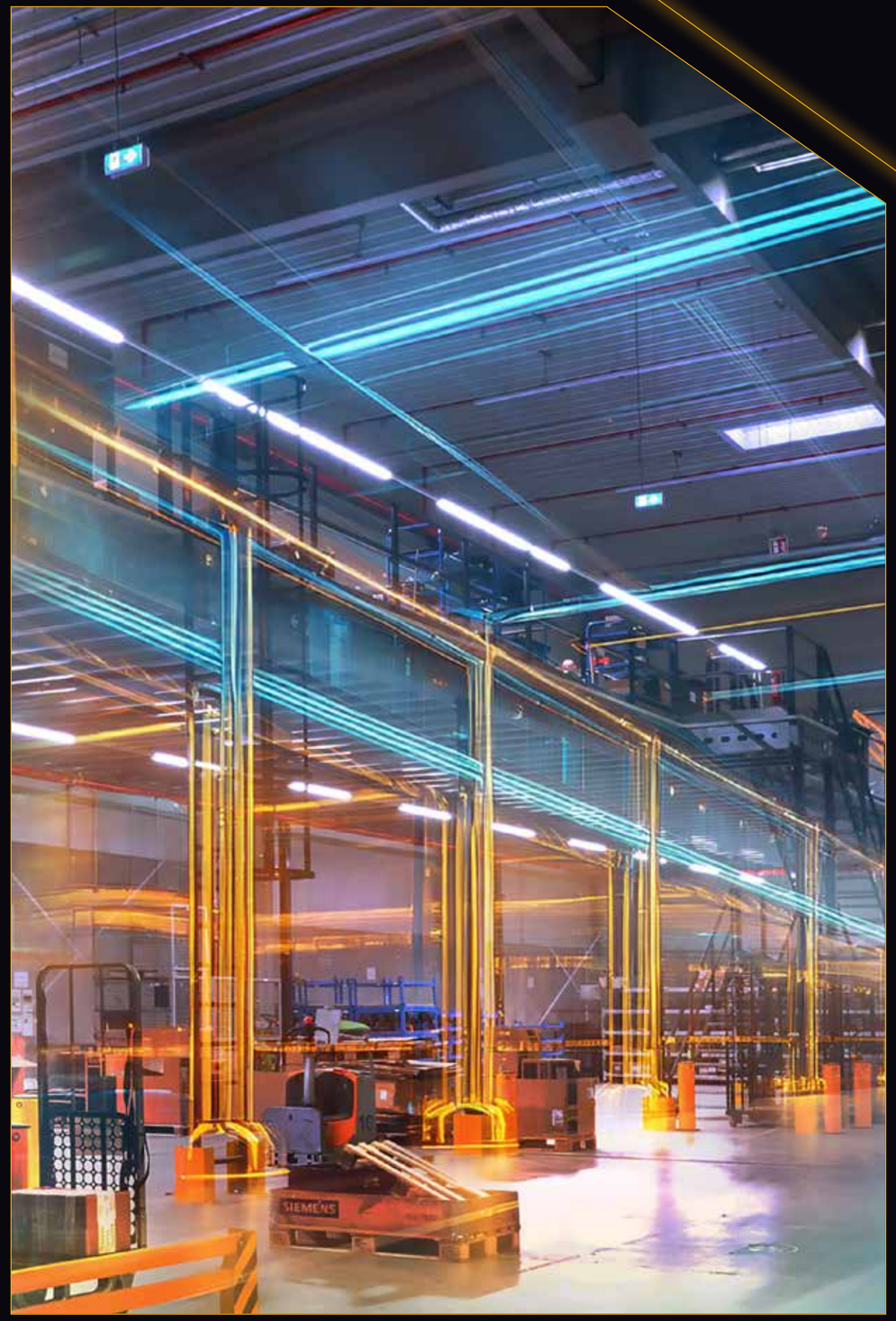
DEMATIC

Power the Future of Commerce

THE UK'S AUTOMATION TIPPING POINT – A VISION FOR THE FUTURE

Your 5-year strategic blueprint for mastering disruption, boosting efficiency, and securing growth.

Contents



Introduction

It's widely predicted that the warehousing sector is on the verge of an explosion of investment into automation. But with a vast array of fast-evolving new technologies now available to the market – such as 4D shuttles, Co-bots and AMRs, all given agency through AI and the emergence of Digital Twins – what forms of technology will the smart money be on? What will the drivers for investment be over the next five years in the UK? And what market trends and strategies may influence investment, now and further ahead?

This Vision White Paper draws its findings from interviews with experts in the field of warehouse automation, along with thought leaders from within Dematic.

Our focus for these insights was to uncover:

- The main **challenges** facing warehouse operators, both within supply chains and more global/geosocial issues
- Which of these are **potential drivers for automation**
- How automation might help address the specific challenges of labour **skills shortages** and costs
- What ‘styles’ of warehousing will attract **automation investment**, such as new greenfield v brownfield; shared use/multi-tenancy; micro fulfilment centres
- Which of the current and **emerging technologies** will be most favoured, and in what situations
- How consumer expectations – from 24-hour shopping to sustainability – will develop, and how these will **influence automation investment decisions**
- What are the implications for **human skills** in future automation

In addition, many other impactful topics emerged during our conversations with our experts, revealing the full nature of a fast-evolving landscape for warehouse automation.

While we don’t claim any deep statistical significance for our findings, nonetheless we have found a fair degree of consensus. Our experts express their views on the future of warehouse automation to 2030 – a future full of potential, but with pitfalls to avoid.

How did we get here

Not so long ago, it was only large businesses that could afford to deploy resources to sophisticated, costly automated warehousing projects. But times have changed, and so too have the technological options available and the associated costs. SMEs are now able to compete on levels of operational performance and customer service that were once only the province of big businesses. So, what changed?

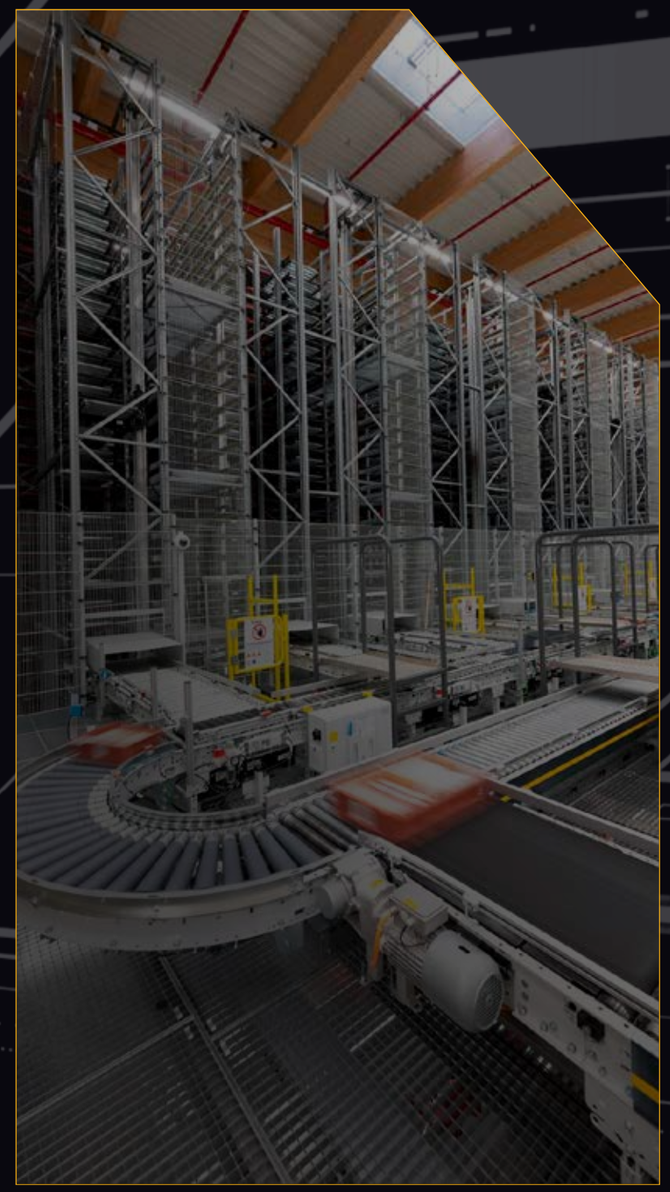
It feels like we’ve been here before. As **Phil Riley, VP Automation & Accelerated Digitalisation at DHL Supply Chain** recalls, around the turn of the Millennium there was a wave of investment in automated warehouses, using what was then state-of-the-art technology, by major and influential players and driven in part by the cost and unavailability of a suitable workforce for manual operations.

“But in 2004 the UK labour market was opened to workers from East European countries newly acceded to the European Union, which mitigated the labour constraint, and so for 20 years very few automated warehouses were being built.”

Now, partly because of Brexit and also because their own economies are thriving, much of this labour has gone home and – together with other labour market issues – this is making automation increasingly attractive once again.

“...businesses...desire to use automation but are not sufficiently educated in how automation can drive benefits...”

Phil Riley



Added to this, as **Dave Berridge, MD of Emkat Solutions Ltd** and also **Secretary of the Automated Materials Handling Systems Association (AMHSA)**, points out, different companies tend to identify the same geographical locations – such as the Midlands ‘Golden Triangle’ – as optimal, without regard to the availability of labour. And the resulting labour shortages constrain growth while forcing rates up, which is another driver for automation. But, **Riley** cautions:

“We have a generation in the C-suite with expectations from automation, but who have never actually seen an automated warehouse. We see businesses that desire to use automation but are not sufficiently educated in how automation can drive benefits, so they make poor decisions, or the decisions themselves keep getting pushed back.

‘Conversely, there are some big retailers, for example, who have the engineering and other capabilities in house and so could go out to procure automation, but deploying their capital on what is not their core business is seen as a big risk in the current market.

‘Our strategy is that we want to be the operator of choice. We have invested, globally, in engineering, operations and IT expertise and capabilities, and in installing and using automation on our own account, so we – and other 3PLs – can educate the market as the right partners with the right solutions. But the market is understandably sceptical, given some absolute horror stories about businesses that spent a lot of money but didn’t obtain a return on investment in a timely fashion, or even at all.”

IN SUMMARY

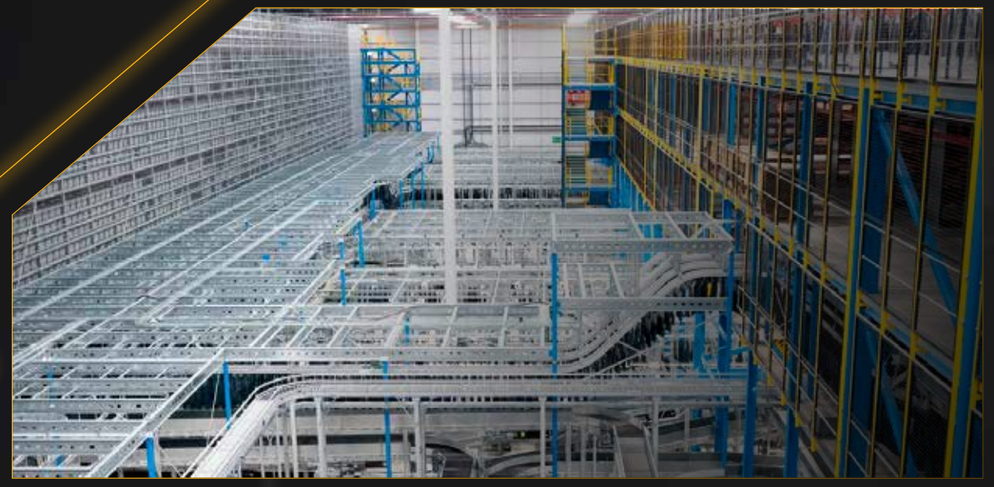
Given this context – and we’re in an industry that thinks in long timeframes – it sounds almost like warehouse automation has come to a second tipping point defined this time around by necessity, not novelty. The shifting labour markets, economic pressures, and technological landscape have levelled the playing field, opening up access to automation. Despite the fears, this new wave isn’t about replacing people with machines; it’s about recalibrating how businesses think about their supply chain. The industry is discovering a new truth: automation isn’t simply an engineering challenge, it’s a strategic one. Those with the knowledge and courage to deploy it, stand to redefine their competitiveness — while those without may find themselves watching the next industrial transformation from the sidelines.

Chaper One

A need for 20/20 vision on the drivers of change

> **It's not all doom and gloom on the horizon, the outlook is positive for those with a long-term outlook who are prepared to seize the opportunities where they lay.**

Our interviewees suggest that while **labour shortages** will remain a key consideration **(Chapter 8)**, they are far from the only force shaping the future of automation. Many of those we spoke to described a complex mix of influences likely to affect their strategies over the next five years — balancing **budget constraints** (see **Chapter 3** for our take on RaaS) against the opportunities offered by **new technologies (Chapter 2)**, along with responding to **geopolitically-driven supply chain shifts** (while somewhat beyond our remit but do take a look at **Chapter 9**). Underpinning these pressures sits a broad set of challenges: improving the **customer experience** by keeping pace with rising order volumes and the need for additional warehouse capacity **(Chapter 12)**, and navigating the rapid advance of **AI**, which remains front of mind for almost everyone we spoke to **(Chapter 4)**.



