



Inventory Management

Virtual Warehouse



Training Rules

- **Be punctual**
- **Turn off your mobile phone**
 - 4 In case you need to attend a call, please go out training room or use coffee breaks
- **Participate actively**
 - 4 In case of questions ask

Any Other??



Training Summary



- **Description:** Explanation of virtual warehouse concept. Overall process explanation, how and who roles are involve



- **Duration:** 8 hours



- **Target group:** Purchasing, Regional Purchasing, Planner, Warehouse responsible, Virtual Warehouse responsible, MRP controller, Local Manteinance



- **Topics:** Virtual Warehouse Management



- **Tools:** SAP MM/PM

Objectives

The **specific objectives** of this Virtual Warehouse workshop are:

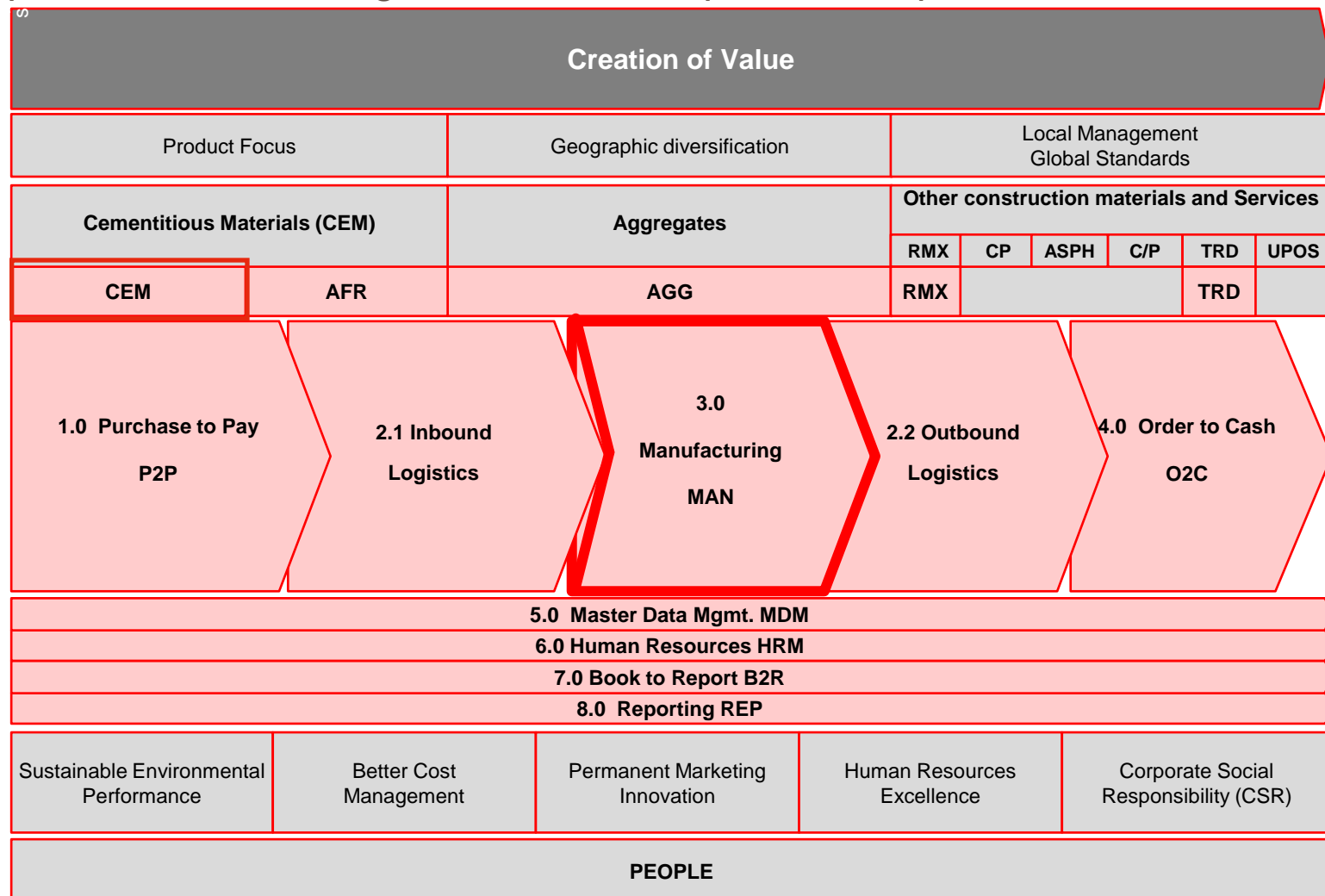
1. Unique and common understanding of the Business Process defined for Virtual Warehouse
1. Common understanding of Intercompany and Intracompany flow
1. Tools and system landscape used in EBM



Overall Processes

EBM Business Process Framework

This graphs illustrates the high-level business process map of the EBM solution.



