

Management Outlook



Virtual warehousing

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Logistics is the art of delivering merchandise according to agreed-upon service levels at the lowest costs. The focus of logistics in the Netherlands, now in particular, is on improving customer service and cost reduction no longer has the highest priority. Web vendors such as ECI (www.ECI.nl) and Wehkamp (www.Wehkamp.nl) deliver nowadays within 24 hours. Office supplies vendor Viking Direct (www.VikingDirect.nl) delivers in a large region of the Netherlands on the same day. Max foodmarket, (www.MaxFoodmarket.nl) the new web supermarket, goes even further and delivers within two hours.

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What kind of impact do the increased customer service demands have on present-day logistics? The general drive to reduce stock makes the orders increasingly smaller. At the same time, the geographical area that we have to supply is larger (globalisation). Eastern Europe has opened up for example. Also customers *from anywhere in the entire world* can order via the website. Nevertheless, we want to be able to deliver our products to the customer quickly, or rather, whenever it suits the customer. Furthermore, our assortment is becoming increasingly broader as a result of mergers, for example. We also see that those who sell books and CDs via the Internet are offering an assortment that they themselves do not have in stock. The moment a customer wants an item that is not in stock, it is ordered from the supplier and subsequently delivered to the customer, sometimes accompanied by several stock items. In this manner, the assortment becomes almost limitless. Virtual warehousing possibly is the answers to these challenges in the supply chain.

Collaboration in the supply chain

To improve customer service it is necessary to collaborate more closely with suppliers and buyers and to exchange information more intensely (buzzwords: collaboration, extended supply chain or supply chain integration). To subsequently synchronise the flows of goods and information, we need smart logistical information systems. The ERP, WMS, TMS and APS logistical standard packages are offering more and more functionality. However, we will have to develop new logistical concepts since conventional logistics is not designed to process thin flows.



Figure 1. Regional DC supplies complete assortment to region.

Problems with existing supply chain structures

In the 1980s the supply chain consisted of regional distribution centres (RDCs) that delivered the complete assortment to a country (Figure 1). In the 1990s, the borders within the EU were opened, which meant that pan-European transport could proceed more quickly. This presented the opportunity to centralise the stock in a European distribution centre (EDC) while continuing to guarantee an acceptable delivery time. As a result, we could reach the same service level with less stock. However, it can happen that a customer in Spain orders a product that is also produced in Spain. This product would then be transported to the EDC in the Netherlands first and subsequently, possibly accompanied by a number of other order lines, transported back to Spain again (Figure 2). There must be a more efficient way!

Virtual warehousing: DC's as a network

A new logistical concept that is suitable for processing thin flows is *virtual warehousing*. Virtual warehousing considers the various DCs as a network. It no longer matters where the merchandise is stored, as long as it can be delivered to the customer on time. We prefer to store merchandise close to the factory (Figure 3). We transport the requested goods as efficiently as possible through the network of DCs when the order comes in, and we prefer to transport with full trucks. We see in Figure 4, for example, that the merchandise needing to be transported directly from Finland to Spain is insufficient for a full truckload. However, if we *cross-dock* goods in the DC in the Netherlands, we then get full truckloads on both partial hauls and the total costs decrease.

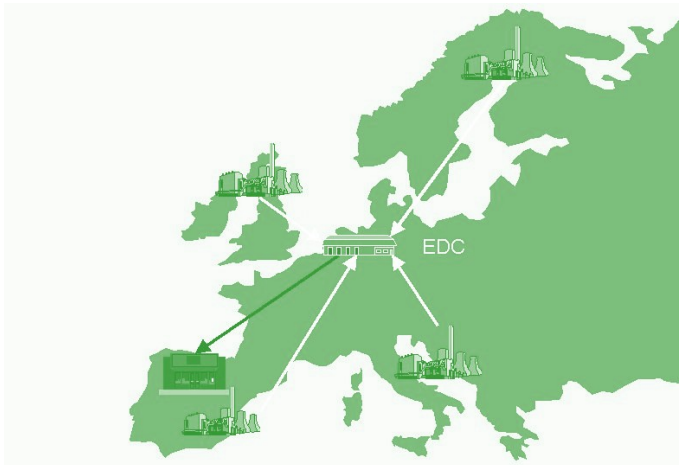


Figure 2. European DC supplies whole Europe.

