

GOODS TO PERSON SOLUTIONS 2024

WAREHOUSE AUTOMATION | ECOMMERCE FULFILMENT INFRASTRUCTURE | APRIL 2024



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EXECUTIVE SUMMARY: G2P SECTOR MATURING. A SOFTENING IN 2023 FOLLOWED THE EUPHORIA OF 2021+22. HIGHER GROWTH ANTICIPATED IN 2024 BUT 2025 MORE LIKELY

G2P SOLUTIONS – “EACHES” PICKING

- This report focus on warehouse automation technologies for “eaches” picking, frequently used in e-Commerce fulfilment warehouses, but also increasingly used in other industry verticals
- The 2024 report is the seventh annual report STIQ has published on the G2P Solutions sector

SECTOR TILT FROM G2P 2.0 -> G2P 3.0

- STIQs view was the G2P Solutions sector had tilted towards its next big phase, “G2P 3.0”, boosted in part by Covid enhanced market dynamics and a fast maturing vendor landscape
- Significant market/customer demand remained despite penetration touching 20% of TAM
- Niches and clear differentiation appeared to be increasingly important combined with a stronger focus on flexibility & scalability

SOFTENING GROWTH IN 2023

- The 30-35% annual growth experienced 2021-2022 appeared to have slowed right down as many customers, especially retailers, postponed projects
- Customer postponements were frequently due to Capex decisions moving up to board level as a result of contradicting economic indicators, and declining visibility of forecasts as markets appeared to anticipate a recession

- Some vendors had responded by adding consulting type services to enhance their board level communications potentially to speed up decisions
- Interviews suggested that whilst most vendors had been doing ok, there appeared to be a sharper contrast between winners and losers than in previous years
- A lack of new VC funding appeared to have impacted some startups and many of these had gone into cash preservation mode and some had even executed redundancies to improve cashflows

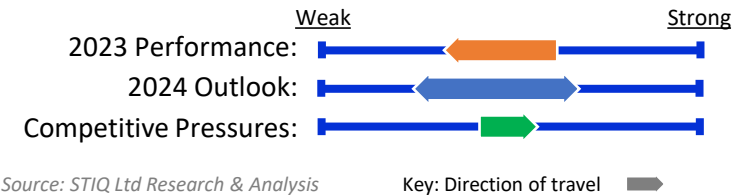
ASIAN MARKET DYNAMICS

- China exited Covid lockdowns in 2023 and many vendors that had been prevented from opening up international export markets had been quick to explore options
- Whilst there were suggestions intensive price competition had spread in Asia, there were no evidence for this having any impact in Europe or North America

FASTER GROWTH TO RETURN 2024-25

- Sales pipelines were at historical highs with potential for pent up demand to be released into the market in 2024, or more likely in 2025
- However, forecasting when this would convert remained very difficult as customers continued to postpone and/or change projects at short notice

STIQ G2P MARKET INDICATORS, 2024



- This uncertainty appeared to have affected budgeting and planning processes throughout the G2P sector
- System Integrators and vendors with an established customer base had strategically focused on lifetime services, upgrades, etc. to capture more predictable revenue streams
- There was some caution 2024 could be a difficult year, although a few vendors reported healthy order intake in the first 1-2 months of the year

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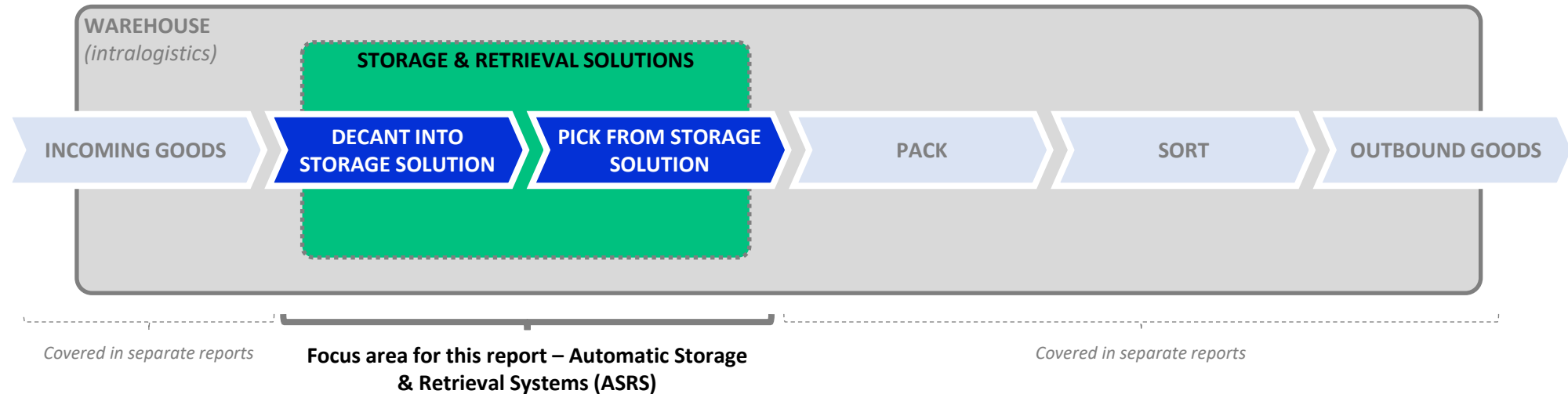
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G2P SOLUTIONS REPORT FOCUS ON STORAGE AND RETRIEVAL SYSTEMS (ASRS) USED IN “EACHES” FULFILMENT PROCESSES

G2P SOLUTIONS REPORT: AUTOMATED STORAGE & RETRIEVAL SYSTEMS (ASRS) FOCUS



FOCUS ON STORAGE & RETRIEVAL PROCESSES

- This report focuses on warehouse automation technologies for Storage & Retrieval processes mostly deployed in warehouses for each picking (“G2P”)
- STIQ also cover other warehouse automation technologies such as WMS Software, AGV & AMR Robotics, Loading & Unloading Automation, Sortation Equipment and more – view all our FREE market research reports [here](#)

FULFILMENT, THE LOWEST HANGING FRUIT

- Warehouse pick, pack and sort processes were often the most human resource intensive operations in warehouse fulfilment operations
- Improving accuracy, productivity, etc. in such processes could yield the most benefits and were often viewed as low hanging fruit

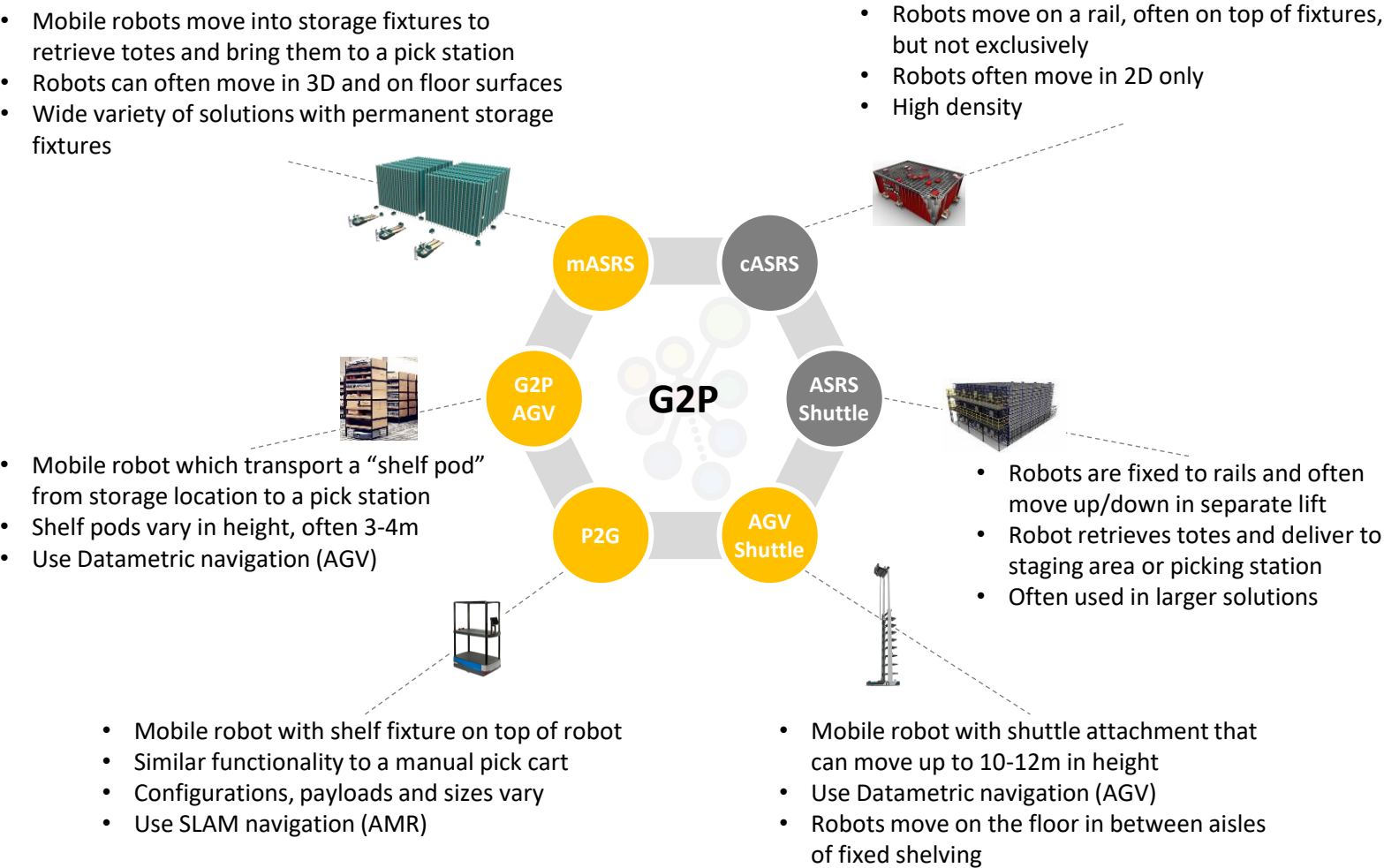
“Everyone focuses on order fulfillment first. Because that's where the opportunity is in terms of labour reduction and then you go from there.” [NTT DATA]

- However, determining which solution to use has become an increasingly difficult task for potential buyers with multiple technologies and vendors in the sector
- Furthermore, a continuing stream of new startups were also adding to this

“There are more vendors out there. It used to be conveyors and simple sortation, maybe a multi-level pick module and that was it. Now it's a little more difficult for end customers to weed through all the alternatives that are out there.” [NTT DATA]

G2P SOLUTIONS RANGE FROM MOBILE ROBOTS TO FIXED AUTOMATION ACROSS SIX KEY SEGMENTS. CONTINUOUS INNOVATIONS ADD TO SIGNIFICANT OVERLAPS

G2P SOLUTION SEGMENTATION, MOBILE ROBOT V FIXED RAIL (SIMPLIFIED)



G2P SOLUTIONS: STORAGE & RETRIEVAL

- The G2P Solutions sector is defined here as storage & retrieval solutions deployed to enable single unit picks or “eaches”
- Typically, this has been deployed in e-commerce or B2C fulfilment centres
- However, “eaches fulfilment” is increasingly spreading to many other industries and sectors traditionally considered B2B
- Whilst the majority of G2P Solutions customers were e-commerce or omni-channel companies, there is a growing share of other industries

INNOVATIONS AND SEGMENTATION

- The G2P Solutions sector has experienced a large influx of new solutions, and this continued throughout and after Covid
- STIQ’s G2P segmentation remains relatively fluid as a result with new solutions often overlapping two or more existing segments
- Furthermore, other unit storage and retrieval solutions include Vertical Lift Modules (VLMs), Mini Loads, Stacker Cranes, etc., not covered in this report as they were rarely deployed in eCommerce fulfilment applications

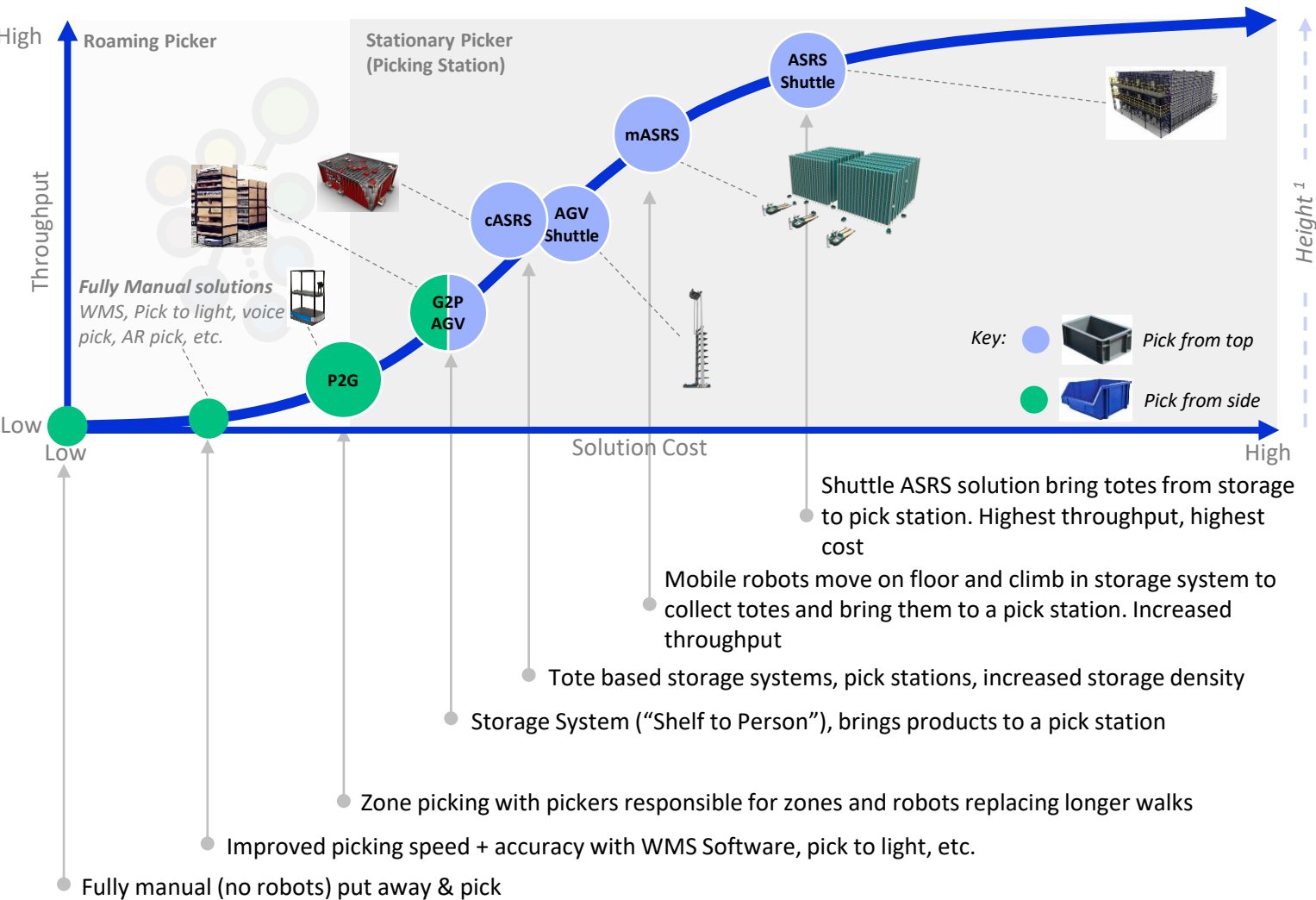
OVERLAP WITH AGV & AMR ROBOTICS

- Note mobile robot solutions in this report were used primarily for storage and retrieval missions
- Transportation and conveyance missions are covered in STIQs AGV & AMR Robotics reports ([download here](#))



G2P SOLUTIONS SEGMENTED ALONG A GREY SCALE FROM FULLY MANUAL TO HYBRID MANUAL TO NEAR FULLY AUTOMATIC. MANUAL IS THE BASELINE

G2P SOLUTIONS, THROUGHPUT VS COST (SIMPLIFIED)



SIMPLIFIED G2P SOLUTIONS EXPLANATION

- Note that this is a very simplified overview of the various automation solutions available to potential customers, from near manual to highly automated
- The chart focuses on the retrieval or picking process
- In general, there are three picking approaches:
 - **Fully manual** (Roaming Picker): Pickers roam a warehouse and pick any product in any location and transport them to a staging or packing area
 - **Zone picking** (Roaming Picker): A picker is given an area to work and pick in. Picked products may be transported with conveyors or P2G robots, etc.
 - **Picking station** (Stationary Picker): Pickers are given a picking station and goods are moved to the picker ("Goods to Person"). Picked orders are typically transported by conveyors or mobile robots
- Goods are stored differently in each solution and most ASRS solutions (**ASRS Shuttle**, **cASRS**, **mASRS**, **AMR Shuttle**) use a tote with an open top (blue dots)
- Goods in **G2P AGV** and **P2G** solutions tend to be stored so manual pickers can pick from the side as in a shelf pick (green dots)
- Picking Robots are primarily deployed with solutions where they pick from above (blue dots)

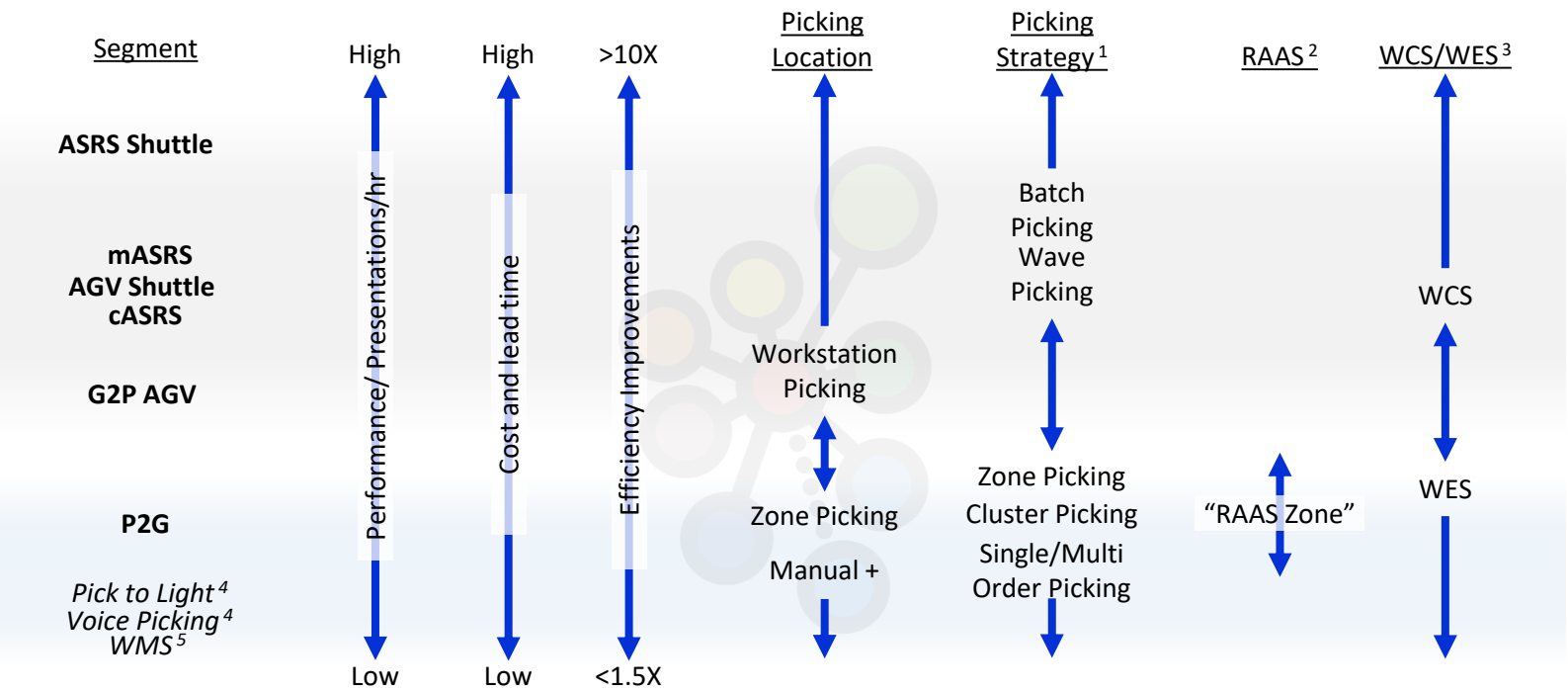
Source: STIQ Research & Analysis. Note: Throughput depends on configuration

¹AGV Shuttles exist that can store & pick from up to 12m height and G2P AGV solutions are increasing in height management



SOME G2P SOLUTIONS HAVE SPECIFIC STRENGTHS WHEREAS OTHERS OFFER A WIDE SET OF ADVANTAGES. OFTEN RELATED TO CUSTOMER SKU AND ORDER PROFILES

ALTERNATIVE SEGMENTATION OF G2P SOLUTIONS (SIMPLIFIED)



EVOLVING G2P SOLUTIONS & SEGMENTATION

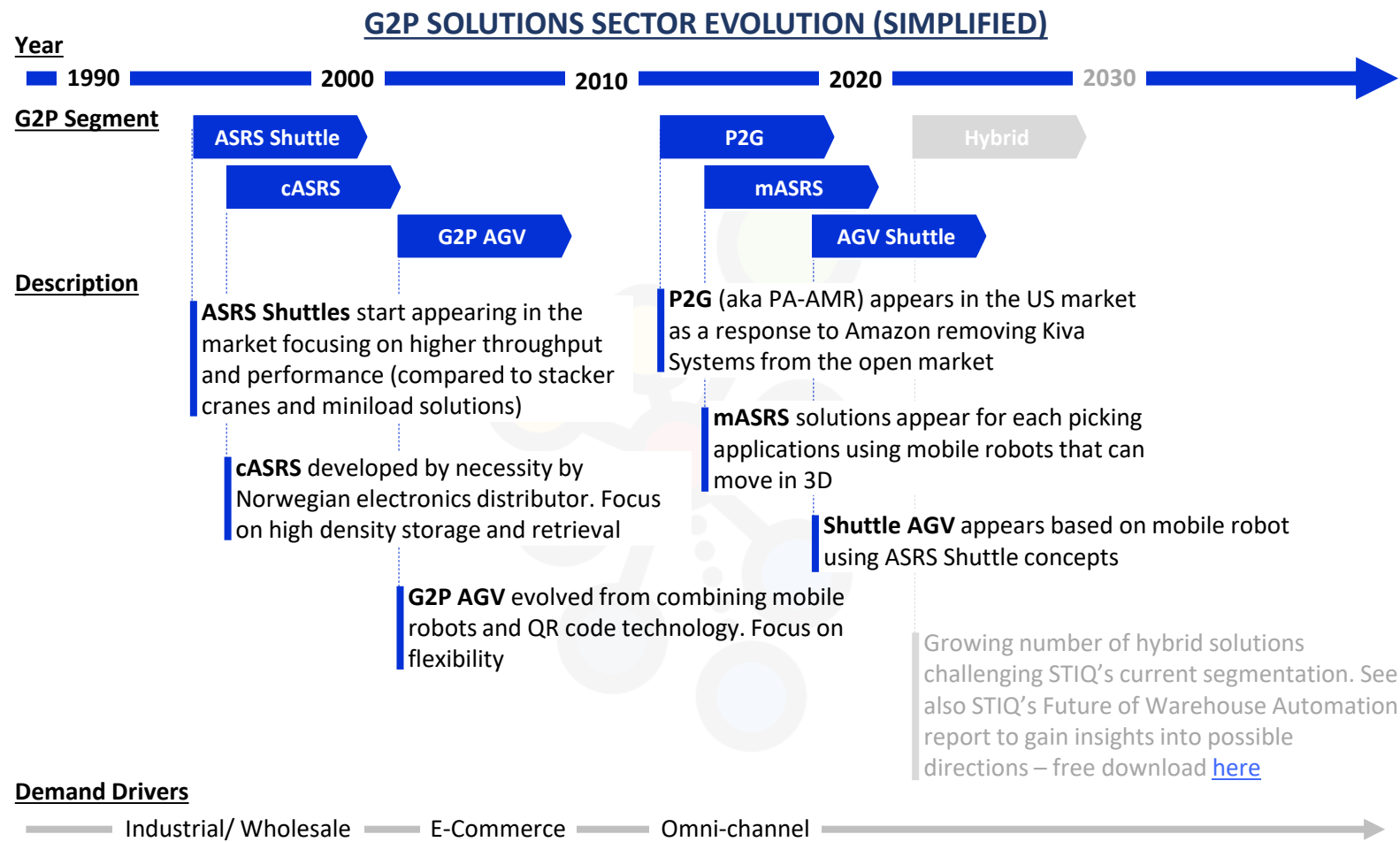
- The G2P Solutions sector has continued to evolve and segments have changed as new innovations mature and become part of segmentation
- As a result of complex functionality & technology among G2P Solution segments combined with some level of overlap between solutions, there were several ways to create a reasonable segmentation
- This report focuses on 6 segments: ASRS Shuttle, mASRS, AGV Shuttle, cASRS, G2P AGV and P2G (aka PA-AMR)
- Each of these segments have advantages and disadvantages, some are highly flexible, others are cheaper whereas others are more suitable for large SKUs and some work better with specific picking strategies
- Evaluating a G2P Solutions project can be a complex task with deep analysis of SKU and order profiles, existing fulfilment processes, etc.

