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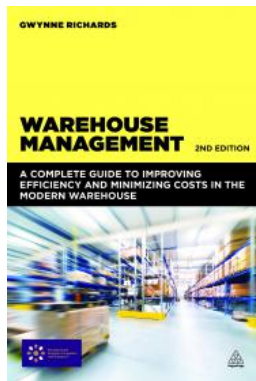
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## The Warehouse of the Future

22nd October 2014 | Gwynne Richards

*What does the future hold for supply chains? What will the warehouse look like in the future? In this article, Gwynne Richards makes some insightful projections of what to expect*



### The future supply chain

In terms of collaboration, Capgemini (2010) see the characteristics of the 2016 supply chain being based on multi-partner information sharing among consumers (the originators of demand, either from home or from a store), suppliers, manufacturers, logistics service providers and retailers.

Once produced, products will be shipped to collaborative warehouses in which multiple manufacturers store their products. Collaborative transport from the collaborative warehouse will deliver to city hubs and to regional consolidation centres.

Warehouse locations on the edge of cities will be reshaped to function as hubs where cross-docking will take place for final distribution. Non-urban areas will have regional consolidation centres in which products will be cross-docked for final distribution. Final distribution to stores, pick-up points and homes in urban and non-urban areas will take place via consolidated deliveries using efficient assets.

Although there are many shared-user operations currently in place, including retail consolidation centres, Capgemini's vision of collaborative warehousing takes it to another level. They see the key point being that both retailers and manufacturers collaborate even more closely by extending the consolidation centre premise to cover multiple retailers, thus ensuring greater warehouse utilization and full truckload deliveries in all directions. This is borne out by recent surveys, such as those by Kewill, Savills and others who cite collaboration and shared user warehouses as being one of the future solutions for cost reduction and the shortage of labour.

To succeed, this concept will require high levels of trust and commitment among manufacturers, retailers and logistics service providers. Trust is likely to be one of the main stumbling blocks. It will require 3PLs to play a greater role by being more proactive and brokering agreements between all three parties as well as taking on some of the risk.

### The future warehouse

I am certain that those of us who grew up in the 1960s and '70s would not have predicted the growth of the internet and the effect it has on the way we do business today. Some will argue that there won't be a requirement for highly stocked warehouses as companies will manage their supply chains so well that cross-docking or transshipment will be the norm, and therefore warehouses will become local transit sheds, parcel and pallet hubs.

Second, there will be more fulfilment and returns centres as opposed to warehouses. In addition, with the increase in fuel costs, there may be an argument for production becoming more localized and, therefore, warehouses will become an extension of the production plant once more. This should lead to a more 'just-in-

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time' method of order fulfilment. These warehouses will need to have real-time interaction with the company's website and thus the consumer.

The current trend seems to be towards greater centralization of warehousing, with retailers building bigger sheds with more automation, replacing smaller regional centres. However, the rising cost of fuel and customer demand for shorter lead times will result in a greater number of local warehouses. These centres will act as replenishment centres for stores, and continued growth in e-retailing will increase home delivery significantly.

On this point, orders to the warehouse will grow appreciably, but the number of lines and items per order will be small. Thus, where individual items are ordered by consumers over the internet, there will be a greater need for technological solutions and quicker, more accurate methods of order picking and despatch. There will be a requirement for value adding services, such as gift wrapping and reconfiguration, and the need for a slick returns processing operation.

Automation will play a big part in the warehouse of the future and it is likely that we will have many 'robots' criss-crossing the floor or operating above the stored product, collecting and depositing pallets, cartons and totes to wherever they are needed, with very few humans in sight. In order for automation to work efficiently, everything will need to be uniform. Pallets will need to be the same size – no combinations of UK, US, euro or print pallets, for example. Cartons will also need to be standardized. Alternatively, goods will be moved in plastic, returnable and recyclable totes.

Current examples include Kiva, Cimcorp and Swisslog's Autostore systems. Conveyors and AGVs (Automated Guided Vehicles) will abound and robots will move both horizontally and vertically, making full use of the cube of the warehouse. Radio frequency sensors will be placed strategically throughout the warehouse to ensure that there aren't any breaks in transmission and to guide the various automated equipment.

We humans will no doubt still be involved in some capacity, but mainly as IT and equipment service engineers. Skilled pickers will still have a place on the warehouse floor where goods-to-person systems will continue to play their part and we will still see products being transferred from cardboard boxes to plastic totes. Staff will also be required for various value-added tasks such as gift wrapping, re-packing, kimballing and kitting.