Separately, **Clare Bottle**, **Chief Executive of the United Kingdom Warehousing Association (UKWA)**, reports that a poll of her members shows cost control (of rents, rates, labour and other business costs) as among the top three concerns for most of her members, and recruitment and retention of talent as the number one issue for at least a third*. **Bottle** suggests, "We need to frame automation as a solution to these problems, but at the moment it is not necessarily recognised as being the answer."

Danielle Dakin, Market Development Director at Dematic says:

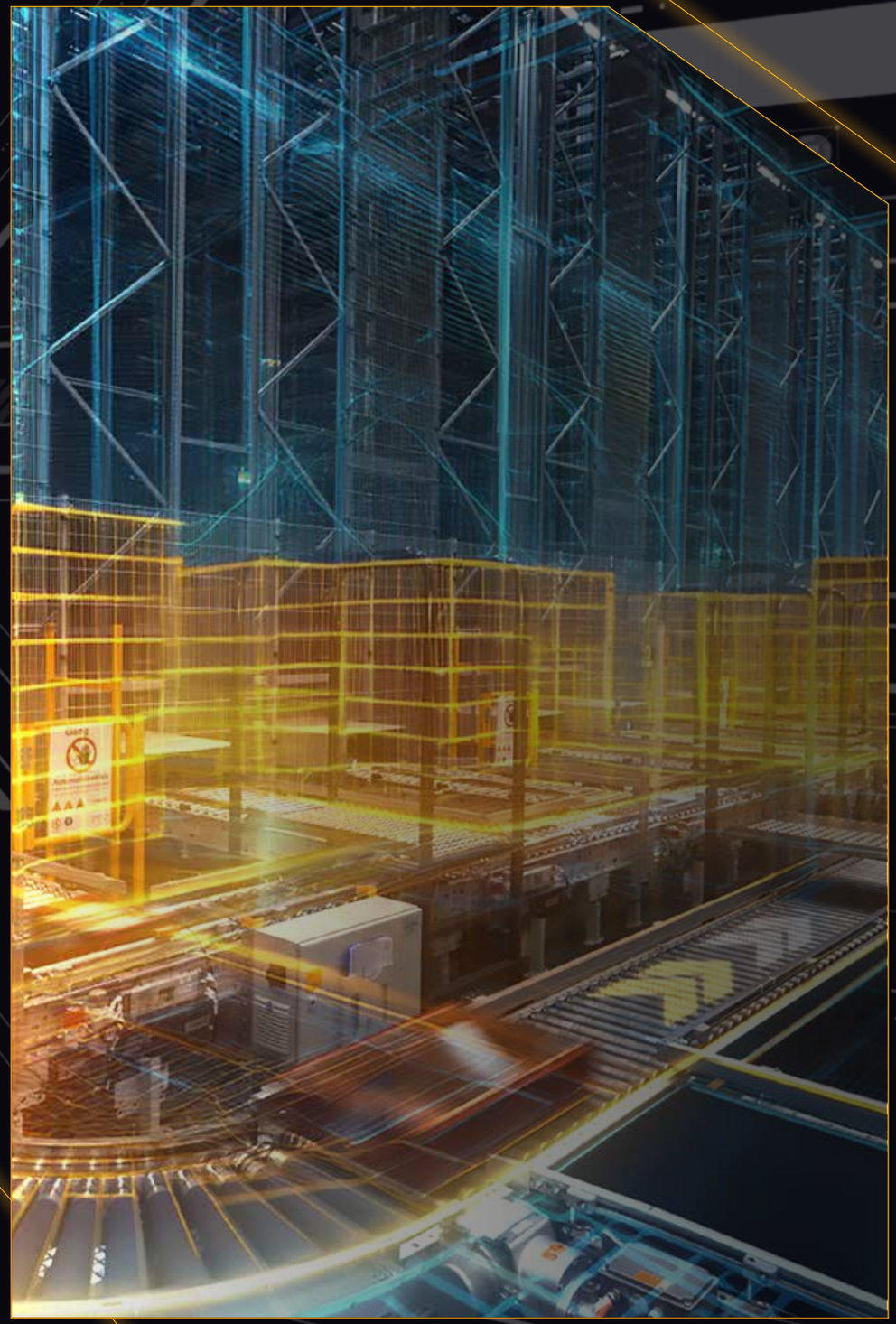
"It's important to recognise, that every industry is ultimately unique in how they operate. Businesses need to think strategically before they automate – what are the goals and objectives? What types of automation could serve their needs?"

This has to go a lot deeper than just addressing current and local pain points. **Dakin** adds:

"There are so many technologies available to support you, but you need to ask fundamental questions about who you are and what you are trying to deliver."

*The Warehouse of the Future - UKWA - The Voice of Warehousing: https://www.ukwa.org.uk/the-warehouse-of-the-future/

“New technologies will offer new opportunities...”



*A **“brownfield”** site refers to an existing warehouse, distribution centre, or site that is being retrofitted or upgraded with automation. In contrast, a **“greenfield”** site is a completely new facility built from the ground up with automation in mind from the start.*

Issues of land and space are becoming just as significant in a difficult socio-economic climate. Big retailers want to hold more stock in the UK rather than relying on just-in-time deliveries from China, so they continue to look at very high and very dense warehousing. On the other hand, a number of retailers are investing in renovating and reorganising their brownfield sites, stripping out earlier automation that may be 20 years old and are looking to tackle both labour and space problems by doing things slightly differently. The question they ask of flexible automation is: "what can we squeeze into this awkwardly shaped site envelope?"

Interestingly, 'fulfilment failure at peaks' is rarely mentioned as a driver, perhaps because, as suggested by **Dakin**, **Riley** and others, "peaks aren't what they used to be." If you look at the evolution of 'Black Friday' over the years, what started life off as a single day of sales is now a week and, sometimes, lasts up to a fortnight.

New technologies will offer new opportunities, while budget constraints may simultaneously make automation more desirable and less affordable. However, UKWA's **Bottle** notes that: "anxiety around disruption, expense and payback" with the plethora of different options may be creating "paralysis by analysis," as the warehouse automation industry enters into an 'interesting' phase.

As **Simon Barnwell, VP & Market Leader UK&I** at Dematic, says:

"There's not just one technology anymore. Multiple technologies are competing; none are dominant. Consolidation is inevitable."

The picture emerging of the warehouse and supply chain automation landscape is one of undeniable complexity. It's shaped not by a single dominant force, but by a confluence of evolving factors – tough economic times, rapid technological advancements, labour and space constraints, and even global geopolitical shifts. As we grapple with decision paralysis, it's clear that a reactive, piecemeal approach will no longer do.

OUR ADVICE IS SIMPLE YET PROFOUND

Shift from identifying problems to strategically defining your overarching goals. Don't automate a pain point; automate for a purpose. This requires a 20/20 vision of your unique operational DNA, asking fundamental questions about who you are, what you aim to achieve, and how your chosen automation roadmap supports that vision, both today and five years down the line. In a market where peaks are changing and 'no clear winner' exists amongst technologies, the real competitive advantage lies in clarity of purpose, enabling you to cut through the noise and make informed decisions that deliver measurable returns and resilient operations.

Chaper Two

What's hot, and what's not

> **So, what will have the most impact in the next five years? 'Artificial Intelligence' inevitably comes up in discussion, although there is less agreement on how AI will be used, or even what it actually means.**

On the hardware side, while not particularly 'new', 4D shuttle* systems, and free-ranging forms of mobile automation, be they Autonomous Mobile Robots (AMRs) operating independently, or Collaborative Robots* (Cobots) working alongside human workers, are expected to be major drivers of change.

A smaller but still significant number of our interviewees believe that Digital Twins* will have a major impact in the next few years. This of course tends to necessitate some level of AI, or at least of Machine Learning.

Ian Abbott, Director, Solution Development UK / IRE at Dematic, suggests that AI aligns well with the move to improve brownfield warehouses as its worth lies in: "Being able to get live data, to simulate existing or new automation, to see inventory outside the four walls of the warehouse.

"This becomes more and more important for big retailers. They have multiple warehouses across multiple locations, some with automation, some manual – they need to know which to close, which to consolidate, where they can or should use robotics – all this is currently done manually."

* Please see the glossary for a summary of all definitions of the key terms used.

> Automation within the distribution centre will extend out beyond the warehouse walls

*A **4D Shuttle** system goes beyond the automated movement of goods in a racking structure. It uses real-time data, advanced analytics, and AI to create a highly adaptive AS/RS system. It's about making the shuttle system smarter, more efficient, and more responsive to the ever-changing demands of the modern supply chain. This is more of a conceptual advancement of existing shuttle systems, rather than a completely separate technology. It's about applying the 4D warehouse principles to that specific type of automation.*

*A **COllaborative roBOT** (co-bot) is designed to work safely alongside human workers in a shared workspace. They are not caged off and are designed to collaborate alongside people, assisting with repetitive, physically demanding, or potentially hazardous tasks.*

*A **digital twin** is a virtual representation of a physical warehouse, distribution centre, or even an entire supply chain network. The virtual model replicates the physical assets, processes, and systems, allowing for real-time monitoring, simulation, analysis, and optimisation without disrupting the actual physical operations. By creating a virtual replica of the physical warehouse, companies can optimise their processes, reduce costs, and improve customer satisfaction.*

There is, too, support for the view that automation within the distribution centre will extend out beyond the 'warehouse walls' to the information flows for inbound and outbound, although opinions differ on how fast this will happen. There is a view that an 'end-to-end' operation will become increasingly viable and valuable as trade generally becomes further digitalised. The deployment of Digital Twins will be key in enabling this end-to-end view, as traditional systems are challenged to incorporate what's happening outside of the warehouse environment.

Hazel Beasley, Automation Consultant at supply chain and logistics consultancy Hatmill, notes that, while warehouse technology has often been influenced by developments in the manufacturing/production environment, there is now a degree of influence moving in the other direction.

While the options appear vast when considering the ways to automate the supply chain end-to-end, the real challenge isn't merely in identifying the trends and options, but also in integrating them into your overall vision.

OUR ADVICE TO READERS

Resist the urge to chase new technology in isolation. Instead, approach innovation with a clear, application-driven mindset. Understand that AI's power is in its ability to gather information and data from many sources, analyse and produce meaningful conclusions in a time that no human brain ever could. AI can optimise operations and simulate scenarios, making it invaluable for brownfield reinvention and complex decision-making; it's not just a buzzword. Consider the practical impact of mobile robotics – such as AMRs and co-bots – for their agility and ability to work alongside human teams. Furthermore, think about Digital Twins as a critical enabler for true end-to-end visibility, allowing you to simulate and manage your entire supply chain, not just within your facility. The future demands not just technological adoption, but strategic technological integration. Focus on how these interconnected innovations can extend beyond your warehouse walls, streamline information flows, and drive tangible, holistic improvements across your entire operation over the next five years.

Chaper Three

Robots on demand

As automation technologies become both relatively cheaper and better understood they will increasingly be available to smaller and midsized warehouse operators and, as several of our interviewees pointed out, a very large proportion of UK warehouse operators are small businesses both in terms of turnover and capital. Fluctuations in volumes and in customer needs are particularly challenging for smaller operators, so to give them access to the flexibility and scalability they need, and to lower the barrier to entry for automation, or to help operators build on their early and tentative steps into the field, new business approaches are needed.

One of the current buzzwords is RaaS or Robots as a Service*: it embodies the idea that a warehouse operator can scale up or down in response to changing or peak demands by hiring robots ‘as required’, thus avoiding a large initial CapEx. Some of those we asked are optimistic that one or several models for this will emerge and be adopted, but most are rather more cautious – yes, there will be pilots, but they foresee barriers and limitations. Primarily, there are perceived risks inherent in not owning such critical assets. What happens, for example, if the vendor or their finance company goes bust?

* Please see the glossary for a summary of all definitions of the key terms used.

Consequently, gaining internal approval for this approach is expected to be difficult. Larger companies with available free cash may be tending to buy their automation (and warehouses) while contracting a third party to manage the operation, thus de-risking the possibility of failure by an automation partner. At the same time though, **Gwynne Richards**, director at Apprise Consulting, says that “clients are beginning to appreciate the need to give 3PLs longer contracts to allow them to make the appropriate investment in infrastructure.”

***Robots** as a Service is a business model where companies rent robots and automation solutions from a provider, rather than purchasing outright. This typically includes the robot hardware, software, maintenance, and support as part of a subscription-based service. It allows companies to improve their operations and stay competitive without making a large investment in CAPEX (CAPital EXpenditure).*

Meanwhile, the possibility of increased access by SMEs to appropriate and affordable automation with flexibility and scalability may enable them to offer the service levels that customers are used to historically from larger retailers – and to compete on a similar level.

According to **Kevin Price**, **Logistics Consultant** at Dematic, “80 per cent of the projects we are talking about are not entry level, but in the middle, with companies looking to add automation incrementally in a scalable, modular fashion.”

Claire Charlton is **Head of W2**, the Wincanton Innovation Programme, and suggests that, while some clients will be in a position to allocate capital upfront, others might not be able to make that commitment. This is where 3PLs can step in to bridge the gap,

“if 3PLs can offer flexible solutions that multiple clients with differently timed peaks can share, we can put the investment in and charge back, so we become ‘pay as you go’.”

In effect, this becomes more of a Warehousing as a Service (WaaS) model, rather than pure RaaS.

For RaaS to become a norm, however, the industry must change. **Abbott** says, “This approach is still emerging and evolving for many technology providers, except perhaps some of the shuttle manufacturers with standard products, who can manufacture them to stock rather than by the project, and can monitor performance, adding or subtracting units and even providing maintenance cover.”

