The Magazine for the materials handling professional



City logistics challenges and solutions.

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Manage your stock to unlock cash flow.

EUREKA IN THIS EDITION

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As usual, Eureka has been looking for practical ways to help businesses become more efficient and profitable by overcoming challenges in materials handling and logistics.

We begin in the city, where Gian Schiava investigates the conflicting demands of Last Mile delivery. Drawing on expert advice from a Professor in City Logistics, and highlighting successful initiatives, he offers a combination of approaches to keeping customers happy while improving their environment.

Taking a global view, Mark Nicholson advises on climate change effects which threaten to halt deliveries, increase costs and even put companies out of business. This is not another call for reduced carbon emissions: it is a set of measures you can take to protect your company today.

One of the most important but difficult warehouse activities to carry out efficiently and without errors is order picking. Ruari McCallion brings us up to date on the very real benefits now achievable in this sector through augmented reality (AR) technology.

Finally, Gian Schiava discusses the tricky balance between maintaining stock - on which good service levels depend - and making cash available to invest in the company itself. He turns to an industry expert for advice on optimising inventory, cost and cash flow management to create new opportunities.

We hope you will find these articles useful. Feedback, questions and suggestions are always welcome. Is there any other topic you would like us to investigate? You can email comment@eurekapub.eu or message us via our website www.eurekapub.eu



Monica Escutia Commissioning Editor

Eureka's Commissioning Editor is Monica Escutia, a Bachelor of Communications -Journalism. She is a Spanish national and fluent also in Dutch, English and Italian. Having previously edited a variety of international media, she has spent the last 14 years in the materials handling industry the first four as a parts sales representative for several European countries, before becoming the EAME Manager Marketing Communications for Cat® Lift Trucks. based in the Netherlands.



information with fellow professionals.

of stock management.



THE LAST MILE

SOLUTIONS TO CITY LOGISTICS CHALLENGES

Modern urbanisation is posing ever harsher challenges. People have high expectations concerning mobility and delivery levels for consumer goods. However, we all want to live in a healthy and safe environment. Most of these challenges come down in the end to emissions and congestion. How are companies adapting their logistics to serve urban customers? What will they have to do differently tomorrow? Eureka's Gian Schiava delves into the world of city logistics and deliveries in the Last Mile.



STRUGGLES IN THE CITY

Whilst politicians struggle with the global situation, on a different level both cities and companies are facing the challenges of increased urbanisation. Transportation causes part of the emission problem, but at the same time e-commerce has boomed and we have all become used to the luxury of goods being delivered right to our doorstep. Even better, if we don't like them, we can send the goods back to the retailer, and thus we have created a completely new flow in the supply chain: reverse logistics.

Ordering online is here to stay and will only continue to grow. This means new forms of urban distribution are necessary, with fewer logistic movements and lower emissions. But how is that possible? We can do it by organising transport differently, adapting the regulations, and applying new technology, smart procurement and sustainable procurement. There are several interesting ongoing developments in those areas.

THE EXPERTS' ADVICE: **COLLABORATE**

What do the experts think should be done? Walther Ploos van Amstel, Professor in City Logistics at the University of Amsterdam, works together with students, governments, knowledge institutions and entrepreneurs to shape the solution. He sees potential for various factors to deliver their promise, including: electric freight vehicles; smart use of data with advanced information technology; compact hubs (transfer points for lorries) on the city outskirts; and innovative entrepreneurs and governments.

In an interview with Logistiek.nl, he sets out five pillars for governments to use as the basis for improving city logistics. First, he would make electric transport in the city compulsory from 2025. Today the technology may still be costly, but if electric transport gets a monopoly then costs will diminish through economies of scale.

Then, local authorities should share data from traffic management systems with logistics service providers. For example, if lorries can communicate with traffic lights, this will lead to optimal and safe traffic flows.

The third element is more related to safety but has an immediate effect on congestion as well. Lorries with blind spots should no longer be allowed to drive into city centres. Many accidents can be eliminated by doing this. In the UK, for example, lorries with poor visibility will be banned from London's roads by 2020.

