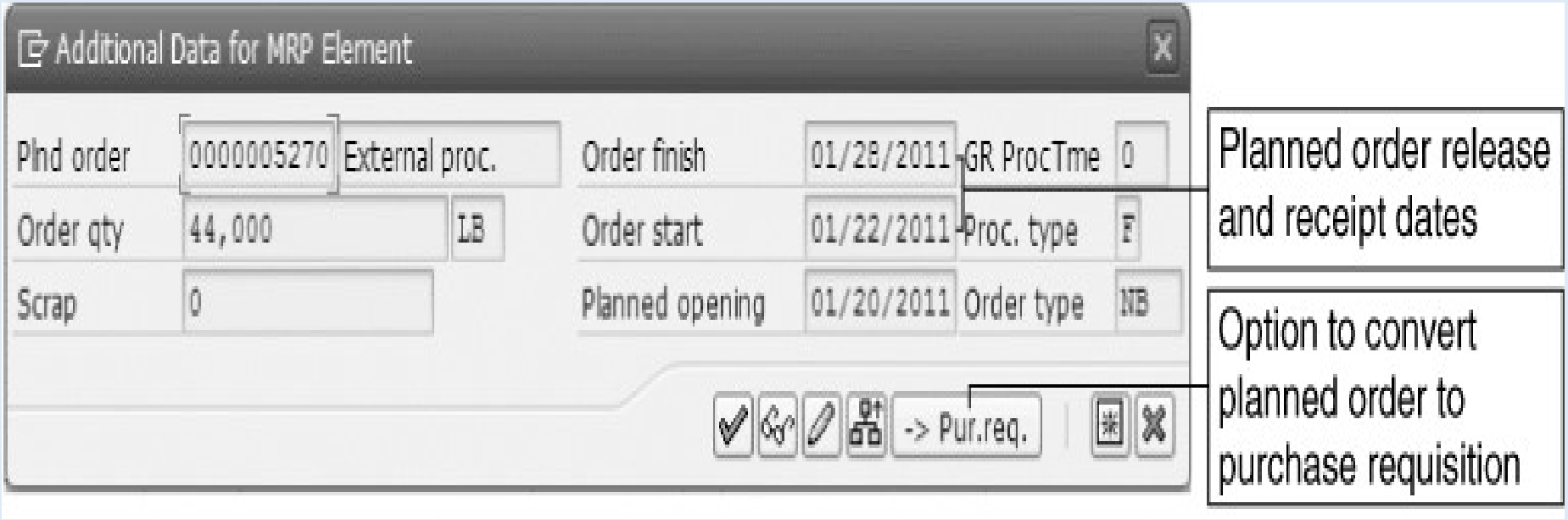
Material A01232589 DFU LEAFLET CORAGEN IN

Plant INA2 MRP type X2 Material Type VERP Unit EA

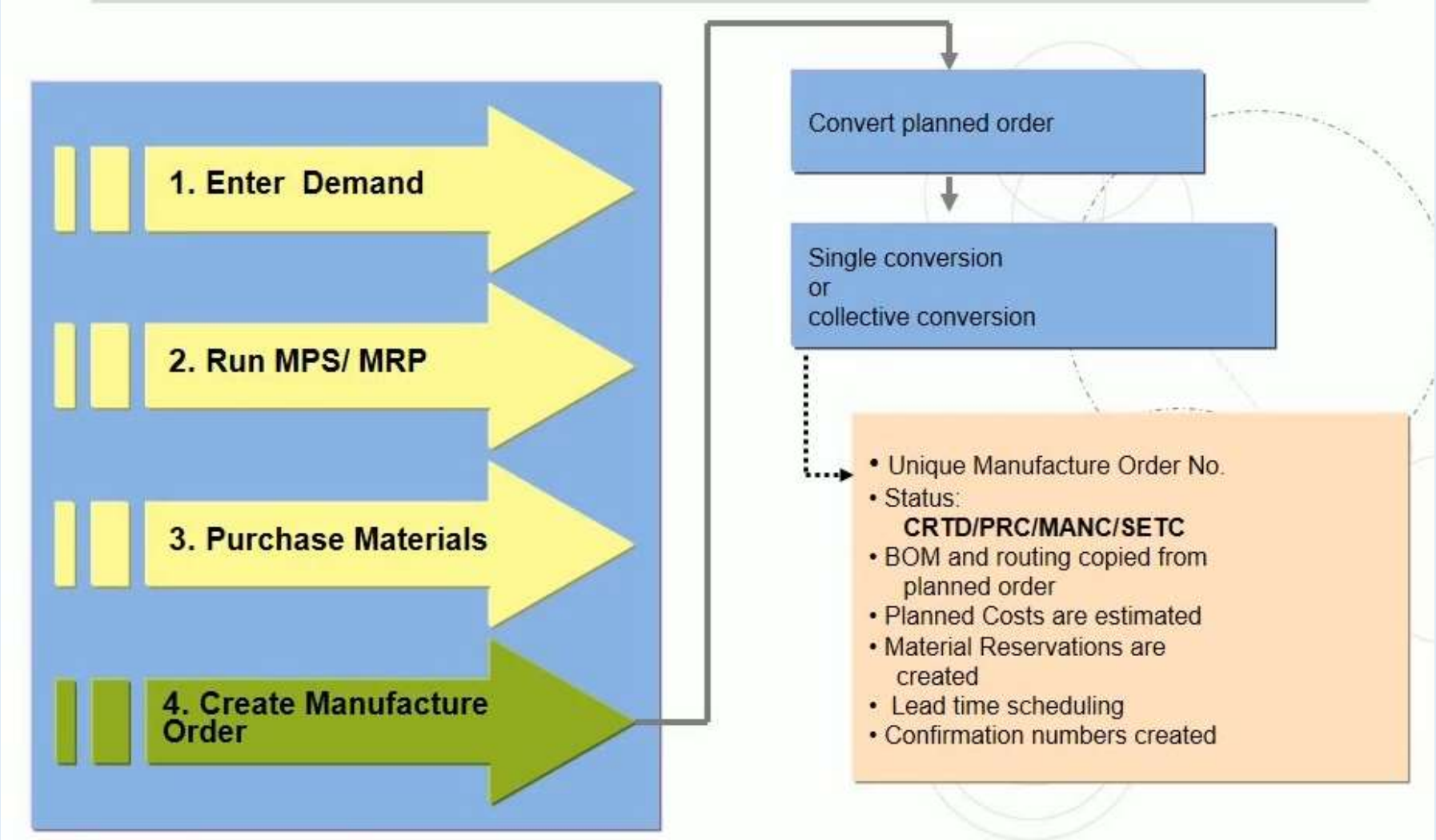
A	Date	MRP el	MRP element data	Reschedulin	E	Receipt/Reqmt	Available Qty
	24.08.2015	OrdRes	D13967476			670-	34.236-
	28.08.2015	OrdRes	D13967476			6.700-	40.936-
	31.08.2015	OrdRes	D13967476			670-	41.606-
	23.09.2015	PurRqs	1000000540/00010	06.07.2015	30	50.000	8.394