Overall Processes

EBM Manufacturing Business Processes

MAN- 1 Capex Management

MAN-2 Production Planning

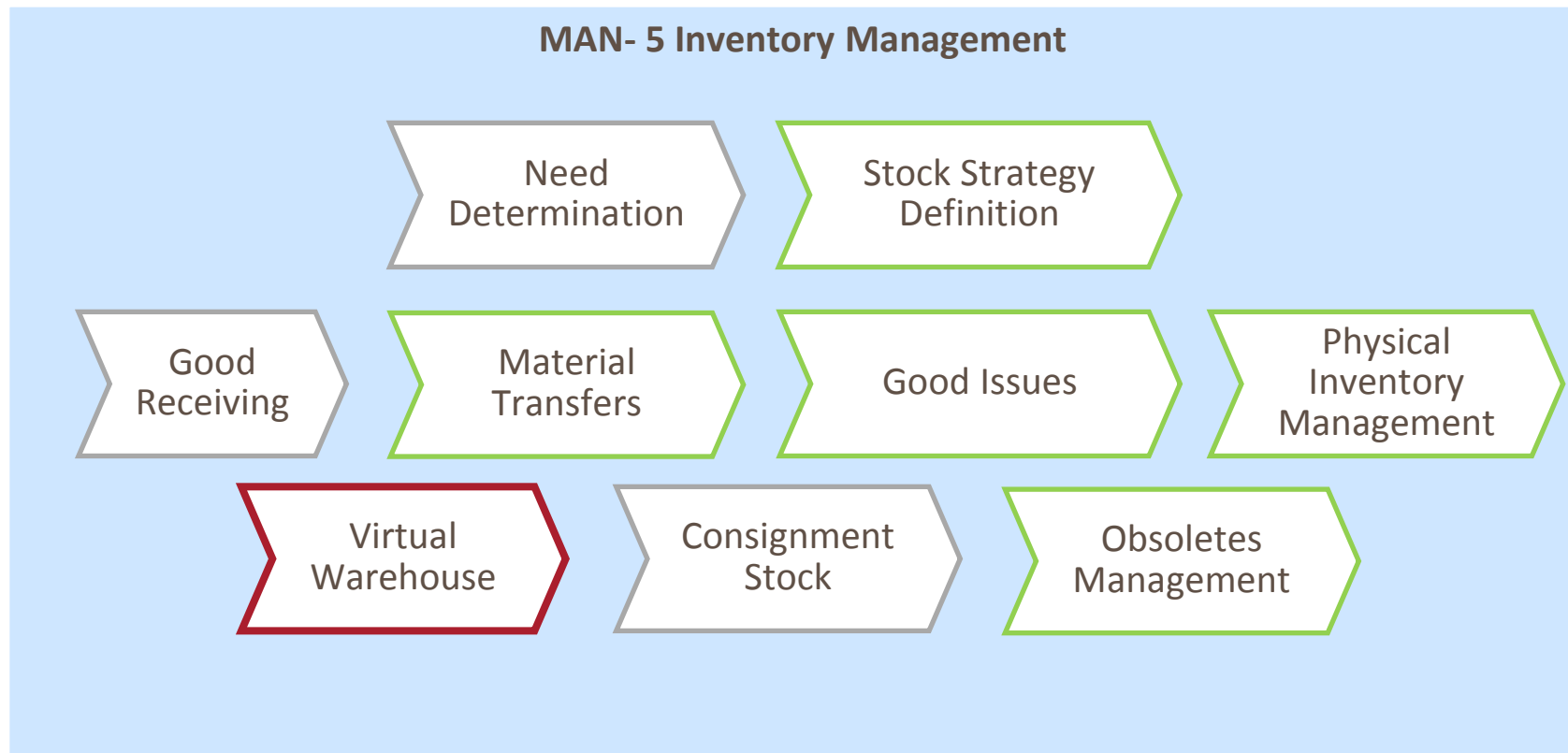
MAN-3 Production Execution

MAN-4 Maintenance Management

MAN-5 Inventory Management

Overall Processes

EBM Manufacturing Business Processes



(*) Processes lead by P2P are explained in the Blueprint document of this stream

Overall Processes

EBM Inventory Management Processes

Virtual Warehouse

- Consolidate and Share spare parts to reduce inventories
- Keep safety stocks for several countries and not for each plant
- Improve the sourcing
- Reduction of Net Working Capital
- Improve procure inventory management
- Assure and maintain the plant availability

Impacts:

- Materials covered by Virtual Warehouse are defined by the business in coordination with P2P
- Common Naming Convention: extension of standard Naming Convention has been defined
- A unique Material Id will be used across whole FMFA

| | Key Inputs | Key Outputs |
|--|--|---|
| Building Process (Task Force) Means the process to implement and set up the Regional Virtual Warehouse | <ul style="list-style-type: none">- Identification of materials to be in scope- Risk Matrix Analysis and FMEA | <ul style="list-style-type: none">- Standard naming convention for materials- Unique material ID in all sites (Regional) |
| Operational flow Means the process to run the Regional Virtual Warehouse | <ul style="list-style-type: none">- Identify the need | <ul style="list-style-type: none">- Procurement and material transfer flow- Material received in the requesting plant |

Virtual Warehouse in Eastern Europe has been recognized as best practice to improve inventories of maintenance materials at plant and regional level.

Overall Processes

EBM Virtual Warehouse Process

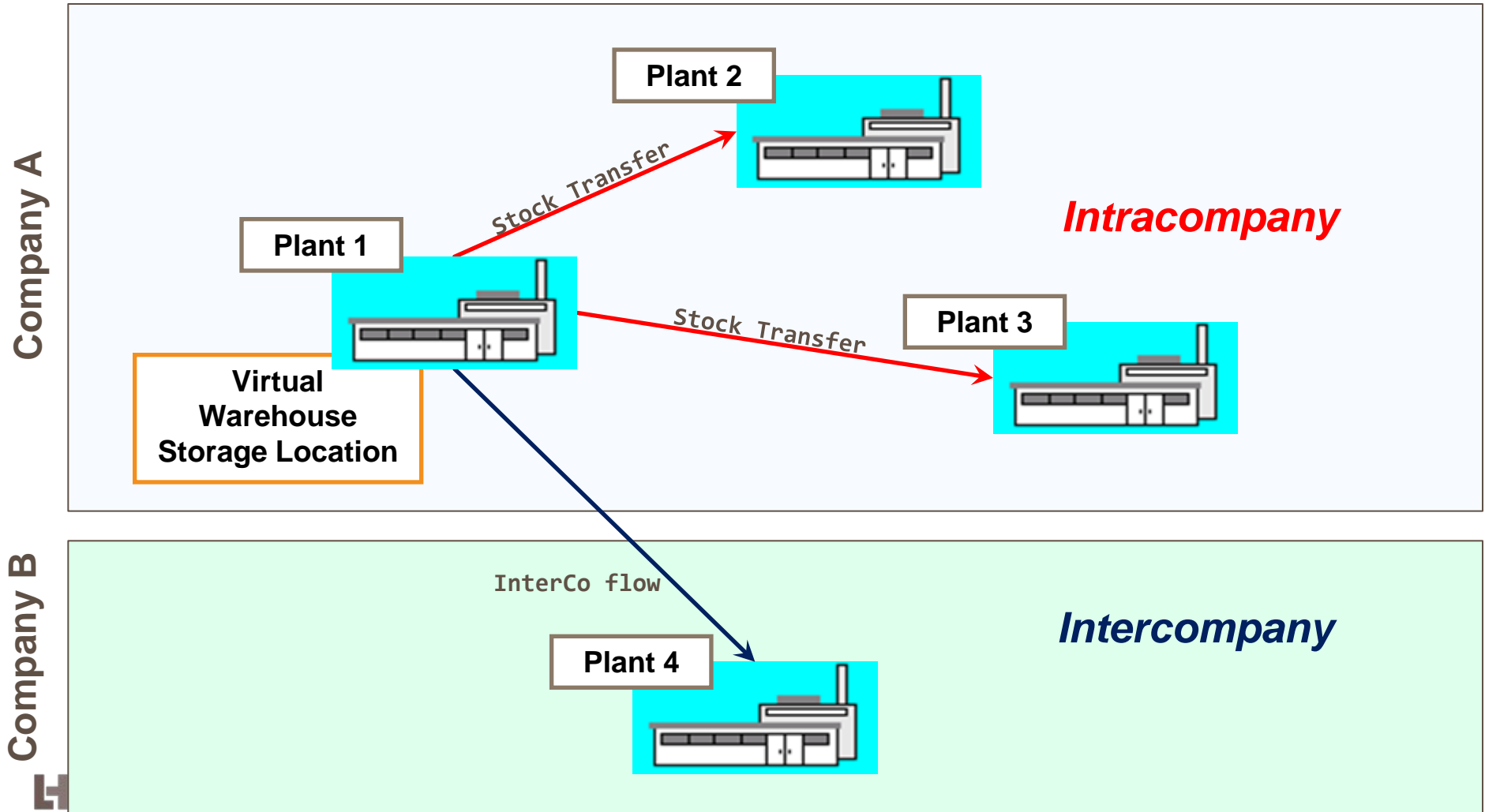
VIRTUAL WAREHOUSE

- One physical place(Warehouse) of any LafargeHolcim plant, where material is centrally stored
 - Currently in place in Eastern Europe:
Example: Central Physical Warehouse located in Senec – 20 km away from Bratislava; a rented location keeping safety stock for Refractory, Grinding Media and a few other commodities in plan
 - In a regular MRP process the provider is a third party (vendor), in virtual warehouse the provider of the material will be a LafargeHolcim plant.
- Depending of plant relationship we will have two process:
 - **Intracompany:** Material transfer from plant for the same company
 - **Intercompany:** Material sell from a plant of different company that the receiving plant