FREE CONSULTATION OFFER FROM STIQ LTD

- **Are you looking at your first warehouse automation project, have issues with your current solution or looking to upgrade to a new G2P Solution or simply looking for insights on the market, etc?**
- STIQ Ltd offers a #FREE conversation touching the basics of G2P Solutions (contact details on [cover page](#))
- This is free courtesy of our advertisers and can be structured in a way suitable for you and your team, for example you may have very specific questions of simply want to general overview of the sector, etc.
- All inquiries treated in strictest confidence

Source: STIQ Ltd Research & Analysis
¹ Picking strategies can vary across manual and automated solutions. Use only as indication and contact a consulting firm to evaluate suitability for your application
² RaaS currently means rental (see also STIQ definitions) and has become the go to business model in the P2G sector. Other vendors may offer, but RaaS remain relatively rare outside of the P2G segment
³ WES was increasingly used with non-stationary/fixed solutions such as mobile robots and people whilst WCS primarily control PLC level solutions, conveyors, ASRS solutions, etc.
⁴ Not focus in this report
⁵ See also STIQ's WMS Software report [here](#)

THE G2P SOLUTIONS MARKET REMAINED RELATIVELY YOUNG AND HAVE LARGELY FOLLOWED GROWTH IN E-COMMERCE AND OMNI-CHANNEL



G2P SOLUTIONS SECTOR EVOLUTION

- Warehouse automation remains a relatively young sector with many vendors less than 10 years old
- The sector has largely evolved on the back of online disruption in the retail sector, with E-Commerce and Omni-Channel at the forefront
- The advent of E-Commerce also reshaped other parts of the warehouse automation sector as a whole

“ASRS shuttles have scaled in the past decade. Early 2000s was still dominated by traditional systems like cranes. And there’s one very important shift in the businesses that drove that development and that is the shift from brick and mortar retail towards ecommerce and multi-channel.”
[Conductix-Wampfler, via 2023 G2P Solutions report]

- Developments between 2000-2010 were mainly isolated to the advent of the G2P AGV, originated by Kiva Systems in the US
- Amazon acquired Kiva Systems in 2012 and removed the robot vendor from the open market
- This caused an initial reaction in the sector with numerous startups and vendors adding new G2P solutions from mid 2010’s to current day
- Whilst Covid initially muted some startup activity, there has been increased startup activity from 2021-2022 and STIQ has seen many new solution vendors/ startups in the sector offering hybrid systems

Source: STIQ Research & Analysis



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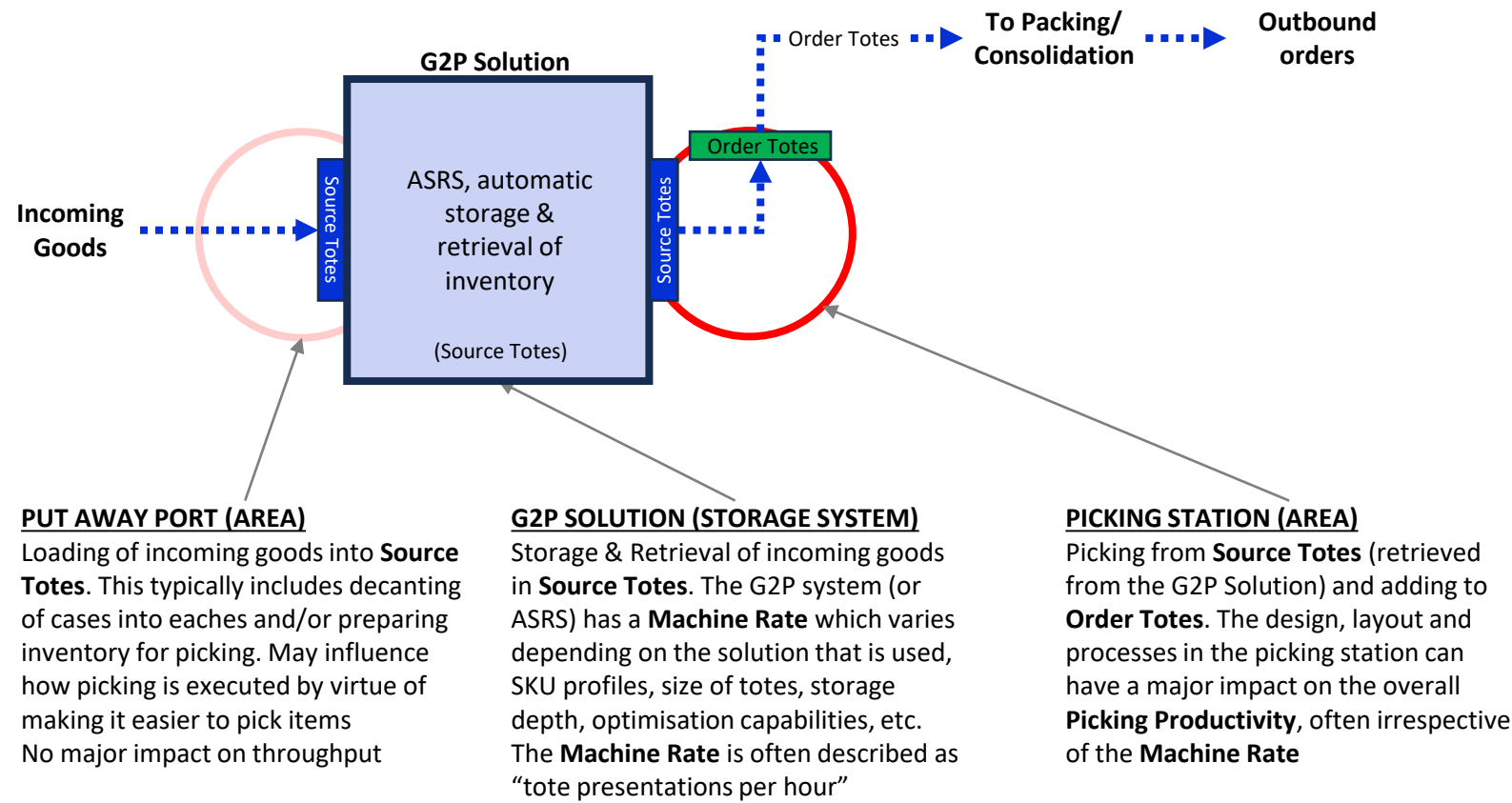
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G2P SOLUTION “MACHINE RATE” v “PICKING RATE” v PRODUCTIVITY. PICKING STATION DESIGN AND LAYOUT CAN BE A LIMITER OR A MULTIPLIER

G2P SOLUTION (SIMPLIFIED) MACHINE V PICKING RATE V PRODUCTIVITY



MACHINE RATE V PICK RATE

- Throughput of a G2P solution is not solely dictated by the machine rate but also depends on picking station design and configuration

“Throughput capacity really depends on your pick stations and environment... that’s ultimately going to dictate your throughput... once you send that donor bin to a pick station, the activity at the pick station is more or less the same regardless of the infrastructure behind it. Whether it’s a multi shuttle, a cASRS or a mASRS or an AGV Shuttle... it’s the operators in front of that pick station that’s going to dictate what your capacity is. So it’s just a matter of how much infrastructure you have behind it in order to feed those pick stations. Then it’s the business case comparison between all those different alternatives.”
[NTT DATA]

PICKING, THE G2P CUSTOMER INTERFACE

- Pick and put away stations may be viewed as the interface between a G2P solution and other processes
- Depending on a project, there may be multiple stakeholders involved in the design of a picking station
- Customers also frequently require customisations to their picking processes

Key: Goods flow Pick/put away area

Source: STIQ Research & Analysis

ENSURING EXISTING FULFILMENT PROCESSES CAN BE INTEGRATED WITH A NEW G2P SOLUTION WAS VIEWED AS AN IMPORTANT ASPECT OF G2P SOLUTION EVALUATION

MACHINE RATE V HUMAN PICK RATE

- Picking station design was frequently customised and often required ergonomic considerations alongside integration with existing fulfilment processes
- Considering how existing processes will fit into a G2P solution and the picking station should be part of the solution evaluation

“We talk about machine rate versus what a human can do... Machine rate is one thing, but we always temper that and say OK, what do you want to do? Because it's great to have a high pick rate, but then if you're having to do 3 touches after the pick, then it doesn't make sense because now you're degrading your overall throughput of the building. We talk about units per labour hour out of the building. So what are we doing overall from a labour hour standpoint in your building rather than just simply looking at pure pick rate numbers.” [Attabotics]

“The biggest part really goes into ergonomics for example what we had here.” [Movu Robotics]

OTHER G2P CONSIDERATIONS

- A common question for customers is how much of their inventory can fit into an ASRS which often varies depending on the design of a system, bin sizes, etc.

“What percentage of your overall offering does the ASRS take care of for you? Is it 40%, 70%? Rarely is it 100%. You still got to have other infrastructure within the four walls to be able to handle those other products that don't fit in the ASRS.” [Quartel Associates]

- Another consideration may be how well the automation fits into existing warehouse processes or how it can be integrated into current workflows

“How well will the automation integrate into the rest of your warehouse. So there can be a view that some sort of spot automation might be more difficult. And I guess that's the role of the integrator and that's why a lot of people go with integrators because they're going to be the experts at putting all these things together.” [Anonymous]

EVALUATING PROPOSALS

- Interviews suggested prospective G2P customers should question proposals in depth and if there are different labour requirement, try to get to the bottom of why there were differences in the responses

“When I see different labour requirements for different G2P systems, I interpret that to mean 2 different vendors gave you different productivity rates. It would be foolish to take their productivity rates and say one gave you a higher rate. Because the two should have the same rate. I would never select vendor A instead of Vendor B because A say they can achieve 300 and B can achieve 250. It's just because they're working with limited data and it's very hard to exactly know the size of products and the complexity of the picking. One made an assumption of 250 and the other 300, but it doesn't mean that one's better than the other. Picking productivities are very specific to the products you're picking. If you're picking something that's easy... it's also a little bit specific to your labour and how fast they are.” [Anonymous]

- Interviews suggested evaluation of similar systems should be made on a similar basis rather than just accepting that one is better than the other based on their responses

“In some ways, you should really evaluate the technology based on other factors, or at the very least you should challenge the lower picking productivity. Make sure they're giving you the best picking station so that you're comparing something that's comparable. Maybe one vendor is giving you a picking station that has only a 1-1 tote rate, i.e. 1 origin tote + 1 order tote so there's a lot of waiting time and therefore they have lower productivity. But you could just ask them to redesign that into something that's better.” [Anonymous]

BASELINE PERFORMANCE SHOULD BE VIEWED AS A MOVING (IMPROVING) TARGET FOR CUSTOMERS LOOKING AT G2P SOLUTIONS

TO G2P OR NOT TO G2P

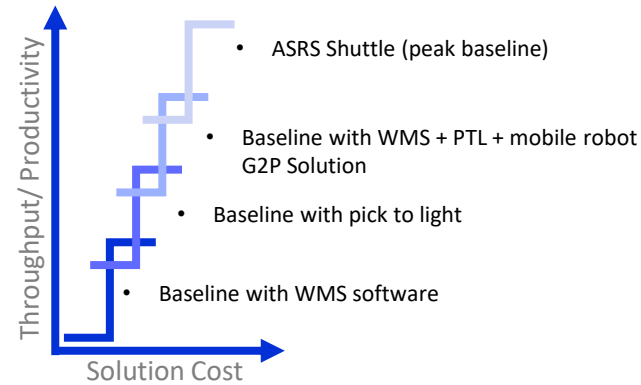
- At management consultancy level, the decision is often whether G2P makes sense based on the requirements of a business

“There's lots of G2P solutions to choose from. When I'm working with a client it's much more important to figure out whether a G2P system makes sense. Because in my mind, all G2P Solutions, from afar, are fairly similar in terms of performance Capex/ Opex. Of course, once the client goes to tender and vendors look at details, maybe one will be a little bit better than the other. But the most important decision is whether it's viable to do G2P vs continuing some sort of manual operation, or a mechanised solution with conveyors and zone picking, etc. I would say the biggest hurdle is to decide whether you can do it. Once you decide you can do it, then it's very difficult until you actually have specific offers to determine which G2P solution offers the best ROI.” [Anonymous]

- Interviews also suggested buyers should dig deeper into why two similar solutions may give two different labour saving rates

“The first question is going to be the ROI labour savings versus the cost of the solution. I'd be quite careful on the labour savings because of two mistakes that I see. One is having different labour savings for two solutions that should theoretically have the same savings. Don't use labour savings to differentiate G2P solutions, or at least try to understand why it's different.” [Anonymous]

SIMPLIFIED BASELINE CONCEPT



Source: STIQ Research & Analysis

WHAT IS YOUR BASELINE?

- Improving current processes could mean bypassing certain G2P segments depending on how optimised your baseline is

“We have one customer right now that we are talking to, which has ‘paper and pencil’... and talking about them running their warehouse with a WMS and then thinking about some kind of automation. Usually when you have a WMS and you have it implemented the right way, you are at an UPH of 90-120. Some of our customers do 200. Then it takes a G2P AGV or even an ASRS Shuttle and so on to get it higher.” [Koerber Supply Chain]

- When looking at G2P, buyers were recommended to view the baseline as a moving target

“And the second thing is using a current state without really thinking about the optimised version of that current state. i.e. making sure you have accounted for improvements. Today I’m picking at 80 lines per hour. But I could be at 120 if I put in a bunch of improvements. What if I get a larger facility? If I redesign and put fast movers in a different location, etc? You have to make sure that you're kind of comparing the automation against an optimised baseline, and that's a pretty fair comparison. Because the automation is perhaps going to take 2-3 years to put in place. In those two years you should be able to make improvements on your operations and put in place various levers to improve.” [Anonymous]

MANUAL IS THE STANDARD TO BEAT

- One interview suggested any G2P Solution in consideration needed to beat prevailing systems or at the very least, the prevailing manual processing speed

“Manual is the standard you need the beat.” [Anonymous]

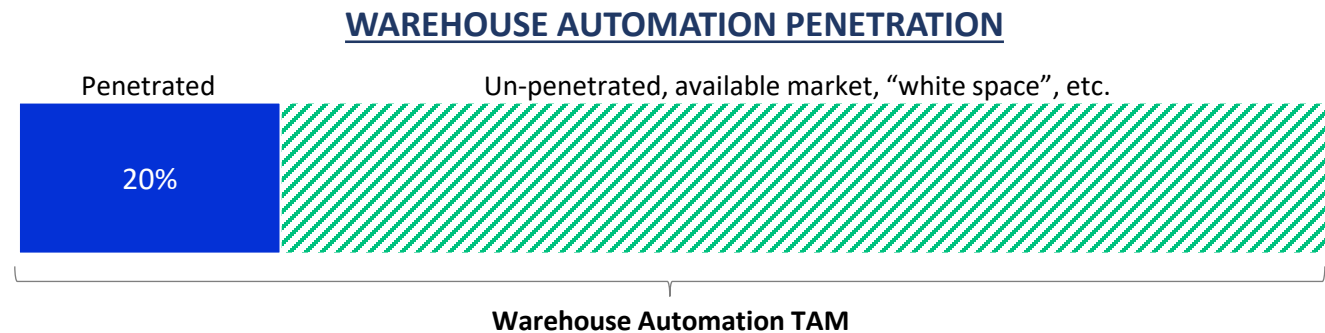
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WAREHOUSE AUTOMATION MARKET PENETRATION MAY HAVE REACHED 20%, BOOSTED BY COVID, WHEN THE MARKET JUMPED BY 30-35%



Source: STIQ Research & Analysis

AUTOMATION PENETRATION NOW AT c.20%?

- Some vendors have suggested penetration of warehouse automation technology has reached 20-30%, boosted by rapid growth during Covid

“Only 20% of the market for warehouse automation is currently penetrated. And that is a tremendous opportunity.” [AutoStore FY23 presentation]

“About 20-30% have some form of automation... it's not a priority for many businesses, so it's a lot of volume and a lot of labour, a lot of forklifts. There's just so much opportunity out there for vendors to take advantage of.” [NTT DATA]

- Interviews suggested the global warehouse automation market grew by c.30-35%

“Business is still quite good. The pandemic lift was really very big. We calculated that the whole market increased with 30-35% in a single year.” [Vanderlande]

- Penetration figures may be influenced by definitions, geographic areas, etc. and some estimates were lower

“The great thing about this market is penetration rates for automation are low... We believe it's less than 5%, some will argue 10%. I think it's probably less than 5%, so the green space out there is significant.” [Locus Robotics]

PLENTY OF POTENTIAL TO COMPETE FOR

- Interviews highlighted that there were ample opportunities remaining in the market despite increased penetration

“We work with so many consumer products companies. They'll have forklifts and that'll be it despite running a lot of volume. There's not much automation but there may be some conveyors. So I think there's still a lot of white space and opportunities in the industry.” [NTT DATA]

“Globally in the G2P market still there's a lot of potential.” [Mushiny]

- Higher penetration levels appeared to have ensured higher awareness of the various technologies among customers

“It seems like customers are more educated than they used to be.” [SAFELOG]

ACCESS TO LABOUR, A KEY MARKET DRIVER

- Interviews for STIQ reports have continually suggested the primary market driver was scarcity of labour and/or unreliable access to labour
- This appeared to have prompted some customers to go ahead with automation even in some weaker ROI cases

“The first question is always how a certain technology fits them, because everybody, for some reason, wants that and also the comparison. We're quite keen on comparing the current process, the base case and then base case plus, so we try to always improve with little means, the existing process... such that you can move on... if you have a simple cart pick but adding a scanner instead of papers and such things. From that point on we say well, then there's a business case how to make further improvements or not. And we see a strong demand also in weak business cases, people still going for automation because of the expected scarcity of people.” [Groenewout]

AS THE MARKET MATURE AND PENETRATION INCREASE, TAM DEFINITION BECOMES PROGRESSIVELY IMPORTANT

RETHINKING TAM: WHAT IS AUTOMATION?

Advanced robotics = Automation?



Complex conveyor networks = Automation?



Source: STIQ Research & Analysis. Image source: [Exotec](#), [Hy Tek](#)

HOW MUCH RUNWAY LEFT?

- STIQ wholeheartedly and undoubtedly believes there to be a massive and continued market opportunity for warehouse automation equipment in the longer term
- However, as market penetration increases, there will be a need to rethink “unpenetrated TAM” and how this is presented to investors and other stakeholders
- STIQ frequently has conversations with investors and in a recent call (1Q24), investors appeared to voice some concerns the market could be heading into a sunset mode

“How much is really left in this market?” [PE Investor]

THE AUTOMATION CONCEPT

- Automation is a broad concept that continues to evolve and change as older equipment becomes obsolete and newer equipment requires optimisation, etc.
- Many customers already have some form of automation in a traditional sense, but this could be a sorter or complex conveyor networks

“A lot of customers have had some level of automation with conveyance and perhaps sortation, but now they are moving up the value chain and investing in other forms of automation, including G2P.” [Swisslog]

“About 30% of buyers we see are new to automation while 70% already have some form of automation in one way or another.” [Fabric]

RETHINKING TAM + MARKET PENETRATION?

- Equity analysts offered a sobering view on how warehouse automation TAM is currently presented to the market

“Is the 20% maybe wrong? Because in 2021 a vendor said it was 15% and now we are already at 20% and we've had 5 years of growth during the pandemic. The other question is... what does automation mean in this remaining 80%? If you have a warehouse that's fully manual, it's not going to be fully manual in 20 years or will all have some automation? But there may be some that just need conveyors, some are tiny and so on. There will be an ASRS solution and somewhere they have a huge pallet shuttle. Just saying it's going to go from 20% to 80%. When actually maybe just a small % of warehouses will have just tiny bit of automation because they don't need any more. Not everything will go fully automated with ASRS advanced kind of lights out automation... and so to say the runway is from 20% to 80% TAM that's probably not the right way to look at the market. I still think there's a massive amount of TAM to go because we're still adding loads of warehouses and the existing stock is not fully automated. It's still quite low. But I feel like we might not have the levels of growth that people think they say.” [Anonymous]

- Whilst there is significant runway left in the market, how should the sector rethink its approach to describing TAM?
- Contact STIQ Ltd if you wish to discuss this

INCREASINGLY DIFFICULT TO BUILD NEW WAREHOUSES IN SOME COUNTRIES/ TERRITORIES DUE TO ENVIRONMENTAL IMPACT CONCERNS, ETC.

STIQ ESTIMATED G2P SECTOR BROWNFIELD V GREENFIELD PROJECTS (% OF PROJECTS)



Source: STIQ Research & Analysis
Note: Brownfield = existing site and greenfield = completely new site, constructed from scratch. Illustrating volume (not value) of projects

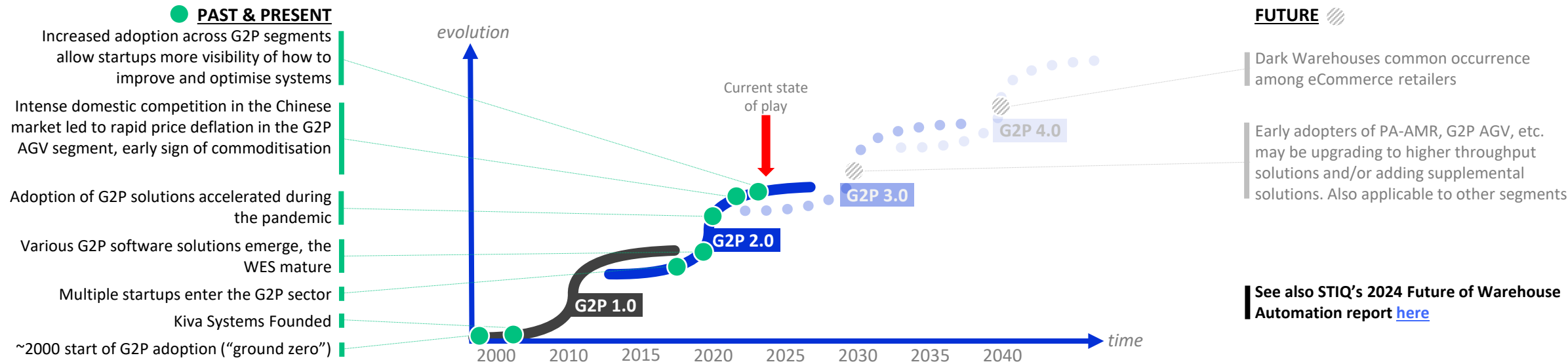
BROWNFIELD v GREENFIELD

- New warehouse construction can be difficult, especially in countries or territories where environmental concerns may be higher on the agenda
- “Due to the political choices made in the Netherlands, we have a serious issue on the nitrogen legislation. As a result, different stakeholders are now in conflict over the nitrogen issue. In the end this currently limits the ability to get new warehouse construction permits or permits are delayed. Of course we thrive for new logistical buildings. The main topic in the Netherlands for a lot of companies is now how to get more out of your brownfield operation instead of building a greenfield.” [Groenewout]**
- In these countries there would naturally be a tendency towards brownfield projects

- Certain segments and type of deployments were also more likely to have brownfield solutions
- “As a vendor of mobile robots we've always been involved in brownfield projects and greenfield has more or less been the exception.” [SAFELOG]**
- “Our customers are looking to maximize current brownfield facilities by going vertical versus building new greenfield.” [Locus Robotics]**
- ### NEW CONSTRUCTION DOWN IN 4Q23
- However, there were some concerns from the property sector on the outlook for 2024
- “New warehouse construction really slowed down in 4Q23.” [CBRE Americas Consulting]**

BOOSTED BY PANDEMIC GROWTH, THE G2P SECTOR APPEARED TO BE ENTERING A NEW PHASE, MOVING TOWARDS G2P 3.0

G2P SOLUTIONS SECTOR EVOLUTION (ACCORDING TO STIQ LTD)



Source: STIQ Ltd Research & Analysis

GEARING TOWARDS G2P 3.0

- STIQ's impression was 2024 signalled the pivot from mid-way between G2P 2.0 towards G2P 3.0
- There were multiple drivers for this switch, many of which accelerated and changed during Covid, especially in 2020-2022 as the sector gained 5-6 years of growth in a very condensed time frame
- Covid-era hyper growth has been replaced by significant ambivalence and hesitancy by customers who appeared shocked market growth might slow down following such a spurt

- Two key influences in this pivot were Amazon's hyper accelerated automation roll outs combined with a super competitive environment in the Chinese market
- Amazon ran into a wall with their Kiva Systems setup quite a few years ago and are now trying to identify a longer-term setup that would allow them to squeeze more productivity¹
- Chinese market competition appeared to push the G2P market into higher throughput at a lower cost
- Increased market penetration also appeared to have pushed vendors into a renewed focus on R&D whilst others have consolidated ranges

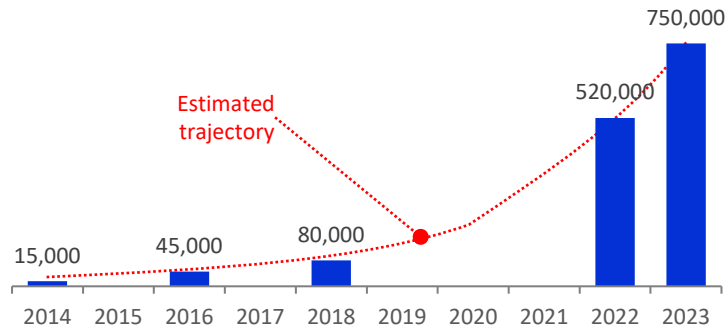
THE VARIOUS PHASES EXPLAINED

- G2P 1.0:** The "each picking" era. MHE vendors adjust existing solutions to eCommerce each picking demand
- G2P 2.0:** The "flexibility era", multiple startups joining the sector offering more flexible solutions. Amazon acquisition of Kiva Systems in 2012 a catalyst
- G2P 3.0:** The "upgrading era". Pandemic 2020-2022 a catalyst
- G2P 4.0:** The "enhanced intralogistics" era. Dark warehouses a common occurrence

¹ STIQ hypothesis

DESPITE NOT OFFERING ROBOTS ON THE OPEN MARKET, AMAZON'S INFLUENCE IN THE G2P SOLUTIONS/ WAREHOUSE AUTOMATION SECTOR SHOULD NOT BE UNDERESTIMATED

AGGREGATED NUMBER OF ROBOTS DEPLOYED AT AMAZON WAREHOUSE FACILITIES, 2014-2023 (#)



Source: STIQ Ltd Research & Analysis. Public numbers released by Amazon in various media outlets ([link](#))

COVID SUPER-CHARGED AMAZON ROBOTS

- In 2018, Amazon disclosed they had deployed 80,000 robots in their warehouses
- In the summer of 2022, Amazon announced they had deployed 520,000 robots (primarily of the Datametric navigation kind)
- STIQ's view was that this represented the vast majority of the overall market for this type of robots
- In 2022, Amazon stopped and/or delayed multiple planned robot warehouses due to declining online retail sales

BACKGROUND: AMAZON + KIVA SYSTEMS

- Kiva Systems (US) was founded in 2003 and was acquired by Amazon in 2012 for \$750m
- As part of the acquisition, Amazon removed Kiva Systems from the open market
- Following the expiry of multiple Kiva Systems patents in the end of the 2010's, a number of G2P AGV solution startups entered the US and European markets around 2017—2019
- Most of these new vendors were Asian

AMAZON AND THE OPEN MARKET

- In 2016, Amazon publicly announced their new Robot Warehouses template; A single "robot warehouse" deployed 6,000 mobile robots, split into 6 cages across 3 floors with 1,000 robots in each cage
- This should be compared to the single largest individual deployment of c.1,000 robots
- Whilst there has been several non-Amazon deployments with many 100's of robots, STIQ had not heard of any single customer deployment with >1,000 robots in a single warehouse
- In pure volume terms, STIQ Ltd estimated that Amazon represented at least 80-90% of the G2P AGV segment whilst the open market represented 10-20% of volume
- Interviews suggested the Kiva solution may require an update

"Amazon's core Kiva based solution is looking a little bit tired." [Anonymous]

AMAZON ROBOTICS (EX-KIVA SYSTEMS)



Source: Aboutamazon ([link](#)). N'th development generation of Kiva Systems

- Amazon's G2P AGV robot volumes has meant key component suppliers frequently execute R&D and NPD based on the requirements of a single customer

G2P AGV, A COMMODITISED SEGMENT?