Materials Requirements Planning in SAP ERP

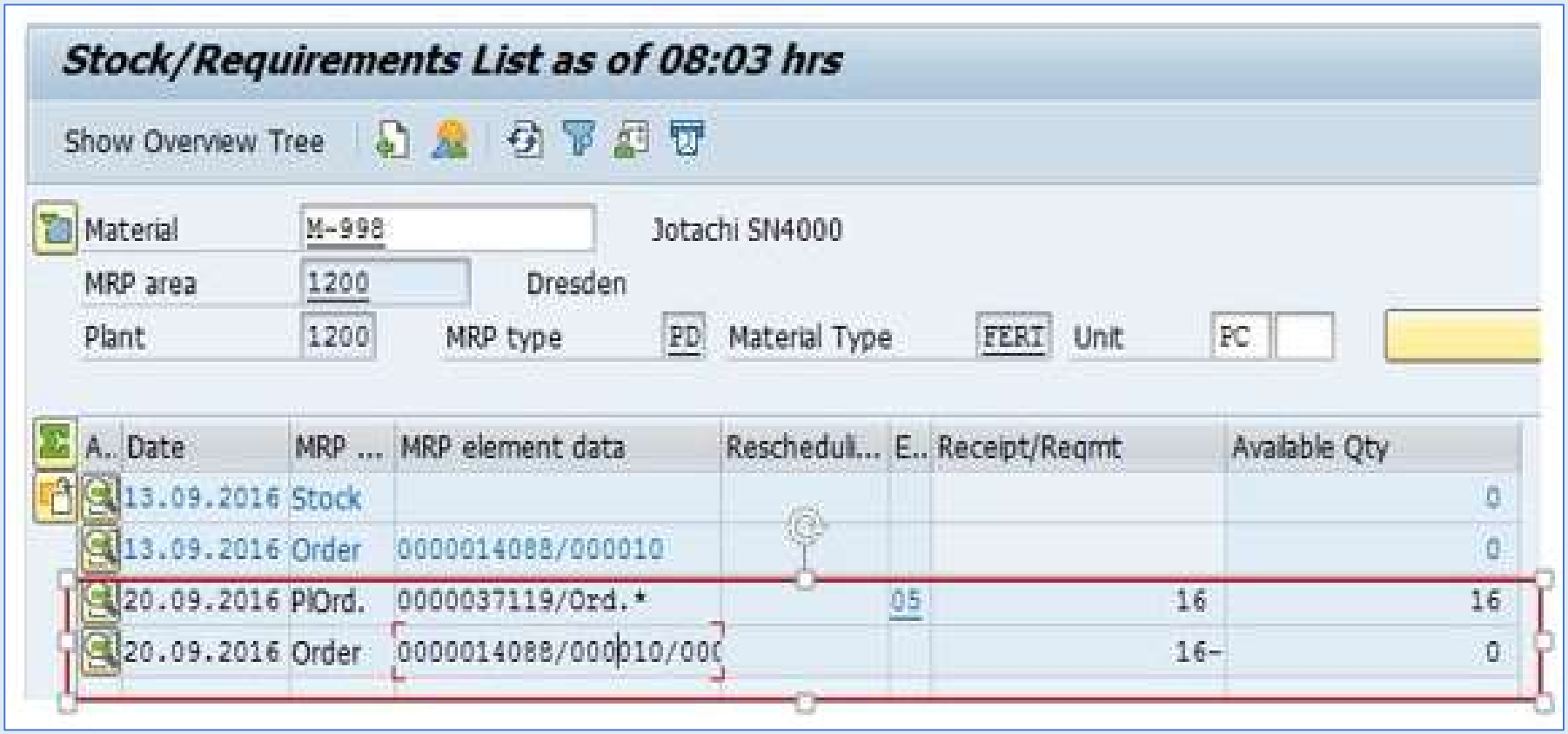
Planner can convert a planned order to a purchase order from Stock/Requirements List by double-clicking the planned order line