Virtual Warehouse

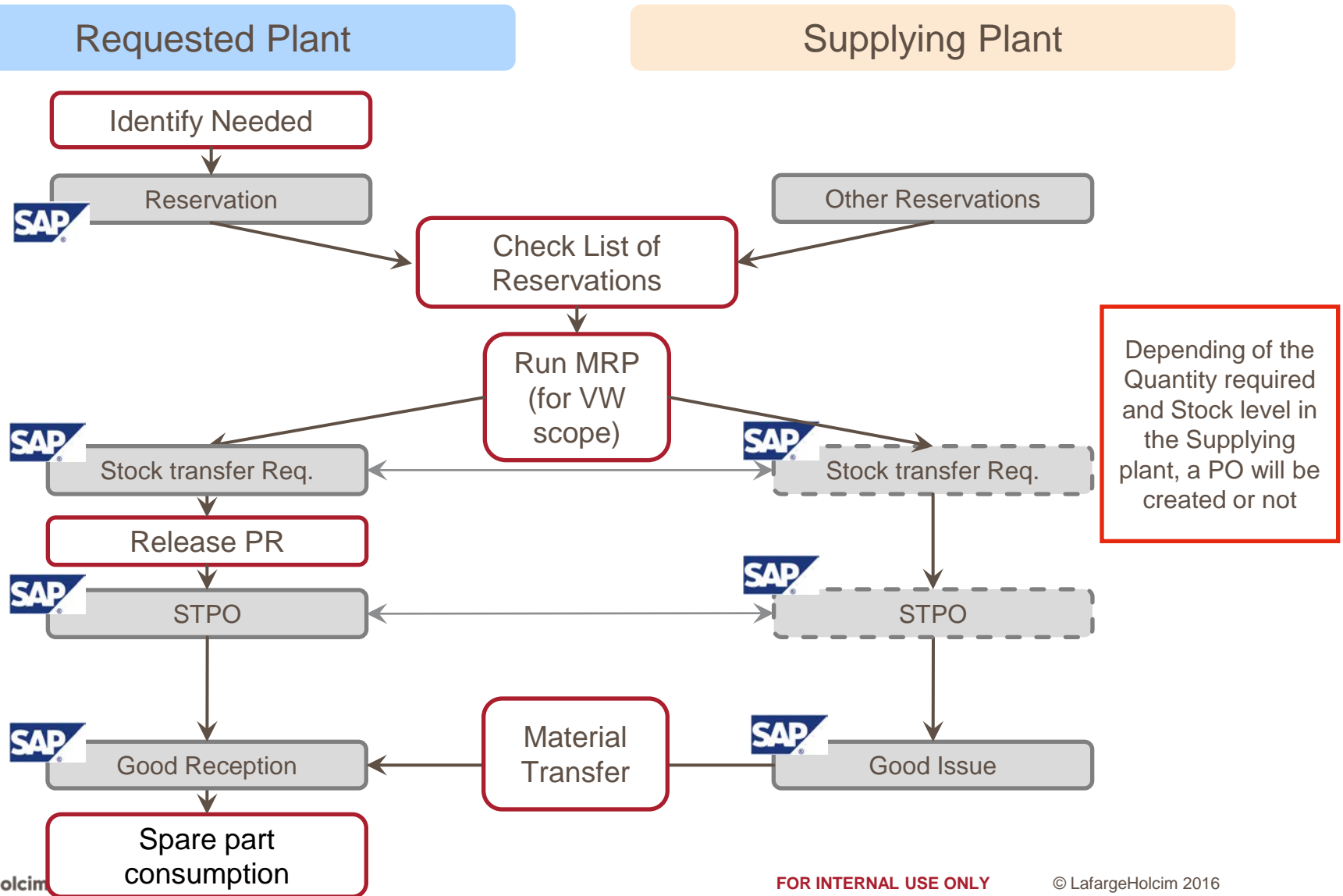
Intra/Intercompany flow

- Different process depending if plants belong to same Company (Intracompany) or other company (Intercompany)



Virtual Warehouse

Intracompany flow



Virtual Warehouse

Intercompany

- Virtual Warehouse process between plants not belonging to the same legal entity (**different Company codes**)
- Some changes concerning Intra/Intercompany flows

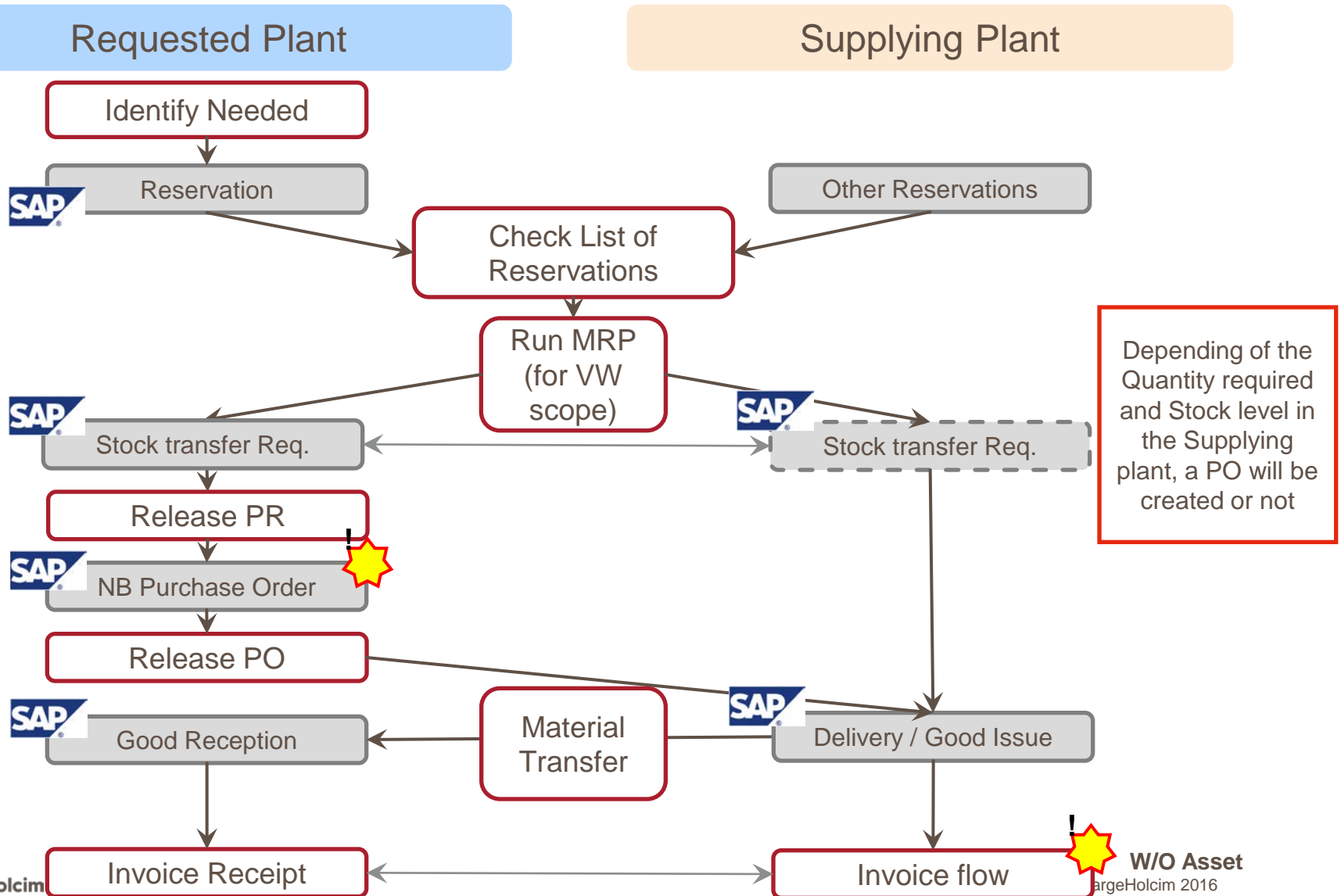
| | IntraCompany | InterCompany |
|------------|-------------------|----------------------------|
| Purchasing | Stock Transfer PO | Standard PO (NB) |
| Invoicing | - | Required between companies |

- Transport cost can be managed using a separate purchase request or adding a condition record in the purchase order

Needed integration with other streams: P2P, O2C and B2R

Virtual Warehouse

Intercompany



Virtual Warehouse - Requirements

System Preparation

- SAP ECC6.0 is the system, and more specific MM module, to support the Virtual Warehouse
- This process follows the standard inventory management and procurement flows
 - **Material Master Data:** Views of material master used for launch the automatic flow (mainly MRP view and Sales view)
 - **Storage Location:** Specific storage location is defined at plant level for VW
 - **MRP Running:** Scope of planning (list of plant included)
 - **Reservation Creation:** in receiving plant and supplying plant
 - **Procurement Flow:** Purchase document to create and good movements
 - **Invoicing Process:** activated for Inter-company process

Virtual Warehouse

Master Data Preparation

- **MRP views** of material master are updated with the standard MRP parameters (e.g. MRP Type, Lot Size, Reorder point, MRP controller,...)
- These MRP values in the material master are prerequisites for the correct execution of the MRP run

- MRP1 View:
 - **MRP type: PD** – MRP
 - **MRP controller: V01**

CONSTRAINS !!!