- Intense competition in the domestic Chinese market has led to price erosion in the market with some interviewees suggesting a buyer with some volume could buy G2P AGV robots at \$5k a piece (in the domestic Chinese market)
- It was difficult to determine if such prices were a consequence of the intense competition or from commoditisation of components

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HEADWINDS FOR G2P SOLUTIONS APPEARED IN 2022, DRIVEN BY GEOPOLITICAL FACTORS AND AMAZON’S PARTIAL EXIT, LEAVING SOME OVERCAPACITY IN THE MARKET

SIMPLIFIED PANDEMIC AND MHE INDUSTRY EVENTS (2019a-2025f)



Key: ↗ Market growth indicator

Source: STIQ Research & Analysis

CONTINUED PANDEMIC VOLATILITY IN 2023

- The pandemic caused a huge upswing for the entire MHE industry but as e-commerce growth has slowed down, some of the investments that were made may have caused a level of overcapacity in the market

“We had record years during Covid and also the whole market increased by double digits. But it appears that several companies may have overinvested as there is now also some overcapacity, especially in e-commerce. Some companies are now starting to postpone projects so it's a little bit of a mixed picture. Some segments are doing well, like food retail, supermarkets for example... In e-commerce we saw some challenges. But still we could secure some orders.” [Vanderlande]

“2022 had difficulties because many customers were severely affected by on the one hand the Ukraine war, and on the other hand, by certain overcapacity, which they build over the two Covid years.” [SSI Schaefer]

- Some headwinds began appearing in 2022 driven by Russia’s invasion of Ukraine in 1H22
- However, the effects of the invasion appeared primarily isolated to European markets

- Amazon’s 2H22 cancellation of multiple warehouse projects, widely reported in various media outlets (source) added further downwards pressures on the warehouse automation sector (see also Amazon’s influence on the G2P Solutions market). This impacted System Integrators mainly in North America, and to a lesser extent also in Europe

“The market has definitely declined with Amazon pulling out of the market.” [Anonymous]

COVID + PROLIFERATION OF NEW SOLUTIONS

- Some interviews suggested the market may evolve in different ways based on some of the purchasing behaviours in the last 3-5 years and during Covid as many of the newer solutions have been adopted

“I think we're still too short in the cycle to understand the implications of some of those decisions that have occurred in the last 3-4 years versus technologies like sorters and things like that which were the rave 15-20 years ago. You can kind of see how it worked out and that type of thing... they're tried and true.” [Quartel Associates]

THE GLOBAL MARKET SOFTENED SOMEWHAT IN 2023 WITH SOME LEVEL OF RECOVERY NOTICEABLE TOWARDS THE END OF THE YEAR

SOME DEGREE OF SECTOR DECLINE

- Overall, the sector may have been trending downwards throughout 2023, however, this should be contextualised by a very high 2022

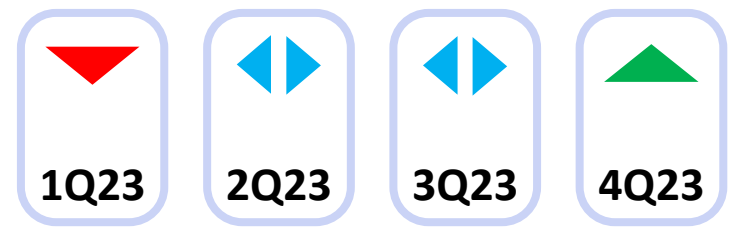
“2023 was a really interesting year for the entire industry. We are in this unique position where we get to talk a wide range of people spanning customers, integrators, advisors, and VCs. The consensus is that the whole industry has contracted in 2023.” [Exotec]

“The industry as a whole had a down year in 2023. But what is a ‘down year’ in this industry? You’re not going to grow 20-30% YoY in perpetuity. Coming out of the post Covid bump, there was going to be some settling. And I think that’s what it is. I think the industry’s settling.” [Hai Robotics]

- In early 2023, China also exited its lockdown policy and whilst the market was set for growth, there appeared to be a level of reluctance in some domestic industry sectors, such as retail and e-Commerce

“2022 was good. But in 2023 we started to open and I think many industries are not the same as before. Many people feel not great in the AGV & AMR industry. But even if the market keeps growing, the actual situation is that some companies do good and some bad. Not all do well... it is not like 2022 when all companies did well. If you do not get business from solar, battery, or EV sector then your business is not good. If you get the business from these three industries in China and then your business is good.” [Wellwit]

2023 G2P SOLUTIONS MARKET GROWTH SENTIMENT



Source: STIQ Research & Analysis

“Compared to 2022, 2023 was good. It was different and I would say it was a year for us of consolidation... we structured our solution offering around, what we call internally, our hero products. Up to 2022 we were focusing a lot on new product lines. And since 2023 the focus is on standardization and innovation around our core product lines.” [Geek+]

“2022 was one of the best years in history for Hy-Tek. However, moving into 2023, orders slowed, but opportunities continued at the same pace as the prior year. This allowed for a focus on the deployment of the very large and complex projects sold in the 2022 calendar year. Our pipeline swelled as projects were pushed to the end of 2023 or into the 2024 calendar year.” [Hy-Tek]

- For a few, both 2022 and 2023 were underwhelming
“2023 was similar to 2022. It was in a similar range, but our ambitions are higher than that.” [Geek+]
“2023 was interesting. We thought coming out of Covid we’d see a bump in business and then with the interest rates and the cost of lending going up... it kind of slowed things for us. 2022 was so so and then 2023 turned into a little bit of ‘so so’ for us as well.” [Attabotics]

SOME RECOVERY IN 2H23

- A few interviews suggested there had been a recovery of sorts towards the end of 2023

“The market was slow in the first half of 2023 but picked up in the last quarter of 2023.” [Swisslog]

“We managed to recover pretty good in 2H23.” [SSI Schaefer]

“I’d say that we started off 2023 a little slow, but as we got into the middle and end of the year, sales started to pick up substantially. Our pipeline has been at record highs. Essentially, throughout 2023 we have experienced a little more scrutiny at the finish line. There’s additional pressure on CapEx, quite a few customers we have been working with were planning to make decisions in 2023 who deferred until 2024. There’s still a lot of interest and sales picked up towards the end of the year.” [Bastian Solutions]



WHILST THE OVERALL MARKET MAY HAVE DECLINED SOMEWHAT, SOME VENDORS EXPERIENCED GROWTH, POTENTIALLY AT THE EXPENSE OF OTHER PLAYERS

SOME PLAYERS REPORTED GROWTH

- Overall, in 2023, the market declined but there were also many companies that grew

“2023 was a little bit higher than 2022.” [Mews Partners]

“It was a down year for the market. But we actually exceeded our plan to a small extent, but being there was something we're pretty happy with.” [KPI Solutions]

“2023 growth was somewhere between like 5-15%.”
[Anonymous]

“For us, 2023 was an excellent year with a solid mix of big projects like Walmart but also numerous smaller projects with various customers.” [Knapp]

“Growth in 2023 was very acceptable.” [IHI]

“2023 was actually a really strong year for us.” [SVT Robotics]

OFTEN IN CERTAIN GEOGRAPHICAL ZONES

“We’ve had a particularly good year in North America., where we more than doubled our order intake compared to the previous year. Perhaps even more importantly we added some nice logos. Almost all of our projects in North America came from net new customers.” [Exotec]

“I would say we had a small growth in 2023, specifically in Europe, but actually also a bit in India and in the US market... decisions were a bit slow especially at the start of the year, it got a bit better in the end of the year.”
[Addverb]

“2023 was within our expectation with a moderate growth compared with 2022. And so far we have achieved double digits. Yeah, this is based on the China market growth. So it is within our expectation and in 2024, we think we'll keep this trend but with a big uncertainty from the global market.” [Anonymous]

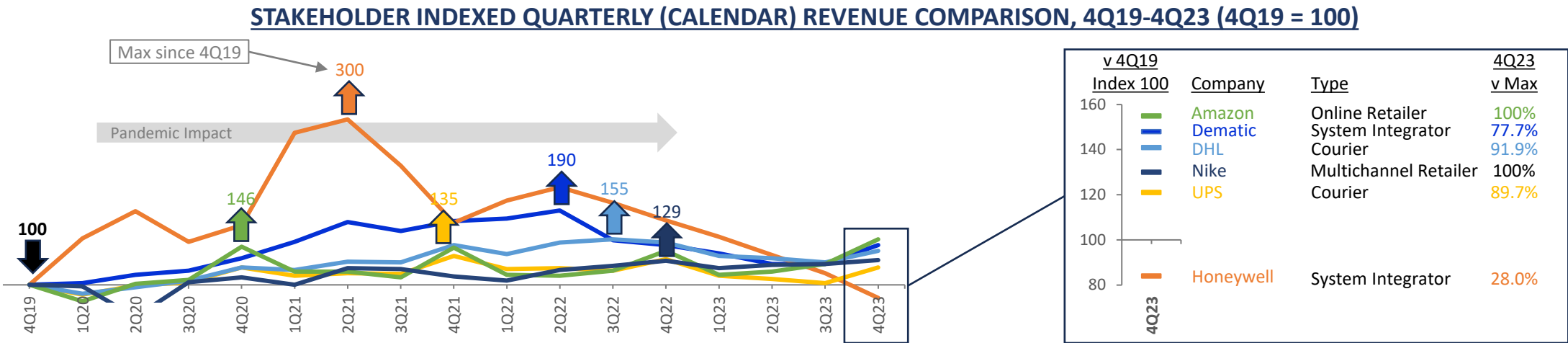
AND PARTLY DUE TO SHARE GAINS

- In a slower 2023 market, not all players can achieve double digit growth, and those that do will achieve it by outperforming competition and taking share

“Exotec actually grew year over year in 2023 in terms of order intake... given the macro challenges this was pretty remarkable and is a good indicator that we continue to take the market share. While it wasn’t the hockey stick growth that we’re used to, I think we did really well compared to the rest of the industry and our peers.”
[Exotec]

“We grew in 2023. Not as much as we hoped and that's because of inflation and people being worried about recession and some customers postponing some projects. But we did grow while a lot of companies like us contracted in 2023. All in all 2023 was a good year, not a great year, but a good year.” [Tompkins Robotics]

INDEXED STAKEHOLDER DATA INDICATED A RETURN TOWARDS PRE-PANDEMIC LEVELS. HOWEVER, IN 4Q23 NEARLY ALL COMPANIES TRADED ABOVE 4Q19



Source: STIQ Ltd Research & Analysis, Company data
 Note re data used: DHL = DHL Express, Honeywell = SPS segment, Warehouse & Workflow Solutions. Amazon = Amazon Online Sales. Fiscal years have been adapted to calendar years to allow for comparison. Nike's Fiscal Q3 (calendar Q1) finishes on Feb 28th

COMPARISON OF INDEXED REVENUE

- STIQ Ltd compared the indexed quarterly revenue for seven stakeholders in the G2P Solutions sector (4Q19 = 100)
- Note that some of these companies post results different to fiscal calendars, for example Nike's first quarter ends in August and impacts from pandemic lockdowns and peak trading etc. may not be absolutely comparative
- This analysis covers the calendar period 4Q19-4Q23 and suggests the pandemic impacted results between 2Q20-4Q22

VARIED RESULTS DURING THE PANDEMIC

- Amazon's revenue peaked early in 4Q20 with a 46% increase on 4Q19, but the retailer was unable to reproduce such growth in 2021 or 2022
- Honeywell's (SPS, Warehouse & Workflow Solutions) quarterly revenue peaked at a huge 200% increase in 2Q21, however, this was against a relatively low quarterly comparative in 4Q19 (\$293m against \$516m average quarterly result 1Q18-3Q23)
- The five remaining companies peaked later between 4Q21-4Q22

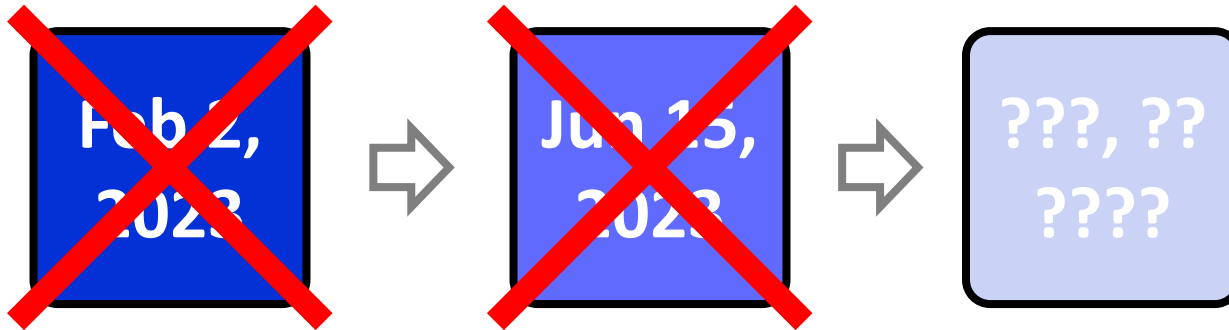
- Selected stakeholders experienced a peak 4Q20-4Q22 which could indicate the end of the pandemic effect by 4Q22

SYSTEM INTEGRATORS HARDEST HIT?

- Two System Integrators reported the strongest peaks (Honeywell 300 and Dematic 190)
- In 4Q23, Dematic traded at 77.7% compared to their peak in the period whilst Honeywell dropped to 28.0%, albeit from a higher peak
- Retailers and couriers appeared to be relatively unscathed performing at 89.7-100% from peak

POSTPONEMENT OF PROJECTS A LARGE PART OF MARKET SLOW DOWN IN 2023

G2P SOLUTIONS SECTOR PROJECT POSTPONEMENTS (ILLUSTRATIVE)



Source: STIQ Research & Analysis

POSTPONED PROJECTS IN 2023

- There appeared to have been many cases of postponed projects

"I would say business was down in 2023. And I think it was the same for everyone. A lot of customers were pushing back on order intake. They were like, we will sign the contract next week, and the next thing we heard that it was pushed back by another quarter." [Swisslog]

"In 2023, a lot of projects in the market were deferred, making it difficult to accurately forecast order intake. This was not isolated to a single player." [Exotec]

- Statements suggested there had been an increasing level of scrutiny of Capex projects and that many such decisions had ended up at board level

"There's no question that in tougher macro environment where there are capex constraints, decision making around capex commitments has escalated, sometimes up to the board room level. That reflects the times we live in. If we do move to a more normal macro environment with more regular and delegated approvals, we will see decision making speed up." [AutoStore FY23 presentation]

- There was also a certain seasonality to order behaviours from end of the year into the next year

"We had a few postponements in 2023... We're more experienced. We also forecast postponements... Every year we have quite a few projects from Q4 that carry over to Q1." [Geek+]

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NORTH AMERICA REMAINED THE KEY MARKET DRIVER IN THE WAREHOUSE AUTOMATION MARKET

GLOBAL GROWTH ESTIMATE BY CONTINENTS, 2023



Source: STIQ Research & Analysis. Interview sentiment. Map image [source](#)

US MARKET, A TOP PERFORMER

- Interviews across all STIQ reports have suggested the US market fared better in the post-Covid era

“In 2023 North America became our #1 market. For the whole company. The US has been a major driver of that. And that’s not because other markets are doing badly... China is doing great, APAC is doing great. Europe is doing less great, but still growing. But 2023 was really the year where the US took off for us.” [Geek+]

“The US market did well. North and South Europe was OK. APAC is a bit difficult to look at because Australia did very well and other parts of Asia maybe for other reasons was a bit more challenging. South America was pretty OK too. But this deviates in individual countries.” [SSI Schaefer]

- However, the US market had also experienced some decline from heights in 2021 & 2022, especially as key retailers had stopped projects

WAREHOUSE CONSTRUCTION DOWN

- The appetite for new warehouse construction appeared to have declined

“At least in the US... there's a lot of new warehouses being built, but there's a downturn there. This leads me to believe that there was a little bit of a softening in demand which will have to play itself out. I think we'll see it in 2024. I'm still bullish on the industry because I think that the core drivers are still there.” [NTT DATA]

“Warehouse construction in the US is down. If construction is down, we're down. That means no one's buying warehouses. No one's designing them. No one's planning those expansions right now.” [Deloitte]

2024 ELECTION IMPACT

- Few interviews thought US elections would affect warehouse automation market prospects, but there could be some impact – also difficult to forecast

“It depends how the economy in the US goes, but I think vendors will probably see an initial spur of hiring in Q1 because there’s always an uptick in hiring in Q1. I think in Q2 and Q3, hiring will be deferred because the elections and depending on how they go... it will depend on the outlook for the rest of 2024.” [CrimsonXT]

EUROPE WAS THOUGHT TO HAVE FARED WORSE IN 2023 WITH LIMITED PROSPECTS IN 2024. POCKETS OF GROWTH IN MEA

EUROPE FORECAST TO BE TOUGH

- The European market appeared to have been worse off in 2023 and onwards

“The party is still not in Europe. If you look to the overall market there's still a lot of signs of a recession in Europe and there's still a big influence from the Ukrainian war throughout European market. Other markets like Asia or North America are not affected by that.” [Rocket Solution]

“Some geographies were maybe hit a little bit harder than others in 2023. It seemed there were some headwinds in Europe.” [Exotec]

- There were differences between countries within Europe as well, with some performing better/worse than others

“It's hard to speak of a European market because the market is either French or German or British or Scandinavian or southern European... it's a bit fragmented.” [Fabric]

“The Scandinavian market for warehouse automation is very big. It always has been. Because of labour cost, space cost, there's a lot of ergonomic regulations. So for us, it's really a big market.” [Anonymous]

“The German economy is under a lot of pressure and there's been a lot of hesitation.” [SAFELOG]

“It seemed traditional integrators were disproportionately impacted compared to robotics vendors. A lot of this was perhaps related to overbuilds... specifically those companies with a high exposure to the Amazons of this world.” [Exotec]

EUROPE DIFFERENT TO NORTH AMERICA

- Plenty of STIQ interviews have suggested European automation buyers may have a different approach to their North American automation peers

“In Europe they have a very good understanding and long history of automation. They are well educated in terms of how automation can be and what they could expect. They like to follow their ideas. In the US, I think it's on the contrary, because they do not have as good as Europe's understanding in terms of automation, so they try lots of new things and they are very open for that. Especially they can be very creative in terms of some new ideas to test and launch in their warehouse. It can rarely happen in Europe where they are a bit more conservative to stay back or hesitate on trying that because they cannot afford their business to be disturbed.” [BlueSword]

“The European market is much more advanced. I think supply chain professionals in Europe are more advanced - it's also kind of the hotbed for some vendors. It's a very competitive market. The US market is more of an open space for us to introduce ourselves.” [Anonymous]

- Interviews suggested there were more larger projects in Europe when compared to North America, however, this could be changing

“There tends to be much larger projects in Europe. We're also seeing a need for H&S in Europe because regulations are becoming tightened. Sustainability is also a big conversation. In EMEA you're also seeing a lot more startups looking for sales people that understand warehouse processes.” [CrimsonXT]

“Europe is more mature when it comes to the MHE market. The US will grow slightly faster than Europe due to lack of penetration. That is what we are seeing. But it is going to be single digit growth for the legacy MHE market in 2024.” [Swisslog]

EUROPE GROWTH RETURNING AFTER 2024?

- Interviews proposed that growth might return to Europe after 2024

“We will not see big growth in the European market in 2024.” [Rocket Solution]

POCKETS OF GROWTH IN MEA

- There appeared to be plenty of scope for growth in MEA albeit these markets were perhaps smaller and more nascent when compared to Europe and North America

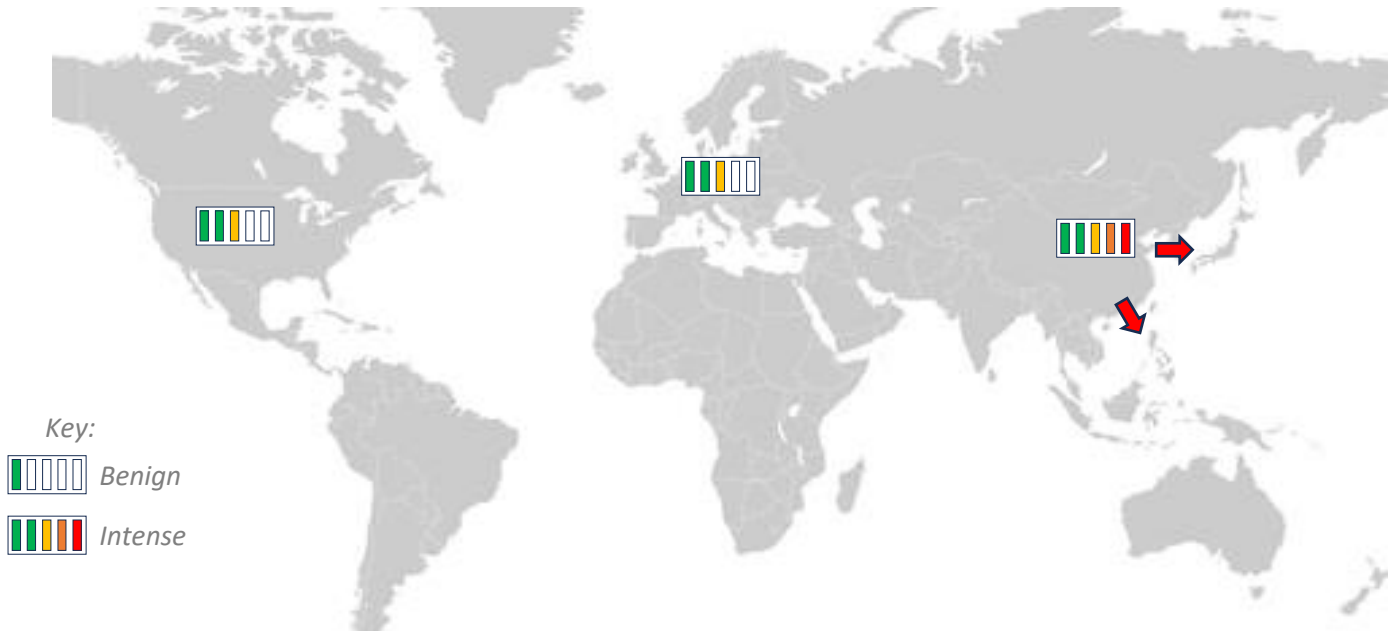
“There's quite a lot of growth in the Middle East. I think there's actually a lot of investments going on. The biggest market is Saudi Arabia, but it's also the least penetrated market. There is a lot happening in all fields... there's a mix of retail and production sites.” [Addverb]

“African companies are investing in automation because of the labour risk, not necessarily because of the cost.” [Quartel Associates]

“One of the key drivers for our deployment in South Africa was shrinkage.” [1MRobotics]

CHINA MAINTAINED ITS POSITION AS A KEY MARKET AND MANUFACTURING BASE FOR WAREHOUSE AUTOMATION ROBOTICS. INCREASINGLY INTENSIVE PRICING DYNAMICS

GLOBAL G2P SOLUTIONS, COMPETITIVE PRESSURES SPREADING



Source: STIQ Research & Analysis. Interview sentiment. Map image [source](#)

AGGRESSIVE PRICE COMPETITION IN ASIA

- The Chinese market for material handling equipment, and in particular solutions based on mobile robots, had faced continued downwards price pressures in 2023
- This appeared to be a response to the very large number of vendors competing for a share in the large domestic market, but could potentially also indicate shrinking demand

“I think everyone told you about the price pressure in China. Many Chinese companies just started to go outside of China this year as Covid finished in 2023.” [Anonymous]

“China at this moment is competing aggressively in terms of pricing. I’m not sure if you know about the local market... the more lower price is sometimes better.” [BlueSword]

- Whilst price competition had centred on mobile robot related solutions, it also appeared to have influenced other warehouse automation equipment segments

“We were thinking to build a Kiva robot, but that’s too competitive. There are 100’s of companies in China building this.” [Django Robotics]

“This price competition is not only in the Kiva segment, but also rack shuttles, lifters, cranes. I think basically everything involved with the automation is now going to that trend. That is maybe also the reason why more and more integrators like to go abroad.” [BlueSword]

G2P AGV SEGMENT LARGELY COMMODITISED

- There were signs of increasing commoditization of certain mobile robot segments

“I think there’s brutal competition within China; That’s why commoditization has accelerated.” [Anonymous]

- The G2P AGV (“shelf to person”) segment had experienced particularly high levels of price deflation and competition

“I’ve heard in China, mobile robotics is already pretty much commoditized... it’s just been an aggressive pricing war.” [Anonymous]

“At Cemat Asia in 2023 there was almost no attention to the rack to person solutions. This seemed to have switched to AGV Shuttles and those kind of applications.” [Vanderlande]

“Competition for the G2P AGV robot... or the ‘shelf robot’ in China is very, very strong and the price is going down continuously. It’s very difficult for every vendor in this segment. Even so this market still has large scale but it’s very hard to win the order at a normal price... let’s put like this.” [Anonymous]



PRICE COMPETITION IN THE CHINESE MARKET SPREADING MAINLY IN ASIAN MARKETS. NA + EU LARGELY UNAFFECTED (TO DATE) DUE TO HIGHER SAFETY, ETC. STANDARDS

PRICE ISSUE NOT SPREADING TO NA+EU (YET)

- STIQ's hypothesis for this report was that such price competition may have reached Europe and North America, but interviews did not back up this presumption
- Interviews with local NA vendors hinted there was not any intensive ongoing price competition, although for larger systems there had been some impact from Amazon's withdrawal in the market
- European vendors had been less impacted by Amazon's cancellations but also had a very well-established system integrator and responded that they had not evidenced any major price deflation
- It should be noted that there was significant price deflation in some segments in 2019 that set the market price

PRICE DEFLATION LIMITED TO ASIA (TO DATE)

- However, price competition appeared to be somewhat limited to China and Asia, often due to certification and standards' demands by North American and European end customers

"In China we decide to decrease our price to make sure that we are more competitive. But in US, in Australia, in Singapore, Japan, we have a different strategy and we are adding more features. We are customising features for the customer and also we changed to better components to make sure the robots are more stable so we don't need to invest a lot in after sale. So we are moving these two different strategies based on different countries." [Django Robotics]

"It's definitely the case that a lot of Chinese vendors are expanding in Asia Pacific. APAC is a region that has a similar structure of competition as in China. I want to say the structure of competition is similar but countries are different. For example, Japan is a market that can be difficult to break into but we have managed to get established there." [Geek+]

CULTURAL DIFFERENCES

- There were also important cultural differences with varying degrees of European and North American standards and technical requirements to adhere to

"The European and US markets are different from China. These markets need certifications and have high demands on quality, service... it's not only about hardware and price. In China, customers only pay for the hardware and often require services for free. So I think this situation is very different with the US and Europe." [Wellwit]

- Cultural differences also applied to many other countries in the APAC region

"For big projects our main competitors are Daifuku and Muratec. I think Japanese customers are a bit reluctant to work with non-Japanese vendors." [IHI]

COMPETITIVE DYNAMICS IN CHINA HAD INCREASED ATTRACTIVENESS OF EXPORT MARKETS WHILST DECREASING WESTERN INTEREST IN THE DOMESTIC MARKET

EXPORT MARKETS INCREASINGLY ATTRACTIVE

- A highly competitive domestic market appeared to have encouraged plenty of product-based companies to search for markets outside of China

“For 2024, I think many, many Chinese AGV companies will go for the overseas market. Like us, we will attend Modex and Logimat.” [Wellwit]

- It was not only point solution vendors that were exporting, but also increasingly System Integrators with their own product ranges

“We do see Chinese System Integrators coming into Japan as well. Mainly via partnerships and so on for now.” [RENATUS ROBOTICS]

“We've seen a lot of competition from Asian vendors.” [Anonymous]

PRODUCTS EASIER THAN SERVICES TO EXPORT

- Some System Integrators had considered exporting their business model including services, but may have realised the financial and resource implications of setting up teams abroad, and settled for exporting products

“We prefer to sell our automation products only. Because we don't have the luxury to maintain a global installation team and after-sales service team. We think we don't have these advantages even if we invest and hire such a team because there are already many, many integrators globally. There's no way for us to compete with them. Our advantage is to leverage on the China supply chain to manufacture a cost-effective system.” [Anonymous]

- Interviews suggested there had been significant investment in new warehouse automation production capacity by some Chinese vendors

“We have just invested in a new plant and the new plant's production capacity is several times bigger than the total capacity that the Chinese market can consume. Therefore, we have this extra capacity and we need to seek growth globally. The China market is still growing, but of course our production grows faster.” [Anonymous]

COVID HALTED EXPANSION PLANS

- STIQ interviews with vendors indicated plenty were planning to go abroad pre-pandemic, but may have faced additional delays due to lockdowns and lack of travel options

“Until now, China was our main market. The company started from here and also prospered from this market in the past 20 years. And that is why our products and our supporting organisation are mature. We started globalisation 3-4 years ago, prior to the pandemic. But as soon as we started go out, I think 2018, then we quickly hit the pandemic.” [Anonymous]

CHINA, EXCLUSIVELY SHUTTLE ASRS MARKET

- The Chinese domestic MHE market appeared to have its own dynamics, such as ASRS shuttles being a standard product versus mini loads, etc.

“It's very funny when I take charge of the overseas market. In Europe, 99% will ask for a miniload, they will never ask for a shuttle. In China you wouldn't see a miniload anymore. It's shuttles everywhere. Shuttles are cheaper here.” [BlueSword]

WESTERN SYSTEM INTEGRATORS IN CHINA

- Whilst aggressive price deflation from Chinese vendors had not yet impacted North America or Europe, there were signs that System Integrators from these continents may have faced entrenched competition
- Some interviews hinted at a declining participation in the Chinese market by Western System Integrators

“I was also at the Cemat Asia show last year and when you compare to 4 years ago, there were hardly any western integrators this time.” [Vanderlande]

- However, there could also be other reasons for this, such as temporary priorities, budget constraints, travel barriers, politics, etc.