Internal Processing



Stock Requirements List : Production Orders



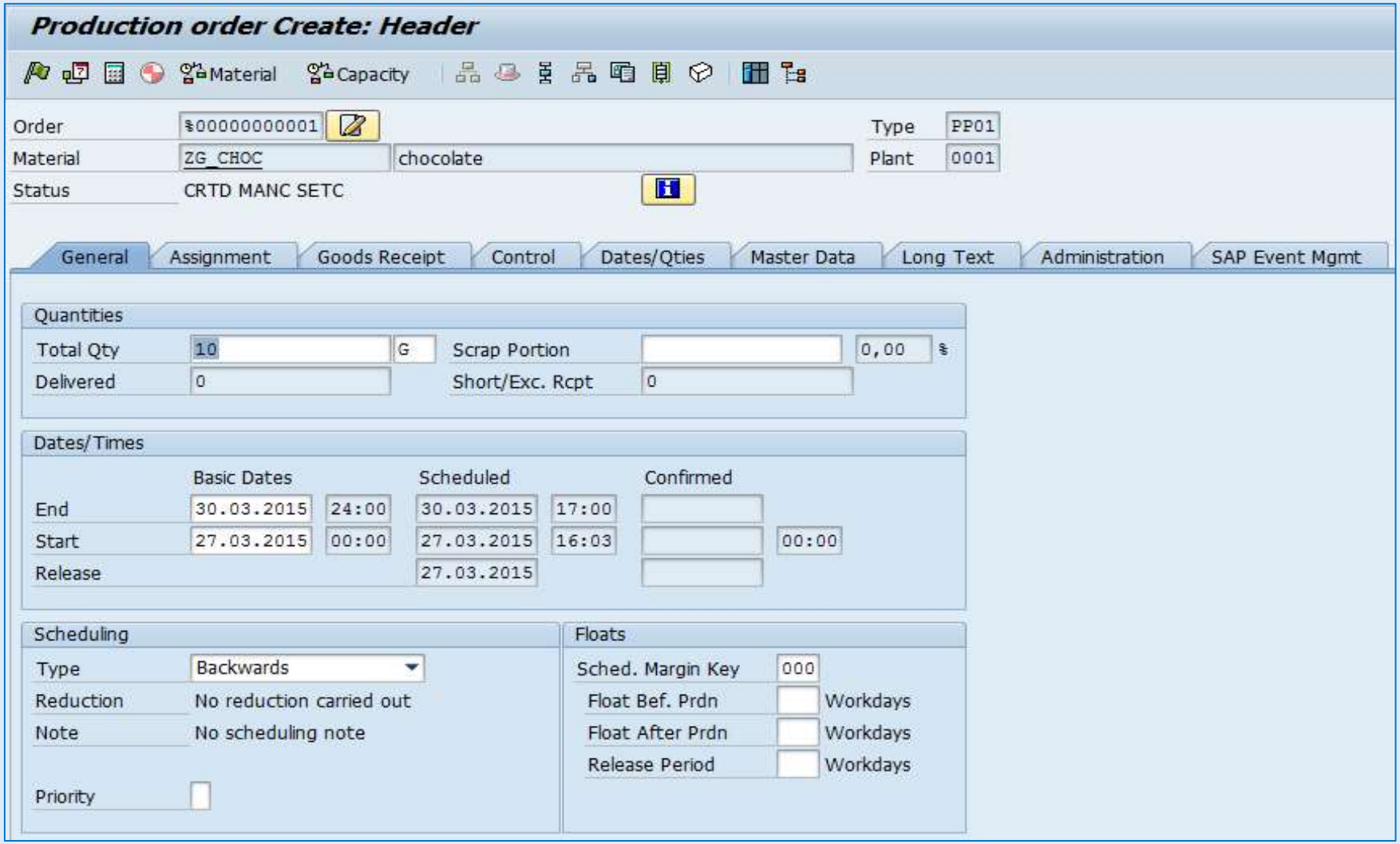
Production orders

Production orders define:

- Which material is to be produced;
- At which location,
- At what time and …
- How much work is required.
- Which resources (stock) are to be used and …
- How the order costs (through cost accounting) are to be settled.

This information is generated from the MRP via the material BOM.

Production order



Production order execution

- For a production order to be issued and executed sufficient materials to make the stock must be in inventory – referred to as Goods issue
- The MRP will check the BOM and inventory before proceeding with the production order
- Once goods are issued (goods receipt is created) costs are assigned to the production order

Production planning and execution

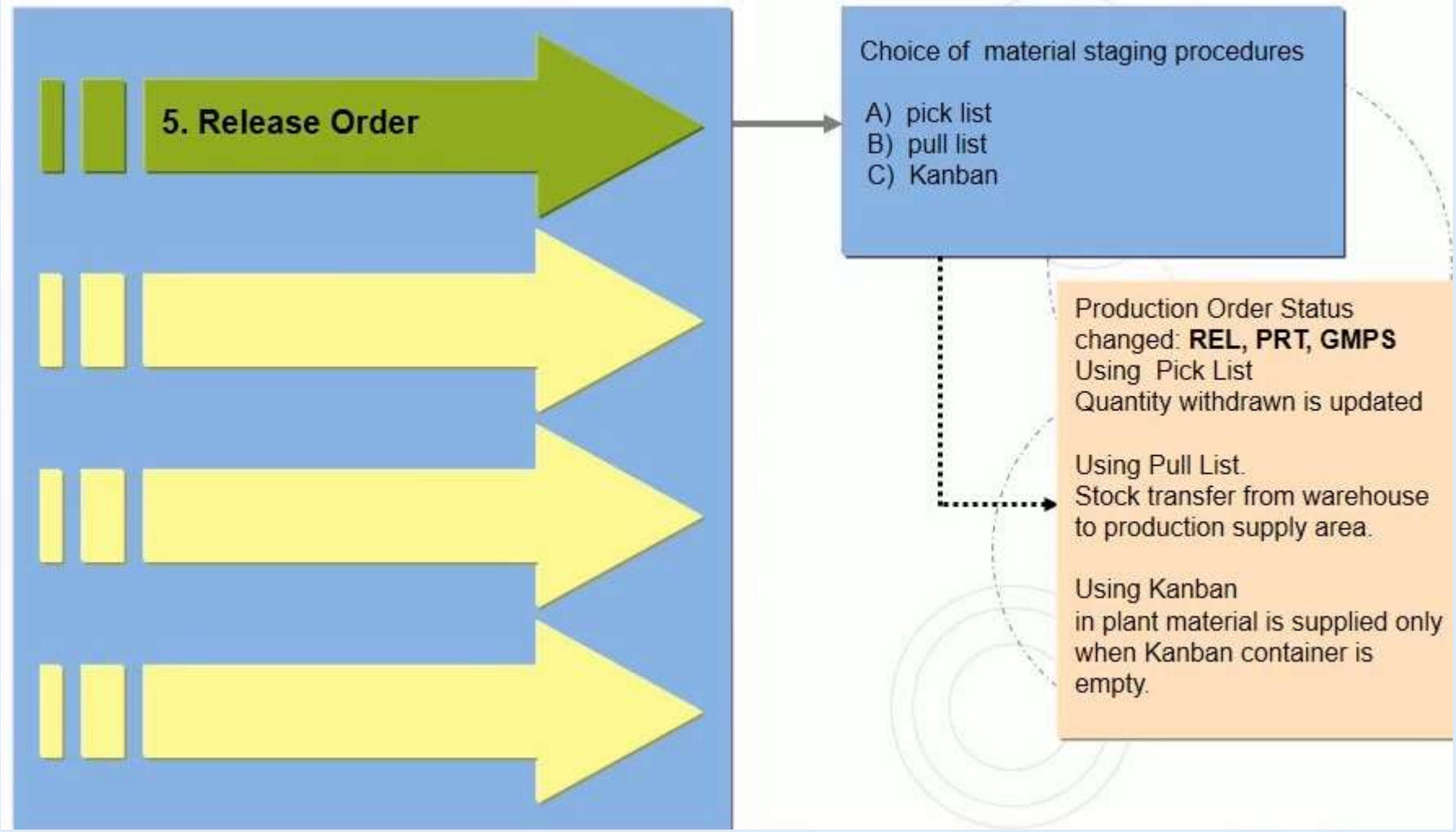
Materials can be received into a storage location in two ways.