Blended technology

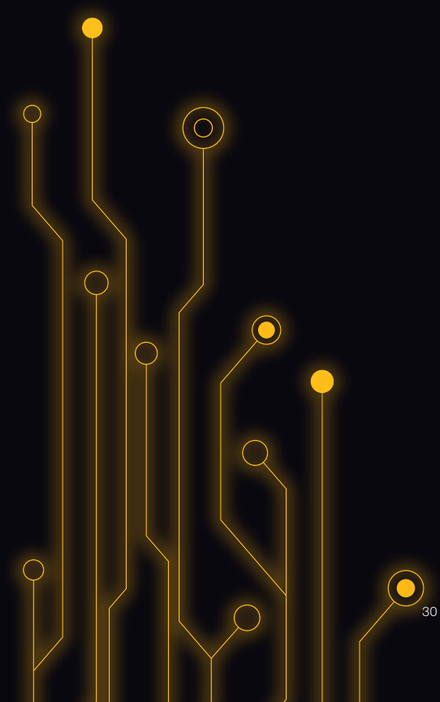
A required market development, suggests Riley **of DHL, is 'blended technology', taking the most appropriate elements of older-style fixed technologies and the newer, more flexible, solutions to suit individual circumstances: "It's taken five years or more to get blended technologies, and I'm staggered that progress hasn't been faster. We've had RaaS models in our organisation for six years, but we look at what is the best technology for the case, based on contract lengths, nature of the site and so on. It may be that if this is a fairly static location, fixed automation that will run for 20 years is the answer."**

This aside, many businesses of course cannot sensibly forecast that far ahead. So, some element of RaaS may be appropriate, but that doesn't necessarily imply a full-blown '4D shuttle' system or the like.

"It may be that a gated AMR or hybrid approach is the way – it doesn't offer the density or throughput of a full shuttle system, but it is still better than having people walking around and may hit a sweet spot for ROI," says **Riley**.

Best of both worlds: fixed AND flexible

By using the ‘engine’ of a shuttle system and taking the best of both worlds, one could avoid some of the capital expenditure. A business could, Riley says, use some fixed automation, some parts of the operation might use shuttles, complemented by a core fleet of robots (rented or purchased), with additional shuttles or AMRs leased for the peaks.



Dave Berridge (Emkat Solutions/AMHSA) points out a potentially serious flaw in the RaaS case, in that the idea that the customer is ‘only paying for the time that they use the units’. This isn’t strictly true. **Berridge** says: “Most people’s peaks, and therefore when they want to rent their robots, happen at the same time, for example; Christmas. But somebody has to pay for the rest of the year when the machinery may just be sitting in a warehouse.”

Head of Automation, **Obinna Njoku**, totally agrees:

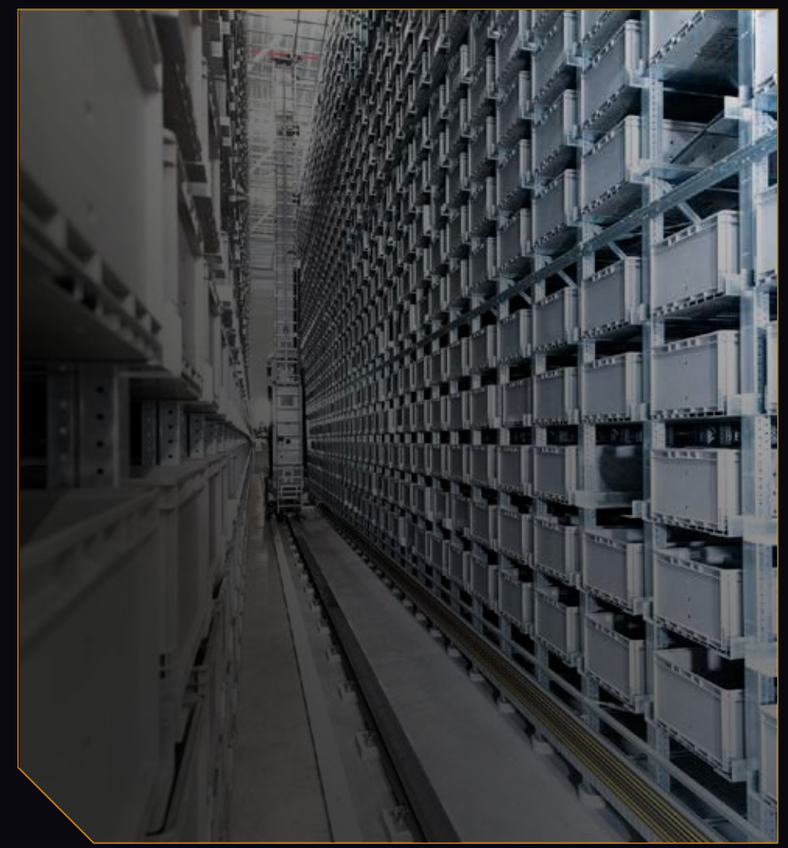
“Beware of the Total Cost of Ownership. While RaaS reduces the initial outlay, the cumulative subscription fees can exceed the cost of owning the equipment outright.”

At UKWA, **Clare Bottle** concurs:

“RaaS will be a good way to pilot, but scaling up towards ‘fully automated’ can quickly become quite expensive. It may be that RaaS is *one of* the models to meet short term/peak requirements, but firms may need to consider different finance options for scaling up.”

And while the RaaS model “sounds great”, **Berridge** cautions that the apparently low barriers to entry for the new technologies may be illusory. As the market is commoditised by basic but low-cost units from Asia (as has long been the case with older technologies such as powered conveyors) it may well be that, as **Berridge** says: “you can have them running around by tea-time but actually integrating them into the rest of the system may not be quite so easy.”

While we’ve explored the potential of “Robots as a Service” (RaaS) for accessible, flexible automation, especially for smaller operators, this model also highlights significant cautions. While RaaS offers appealing flexibility and reduced upfront capital expenditure, challenges include perceived risks of not owning critical assets, and – more importantly – the potential for cumulative subscription fees to exceed outright purchase costs in the long term. Our experts warn that the true cost and integration complexity of RaaS models can be underestimated, particularly when everyone faces similar peak demands.



OUR ADVICE TO READERS ON RaaS

Approach “on-demand” automation models with caution. While they offer flexibility for pilots or short-term needs, a long-term strategy demands a nuanced blended approach: combine appropriate fixed automation with modular, flexible solutions (like AMRs or a core shuttle fleet) based on your specific operational needs, growth projections, and contract lengths. Think about how to ensure robust integration over perceived low entry barriers to ensure genuine resilience, cost-effectiveness, and ROI when considering RaaS as a building block in your automation strategy. If you’re an SME looking to take your first moves into automation, consider your options for WaaS with a 3PL and make sure you’re clear on the long-term costs for such.

Chaper Four

The rise and risk of AI and Digital Twins

We found a divide amongst our interviewees between enthusiasm and caution on the question of Digital Twins (DTs). Some say 'absolutely – we will be using a DT in the next five years' or are indeed already using one (let's face it emulations are not new), but the other half or our interviewees consider it theoretical only.

On DTs, **Riley** says that "definition is critical, and there is no real agreement." DHL's view, **Riley** moots, is that DT's aren't primarily about simulation/ emulation, instead, **Riley** says they are about: "changing real-time decisions based on predictive, scenario-based analytics."

Riley continues: "If you can't act on the DT output to make a real-life difference, then it is not doing its job. But if you can optimise, for example, the Warehouse Control System in real time, then that could have a fundamental impact." **Riley** says he is seeing 'proofs of concept' and expects DTs to become significant within the next five years.

For **Abbott** the goal would be, "a straightforward way of representing the warehouse in a theoretical world, whether that's using old tech, new tech, even manual operations. What you see in the warehouse is what you see on screen, and then you can simulate, emulate, perform predictive analysis and the rest."

Hazel Beasley (Hatmill) says they have been looking in detail at DTs for a few years: "We've seen quite a few trials and it keeps making progress – we haven't seen it widely rolled out, but that feels imminent." Beasley adds that there is a potential problem, as indeed with any AI based system, in that: "they can analyse the data very quickly, but when you put loads of information in, how do you check the validity of the outputs – or do we just blindly believe a system that is going to change things in real time?"

The power of Digital Twins

Nonetheless, Dematic's Dakin regards the prospect of digital twins as: "super exciting. They are so powerful they will make faster and better investment decisions and mitigate the risks of automation by showing what real outcomes will be."

Divergence of opinion about Digital Twins may simply be because early and successful adopters haven't been saying very much – if it is a real source of competitive advantage, you wouldn't, would you? But **Obinna Njoku**, for one, admits that, "Yes, we have a working digital twin covering several facilities. We use it to model flows, test process changes, and identify bottlenecks." **Njoku** believes that the digital twin needs to go beyond the 'four walls' of the warehouse: "Build a digital replica of the whole supply chain – model all the components: warehouses, transport, suppliers, operations and finance. The way I see it you can only truly understand and control your cost-to-serve with accurate digital twins and they will also help uncover productivity opportunities across people, processes and technology."

> You can only truly understand and control your cost-to-serve with accurate digital twins and they will also help uncover productivity opportunities across people, processes and technology.

There is a snag, though, for ‘non-digital-native’ adopters. The likes of Amazon have been designed from the ground up with the right equipment, workflows, productivity trackers to build a ‘data-first’ culture – and crucially that includes metrics on human performance elements. Although manual operations can vary somewhat, as **Njoku** explains: “We know how long it takes someone to do a task, what tasks new hires are likely to be able to do, or where they may fail, how long they will take to train – and the LLMs (Large Language Models) will help provide the big data insights that we can use anywhere from shift-level strategies to full transformations.”

As to whether information technologies such as AI and DTs will help address labour shortages, there are some enthusiasts but most of our interviewees said the likely impact is not going to be significant. “The issue is human knowledge: you cannot replace human experience with AI. It may alleviate some simple tasks but that’s about it,” **Dakin** says.

AI powering technologies such as Digital Twins is a different proposition. Our interviewees are united in seeing the potential for significant productivity improvements of automated and manual operations by employing the analytic and modelling capabilities of AI-enabled DTs.

Looking at Wincanton’s innovation and incubation experiences, **Claire Charlton** says that AI is: “not just a buzzword – classic AI has been used with vision systems, for example, for a while. It’s not mature yet in our sector but it can’t be ignored. Machine Vision is starting to be used in practical applications such as packaging sizing and damage detection, and AI/Machine Learning is affecting areas as diverse as warehouse layouts, pick sequencing, transport optimisation, demand forecasting and dynamic pricing.”

As for Digital Twins, **Charlton** says that while they are still emerging in our sector, “they will come out of the hype cycle,” but “we will need ‘warehouse scientists’ who are able to understand the DT output and implement the right actions.”

While “the technology landscape has moved really fast,” **Charlton** says, there are still big issues around siloed and legacy systems (not just WMS, TMS etc. But also systems such as payroll), and a whole piece about data sharing, where there is a lack of standards. **Charlton** adds: “We have to sort out the foundational data issues, otherwise we may just be adding cost without achieving the savings.”

As **Gwynne Richards** (Apprise) notes:

“We talk about ‘plug and play’ to companies where people are still typing orders in by hand!” There’s clearly a huge gap between these extremes, highlighting just how many practical and cultural hurdles stand in the way of such a fundamental operational transformation.

Optimistically, **Clare Bottle** at UKWA wonders if Digital Twins and AI mean that,

“we will never again have IT implementation horror stories. Can AI write, and DT test, the sophisticated interfaces we need that will also allow us to retain the legacy parts that we value? That could be a real win.”

While there’s strong enthusiasm for the potential of Digital Twins, caution exists regarding clear definitions, actionable output, and integration challenges. Our experts define DTs not just as simulations, but as tools for real-time, predictive decision-making across entire supply chains, enabling better investment choices and risk mitigation. However, concerns persist around data validity, integrating with legacy systems, and the need for skilled staff to interpret complex outputs.

OUR ADVICE TO READERS

Embrace Digital Twins with a strategic, rather than speculative, mindset. Define precisely how DTs will drive *actionable* improvements in your operation, extending beyond warehouse walls to model the entire supply chain for cost control and productivity. Consider how to prioritise your data strategy: address siloed and legacy systems, establish data standards, and ensure you have the talent – warehouse scientists – to interpret DT outputs effectively. While DTs may not directly solve labour shortages, they may offer significant potential for optimising both automated and manual operations, ultimately delivering measurable productivity gains.

Chaper Five

Going local

‘Meeting customer expectations’ came consistently high in our list of drivers, and for many companies to do that at an acceptable cost-of-service means holding stock closer to the consumer or end-user and thus minimising the expensive ‘last mile’. One approach we explored is the Micro Fulfilment Centre (MFC)*, or Urban Fulfilment Centre (UFC)* concept.

The MFC concept, says Dematic’s **Abbott**, “Lends itself to retailers with multiple platforms and multiple styles of fulfilment, who need to maintain a wider range with greater density of inventory that would normally be in different channels, bringing them closer to local markets to improve reaction time.”

As **Hazel Beasley** notes, “In large cities MFCs can make a lot of sense, but they don’t work in rural areas. Some businesses have moved to MFCs and then come away again.” Perhaps this may be because the volumes weren’t there post-Covid. “It’s about finding the right tech at the right scale in the right locations, and automation technology needs to catch up with the need, because final mile costs are so high that they will drive change,” **Beasley** adds.