ASIA WAS OF STRATEGIC IMPORTANCE TO WESTERN VENDORS, BUT LOCAL DYNAMICS, SALARY LEVELS AND PRICE COMPETITION APPEARED A BIG CHALLENGE

ASIAN MARKET DYNAMICS

- Asia was viewed as a strategic market for quite a few European and North American vendors

“We think APAC is a big market and strategic to us. We already have several deployments in the region with plans for further growth.” [Locus Robotics]

- Individual Asian markets are varied in demand, market maturity and dynamics
- China, Korea, Japan and Australia are relatively mature markets, but each has individual characteristics, advantages and challenges

“Most of the warehouses in Korea have many storeys, some have 10 storeys or more. Each story has quite high ceilings. The big players, they may already have paid a lot of big money for the real estate and they want to save money on the equipment and facilities.” [Posco DX]

“Every market has big and small projects. If you look at Korea and Australia, our projects are much bigger because these are very mature markets for us. We have a position there and a reputation. It's easier for us to win bigger projects. In the US market, we see there's a lot of potential with a lot of huge projects as well, but we are a newcomer to the market.” [Mushiny]

- The Japanese market appeared to be looking positive
“In Japan there is this kind of logistics related countrywide issue called the ‘2024 problem’ where they're adding new kind of regulations and laws to help protect truck drivers from being overworked. Experts are saying that this will kind of create demand for more automation in the logistics industry and warehouses. There are many automation projects taking place. There are many new vendors or system integrators introducing new robotic systems. So I do think the automation scene is flourishing in Japan.” [RENATUS ROBOTICS]
- Interviews have suggested labour costs are relatively low (when compared to Europe, US) throughout various Asian countries, except perhaps Australia
“First of all, labour cost is very low in Japan compared with US and Europe. Because of that, the ROI needs a long time. So we are facing a little bit difficult sell on the cost point of view.” [IHI]
- However, labour costs can be a challenge for warehouse automation business cases, but in some cases it doesn't help to throw more labour at problems (diminishing returns)
“What we found is that companies that deploy our solution, obviously want an ROI based on labour, but they're deploying it because they just can't find the labour due to a variety of factors including aging workforce in Japan.” [Locus Robotics]

- India is a fast growing market that is also quickly maturing, especially on the back of significant investments in manufacturing

“I need not tell you about this, but labour rates in India from an automation standpoint... it's kind of a balancing act.” [Accio Robotics]

“We expect to see a much bigger growth in 2024, especially from India, the Middle East and the US. There are already some good projects in India, also for G2P. The biggest projects we have done are in India.... most of the projects are a mix of retail and Ecom.” [Addverb]

- Other parts of Asia may also benefit from offshoring or derisking of manufacturing, such as Vietnam and Thailand (among others)

“Some manufacturing industry is moving to Vietnam, Thailand and Mexico and so on. This is also one reason, not that China's requirements are down. We also feel some price pressure from our customers, also from international customers.” [Wellwit]

“Other APAC countries like Vietnam, Malaysia and Thailand will also be good markets for Chinese AGV & AMR. There is no additional certification required often. We can also ship quite cheap and these markets also need the cheaper prices. I think price is first in these APAC countries.” [Wellwit]

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SOME RELUCTANCE FROM E-COMMERCE & RETAIL BUYERS, THE REAL MOTOR BEHIND G2P SOLUTIONS. OTHER NON-RETAIL VERTICALS INCREASED IN IMPORTANCE IN 2023

HEADLINE

- Note interviews for this report were conducted with a variety of vendors + System Integrators (+ consultants) and some of the responses may be more related to their overall business rather than specifically to G2P Solution applications
- Furthermore, there appeared to be huge differences between vendors, i.e. some were successful in one sector whilst another vendor was not and vice versa

NON-RETAIL LIFTED THE SECTOR

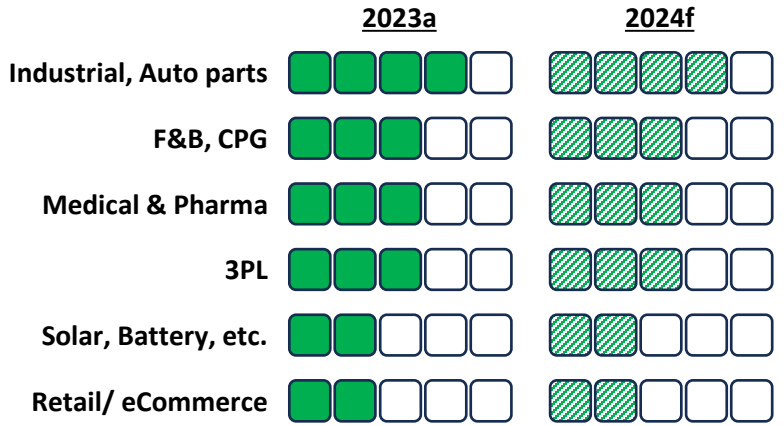
- E-commerce (and retail) growth remained the primary motor behind the G2P Solutions sector, however, in 2023 this did not perform as expected
- Other verticals (non-retail) increased in importance as retail and E-Commerce declined in 2023

“Non-retail is still good.” [Attabotics]

“I think overall 2023 was not that good or as good as we expected after Covid. Some projects were delayed. From the general environment that we can see, some projects got postponed and especially for G2P, related to e-commerce. And then also for pharmaceutical, those kind of like high turnover requirements, throughput and efficiency kind of sectors, we deployed a few large systems.” [BlueSword]

“I think there was a lot of uncertainty and especially for retailers... the reason retail didn't grow at all is because of inflation and recessionary fears, etc. So our growth in non-retail was very good but in retail it was flat.” [Tompkins Robotics]

G2P SOLUTIONS GROWTH BY VERTICAL, 2023-2024



Source: STIQ Ltd Research & Analysis

“There has been very large investments in the non-retail sector. Because their business is more stable. They're growing slower than Ecom but they have less risk around that growth. They're willing to take on a longer term ROI. That's why it's appealing to have a diversified customer base where an Ecom or retailer that's trying to grow aggressively... they need to see a faster ROI on their investments.” [KPI Solutions]

“When we started the E-scala, the idea was to tackle the ECommerce market. First of all, we launched after Covid, E-commerce was going down. And I think we switched a little bit our focus then directly towards non-retail.” [Movu Robotics]

PARTS, AUTOMOTIVE, INDUSTRIAL

- Interviews suggested the parts vertical, especially automotive parts, had been a key sector in 2023 and would experience near term growth

“We've seen some interesting investments in parts, components, and automotive. Aerospace is also moving a little bit... The larger companies in those industries are still making investments.” [Exotec]

“We were seeing a lot of eaches picking growth happening in auto parts, spares...” [Swisslog]

“In the beginning, most of our customers were from ecommerce. But now most of our customers are from the industrial sector. I don't know why, but we have nearly 100 customer in 3C, not so big though. In Japan and the US we have customers, but really large ones, mainly in ecommerce.” [Django Robotics]

“Over the last year, we saw a trend with growing business, a lot of requests. 5 years ago we didn't have a lot of requests to automate small parts warehouses... for sure we had this 15-20 years ago. But with a focus on each picking and G2P. In the last 2-3 years this is really a request in production environments.” [Mews Partners]

- One of the drivers in industrial and parts could be an increased level of near shoring

“From an order intake perspective it's more tilted toward industrials, where we see an increase in the US and Europe. For the industrial segment we have always had applications for storing spare parts, but are now seeing increased in storing pre-assembled components and parts for kitting which correlates with the industry's desire for near shoring.” [AutoStore]



RELATIVELY STEADY DEMAND FROM F&B + CPG VERTICALS WITH A GROWING FOCUS ON OMNI-CHANNEL AND B2C/D2C TYPE SOLUTIONS

FOOD & BEVERAGE

- F&B appeared to be performing strongly for vendors with a continued increased focus on B2C/D2C

“We're moving up and have some nice projects with Fortune 50 customers in some really exciting industries. We're seeing a lot of success, for instance in F&B and CPG in addition to our proven ability in e-commerce and apparel. I think those were some of the highlights from 2023.” [Exotec]

“Food & beverage is good. There are some interesting opportunities... I talked to a peer 2 weeks ago and they said they see a trend with a lot of requests... more requests in 2024 than in 2023. This sector seems to speed up a little bit alongside pharma and medical devices.” [Mews Partners]

“We have focused heavily on the food and beverage industry segments. About 40% of our pipeline is projects in this segment. This has allowed Hy-Tek to continue our pipeline as business segments focused on e-commerce, retail, and wholesale have somewhat maintained or even stagnated. We have put a significant effort on taking all of the great technologies we have deployed for years to this segment.” [Hy-Tek]

CPG OMNI CHANNEL

- Interviews also suggested the D2C model was driving demand from CPG players

“Larger CPG companies were looking to invest in 2023. They're kind of in a natural cycle of replacing their legacy systems but they are also asking themselves “now that we're here, how do we really modernise our operations?” This is why we are seeing some innovative omni-channel approaches emerge. One example is taking a B2B channel, which they usually call direct to store, and combining it with e-commerce. This is where these technologies with next generation capabilities come in as they allow these businesses to operate in a much smaller footprint and really expand the business case.” [Exotec]

“More and more organisations are trying to go direct to consumers. Grocery has always had a fulfilment model to stores, but there are businesses popping up with direct to home fulfilment models. That requires an infrastructure that didn't exist before. We're looking at a lot of pharma and medical device type projects which are also more recession proof.” [Honeywell]

- There appeared to be plenty of current and near future demand for an omni-channel approach among CPGs, albeit some of this interest appeared to be exploratory in nature

“There's definitely a segment that's shopping and wants to kick tires. We have a Fortune 500 CPG company that's thinking about how to open a D2C channel for one of their brands. Is this something that has a budget for 2024, and a site, and something that's just signed off? No, but we do think if we give them the business case, that's something that they can take to their management and make the case for in 2025. We see quite a bit of window shopping in that sense... and then we have a number of projects that we're responding to RFQs with defined sites, defined budgets, defined stakeholders and decision makers, timelines for decision. And we're actively competing on those as well.” [Anonymous]

3PL CUSTOMERS INCREASINGLY ACTIVE, BUT OFTEN WITH CHALLENGING ROI DUE TO BUSINESS MODEL. 3PLs ALSO VERY ACTIVE PARTICIPANTS IN AUTOMATION EVOLUTION

3PLs INCREASINGLY IMPORTANT CUSTOMERS

- Interviews suggested 3PLs have come a long way in terms of automation technology knowledge since STIQ started writing about G2P Solutions
- In fact, it seemed 3PLs now drive not only demand, but also some of the developments among vendors

“In terms of market drivers... so I think the biggest multiplier or service customer group is certainly 3PLs. And they come up with various ideas on how to use the technology. They are very creative and sometimes they need to explain to me the ideas behind them.” [Koerber Supply Chain]

“If you look at 3PLs, they have all kinds of G2P solutions and it's amazing how well they know their own business. There's so many different types of customers that it's really... there's not one type of customer. Some 3PLs are really strong in standardisation, some are really strong in optimising and some are really strong on the financial side and how good they managed to fulfil their customer contracts. If it is a 5-year contract, you can work on a better plan in these 5 years than if it is only for 3 years. They do a totally different setup for each.” [SAFELOG]

- For some vendors, 3PLs were the most important customer type

“3PL increased a lot, then industrials... production industry and spare parts and in the 3rd place I would say pharmaceutical & healthcare.” [Movu Robotics]

“3PLs, retail and apparel are our top 3 industries. And ecom fits into either retail or apparel. Definitely 3PL is big, also because we kind of have developed partnerships with 3PLs that leverage our solutions to sell their offering to their customers. Manufacturing logistics is a rising industry for us as well. One of our biggest deals ever was signed in that space last year. It's definitely a driver for us. And pharma... there is a focus and a renewed attention to manufacturing.” [Geek+]

“3PL is our most successful segment. We see a lot of participation in that space. We also see a lot of retail and e-commerce... and food and beverage, those are the three segments we see the most traction.” [SVT Robotics]

“3PLs are starting to invest more and more in automation.” [Vanderlande]

“The first one is wholesale and also 3PL companies, automotive part centres and ecommerce. Those are the main target customers. And apparel.” [IHI]

- Some evidence pointed to 3PLs increasingly interested in RaaS type deals

“Many 3PLs are now looking for rentals. Not all 3PLs, but there are more and more 3PLs that are saying our management does not accept CapEx anymore.” [Addverb]

HEALTHCARE, PHARMA, AND BEAUTY

- Plenty of 3PLs also have Health & Beauty customers which required automation to optimise processing

“There are a few 3PLs... health and beauty retailers is another one. We are also seeing some interesting traction in apparel, not so much for their pure pick & pack operations but more on returns.” [Fabric]

THE TECH ENABLED 3PL

- There were an increasing number of companies focusing on merging 3PL with software and warehouse automation equipment

“We're thinking about becoming a warehouse developer as well, so eventually starting with the building and also even operating these warehouses on behalf of customers... going beyond just a traditional vendor.” [RENATUS ROBOTICS]

“We think of ourselves as a tech-enabled 3PL with our own software and automation hardware.” [OPLOG]

- Such companies would mimic what Amazon did when they acquired Kiva Systems in 2012

“NEW ENERGY” DIFFERENT BY COUNTRY. RETAIL & E-COMMERCE, KEY TO G2P SOLUTION GROWTH, EXPERIENCED SHARP CONTRASTS BETWEEN WINNERS AND LOSERS

SOLAR BATTERY, NEW ENERGY

- There was less demand from the “new energy” industry
“The economic situation in the USA and Europe is not very good and the situation in China is also not good. The solar and battery - these industries are down. So the big requirements are not coming on the market.” [Wellwit]
- However, sector growth could be isolated to particular countries, for example, the Indian EV sector appeared to be driving some growth right now

“Sectors - its always a bit dependant on where you are. In India it's all over the place and it is not always G2P picking. But you see a lot of development in things like battery manufacturing and electric vehicles. India is booming at the moment.” [Addverb]

RETAIL + E-COMMERCE

- It can often be difficult to separate E-Commerce, Retail and Omni-Channel as a separate industry sector, especially as retail and e-commerce have continued to evolve and become an integrated part of many diverse industries
- However, retail and E-Commerce has been a very important market driver behind the G2P Solutions sector and possibly the wider MHE industry

“Ecommerce is driving a lot of the demand for automation.” [NTT DATA]

“In e-commerce there is a lot of overlap. We have seen a lot of success in the pharma sector, but it is shipping directly to customers. It is not traditional B2C, but B2B.... shipping to hospitals, shipping to large clinics. We have seen a lot of success in that vertical and use case. Its basically B2B fulfillment, but smaller – where they require each picking. I would say its spread over many verticals.... We have seen success in pharma.” [Swisslog]

RETAIL + E-COMMERCE GROWTH

- Interviews appeared to suggest there was a wide growth disparity between different Retail & E-Commerce player’s successes in the market

“Some fashion retailers are struggling a bit but also some others are doing well. For example, sports articles is doing quite well and some other niches, such as pet articles.” [Vanderlande]

“We still see good activity in the Retail and E-com sector. Also, more and more customers looking into omni-channel applications to leverage automation and resources for both channels. Also, we see good activity in the industrial and automotive space for automation and increased efficiency.” [AutoStore]

“Primary sectors are retail, which is still very strong, e-commerce, fashion and healthcare. These sectors did very well. What is at the moment pretty difficult is production logistics. Some of these customers are now focused on other topics, such as energy or bringing back their supply chains to Europe. Their main focus may not be intralogistics.” [SSI Schaefer]

“PIO is targeting the SMB market, especially tilted towards e-commerce. And that particular market has been quite heavily impacted. We see a very attractive marketplace there. I think it's just a matter of prioritisation and where that market is today, but we still see a very attractive space there and we will continue to explore that.” [AutoStore]

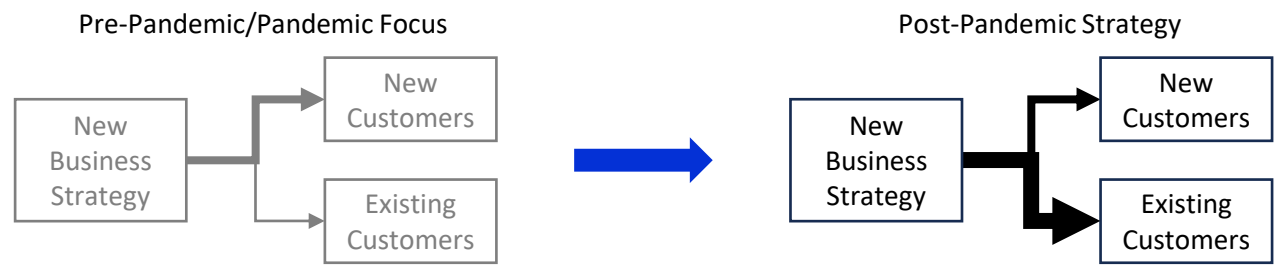
“Ecom and retail are still probably the two biggest industries for us. We do play in just about every vertical. So we did a couple manufacturing projects this year, a couple of hospital/pharma projects. But I think retail consumer goods, apparel, footwear and then specifically the ecom channels within those kind of verticals is where a lot of the investments are still going.” [Hai Robotics]

- Interviews also suggested smaller customers may still be growing and that it was mainly the larger players that had experienced back to normal growth levels

“It seems larger e-commerce companies have some pushback on their daily volumes. But when I talk to smaller players, they still grow at 10-20-40%. It looks like to me that those smaller e-commerce companies are still quite successful and the bigger ones have problems in maintaining sales.” [Intellistore]

A LARGE AND DIVERSIFIED CUSTOMER BASE PROTECTED SYSTEM INTEGRATORS DURING TIMES OF UNCERTAINTY WHEN SOME OF THEIR KEY VERTICALS MAY HAVE WEAKENED

APPARENT STRATEGIC SHIFT IN NEW BUSINESS ACTIVITIES



Source: STIQ Research & Analysis

IMPORTANCE OF A DIVERSE CUSTOMER BASE

- More mature System Integrators and vendors tend to have a good diversity in their customer base and part of that is related to trends where some sectors perform better whilst others may be declining
- Interviews suggested plenty of the System Integrators have been fortunate to develop a diverse customer base

“We have a pretty diverse client base across food and beverage, supermarkets, life sciences, and retail. Compared to other integrators, we are lighter on e-commerce and retail. We see that as some upside for us in 2024. From a market perspective, I see growth across the board. I think retail is probably one of the more uncertain spaces you could be in 2024. I think industrials and food and everything like that could be certainly stronger places to be in right now.” [KPI Solutions]

“We're pretty diversified and we like to keep it that way. So we've got a pretty strong interest in e-commerce, working with some large clients who are moving into omnichannel facilities... trying to understand how to use goods to person to fulfil not only ecom, but also retail store orders. That's been a big need from clients we're working with right now. We've also been pretty strong in industrials. We had a few nice projects in industrial automation, some parts distribution stuff like that. Also, a lot of interest in just traditional store replenishment.” [Bastian Solutions]

- Interviews also suggested system integrators were looking at alternative sectors to continue broadening their customer bases

“We see a lot of demand from different areas and we see a high tendency for automation in fields which are still completely manual. We also see some big retailers going stronger into automation. The tendency towards automation is still there.” [SSI Schaefer]

- A historical, large and well diversified customer base could also assist with business development when there were several customer verticals that performed badly

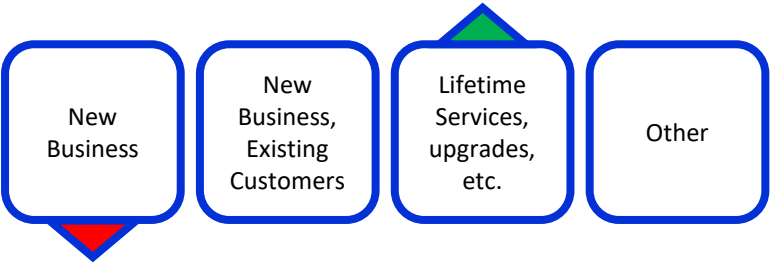
FOCUS SHIFTED TO REVENUE IN 2023

- Interviews suggested that there may have been a sharpened focus on revenue generating activities in the sector throughout 2023, versus project activity

“2022 was a super busy year for us. In 2022 we saw there was a lot of project and program managers needed. These complex projects were set up with fortune 100 customers by the big integrators. That changed in 2023 and it seemed to be more of a scramble for revenue. So we saw a big increase in needs for support staff like maintenance engineers, the electrical engineers, controlled engineers solution design and sales people.” [CrimsonXT]

G2P SYSTEM INTEGRATORS INCREASED THEIR FOCUS ON LIFETIME SERVICES, UPGRADES AND RETROFITS. MARKET PHASE OR REACTION TO LACK OF NEW BUSINESS?

SYSTEM INTEGRATOR REVENUE STREAMS IN 2023 & 2024 (SIMPLIFIED)



Source: STIQ Research & Analysis

INCREASED FOCUS ON LIFETIME SERVICES

- Interviews with system integrators of G2P Solutions suggested a strategic shift towards lifetime services as new business was perhaps a bit more difficult to forecast

“We’re going to both go after the lifetime services segment pretty strongly and then we likewise are going to look at additional opportunities with existing accounts.” [KPI Solutions]

- Incumbent system integrators often had a large portfolio of existing customers with potential for upgrades, build outs, maintenance, etc.

“I think it’s our advantage that we have thousands of existing installations in the world with huge number of customers. If they’re satisfied, they will do a re-buy and buy from us again. There is a large part of the sales pipeline which is to extend existing systems or to do modernization work.” [Knapp]

“We are seeing more growth and opportunity in lifecycle support & services, or aftermarket services... we have a very healthy install base of products given that we’ve been in the market for a while. The opportunity for us is to provide services to help our customers upgrade their systems or do a rebuild, a recontrol or something along those lines. They’re smaller projects but not subject to the whims of an RFP process. That is the risk management that we do as we look at how we can continue to bring more value and strength in the relationships with the customers that we have.” [Honeywell]

- As end customers postponed projects, such “Asset Sweating” could prove beneficial for both parties

“As a result of the pandemic and the exponential growth in newly built warehouses and DCs, many customers now have more capacity than they need. Despite a temporary slowdown in new construction for some, we are still seeing a lot of customers interested in what we call “sweating their assets.” They want to get the most value out of the automation they have, with smaller upgrades and things like robotic investments that they can do without starting a large capital project. It is a shift in the way our customers are thinking about spending money.” [Honeywell]

- Plenty of ASRS Shuttle systems have been around for 1-2 decades and could also be in a renewed phase of updating

“Retrofits and modernising includes new electronics and mechanics. Updating the safety concepts and so on. We can exchange the old shuttles to the new generation, for example. These shuttles are developed only for retrofits. Yes, we can use it also for new installation too... but mainly with it was a huge strategic development that we’re able to help customers to extend the life cycle of the existing system for an additional 10 years... even if they already have had that system in use for 2 decades... from the early 2000s when we started with the first shuttle systems. And so it’s from the cost perspective also very interesting... if you look at the safety standards, they have changed a lot over the last 20 years. There’s often a lot of topics you need to address. And at the end of the day you, you’re giving the customer a chance to work with these systems for the next 10-20 years and have it on the latest technology and safety standards.” [Knapp]

- Recruiters partially confirmed an increased focus on the existing customer base

“In 2023, we saw a big need of maintenance, operational engineers, industrial engineers trying to optimize existing facilities and a decrease in the need for project managers. Because there was less projects to execute... a lot were deferred and coming into this year again. We’ll probably see the need for project managers come back. This industry is quite cyclical.” [CrimsonXT]

- The increased focus on lifetime services and upgrades for the existing customer base appeared to enhance the importance of System Integrators as gatekeepers in the G2P solutions space
- STIQ Ltd will produce a new report on System Integrators in 2024 – download/pre-order report [here](#)



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VENDORS ANTICIPATED GROWTH IN 2024, CONTEXTUALISED IN THE AFTERMATH OF A FEW HISTORICALLY FASTEST GROWTH YEARS DURING THE PANDEMIC

PLENTY OF MARKET GROWTH ANTICIPATION

- Plenty of interviews anticipated 2024 to be another growth year

“We're still finalising our plan for 2024, but we're staying aggressive and we think we're going to see larger deals. We think we're going to see repeat business, things like that.” [KPI Solutions]

“We see 2024 to be our best year ever, probably by a wide margin. We are very excited about our prospects and opportunities for growth.” [Locus Robotics]

“I think in 2024, based on our customer forecast, we should be able to keep double digit growth.” [Wellwit]

“We're quite optimistic for 2024... I mean, we're definitely more optimistic at the start of 2024 than at the start of 2023.” [Geek+]

“From our side, we think 2024 will be more positive than 2023.” [Mushiny]

“We're excited about 2024.” [SVT Robotics]

“2024 is going to be strong. I think we're definitely going to see that egg break and the yolk come out so people are going to start to realise that, 'hey, we just need to move forward. There's been a pause for too long.'” [Attabotics]

“The revenue will be better in 2024, better than 2023.” [Django Robotics]

2024, LOOKING OK

- Interviews for this 2024 G2P Solutions report were conducted in Jan-Feb 2024 and few people had started getting a view on the year as a whole

- However, there were glimmers of optimism as some interviews highlighted early indicators for 2024 looked positive

“Until now, 2024 doesn't look really bad, but it's not as good as the start of 2023. We have a lot of projects in ecommerce retail and we have way more industrial customers. So production environments, actually a lot of requests for G2P solutions in these environments as well.” [Mews Partners]

“We anticipated the dip in the market in 2023. We expect an uptick in the market in 2024, but are monitoring the macro-economic environment, the political climate in Europe and the Presidential elections in the US.” [Swisslog]

MARKET REMAINED UP ON PRE-COVID

- Readers should note that despite many doomsday prophecies, the general MHE market in 2023 remained above 2019 (pre-pandemic) levels
- 2024 should also be viewed in this context, i.e. any dip may still be on par with 2019

“The current situation is a little bit misleading because during the pandemic our revenue increased so much, and now people see it really dropped. But it's still on the level of 2020 or even above. So you must really look at the complete picture.” [Anonymous]

“We're still up compared to pre-pandemic for sure.” [Bastian Solutions]

- Pandemic growth levels have subsided and there appeared to be more scrutiny of business cases for warehouse automation

“We haven't seen the same 40-50% growth that we saw in 2021-2022, but there is still quite good activity when it comes to new project discussions with customers. If we look at 2021-2022, the customer attitude was that ‘we need automation ASAP’. Now there is a great priority for the customer to figure out their broader supply chain network strategy and how that includes automation holistically. This causes things to slow down a little, with customers taking an extra quarter to double check their plan's financials and alignment with the board strategy.” [AutoStore]

- And, whilst there may be shorter term volatility, the longer-term trend pointed towards solid growth

“There's still some solid trends for warehouse automation. Maybe not as much growth as in the past, but it's still solid volume. But maybe there will be a little bit of squeezing of margins to keep those volumes... that might become interesting.” [Anonymous]

FORECASTING 2024 WITH ANY LEVEL OF ACCURACY APPEARED HIGH IMPOSSIBLE

SOME GROWTH CAUTION, UNPREDICTABLE

- Interviews largely agreed that 2024 could turn out either way – as a very good year or potentially not so great

“Actually, for the market, especially the market after the pandemic, the economic situation is not as good as we have expected. But still as you know with the e-commerce it continues to grow and we see some good opportunities.” [Posco DX]

“This year our goals are really ambitious when you compare it with the market. So normally when the market would be not so volatile, I would say OK, that should be a tough goal but achievable. For this year, it is really a challenge, but honestly spoken, any forecast is a little bit like looking in a crystal ball.” [Movu Robotics]

- 2024 would be challenging and some segments of the sector may fare better than others

“2024 will be a challenging year but I'm not completely unhappy with the prognosis and the lead funnel, but it's not going to be an easy year.” [SSI Schaefer]

“I anticipate overall volumes to be somewhat down again in 2023. In 2022, most of the larger integrators saw a downturn in revenue and I anticipate that again this past year. We'll see. I could be surprised. In this market it's really a question of... there's winners and losers every year... I think we're all seeing a migration from the traditional, fixed asset CapEx based designs, not necessarily going away, but being threatened by these new solutions kind of taking up some of that business.” [NTT DATA]

“It's of course a little bit more of a challenge in 2024 compared to previous years. But demand is there, it's just a question on how you fulfil it.” [Koerber Supply Chain]

UNPREDICTABILITY WAS KEYWORD

- Forecasting sales and budgets became very difficult towards the end of 2022, but appeared to have turned near impossible in 2023, despite plenty of opportunities in the market

“I'd say that 2023 was one of the years where there was just more unpredictability than there normally is. And that's because of interest rates because of the economy. But it's always been unpredictable and especially in large systems. It's hard to really predict if a customer will make a decision and when they will make a decision. It's always been very hard for us to predict when the deal will be signed, but most of the time if we've been working with the client for 6-12 months it's pretty likely that they're going to make a decision and nowadays it's just really hard to predict when that's going to happen, not necessarily if it's going to happen.” [Bastian Solutions]

FORECASTING ACCURACY, A NEW HEADACHE

- Interviews suggested forecasting had turned into a major headache for budget planning, especially for many of the incumbents
- However, there can be many reasons for not issuing guidance, such as fear of issuing misleading data ([source](#))
- Providing any shape or form of accuracy appeared to have turned into more or less of a random exercise

“That at the moment is the biggest pain... to have a forecast accuracy. Some of this is because projects may be pushed. But this can also be building permits that are not given, political circumstances. Then we see changing business cases at the customers and so on.” [Anonymous]

“Volatility is probably the right word. A lot of projects have been postponed or cancelled. As I say, my business is probably off by a bit. I believe 2024 is going to be better. It's hard to see how it could be worse. But I don't really have any way of predicting that except to sort of feel the atmosphere and it feels like people have settled into the new normal... then businesses can start to make long term decisions. And even though the consumer is going to be pretty hard off for the next year, but client businesses making decisions for 2-3 years or even 5 years out... not everyone has that long time frame.” [Deloitte]

“I have no comments regarding the future market because it changes so quickly. I don't know if a quote is going to happen, it can change every month. It's meaningless to do any forecast. So we just have to be flexible enough and to adapt to the new changes globally.” [Mushiny]

“It's really hard to say how the market will behave... and it goes on like last year that we have a lot of projects pushed behind in the decision and if that happened that could be tricky.” [Movu Robotics]

“We still get a probability figure from our sales team. But the trustworthy... the dependency on this rate is very questionable these days.” [Anonymous]

2024 COULD ALSO BE A DOWN YEAR WITH CONTINUED DELAYS TO PROJECTS AND WITH POTENTIAL FOR INCREASED COMPETITION. VENDORS MORE POSITIVE ON 2025

CONTINUED POSTPONED PROJECTS?

