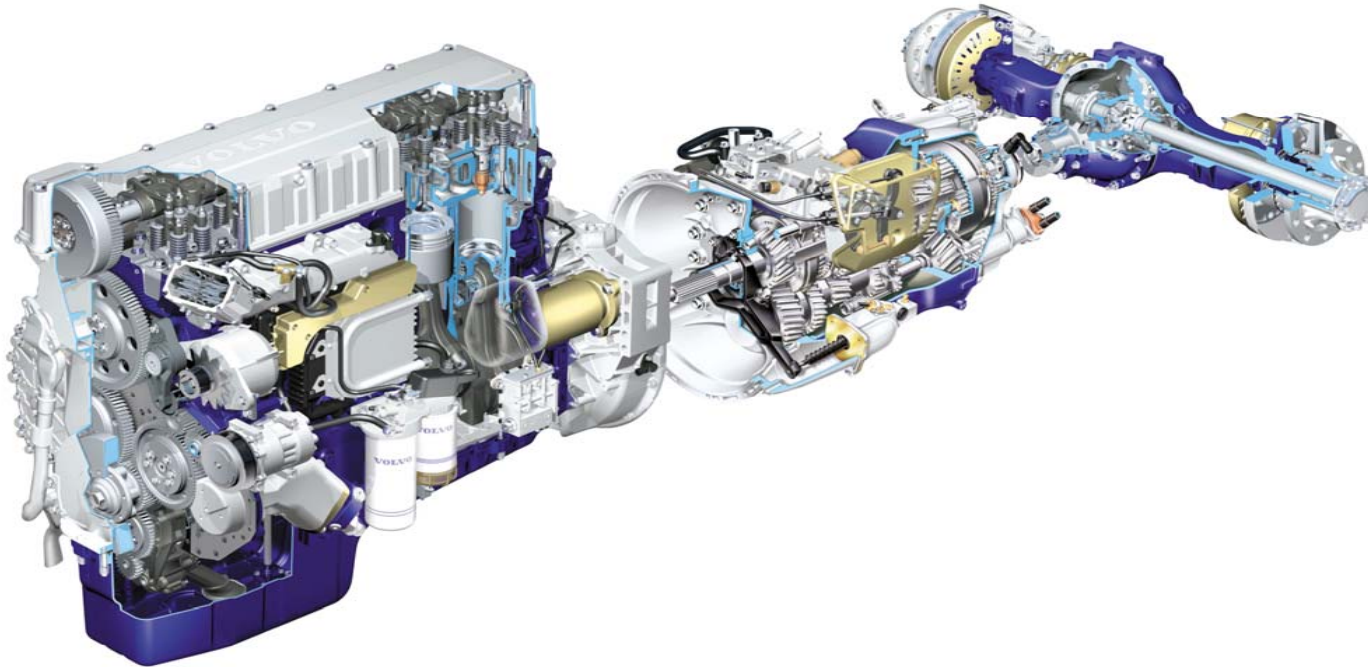


Volvo Powertrain



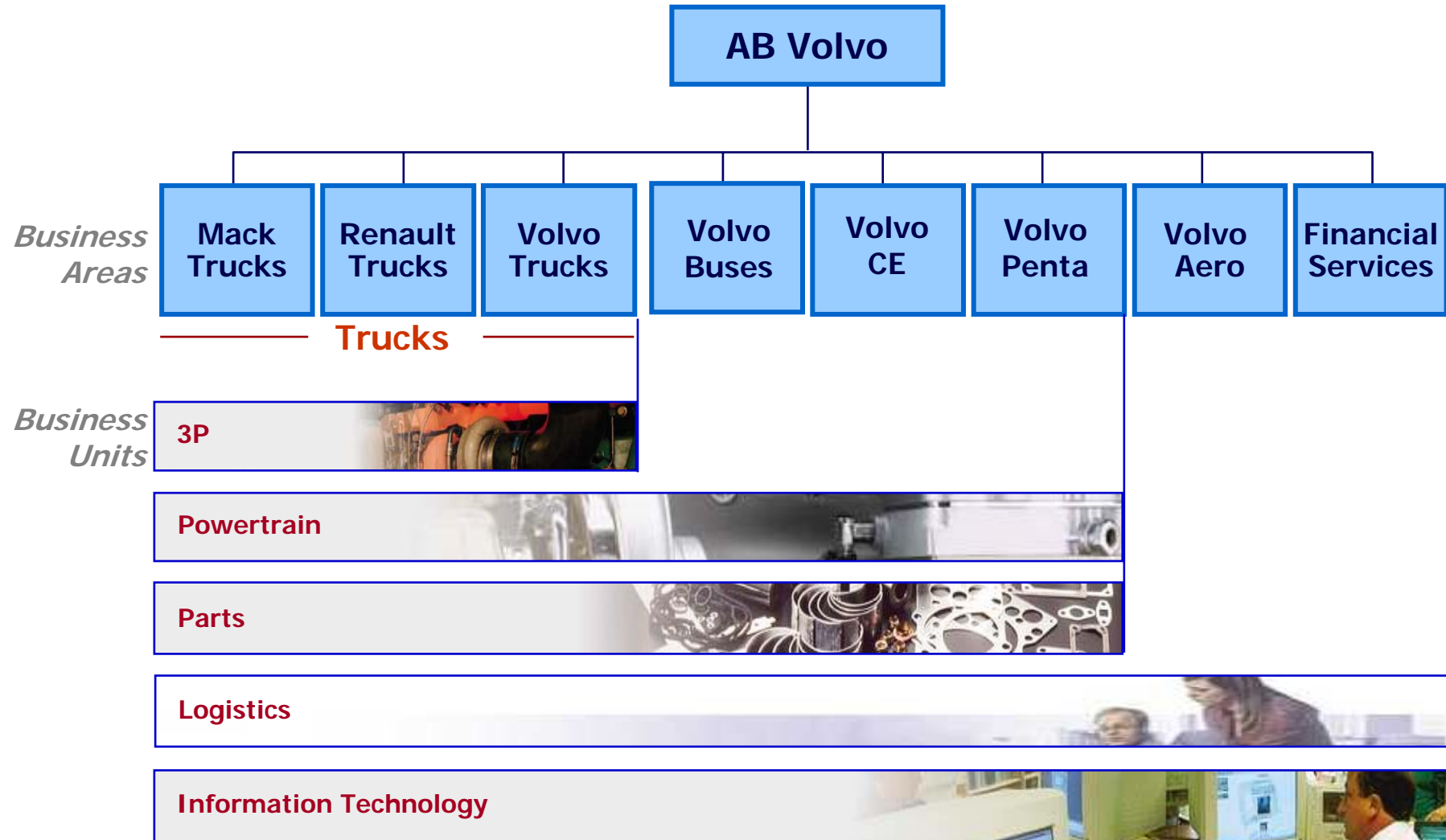
VMI Implementation at Volvo Powertrain

Fredrik Olofsson

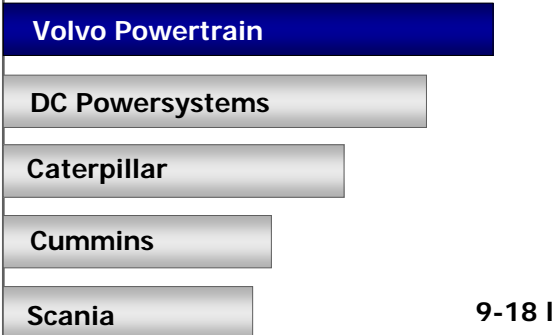