* Please see the glossary for a summary of all definitions of the key terms used.

Examples of companies with some success in MFCs, suggests Dematic’s **Dakin**, are grocery retailers, such as the likes of Tesco. **Dakin** notes some typical figures for automation in an MFC of 900 orders a day with a peak rate of 700 an hour, compared to manually, just 500 orders a day peaking at 190 an hour: “If a business has these volumes, automation in MFCs is something to look at.”

Abbott reports that Dematic continues to receive enquiries about using automation such as AMRs in MFCs. Pharmaceuticals is one sector showing interest in this, in part perhaps, because of government proposals to boost the role of local pharmacies.

Other approaches to the ‘last mile’ problem receive less support – our experts struggle to see either the practicality or the business case for ‘solutions’ such as drones (although Amazon is proposing a trial in Darlington), or autonomous ground-level delivery robots such as are being trialled in Milton Keynes in UK conditions, save for some specialist applications in, for example, the health sector: factors from the nature of housing to the state of the roadways are serious challenges as the infrastructure really is the key barrier here.

Micro-Fulfilment Centres (MFCs) *are typically smaller and more automated than UFCs and may even be located within retail stores. Essentially the MFC is a miniature version of a traditional fulfilment centre, strategically located closer to the end consumer and/or retail stores.*

Urban Fulfilment Centres (UFCs) *are often larger and serve a wider geographical area within the city, potentially acting as a regional hub for several MFCs or handling a broader range of delivery options. A UFC could contain several MFCs.*

Small scale, replicable technology

Small units on industrial estates, typically edge of town, can often accommodate suitable small scale and replicable technology. Former department stores in urban centres is one such option. Njoku **notes that reuse of empty buildings is likely to be encouraged by planners – new build not so much – as: "there are systems that can be installed, with off-the-shelf software for relatively low cost. These would be 3PL run facilities with multiple tenants and high and flexible automation so as to hit cost parity or better.**

"The role of the 3PL is critical – the complexities with tariffs [on exports] and moving things globally are considerable and if this isn't your core business; give it to 3PLs. They can help you predict your supply chain costs better so you can be more secure and resilient."

Another issue raised is the potentially excessive amount of technical and engineering support needed to ensure an MFC is operational 24/7, compared to the amount of trade it is handling.

There is a potential conflict between the MFC and UFC which may affect levels and types of automation. Individual companies such as the large retailers are interested in MFCs as a way of gaining competitive advantage through lower last mile costs, better customer service, or both. But UFCs are of interest to municipal authorities who want cleaner air, fewer carbon emissions and less congestion by reducing the incidence of large trucks in urban areas, and are therefore looking at shared user models, rather than the exclusivity that a big retailer might want from their own MFC.

However, that might change. **Ruth Waring**, Director at RW Consulting, believes business may be moving to more of a 'win-win' rather than 'zero-sum' attitude, allowing greater levels of collaboration between companies, in multi-tenancy propositions from 3PLs, and elsewhere.

One way this might pan out is in the willingness of companies with own account warehousing – or underused space in the back rooms of their High Street shops – to offer spare space and facilities to other users, permanently or seasonally, which could provide an income stream that helps support automation investment. Indeed, brokerages in this field - one sometimes referred to as on-demand warehousing - already exist and, as **Bottle** points out, “shared user has a long history.”

This all feeds into wider issues around warehouse space. **Bottle** reports that UKWA’s real estate contacts claim the 300,000 square foot warehouse “is the least attractive – firms either want much bigger warehouses or quite a lot smaller.” There are companies who are looking to co-locate some manufacturing tasks with their warehousing; those who need to create ‘trade desk’ facilities closer to markets; those who (not so much in groceries but in ambient FMCG, for example) want to create pick-up points for their couriers to optimise last mile delivery. **Bottle** notes a report* by Potter Space and estate agents Savills which claims that the economy is being held back by the lack of smaller warehouses for these markets.

The drive to “go local”, fuelled by customer expectations and the high cost of last-mile delivery, is powering exploration of models such as MFCs and UFCs. While they offer advantages for high-volume urban environments and specific sectors, their practicality is highly dependent on business type, market, and scale. The critical role of 3PLs in offering flexible, shared-user “Warehousing as a Service” models, balancing individual company needs with municipal goals, is a clear factor in breaking down the cost of that last delivery mile.

OUR ADVICE TO READERS

Strategically assess the benefits of localisation on customer service and last-mile costs. Evaluate models rigorously based on your *specific* volumes, market, and geographical context – they aren’t universally applicable, and a clear picture of your ideal outcomes is key. Consider exploring small-scale, replicable automation solutions for local hubs, and 3PL partnerships for managing complexity via flexible, shared-user models; you can, *and should* mix and match models to get the most optimised distribution network in place. Beyond technology, do factor in real estate trends and planning implications when looking at opportunities to achieve cost parity and meet changing customer demands.

*2024 Report BIG things in SMALL boxes 2024 Report
https://pdf.savills.com/documents/BIG-things-in-SMALL-boxes-2024-Report-nov-24.pdf

Chaper Six

Into the dark age?

> **It seems unlikely that shared user facilities will be natural candidates for ‘dark’ operations – too many different operators with different, and possibly short term, requirements which cannot economically be automated. More generally, the jury is out on whether labour costs and shortages will drive the adoption of ‘dark warehouses’. For a few this is already a reality, at least in some areas or on some shifts, and quite a number are at least thinking about it.**

But there are also quite a few who still expect to require a significant warehouse labour component for the foreseeable future – **Riley** of DHL estimates that, “95 per cent of companies don’t have such a uniform way of operating that would lend itself to a totally dark warehouse*.” Unless you’re in the five percent that run a full pallet in, full pallet out operation - that could work. And **Bottle** adds: “I can imagine a fully dark warehouse – but not in my lifetime!”

* Please see the glossary for a summary of all definitions of the key terms used.

Nonetheless, automation head, **Njoku** maintains that, “If the annual cost to hire (that is, including employer’s costs as well as salary) creeps beyond 60-70 thousand pounds or Euros, once you crunch the numbers, this drives innovation – and that is already the employment cost in Europe for a forklift driver. This will drive the emergence of the dark warehouse: indeed, they are already operating in several areas. But the challenge is whether they will be completely dark – for the next 10 years we are going to need maybe 10 people running it, four or five per shift, and we will still need maintenance staff, but beyond that we will see how they can be completely dark.”

There are also some perhaps unexpected stumbling blocks – **Hazel Beasley** (Hatmill) identifies automated trailer load/unload as one such: “they keep working at it. It will happen, but when?” **Abbott** agrees that, “load/unload is fraught with difficulty. We can automate to the door, and then we still need someone to push the roll cages into the back of a van.” Another mundane task with which automation struggles is removing the ubiquitous stretch-wrap.

Interestingly, if dark warehouses are adopted, the labour/skills gap issue resolution is not the most pressing issue impacted, more importantly they will bring overhead reduction and increased supply chain efficiency. Our discussions highlighted dark warehousing would most likely not shift jobs to other areas, however, but instead would have improvements in worker safety, which is seen as a huge positive. The actual headcount reduction seems not to be not uppermost in the thinking nor a major driving force behind adoption, although there is an undeniable benefit in terms of reducing labour costs and easing the pressures on recruiting hard-to-find staff. The issue is a difficult one to unpick and is different for different industries, applications and supply chain models.

For some, “dark warehouses” are a contentious topic and can mean anything from human intervention being minimal, to completely absent. While unlikely for shared user facilities, their broader adoption is heavily debated. Despite this, some are already in operation, and other facilities today operate partially or fully dark shifts.

The major hurdles still exist in terms of automating tasks like trailer loading/unloading and stretch-wrap removal, combined with the fact that and many experts anticipate a continued need for human labour, particularly for complex or varied operations. Until automation can emulate the human factor and overcome these issues it’s unlikely we will see much movement on this front – then expect progress to be rapid. For the short term, we expect dark warehousing to operate in its niche with standardised loads within a full pallet in; full pallet out model.

OUR ADVICE TO READERS

Consider your approach to the dark warehouse within your long-term vision. Focus your automation strategy on maximising efficiency and reducing overheads. There are many technologies that address specific, high-cost manual tasks that can be taken advantage of, that come from the dark warehouse model, without having to go fully dark if it doesn’t suit your needs. Even highly automated facilities will likely require human oversight and maintenance for the foreseeable future, making the transition to “dark” a gradual evolution driven by genuine operational need, only reaching the tipping point on technological maturity. But if you do operate a standardised 1-in-1-out pallet model then it may well be worth you exploring the advantages of dark warehousing in your supply chain today.

Chaper Seven

Rise of the co-bot

> **Mention of worker safety raises another interesting issue for automation, as** Dave Berridge (Emkat Solutions/AMHSA) **points out. Given that few operations are ever going to be fully 'dark', 'co-bots' [collaborative robots] working alongside humans are clearly going to be a significant factor.**

The philosophy behind the European Union Machinery Directive, now being rewritten into a Regulation, is that machines need to be separated from humans by a 'big fence' and usually a physical, rather than virtual, barrier – somewhat taking the "co" out of co-bots. "But many organisations say we really want to put someone inside the fence!" says **Berridge**. It might be thought that the use of AI and sensor systems is the answer to this but, as **Ruth Waring** (RW Consulting), notes: "AI in accident prevention is great – but there are so many false positives. It is so sensitive – and so "stupid" – that further training of the AI model is required in order to generate usable data."

A related concern, suggests **Riley,** is that, "The automation market isn't necessarily thinking about the efficiency of the people that are left – the need for them to be made as efficient as possible even after you've spent money on automation." Automation teams don't always see this, **Riley** feels but, he adds: "we have to see past the fun bit of putting all the new metal in, and focus on the years of operating it. We should be buying automation, not just for its own sake but to get the best out of our remaining people."

While AI and sensor systems show promise for safety, the current limitations with false positives will negatively impact efficiency and, therefore, hold up their rollout. Critically, our experts debate that automation strategies often overlook the efficiency of the human workers who remain, emphasising the need to ensure new technology enhances, rather than just replaces human productivity.

OUR ADVICE TO READERS

Co-bots are not a shortcut to full automation — they are a bridge. Their value lies in flexibility, human enablement, and the data they generate for smarter, more resilient operations. Understand the safety regulations and actively explore how future technologies and operational models can bridge the gap between compliance and seamless collaboration. Ensure your automation investment empowers your workforce, maximising their output and overall operational effectiveness. When deploying co-bots, it's not sufficient to just select an automation task and deploy a robot. Success lies in the human-robot relationship: operators must trust the co-bot, be trained and involved in the workflow redesign, and the co-bot must be instrumented and integrated into the broader control ecosystem. This means rigorous task selection (volume, variability, ergonomics), modular and re-deployable design, real-time data capture and analytics, and alignment with systems and workflows. When these elements come together the promise of co-bots (flexibility, productivity, improved ergonomics and quality) can be realised.

Chaper Eight

Mind the [labour] gap

> **Although it seems from our conversations that the labour situation is not quite the all-powerful driver of automation that is sometimes claimed, it is clear that the interaction between automation and the labour market is many-faceted. As** Riley **notes earlier, there is the opportunity and need to elevate the productive performance of remaining manual operators. Meanwhile, increasing automation will require new skill sets, be they in hardware maintenance, software development, or business process understanding. The industry may also feel some sort of moral obligation to the floor workers that are displaced by automation.**

There are similar issues right across the supply chain, and solutions will require industry wide, government supported action.

Dave Berridge of Emkat Solutions/AMHSA points out that there are already higher-level skills shortages affecting warehouse automation projects, from multi-skilled engineers and maintenance staff to systems integrators. **Berridge** says:

"This is good news for integrators offering maintenance contracts, as they can recruit by offering career paths that aren't available in any but the largest end users."

That is why AMHSA has been promoting the apprenticeship programme for integrators – which Dematic is supporting. "We have a duty to the future," says **Berridge.** "There are exciting opportunities and higher skilled jobs being created in AI, IT, robotics and so on, and we must meet the challenge of getting young people into the industry."

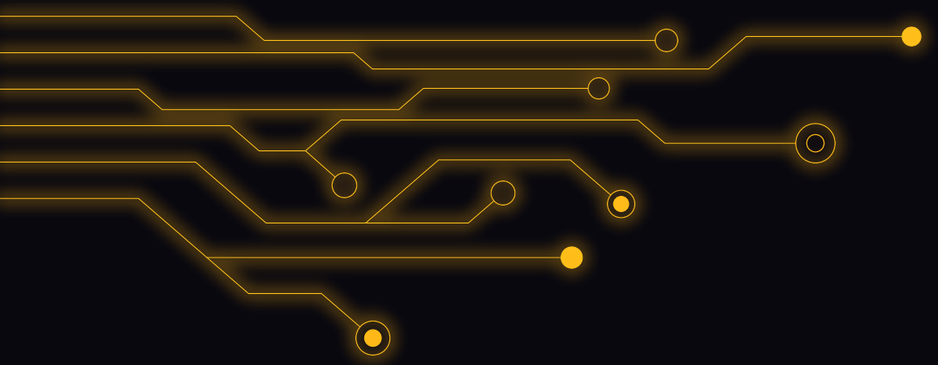
Dakin at Dematic speculates that young people might relate more to increased levels of automation while **Riley** points out that DHL along with other major logistics companies has academies and apprenticeships to upskill warehouse floor staff to engineering and other roles.