- Postponed orders were commonplace among all types of vendors, products, system integrators, etc. and the question was if such postponements were going to continue in 2024

“We've definitely seen that we've had opportunities that were 100% a win. And people coming back and saying ‘we're pausing right now’. We definitely experienced that.” [Attabotics]

- Postponed projects were not isolated to Europe or North America, but could take different forms/ shapes depending on country and culture

“Sometimes Japan also has the same situations with postponed projects. The construction cost is very high now. But the Japanese business style needs lots of people's decisions. I think it's very hard to change a decision.” [IHI]

BUT, 2024 COULD POSSIBLY BE A DOWN YEAR

- Some interviews suggested continued postponements of projects in the short term

“Business slowed down a little bit in early 2024, so the overall market. But it's like the overall market slowed down. So we have c.5 projects on hold where the customer already agreed to the project. But the customer just said OK, let's postpone it a little bit. They're not really sure if we want to have the high investment... and it's like, let's wait until the middle of the year and then just reevaluate again if they want to spend the money or not.” [Anonymous]

“People are kind of reducing a bit their outlook on growth and e-commerce growth. And therefore that is leading to delayed projects. So what I've heard is that there's a bit of delays in automation, but not necessarily cancellations. It would be logical to say that you would have some focus on more flexible automation, but I haven't necessarily heard that. That seems reasonable, but it just hasn't come up.” [Anonymous]

- Others hinted the market may not change in terms of \$-value, but project dynamics might change from larger projects to smaller ones

“We think big projects are getting reduced, the number is decreasing in 2024... The market is still increasing, but the number of big projects is decreasing.” [IHI]

- There was also likely fewer greenfield projects

“New warehouse construction is down and has been for the last several years. Operators are focused on optimizing existing sites and expanding footprints with mezzanines.” [Locus Robotics]

2024, INCREASED COMPETITION

- If the market was contracting, the most likely outcome would be increased competition with potential for some price deflation or increased competition

“I think 2024 is the year where we're going to see competitive dynamics start to really accelerate. We've talked about all those small kinds of cubic storage, nothing really happened, but this year I think we're going to see, maybe from the larger ones...” [Anonymous]

2025 OUTLOOK MORE POSITIVE

- Interviews hinted at a more positive outlook starting in 2025

“We are a little bit neutral about 2024 growth. In 2024 we expect a small declining market or a stable market. Growth will return from 2025, along normal rates.” [Vanderlande]

“I think we're going to have a brighter outlook for 2025.” [Bastian Solutions]

- The longer-term lack of labour trend was expected to remain a key market driver in the foreseeable future

“Scarcity of people is already dramatic, but it is expected to be even worse in the future.” [Groenewout]

PROCUREMENT DECISIONS INCREASINGLY ELEVATED TO BOARDS OFTEN REQUIRED ADDITIONAL INFORMATION, EXTENDED DECISION MAKING TIME

PROCUREMENT DECISIONS AT BOARD LEVEL

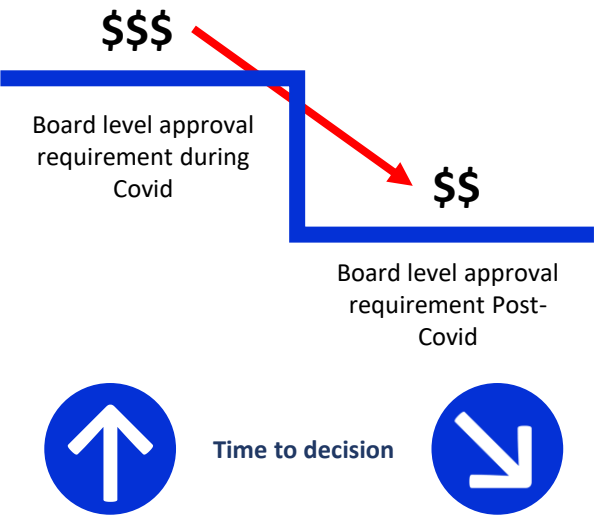
- Interviews suggested warehouse automation Capex/Opex decisions were increasingly elevated to board level
- Part of this was due to increased cost of capital, opacity of forecasting demand and general uncertainty and volatility in economic indicators

“I think the challenge becomes that customers have so much uncertainty in their business that making major investments becomes a riskier proposition. And they don't know what their requirements are going to be in 2025 or 2026 so it's hard to say what are we going to build, what are we going to invest for today.” [KPI Solutions]

“Interest rates increased last year and I think that just put a tighter control from our client's finance organisations on what their investment risk profile was going to look like. It just goes back to the fact we're in a bit of an uncertain environment with stricter controls on investments.” [KPI Solutions]

“I think this uncertainty with the economy, and how their business will perform. Clients that were maybe looking towards making a decision in the fall, but they decided because of the economy and uncertainty around consumer spending in the holiday season that they should let the holiday season play out before making the decision. So they pushed that off until 2024. That in addition to the cost of capital, just making it more expensive for these clients to invest, are the two things that are driving some of the delays.” [Bastian Solutions]

CUSTOMER BOARD CAPEX APPROVAL LEVEL



Source: STIQ Ltd Research & Analysis

- Larger projects also tended to rely on new real estate where cost of land, permits, etc. could hinder new property development

“Currently, one obstacle for warehouse automation for the fulfillment centre is real estate. The real estate market in Korea is not good. Actually, the price is very high and there is not many transactions. That makes the big players hesitate with their investment plans.” [Posco DX]

BOARDS REQUIRED A LEVEL OF TRAINING

- A consequence of this was that a new level of management was injected in conversations which appeared to also push deadlines as these appeared to require some level of training

“The pandemic raised risk levels at boards for any company that did distribution. Labour is still difficult to hire and retain. So if it reaches the risk level in the boardroom, then there's more appetite for spending money on how automation fits into this.” [NTT DATA]

“Interest rates are having an impact. On the other hand there appear to be more complicated internal approval systems. Business cases may be checked 2-3-4 times. Of course, end customer behaviour also changed completely from Pre-Covid to during Covid and post-Covid. Some of our customers see complete changes in consumer behaviour which also requires adaptations.” [SSI Schaefer]

“Maybe a project is postponed. And then you might have to start all over again. Especially if the customer has new management as well.” [Vanderlande]

- Although, such additional processing appeared to be impacting mainly larger projects >\$100m's

“I would say the pressure is rather with the larger \$100m+ investments, which companies may not be willing to do right now.” [Koerber Supply Chain]

SALES PIPELINES HAVE SWELLED FROM POSTPONED PROJECTS AND NEW BUSINESS. POTENTIAL FOR ANOTHER BUMPER YEAR IN 2024/25 IF PIPE CONVERTED

STRONG 2023 SALES PIPELINES

- Interviews hinted at very healthy sales pipelines throughout the larger G2P Solutions sector

“2024 is going to be a great year... and I think 2025 is going to be an even better year because of the pipeline that we're having right now.” [Hy-Tek]

“At the end you can only measure success by signed contracts. But looking at our funnel and the interest and projects which are on the list, I don't see a problem in 2024... no problem.” [Intellistore]

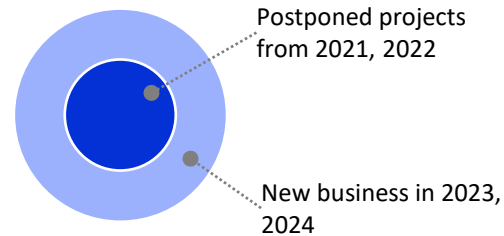
- However, whilst order intake was healthy, there was also some caution regarding the potential for delays

“Let's say on order intake... we were so successful in 2023, so I'm pretty positive that we'll get lots of new orders also in 2024, perhaps even keeping the hockey stick alive... But it's hard to predict when the project is really going to happen. We have postponements on some contracts. And this is all connected to the general situation and on how budgets have shifted. I'm still 100% positive that mobile robotics is on the up cycle. Especially in the US.” [SAFELOG]

POSTPONED PROJECTS INFLATING PIPES?

- As a result of continued growth in the sector and (potentially) many postponed projects in 2022 and 2023, pipelines appeared to have swelled to new heights

2024 SALES PIPELINES AT HIGH LEVEL



Source: STIQ Ltd Research & Analysis

“Customers are taking a cautious approach to Capex projects in 2023. Nonetheless, we’ve seen our pipeline grow to record levels, and continue to be deeply engaged with customers, reviewing their supply chain network and warehouse strategy.” [AutoStore FY23 presentation]

“We have a very strong pipeline and I expect to win many deals in 2024. In 2023, we had opportunity to win some very large deals that unfortunately, out of our control, were postponed. Some of this will continue in 2024.” [Bastian Solutions]

FROZEN/POSTPONED PROJECTS THAWING?

- Whilst there had been plenty of postponed projects, there was a belief that frozen projects may be thawing which could potentially release more work in the sector

“Hy-Tek has seen this market behavior of projects coming back to life or now becoming exceedingly important to move forward versus continuing to be on hold. This has allowed our pipeline to swell significantly and we look forward to winning this business in the middle of 2024 prior to any slowing down we may see later in the year.” [Hy-Tek]

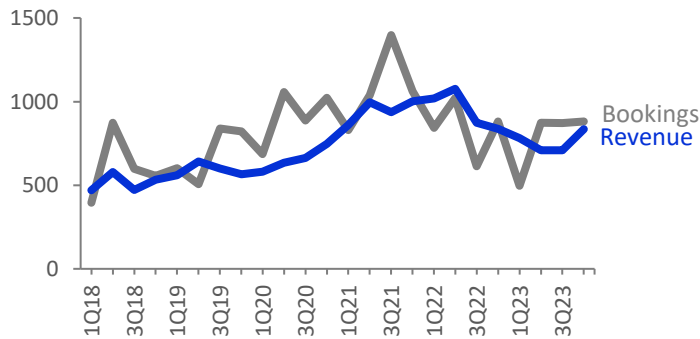
“I would say in the last two months people are starting to order again... and it depends a bit. Sometimes it's smaller projects, some for rental models... That's in all geographies, but it was very slow for 2023.” [Addverb]

- Recruiters anticipated a potential growing demand for project managers in 2024

“2024 will be interesting. I think we'll probably see an increased need for project managers again. A lot of that labour that was available during last year will quickly be picked up. I think a lot of the deferred projects will start to come to realization. The need for sales folks, I mean good folks in the sales industry will always be needed, but the need for sales and solutions may be slightly less and you may be looking for more project and operations focused candidates this year.” [CrimsonXT]

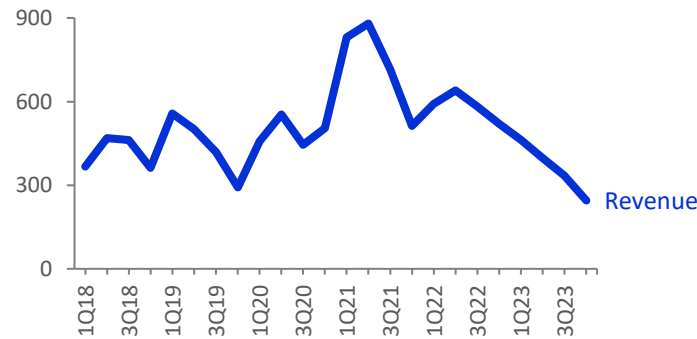
TURBULENCE EXPECTED IN THE SHORT TERM. HEALTHY LONGER-TERM PROSPECTS REMAINED

KION (SUPPLY CHAIN SOLUTIONS SEGMENT) QUARTERLY RESULTS, 1Q18-4Q23 (€M)



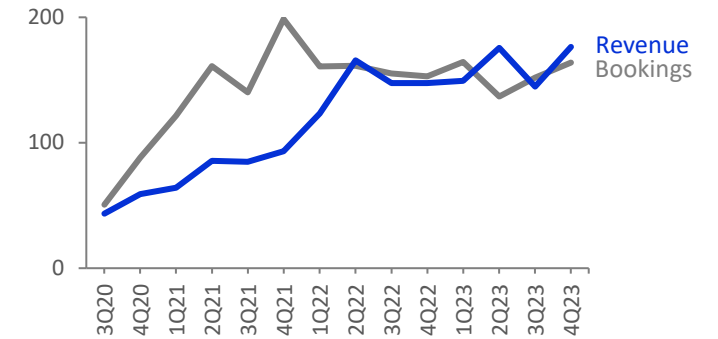
Source: KION data for Supply Chain Solutions segment. Honeywell data for SPS segment, Warehouse & Workflow Solutions

HONEYWELL WAREHOUSE & WORKFLOW QUARTERLY REVENUE, 1Q18-4Q23 (\$M)



Source: Honeywell data for SPS segment, Warehouse & Workflow Solutions. No bookings data provided

AUTOSTORE QUARTERLY REVENUE, 3Q20-4Q23 (\$M)



Source: AutoStore. No quarterly data before 3Q20

TURBULENCE TO BE EXPECTED

- There was bound to be increased turbulence as the world exits Covid with a new normal and getting used to conflicting economic indicators alongside heightened geopolitical tension
- Listed companies in the sector have experienced significant volatility in revenue and bookings

LACK OF FY24 VISIBILITY

- Interviews highlighted that some of the listed companies did not provide a full year revenue guidance for FY2024 which was partially due to a lack of visibility

"It's definitely strange not to provide a FY forecast guidance. It's not a legal requirement, but they gave it before... I think it was because they're lacking the visibility. They may be sensing that the market is struggling a little bit. And what they've said for the past few quarters about postponements, about the pipeline... but not being able to actually convert that into firm orders and people actually spending money on CapEx. I think it's just a tell on the fact that the situation is still difficult generally." [Anonymous]

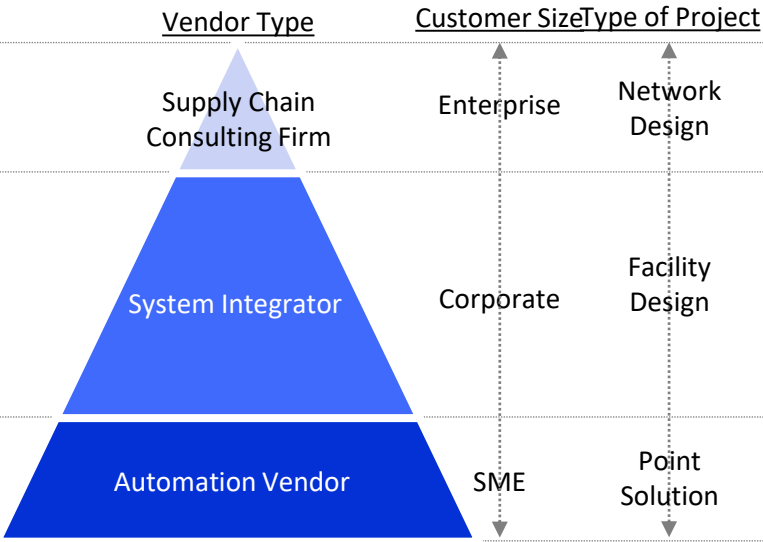
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CONSULTING TYPE SERVICES INCREASINGLY USED BY SYSTEM INTEGRATORS AND VENDORS. ACCELERATING DECISION PROCESSES APPEARED TO BE THE MAIN DRIVER

SIMPLIFIED RELATIONSHIP CONSULTANCIES, SYSTEM INTEGRATORS + AUTOMATION VENDORS



Source: STIQ Research & Analysis

CONSULTING FIRMS IN G2P

- Consulting firms in G2P typically engaged on larger projects, often focusing on the infrastructure required for growing a client’s business
- These consulting firms often make a suggestion on what type of G2P solutions to deploy, which can vary from highly detailed reports to relatively generic advice
- Note that consulting firms were included in STIQ’s 2024 report on System Integrators, free download [here](#)

INCREASING DEMAND FOR CONSULTING

- Interviews suggested system integrators and vendors had invested in consulting type service provisioning
- The primary reason for this appeared to be that decisions had moved upstream to board level

“We’ve made a lot of investment in our upfront strategy and consulting services. We have people that are coming out of management consulting backgrounds through to our kind of industrial engineering consulting base. So our services go from distribution strategy to distribution & industrial engineering.” [KPI Solutions]

- Part of these services appeared to be an attempt at accelerating decisions

“We are doing a little bit more of business modelling now than we were before. Now we spend a lot more time helping customers so that they can present to their leadership. We definitely spend a lot more time on that and then helping them to understand just overall what it is that can happen within their facilities when they put in some automation solutions similar to ours.” [Attabotics]

- Various other stakeholders had also invested in such consulting services to promote various distribution and logistics infrastructure

“CBRE has a team of supply chain consultants. We don’t all have real estate broker backgrounds, but we help our clients through a supply chain lens, which helps drive real estate business. We do both supply chain design and facility concept design, 3PL selection and capacity modelling, and operations assessments.” [CBRE Americas Consulting]

BUSINESS CASE EVALUATION

- Interviews also suggested customers increasingly explored the full intralogistics + logistics business case in the context of warehouse automation

“Another trend that we saw was companies were willing to evaluate the business case, not only within the four walls, but looking a bit more into transportation savings, packaging savings, and even labour savings at the store level. That’s a big part of our value proposition, not just saying ‘hey, we have the highest throughput in the smallest footprint, but also that we can enable some of these next generation features’... and that that allows the business case to be opened up and looked at a little bit more from the supply chain standpoint.” [Exotec]



FOR MANAGEMENT CONSULTANTS, G2P SOLUTIONS WERE NOT ALWAYS A DONE DEAL AND THERE CAN BE PLENTY OF STRATEGIC CONSIDERATIONS

ROUTE FROM A BUSINESS PROBLEM TO G2P

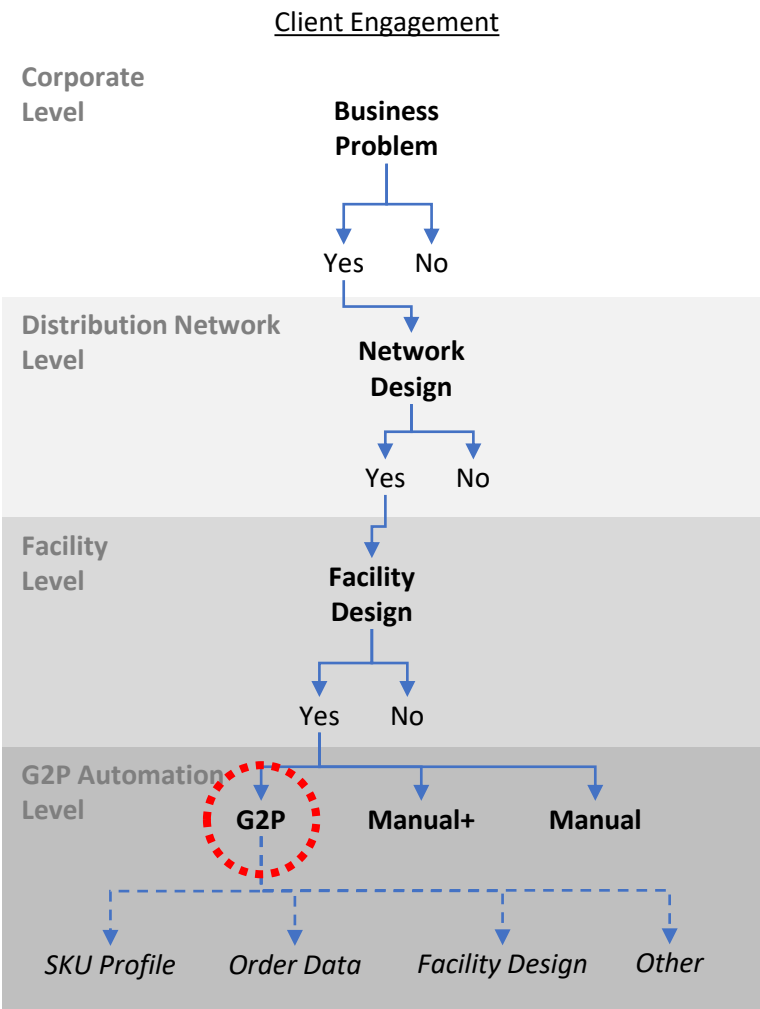
- Consultants tend to be brought in when there is an issue and businesses require assistance where one of the many different outcomes could be a G2P Solution

“People don't necessarily know if it is a redesign or a completely new facility when they call us. They just know they have a problem and they're going to have to spend money to fix it. And whether it's inside or outside their building, it's still money.” [Deloitte]

- Management consultants tended to work with larger clients where problems typically included where to locate warehouses and whether or not those locations required automation

“I'm working with a growing organisation and they need to figure out when they need to build their next DCs. I go through that exercise with them and give them an understanding of the impact on operating expenses, whether it's transportation, warehousing, inventory, service impacts... ability to reduce transit time, holding less safety inventory. I do all of that labour market analysis, real estate analysis and I say OK, you really need to be in Kansas City, MO. And you need to build a building that's 4-500k sqft. You should have these types of technologies or at least investigate them as part of your design process. You might need 350 people this level of automation and you will need 200 for this level.” [Quartel Associates]

SIMPLIFIED DECISION TREE (TO GET TO G2P)



Source: STIQ Research & Analysis
Network Design = distribution network, nodes, facilities
Facility Design = warehouse design

G2P, NOT PANACEA

- It was important to note that whilst G2P Solutions was an important part of warehouse automation, it could be one of many options for customers

“G2P has its place for certain organisations for certain order profiles, product types but it certainly is not a one-size-fits-all type.” [Quartel Associates]

AUTOMATION & FORECASTING

- With forecasting becoming anyone's guess, thinking about larger projects may have become far more difficult, especially as customers may need to be certain of their position in 5-7 years time

“When you go through a facility design, my rule of thumb is you need to look 7 years out. It's going to take you 2 years to implement. And then you want at least a 5 year run rate period on that investment. You're trying to project as best as possible what the business is going to look like 7 years down the road and that's near impossible. So you need some level of flexibility to support a 7 year horizon and you need to have confidence that your business isn't going to change materially to the point where the investment you're making in fixed asset technologies is going to make sense down the road... Whereas if you have more scalable technology and at a lower price point, you have more flexibility to adapt to changing business needs than if you've committed to a lot of conveyor, multi-shuttles, mini-loads, or unit sorters throughout the facility.” [NTT DATA]

SOME ACCEPTANCE INFLATION HAS DRIVEN UP COSTS AND THEREFORE PRICES. POTENTIAL FOR FURTHER PRICE COMPETITION. LEASING POPULAR IN PARTICULAR G2P SEGMENTS

ACCEPTANCE INFLATION HAS AFFECTED COSTS

- Inflation had pushed up costs faster towards the end of Covid

"In 2022 you were seeing 20% as a minimum raise being offered and in 2023-2024, we're probably only going to see equal salaries on offer where anything over 10% could be abnormal." [CrimsonXT]

- There also appeared to be an increasing acceptance of the fact that inflation has affected all areas and these solutions cost a bit more compared to pre-Covid

"I think as we've migrated through Covid, there's more acceptance of the fact that they need to drop a little bit more money on more advanced solutions than it used to be. If you're going to put in a \$20-25m ASRS, they really do continue to think about it. But the fact of the matter is especially with firms that utilise a lot of folks, do a lot of each picking... piece picking etc. is they can't get the labour that they need and so they have this risk versus hiring fewer people, letting the machine do the work..." [Quartel Associates]

PRICE NOT PRIMARY KPI BY WESTERN BUYERS

- Price appeared to be less important for Western buyers, especially compared to Asian/ Chinese buyers

"Western buyers don't really take price as their main priority when they discuss a project. They care more about the solution we provide, after sales, how to make sure they can have proper long-term maintenance... and then the after sales team, who can take care of the system for the long-term... and if the spare parts can be located locally." [BlueSword]

- In the end, ROI is about saving costs and improving productivity

"Cost for sure is a driver. ROI, what am I getting back on this thing? And then the throughput and touches, what are you reducing for me or what are you simplifying? How can you impact my overall costs within my warehouse?" [Attabotics]

POTENTIAL INCREASING PRICE COMPETITION

- Interviews hinted at potential price deflation as more solution vendors come to market

"The market feels like there's going to be more price competition as more solutions become mature and trusted. There is differentiation between solutions but not that much. In some situations you have aggressive pricing. I guess if I was advising clients, I would be thoughtful about it and really consider that maybe if you have two solutions that you like, then maybe you can negotiate a bit on price." [Anonymous]

- It appeared some G2P Solution segments had become more commoditised than others

"I would say pricing has become important, but only in terms that many each picking technologies have become commoditized and so the manufacturers are under a lot of pressure to compete on price." [KPI Solutions]

- Whilst others suggested there had not been any major price deflation in the marketplace

"We have not seen price compression at all. Prices have been going up over the last three years." [Locus Robotics]

LEASING INCREASINGLY POPULAR

- The increasing cost of capital may have made it more appealing for some customers to use leasing firms

"I'm seeing more leasing type deals than I've ever seen in my career right now." [KPI Solutions]

- Some G2P Solution segments were more suitable for RaaS deals than others

"A turnkey project probably would not include a RaaS, that would be rented directly from the equipment supplier, not the turnkey provider. A turnkey project brings in fixed equipment like racks, professional fees, other equipment like pallet stackers and other components that are capital acquisitions." [Deloitte]

- RaaS meant different things to different readers, but the concept nowadays seems more related to a rental model

"Everybody talks about RaaS and all these kind of models, that's all fine, but most of them are still talking more about rental." [Addverb]

VENDOR BRANDING MORE IMPORTANT

- Branding appeared to have gained in importance as the G2P Solutions sector matured

"The brand is important. It's one of the things... clients are kind of saying will this company be around in 10 years time... they're definitely a bit risk averse... potentially rightly so. I've seen a few pilots that haven't gone so well with newer technologies because maybe they didn't get the system integration right or whatever." [Anonymous]

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TRENDS: PROJECT SIZES WAS CYCLICAL, POTENTIALLY HITTING PEAK DURING THE PANDEMIC. SIZE OF PROJECTS OFTEN DETERMINE ROI EXPECTATIONS

THE MEGA SIZED WAREHOUSES TREND

- Interviews suggested there was a level of cyclicity in the size of new warehouses and the automation that was placed inside them

“With the recession possibly on the horizon, companies are getting more cautious with investments. I think we may see a trend towards smaller installations again. It’s often a reflection of how the future is viewed. Projects are still there, but not that huge volume perhaps and also not the very very big sizes.” [Knapp]

- In recent years systems have grown in size and scale and possibly the market has reached a temporary peak

“In recent years the trend has been that systems were getting bigger and bigger. And Walmart is the peak of that. We are talking about an installation that has 2,000 shuttles in one system and 2 million locations. It’s a huge thing. And there’s a couple of sites in this dimension. But what we see in the last year is that the trend is going down again. So you get a tendency towards smaller installations again. But that always comes in kind of waves of demand and depends on how the economy progresses and how the picture of the future is painted.” [Knapp]

“I know that the big projects are getting bigger. You are regularly confronted with projects over €200m on the market. Also in the mid-size project area, around €30-80m, there are projects. In the very small projects, you see of course a certain disruption of other technologies, such as the classical €1-1.5 million without complex conveyors for example.” [SSI Schaefer]

- However, interviews suggested there were several very large projects in the pipeline

“I think there are some players in the market which plan their global networks which require several of the very large size projects. So I don’t see that they are shrinking... I don’t see them going away.” [SSI Schaefer]

SIZE OF PROJECTS OFTEN DETERMINE ROI

- The size of projects can often determine how customers approach ROI and forecasting

“In addition to the large e-Commerce projects, we are increasingly seeing mid-segment customers that are getting into automation for the first time and have never used fixed automation before. They were perhaps doing everything manually and may be looking for ways to solve a short-term problem. They have quicker ROI expectations than the giants of the world. Smaller customers often want payback in 2-3 years, and that influences the way they make purchasing decisions.” [Honeywell]

- Flexibility and/or scalability requirements could also influence how to think about ROI

“The cost of land and construction is increasing. If a customer decides to invest in a big project, they cannot change this easily. I think that they prefer to go for small projects and they can move and change their project.” [IHI]

LANDLORDS AND WAREHOUSE AUTOMATION

- Interviews suggested landlords were increasingly considering how they could potentially include warehouse automation in their business models

“Historically landlords don’t like to pay for material handling equipment and racking and things like that because they don’t necessarily see any reuse of these as an asset. However, I had more than a dozen conversations with companies last year who, as a landlord, are starting to warm up to the idea of paying for the automation equipment that goes into the building as a way to attract users... as a way to demand a longer term of a contract instead of a 5 year lease for the building. We’re not at a tipping point. I wouldn’t call it a trend as I haven’t actually seen it transact that much yet. But there’s a lot more conversation about it.” [CBRE Americas Consulting]

TRENDS: MORE VENDORS MEANT A POTENTIALLY GROWING DIRECT TO END CUSTOMER APPROACH

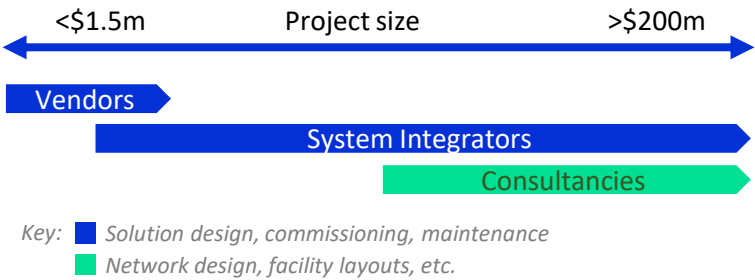
VENDORS GOING DIRECT TO END CUSTOMERS

- Interviews suggested vendors are increasingly also going direct to end customers, bypassing System Integrators

Historically, we've been competing with a shuttle OEM or another integrator but we're now also competing with more manufacturers. As the space in G2P has expanded, more manufacturers are looking for integrators to help them scale. They're looking beyond our traditional competitors, who we have always competed with, widening the pool of integrators." [Bastian Solutions]

- There could be a few explanations for this behaviour
 - More manufacturers/ vendors are fighting for a smaller pool of system integrator partners to help them reach new customers
 - Smaller projects rarely require complex conveyor networks, etc. and can sometimes be managed by vendors directly
 - Increased competitive pressures and other internal pressures are forcing vendors to go directly to customers with a larger set of products and services with a "System Integrator Light" approach
 - Customers prefer to work directly with the vendor
- Capturing additional margin could also be a driver, but this was often connected to building a larger organisation, detrimental to cashflows if expanded in multiple countries/geographies

SIMPLIFIED PROJECT STAKEHOLDER OVERVIEW



Source: STIQ Research & Analysis

TRENDS: PIECE PICKING ROBOTS MATURING, LESS CONVEYORS (IN SMALLER PROJECTS) AND MOBILE ROBOTS TRANSFORMING?