Firstly you will receive into inventory the raw materials and/or sub assemblies required to make the finished product.

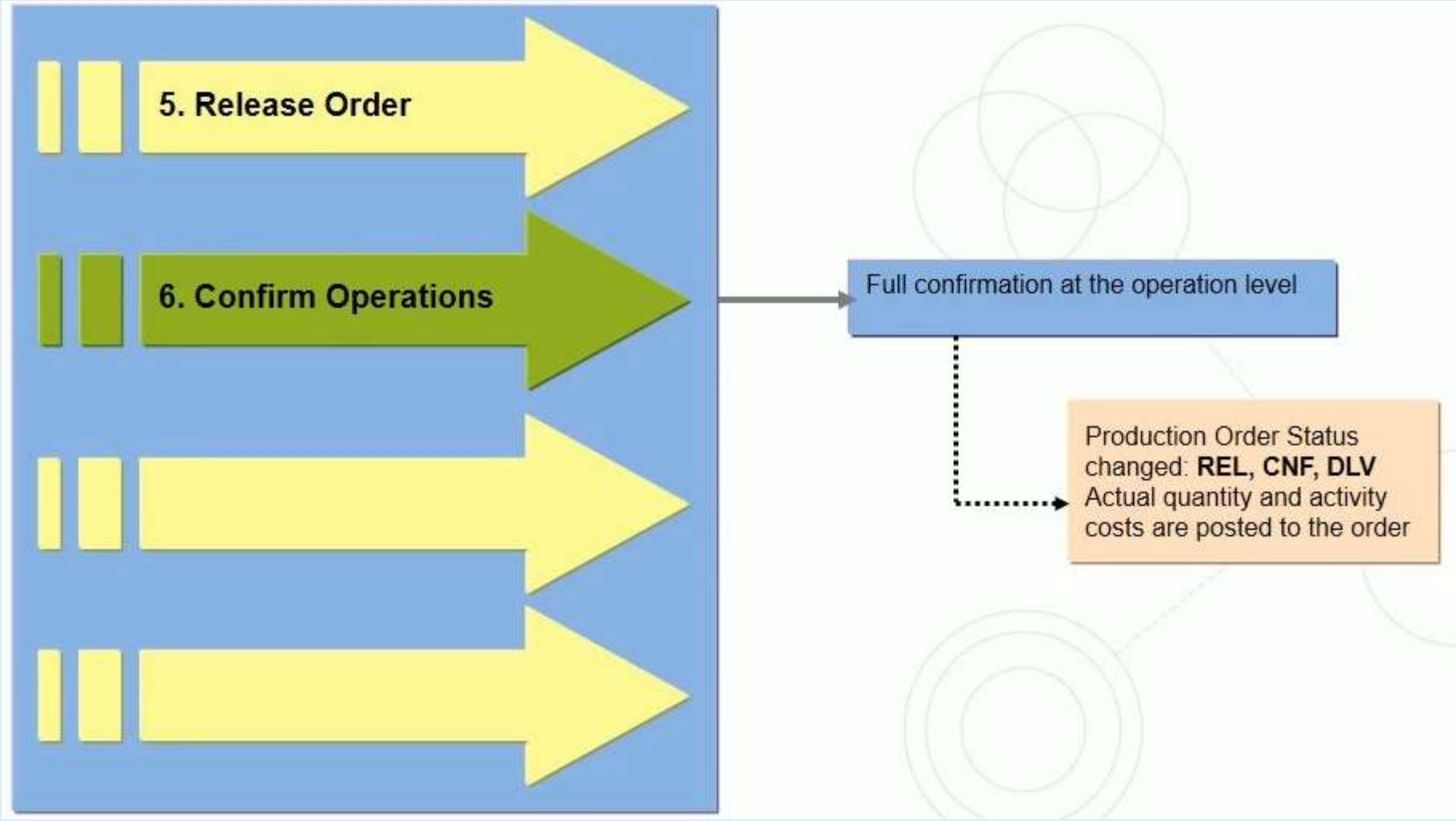
RM and sub assemblies may be produced on site or purchased from your vendor partners via a PR/PO

Secondly, when the production order for the finished product is completed, you will receive the finished product into inventory for distribution to customers.