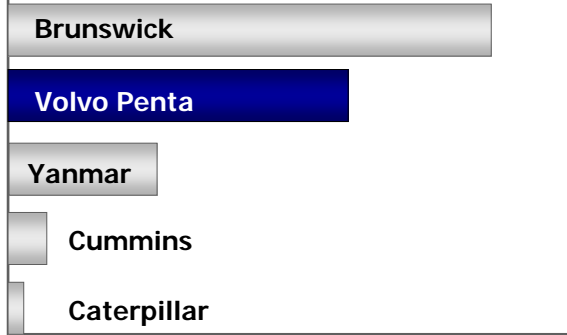
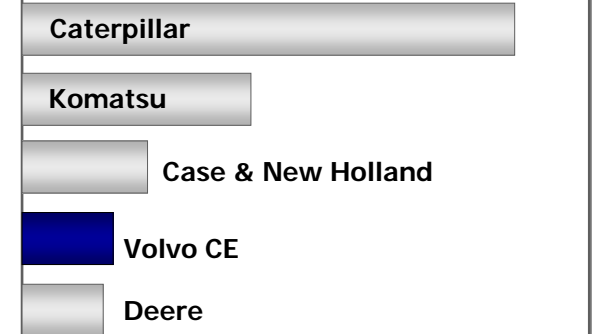
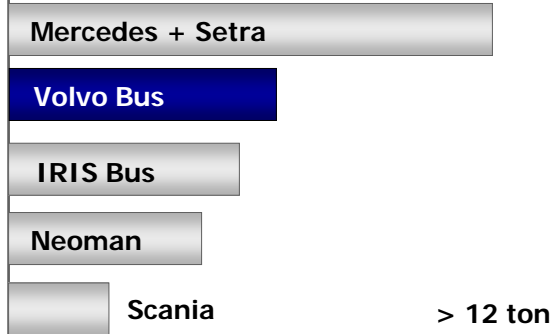
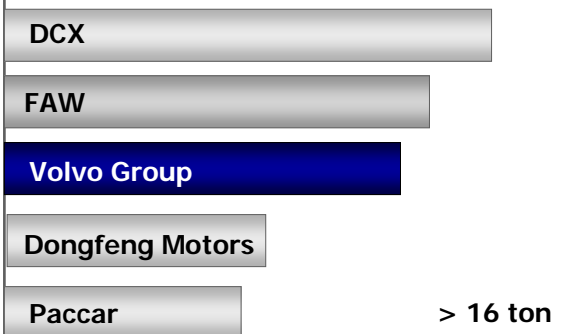
Volvo Powertrain