The fourth pillar is that, as far as possible, city logistics should only be handled by specialist companies. Today, most movements are still carried out by companies with their own vehicles. The downside of this is that these vehicles have an average of four times less cargo than those of a specialised company. As



you would expect, professional carriers have much higher efficiency levels with much fewer traffic movements per package.

The last pillar is about urban design. Ploos van Amstel believes neighbourhoods should be structured in such a way that supplying residents can only be done with light electric vehicles.



A most interesting initiative is called CITYLAB. This pan-European project is a combined effort with participation from London, Rome, Brussels, Southampton, Oslo, Paris and various private companies like TNT and Procter & Gamble. Each city defines its own priorities, but all participants support each other with ideas and innovative solutions, often in collaboration with scientific researchers.

For example, London prioritises use of electric vehicles, Rome wants direct and reverse logistics to be integrated, and Oslo encourages shopping centres to use common logistic functions. Amsterdam, being famous for its bike traffic, sees transport in the near future being achieved using electric cargo bikes in combination with a widespread network of small warehouses throughout the city. The overall goal of the CITYLAB project is to realise CO2free logistics by 2030.

Ordering online is here to stay and will only continue to grow.

MASTERING THE LAST MILE

In practice, deliveries are most difficult in the Last Mile. It is increasingly difficult to keep that track affordable, practical and sustainable. From an environmental point of view, this is the mile in which most waste (packaging) and emissions are generated. But there are hopeful initiatives.

The Scandinavian company Repack aims to increase recycling through its reusable packaging. Consumers who purchase something through web stores can - after receiving their online order - return the empty Repack package via mail. In return, they receive a voucher! Beer producer Heineken has announced that it will use only electric vehicles when entering cities. Some companies go a more daring way:

reversing the trend of pleasing the customers by reducing choice. Dutch retailer Picnic offers far fewer delivery slots than the market leader but explains to customers that delivering at some times of day has a negative impact. Sometimes customers are asked to make a little effort. Instead of receiving goods or groceries at home, they may have to stop at a hub on the way home (such as a gas station) to collect them. Other experts believe we should restrict times of delivery to evenings only and eliminate unnecessary traffic during the day.

All in all, consumers seem to respond positively to a reduced service level when it is properly explained. For instance, many passengers on air flights are happy to make a small extra payment on top of the flight ticket price to make the journey climate-neutral. After all, don't we all want a better planet? •

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$\mathbf{I}\mathbf{I}\mathbf{S}$ ACTION

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CLIMATE CHANGE THREATENS WAREHOUSE BUSINESSES TODAY

This is a climate change article with a difference. It won't ask you to reduce your carbon footprint. Instead, its aim is to help you protect your warehouse or factory business. Mark Nicholson explains...

Whether or not you believe the scientific evidence that human activities are accelerating it, climate change is a measurable fact. In Europe, winters are becoming wetter and summers drier, while the frequency of extreme weather events like storms, floods, heatwaves and droughts is increasing.

These changes are already affecting businesses, either directly or through their supply chains. Today's very real - and growing - climaterelated threats are summarised here, along with practical advice on how to mitigate and manage them.

THREAT I

THREAT 2



FLOODING

Floods resulting from heavy rainfall are often made worse by overloaded drainage, overflowing rivers and, in coastal regions, rising sea levels. As well as damaging premises and their contents, flooding can put operations out of action. Even if a site remains open, staff may be unable to reach it due to flood effects on transport. And if flood water destroys essential paperwork, there is potential for administrative problems and lost orders.

ACTIONS

- Research the estimated flood frequency and severity in your current and planned locations.
- Place your most important and valuable goods and equipment in higher positions.
- . Think about having pumps permanently on-site, so you can react immediately to flooding rather than waiting to be rescued.
- Deploy temporary or permanent flood barriers around your buildings.
- Review your drainage to ensure the water landing on your roofs and surrounding land is effectively channelled away.
- Replace impermeable hard ground surfaces with porous alternatives.
- Develop some areas as natural habitats. which absorb more water.
- Set up IT solutions, procedures and equipment allowing at least some operations to be managed, monitored or even controlled remotely if personnel are unable to get to work.
- Move toward electronic rather than paper-based administration.
- Invest in insurance (flood damage and business continuity) - and try to reduce premiums by taking the preventative actions above.