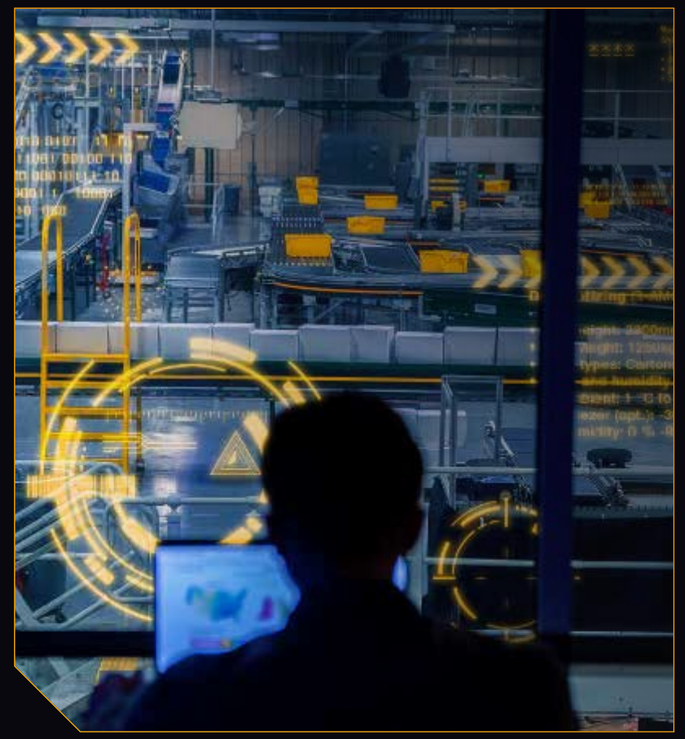
Abbott agrees that automation has often 'deskilled' the roles of staff that remain but perhaps surprisingly, "a lot of people show aspirations to understand and manage these systems. So maybe we shouldn't aim for fully lights out, but get people involved in and responsible for running the system?"

Dematic's Kevin Price goes on to suggest that, "Fulfilment centres are now in the equivalent position to that of production lines 10 or 15 years ago. There is the same emphasis on high availability and uptime, and the same sort of technical skills are required."

There is an irony in that the shortage of labour for ‘warehouse floor’ roles will promote the adoption of automation that could make many of the existing workers redundant. In his role as Head of Automation, **Njoku** notes that, “As automation and advanced technologies reshape warehouse operations, there is growing consideration around workforce evolution. While many organisations are investing in upskilling pathways to help operational colleagues transition into technical and engineering roles, there remains a broader industry question about future workforce structures and opportunities. It will be important to develop thoughtful policies and reskilling frameworks to ensure employees are supported through this transition and can access new career pathways as automation matures.”

At UKWA, **Bottle** says that: “There have to be entry level jobs that are easy for people to enter – they aren’t going to go straight in as managers.” Nonetheless, **Bottle** maintains that there are lots of examples of warehousing as a promoter of social mobility and she cites examples of logistics companies working actively with ex-offenders, or with people with autism. But **Bottle** is concerned about the direction of various government-backed schemes over the years. “They are always harping on about functional skills by which they mean Maths and English, but that is completely outdated. Yes, being good at Maths and English makes life easier, but for accessing a job, being digitally literate is far more important. We need to update our thinking on what constitutes core functional skills.”





Gwynne Richards from Apprise Consulting agrees that, “One of the big challenges is the shortage of technicians, engineers and software developers. We must be able to back our technologies with skilled people, and I meet companies who are really struggling with that.

“There is career progression available but it’s down to companies to provide that training – although government could give more support. We have to have a ladder in place to enable people to become the warehouse managers and technicians of the future – hence, for example, the importance of the Warehouse Managers’ CPC course.”

This is demonstrated by UKWA today, as the organisation is working with the Royal Academy of Engineering to introduce young engineers and technicians to the challenges and opportunities in high-tech warehousing (among other workplaces).

> “For accessing a job, being digitally literate is far more important.”

This problem – of a shortage of labour that nonetheless risks becoming redundant – extends throughout the supply chain, not just within the warehouse, and is a challenge that needs to be met by the entire sector working together. Automation alters required skill sets, creating a demand for new technical roles like multi-skilled engineers and system integrators. Subsequently there’s a recognised need and opportunity to upskill remaining manual operators, though generational shifts can make this challenging. There’s a strong spirit of advocacy for apprenticeship programmes, academies, and updated functional skills training (emphasising digital literacy) to prepare a new generation for high-tech warehousing roles.

OUR ADVICE TO READERS

Proactively address the evolving skills landscape within your organisation. There are pathways to develop and upskill your existing workforce into new technical and operational roles required by automation. Recognise that automation can transform job roles, requiring investment in training for digital literacy and technical skills. There are options to collaborate with industry bodies and educational institutions to foster a pipeline of new talent, ensuring the UK’s supply chain sector has the expertise needed to support increasingly automated operations.

Chaper Nine

New risks and unknown unknowns

> **A problem with conversations of this nature is that people are inevitably focused on the risks and issues that are already apparent. As anyone in a supply chain knows after the last few years, supply is very much a 'tale of the unexpected' – Covid, the Ukraine war, ships going sideways in Suez, and all the rest.**

Of course, not all of these 'unknown unknowns' will permanently alter the environment for warehousing and automation, but some will, sometimes subtly. We noted earlier the perceived need by many companies to hold more stock 'in country' rather than depending on JIT (Just-In-Time) delivery from Asia – and some of course are re- or near- shoring their sourcing. This inevitably affects volumes and flows through the warehouses.

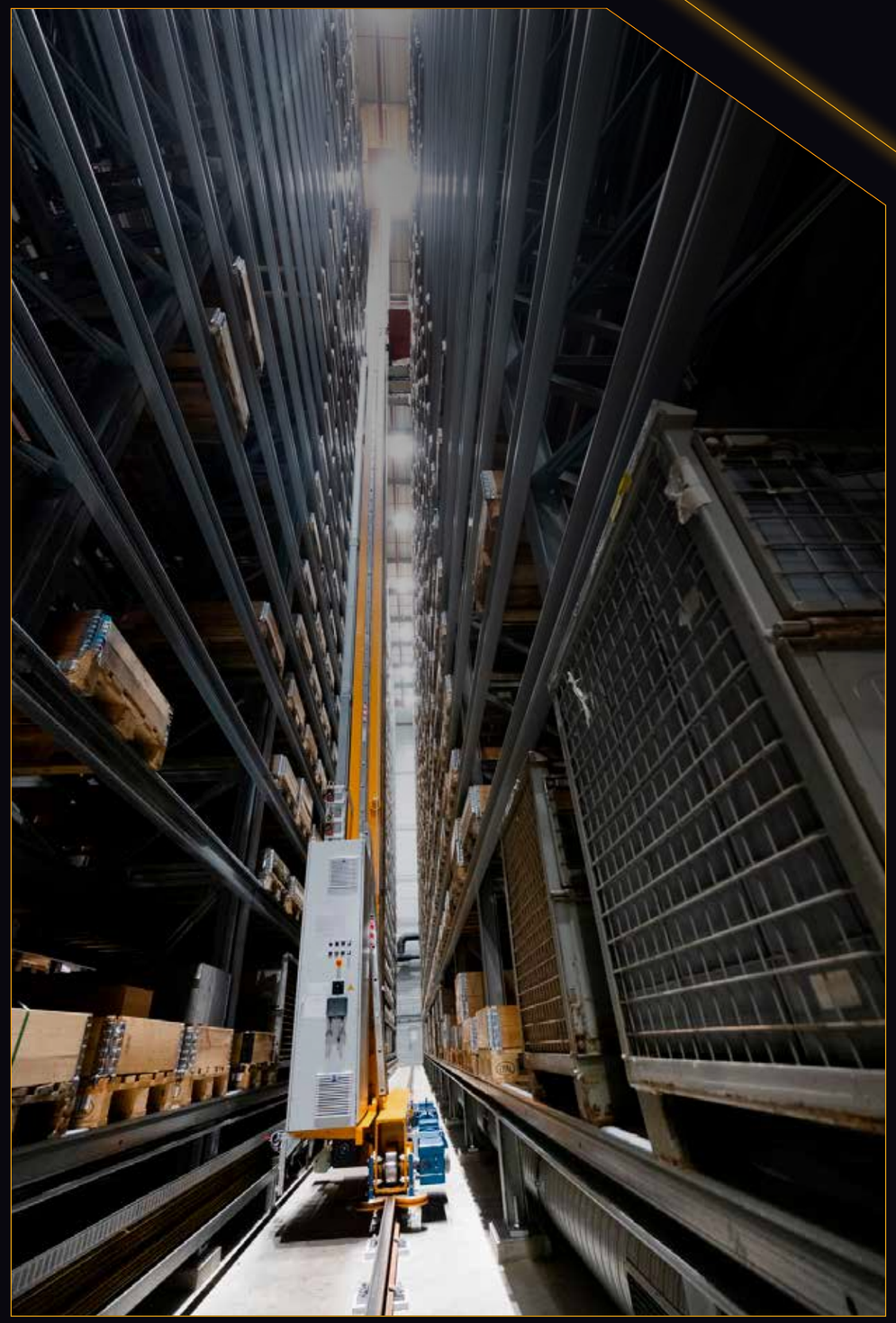
The supply chain has its own supply chain, independent of the goods that flow through it, and there are other risks out there for the automation sector and its customers. Sourcing automation from 'lower cost' countries raises a potential red flag for **Ruth Waring** (RW Consulting). One risk is that volume production will commodify the product and suppress further innovation. Another is that as we become increasingly dependent on sophisticated automation, we are also dependent on supply chains for everything from Lithium batteries onwards that depend on a few companies or countries that aren't necessarily playing by the old post-war rules. Secure energy supply for all the AI and other systems is also a potential issue that people haven't got their heads around. "Risk mitigation has all been carried out using the old ways of doing things," **Waring** fears.

Waring sees whole new categories of risk to which supply chains generally, and automated systems in particular, might be vulnerable – from the continued availability of cheap batteries and other parts for all those shuttles, to the threat hackers could pose to the dark warehouse or its digital twin. **Waring** goes on to explain that, "billions are being put into 'open source' models, but actually control is incredibly concentrated. They are available and free – until someone doesn't like you anymore. There are unknown unknowns, like the fact that we're all using tech that only 50 people in the world understand." Covid, **Waring** suggests, revealed the shortcomings of traditional approaches to risk assessment but, Waring believes, "some of the people in charge still haven't got their heads around this minefield."

The core message is that traditional risk assessment methods are at risk of becoming outdated, and many leaders are yet to grasp these new "unknown unknowns".

OUR ADVICE TO READERS

Your past approach to supply chain risk mitigation strategies may need to change. Critically evaluate your supply chain for dependencies, geopolitical vulnerabilities, and security implications. Diversify sourcing where possible and understand the true ownership and control of technologies you adopt to develop robust cyber resilience plans. If you can move beyond reactive responses to unforeseen events, you can build a resilient and secure operation against a backdrop of complex, rapidly evolving global threats.



Chaper Ten

Cost and consolidation

Many in our research expect cost conservation to become even more important, and likewise they expect multi-site operators to spend to consolidate into less real estate. Paradoxically this isn't expected to create a raft of empty warehouses, but our respondents do expect to see a lot more automation going into existing brownfield sites, as opposed to new build.

Says **Njoku**: "Consolidation and new fulfilment models will certainly reduce the number of single-tenant warehouses, but these spaces are more likely to be converted into multi-tenancy facilities, micro fulfilment hubs or Warehouse as a Service than to remain empty."

The need to 'do more with less' will, most of our interviewees believe, further drive the rise of the high density 4D warehouse*. '4D' implying a 'smart, connected and automated warehouse that uses real time data and predictive analytics to optimise operations and respond dynamically to changing conditions' – in other words, incorporating the dimension of time to envisage and change the future rather than just making decisions based on a static 'as is' picture.

* Please see the glossary for a summary of all definitions of the key terms used.

That in itself could have some interesting side-effects. Many in our panel of experts expect to see a further polarisation in the market between operators of very big DCs and much smaller, perhaps niche, providers. Equally though, **Hazel Beasley** (Hatmill) sees continued growth in demand, especially from SMEs, for third party and short-term space. **Beasley** says: "Shared space in multiple-client 3PL facilities, and the increased affordability and availability of small-scale automation, will open up automation for smaller companies, and this approach will become more 'normal' and standardised."

Njoku's view is similar, "If you want your own high-bay warehouse it costs you around £1,000 per pallet location, so a 50k location high-bay warehouse is £50 million. Before I commit to this I want to see if I can just rent and see what the next couple of years look like. That's OpEx which I can write off as a business expense, and spend my CapEx on things that will yield far higher returns. So, looking at our mix of 3PL facilities, they are mostly multi-tenanted because there may not be the demand or volume to fill the whole facility."

Cost conservation could drive consolidation into less real estate, but primarily through denser utilisation of existing brownfield sites rather than new builds. This will further push the adoption of high-density "4D warehouses".

OUR ADVICE TO READERS

Make sure to seek out opportunities to learn about the different routes to automation available to you – particularly from other organisations in a similar position. First, think about how to maximise space utilisation and operational flexibility within existing footprints. Then consider the future and if/how you see the high-density "4D warehouse" as having a role in future-proofing your operations, with its real-time data and predictive analytics. For automation investments, assess the OpEx vs. CapEx balance; it may well be that renting space or utilising a "Warehouse as a Service" model gains you considerable agility and conserves capital for future ventures. Explore options for multi-tenancy, shared-user models to provide a pathway to efficient automation if you're an SME, as this approach is likely to become increasingly standardised and crucial for market competitiveness.