Project Manager for Inbound Supply and Logistics

The Volvo Group Organisation



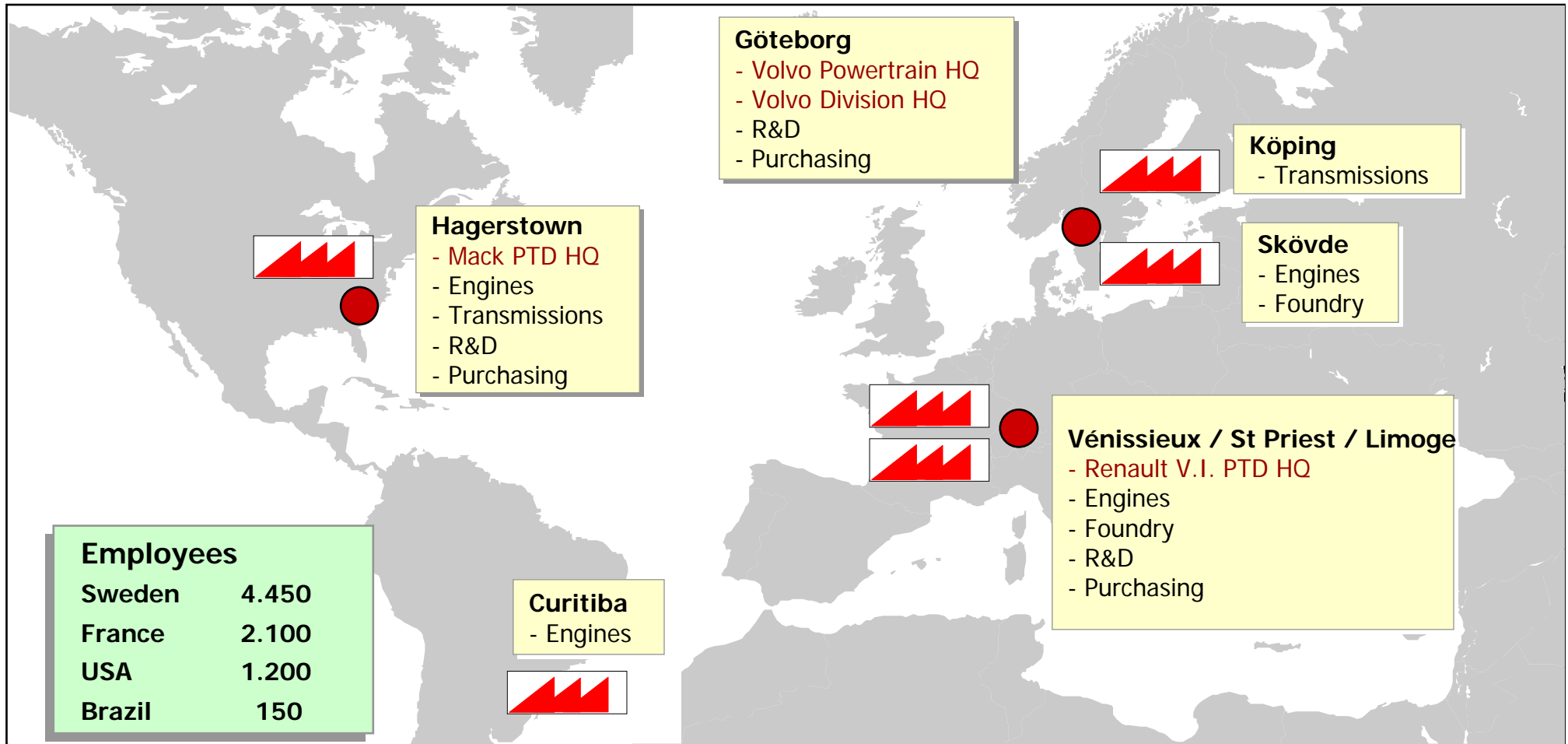
Strong positions in all areas



Volvo Aero

- World leading in development and production of selected engine components.
- Engine components from Volvo Aero is included in 80% of all larger civil aircrafts.