The same material ID has to be maintain in all the Plants where we are going to manage the shared parts.



Display Material 30000162 (Spare parts & Wear parts)

Additional Data Org. Levels

Purchase order text MRP 1 MRP 2 MRP 3 MRP 4 Pla...

Material 30000162 Filter Bags (Test Virtual WH - STPO) ⓘ

Plant 8101 AD CEM Plant.

General Data

| | | | | |
|----------------------|-----|-------|---------------|------|
| Base Unit of Measure | PC | Piece | MRP group | 0000 |
| Purchasing Group | 801 | | ABC Indicator | |
| Plant-sp.matl status | | | Valid from | |

MRP procedure

| | | |
|---------------------|-----|-----|
| MRP Type | PD | MRP |
| Reorder Point | 0 | |
| Planning cycle | | |
| Planning time fence | 0 | |
| MRP Controller | V01 | |

Lot size data

| | | |
|---------------------|------|----------------------------|
| Lot size | EX | Lot-for-lot order quantity |
| Minimum Lot Size | 0 | |
| Maximum Lot Size | 0 | |
| Maximum stock level | 0 | |
| Assembly scrap (%) | 0,00 | |
| Takt time | 0 | |
| Rounding Profile | | |
| Rounding value | 0 | |
| Unit of Measure Grp | | |

For all materials to planned in VW the MRP Controller: **V01** must be maintained.

Virtual Warehouse

Master Data Preparation

- MRP2 View:
 - **Special Procurement** *Stock Transfer from Plant/Area (VW Plant)*

Display Material 30000162 (Spare parts & Wear parts)

Additional Data Org. Levels

MRP 1 MRP 2 MRP 3 MRP 4 Plant data / stor. 1 Plan...

Material 30000162 Filter Bags (Test Virtual WH - STPO) i

Plant 8101 AD CEM Plant.

Procurement

Procurement type

Special procurement 40

Quota arr. usage

Backflush

JIT delivery sched.

☐ Bulk Material

Scheduling

GR Processing Time 0 days

SchedMargin key 000

Net requirements calculation

Safety Stock 0

Min safety stock 0

Safety time ind.

STime period profile

Special procurement type (1) 10 Entries found

Restrictions

Plant: 8101

| S... | Long Text |
|------|---------------------------------------|
| 10 | Consignment |
| 20 | External procurement |
| 30 | Subcontracting |
| 40 | Stock transfer from Plant 8104 |
| 45 | Stock transfer from plant to MRP area |
| 50 | Phantom assembly |
| 52 | Direct production / collective order |
| 60 | Phantom in planning |
| 70 | Withdrawal from alternative plant |
| 80 | Production in alternative plant |

10 Entries found

Attention:
only in Plant of
receiving Plant
(not in VW Plant)



Special procurement Type
with supplying Plant.

Virtual Warehouse

Master Data Preparation

- **Sales views** of material master are updated to allow intra/intercompany flow
- These Sales values in the material master are pre-requisites for the correct execution of the procurement flow
- Materials should be created at Sales organization level
 - **Sales organization** *Depending of Supplying plant*
 - **Distribution Chanel** *10 - Domestic D.C.*

Display Material 30000162 (Spare parts & Wear parts)

Additional Data Org. Levels

Classification Sales: sales org. 1 Sales: sales org. 2 Sales: General/...

Material 30000162 Filter Bags (Test Virtual WH - STPO)

Sales Org. AD02 Sales Org. AD02

Distr. Chl 10 Domestic D.C.

General data

Base Unit of Measure PC Piece Division ☐

Sales unit ☐ ☐ Sales unit not var.

Unit of Measure Grp ☐

Delivering Plant ☐

Material Group 040701 Filter Bags For Bag

☒ Cash discount Conditions

Tax data

| C... | Country | Ta... | Tax category | T | Tax classification |
|------|----------|-------|--------------|---|--------------------|
| AD | Andorran | ZMWS | Output Tax | 1 | Full tax |
| AD | Andorran | ZT05 | TGAP | 0 | No tax |

Entry 1 of 4

Quantity stipulations

Min.order qty 0 PC Min. dely qty 0 PC

Delivery unit 0

Change Material 30000162 (Spare parts & Wear parts)

Errors (Posting) Additional Data Org. Levels Check Screen Data

Sales: sales org. 1 Sales: sales org. 2 Sales: General/Plant Foreign trade ...

Material 30000162 Filter Bags (Test Virtual WH - STPO)

Sales Org. AD02 Sales Org. AD02

Distr. Chl 10 Domestic D.C.

Grouping terms

Matl statistics grp 0 No update Material pricing grp ☐

Volume rebate group ☐ Acct assignment grp 46 CR Mainteanc...

Gen. item cat. grp ZSTO Other stockab... Item category group ZSTO Other stockab...

Pricing Ref. Matl

Product hierarchy

Commission group ☐

Material groups

Material group 1 ☐ Material group 2 ☐ Material group 3 ☐

Material group 4 ☐ Material group 5 ☐

Product attributes

☐ Product attribute 1 ☐ Product attribute 2 ☐ Product attribute 3

☐ Product attribute 4 ☐ Product attribute 5 ☐ Product attribute 6

☐ Product attribute 7 ☐ Product attribute 8 ☐ Product attribute 9

☐ Product attribute 10

Virtual Warehouse

Storage Location

- **Specific storage location** is defined in SAP at plant level for Virtual Warehouse.
- Materials are created in the physical storage location (Where is physically located the material) and in the virtual warehouse storage location.

| Object | EBM Concept |
|--|---|
| Storage Location (Maintenance Materials) | <ul style="list-style-type: none">▪ Follows the General EBM concept▪ One storage location will represent physically the place/location in which the material is located (e.g. different storage locations for lubricants, obsoletes parts,...).▪ It is codified with a «G» letter as first digit<ul style="list-style-type: none">- G200: General for Spare Parts- G2xx to G299: Special Storage for ...- V2xx: For virtual / central warehouse |

C0 and C1: Stock Transfer to V200 ; **C4:** Direct migration to V200

Virtual Warehouse

MRP Preparation

- Define the MRP Planning scope: List of plants of the region in which VW is performed

| Scope of planning: VIWH | | |
|------------------------------------|----------|-------------------------|
| Description: Virtual Warehouse CHE | | |
| | | |
| Sequence | Plant | Name |
| 1 | 0001 | Plant 1 |
| 2 | 0002 | Plant 2 |
| 3 | 0003 | Plant 3 |
| 4 | 0004 | Plant 4 |
| 5 | VM Plant | Virtual Warehouse Plant |

MRP Run

| | | |
|-------------------|------|------------------|
| Scope of planning | VIWH | Virtual WH ZA/AD |
| Plant | | |

Scope of plants and Supplier plant to be provided

- MRP Running:**
 - MRP runs by selecting the MRP controller
 - The MRP program takes into account the reservations made for other Plants (included the ones from other companies)