Case 1. Frans Maas - Platform Logistics

Frans Maas (www.FransMaas.com) is a logistics service provider with a European network of 130 depots and 20 dedicated warehouses. The company provides the transportation of full truckloads and groupage services throughout all of Europe. In order to achieve better service, Frans Maas has introduced a new virtual warehousing concept for the high-tech industry under the name *Platform Logistics*. The goal is to set up approximately 10 depots throughout all of Europe for Platform Logistics. These 10 depots will collaborate as a virtual warehouse.

Frans Maas implements the warehouse management system Exceed from EXE Technologies (www.EXE.com) for the control of the depots. Frans Maas uses the self-developed GNTS package as its transport management system. Moreover, Frans Maas is currently working on the Enterprise Application Integration project. The logistics service provider hopes to integrate various systems for connectivity, visibility and planning / execution. The connectivity layer connects Frans Maas and the customers' systems (Figure 6).

Viewlocity (www.Viewlocity.com) and webMethods (www.webMethods.com) are known suppliers of such systems. Also, WMS suppliers are venturing more and more into this market. Furthermore, Frans Maas would like to have a good overview of the status of the orders and shipments in the logistics network (visibility). Finally, a planning / execution system needs to offer support during the dynamic optimisation of the flows (synchronisation).

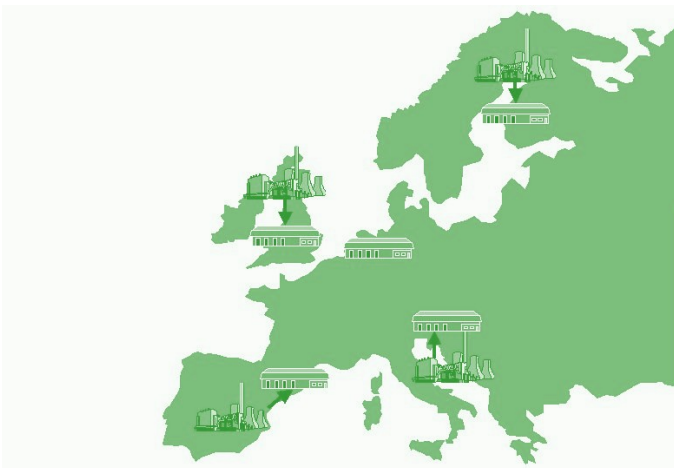


Figure 3. Virtual warehousing keeps the stock close to the factory.

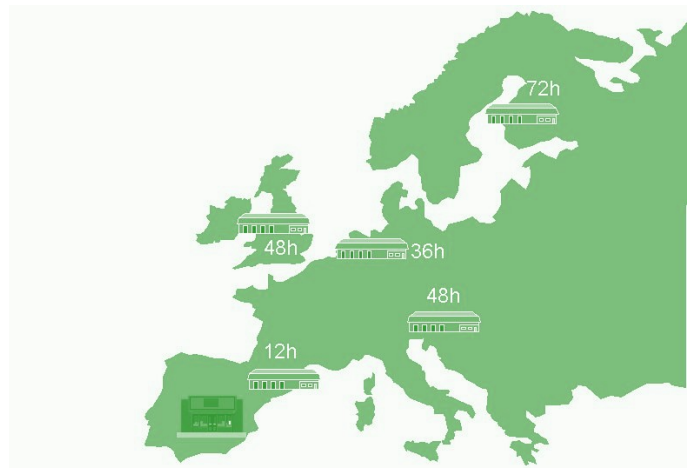


Figure 5. Virtual warehousing achieves short lead times with forward stock positions.

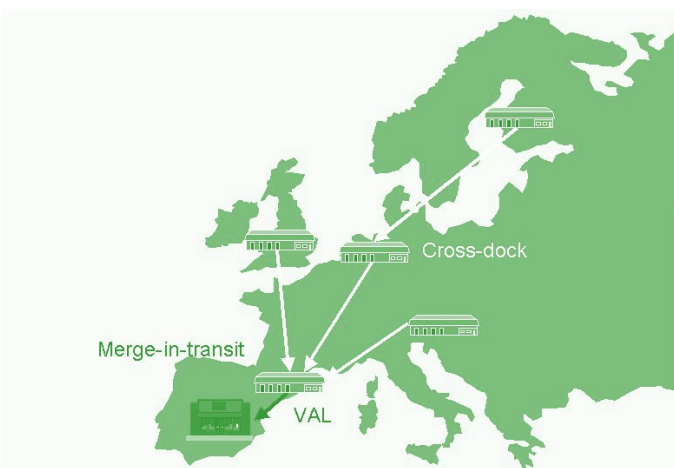


Figure 4. Virtual warehousing provides full truckloads through the network.