Volvo Powertrain Structure



VMI – A definition

“Vendor Managed Inventory (VMI) is a concept and process for consumption-based Supply Chain Management. It requires the supplier to maintain inventories within a predefined and mutually agreed thresholds based on a min/max-range. The supplier can freely deliver within this indicated range” (Odette definition)

General VMI scope:

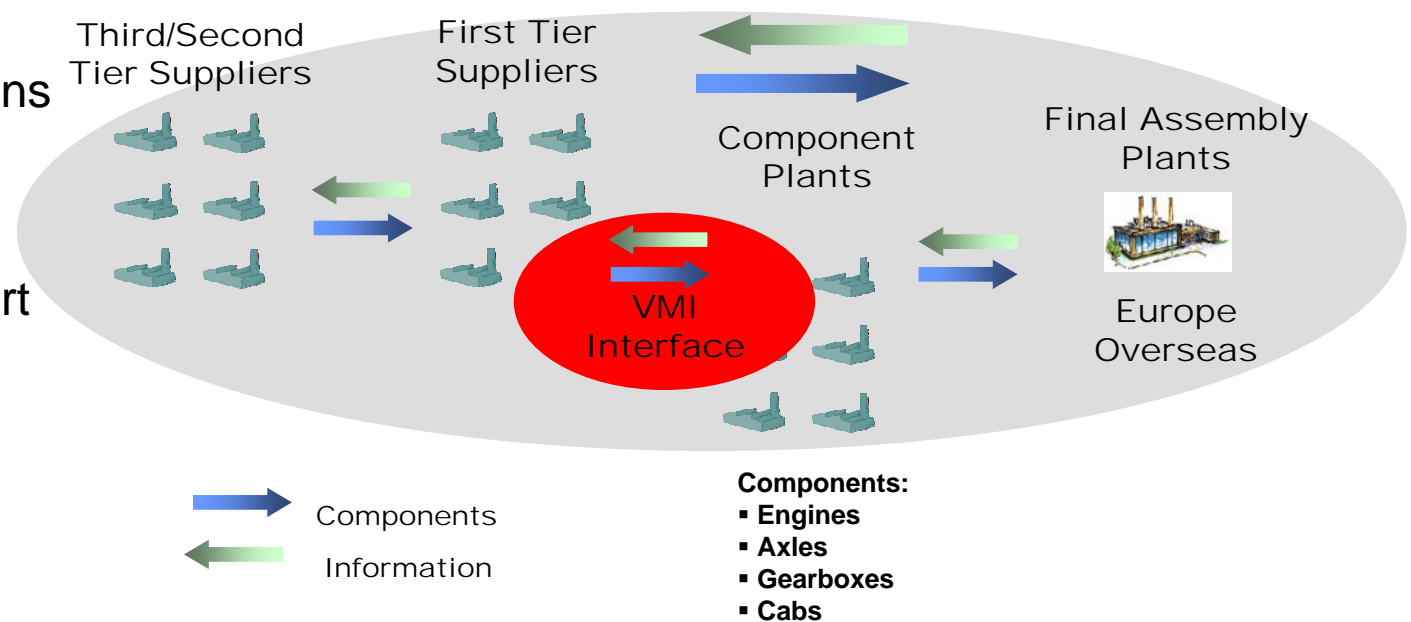
- VMI can be realized with customer-, supplier- or 3PL-owned stock
- Terms and conditions for transport may vary

In VPT we limit our scope to a VMI process where the supplier takes full responsibility for the supply chain including ownership of the stock and responsibility for the transport and warehousing of their goods.