User exit: select materials for planning

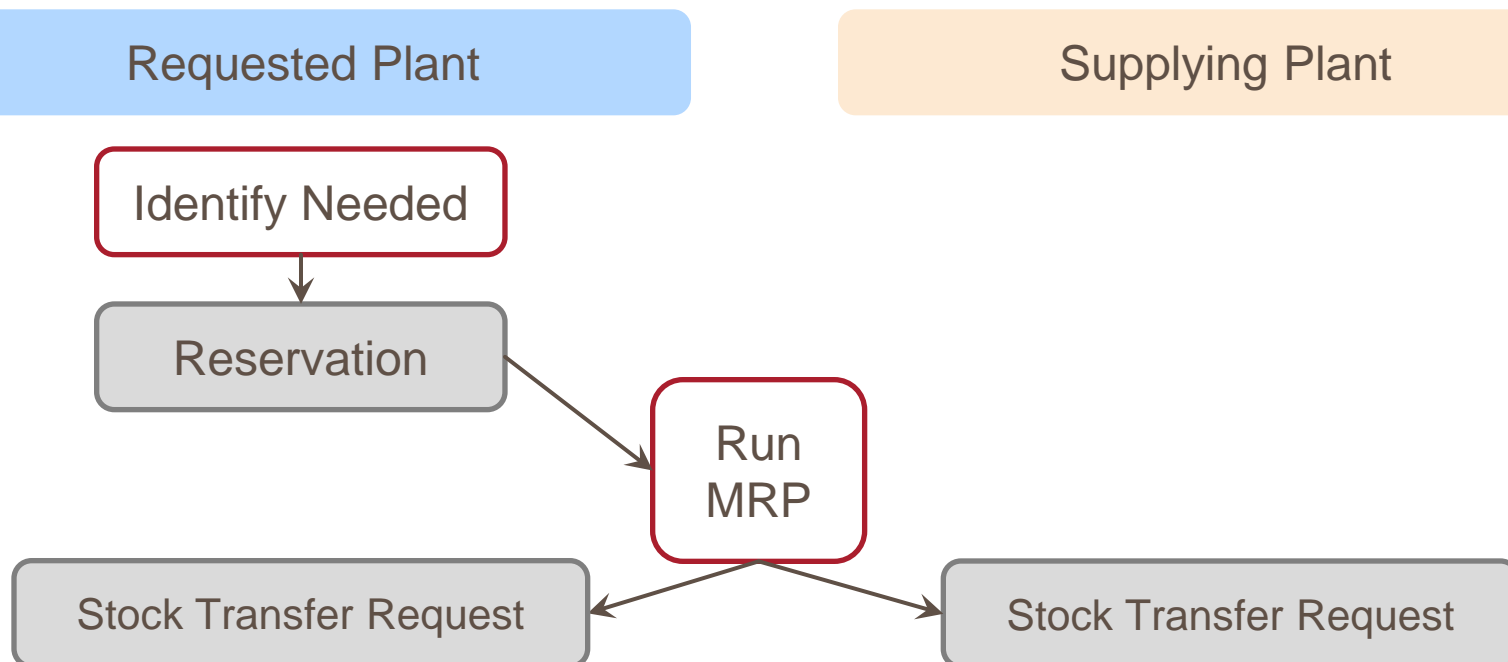
| | | |
|---------------------|-----|------------------------------------|
| User exit key | 201 | Select materials by MRP Controller |
| User exit parameter | V01 | |

Include only Materials
with MRP Controller:
V01

Virtual Warehouse

Reservation Creation

- Reservation Creation: Usage of standard SAP reservations
- The system will create a reservation number through **PM order** with the following information:
 - Movement Type
 - Receiving plant and storage location
 - Material ID, quantity and unit of measure
 - Requested plant and storage location
- Once MRP has run, the requirements are balanced in both plants



Virtual Warehouse

Reservation Creation

- Result after the MRP Run in receiving plant
Stock/Requirements List as of 14:15 hrs

Show Overview Tree

Material: 30000162 Filter Bags (Test Virtual WH - STPO)

Plant: 8101 MRP type: PD Material Type: ZSWP Unit: PC

| A... | Date | MRP el... | MRP element data | Reschedulin... | E... | Receipt/Reqmt | Available Qty | Sup... | Sto... |
|------------|--------|------------------|------------------|----------------|------|---------------|---------------|--------|-----------|
| 12.10.2011 | Stock | | | | | | | 0 | |
| 06.10.2011 | OrdRes | 000090000436 | | | | 20- | | 20- | |
| 27.10.2011 | POitem | 4500000632/00010 | | 06.10.2011 | 10 | 20 | | 0 | 8104 V200 |

Requested quantity (Reservation / PM Order)

Stock Trans PurReq → Stock Transfer PO

Supplying Plant (VW)

- Result after the MRP Run in supplying plant
Stock/Requirements List as of 14:22 hrs

Show Overview Tree

Material: 30000162 Filter Bags (Test Virtual WH - STPO)

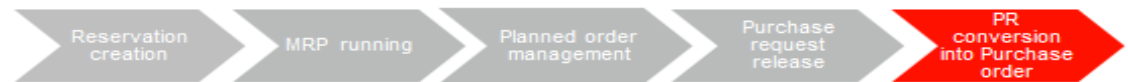
Plant: 8104 MRP type: PD Material Type: ZSWP Unit: PC

| A... | Date | MRP el... | MRP element data | Reschedulin... | E... | Receipt/Reqmt | Available Qty | Sup... | Iss... |
|------------|--------|------------------|------------------|----------------|------|---------------|---------------|--------|-----------|
| 12.10.2011 | Stock | | | | | | 50 | | |
| 12.10.2011 | Ord.DS | 4500000632/00010 | | | | 20- | | 30 | 8101 V200 |

Receiving Plant

Release Order for a ST Req. → Order Delivery Schedule

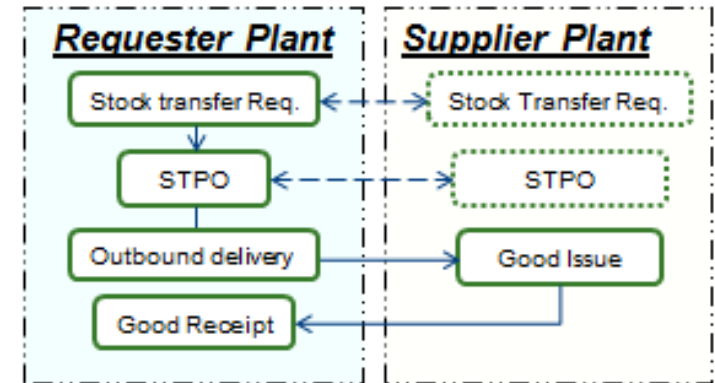
Virtual Warehouse Procurement Flow



For Intracompany:

- Stock Transfer Procurement flow

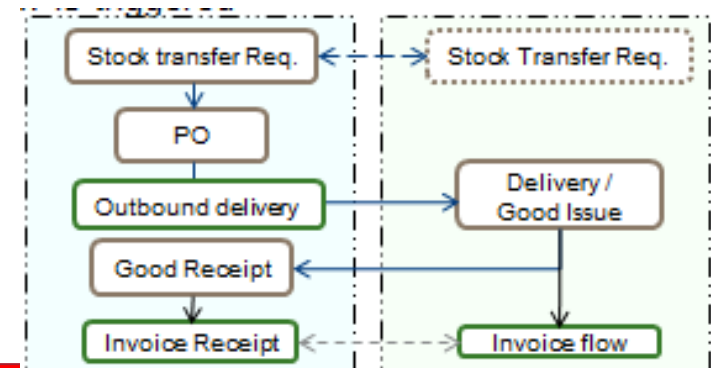
- ☐ Purchase Requisition for the requested plant
- ☐ Stock Transfer Purchase Order for the requested plant
- ☐ Outbound delivery creation for the requested plant
- ☐ Goods issue for the supplying plant
- ☐ Goods receipt for the requested plant