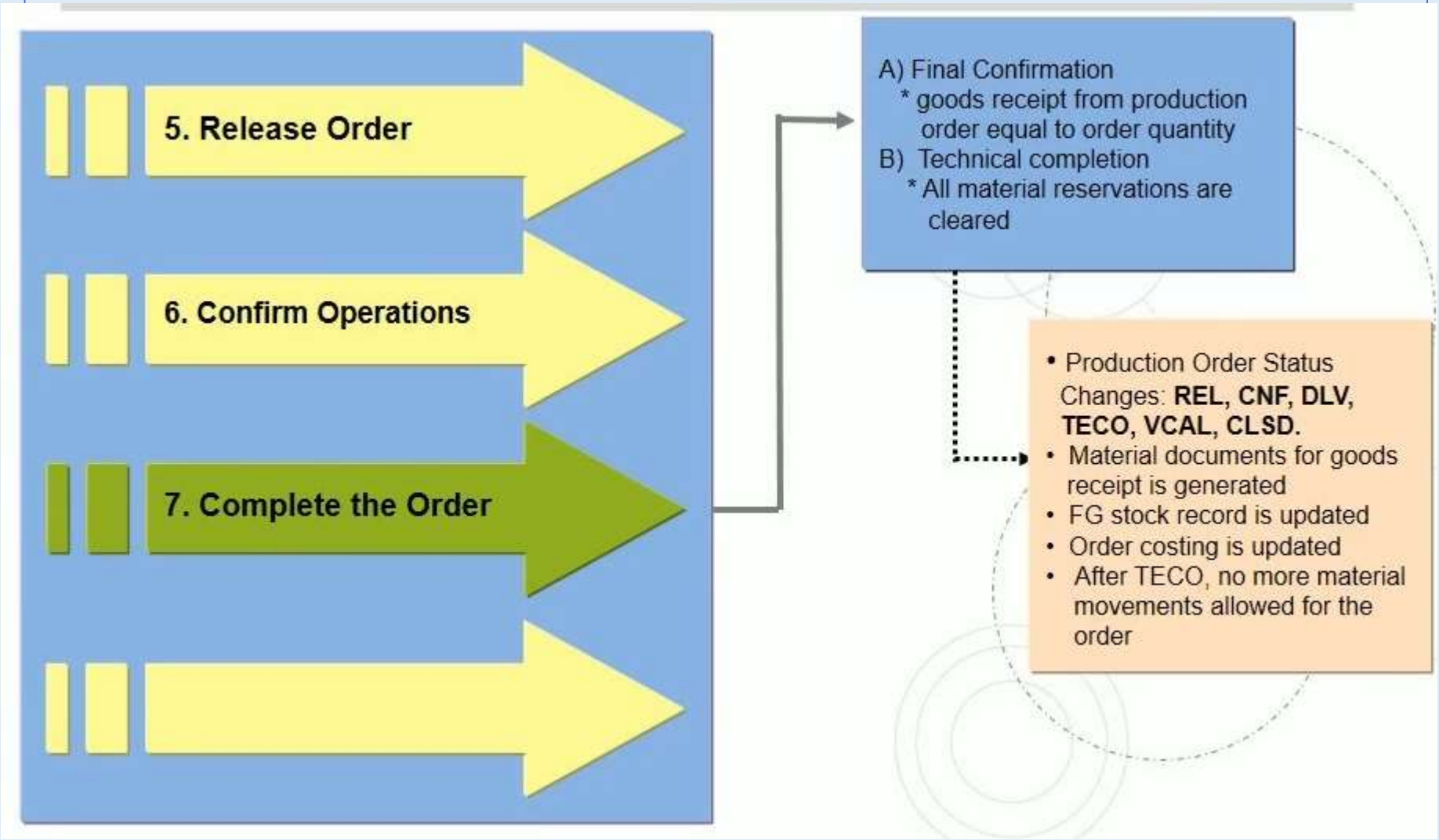
Internal Processing



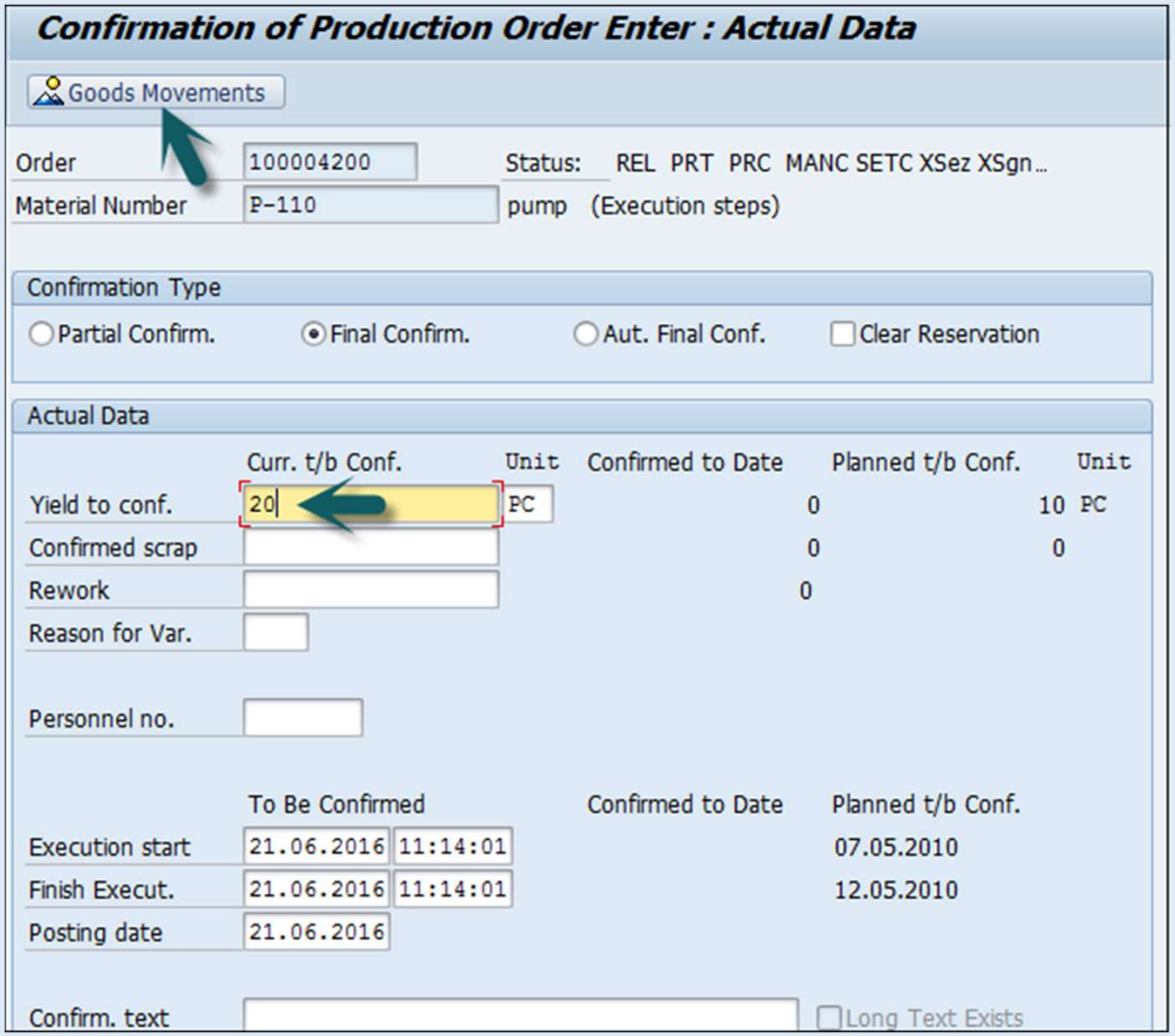
Internal Processing



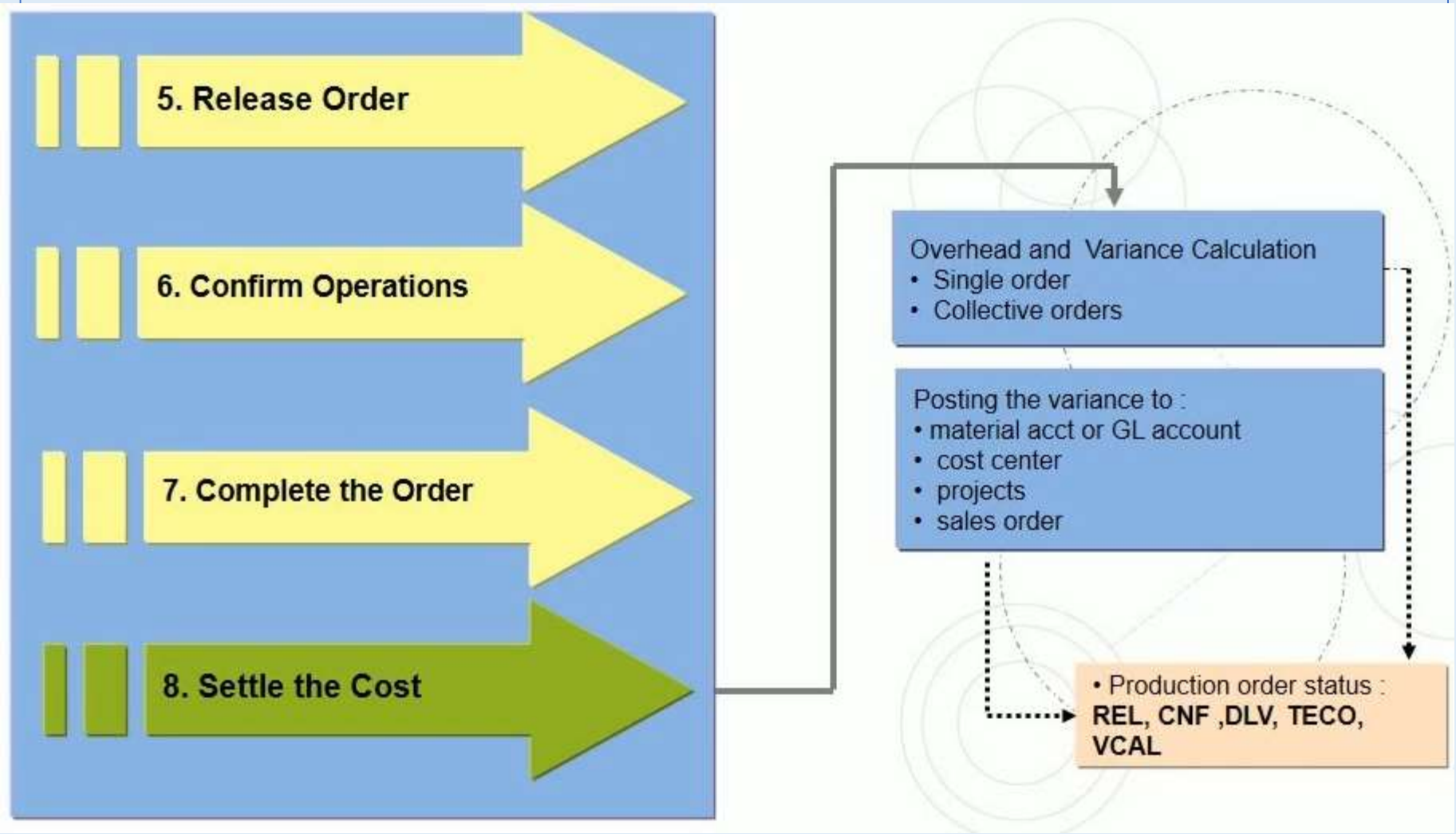
Internal Processing



Confirm production completion



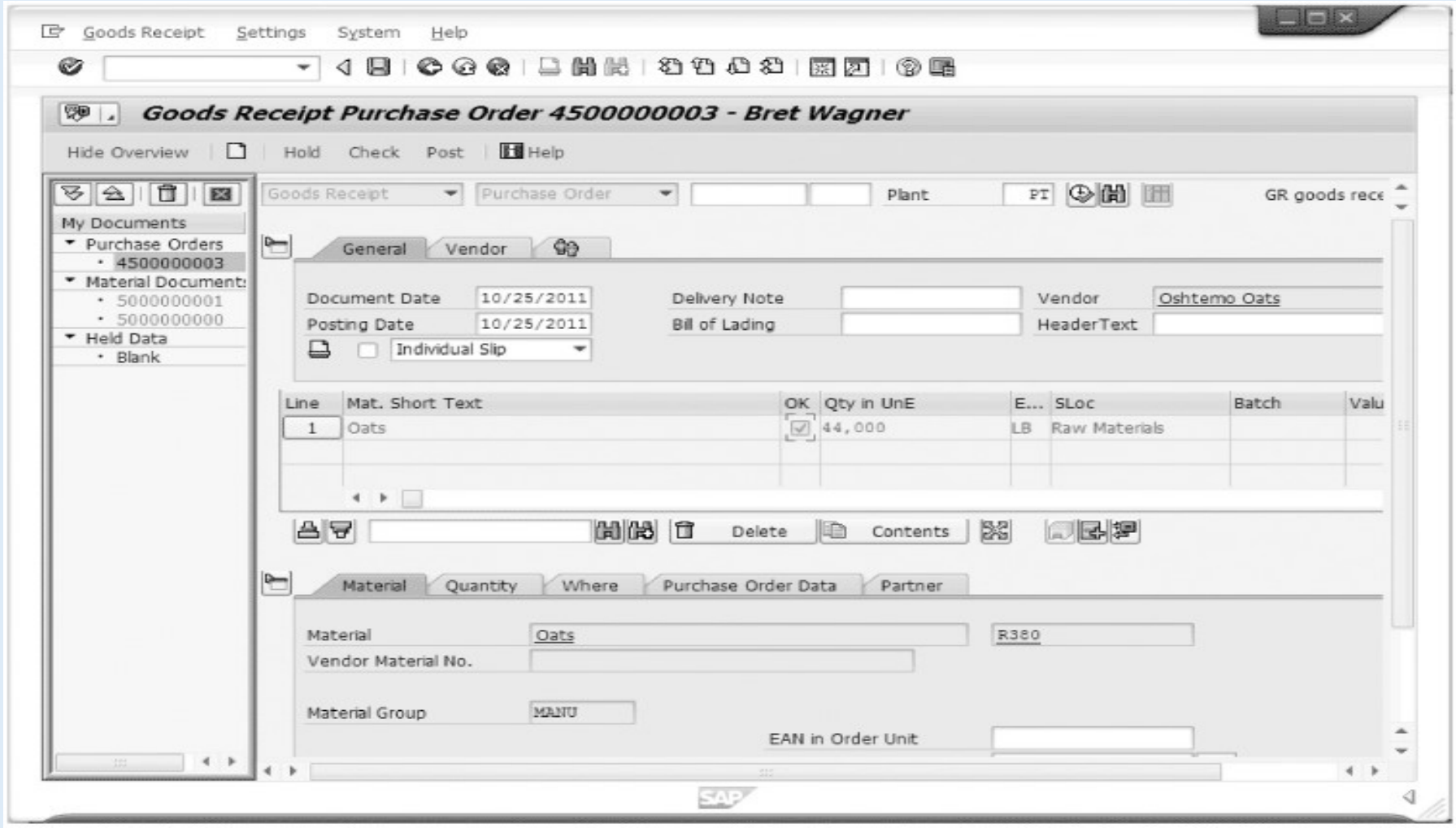
Internal Processing



Providing Production Data to Accounting

- Once a shipment is accepted, Receiving must notify SAP ERP system of the arrival and acceptance of the material
  - Goods receipt transaction