Chaper Eleven

Death of the crane?

Do the models we've looked at in this report so far mean that the 'death of the crane' is imminent? We don't think so just yet – we still see demand going forward for particular situations but undeniably stacker cranes and miniload systems are no longer the 'go-to' technology. That is only partly because more flexible and intelligent alternatives have been developed. According to Dematic's Ian Abbott: **"One of the reasons for this approach was battery technology – you simply couldn't have created shuttle systems 30 or 40 years ago: they would have been drained in minutes – so we had to have automation that was permanently 'plugged in'."**

"...I've been trying to kill off the crane for five years!"

Riley at DHL claims he has been, "trying to kill off the crane for five years!" But **Riley** and others acknowledge that this isn't going to happen any time soon.

"We want to build solutions for our customers with as much flexibility as possible, but we need to ask 'How well do you know your business? How comfortable, at Board level, are you that current projections will still apply in two, four, six years? There used to be a simple binary manual/automated decision – now there's a sliding scale depending in part on how locked in you are to your forecast. We could pitch technologies that offer a 20 per cent productivity improvement, ROI of six years and it will work for seven or eight before you move on. Or if you see your business as essentially stable and static, there might be a more old-school solution that will last you for twenty years."

Or, **Riley** suggests, businesses might start with ‘gateway’ products, islands of automation and then move up, say from palletisers to AutoStores, and then picking robots and so on.

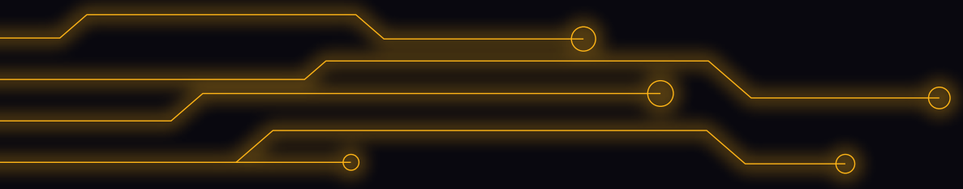
Berridge at Emkat Solutions/AMHSA concurs that in UK&I, and indeed across Europe, the pallet crane market is gradually declining; miniload solutions have plateaued, and shuttle systems are rising quickly. But while 4D shuttles offer resilience and accessibility and can ‘play tunes’, “they are not necessarily a revolution; more an evolution.” Also, as **Dakin** points out, “The market is moving towards more flexible fulfilment, so it needs faster implementation and a quicker ROI.” Cranes are widely regarded as inflexible; whereas shuttles may offer extra flexibility but tend not to be quick to install.

Hazel Beasley (Hatmill) notes: “There is still a demand for ‘legacy’ automation – there are many companies that see ‘end-of-life’ as twenty years and are happy with their style of embedded automation because ‘that’s what we do’.”

We have found that both shuttle systems and AMRs have, in slightly different ways, disrupted the markets for cranes and mini-loads. Though it’s clear to see they are still required in the market for specific, stable situations; fixed automation appeals to companies with very stable operations and long-term asset lifecycles.

OUR ADVICE TO READERS

Avoid a rigid “either/or” mentality when considering automation. Assess your business’s operational stability and future predictability to determine the level of flexibility required. Don’t dismiss established technologies like cranes if your operations are genuinely stable and long-term. Conversely, explore “gateway” products and modular approaches with shuttles and AMRs if flexibility, faster implementation, and quicker ROI are paramount. The key here is to match the automation technology to your operational reality, balancing upfront investment, and expected lifespan, with the level of flexibility your business demands.



Chaper Twelve

Great [consumer] expectations

For retail-oriented warehouses, changing consumer expectations will continue to affect automation strategies. Although the distinction between retail/B2C and commercial/B2B operations is becoming increasingly blurred – 'trade desks' becoming available to ordinary consumers, while commercial customers switch to smaller but more frequent ordering, rather than 'by the pallet load'.

In particular, the demand for same-day (or even quicker) delivery isn't going away, nor albeit to a lesser extent is the requirement for rapid returns procedures. All night shopping, and high-street 'dark' retail stores might appear to be appropriate options on the face of it, but our interviewees have a slightly different take.

Njoku cites an AutoStore system installed for The Hut Group in Warrington, which offers midnight cut-offs for next day delivery, and says,

"The answer to 24-hour shopping is the right system that can cost-effectively fulfil that order. You can increase revenue if you have the right tech stack from the website feeding into your order management system. Then it's about how you pick, pack and ship; whether you have the right distribution network to help you do this last mile delivery. But if you can't keep that [next day] promise you lose trust; and if you lose trust you are done as a retailer."

'Black Friday' and its equivalents will continue to stretch the capacity of DCs, driving the need for warehouse automation, and faster returns processes, despite the fact that these event 'peaks' are tending to spread out – Amazon Prime day being more like a week, for instance. Some retailers are actively trying to push their markets in this direction.

'Less peaky peaks', **Riley** (DHL) observes, are encouraging for automation; on the other hand, peaks created unexpectedly by 'influencers' can be massively, and unpredictably, disruptive.

In many retail sectors, not just apparel, a peak in orders will also drive a peak in returns as consumers exercise their 'right' to sample multiple variants of size, colour or other features. Retailers are recognising the costs – not just in the initial fulfilment, but in recovering and processing returns, the inevitable levels of wastage, the need to carry higher levels of inventory than is reflected by actual completed sales, and, especially with influencer-driven peaks, the difficulty in returning items to saleable stock before the moment has passed.

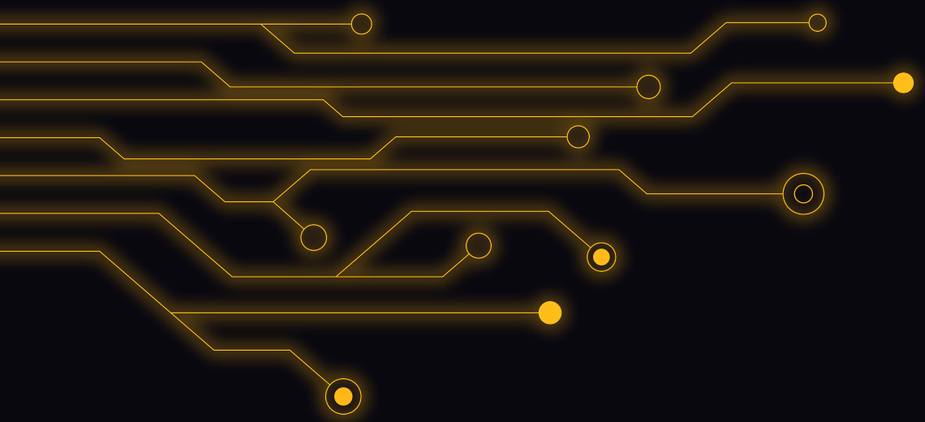
However, says **Obinna Njoku**, “The best way to fix returns is not to have any!” Strategies to mitigate the returns risk may involve less generous returns policies, or the use of technology to provide a ‘fitting room’ or equivalent experience on-line.

Another possible approach to coping with peaks, and perhaps other disruptions in a ‘dystopian’ future, could be the creation by 3PLs of pop-up warehouses. The analogy here is with manufacturing during the Covid restraints where pop-up facilities were commonly used.

Evolving consumer expectations, particularly for rapid delivery and returns, continue to shape automation strategies in retail-oriented warehouses, even as the B2C/B2B lines blur. Pop-up warehouses are considered for managing peaks and disruptions, and a strong emphasis on sustainability also influences consumer choices.

OUR ADVICE TO READERS

Recognise where consumer expectations sit for speed and seamless returns as these factors demand automation. Invest in robust, integrated technology stacks that can cost-effectively fulfil rapid delivery promises and manage returns efficiently, understanding that failure to do so erodes customer trust. Embrace automation to navigate evolving “peaks” – both predictable and unpredictable – and explore innovative solutions for returns management, aiming to minimise their financial and environmental impact. For agility during disruptions, consider flexible models like pop-up warehouses, and ensure your automation strategy consistently aligns with growing consumer demand for sustainable practices.



Chaper Thirteen

Making sustainability pay

Expect continued consumer demand for more demonstrably sustainable supply chain practices, including fit-to-size ecommerce packaging, and reductions in 'waste' more generally. One area of obvious disparity is around current cut-off and returns policies.

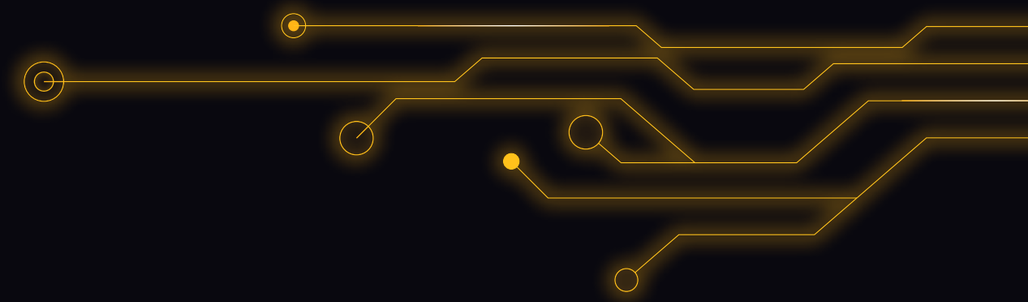
Says **Richards** (Apprise): "Ever later cut offs and free returns are not really sustainable for retailers unless they are very close, not just to their customers but to their courier companies. As a result we are seeing more warehouses being built close to the latter's transport hubs."

There is also a need, **Richards** says, to "educate the consumer about what goes in to getting your parcel to you."

Wincanton's **Claire Charlton** ponders another possible complication if retailers continue to expand and take control of their 'pre-loved' market, buying their products back and returning them to market. Retailers may also be getting into the burgeoning rental market (for furniture, household goods and the like), and warehouses are also becoming locations for repairs offered in sectors from apparel to electronics and even stair lifts. And recycling – of goods and of packaging – is also a warehouse activity. This all drives the evolution of the warehouse into a multi-functional hub; not just for storage and distribution but also for repairs, and refurbishment, alongside the recycling. Automating elements of these processes would present a whole new set of challenges, but they are what consumers (and regulators) are growing to expect from a 'circular economy'.

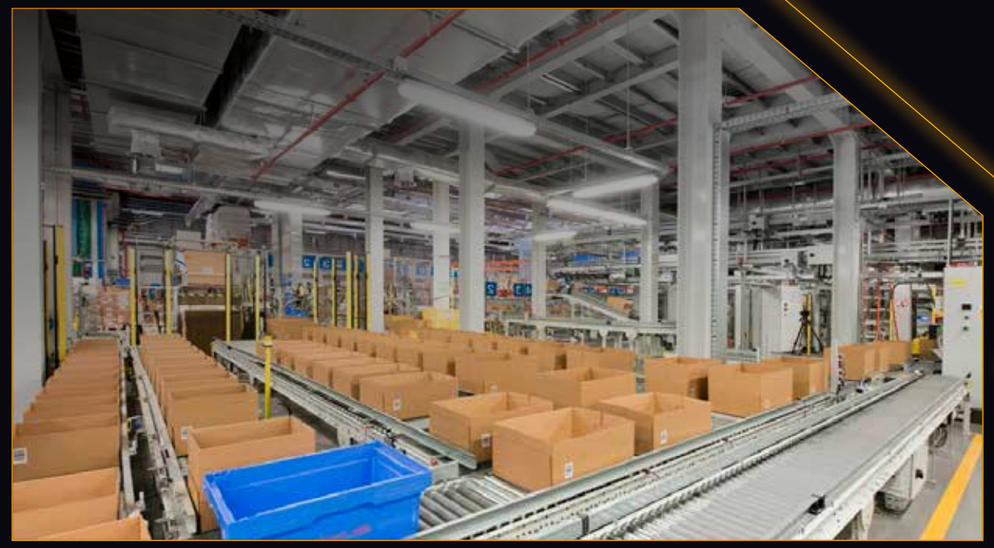
No one we spoke with thinks that sustainability is going to become less important to consumers because of the geopolitical and economic climate. Automation, with its use of power and resources, is not self-evidently 'eco-friendly' and the case needs to be made by the industry. Responses from the supply chain are expected to include better route optimisation, loading practices and per van shipments (via urban or micro distribution centres), resource conservation, reduced DC footprints, and measures to cope better with the inevitable continued growth in returns.

Customers for automation increasingly have power consumption as a criterion. **Kevin Price** from Dematic suggests that companies are, finally, looking at Total Cost of Ownership of automation and other systems, including maintenance and running costs – and if they can lower energy consumption and other costs this will generally deliver sustainability gains as well. But automation suppliers also have to understand their customers' cost to fulfil.



This does beg the question of why so few warehouses have solar panels on their roof spaces. **Abbott** (Dematic) notes that energy consumption for automation, and for its supporting IT, can be considerable, "and you need data capture and AI to give energy consumption metrics that actually prove that a dark warehouse, say, is more sustainable than having 500 people turn up in cars. How better to power this than from solar panels on top of the warehouse? But we would need a bit more data science to work out how much and when we can be powered by our own resources (solar panels), and how to reduce the risks of a cloudy day."