VMI Implementation - Overview

To be able to create value to Volvo Powertrain and its suppliers through a robust VMI set-up it is essential to review the following steps:

- VMI process
- Warehousing solutions
- Transport solutions
- INCOTERMS
- External IS/IT support
- Material Control

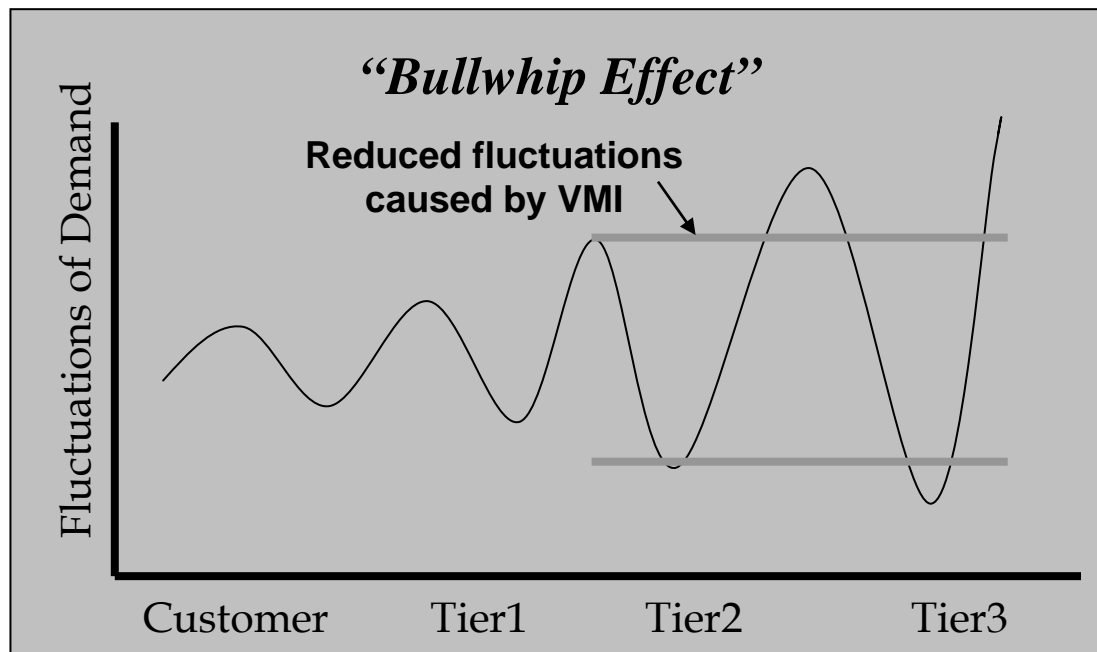


Background to VMI implementation

- Customers demand for flexibility increases
 - Firm time-fence (ex. RT 4 hours)
 - Variations
- Capital tied-up is driven by the uncertainties in supply
- Transport time from suppliers 1-5 days
- Cost for management of emergencies is high
 - Administration
 - Rush transports
 - Production disturbances
 - Effect on work morale
- Variations in supply demand is high, plan vs. real consumption
- Supply chain delivery performance is low

Why VMI? - Mutual Interest

To deal with the high demand volatility, the supply chain needs to be highly integrated to reduce the bullwhip effect, i.e., the increased fluctuations along the supply chain