- Receiving department must match goods receipt with purchase order that initiated it
- When receipt is successfully recorded, SAP ERP system immediately records the increase in inventory levels for the material.

Providing Production Data to Accounting (cont'd.)



The Supply Chain

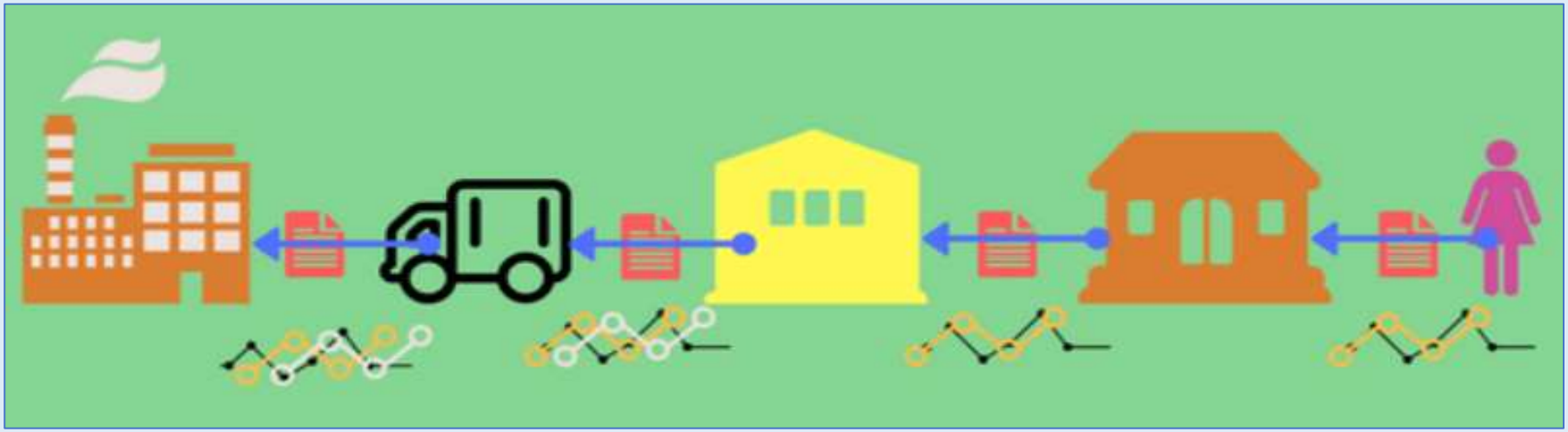
A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer. This network includes different activities, people, entities, information, and resources. The supply chain also represents the steps it