ROBOTICS PIECE PICKING MATURING?

- Robotic piece picking may be inevitable, but it was more likely to come into its own in very specific applications, such as pharmaceutical or medical where there is more uniform packaging

“Piece picking for robots... I think it’s inevitable with many of the ASRS systems that are out there with fixed picking locations... Yeah, I think that market is ripe for growth.”
[NTT DATA]

“We see robotic piece picking being an interesting bit of tech to further enhance the capabilities of automated storage systems. Adoption of the tech has been slower than expected but we continue to see customers and 3PLs interested in testing it out. To support, we continue to develop tech that is flexible and compatible with multiple auxiliary robotic technologies including robotic piece picking.” [AutoStore]

CONVEYORS STILL PREVALENT, BUT...

- Conveyors have traditionally been a core part of automated warehouses, but some interviews suggested smaller or more focused automation projects may require relatively fewer conveyors

“There are a lot of customers out there right now that are really interested in the combination of ASRS and sorting bot. Our first such deployment went live in 2022. The storage part is still the same... But you can get more hits and more picks out of every tote presentation with this combination... you could also save on the conveyor system on the front end, moving totes back and forth to pick stations.” [Tompkins Robotics]

“I would say within the G2P box, yes, less conveyors is certainly a trend.” [Bastian Solutions]

MOBILE ROBOT SYSTEMS TRANSFORMING

- Interviews suggested subtle changes in mobile robot segments with a trend towards product consolidation and the AGV Shuttles

“I have been hearing that robotics will be the largest market since 2017. And if you don’t invest in robotics, you are out of the water. But we are in 2024 and I have not seen that hockey stick growth yet.” [Swisslog]

“We can see the continuation of market maturity as customers directly ask for AMRs instead of saying ‘we need an automation solution’.” [Koerber Supply Chain]

“Shelf to person is definitely still a major driver for us. For many customers, that is kind of the lower hanging fruit and there's still a big market. But the uptick in demand is for the other types of solutions comparatively to previous years. I would say shelf-to-person is a big money maker but it's no longer where the major growth lies. Enhanced Shelf-to-Person, Tote-to-Person, Pallet-to-Person and multi-solution capabilities are the future.” [Geek+]

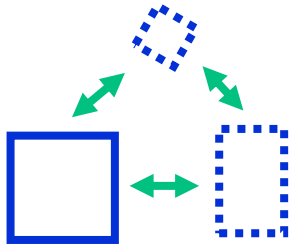
“Our main business is from the lidar vehicle, so the Kiva system is only small part of our business. Our opinion is it's go down for the QR code, this Kiva system.” [Wellwit]

“There are recruitment trends. For AMR companies, product development and software was huge over the last years.” [CrimsonXT]

TRENDS: FLEXIBILITY AND SCALABILITY, AN INCREASINGLY IMPORTANT TOPIC IN CONVERSATIONS WITH BUYERS AND END CUSTOMERS

FLEXIBILITY v SCALABILITY (G2P SOLUTIONS)

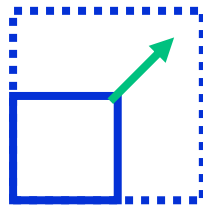
Flexibility



- How easily can the solution adapt to changes?
- Portable solutions (between sites). Flexing up/down. Short term planning. <1 year construction. Small to medium sized projects. Rental solutions discussed.

Source: STIQ Ltd research & analysis

Scalability



- How easily can the solution be scaled?
- Permanent fixtures. Construction in phases. Upscaling mainly. Long term planning. 1-2 years construction. Medium to large sized projects.

SCALABILITY v FLEXIBILITY

- Scalability was different to flexibility, and more related to adding bin and/or storage locations without necessarily building more infrastructure

“I would say that there is more of a focus now on scalability, not just flexibility. There's this trend towards more flexible automation using AGV/AMRs. Some solutions out there have a lot less ‘fixed automation’ like conveyors versus G2P systems which handle a lot of bin movements with mobile robots. I'll call that ease of scaling, not having to add a bunch of fixed automation, but easily being able to add bin locations in the system or additional robots as required.” [Bastian Solutions]

- Building the basic infrastructure in anticipation of future growth was one example of how to create scalability of a solution, allowing customers to add more storage locations as the business requirements grew

“Flexibility is a general topic in the industry. The industry is looking for solutions that are easily scalable and can be built up in phases. You can do that to a certain extent also with shuttle systems. That's certainly something that our customers are asking us... We can build a project in phases. We have a couple of customers where they say, OK, we start with number of aisles and we put the steel construction for the next additional aisle already on site and go from there when we need it.” [Knapp]

FLEXIBILITY + SCALABILITY GROWING KPCs

- Interviews hinted at flexibility and scalability becoming more important in customer conversations and potentially also as key purchase criteria
- Flexibility appeared to be more related to how easy a solution could adapt to changes in demand or new/additional requirements

“I think the market is really looking for flexibility. Especially if you go to the automotive industry. Talking to clients in this sector, they want to have flexible space in their factories and use flexible solutions, such as AGV warehouses. The AGV is operating in the warehouses and once the customer decides to change the solution or to reuse the space it should be quick. So that's why they don't invest a lot in static solutions anymore in the automotive sector.” [Mews Partners]

- 3PL customers required a higher degree of flexibility from warehouse automation solutions

“On the one hand, you see that there's a high demand on flexibility, especially from 3PL customers. They have short term contracts. On the other hand, flexibility also means that your system is completely future proof. That you can adapt it later on, that you can add things.... And this is our main focus here where we are concentrating on.” [SSI Schaefer]

- However, all kinds of customers appeared to appreciate the flexibility of some systems

“Our customers like flexibility and scalability of the Exotec system. They can start from a smaller project size. That is a very good selling point for the Skypod system.” [IHI]

“What we are seeing is that customers are expecting more flexibility in choosing different technologies, whether that is software or hardware.” [AutoStore]

TRENDS: MOBILE ROBOTICS MAY OFFER INCREASED FLEXIBILITY. INCREASED SYSTEM INTEGRATORS + MOBILE AUTOMATION PARTNERSHIPS

MOBILE TECHNOLOGIES ON THE MOVE

- Mobile robots have gained an increasing role in the G2P sector

“Because a G2P solution with mobile robots is so scalable, the number of robots can be adapted to the current demand. If you buy an ASRS, you buy for the demand you have in 5-10 years. But for a G2P solution you have a short term planning cycle. You probably only need to look at 3 years and that makes it possible to have a specific three-year solution.” [SAFELOG]

- Interviews suggested mobile robot-based solutions may take more market share in the warehouse automation sector and especially in the G2P Solutions space

“I think with the evolution of more mobile scalable technologies, it offers up an opportunity to satisfy a lot of the business need within distribution, without that large upfront capital expense. You’re going to continue to see these AGV technologies and other kind of lower price technologies compete favourably with more elegant, perhaps, traditional systems like the multi shuttles.” [NTT DATA]

SMALLER PROJECTS MORE FLEXIBLE?

- Smaller projects are typically also more flexible as they require less fixed conveyors and other infrastructure

“I don’t see that projects are getting smaller, but I see more projects on the market, definitely. This year perhaps not bigger ones and more focus on flexible solutions. Flexible solutions are usually not as large as fixed systems.” [Mews Partners]

SYSTEM INTEGRATORS + “FLEXIBLE AUTOMATION” PARTNERSHIPS (SAMPLE ONLY)

System Integrator	Sample Partner
Dematic (US)	Quicktron
Fortna (US)	Geek+
Honeywell (US)	HAI Robotics
Hy-Tek (US)	Exotec
IHI (JP)	Exotec
TGW (AT)	SAFELOG
Toshiba (JP)	Mushiny

Source: STIQ Ltd research & analysis
Note: For more information on SI partnerships, see STIQs System Integrator report [here](#)

- Smaller and more flexible system can also be where there is a quicker ROI

“The biggest place that people are looking at the robotics right now is in the different types of storage. And there’s half a dozen different vendors that do storage that seems to be the place where the customers are looking at more short-term opportunities and a quicker ROI.” [Honeywell]

SYSTEM INTEGRATORS + MOBILE = TRUE

- Interviews suggested larger system integrators have partnered with more flexible system vendors to ensure they capture a wider share of the market

“Our customers are prioritizing flexibility in their purchasing decisions. For example, the fixed sorter is still by far the best solution for high-capacity applications, but there are situations where a customer might try a robotic sorter because of the flexibility it can provide. We want to adapt to make sure we can provide the most value-added solutions to customers, whether it’s something we invent ourselves or something we offer in collaboration with a partner.” [Honeywell]



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3PL (1) INTERVIEW: LIMITED BUT STABLE AUTOMATION REQUIREMENTS. FOCUS ON LARGER AUTOMATION PROJECTS WITH EXISTING LONGER TERM CUSTOMERS

LIMITED AUTOMATION REQUIREMENTS

- There appeared to be a glut of 3PLs in the European market fighting for new business opportunities with pricing
- This had sharpened the focus of this 3PL on fewer, higher value and longer standing clients rather than chasing potentially unprofitable business opportunities

“In 2024, we are focusing on a few projects and are not chasing too much new business. It's quite tough to win new business and customers have a lot of choice. There are many 3PLs in the European market, some quite new ones just try to go in with the lowest price. Our focus is stable growth this year... with few projects, but really doing them right. We have been successful with this focus in recent years without any implementation hiccups... and that's important for us.” [Anonymous]

- There was a relatively stable requirement for automation projects and these appeared to be a strategic focus

“We have several bigger projects that we're working on. But it's not that we see any wider developments. There's no scaling up. We're really focusing on a few projects and deep dive into those projects. We don't see a big move towards more projects, but we also still have some in the pipeline.” [Anonymous]

EXISTING CUSTOMERS EASIER TO AUTOMATE

- Existing customers were viewed as the easier automation business case to make and to model as a part of historical data visibility and closer client relationships

“It's always easier for us in the engineering team to drive automation projects with existing customers. We already have a lot of data. We have a long-term partnership... then it makes more sense. When it comes to new RFQ projects for new business, there's not that much automation that goes through to implementation.” [Anonymous]

- Whilst automation was generally also a topic with new (and often younger customers), forecasts impacting the type and size of automation equipment could often be a sensitive subject

“The automation discussion is always easier with existing customers. For example, we have a customer in country X with several sites. We now want to consolidate these sites into one new site. In this case, it is easier to put automation in. We know all the numbers, historical data, pallet details also growth discussions are easier because we have the historical development.” [Anonymous]

- Growth forecasts were perhaps viewed with a bit more analysis and volatility expected in a post-Covid world

“For new business, it's always a bit volatile. The customer tells us they will grow with 100% in the RFQ. But then all of a sudden growth is only 50% and then it's more commercial discussion, that has nothing to do with engineering.” [Anonymous]

- Customer's sector dynamics also play into the automation topic and some sectors may be easier to automate and more used to automation
- However, verticals such as automotive can be difficult as they typically manage automation planning internally

“I would say there are some verticals where it's easier to sell automation... ecom, retail and store supply is good. We are now also working on projects in pharmaceuticals. That's also something that's good. But the automotive sector was difficult in the last year with almost no automation. But there is also another business model with very strong internal logistics & supply chain teams. And they plan everything themselves. You will find a lot of automation in those locations, but these tend to be planned by customers themselves... and they basically just want 3PLs to send in the labour. That's a whole different story.” [Anonymous]

AUTOMATION & MARKETING MATERIAL

- 3PL marketing is also using automation to attract customers, however, in STIQ's view the appeal of this may have diminished somewhat in recent years

“Automation is still something that is used in our marketing toolkit... that we know it, use it and can add it if required. Our KAMs also keep asking for automation case studies as customers want to see that we have proven skills and sites. We have a few of this and a few of that, so we can we can show a quite broad experience.” [Anonymous]

3PL (1) INTERVIEW [CONTD.]: 3PLs REQUIRE VERY DETAILED ROI CALCULATIONS TO ENSURE PROJECTS ARE APPROVED, LABOUR IS SIMPLY NOT ENOUGH

3PL ROI CALCULATION, COMPLEX

- Vendors often provide what appeared to be rudimentary ROI calculators that are helpful, but often also require further investigations

“Vendors always tell you it's so easy to calculate something but then you go into the details and look at what do you put in, what do you leave out, how about replenishment ideas and strategies. And then you end up with a lot of calls anyway.” [Anonymous]

- ROI of 3 years is impossible for more complex projects and 3PL contracts need to cover nearly 10years

“One of our board members always told us automation ROI needs to be within 3 years. But realistically with G2P solutions, 3 years is just not possible. I would say it's always 5+ years. With our current projects, we're looking at something between 5-10 years. But these are double digit investments so it needs to be a long-term agreement. Otherwise you're talking about residual value and what will happen after 5 years after the contract. And then of course, the customer needs to take over because otherwise our CFO would say no to this project. We wouldn't take on that risk. But customers understand that.” [Anonymous]

- It could be difficult to get a complete overview of the total cost of a solution when including peripheral costs

“It's always a bit difficult to clearly see the total cost because of course you have the building and you need electricity also for your manual solution. So it's always kind of a gap and sometimes it's quite hard to extract that. Yeah, but specifically for the Fire Protection and sprinklers there we see a lot of big difference between manual solutions and automation. I think +25% is a good estimate. Yeah, that's a good estimate.” [Anonymous]

FIRE REGULATIONS GROWING G2P TOPIC

- Fire protection regulations were also an increasingly important topic, especially with new standards in the market

“Fire protection standards, such as FM Global are required more and more by our customers... FM global is the guideline I would say. But the interpretation of this often depends on the specific country and on the insurance company. But I would say that with FM Global you're on the safe side. But there are a lot of fire protection topics right now and that's something where the suppliers normally cannot help. It's often a local topic and it can depend sometimes on the city you are in, not even the state.” [Anonymous]

- However, fire regulations appeared to rely on partially subjective local enforcement

“Fire regulations is a big grey zone. Automation vendors have some initial setups for their Fire Protection procedures and systems.” [Anonymous]

- Fire protection equipment was rarely included in the automation cost but is required for a project

“And that also is a topic for the ROI. Yeah. And for the overall cost, because if you need to add additional layers for sprinklers and all of those topics that can hurt ROI a lot when it comes to the business case.” [Anonymous]

PRICE INCREASES ALSO AFFECT ROI

- Price increases in some segments have made ROI slightly more challenging, especially as there appeared to be additional “hidden costs”

“Prices have not really come down yet. They still go up I think and that makes it even harder for our ROI. For each and every project we really need to see the ROI. Does it make sense to put in automation with all of these costs? Because we also have a lot of hidden costs. I mean you start and then you calculate the concept and the G2P solution. But then you have electricity. Then you have stuff for the building, server stuff... yeah, it's a lot of additional costs. It might be a showstopper at the end of the day even though the solution itself works fine and you see the benefit.” [Anonymous]

NICHE ENGAGEMENT WITH STARTUPS

- There was a relatively strong focus on engaging with startups in recent years but this appeared to have diminished somewhat

“Using younger startups was stronger in previous years when we also had a stronger global startup management in our team and introduced a lot of startups.” [Anonymous]

3PL (2) INTERVIEW: HIGH WAREHOUSE AUTOMATION DEMAND DRIVEN BY DISINTERMEDIATION THREATS. TIGHT BOARD LEVEL ROI REQUIREMENTS

HIGH DEMAND FOR G2P

- There was a large number of potential projects, but satisfying the business case was perceived as a hurdle

“There's plenty of demand. At the moment I'm probably guilty of trying to work on too many things to the extent it's difficult to get them all done. There's plenty of opportunity. We've probably got 20 potential automation cases within the business. It's just getting something at a price point that satisfies the business case.” [Anonymous]

- Plans for more automation appeared to have accelerated during the pandemic

“We started doing G2P robots around 2020-2021. That's when we started to shift towards doing something with that. We have done quite a few sites and have started to accelerate it over the last couple of years really. We've had other solutions before that, shuttles, stacker cranes, etc.” [Anonymous]

- Some of the current demand could also be driven by an urge to learn how to best deploy and optimise various different automation equipment

“There's a number of factors driving our work in G2P. A lot of it has been around POCs and understanding what we can do with the systems and what we can get from them. The main drivers are the continued pressure on labour availability, cost inflation and everything else that goes with that.” [Anonymous]

G2P, A 3PL DISINTERMEDIATION THREAT?

- Whilst there was a certain level of FOMO, to automate or not could be the difference between staying in business and to experience disruption to the 3PL business model

“One of the more important things is if we don't do anything, we'll end up getting disintermediated. If customers do this themselves... that's not really where we want to be. We want to be doing this for our customers, not the other way around. Most of our contracts are open book. So we charge based on the labour that's used and the management fee that goes on top of that. If a customer spends \$20m on automation and halves our labour, then our invoice also halves. Whereas if we can get ahead of it, yes, the labour is still going to fall because that's what automation does. But there is then a better mechanism for us to earn from it... so that disintermediation is very important.” [Anonymous]

G2P ROI REMAINED CHALLENGING

- 3PLs are highly adept at optimising intralogistics processes and often have a higher base case as investment comparison versus end customers, such as retailers
- The 3PL business model with time limited contracts could also be a barrier where high demands on returns are expected

“We require a 3-4 year payback and a positive ROCE. Customers also want to take a chunk out of that. If you have a reasonably large project you also have to include depreciation which immediately... just to break even, you have to save a lot of money on labour. That's often a big number. And that's before you factor in the cost of capital at around 10%, which is higher than it has been for some time. Our labour rates, fully loaded, are about \$18-19/hr which is lower than some people think and is also why labour savings is not enough. You've got to go for more than just labour or you will struggle to get projects off the ground. We might be a bit more aggressive on ROI than other people.” [Anonymous]

- Interviews suggested that simply calculating labour savings would often not suffice for clearing an automation project investment

“Labour is not enough for calculating ROI. We have to capture a lot more value. And it may not just be about costs, it could also be about intangible benefits. For example, in one of our deployments... because of the way that we're doing it, we're now getting more stock into a cage compared to the manual solution. And the reason we're getting that is because we have one person owning the stacking in that cage rather than multiple people. That means you get better stacking, more cases, and it's being stacked a lot better, which means less damage. Then we're taking it to the next level, where less damage means we're going to save X, because of less waste or shrinkage. By having more stock in the cages means that we're also sending less cages, which either means more stops per vehicle, or less vehicles. Simply exchanging labour is not enough to justify an automation project.” [Anonymous]



3PL (2) INTERVIEW [CONTD.]: PRICING APPEARED TO HAVE ACCELERATED COMPARED TO LABOUR, AFFECTING ROI CALCS. ACCESS TO LABOUR; A KEY ISSUE DURING PEAK

AUTOMATION PRICE INCREASES & ROI

- Warehouse automation price increases throughout Covid also appeared to have accelerated when compared to labour rates which could make some business cases more difficult

"In the last few years, we've seen inflation of 9-10% and we see prices go through the roof at the supermarket. But I don't think you'll see many people in warehouses have had a 10% increase. There's been a lot of c.5-6% increases. That's a good increase, but the cost of equipment and the interest rates have gone up quicker. So that is not making the business case for automation any easier." [Anonymous]

ACCESS TO LABOUR

- Pressure on access to labour had declined, but this appeared to be a largely temporary issue as once demand increases again, companies like Amazon could simply hike labour rates to hoover up available labour

"It's one of those things that when the labour market tightens... we're in quite a fortunate place where the labour market is not what it was during Covid. But a lot of that is because demand has dropped. This will definitely come back soon. But in a tight labour market companies like Amazon will beat you every time." [Anonymous]

- 3PL customers are typically highly diversified in industry sectors and volume throughput with different product profiles and volume peaks

"Black Friday and Christmas are our peak periods. We have some customers that increase 1000% during this time, it's big. This is probably very isolated these customer profiles. I would say the increase may be as much as 10-20% for some of the larger contracts... these tend to be more static." [Anonymous]

- Access to labour can be challenging, but 3PLs are typically also very adept at modelling this around their demand dynamics

"In a manual environment when you start to put more people in, you get diminishing returns. People start to get in each other's way. And then you've got untrained people in there. So actually to say you need 10X more people is wrong. You probably need more... and then you've got to factor in attrition because the nature of the temporary labour market... if we need 100 people, we've probably got to employ 150 just to get the 100." [Anonymous]

WIDE RANGE OF SOLUTIONS REQUIRED

- 3PLs offer a unique type of customer with demand for many different solutions often depending on their customer's appetite for investment, potential disruption, etc.

"We put together a \$20m proposal for an ASRS solution for one of our contracts. But the customer didn't want to commit to that level of investment, which was one thing. And we were going to have a real problem getting it in because there was going to be massive disruption to the warehouse and they didn't want any disruption. So any kind of overhaul of that is just not really an option. P2G could be an option in such a case." [Anonymous]

IMPROVING CUSTOMER INTEGRATION TIME

- There is continued pressure on 3PLs to make the onboarding process for new customers as smooth as possible
- The interview suggested this had focused the company on creating an API layer to ensure a smooth and faster integration

"We're working on an API layer internally. Because integration is a really big problematic area since many customers will work in different ways. And if you want to do anything with your customers and you might end up in an IT queue for 12 months or something. So anything we can do to facilitate making that integration quicker is only good." [Anonymous]

RETAILER (1) INTERVIEW: CONTINUED AND GROWING DEMAND FOR MHE. PRICE INCREASES COMPLICATING DEMAND. ERGONOMICS AN IMPORTANT KPC

CONTINUED AND GROWING MHE DEMAND

- There appeared to be continued and growing demand for warehouse automation solutions

“Our projects are so big and long that we do not entirely base a decision on the current market conditions. Cost is of course an issue that we need to monitor closely. We still have large ongoing projects... I am working on defining one right now.” [Anonymous]

THE STANDARD 3 YEAR ROI DOES NOT APPLY

- The 3 year standard ROI is often disregarded

“So, ROI expectation wise, when you start up a project it's normally 3 years. But to be honest, it's not that often that I've seen that in the end of the project. Mostly it ends up somewhere between 5-7 years. Or you actually don't have a business case. But it could also be that the business case is about creating capacity in a new market, for example if you are expanding into a new market.” [Anonymous]

PRICE INCREASES COMPLICATING ROI CALCS

- There appeared to have been an anticipation of price decreases, but these had not materialised to any extent

“To be honest, I've been waiting for the big price decreases. But I think when inflation hit and everything else, it's not really looking like it will come down... the price for me at least... I'm not seeing this. Prices might have gone down on some of the elements that really spiked in the pandemic or during the war, like plastic and steel... But yeah, I think total solution cost for me has been increasing, unfortunately, in the past 3-4 years.” [Anonymous]

- Instead, warehouse automation solution prices had increased by 20-30%

“As a guesstimate I would say prices have increased maybe around 20%... maybe even 20-30% compared to prior to the pandemic.” [Anonymous]

- Price increases have meant that budgets and plans have had to be updated potentially causing further delays
- Furthermore, customers also changed how they procured warehouse automation solutions when there was significant price volatility

“We of course need to update budgets... we have been in discussions where you might need to do this kind of pre-contracts... almost like you set the rate earlier than you did previously... I think during the pandemic or when the war started, that resulted in extreme price volatility. Prices could really change from one month to another, one week to another. And it really skyrocketed like the price of plastic or steel or aluminium. All of this meant we locked in the prices quite early with vendors.” [Anonymous]

KEY PURCHASE CRITERIA

- Key purchase criteria focused on price, density and also how much of the SKU range that can fit inside the ASRS system

“Price and density is something we look at quite a lot. For us it's also... at the moment we're looking a lot at how much can we fit into the totes. So we're looking a lot on tote sizes. When looking at a G2P solution, how much of the range can we put into the totes. Because there is a difference even if you talk about totes which are 600x400 compared to 600x500... even if it's a small difference, that could actually mean that we could have a bigger part of the range, meaning more articles, meaning more volume through that system. Because we want to utilise the system as much as possible.” [Anonymous]

- Ergonomics of the picking station was also raised as a key purchase criteria

“Ergonomics is another super crucial thing, for all the companies I have worked with. Ergonomics for coworkers was or is a super big thing. One of the key criteria for our choice is just ergonomics. You're taking away a lot of the regular walking from an operator which should be a good thing. But you don't want to replace that with a super bad picking station instead so people don't like to work there. You need to make that station as good as possible.” [Anonymous]

RETAILER (1) INTERVIEW [CONTD.]: FIRE PREVENTION STANDARDS INCREASINGLY IMPORTANT. GETTING LISTED ON SUPPLIER ROSTERS INCREASINGLY TRICKY

FIRE STANDARDS INCREASING IMPORTANCE

- There are plenty of exciting G2P solutions in the marketplace and more are entering, but if they do not fulfil standards, they will often not be able to be used

“If you do a Google search, there are new G2P solutions popping up almost weekly. You also see on LinkedIn and someone is sharing something and it's super interesting and a cool solution but then when you start to dig into it a little bit more... it's maybe not possible, or they haven't really done this or that. So on risk management and our 5 year requirements... you can discuss around these super interesting solutions, but then in the end you cannot really move forward because they are not FM Global compliant. The companies I've worked with they all request FM Global compatibility or they need to be able to fulfil the other one... If not, then we cannot really move forward even if it's a great solution.” [Anonymous]

- Fire protection is a key standard. Fire risk experts were typically involved from an early project stage to ensure compliance throughout selection and deployment

“When we start a project insurers come in... maybe not the insurers themselves, but people appointed by our insurance company, such as fire risk experts and so on that have guidance from the insurers which we need to follow. We bring them in quite early when we're looking at solutions. So we are trying to find out which are the solutions we should work with. And then when we start the project, we already know what type of solutions we can work with. And then of course you need to start a discussion in the different countries as well later on once you look at the deployment for further fire protection guidance.” [Anonymous]

THE SOLUTION VENDOR MATRIX

- Larger customers have created vendor rosters (or Solution Matrix) for various solutions that fit many common problem statements

“We have what we call a Solution Matrix. This includes predefined solutions that we view internally as proven technology that solves some of the problem statements that we need to handle. And for us that can be if we need to solve volume, if we need over a specific yearly volume and so on. And then we can have this and that solution. And we have a few different versions of that. Like if you have a lower ceiling height then we can use solution X for example. And if we have higher then we might want something else.” [Anonymous]

G2P AGVs INCREASINGLY MATURE PRODUCT

- Interviewee suggested G2P AGVs had matured in its applicability and become an important part of the various automation tool setup for certain use cases

“I would say from when I first saw it, it was super interesting. Now they have a use case when you have a very limited ceiling height. Or if you need to have a flexibility of having hanging and having bulky items and small items in the same system.” [Anonymous]