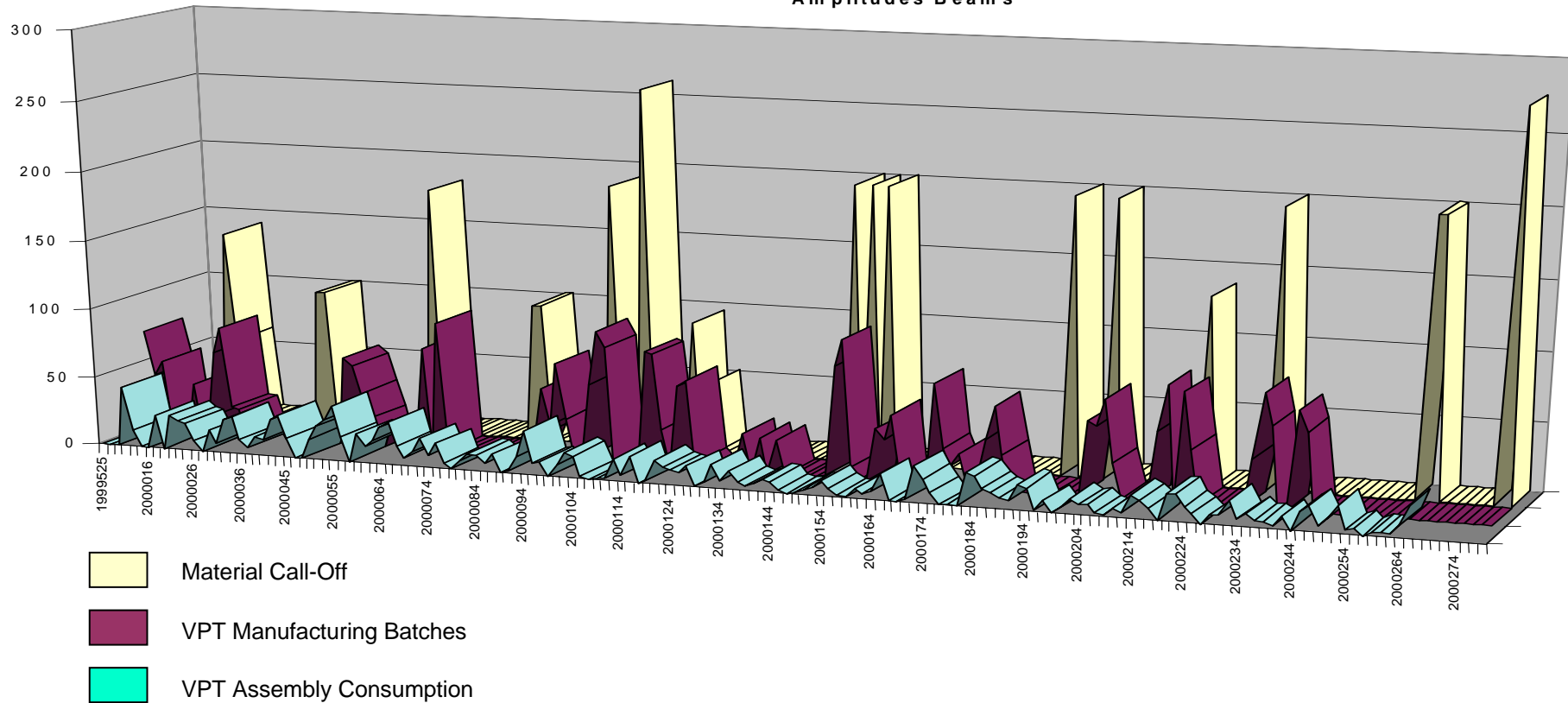
- Increased inventory
- Increased handling cost
- Sub-optimised production and transportation
- Material shortage
- Poor information sharing