takes to get the product or service from its original state to the customer.

Companies develop supply chains so they can reduce their costs and remain competitive in the business landscape.

Supply chain management is a crucial process because an optimized supply chain results in lower costs and a faster production cycle

(Investopedia, 2020)

The Supply Chain (Cont'd)



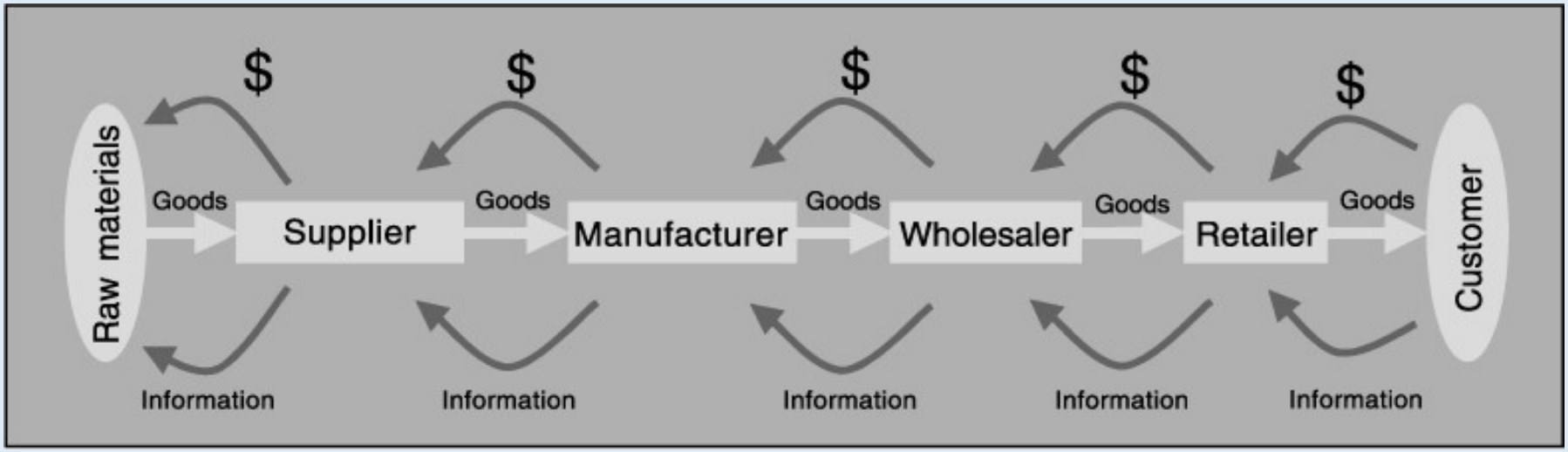
Working with suppliers in a collaborative fashion requires trust among all parties