RECOMMENDATIONS FOR STARTUPS

- Interviewee recommended startups new to the sector focus on building an initial customer case as they wish to see it working in real life

“I would recommend startups try to approach a company... if I'm a new vendor, maybe not the biggest one, but a medium sized company. And I would try to make some type of show projects almost... and maybe to put my marketing money in doing that... then I would recommend to actually get a site up and running because that is what everyone wants to see in the end... they want to see a working site.” [Anonymous]

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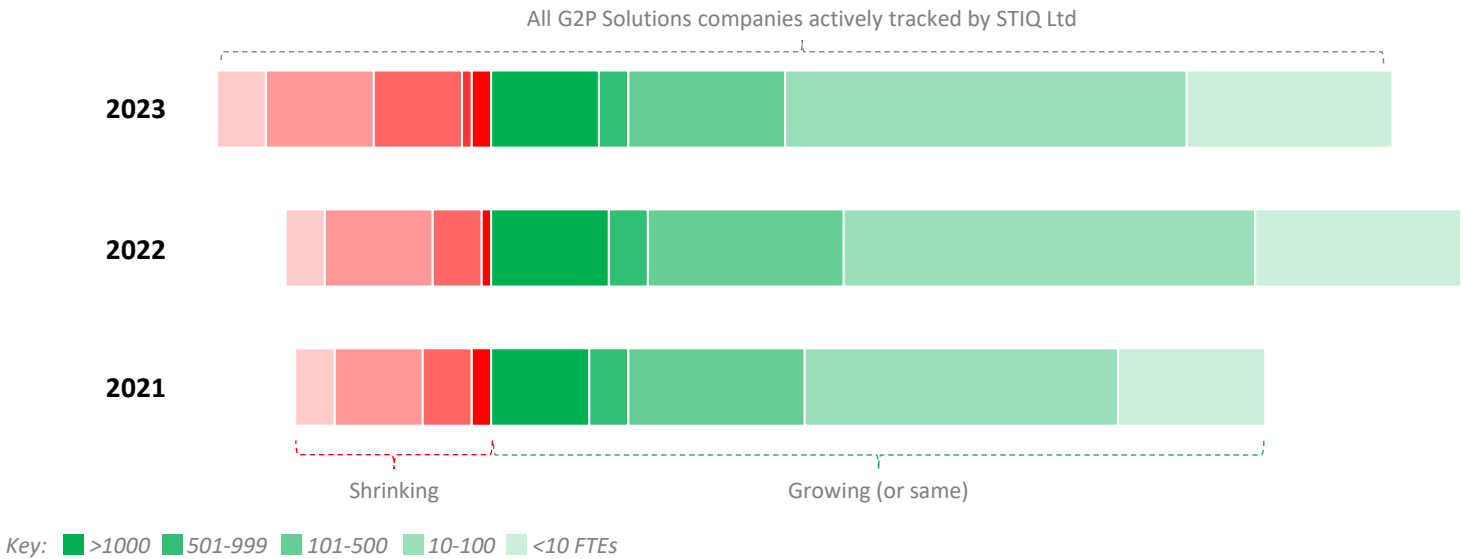


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2023 WAS A YEAR OF FTE CORRECTION WITH 8% LESS COMPANIES GROWING COMPARED TO 2022. COMPANIES WITH 101-1000 FTEs MOST AFFECTED

FTE GROWTH/ DECLINE IN G2P SOLUTION RELATED COMPANIES COMPARED TO PREVIOUS YEAR, 2021-2023 (#)



Source: STIQ Research & Analysis. Number of companies with growing/declining FTEs (not total FTEs)

NOTE RE CHANGING DATA

- Note that the number of companies tracked by STIQ Ltd has increased year on year as new startups join the sector/ emerge from stealth, or incumbents add (or remove) G2P solutions to product/ service ranges
- This analysis is based on companies tracked for two or more years

- The number of companies whose FTE count was tracked by STIQ Ltd did not change between 2022-2023, but increased by +21% in from 2021-2022 and +32% between 2020-2021

2023, A YEAR OF CASH PRESERVATION

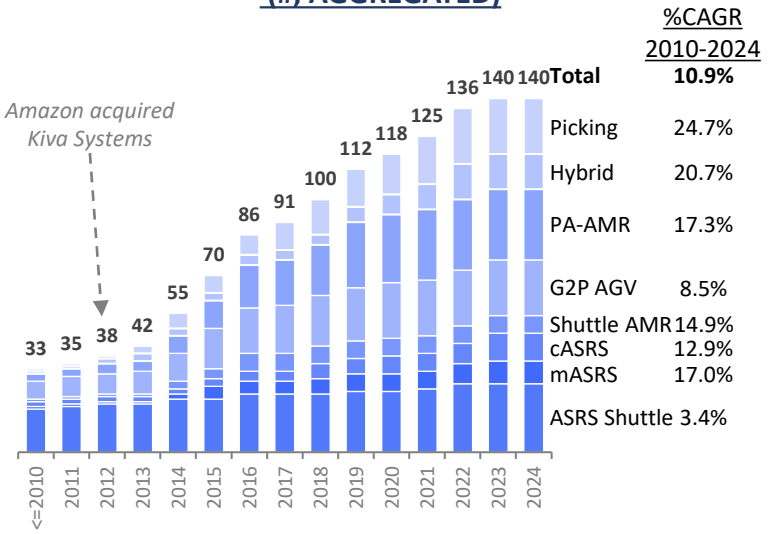
- STIQ research suggested plenty of companies had entered cash preservation mode throughout 2023 with numerous vendors announcing downsizing programmes
- Whilst not exclusive to VC-backed businesses, these appeared most severely affected as additional funding sources dried up

FTE COMPARISON

- Overall, the proportion of companies with an increased headcount in 2023 was 76%, down from 83% in 2022 and 81% in 2021
- The number of companies with increased headcount in the 101-500 FTE bracket declined by -20% in 2023 compared to +11% in 2022 and +29% in 2021
- Companies with growing headcount and 501-1000 FTEs declined by -25% in 2023 versus 0% in 2022 and +33% in 2021

STARTUP ACTIVITY CONTINUED. HOWEVER, FUNDING LOOKED LIKE IT MIGHT SLOW DOWN. SOME MATURING AMONG EARLIER STARTUPS

G2P STARTUP ACTIVITY BY MAIN PRODUCT, 2010-2024
(#, AGGREGATED)

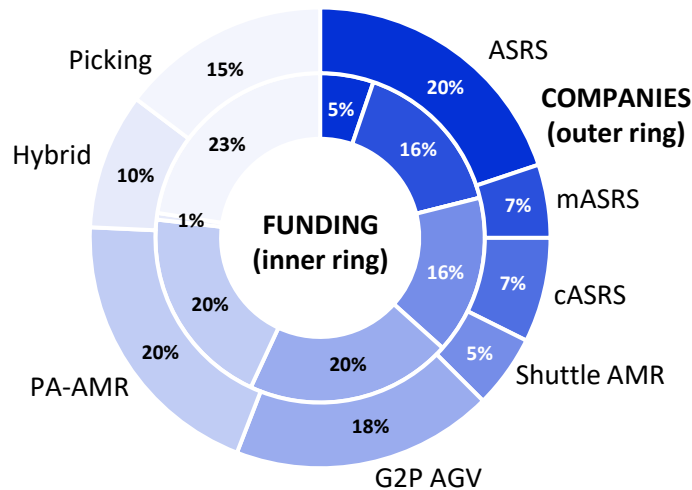


Source: STIQ Research & Analysis. Company foundation year. May add up to <>100%

STARTUP ACTIVITY BY TYPE OF PRODUCT

- The data on this page focuses on a vendor's main product which could be a subjective measure and may be different to other charts
- ASRS Shuttle segment was considered the most mature segment in the G2P Solutions sector, hence also recording the lowest new vendor growth
- Picking and Hybrid solutions experienced the fastest growth of new vendors

G2P COMPANIES & FUNDING BY PRODUCT TO 2024

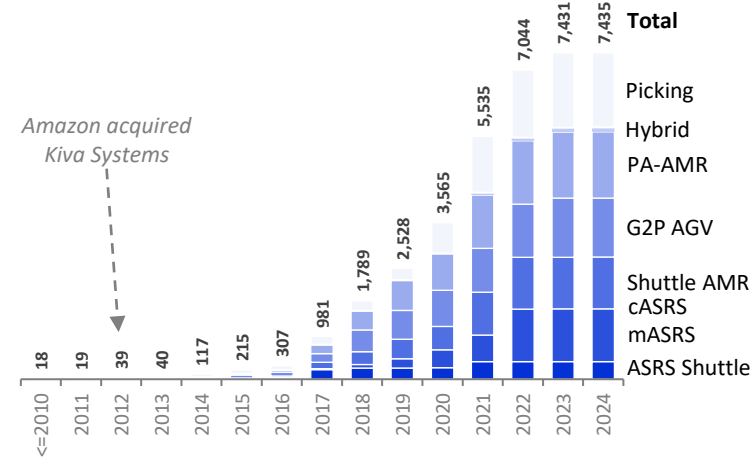


Source: STIQ Research & Analysis. Company foundation year, main product range. Chart indicates as a share of all companies, all known funding. Rounded numbers used for simplicity. May not add up to 100%

SHARE OF VENDORS VS SHARE OF FUNDING

- There was no significant change in fundraising for G2P Solutions companies 2023-2024 as funding froze
- Picking robot companies remained the primary VC money inflow benefactors and represented c.13% of companies and c.26% of all funds raised
- This was followed by cASRS vendors which accounted for c.11% of vendors and c.20% of funds raised

AGGREGATED G2P FUNDING ACTIVITY BY PRODUCT, 2010-2024 (\$M)



Source: STIQ Research & Analysis. May add up to >100%

FUNDING ACTIVITY BY MAIN PRODUCT TYPE

- Readers should note this analysis may not be representative as many vendors have more than one product
- Funding for G2P Solutions accelerated in 2017 and appeared to have focused on segment by segment, starting with G2P AGV in 2018, followed by Picking Robots in 2020, PA-AMR in 2021 and mASRS in 2022

STARTUPS IN 2023 INCREASINGLY FOCUSED ON SETTING UP AND MANAGING REFERENCE SITES. NEW FUNDRAISING WITH DIFFERENT FOCUS

STARTUPS FOCUS ON REFERENCE SITES

- Most startups (and new entrants) focused on getting the first few reference sites up and running

“It was our second year in the market and we have the first references up and running now. You know how it is with logistics automation, most customers want to see something up and running. And that’s why we planned the hockey stick for next year. The first 2 years was more or less getting the first systems sold, get the first systems installed. So 2023 was pretty good I would say.” [Movu Robotics]

- Vendor interviews confirmed it can be challenging to break into the wider warehouse automation market and reference sites are often key

“You know better than most that breaking through in the G2P sector is challenging.” [Fabric]

“For us it’s important to get the first site right, so we can fully show it and for it to be an excellent first reference site. The customer can speak about how happy they are based on data points and so on. Once that is done, I think we will be doing much more together with resellers, partners, and prospects.” [Instock]

- It had been relatively easy to sign up new customers during the pandemic, but multiple orders combined with lengthy supply chain delays sometimes led to complicated deployment schedules

“We did not focus on sales in 2023 as the projects we already had took a lot of effort and energy. It was still quite difficult to get all the material in time in 1H23, but we adapted our supply chain and now it’s easier to handle. There are still extended time frames, but it’s more manageable. Of course, the price level is still expensive in comparison to previous years.” [Rocket Solution]

“Our focus is on the local Dutch market. That’s a decision from a strategic perspective. We focus mainly on end customers here as we want to create an install base.” [Intellistore]

MATURING MARKET & INVESTMENT CASE

- Interviews suggested companies currently with high margins could find it tricky to retain these as the sector matures

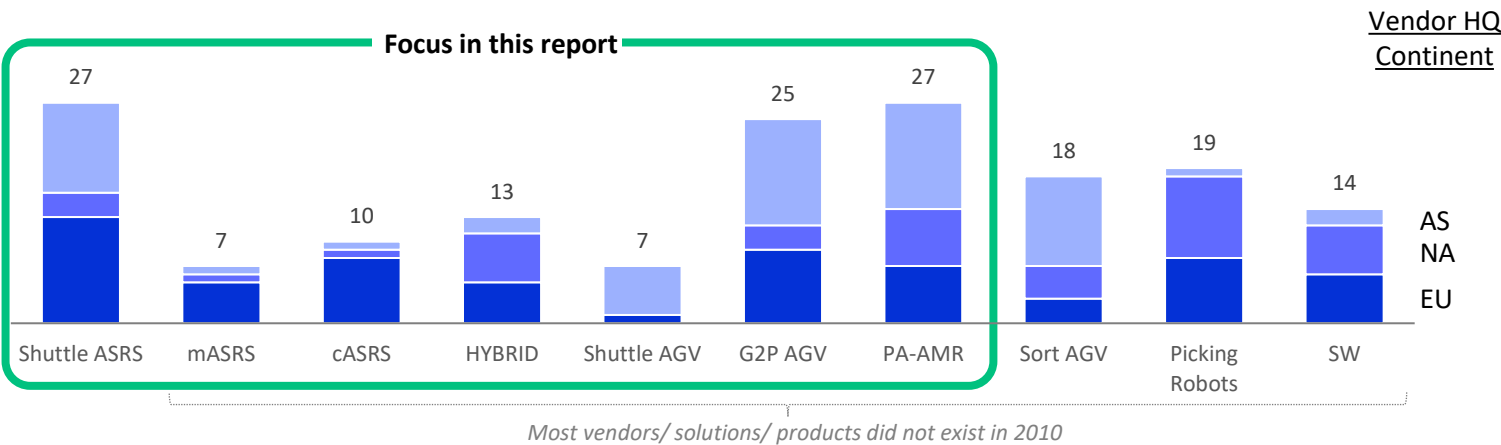
“I wonder... as many of these companies are starting to mature and kind of pick up steam... would some of the margins we see start to drop? Are we in a phase where G2P is becoming... not commoditized, but how sustainable are the 60-70% margins going to be? This makes sense if it’s very innovative and so on.” [Anonymous]

- Startups fundraising had therefore turned interesting with a focus on the business model

“We raised a seed extension that was led by Amazon Industrial Innovation Fund. There were a lot of questions around the business model in this new economic environment with the new cost of capital. At the end of the day, we realized that it would be better to offer both Opex and Capex models to the market.” [Instock]

SOME CONTINENTAL DOMINATION BY G2P SOLUTION SEGMENT. FEW VENDORS EXISTED A DECADE AGO

G2P SOLUTIONS SEGMENTATION, NUMBER OF VENDORS BY SEGMENT (# VENDORS)



Source: STIQ Research & Analysis. Vendors may offer more than one product. HYBRID vendors are companies that do not fit neatly into one or other STIQ G2P Solution segments

G2P, MORE CROWDED IN THE LAST DECADE

- There has been a huge influx of new solutions in the G2P Solutions sector over the last decade (see also sector demographics)
- Amazon’s acquisition of Kiva Systems in 2012 signalled a kind of starting shot for many of these newcomers and accelerated growth for the companies already in the space
- The primary market driver for these developments were E-Commerce and Omni-Channel growth

- In 2024, STIQ covered c.170 companies in the wider G2P Solutions sector (including robot sortation, picking robots and various software vendors)

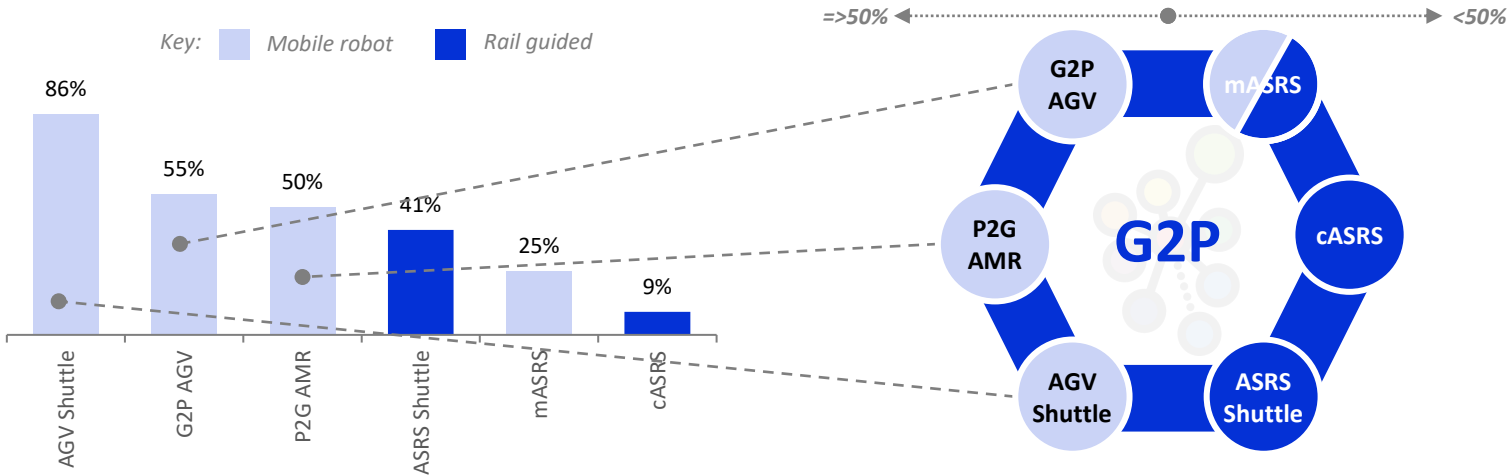
“G2P has become a somewhat crowded market and is becoming more crowded... many newer companies are trying to weave their way into the mix. So, it’ll be increasingly competitive moving forward” [NTT DATA]

GEOGRAPHIC CONCENTRATION (VENDORS)

- **Note this analysis focuses on the number of companies (not volumes produced)**
- The sector has partially evolved along continental differences
- For example, the Shuttle AGV segment has largely grown out of the Asian market whereas the mASRS and cASRS segments were a largely European affair
- The PA-AMR segment grew out of Amazon’s acquisition of Kiva and their withdrawal from the open market
- PA-AMR was initially a North American solution in response to Kiva being withdrawn from the market which has spread across continents
- Asian vendors have come to dominate many of the floor-based mobile robot segments, such as Shuttle AGV, G2P AGV, PA-AMR, and Sort AGV
- A key reason for this has been superior manufacturing costs and high level of competition spurring on new innovations
- The reason most mASRS and cASRS vendors are concentrated in Europe

ASIAN VENDORS DOMINATED CERTAIN MOBILE ROBOT G2P SOLUTION SEGMENTS (BY VOLUME OF VENDORS)

SHARE OF ASIAN MANUFACTURERS BY G2P SOLUTIONS SEGMENT



Source: STIQ Research & Analysis. Focus on primary product/s, share of vendors tracked by STIQ Ltd

CAVEAT: STIQ LTD ANALYSIS

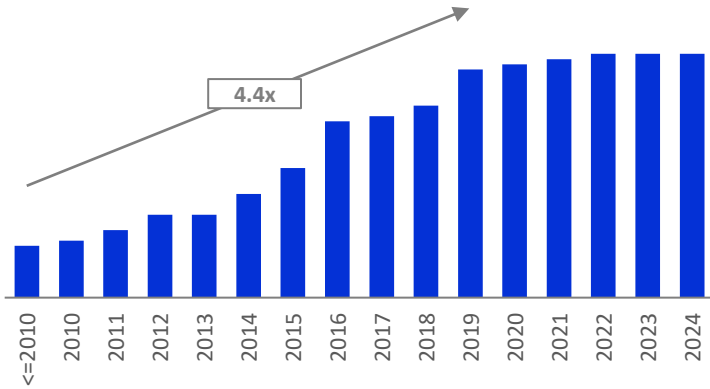
- Readers should note there are nuances in each G2P Solution segment/niche and a dominant Asian manufacturing base does not equal more competitive pressures for any particular vendor and/or G2P segment
- For example, whilst Asian vendors may account for 41% of all ASRS Shuttle vendors, they were estimated to account for <5% in North America + Europe
- Part of the reason was that Shuttle ASRS equipment was typically installed alongside complex networks of conveyors, etc. and frequently required in-depth software integration with WMS and ERP systems

- Such projects are frequently complex and require system integrators to design, integrate, deploy and commission (see also STIQ Ltd's report on [System Integrators](#) and [WMS Software](#) for free)

ASIAN VENDORS DOMINATED SEGMENTS

- By number of vendors, Asian vendors dominated the mobile robot segments (G2P AGV, P2G AMR, and AGV Shuttle)
- This was partly due to very high demand for mobile robots in a few key Asian markets, such as China, which had also accelerated the number of vendors of mobile robots (not only G2P Solutions related)
- See also STIQ's AGV & AMR Robotics reports [here](#)

ASIAN G2P SOLUTION VENDORS, AGGREGATED, 2010-2024 (#)



Source: STIQ Ltd Research & Analysis

ASIAN MARKET DYNAMICS

- A relatively saturated vendor space combined with pandemic pressures appeared to have limited the number of new entrants from 2020
- These dynamics also appeared to have pushed some vendors to offer OEM services which could mean that some segments could have a higher % of Asian origin

15 G2P VENDORS HAVE RAISED >\$4BN AND INVESTORS MAY BE STARTING TO ITCH FOR POSITIVE EXITS

TOP 15 COMPANIES BY PUBLICLY KNOWN FUNDRAISING (JAN 2024) ¹ (ORDERED BY TOTAL RAISED)

COMPANY	COUNTRY	FOUNDED	TOTAL RAISED (\$m) ¹ ▲	STATUS	LATEST RAISE ²	LATEST ROUND / NOTE
Geek+	China	2015	534.6	Private	2022	\$100m
GreyOrange	US/India	2011	528.1	Private	2023	\$135m
Fabric	Israel	2015	476	Private	2022	\$140m
Exotec	France	2015	446.2	Private	2022	\$335m
Locus Robotics Robotics	US	2014	416	Private	2022	\$117m
Hai Robotics	China	2016	331	Private	2022	\$100m
Covariant	US	2017	231.5	Private	2023	\$75m
Dexterity	US	2017	196.2	Private	2021	\$140m
Attabotics	Canada	2015	193.4	Private	2022	\$71m
Quicktron	China	2014	145.4	Private	2021	\$100m
ForwardX Robotics	China	2016	137.8	Private	2023	\$28m
RightHand Robotics	US	2014	119.3	Private	2022	\$66m
Nimble	US	2018	115	Private	2023	\$65m
ForwardX	China	2016	109.9	Private	2021	\$69m
XYZ Robotics	China	2018	103	Private	2022	\$40m
Average	-	c.8yrs	\$272.2m	-	c.2yrs ago	\$105.4m
TOTAL			\$4083.4m			

Source: STIQ Research & Analysis, Crunchbase

¹ Publicly known funding raised to Feb 2024. It is likely companies have raised more but are waiting to announce to maximise PR value² When the funding was publicly announced

CIRCA 60 VENTURE FUNDED COMPANIES

- STIQ Ltd tracked c.60 VC funded vendors in the G2P sector in Jan 2024 where investors remained vested in the companies
- Whilst a few of these companies may have reached some kind of profitability, the presumption was that most or many remained loss making

15 VENDORS RAISED c.\$4.1BN

- The top 15 companies had raised more than \$100m each, with the top two companies more than \$0.5bn per business
- The average age of these 15 companies was just over 8 years which may be at the limit of what could be called a startup

INVESTORS ITCHING FOR AN EXIT?

- STIQ's impression was that investors were now actively exploring exit options for many of these 15 companies, but that the climate had turned somewhat negative, especially for IPOs

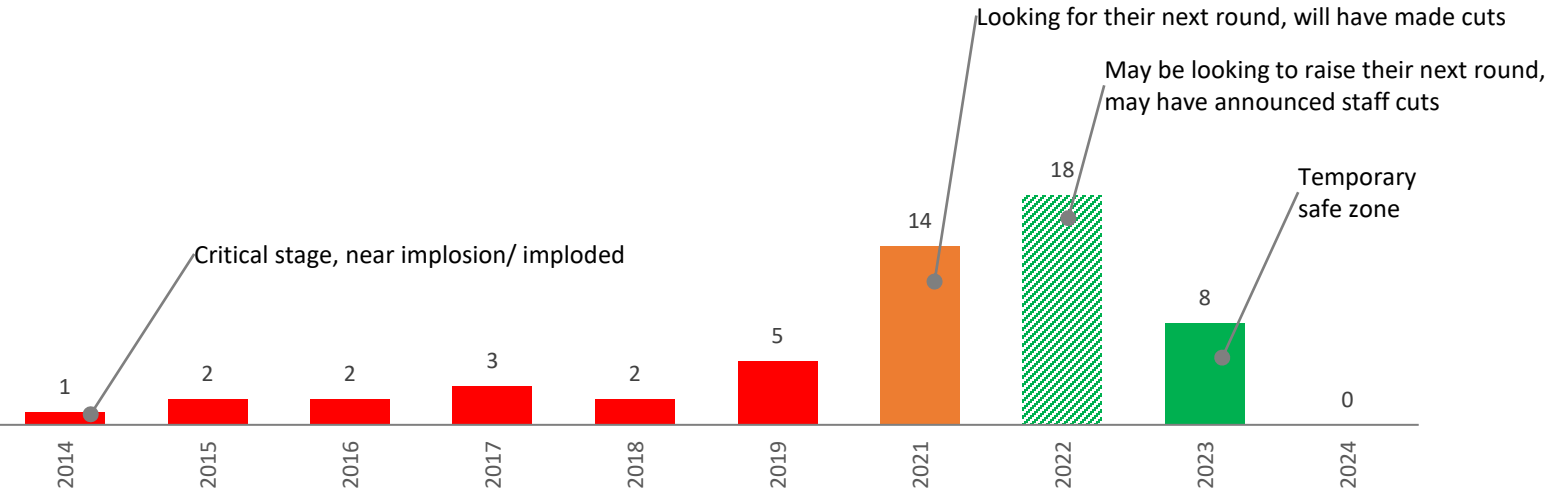
UPCOMING INITIAL PUBLIC OFFERINGS (IPO's)

- Two companies that have been aiming for IPO's included HIK Robots (owned by HIK Vision) and Megvii, both companies on the US entity list ([source](#))
- During the production of this report, Megvii announced its third IPO attempt ([source](#)) since 2019; The company was aiming to list in 2Q-3Q24
- See also STIQ's blog on HIK Robot planned IPO in 2022 ([source](#))



THERE APPEARED TO BE AN INCREASED LEVEL OF CASH CONSERVATION AS FUNDING SOURCES HAVE DRIED UP (OR BEEN DIVERTED INTO OTHER SECTORS)

KNOWN LATEST FUNDING ROUND FOR NON-EXITED G2P SOLUTION STARTUP VENDORS, 2014-2024 (STIQ ILLUSTRATIVE HYPOTHESIS)



Source: STIQ Ltd Research & Analysis. Crunchbase. Companies with publicly known rounds >\$0

- Interviews suggested there may be an increased level of consolidation in the marketplace in coming months/ years

“I think we're going to see some consolidation, maybe some strategic M&As here and there. To me that makes sense. But also sorting the wheat from the chaff.... Some companies out there are struggling and they're having to go to the government and say, “hey we need money to save these tech jobs”. And I don't think that really helps their competitive position, not being subject to market forces doesn't make them better. It's an interesting time in robotics now.” [Exotec]

THE STARTUP FUNDING “SAFE ZONE”

- STIQ’s impression was that startups in the MHE space raised funds on average every two years
- Based on this assumption, companies that raised their latest round in 2021 were potentially out of the funding “safe zone” where their capital reserves were possibly dwindling
- For example, Noyes Technologies, acquired by Knapp in 2024, raised its latest known public funding in 2021

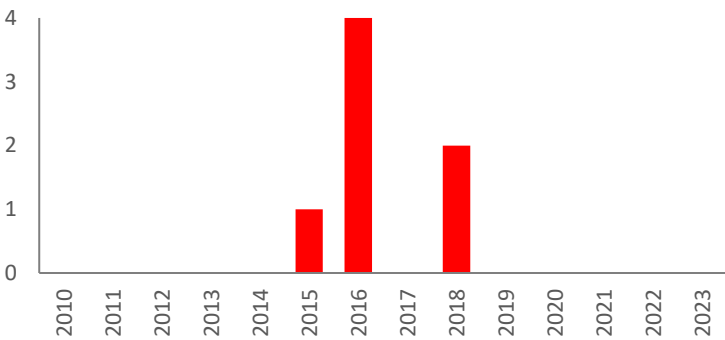
- Companies tended to raise for 18-24 months of runway at a time; in between these periods, there could be less turbulence