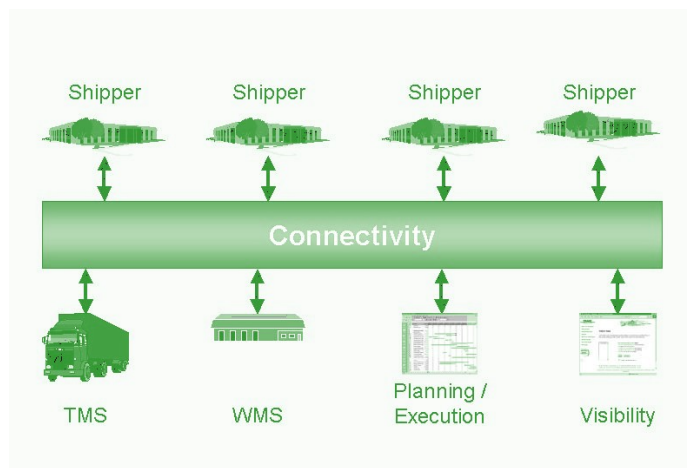


Figure 6. Frans Maas integrates systems of principals with its own logistical systems.

A big advantage of the EDC is that we can combine simply the various products for an order. In the virtual warehousing concept this happens via *merge-in-transit*. The goods for an order come together from various DCs at a site in the neighbourhood of the delivery address. If necessary, the goods are made country or customer specific here via *value added logistics* (VAL), after which it goes to the customer.

If we were to store the stock exclusively near the factories, virtual warehousing would drive up the delivery times considerably, while it is in fact the customer service we want to improve. We can remedy this by holding on to limited *advanced stock positions* in the DCs close to the customer outlets. This stock serves to bridge the demand during stock replenishment from a stocked DC. The advanced stock quantities are small in comparison to the stock in the RDCs of the 80s. This means that the total stock required remains limited.

Old versus new supply chain structures

In Table 1 we compare the three supply chain structures. If we look at the delivery lead time, we see that the transition from RDC to EDC was meant purely as a cost measure, while virtual warehousing aims at reducing delivery lead times. If we look at the stock availability, we see that with the RDC structure it can happen that a customer cannot be supplied because there is no stock present in the RDC nearby, while there is stock in another RDC. This problem is remedied with the EDC just as it is with virtual warehousing. The inbound transport costs decrease with virtual warehousing since we store the stock near the factory. With regard to the outbound transport, virtual warehousing consolidates the shipments. This explains why virtual warehousing is pre-eminently suitable for delivering small orders.

Case 2. Philips Lighting - E-transportation

Philips Lighting (www.Lighting.Philips.com) produces lamps and luminaries in 32 factories in Europe. In addition to the factory warehouses, the company has about 5 DCs at its disposal, spread throughout Europe (Figure 7). In total, Philips Lighting delivers approximately 30,000 orders each day. The ongoing *e-transportation* project has as its goal making a network of various sites. Philips Lighting implements the transport management system (TMS) from Manugistics (www.Manugistics.com) for this.

The TMS minimises the transport costs according to the rates of the carriers and the individual handling costs (cross-docking, for example). Improving customer service and acquiring a better visibility of the European network (tracking & tracing) are important goals. Philips Lighting is also going to generate invoices itself for the services of the carriers (self-billing).

In total, approximately 500 individuals from the finance and logistics departments and from the carriers will be working with the TMS. New functions will originate for central and regional planning, and there will be a new function for maintaining the master data. Some things in the warehouse will change as well. Here, new concepts will be realised such as cross-docking and fast transit (a form of merge-in-transit, in which partial shipments are temporarily stored). The transport planning will also become more dynamic. Up until now, the trucks left primarily according to a timetable that was more or less fixed.

Since we need a number of DCs, the warehousing costs for virtual warehousing might increase in comparison with the EDC.

	RDC (80's)	EDC (90's)	VW (00's)
Lead time	<3-5 days	<3-5 days	<1-3 days
Stock availability	Regional	Complete	Complete
Inventory costs	High	Low	Low
Inbound transportation costs	High	Consolidated	Low
Outbound transportation costs	Low	High	Consolidated
Warehousing costs	High	Low	High

Table 1. Comparison old and new supply chain structures.



Figure 7. Philips Lighting minimises the transportation costs according to the price table of the carrier.

When is it applicable?