- Company opens its records to its suppliers
- Suppliers can read company's data because of common data formats

Advantages

- Reductions in paperwork
- Savings in time
- Other efficiency improvements

The Traditional Supply Chain

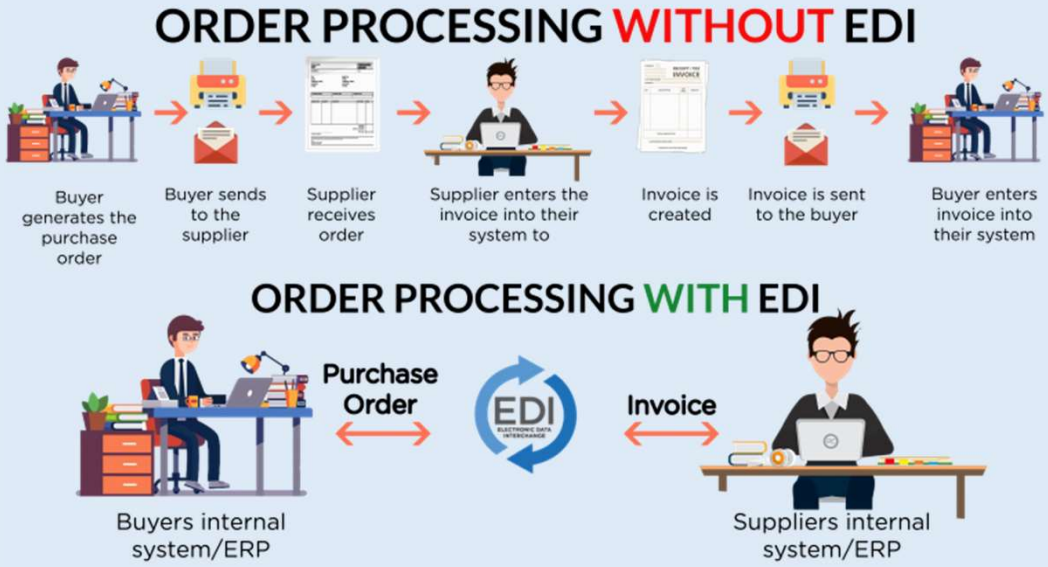


In a traditional supply chain, information is passed through the supply chain *reactively*, as participants change their product orders. Example:

- Retailer sees an increase in the sales of a product and orders a larger quantity from the wholesaler.
- The wholesaler will increase its orders from the manufacturer who will increase production.
- This will result in more raw materials being ordered from the supplier.

This process can be very slow unless all the participants are part of an integrated system.

The Traditional Supply Chain



- Before ERP systems were available, companies could be linked with customers and suppliers through electronic data interchange (EDI) systems
- Well-developed ERP system can facilitate SCM
- Needed production planning and purchasing systems already in place
- With ERP system, sharing production plans along the supply chain can occur in real time

The Measures of Success

- **Cash-to-Cash cycle time**.
  Time between paying for raw materials and collecting cash from customer.

- **SCM costs**
  Include cost of buying and handling inventory, processing orders, and information systems support.

- **Initial fill rate**
  Percentage of the order that the supplier provided in the first shipment

- **Initial order lead time.**
  Time needed for the supplier to fill the order.

- **On-time performance**
  If supplier agreed to requested delivery dates, tracks how often supplier met those dates.

Building a Boeing Aeroplane in the factory

- https://www.youtube.com/watch?v=WyDy-KdMGEA

- How do employees know what they have to do to ensure the plane is built correctly.
- How are the materials ready when the workers need them.
- Identify the business processes involved in manufacturing this plane.

Sample Exam Questions

A make-to-stock production system is where:

A. items are made for inventory in anticipation of sales orders.

B. items are produced to fill specific customer orders

C. items are assembled for a specific customer order from an inventory of components

D. both A and C

An unexpected increase in product demand can lead to:

A. a depletion of finished goods inventories

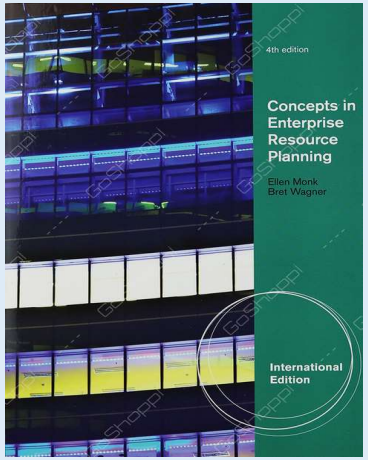
B. a depletion of raw materials inventories

C. increased overtime and transportation expenses

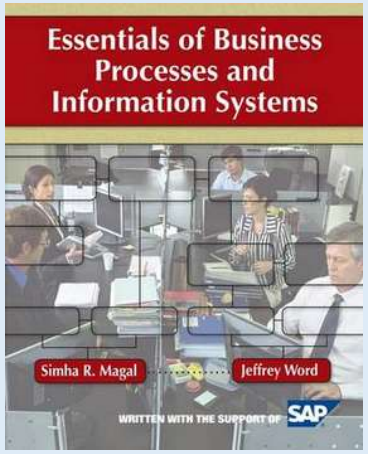
D. all of the above

E. both A and B

References



Monk & Wagner Chap 4



Magal & Word Chap 5

Revision Quiz

- Based on Lectures 4 – 6
- Multiple Choice
- 15 seconds to answer
- Select the closest answer
- Fantastic prizes
- Optional or you can use an alias! (But no prize!)

Go to www.menti.com
You will be given an access code.

Good Luck !