Clare Bottle notes that UKWA launched a 'Solar Toolkit' at the September 2025 IMHX show to give the industry a strategic steer, but in **Bottle's** view solar panels, and indeed automation, are facets of a much wider 'electrification' issue.



What might reasonably be called 'the electrification of the supply chain' isn't just about the power consumption of automation inside the warehouse. The associated data-processing, especially for AI and DT, is also power-hungry, and **Bottle** notes the irresistible drive towards electrifying transport fleets, however uncompetitive this may appear for 44 tonners, and the accompanying need for battery charging at warehouses and depots as challenges.

One effect, says **Bottle**, may be that in designing their logistics networks and locations, companies are going to have to consider power availability (and range restrictions on trunk HGVs) alongside the traditional criteria of land, labour and access to markets.

Energy sustainability is becoming a warehousing issue in another way that **Bottle** notes. Government regulations are already requiring warehousing for lease to have an Energy Performance Certificate of at least 'E'. That is a fairly low bar, but government intentions are to ramp this up – the previous administration was proposing an EPC 'C' requirement for leased property by 2027. And there are those who claim that 80 per cent of warehousing (and not just old buildings) might fail that test.

That could, **Bottle** speculates, have an indirect effect on the take-up of automation. The rules only apply to leased buildings – so there could be an incentive for more firms to own their warehouse estate. And with that commitment, **Bottle** thinks, smaller, typically family-owned, companies may be more likely to take a longer-term view of automation such as AS/RS that become part of their 'fabric'.

But, and it is a big but, businesses are going to start requiring a clear Return on Investment for sustainable practices, over and above any rather amorphous ‘goodwill’ PR factor. Third party warehousers are also at the mercy of retail goods manufacturers who keep introducing novel forms of ‘sustainable’ packaging, which may not be compatible with existing automation such as robotic picking arms. Good news, says **Njoku**, in that, “sustainable packaging design is now being co-developed with [automation] suppliers to reduce cube size, optimise palletisation and improve reverse logistics.

“Smart waste segregation and recycling at warehouse level is reducing landfill costs and feeding into zero-waste targets [and of course the new Extended Producer Responsibility impacts on packaging material use will encourage these trends]. And better packaging durability and modularity is reducing damage rates and returns performance, improving customer experience and the carbon impact.” After all, packaging is there for a purpose, which includes enabling damage-free handling.

Sustainability is no longer a “nice to have” — it’s becoming a competitive and regulatory imperative that also needs to make financial sense. For automation and logistics operations, that means moving beyond energy-efficient hardware to a system-wide view of sustainable value creation. Forward-thinking organisations are linking sustainability directly to operational efficiency — cutting waste, reducing power use, and optimising processes to lower both emissions and cost-to-fulfil – to carry through the sustainable agenda into the supply chain in a way that links it to ROI.

OUR ADVICE TO READERS

Sustainability will only “pay” when it’s embedded as a core performance metric. The winners will be those who view environmental responsibility, automation strategy, and operational efficiency as one and the same.

- **Design for the circular economy:** Position warehouses as multi-functional facilities capable of repair, refurbishment, and recycling, supported by flexible automation that adapts to changing product lifecycles.

- **Measure to manage:** Use data and analytics to track energy consumption, carbon output, and asset utilisation. Quantify sustainability ROI alongside traditional TCO metrics.

- **Electrify strategically:** Deploy renewable energy generation and battery storage to prepare for electrification of fleets and infrastructure. Factor power availability into network design as you would land, labour, and location.

- **Collaborate for compatibility:** Talk with automation suppliers early to ensure any new sustainable packaging formats or materials work with automated systems and there aren’t any unexpected inefficiencies.

- **Turn compliance into opportunity:** Use sustainability for long-term ROI through cost reduction, resilience, and brand trust.

“The pace of warehouse automation will accelerate.”

And finally...

We've largely looked at the prospects for the next few years from the point of view of our supply chain customers. But of course, there will also be change in our own automation industry sector.

There is general agreement that a degree of consolidation is bound to happen in the warehouse automation industry. What this might look like is less clear, but in hardware areas where a degree of commoditisation comes in, many vendors may go under, whilst those with unique proprietary technology – hardware or software – will be acquired by the larger players.

Simon Barnwell at Dematic floats an interesting idea: "I wouldn't be surprised if some of the largest warehouse users, like the big grocers, started buying up the technology vendors for whom they're early adopters. As they become more tech-savvy, they might not only be more prepared to bring capabilities in-house and run their own warehousing business, but they may also be able to lock competitors out of those particular technologies." That may sound left-field, but then Amazon and Ocado have been 'technology companies with a bit of a retail offer' for decades!

As automation becomes ever more flexible and scalable it will become more appropriate for smaller customers. But although affordability, at least in terms of 'bang for your buck' is rapidly improving, smaller companies will still face the dichotomy:

"Can we afford to automate? Or can we afford not to?"

Integration of all the different automation components will be increasingly important, especially as, enabled in part by the view that digital twins can give, it extends beyond the four walls of the warehouse. Increasingly, the successful vendors will be, not just systems integrators, but business systems integrators and, alongside trade associations and other bodies, will play a huge role in the education of individuals and firms.

Finally, it does seem that, as with other technological revolutions, the required engineering may be as much financial as physical. New financial models, especially around RaaS and around shared facility/multi-tenant warehousing will have to be developed. This will involve evolution in finance houses and space brokerages, and may need active support and promotion by 3PLs and by automation vendors themselves.

Conclusions

What are the key predictions that emerged from our discussions?

- The pace of warehouse automation will accelerate, and reach further down into smaller operations.
- New warehouses will continue to be built but expect increased activity on brownfield sites, whether these are existing warehouses or the repurposing of former department stores, industrial units etc.
- There will be an increased demand for multiple tenant/ shared facility warehousing – both from smaller firms wishing to share the costs and benefits of automation, and from larger companies with ‘peak’ or seasonality issues. That implies that the centrality of 3PLs will, if anything, increase.
- Fixed automation solutions will still have their place but increasingly and especially for smaller users, the flexibility and scalability of AS/RS, co-bots and other solutions will become the norm.
- Automation will not necessarily or solely be driven by labour costs and availability: on the contrary, new issues about the availability of engineering, software and supply chain skills will become increasingly relevant.
- There is a need for education at boardroom level so that companies have a better understanding of concepts such as cost-to-serve and total cost of ownership, leading into ROI, in the automation context.
- Organisations need to invest in both current and future generations now – with careers paths, foundational skills and digital literacy – to ensure they have warehouse workers and staff to manage their supply chain effectively.
- Once understanding around digital twins is established, their impact at every level from hour-by-hour optimisation to long term investment planning and end-to-end operation will be enormous.
- AI is here to stay and, with uses in many areas of our operations already, will further drive our understanding of and ability to manage our supply chain network – but we will need ‘warehouse scientists’ to validate and analyse the data.
- New forms of finance and business relationships around the ownership and operation of automation will be developed – WaaS and RaaS will become more tangible.
- Vendors will have to become, not just systems integrators, but business systems integrators.

Our Vision Paper is more than statement; it’s an invitation to bring the UK automation community together, sharing insights and collectively shaping the future of our dynamic market.

We hope you’ve enjoyed hearing these viewpoints and if you would like to join in the conversation, we’d love to hear what you think.

If you would like to take part in a future iteration of this Vision paper, let us know!

Contact Us

emeamarketing@dematic.com **or** Melissa.urry@dematic.com

Dematic

With thanks

Dematic would like to thank everyone involved in the production of this paper and especially our interviewees:

Hazel Beasley
Automation Consultant
Hatmill
www.hatmill.com

Hatmill

Hazel is a mechanical engineer with extensive experience in automation development, project delivery, and MF/1 contracting. Hazel has held roles in solution design, project management, and senior leadership, delivering complex, end-to-end automation projects across a wide range of industries and technologies. A member of the IET MF/1 drafting panel, Hazel acts as MF/1 Engineer for clients from initial design through to contract signature, installation, testing, and ramp-up. Hazel's expertise spans automation development through RFP, contracting, and procurement for major projects, both brownfield and greenfield, including a new distribution facility for an industry-leading manufacturer and the design of a central hub for a national courier.

Dave Berridge
MD, Emkat Solutions and Secretary
Automated Material Handling Systems Association (AMHSA)
www.emkat.co.uk / www.amhsa.co.uk

emkat AMHSA

Dave's wealth of experience has been gained over 35 years in the sale, contracting, design, execution and support of materials handling systems. An Oxford Physics degree and later an MBA projected Dave's career across a broad spectrum of disciplines. Dave's early career in real time computer controls developed a deep knowledge and expertise as automation was being embraced by the industry. Rising to the Head of Solutions for a major integrator, Dave established Emkat Solutions in 2009, sharing his expert knowledge and experience of automated systems to a wide portfolio of customers and suppliers. Dave has been AMHSA's secretary for thirteen years, developing AMHSA into the voice of the industry. Heavily involved in international standards, through BSI, CEN and FEM, Dave continues to influence decisions at the most senior levels for regulatory, safety and design standards across Europe. Dave is widely recognised as 'the go to expert' in his field.

Clare Bottle FCILT
Chief Executive
United Kingdom Warehousing Association (UKWA)
www.ukwa.org.uk

UKWA
THE VOICE OF WAREHOUSING

Clare is CEO of the UK Warehousing Association (UKWA), a leading trade association with 1,000 members, and co-founder of Women in Logistics UK. Clare champions economic, social and environmental sustainability, while driving greater diversity and inclusion across the sector. A prominent advocate for rooftop solar, Clare advises Government on unlocking renewable energy potential within warehousing. Clare spearheaded the *2024 Year of Warehousing campaign*, a national campaign to raise the profile of the industry, and undertook 80 site visits marking UKWA's 80th anniversary. Under Clare's leadership, UKWA developed the first independently accredited Warehouse Manager CPC Level 3 qualification. Clare is also author of the influential white paper *The Warehouse of the Future: Predictions from 2025 to 2050*, offering strategic insight into the innovations set to reshape the sector.

Claire Charlton
Head of W2
The Wincanton Innovation Programme
www.wincanton.co.uk

Wincanton

Claire leads Wincanton's W2 Innovation Programme, driving the identification, testing, and implementation of emerging technologies. Through the W2 Labs initiative, Claire mentors start-ups to develop and commercialise their solutions as part of Wincanton's service offering. Claire also designed and manages Wincanton's Innovation Centre, which has welcomed over 6,000 visitors and showcases interactive technology while serving as a hub for customers, partners, colleagues, and community groups. With 27 years' experience in logistics spanning transport, operations, business development, and solution design, Claire recently completed an MSc in Supply Chain Management and serves as a trustee at a Mental Health Hospital Museum in Bristol.

Obinna Njoku CMILT
Head of Automation
HellermannTyton UK
www.hellermanntyton.co.uk

HellermannTyton

As a Chartered Member of CILT (CMILT) and Head of Automation, Obinna has a track record of delivering large-scale automation and sustainability programmes across global supply chains. Most recently, Obinna led warehouse transformation for PepsiCo's EMEA network, turning market insight into robotics, AI and low-carbon strategies that delivered measurable operational and financial impact. Obinna previously held roles at Amazon and The Hut Group, where he delivered multimillion-pound fulfilment centre projects, optimised packaging operations and shaped major distribution-centre designs. With an engineering background spanning manufacturing, rail, and oil and gas, alongside postgraduate training from the University of Cambridge and MIT, Obinna brings deep technical and strategic expertise to the future of automated, efficient warehousing.

Gwynne Richards FCILT, MBA
Director
Apprise Consulting Ltd
www.appriseconsulting.co.uk

With over 40 years' experience in warehouse management and logistics, Gwynne founded his consultancy and training company in 2003, supporting organisations worldwide to optimise operations, benchmark performance, and assess outsourcing strategies. Having co-written the UKWA Warehouse Manager's Certificate of Professional Competence, accredited by CILT, Gwynne serves as Course Director for the Diploma in Logistics Management with North Kent College and Lloyd's Maritime Academy. A Practising Associate of the Academy of Experts, Gwynne delivers courses globally and has authored several leading texts, including *Warehouse Management* (5th edition, 2025), that's been translated into five languages and has sold over 20,000 copies worldwide.

Phil Riley
VP Automation & Accelerated Digitalisation
DHL Supply Chain
www.dhl.com

As Vice President of Automation and Digitalisation at DHL Supply Chain, Phil's work focuses on delivering operational and digital transformation across logistics environments. With experience spanning programme management, solution design, and strategic planning, Phil has led initiatives that improve performance, streamline processes, and support large-scale change. Phil's responsibilities have included developing automation strategies, managing cross-functional teams, and overseeing the implementation of technology across varied operational settings. Phil's approach is structured and outcome-focused, with a strong emphasis on stakeholder alignment and measurable impact. Phil holds a degree in Logistics and maintains professional certifications in project and service management.

Ruth Waring FCILT
Director
RW Consulting
www.rwconsulting.uk

Ruth has spent over 36 years in the logistics industry. Ruth is the Founder of Women in Logistics UK and Director of the WiL Community Interest Company, where Ruth continues to volunteer her time to support greater inclusion and collaboration across the industry. In her professional role, Ruth works as a compliance consultant, supporting transport and warehousing businesses with O Licence audits, Health and Safety compliance, and ISO standards. Ruth also writes award submissions for clients and is a highly regarded trainer, recognised for her expertise and practical insight across all the above areas.