Technology will continue to improve, evolve and become more affordable. As has been proven time and again, the next big idea is likely to be just around the corner. There will continue to be a battle between ERP warehouse management modules and Best of Breed WMS; and as for RFID usage, it will increase gradually. However, the introduction of 2D barcodes has bridged a gap in terms of data capture.

Technology that is just around the corner includes optically guided picking systems. The picker wears a camera and is guided by the system to each pick location, using superimposed arrow symbols directly in the field of vision of the operator via a head-mounted display. There is a countdown in terms of the metres left to travel. At the pick location, the goods to be picked are identified for the picker and the camera reads barcodes, lot numbers and serial numbers to confirm the pick without any further human intervention. A digital display will show the number of items to be picked. Once established, it is thought that the system will prove even more accurate than voice, and the head-mounted equipment will be the same weight and design as a normal pair of glasses. As with voice-directed picking, training is quick and allows operators to keep both hands free for picking. Knapp and SAP are both currently working in this area.

As for the building itself, it is likely to be built with sustainability in mind. The warehouses will operate 24/7/365. From an environmental stand-point, the warehouse roofs will have solar panels and the yards will be full of wind turbines, not only to run the warehouse but also to produce energy to recharge the electric vehicles which make the deliveries. The equipment will be regenerative and all operations will benefit from energy-efficient lighting and heating.

The majority of warehouses are likely to be high bay (at least 12 metre eaves according to a BNP Paribas report), with some lower height warehouses or sections of warehouses to act as cross-docking operations. The continued growth in third-party logistics and shared-user warehousing is also likely to see larger warehouses, with the potential for sub-division. The increase in product lines and need for value adding services could also see greater use of mezzanine floors.

As for location, port-centric logistics is increasing in popularity, together with the increased use of rail transportation, which suggests coastal locations or those linked by inland waterways and rail. An increase in the number and capacity of inland rail-connected terminals will be required, with Governments looking to meet their

CO<sup>2</sup> emissions targets by switching transport modes. It will be interesting to see whether HS2 will free up much-needed capacity for freight transport. Finally, there will be a requirement for greater flexibility with shorter lease terms.

One other piece of technology which is likely to have an effect on warehousing and the supply chain is 3D printing or additive manufacturing, which was originally developed as a method of producing proto-types. Although there are several competing technologies, most work on the basis of building up layers of material (sometimes plastic, ceramics or even metal powders) using computer-aided design. Hence, it is referred to as an 'additive' process; each layer is printed until a three-dimensional product is created.

A report by Transport Intelligence (2012) suggests that 3D printing is: 'already very good at producing products (even with moving parts) which previously would have required the assembly of multiple components'; and by 'eliminating the assembly phase there will be huge savings for the manufacturer in terms of labor costs'. 3D printing-based production could also reduce or eliminate storage, handling and distribution costs.

People will be able to print a required item at home providing they have the scanned image or the blueprints of the product itself. The report goes on to say: 'A major new sector of the logistics industry will emerge, dealing with the storage and movement of the raw materials which "feed" the 3D printers. As 3D printers become more affordable to the general public, the home delivery market of these materials will increase'.

Global and national parts warehouses, as well as forward stock locations, may become unnecessary. At present, billions are spent on holding stock to supply parts to products as diverse as cars and x-ray machines. In some cases a huge amount of redundancy is built into supply chains to enable parts to be dispatched in a very short timescale to get machines up and running again as fast as possible.

The Service Parts Logistics industry will be either transformed or decimated by 3D manufacturing - or perhaps both! With small 3D Printing machines available, operations in remote locations – or even in an engineer's van – will only need access to electronic libraries of designs available via the internet or on a local computer. They can then call up the design of the spare part required and print it immediately. Obsolete parts could simply be scanned in 3D, fixed in the computer's memory and the new part printed.

The implications for inventory are clear. Not so clear will be the intellectual property rights.

## Conclusion

One thing is certain in this world of uncertainty: we cannot afford to stand still. As US Rear Admiral Grace Hopper once said: 'The most damaging phrase in the English language is: "It's always been done that way"'. Things are changing and as logisticians we need to be ahead of the game.

*This is an extract from an article that originally appeared in the October 2014 edition of Logistics and Transport Focus. View the original article here: <http://edition.pagesuite-professional.co.uk/launch.aspx?pbid=caae06e6-cf57-488d-8cd0-f96e3006a4bf>*

**Gwynne Richards is also author of [Warehouse Management](#) – a complete guide to best practice in warehouse operations, offering essential guidance on how to operate an efficient and cost-effective warehouse.**

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