POWER CUTS

Floods and storms can also shut you down by damaging local electricity supply systems. As these incidents become more common, we can expect the cost of repairs to increase electricity prices.

ACTIONS

- Work out whether investing in a diesel-powered back-up generator for emergency use would pay for itself through downtime savings.
- Be less dependent on the power suppliers by generating at least some of your own electricity from renewable energy sources like solar and wind.
- Reduce your consumption through improvements such as efficient lighting and better insulation.



THREAT 3



HEATWAVES

The death toll from spells of unusually hot weather in Europe, as experienced in 2019, can number tens of thousands in a single summer. These conditions also increase employees' sickness absence and fatique, lower their concentration and affect their productivity.

ACTIONS

- Reduce absorption of solar heat by fitting reflective roofs.
- Insulate walls and doors to keep out heat.
- Fit window blinds to provide shade.
- Separate hot machinery from workers using insulated curtain walls or strips.
- Open doors, windows and vents when the air is cooler outside than inside - and install insect screens if necessary.
- Consider whether portable industrial fans. dehumidifiers or air conditioners – easily moved to where they are most needed are more cost-effective than whole-building installed systems.
- Investigate and compare installation and running costs for air conditioning systems and high-volume low-speed (HLVS) fans.



THREAT 4

THREAT 5



DROUGHTS

In drier summers, water demand may exceed supply. This leads to restrictions on water use, as well as higher prices. Everyone needs water, but for some manufacturing and processing companies it is also an essential ingredient of their business.

ACTIONS

- Educate staff to use less water and avoid waste.
- Capture water from roof drainage, which is clean enough for many purposes.
- Reuse water from washing for purposes such as flushing toilets.
- Explore other possibilities for making use of previously discarded water.

THREAT 6

TAXATION AND

LEGISLATION

ACTIONS

• Think ahead.

sudden changes.

Governments are imposing restrictions on carbon

emissions, as well as climate change levies on

energy used. These measures will intensify as

the seriousness of climate change becomes

more obvious. To meet regulations, you may

need to invest substantially in new equipment and

will pass them on to you. Differences in regulation

facilities. Other businesses facing these costs

between countries will add complexity.

• Plan a smooth transition to low-carbon

operation, instead of being disrupted by

KNOCK-ON EFFECTS

If any company in your supply chain has a climate-related problem, it will affect you all. For example, your premises may not be flooded, As a result, we are likely to see shortages - and materials and foods, for instance.

- Ask your supply chain partners what management strategies they have in place for climate-related risks.
- and respond quickly to problems.
- Work together to increase your supply chain's efficiency and flexibility, using digital data collection, monitoring and management processes.
- Take out business interruption insurance in case a climate-related blockage anywhere in the chain stops your operation.

If any company in your supply chain has a climate-related problem, it will affect you all.

THREAT 7

THREAT 8



CHANGING CUSTOMER ATTITUDES AND DEMANDS

Customers are less and less likely to do business with companies which appear to act unsustainably. Patterns of product choice will also change with the weather, to meet different clothing needs for example. Effects of climate change on raw material prices may make some products less attractive, while changes in growing conditions may alter the range of foods available.

ACTIONS

- Operate sustainably and make sure customers know you take environmental concerns seriously.
- Diversify the products you make or handle and be ready to respond quickly to market trends.

to assess whether companies are managing climate-related risks properly, and finance will be less accessible for some. Disruption of supply chains and markets will add further pressures, affecting the whole business world.

WORLDWIDE

ACTIONS

• Take the mitigation measures suggested above. Develop a plan.

A WIN-WIN SITUATION

Even if all those scientists are wrong and the climate changes less than they predict, by acting now you will gain all these things and more:

- · Better preparation for today's floods or power cuts
- Increased untime
- · Happier and more productive employees, whatever the weather
- Reliable water supply
- · Lower electricity and water bills
- Higher efficiency and flexibility in your business and its supply chain
- A more attractive image to customers

When you add it all up, preparing for climate change makes great business sense - and you will be a planet-saving hero too.