Disclaimer The views and opinions expressed in this Vision Paper are those of the contributors and do not necessarily represent the views, positions, or policies of their employers or affiliated organisations. They are shared to provide perspective and stimulate discussion within the logistics and supply chain community.

Dematic Interviewees:

Ian Abbott
Director, Solution Development UK / IRE

With over 19 years' experience in logistics and supply chain automation, Ian specialises in designing and delivering complex automated solutions across sectors including multi-channel fulfilment, high-rate eCommerce picking, automated palletising, and high-speed sortation. Ian's expertise spans mechanical design engineering, data analysis, project and proposal management, sales, and software development. Ian is known for building strong customer relationships throughout Northern Europe and leading teams that value excellence, innovation, agility, and collaboration. Under Ian's leadership, the team continually adapts to evolving market demands, striving to set new standards in concepting complex and high-performing logistics automation solutions.

Simon Barnwell
VP & Market Leader UK&I and Nordics

Simon leads strategic growth across the UK and Ireland and Nordics markets. With over two decades of experience in industrial automation and materials handling, Simon has played a pivotal role in advancing warehouse and supply chain innovation. Simon began his career as an engineer and brings an extensive engineering background to his work, using this strong technical foundation to great advantage in the industrial automation and materials handling sector. Simon combines deep technical understanding with a strong commercial focus, working closely with customers to advise on scalable automation solutions that enhance efficiency and resilience. A Warwick Business School alumnus, Simon is passionate about shaping the future of intelligent, sustainable supply chains.

Danielle Dakin
Market Development Director

As Market Development Director at Dematic, Danielle is involved in shaping market strategy, particularly within the retail and 3PL sectors. With over 20 years of logistics and supply chain experience, Danielle brings a wealth of knowledge from working with industry leaders such as Coca-Cola and Tesco. Danielle's deep understanding of complex operational landscapes and client needs is instrumental in driving innovative solutions for Dematic's global customer base. Danielle's strategic insights and deep industry expertise drive growth and operational excellence for businesses worldwide, while shaping Dematic's strategic direction and expanding its market influence to stay ahead of evolving industry trends.

Kevin Price
Logistics Consultant

Kevin brings over 30 years of experience in automated systems design, industrial engineering, and large-scale project delivery within the logistics sector. Kevin's expertise lies in developing intelligent, data-driven supply chain solutions that enhance operational efficiency and resilience, having successfully delivered many complex projects in diverse industries. Prior leadership roles at Swisslog, SSENSE, and Tesco have provided Kevin with a unique perspective on integrating automation technologies with strategic business objectives. As Logistics Consultant at Dematic, Kevin leads business development and strategic automation initiatives. Known for a pragmatic, forward-looking approach, Kevin continues to shape industry thinking on the role of intelligent automation in building agile, scalable, and future-ready supply chains.

Glossary

A **4D Shuttle** system goes beyond the automated movement of goods in a racking structure. It uses real-time data, advanced analytics, and AI to create a highly adaptive AS/RS system. It's about making the shuttle system smarter, more efficient, and more responsive to the ever-changing demands of the modern supply chain. This is more of a conceptual advancement of existing shuttle systems, rather than a completely separate technology. It's about applying the 4D warehouse principles to that specific type of automation.

A **4D warehouse** is a smart, connected, and automated warehouse that uses real-time data and predictive analytics to optimise its operations and respond dynamically to changing conditions. It's about moving beyond static storage and creating a truly intelligent and responsive supply chain node. Think of it as taking the "3D" warehouse (length, width, height) and adding a fourth dimension: real-time intelligence and dynamic optimisation.

A **"brownfield" site** refers to an existing warehouse, distribution centre, or site that is being retrofitted or upgraded with automation. In contrast, a **"greenfield"** site is a completely new facility built from the ground up with automation in mind from the start.

A **COllaborative roBOT** (co-bot) is designed to work safely alongside human workers in a shared workspace. They are not caged off and are designed to collaborate alongside people, assisting with repetitive, physically demanding, or potentially hazardous tasks.

A **Dark Warehouse** (sometimes called a "lights-out warehouse") is a fully or largely automated warehouse facility that operates with minimal or no staff on the warehouse floor. The term "dark" refers to the fact that the warehouse can operate without lighting, as there are no people working inside. The entire process, from receiving goods to picking, packing, and shipping orders, is carried out by automated systems, robots, and sophisticated software.

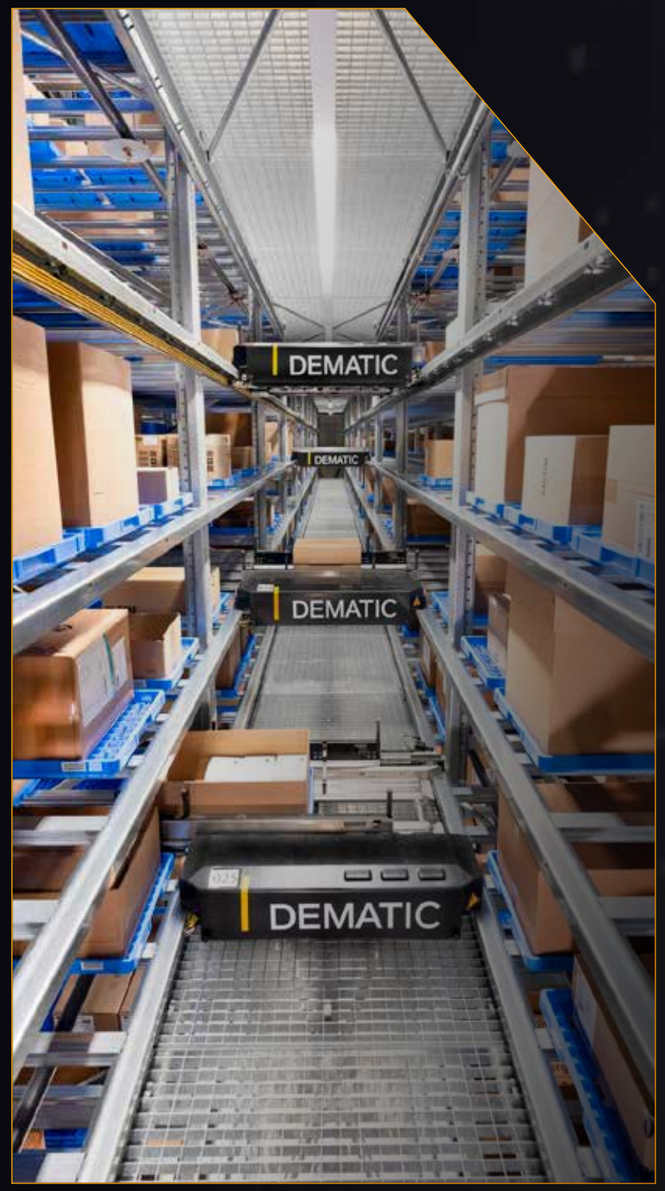
A **digital twin** is a virtual representation of a physical warehouse, distribution centre, or even an entire supply chain network. The virtual model replicates the physical assets, processes, and systems, allowing for real-time monitoring, simulation, analysis, and optimisation without disrupting the actual physical operations. By creating a virtual replica of the physical warehouse, companies can optimise their processes, reduce costs, and improve customer satisfaction.

Robots as a Service is a business model where companies rent robots and automation solutions from a provider, rather than purchasing outright. This typically includes the robot hardware, software, maintenance, and support as part of a subscription-based service. It allows companies to improve their operations and stay competitive without making a large investment in CAPEX (CAPital EXpenditure).

UFCs and **MFCs** are closely related and are sometimes used interchangeably, however:

- **Micro-Fulfilment Centres (MFCs)** are typically smaller and more automated than UFCs and may even be located within retail stores. Essentially the MFC is a miniature version of a traditional fulfilment centre, strategically located closer to the end consumer and/or retail stores.

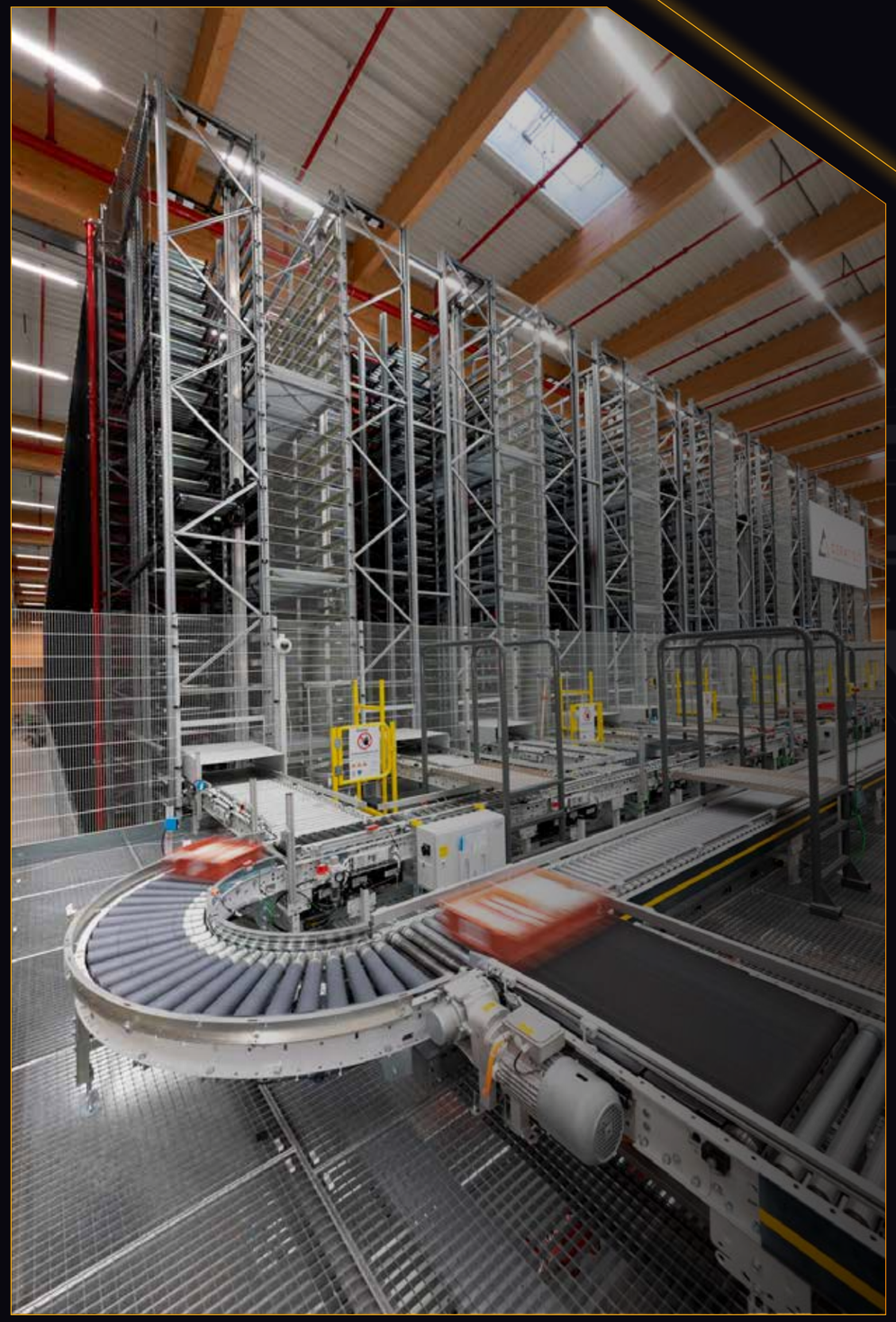
- **Urban Fulfilment Centres (UFCs)** are often larger and serve a wider geographical area within the city, potentially acting as a regional hub for several MFCs or handling a broader range of delivery options. A UFC could contain several MFCs.



Why Dematic?

We're well placed to be the catalyst to bring together these views and opinions because of our:

- **Deep market understanding.** Dematic intimately understands the real-world pressures faced by UK warehouses and supply chains – from rising costs and labour shortages to market volatility. We leverage this insight, gained from years on the ground in the UK, alongside our global expertise.
- **Trusted strategic consultancy.** We don't just sell technology; we act as a trusted guide, translating complex operational challenges into clear, data-driven visions for senior logistics and supply chain leaders. We are the only business systems integrator you'll ever need.
- **We offer best-in-market solutions.** We offer a full ecosystem of flexible automation solutions – from hardware, to software, our own developments, and those from partners, as well as lifecycle services – which are woven into bespoke systems designed for each unique operation.
- **Confidence in ROI.** Our approach builds confidence, ensuring that automation investments yield measurable ROI and foster lasting operational resilience, moving beyond immediate fixes to long-term success.
- **Credibility & heritage.** Dematic leads the conversation confidently, being able to draw upon a heritage stretching back over 200 years. However lengthy or complex your project, no matter however many years your commitment to automation spans – we'll be with you from the start and throughout every step of your journey and long into the future. We've customers with us now, who've been with us on their automation journey for over 25 years.



About Dematic

Dematic is a global leader in supply chain automation solutions featuring advanced technologies and software empowering the future of commerce for its customers in manufacturing, warehousing, and distribution. With research and development engineering centres, manufacturing facilities, and service centres located in more than 26 countries, the Dematic global network of approximately 10,000 employees has integrated and supported automation solutions for many of the world's leading brands. Headquartered in Atlanta, Dematic is a member of KION Group, one of the world's leading suppliers of industrial trucks and supply chain solutions.

Dematic's UK office is based in Adderbury, just outside of Banbury.

Learn more about Dematic here.