For Intercompany:

- In case the material stock transfer is between plants not belonging to the same legal entity (SAP Company code) the inter-company process flow is triggered
- Procurement flow

- ☐ Purchase Requisition for the requested plant
- ☐ Standard Purchase Order for the requested plant
- ☐ Outbound delivery creation for the requested plant
- ☐ Goods issue for the supplying plant
- ☐ Goods receipt for the requested plant



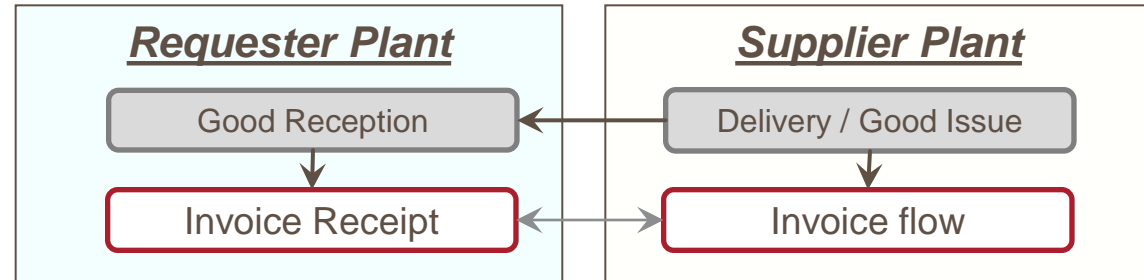
Requested information for P2P: Plants Relation list (partner functions):

- Supplying plants works as Vendor
- Receiving Plants works as Customer

Virtual Warehouse

Invoice Process (w/o assets)

- Invoicing is needed only for stock transfer of spare parts, for Intercompany flow



- **Requirements for O2C**

- ☐ Delivery Class to be used (ZLCC)
- ☐ Price Schema determination, to be assigned to a Delivery Class, (*standard EBM Price schema*)
- ☐ Billing type ZNIC
- ☐ Payer and Bill-to determination

- **Requirements for B2R**

- ☐ Invoicing Account determination



Virtual Warehouse variant

Intracompany flow

Requested Plant

Supplying Plant

| Master Data | WO | Operation | Reservation | PR | Planning | Local MRP Execution | Plan. Order Management | PR from MRP Exec. | Schedule |
|-------------|------|-----------|-------------|------|----------|---------------------|------------------------|-------------------|----------|
| Docs | Docs | Process | Process | Docs | Process | Process | Process | Docs | Process |



| | | | | | | | | | |
|--|-----------|--|---|--|-----------------|--|--|------------|-----------------|
| Update/Check MRP parameters in Materials | Create WO | Select Internal Operation required and release the order | Select material from stock (with stock in virtual WS) | | Planning the WO | Virtual MRP Execution (VW coordinator) | Plan Order Management (Revision, Analysis and Convert to PR) | Release PR | Schedule the WO |
|--|-----------|--|---|--|-----------------|--|--|------------|-----------------|



| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| Update/Check MRP parameters in Materials | | | | | | Virtual MRP Execution (VW coordinator) | Plan Order Management (Revision, Analysis and Convert to PR) | | |
|--|--|--|--|--|--|--|--|--|--|



| | | | | | | | | | |
|----------------------|------------|-------------------|--------------------------|--------------------------|-------|--------------|---------|------------|-------|
| Create Purch. Orders | PO Release | Outbound Delivery | GI for Virtual Warehouse | GR for Virtual Warehouse | GR/GR | Confirmation | Invoice | Settlement | Tarif |
| Docs | Docs | Docs | Mvmts | Mvmts | Mvmts | Docs | Docs | Docs | Docs |



| | | | | | | | | | |
|-------------------|--------------------|--------------------------------------|--|--|------------------------------|--|--|---|--|
| Create STPO (P2P) | STPO Release (P2P) | Generate the Outbound Delivery (P2P) | | Post the GR for VW Items in STPO (P2P) | Do the GI for VW Items in WO | Do the confirmation of the WO and close it | | Settle WO order to WBS and from WBS to CO (B2R) | Recalculate the tariffs and re-evaluate the wo (B2R) |
|-------------------|--------------------|--------------------------------------|--|--|------------------------------|--|--|---|--|

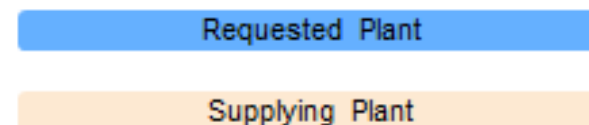


| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | Post the GI for VW Items in STPO (P2P) | | | | | | |
|--|--|--|--|--|--|--|--|--|--|



Virtual Warehouse variant

Intercompany flow

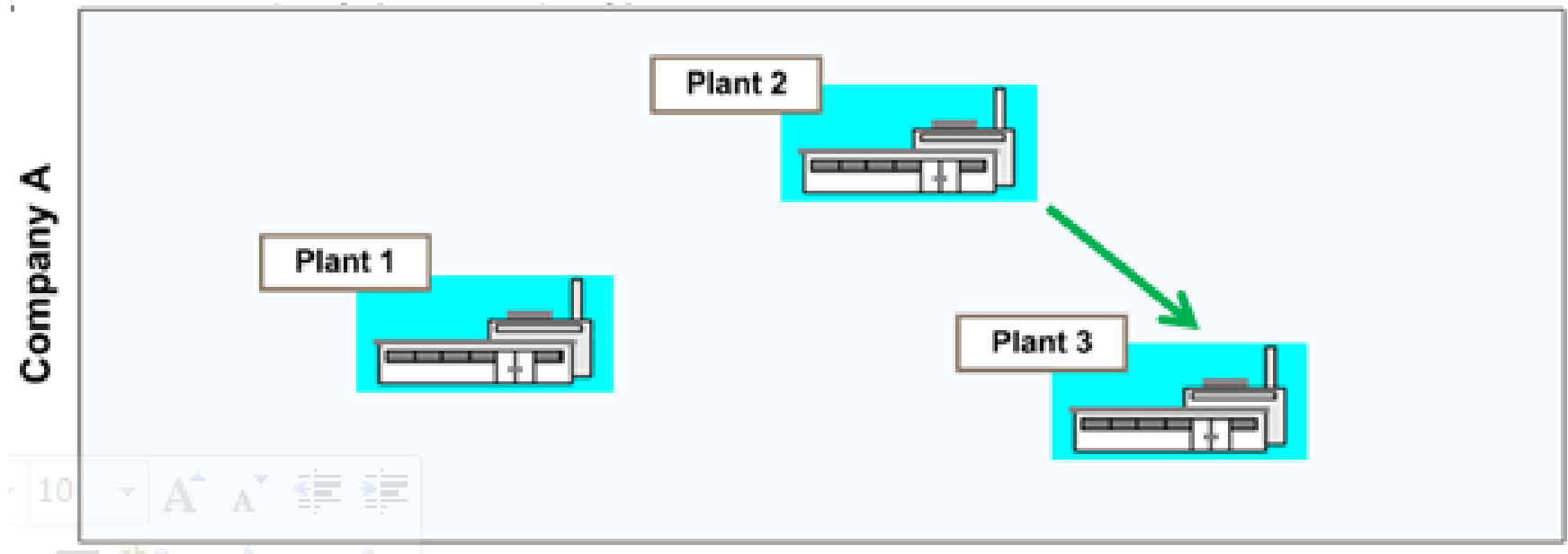




Spot transfer scenario

Material is available in another plant and can be transferred when needed. In this case, we are talking about a manually managed spot transfer. This transfer can be to a plant in the same OpCo or to a different OpCo.