Virtual warehousing is pre-eminently suitable for organisations that want to deliver small orders within short lead times in a relatively extensive market. We have seen that the warehousing costs can increase compared to an EDC, however. We will have to recover the costs via a higher level of customer service and a better occupancy rate of the trucks. This explains why virtual warehousing is applied particularly in the high-tech industry where the logistical costs make up a relatively limited part of the cost price. Furthermore, we need enough transport volume to combine (small) orders effectively. That is why we come across these concepts mainly with logistics service providers and large shippers. However, if the size of the order continues to decrease, we will be encountering virtual warehousing more and more.

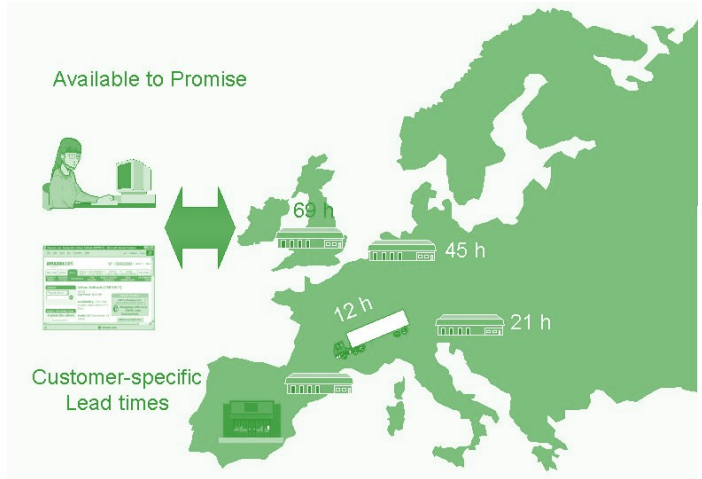


Figure 8. Hays computes the lead time based on the current situation.

What does it take?

To realise virtual warehousing, you may take the following steps.

1. Commerce and logistics jointly determine the desired service levels. The service levels are in fact the driving forces behind the change.
2. Subsequently, we design the new supply chain structure and distribution strategy and we calculate the associated costs and benefits. This analysis might be a reason to review the service levels.
3. Next we list the necessary changes in warehousing, transportation, inventory management and in the interaction between these disciplines. The changes define the subprojects that we will have to execute. Changes may be in the field of IT, procedures

Case 3. Hays Logistics - 4PL

Hays Logistics (www.Hays-bnl.com) is a European logistics service provider active in the business-to-business market. Hays currently implements the APS package Rhythm from i2 (www.i2.com). The enterprise would like to anticipate developments in the New Economy with the system, such as more frequent but smaller orders with short customer-specific delivery times. Furthermore, Hays would like to evolve into a 4PL (fourth-party logistics service provider) that directs the flow of goods on behalf of several logistics service providers and leaves the logistics execution to others, at least partially.

Rhythm determines the delivery lead time of a customer order (available to promise) against limited capacity. This functionality can be placed in the back office of a call centre or website. At the same time, Rhythm determines from which warehouse the customer can be supplied. Furthermore, Rhythm takes care of the complete distribution planning. Here, the system minimises the total transportation costs by putting together full truckloads and, when necessary, by consolidating partial truckloads via cross-docking or merge-in-transit. The system has already been put to use for three principals.

& control, layout & equipment and organisation.

4. Finally we perform the subprojects one by one. An obvious first project is connecting the information systems concerned to establish a good visibility on the goods flows. The biggest problems are observed automatically and the most important subsequent projects present themselves .

It strikes that virtual warehousing is achieved gradually. This in contrast to the ERP implementations of the past years which often were accompanied by a complete business process redesign.

The ongoing projects of Frans Maas, Philips Lighting and Hays (see text boxes) show that the modern standard packages are not yet ready to support virtual warehousing. Frans Maas wants to cover this need by combining separate systems for

connectivity, visibility and planning / execution. Philips Lighting and Hays are choosing for one system. However, the respective suppliers Manugistics and i2 do not yet have a ready-for-use standard package. The systems still have to be substantially adjusted before they can be used.

Invitation to respond

We see virtual warehousing as a way to cooperate with multiple DC's and better serve the customer. Does virtual warehousing limit itself to large companies or can middle-size companies also profit from it? In which verticals, beside high-tech, is virtual warehousing possible? The warehouses could be of various organisations, e.g. of a trading company and some of its suppliers. In this way multiple links in the supply chain are integrated. Do you recognise this opportunity? Which obstacles do you see for virtual warehousing? Is virtual warehousing the model of the future? Please

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