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SUPPLY CHAIN

but flooding elsewhere may prevent your supplier from reaching you, or stop you from reaching your customer. Supply chains extend globally, and some countries are facing much more extreme climate change impacts than us. increased prices – of some commodities, raw

ACTIONS

- Look for partners who communicate well







FINANCIAL DISRUPTION

Climate change could potentially disrupt the stability of the global financial system. Insurers will have to pay out large sums and charge higher premiums. In high-risk areas, insurance will more difficult to obtain. Investors and banks will have



LACK OF **ADAPTIVE STRATEGY**

If your business has no plan for climate change, it will suffer.

ACTIONS

- Make sure climate change is covered by your company's business risk management process.
- Transform your business model and strategy to work in the coming low-carbon world.
- Look well ahead and consider whether the assets you invest in today will be right for the situation in, say, 20 or 100 years.
- Use your asset replacement and development schedule to introduce adaptations to climate change.
- Work with your relevant trade associations to help your sector adapt together.





AUGMENTED AND VIRTUAL REALITY IN THE WAREHOUSE

Augmented reality and virtual reality technologies are claimed to offer some spectacular advantages to warehouse operations – up to 30% savings, in some cases. Ruari McCallion has been taking a closer look.

Augmented reality (AR) and virtual reality (VR) are not the same thing. VR is an immersive experience, typically involving an all-enclosing headset, in which the user enters a virtual world; it is most associated with online gaming, rather than industry. AR is designed to assist operations in the real world through the application of mobile and wearable technologies that enable a real-time interactive view of reality, with superimposed virtual content. One of the first examples of AR to appear on the market was Google Glass.

"The consumer market is the most difficult market that anybody can tackle," says David Lock, Director of Operations EMEA Region, Vuzix Corporation, which makes the hardware for AR enterprise solutions – the glasses and headsets themselves. He maintains that enterprises are more open to and accepting of emerging technology than the consumer market. Having said that, enterprises have to be convinced the technology will work before they will spend hard-earned money on it.

"You are talking at least two years of proof of concepts as necessary to get a company to commit to emerging technology. The questions are always: is this going to get me more business, is it going to improve efficiency and is it going to be accepted by employees?"

OPERATIONS IN PRACTICE

In the world of AR, a number of possibilities are appearing on the marketplace and being offered across a range of activities, from manufacturing and warehouse management to medicine, including surgery. In 2018 I attended a demonstration of Microsoft HoloLens, which included a visit to a skin graft surgery attached to a major teaching hospital. We were shown how AR can improve the effectiveness of major surgery, cutting operating time in half and delivering better outcomes. The same tour took in a demonstration of its use in mechanical and electrical (M&E) functions in construction. I was also taught how to assemble a lithium-ion battery by a teacher guiding me from a remote location. It was impressive, but once you sleep on it and get over the 'gee whiz' excitement, the questions raised by David Lock still have to be answered.



Microsoft's HoloLens facilitates remote training and teaching; whether a fond father helping his daughter with some basic plumbing, or more complex assembly, or warehouse management.







Augmented reality (AR) technology provides users with more information about the objects in front of them; even the fire performance of domestic furniture.



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Within warehouse management, one of the most important activities is order picking – but it is also often considered a nuisance. A great deal of effort has been expended on trying to automate the process but it always seems to come down, in the end, to human beings. Within logistics and warehousing, order picking accounts for approximately 20% of all logistics costs and up to 55% of the total cost of warehousing. This is according to research published in the European Journal of Operational Research in 2007 and cited in Augmented Reality Research, published by Maastricht University School of Business and Economics, January 2016.

Mistakes made in order picking, the last step in the supply chain before delivery, directly influence customer perception of the quality of an order and of the supplier. Improving its efficiency and reducing errors can make a major difference to profitability, competitiveness and reputation. The issues become even more important in agile and demand-driven supply chain management.

CLEARER VISION

Smart glasses allow task-relevant information to be superimposed directly in the order picker's field of vision, fed directly by the warehouse management system. Pickers are better able to obtain information, stock locations and directions without switching attention from a technical device or being distracted by anything else in the work environment.

Third-party logistics providers have already adopted AR in some of their warehouses: global logistics provider DHL showcased Vuzix' M-Series Smart Glasses at the grand opening of its 2,600-square-metre Americas Innovation Center in Chicago, Illinois, USA, in September 2019. The facility provides a collaborative space for DHL to work with customers, technology partners and academics, as well as its employees.