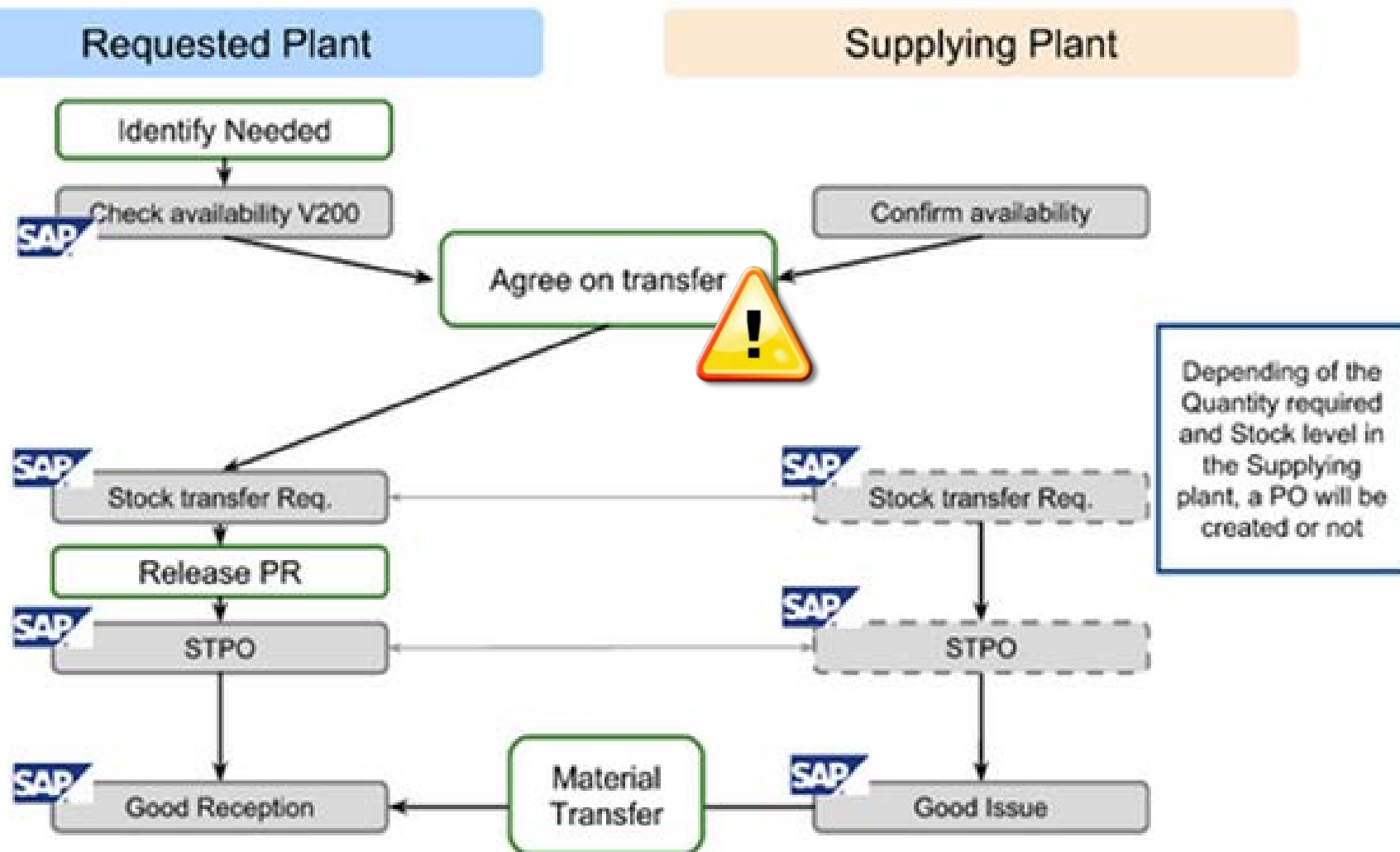
INTRACOMPANY PROCESS





Spot transfer scenario

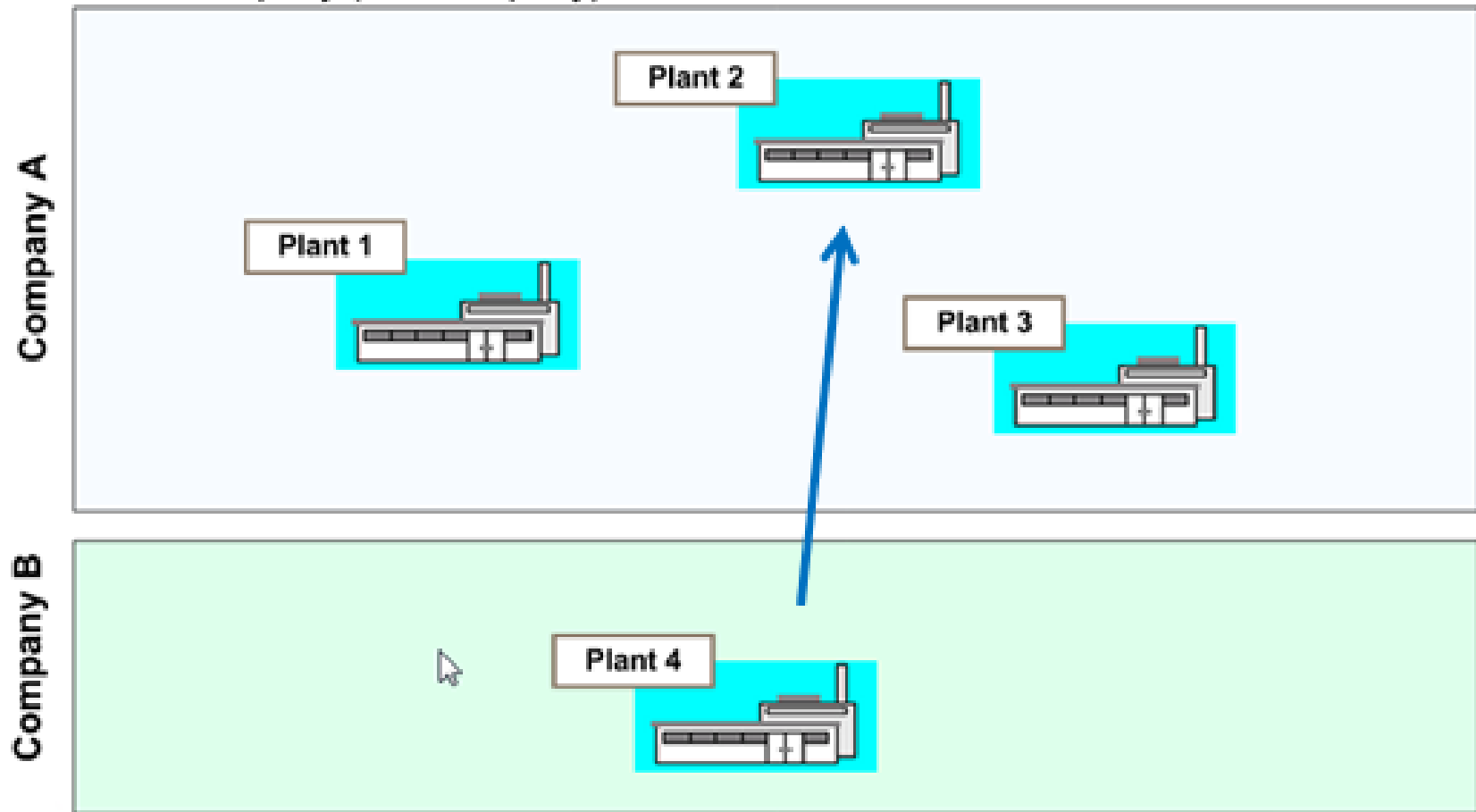
INTRACOMPANY PROCESS





Spot transfer scenario

INTERCOMPANY PROCESS

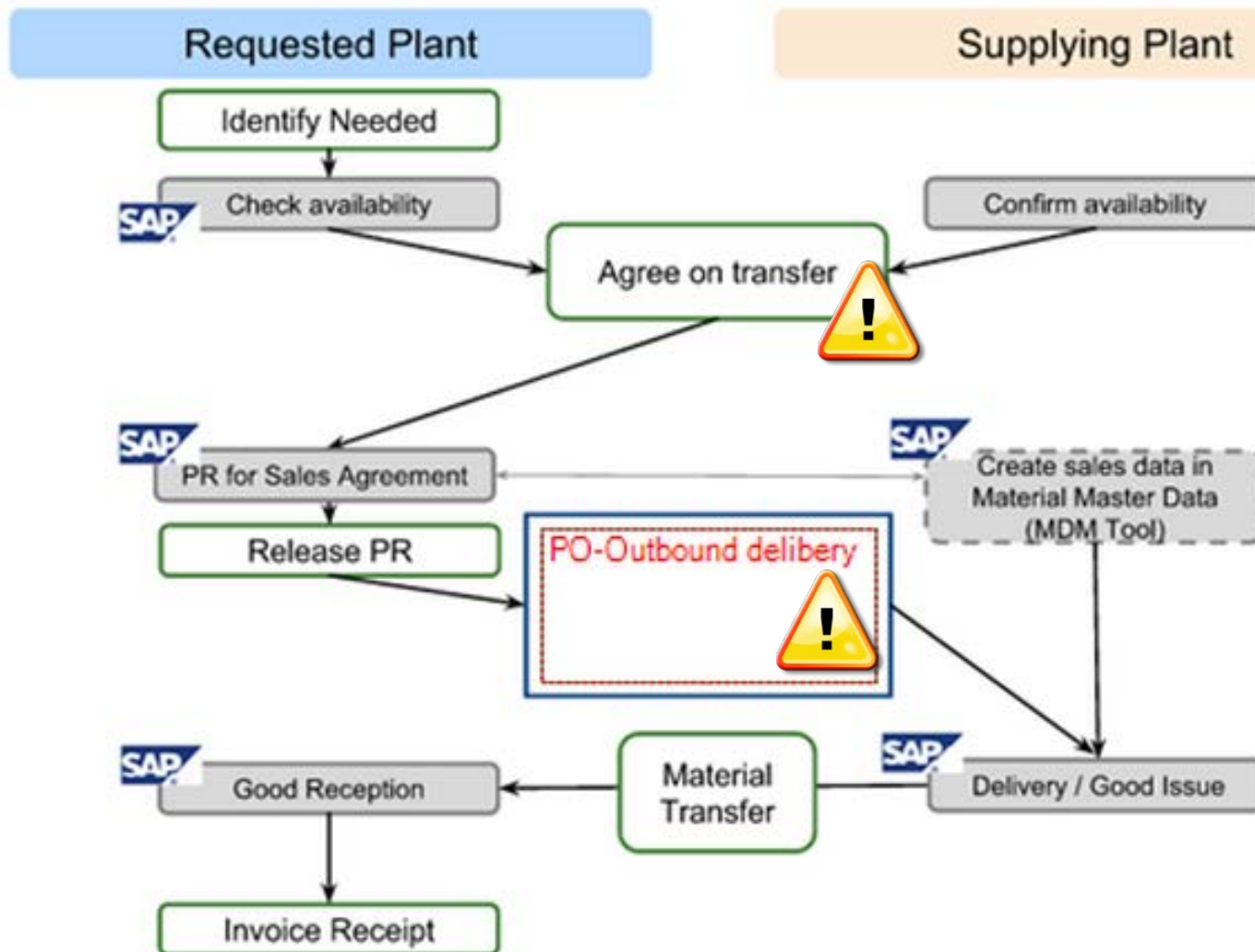


H In this case the transfer is more complex as it needs additional documents and involvement of other streams (P2B, P2B, Q2C)



Spot transfer scenario

INTERCOMPANY PROCESS



In this case some material master data has to be checked and aligned before the transfer process can start



Spot transfer scenario

| No | Step Name | Input | Description of Step | Output |
|----|---|--|---|--|
| 1 | Identify Requirement (Receiving plant) | <ul style="list-style-type: none">• | <ul style="list-style-type: none">• Identification of the need of spare part | <ul style="list-style-type: none">• Material needed identified |
| 2 | Check via classification system if material is available in other plant | <ul style="list-style-type: none">• Material ID and requested quantity• Plant and storage location possible supplying plant | <ul style="list-style-type: none">▪ Receiving plant calls supplying plant and asks for availability | <ul style="list-style-type: none">• Material is available |
| 3 | Include sales view in MMD via MDM Tool | <ul style="list-style-type: none">• Company code, plant code,• Invoicing company | <ul style="list-style-type: none">▪ Change MMD | <ul style="list-style-type: none">• Material ready in supplying plant |
| 4 | Extend material ID via MDM tool | <ul style="list-style-type: none">• If material ID not ready extend | <ul style="list-style-type: none">▪ MDM administrator extends | <ul style="list-style-type: none">• Material ID ready in receiving plant |
| 5 | Receiving plant create PR | <ul style="list-style-type: none">• Create PR via WO | <ul style="list-style-type: none">▪ Release PR | <ul style="list-style-type: none">• PR ready to be transferred in PO |