VMI – VPT Supply Information

VMI serves as an absorber of demand variance

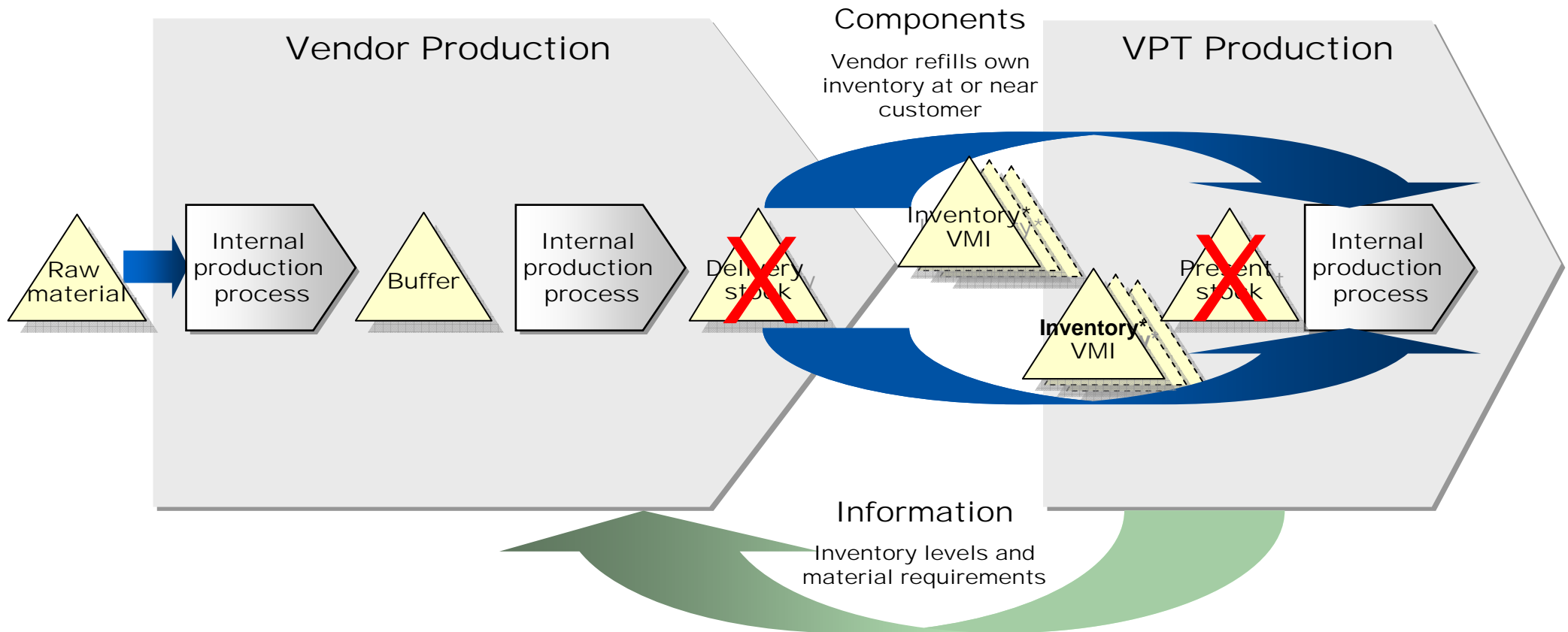
Amplitudes

Amplitudes Beams



VMI - Supply Process, Information and Components

VMI replaces the vendor delivery stock and the present stock at VPT. The VMI inventory (vendor owned) could be localized within or outside VPT. One component might also have several customers within VPT and can be stored at one or several locations.

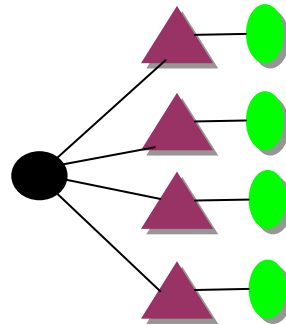


*Min and max including safety stock

VMI Process, Warehousing and Transports - Options

First Option

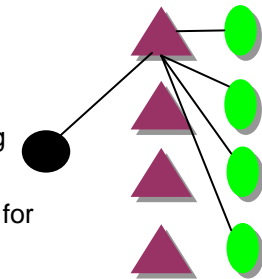
- Supply to each VPT warehouses
- No drop and take off
- Optimum cost for most of the parts



This implies that the warehouse should be located in the plants, but some transport optimization can occur before.

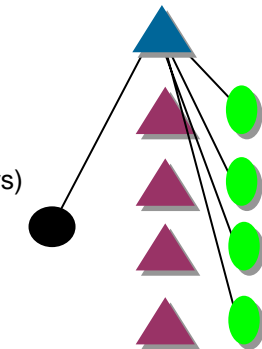
Second Option

- Utilization of a VPT warehouse for global supply
- For some small flows that require grouping or for highly unbalanced flows
-> Optimization of, at least, the major flow for one site



Third Option

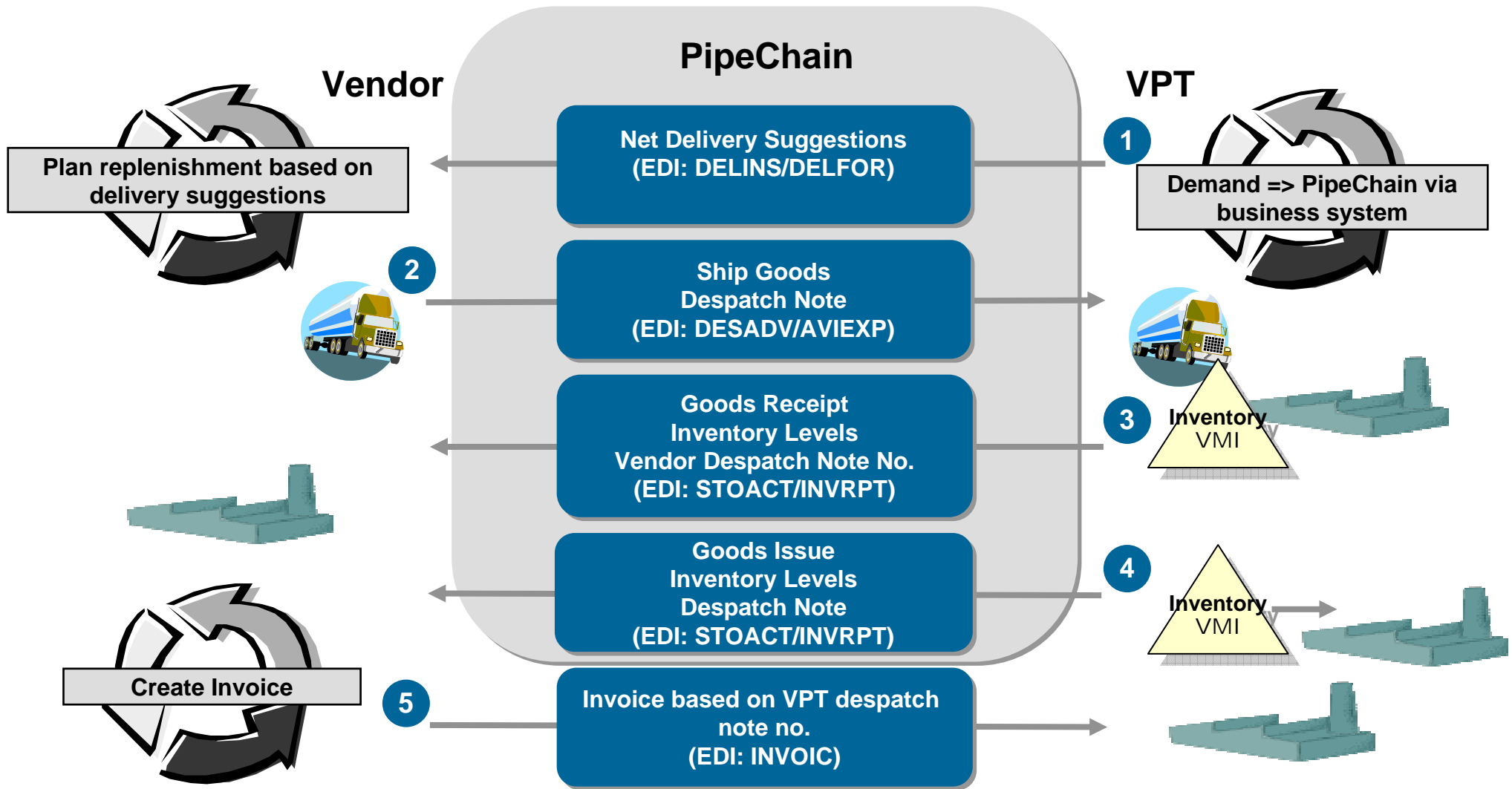
- Utilization of an external HUB (VLC or others)
- To be justified by a global optimization at a Volvo AB scale