BENEFITS IN PRACTICE

Adoption of AR in practice has, according to the Maastricht University study, shown some quite significant benefits. Picking time per bin reduced by over 40% – from 27 seconds to just 15 – and error rate was cut by 90%. Out of a range of other workload measures, as developed by NASA in its Task Load Index, improvements were reported by stock pickers in all areas except one; and quite

an odd one. They reported that AR order picking was physically more demanding. However, the analysis did not find any increase in heart rate, so the physical demand may have been a perception by the individuals studied, rather than an actuality - something that could be explained by the unfamiliar experience of wearing the AR glasses. Overall, the Maastricht University survey clearly identified a 30% improvement in efficiency by warehouse operators using smart glasses.

AR technology is not free-standing. It has to be integrated with the warehouse management system or with the enterprise resource planning (ERP) system, which is where it gets its information from

The technology works with RFID, barcodes, specialised tags or bocodes. The wireless technology is not 5G GSM, which requires SIM cards and a lot of power; it is Wi-Fi. Lower power consumption means longer battery life and less weight for the operator to carry around.

UPGRADING HEALTHCARE

In the healthcare sector, Swiss company Scandit (see panel below) has participated in a project at Leeds Teaching Hospital in the UK, named Scan4Safety. The hospital was using an inventory management solution which included a limited ability to scan barcodes on products, patient wristbands and locations. The Scandit scanner solution, which uses mobile phones and other smart devices, demonstrated extremely high barcode scanning speeds and accuracy. The information is updated in real time to the electronic whiteboard at the nurses' station. The pilot project showed significant cost savings and improvement in standards of patient care.1



Vuzix works with a number of software and systems providers, such as SAP, Evolaris and Ubimax, who offer 'pick by vision' order picking and 'make by vision' assembly, quality assurance, inspection and training solutions, as well as remote assist and healthcare solutions². Vuzix hardware has also been trialled with a global logistics provider on a project that will provide higher levels of security and traceability of medical packages.

According to David Lock, smart glasses have already achieved a significant level of penetration with some blue-chip companies, including Mercedes. Over 10,000 units are now in use in warehouses across Europe.

Vuzix smart glasses in order picking action.

1. https://www.scandit.com/resources/ case-studies/leeds-teaching-hospitals/ 2. https://www.vuzix.eu/Partner/Index/7

AR is not just about smart glasses, which may be more suitable for larger premises and operations. Scandit, a relatively young company based in Zurich, Switzerland, uses smartphone technology to improve order picking, inventory maintenance and consignment packaging.

"Our technology could be used in a warehouse, in a supermarket, anywhere that is managing stock," said Paul Davis, Scandit Vice-President Sales for Northern Europe, Middle East and Asia. "You have a row of items on a shelf and each of the items has a barcode underneath. You take the camera on the smartphone and it will capture 10 or 12 items immediately."



Scandit's augmented reality app provides at-a-glance information about stock levels and delivery schedules.



"Dude, where's my parcel?" "Right there." Scandit's AR smartphone app quickly locates and identifies specific items in amongst dozens of others.

Each barcode can be colour-coded when viewed through the phone. The employee will be presented with visual information about the health levels of stock, with a green, orange or red indicator. As the operator walks forward, the app drills down and provides more contextual information, including precise stock levels and expected replenishment delivery schedules. The phones are linked to the central planning system, but data is cached onto the device and all processing is done on it.

"Traditional heavy, rugged barcode scanning devices might take 10 or 15 seconds to scan each item. Now, you can simply read and get information with the camera and highlight what you should be looking at, drill down for more details and contextual information, all through the augmented reality app, without having to press buttons on the phone."

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REAP THE BENEFITS OF BETTER WAREHOUSE STOCK MANAGEMEN

A company's financial resources are tied up in stock and that can have a negative impact on cash flow.

Lowering your stock may sound like a negative measure for your service levels, but it can yield more than you think. Your Eureka reporter **Gian Schiava** discovers the opportunities that proper stock management can create and how inventory costs relate to cash flow.