| 6 | Procurement of receiving plant creating PO | <ul style="list-style-type: none">• Include transport costs as costs condition in the PO (ZFL*) | <ul style="list-style-type: none">▪ Release PO | <ul style="list-style-type: none">• PO ready |
| 7 | Creation of the outbound delivery | Include custom document for non EU countries (intercompany) | | <ul style="list-style-type: none">• Outbound delivery |
| 8 | Outbound delivery process | <ul style="list-style-type: none">• Picking creation | <ul style="list-style-type: none">▪ Through the PO can access to the outbound delivery | |
| 9 | Good issues | <ul style="list-style-type: none">• Delivery process | <ul style="list-style-type: none">▪ Automatically in outbound delivery management | |
| 10 | Good received | | <ul style="list-style-type: none">▪ Standard good receive through MIGO transaction | |



Spot transfer scenario

| No | Step Name | Maint.Planner / Local Warehouse (Receiving plant) | Maint.Planner / Local Warehouse (Supplying plant) | Procurement (Receiving plant) | SD (Suplying plant) | B2R (Receiving plant) | Local MDM administrator |
|----|---|---|---|-------------------------------------|------------------------|-----------------------------|----------------------------|
| 1 | Identify requirement | A,R | | | | | |
| 2 | Check material availability through classification system | R | I | | | | |
| 3 | Adapte material master data (sales view) | I | A | | | | R |
| 4 | Extend material MDM tool | A | I | | | | R |
| 5 | Creation Purchase Requisition | A | I | R | | | |
| 6 | Creation of PO | I | I | A,R | I | | |
| 7 | Creation of Outbound delivery | I | I | | A,R | | |
| 8 | Good Issue from Outbound delivery | I | A,R | | I | | |
| 9 | Good receipt (PO) | A,R | I | | I | | |
| 10 | Spare part reception/consumption | A,R | I | | | | |
| 11 | Invoicing | I | | | | A, R | |

Summary

Questions / Doubts

Comments



Summary

CONGRATULATION S



THANK YOU FOR YOUR ATTENTION



LafargeHolcim