Study recommendations - Summary

- Develop warehousing facilities and systems that supports VMI and EMS at each site
- Create a global VMI process
- Short term: Keep the current FCA supplier set-up with a addendum to current purchasing contracts.
- Long term: Renegotiate delivery term for VMI suppliers on case-by-case from 'FCA' to DDU/DDP 'Warehouse including warehousing and insurance' INCOTERMS 2000
- Use existing system at Transmission manufacturing
 - Develop global VMI tool for VPT

VMI – Baseline Operating Model



Information to be communicated

- Inventory balance
- Goods receipts
- Goods issues
- Dispatch note numbers
- Delivery suggestions

Means of communication

- EDI messages
 - DELINS/DEFOR
 - AVIEXP/DESADV
 - STOACT/INVRPT
- PipeChain features
 - Web Access
 - PipeChain B2B set-up

Other systems changes

➤ Goods Receiving

- ❖ Identification of the VMI package
- ❖ Mark the package (system wise) as a VMI package
- ❖ Separate routing to the inventory system, i.e. separate vendor and VPT owned stock
- ❖ “Virtual” goods receipt of vendor owned stock, i.e. goods is placed in the VMI but no economic transactions are generated = stock is still vendor owned
- ❖ Cancellation of deliveries
- ❖ Warnings for under/over deliveries

➤ Goods issue

- ❖ Consumption takes place when goods is withdrawn from the VMI, i.e. goods issue
- ❖ Goods receipt takes place at the same time as consumption
 - At consumption the VMI balance is reduced and the VPT balance is increased
 - At consumption a fictitious despatch note no. is created
- ❖ Records regarding (economic) transactions are generated at consumption
- ❖ Possibility to consume complete package or specific quantity
- ❖ Consumption of inventory is updated per part/vendor

Other systems changes

➤ Warehouse

- ❖ VMI part localisation
- ❖ FIFO
- ❖ Traceability
- ❖ Block possibility, i.e. a package must be able to block for rejection or quality inspection purposes (for example)
- ❖ Stock transfer inside the VMI inventory without causing any consumption transactions

➤ Inventory Balance

- ❖ The inventory balance must be separated to show vendor owned and VPT owned inventory

➤ Invoicing

- ❖ Invoicing takes place at consumption of inventory, i.e. at goods receipt (not “virtual” goods receipt)
- ❖ The vendor invoices VPT based on the communicated despatch note numbers identifying each goods issue
 - Invoicing frequency is vendor specific and stated in the agreement between the parties
- ❖ The invoice and goods issue relationship is verified

Other areas to be developed

- **Supplier selection**
- **Communication kit to suppliers**
- **Commercial and logistic agreements**
- **Develop negotiation and implementation strategy**
- **Perform training**
- **IS/IT development**
- **Document VAT, customs and other government regulations**
- **Future: self-billing?**