ORIGIN AND PURPOSE OF THE WAREHOUSE

Let's take a step back and see how warehouses originated. Basically, a warehouse can be defined as a (large) building where (raw) materials or manufactured goods may be stored (temporarily) prior to their distribution. In ancient civilisations we already find evidence of people or communities gathering and storing agricultural surpluses. The Romans understood the necessity of creating buffers between demand and supply, and started using purpose-built locations with sizes up to 21,000 square metres.

The industrial revolution accelerated the process of development; warehouses evolved and became more specialised. Forklift and specially designed warehouse trucks boosted output and became the most applied tool after World War II. In the past few decades, warehouses have adapted to standardisation, mechanisation and technological innovation. Even robots are now starting to help us in getting the products shipped. Stock levels have increased and, for a long time, more stock has meant greater ability to fulfil demand and therefore generate turnover.

THE OTHER SIDE OF THE COIN

However, with increased ability to ship, costs have risen as well. Moreover, a company's financial resources are tied up in stock and that can have a negative impact on cash flow. Besides that, it also costs a lot of money to run a warehouse. Before coming to the benefits of inventory management, we have to look at what the costs of stock-keeping are. We talk to Jan Kraaijeveld from Slimstock, a company with a worldwide focus that specialises in optimising stock amongst producers, retailers, wholesalers and even logistics companies. Its clients have seen performance improving because the right items are in stock, costs are lower, urgent deliveries are eliminated and warehouse processes are beginning to run efficiently.

Jan explains that there are essentially three categories of costs for keeping inventory. "First, there are capital costs. A company pays interest to get activities financed. The second category lies closer to the warehouse itself: the costs of space. Simply put, these are defined as the costs incurred between the time the goods are placed in the racking and the time they leave the warehouse. They can be calculated as variable or fixed costs. Let's start with the variable approach. If the warehouse activity is outsourced, it is easy; those are the costs per pallet charged by the service provider. For example, a few Euros per pallet per week. When you manage your own inventory, you have to make a list of all costs: the rent of the building, depreciation of equipment such as racking and materials handling systems, energy costs, personnel costs etc. Allocate these costs to your inventory."

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Jan continues: "Many companies who have their warehouse in-house regard space costs as fixed. After all, the warehouse and the employees are already there and a bit more or less inventory won't make a difference, right? Wrong. This approach can lead to wrong decisions about the inventory. Inventory costs should serve as a factor in calculating or determining purchase batch sizes, for example. Without that, you will always be ordering too much stock."

The third and last category is for the costs of risk. The largest components here are costs for obsolete stock (writing off inventory), but consider also insurance costs, like for fire and theft.

Most gains in cash can be found by reducing the amount of fast movers. Results are more

modest when they concern non-movers, but here the purpose is to avoid building up new stocks of obsolete inventory. That is a road you don't want to get onto again.

HARVESTING THE RESULTS

Now, companies who develop a series of plans to forecast better, order in a much smarter way, create a more reliable supply chain, implement ABC classifications and apply proper product lifecycle management could reduce their stock by as much as 30%.

Jan gives us an example: "Let's take a company with a stock of 1 million Euro. Typically, it would face around \in 320K of inventory costs. Reducing the stock value to \in 700K yields an immediate saving of \in 96,000 per year (\in 300,000 x 32%). Thus, in addition to that saving, \in 300,000 in cash flow is unlocked."

Lowering stock may sound easy to do, but serious efforts and hard work lie ahead. "What now needs to happen," explains Jan, "is a stepby-step approach. First you focus on the stock itself. Clean up the obsolete with, for example, special discounts; make an ABC analysis; and



get the product range and build-up right. The next step is to analyse your data and make sure this becomes a reliable source. Without proper master data, you will not be able to steer in the right direction. When this is achieved, then move on to setting up KPIs, business rules and other parameters. You can see each step is important and necessary before you can move on. Now we can determine the proper minimal stock levels and ordering amounts, and we suddenly find ourselves doing proper inventory management."

The last step is to go outside and meet with the other participants in your supply chain. Firm agreements must be made, and structural co-operation with both clients and suppliers are crucial if you are to maintain that lean but also effective inventory.

From now on, it will be a constant battle to find or maintain the balance between keeping stock and providing the desired service level to customers, whilst ensuring costs are low so cash flow can be deployed for other investment opportunities.

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