“Typically you raise for 18-24 months of runway.”
[Anonymous]

- Some startups may elect to be sold instead of facing a lengthy money raising process
- This analysis could potentially indicate there are at least 14 companies that could be acquired in 2024

FAILURES BEGINNING TO APPEAR AMONG SMALLER STARTUPS/ COMPANIES IN THE SECTOR. A LAGGING INDICATOR WITH LIKELIHOOD OF FURTHER ADDITIONS

**G2P SOLUTION STARTUP FAILURES BY YEAR
FOUNDED, 2010-2023 (#)**



Source: STIQ Ltd Research & Analysis
Note: A company was presumed closed/ failed when STIQ Ltd was unable to connect with the website during multiple attempts spread over several weeks

FAILURES - A LAGGING INDICATOR

- Note: Any of these charts should be used with caution
- Startup failures was a lagging indicator and some of these companies may have failed in earlier years
- STIQ LTD tracks c.150 G2P Solution vendors and a company failure is only considered once a website was not working on several occasions (often weeks apart) or when STIQ Ltd was notified about a company closing down (by founders or people close to a company)
- Websites may outlive company operations by many years and cannot be a considered a time specific measurement

**G2P SOLUTION STARTUP FAILURES BY SEGMENT
(#)**



Source: STIQ Ltd Research & Analysis
Note: Primary segment used. Companies may have been active in multiple G2P segments

FAILURES BEGINNING TO APPEAR

- STIQ Ltd has published the G2P Solutions report annually since 2018 to actively track vendors in the sector
- Segment leaders have largely crystallised since 2018 with some level of price depression (or commoditisation) in certain segments
- There has been an expectation that the long tail of vendors remaining in the sector may have to close down or change their business models/ products to survive
- This started to become clear throughout 2023 with a few identified failures

LOWER THROUGHPUT SEGMENTS AFFECTED

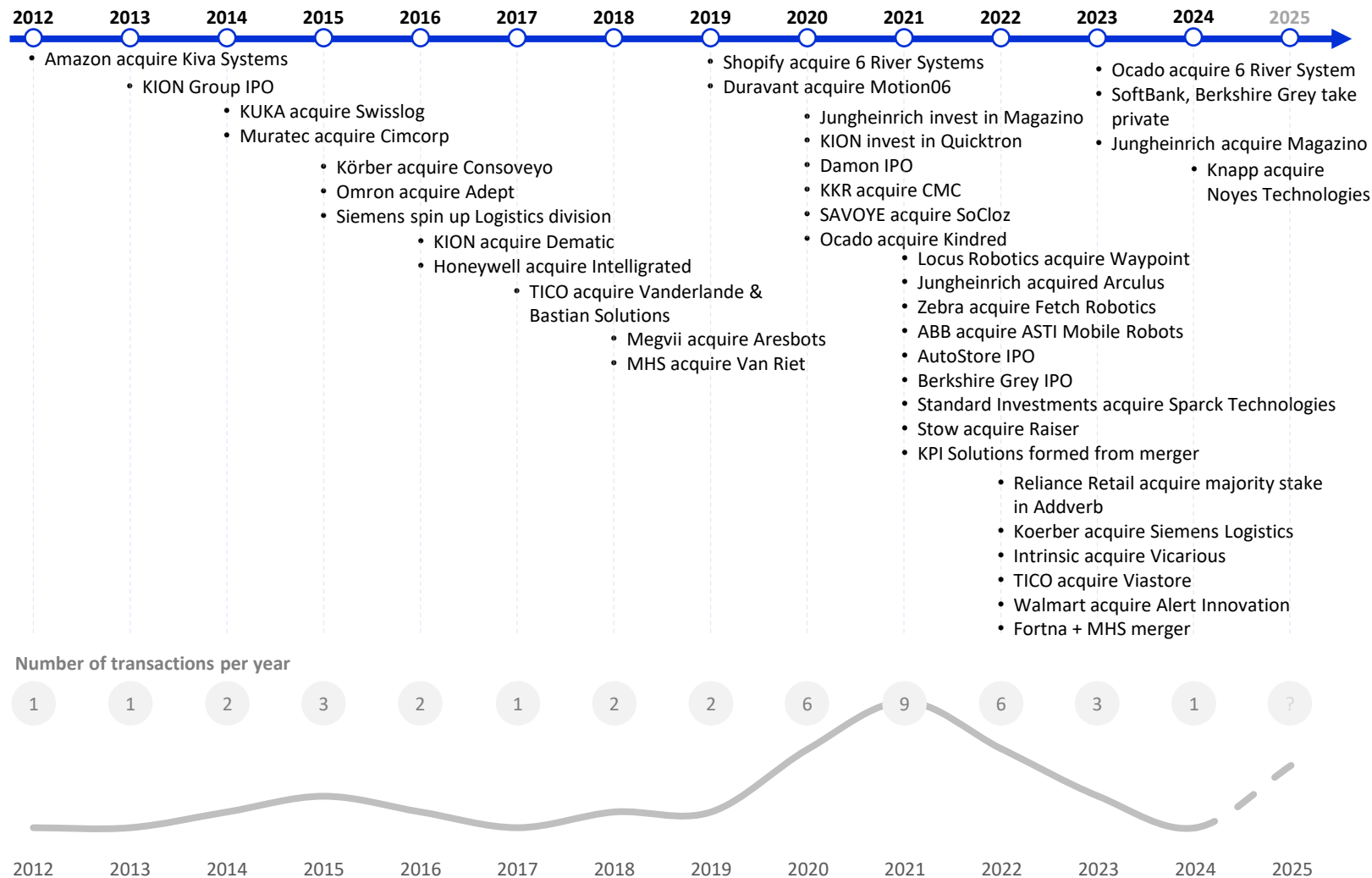
- Companies that were known to have closed were primarily active in lower throughput segments, such as PA-AMR and G2P AGV
- Barriers to entry remained relatively low in the PA-AMR segment whilst they were somewhat higher in the G2P AMR segment due to a higher level of system complexity
- However, OEM manufacturers have proliferated in these segments, helping to bring barriers to entry down and pushing software as the primary differentiator
- There were also a few software failures in the sector, mainly associated with operating models

FURTHER FAILURES EXPECTED

- STIQ Ltd expect more failures in the sector due to a lack of VC investments, lack of traction, leaders emerging, etc.
- Whilst some failing companies will simply shut down, others may be acquired based on intellectual property, human resources, etc. and occasionally hoisted as successes
- However, “acquihires” (where vendors are acquired for their people/ teams) may no longer be required as the market for human resources has turned in favour of hiring companies

RETURN TO PRE-PANDEMIC M&A ACTIVITY BUT WITH POTENTIAL FOR STRESSED TRANSACTIONS AMONG VC-BACKED COMPANIES

SELECTED G2P SOLUTIONS SECTOR TRANSACTIONS, 2012-2024



Source: STIQ Ltd research & analysis

M&A ACTIVITY IN 2023 AND 2024

- 2023 M&A transaction activity halved compared to 2022, but remained on par or slightly above pre-pandemic levels
- STIQ expect a higher level of M&A activity in the sector in the short to medium term
- This was likely to be executed across the sector, from large corporate buy-and-build mergers to acquisitions of startups to potentially also a limited number of IPOs
- The first publicly acknowledged transaction in 2024 was Knapp's acquisition of Noyes Technologies

M&A RUMOURS/ GOSSIP

- In 2H23 there was plenty of market rumours in the market re potential big market transactions
- Honeywell (Intelligrated) and AutoStore were only two of the larger companies involved
- SoftBank has been active in take private transactions with Balyo and Berkshire Grey and some of the gossip revolved around a potential take private of AutoStore

“For anyone looking to take private, THL are now starting to sell down... they now have a lock up for three months and they can't do anything more... they're trying to sell down and cash in... they made a great investment and then it was \$2bn EV. Now it's probably \$6bn EV. I think it's normal to have those type of discussions. But it probably makes a lot more sense at share price of NOK11, 12, 13, 14 versus when it was NOK20+. But we probably haven't heard the last time that people are talking about a take private.” [Anonymous]



EXIT OPTIONS MAY OPEN UP TOWARDS THE END OF 2024. EXPERTS CONSIDERED 2025 AS A LIKELY IPO SCHEDULE FOR WAREHOUSE AUTOMATION COMPANIES

SELECTED EXITS SINCE 2012 ¹

COMPANY	ACQUIRER	EXIT YR	EV ²
Berkshire Grey	SoftBank	2023	~\$750m ³ ←
→ 6 River Systems	Ocado Group	2023	\$12.7m
Addverb	Reliance Retail	2022	\$270m
ASTI	ABB	2021	\$190m
Fetch Robotics	Zebra	2021	\$305m
Berkshire Grey	IPO	2021	\$2.7bn ←
AutoStore	IPO	2021	\$12bn
→ 6 River Systems	Shopify	2019	\$450m
SAVOYE	Noblelift	2018	€32.3m
Vanderlande	Toyota (TICO)	2017	\$1.2bn
Intelligrated	Honeywell	2016	\$1.5bn
Dematic	KION	2016	\$3.3bn
Swisslog	KUKA	2014	\$357m
Kiva Systems	Amazon	2012	\$775m

Source: STIQ Research & Analysis

¹ There were four sector IPOs since 2012, STIQ has excluded two as they are not relevant: KION (2013) and Damon (2020)

² Note that STIQ has rounded a few numbers. Includes partial exits

³ Estimated. Softbank purchased the shares it did not own for \$1.40 in a deal valued at \$375m in 2023. STIQ Ltd estimated Softbank had retained a c.50% position in the company (hypothetical based on its shared SPAC vehicle, prior investments). Readers are recommended to do their own research

INVESTOR EXIT OPTIONS

- Exit options for investors include IPO, Trade Sale (typically a corporate buyer), Secondary Buyouts, Management Buy Outs, etc.
- These typically come with different enterprise valuations, i.e. the multiple an investor can realise from an equity or company sale

OCADO x 6RS AND ENTERPRISE VALUATIONS

- One of the more talked about exits in 2023 was Shopify's sale of 6 River Systems to Ocado Group for \$12.7m ([source](#)) in 2023 which represented a c.3% of the \$450m price Shopify paid in 2H19
- Experts and equity analysts STIQ talked to following the transaction did not think there would be any significant hollowing out of valuations due to Shopify letting go of 6 River Systems for a penny

G2P SECTOR IPO ACTIVITY, LIKELY FROM 2H24

- IPO activity may begin loosening up towards the end of 2024 and in 2025

"I just feel like at the moment there's just not much IPO pipeline generally in Europe. Even in the US we have still very, very low levels when we come to equity markets. Because now we're seeing very good performance in the markets that's going to attract good liquidity. We also see the economy starting to turn. Banking and capital market are cyclical and we are perhaps at the last year of the through and we're going to see more and more activity in 2H24." [Anonymous]

- STIQ considers it highly likely there will be more M&A activity, including IPOs, in the next 12-24 months
- As a part of that the market may be experiencing a higher degree of PR activity with key flagship customer signings, EBITDA numbers in public and other optimistic forecasts

AMAZON USED AS A VALUATION PIVOT

- Interviews seemed to suggest anyone with an Amazon project would potentially be using such to increase their enterprise valuation or to drive up private valuations

"They can't say much about vendor X's Amazon work. I don't think there's much change to it. They really like that angle also... they play into this narrative a little bit perhaps... maybe they'll get an order from Amazon soon. And then perhaps they think the share price will spike on that because they could potentially buy them out... like everyone can go with their own assumption." [Anonymous]

SYSTEM INTEGRATORS SCANNING MARKET

- Interviews suggested some system integrators were actively scanning the market for acquisition opportunities, evidenced by Ocado + 6 River Systems and Knapp + Noyes Technologies

"I hear that the big system integrators are scanning the market for opportunities to acquire and to integrate into their portfolio." [Rocket Solution]

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EXOTEC

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2024 G2P SOLUTIONS DIRECTORY: 1-D

1MRobotics IL 2021 W in cb ▶ <ul style="list-style-type: none"> Hybrid 	6 River Systems US 2015 W in cb ▶ <ul style="list-style-type: none"> P2G Acquired by Ocado in 2023 	ABB Mobile Robots ES 1982 W in cb ▶ <ul style="list-style-type: none"> G2P AGV Acquired ASTI Mobile Robots in 2021 	Abiman Engineering KR 1980 W in cb ▶ <ul style="list-style-type: none"> System integrator 	Accio Robotics IN 2019 W in cb ▶ <ul style="list-style-type: none"> mASRS 	Addverb IN 2016 W in cb ▶ <ul style="list-style-type: none"> System Integrator
Alog Tech IN 2016 W in cb ▶ <ul style="list-style-type: none"> P2G 	Amazon Robotics US 2002 W in cb ▶ <ul style="list-style-type: none"> G2P AGV Amazon acquired Kiva Systems in 2012 	Attabotics CA 2015 W in cb ▶ <ul style="list-style-type: none"> cASRS 	AutoStore NO 1995 W in cb ▶ <ul style="list-style-type: none"> cASRS 2021 IPO 	Barcodes Inc US 1994 W in cb ▶ <ul style="list-style-type: none"> System integrator 	Bastian Solutions US 1952 W in cb ▶ <ul style="list-style-type: none"> System integrator Acquired by TICO in 2017
Berkshire Grey US 2013 W in cb ▶ <ul style="list-style-type: none"> System integrator IPO 2021, privatised 2023 	Blue Robot Company NO 2018 W in cb ▶ <ul style="list-style-type: none"> cASRS 	BlueSword CN 1993 W in cb ▶ <ul style="list-style-type: none"> System integrator 	Brightpick US 2013 W in cb ▶ <ul style="list-style-type: none"> AMR hybrid 	Caja Robotics IL 2014 W in cb ▶ <ul style="list-style-type: none"> AGV Shuttle 	Cartesian Kinetics US 2022 W in cb ▶ <ul style="list-style-type: none"> ASRS Shuttle
CBRE Americas Consulting US 1906 W in cb ▶ <ul style="list-style-type: none"> Property 	CMC IT 1980 W in cb ▶ <ul style="list-style-type: none"> Packaging 	Covariant US 2017 W in cb ▶ <ul style="list-style-type: none"> Pick 	CrimsonXT UK 2018 W in cb ▶ <ul style="list-style-type: none"> Recruitment 	Cuebus JP 2013 W in cb ▶ <ul style="list-style-type: none"> Hybrid 	Damon Group CN 1997 W in cb ▶ <ul style="list-style-type: none"> Conveyor IPO 2020

2024 G2P SOLUTIONS DIRECTORY : D-G

Daifuku
JP | 1937

W

in

cb

▶

• System integrator

Django Robotics
CN | 2019

W

in

cb

▶

• 2-5 words focus on main product (not possible to change) selected by STIQ

Fabric
IL | 2013

W

in

cb

▶

• mASRS

Fetch Robotics
US | 2014

W

in

cb

▶

• P2G

• Acquired by Zebra 2021

Deloitte
UK | 1845

W

in

cb

▶

• Consultancy

Doog
SG | 2012

W

in

cb

▶

• P2G

Fortucky
CN | 2014

W

in

cb

▶

• System integrator

Fives
FR | 1812

W

in

cb

▶

• System integrator

Dematic
US | 1900

W

in

cb

▶

• System integrator

• Acquired by KION in 2016

Eiratech Robotics
IE | 2014

W

in

cb

▶

• G2P AGV

ForwardX Robotics
CN | 2016

W

in

cb

▶

• P2G

Fizyr
NL | 2014

W

in

cb

▶

• Pick

Exotec
Lille, France | 2015

W


in


cb

▶

• System integrator

Exotec is a global warehouse robotics company powering the world’s largest brands. The company combines the best of hardware and software to offer elegant warehouse robotic systems that drive operational efficiency, add resiliency, and improve working conditions for warehouse operators. 50+ industry-leading brands including Gap Inc., Carrefour, Decathlon, and Uniqlo trust Exotec to improve their operations across 100+ sites worldwide.





Galaxis Tech
CN | 2014

W

in

cb

▶

• System integrator

Gebhardt Intralogistics
DE | 1952

W

in

cb

▶

• System integrator

Geek+
CN | 2015

W

in

cb

▶

• G2P AGV

75

2024 G2P SOLUTIONS DIRECTORY : G-L

<p>Grey Orange US 2011</p> <p>   </p> <ul style="list-style-type: none"> G2P AGV 	<p>Gridstore DE 2023</p> <p>   </p> <ul style="list-style-type: none"> cASRS 	<p>Groenewout NL 1966</p> <p>    </p> <ul style="list-style-type: none"> Consulting firm 	<p>Guozi CN 2010</p> <p>   </p> <ul style="list-style-type: none"> G2P AGV 	<p>HAI Robotics CN 2016</p> <p>    </p> <ul style="list-style-type: none"> AGV Shuttle 	<p>HIK Robot CN 2001</p> <p>   </p> <ul style="list-style-type: none"> AMR G2P
<p>Honeywell (Intelligrated) US 2001</p> <p>    </p> <ul style="list-style-type: none"> System integrator Honeyweyll acquired Intelligrated in 2016 	<p>HÖRMANN Intralogistics DE 1987</p> <p>   </p> <ul style="list-style-type: none"> System integrator 	<p>Huazh CN 2011</p> <p>   </p> <ul style="list-style-type: none"> System integrator 	<p>HWArrobotics SG 2011</p> <p>    </p> <ul style="list-style-type: none"> System integrator 	<p>Hy-Tek US 1963</p> <p>   </p> <ul style="list-style-type: none"> System integrator 	<p>i-Collector System NL 2012</p> <p>   </p> <ul style="list-style-type: none"> Hybrid
<p>IHI JP 1853</p> <p>    </p> <ul style="list-style-type: none"> System integrator 	<p>instock US 2020</p> <p>    </p> <ul style="list-style-type: none"> Hybrid 	<p>Intellistore NL 2020</p> <p>    </p> <ul style="list-style-type: none"> cASRS 	<p>inVia Robotics US 2015</p> <p>   </p> <ul style="list-style-type: none"> P2G 	<p>Jungheinrich DE 1953</p> <p>   </p> <ul style="list-style-type: none"> cASRS 	<p>Knapp AT 1952</p> <p>    </p> <ul style="list-style-type: none"> System integrator
<p>Koerber Supply Chain DE 2005</p> <p>    </p> <ul style="list-style-type: none"> System integrator 	<p>KPI Solutions US 2021</p> <p>    </p> <ul style="list-style-type: none"> System integrator Merger of Kuecker + Pulse Integration, 2021 	<p>Libiao Robot CN 2016</p> <p>   </p> <ul style="list-style-type: none"> Sort 	<p>Locus Robotics US 2014</p> <p>    </p> <ul style="list-style-type: none"> P2G 	<p>Logtopus IL 2021</p> <p>   </p> <ul style="list-style-type: none"> Stealth 	<p>Lowpad NL 2017</p> <p>   </p> <ul style="list-style-type: none"> G2P AMR



2024 G2P SOLUTIONS DIRECTORY : M-S

<div><div>Martistel AE 2022</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">mASRS</div></div>	<div><div>Mews Partners FR 1992</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">Consulting firm</div></div>	<div><div>Movu Robotics HQ 2013</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">mASRS</div></div>	<div><div>Mushiny CN 2016</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">G2P AGV</div></div>	<div><div>Nimble US 2018</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pick</div></div>	<div><div>Nomagic PL 2017</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pick</div></div>
<div><div>Noyes Technology HQ 2013</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">mASRSAcquired by Knapp in 2024</div></div>	<div><div>NTT DATA US 2001</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">ConsultancyNTT DATA acquired Chainalytics</div></div>	<div><div>Ocado Intelligent Automation UK 2023</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">cASRS</div></div>	<div><div>OPEX US 1970</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Shuttle ASRS</div></div>	<div><div>Osaro US 2015</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pick</div></div>	<div><div>Ottobo TR 2016</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">P2G</div></div>
<div><div>Packsize US 2002</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pack</div></div>	<div><div>Panotec IT 1986</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pack</div></div>	<div><div>Pickr NO 2016</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pick</div></div>	<div><div>Posco DX KR 2013</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">System Integrator</div></div>	<div><div>Prime Robotics US 2018</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">G2P AGV</div></div>	<div><div>Quartel & Associates US 2013</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">Consultancy</div></div>
<div><div>Quicktron CN 2014</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">G2P AGV</div></div>	<div><div>Rapyuta Robotics JP 2014</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">P2G</div></div>	<div><div>RENATUS ROBOTICS JP 2022</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">Shuttle ASRS</div></div>	<div><div>Righthand Robotics US 2014</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><ul style="list-style-type: none">Pick</div></div>	<div><div>Rocket Solution DE 2019</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">Shuttle ASRS</div></div>	<div><div>SAFELOG DE 1996</div><div><div>W</div><div>in</div><div>cb</div><div>▶</div></div><div><div>🎤</div><ul style="list-style-type: none">G2P AGV</div></div>



2024 G2P SOLUTIONS DIRECTORY : S-Y

<div>SAVOYE</div> <div>FR 1950</div> <div>   </div> <div><ul style="list-style-type: none">• System integrator• Acquired by Noblift in 2018</div>	<div>Scallog</div> <div>FR 2013</div> <div>   </div> <div><ul style="list-style-type: none">• G2P AGV</div>	<div>Servus Intralogistics</div> <div>AT 2005</div> <div>   </div> <div><ul style="list-style-type: none">• Shuttle ASRS</div>	<div>Solystic</div> <div>FR 1955</div> <div>   </div> <div><ul style="list-style-type: none">• Sort• Acquired by Northrop Grumman in 2001</div>	<div>Sparck Technologies</div> <div>NL 1924</div> <div>   </div> <div><ul style="list-style-type: none">• Pack</div>	<div>SSI Schaefer</div> <div>DE 1937</div> <div>    </div> <div><ul style="list-style-type: none">• System integrator</div>
<div>Staxel</div> <div>UK 2022</div> <div>   </div> <div><ul style="list-style-type: none">• Hybrid</div>	<div>Storojet</div> <div>HQ 2013</div> <div>   </div> <div><ul style="list-style-type: none">• mASRS</div>	<div>SVT Robotics</div> <div>US 2018</div> <div>    </div> <div><ul style="list-style-type: none">• Software</div>	<div>Swisslog</div> <div>CH 1898</div> <div>    </div> <div><ul style="list-style-type: none">• System integrator• Acquired by KUKA in 2014</div>	<div>Syrius Robotics</div> <div>CN 2018</div> <div>   </div> <div><ul style="list-style-type: none">• P2G</div>	<div>Tarqan</div> <div>TR 2020</div> <div>   </div> <div><ul style="list-style-type: none">• G2P AGV</div>
<div>Techvico</div> <div>VN 2013</div> <div>   </div> <div><ul style="list-style-type: none">• P2G</div>	<div>TGW</div> <div>AT 1969</div> <div>   </div> <div><ul style="list-style-type: none">• System integrator</div>	<div>The Rubic</div> <div>CA 2020</div> <div>   </div> <div><ul style="list-style-type: none">• Hybrid</div>	<div>Tompkins Robotics</div> <div>US 2017</div> <div>    </div> <div><ul style="list-style-type: none">• Software</div>	<div>Unbox Robotics</div> <div>IN 2019</div> <div>   </div> <div><ul style="list-style-type: none">• Sort</div>	<div>ADVERTISE IN STIQ's FREE MHE INDUSTRY REPORTS REQUEST MEDIA PACK</div> <div><ul style="list-style-type: none">• Gain exposure to STIQ Ltd's audience, global decision makers• >25,000 downloads (since 2020)• Viral multiplier: one download = 5X shares• 80% of readers in Europe + North America• Media pack download</div>
<div>Vanderlande</div> <div>NL 1949</div> <div>    </div> <div><ul style="list-style-type: none">• System integrator</div>	<div>Wagner Fire Safety</div> <div>DE 1976</div> <div>   </div> <div><ul style="list-style-type: none">• Fire safety</div>	<div>Wellwit</div> <div>CN 2015</div> <div>    </div> <div><ul style="list-style-type: none">• G2P AGV</div>	<div>XYZ Robotics</div> <div>US 2018</div> <div>   </div> <div><ul style="list-style-type: none">• Pick</div>	<div>Youibot</div> <div>CN 2017</div> <div>   </div> <div><ul style="list-style-type: none">• P2G</div>	

GOLD SPONSOR



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INTERVIEWS, TRADE SHOWS AND GLOSSARY

STIQ SPOKE TO THE FOLLOWING COMPANIES:

• 1MRobotics (IL)	VP Sales
• Accio Robotics (IN)	Co-founder
• Addverb (IN)	CEO EMEA
• Attabotics (CA)	SVP Global Sales
• AutoStore (NO)	CMO
• Bastian Solutions (US)	Director of Corporate Strategy
• BlueSword (CN)	Director of Overseas Sales
• Cartesian Kinetics (US)	Co-founder
• CBRE Americas Consulting (US)	Managing Director
• Conductix Wampfler (DE)	Global Market Director
	Industrial Automation
• CrimsonXT (UK)	Sr BDM
• Deloitte (CA)	Partner, Supply Chain & Network Operations
• Django Robotics (CN)	CEO
• Exotec (FR)	EVP Sales NA
• Fabric (IL)	VP Sales
• Geek+ (CN)	VP International Marketing
• Groenewout (NL)	Sr Logistics Consultant
• HAI Robotics (CN)	VP Sales, Marketing & Solutions
• Honeywell (US)	CMO (Honeywell Intelligrated)
• HWArobotics (CN)	General Manager
• Hy-Tek (US)	VP Robotics
• IHI (JP)	GM Sales Division
• Instock (US)	CEO & Co-founder
• Intellistore (NL)	Commercial Director
• Knapp (AT)	Product & Sales Manager
• Koerber Supply Chain (DE)	VP AMR
• KPI Solutions (US)	Sr VP Sales
• Locus Robotics (US)	CEO

• Mews Partners (DE)	Partner
• Movu Robotics (DE)	CSO
• Mushiny (CN)	CMO
• NTT DATA (US)	Managing Director
• Quartel & Associates (US)	Founder
• Posco DX (KR)	VP Logistics Division
• RENATUS ROBOTICS (JP)	Head of Global
• Rocket Solution (DE)	General Manager
• SAFELOG (DE)	Managing Director
• SSI Schaefer (DE)	Global Head of Sales Logistic Solutions
• SVT Robotics (US)	SVP of Product
• Swisslog (CH)	VP Strategy & Marketing
• Tompkins Robotics (US)	President
• Vanderlande (NL)	Senior Manager
• Wellwit (CN)	CEO

ANONYMOUS CONTRIBUTORS:

• Anonymous #1	[Global 3PL]
• Anonymous #2	[European 3PL]
• Anonymous #3	[Global Retailer]
• Anonymous (other)	[Consulting, Equity Analysis]

TRADE SHOWS & EVENTS VISITED

• LogiMAT	(Stuttgart, DE)	WEB
• Logis Tech Tokyo	(Tokyo, JP)	WEB
• Modex	(Atlanta, US)	WEB
• NRF Big Show	(New York, US)	WEB
• Promat	(Chicago, US)	WEB
• STIQ Robotics Meetups	(London, UK)	WEB
• The Delivery Conference	(London, UK)	WEB

GLOSSARY

3PL	Third Party Logistics
AGV	Automated Guided Vehicle
AMR	Autonomous Mobile Robot
AS	Asia, including India, Australia, Korea, Japan, China, etc.
ASRS	Automatic Storage & Retrieval System
CAGR	Compound Annual Growth Rate
cASRS	cube ASRS
CPG	Consumer Packaged Goods (US, see also FMCG)
DC	Distribution Centre
EU	Europe, including Israel (in this report)
EV	Enterprise Valuation
FMCG	Fast Moving Consumer Goods (UK, see also CPG)
FOMO	Fear Of Missing Out
FTE	Full Time Employee
G2P, GTP	Goods to Person
G2P AGV	“Kiva Type” System (datametric navigation base)
M&A	Mergers & Acquisitions
MFC	Micro Fulfilment Centre
MHE	Material Handling Equipment
NA	North America
OEM	Original Equipment Manufacturer
P2G	Person to Goods
PA-AMR	Pick Assistant AMR
POC	Proof Of Concept
RAAS	Robotics As A Service
ROI	Return On Investment
ROW	Rest of World
SI	System Integrator
SKU	Stock Keeping Unit
SMB / SME	Small & Medium Businesses (US / UK)
WCS	Warehouse Control System
WES	Warehouse Execution System
WMS	Warehouse Management System





Elegant Warehouse Robotics®: The Skypod System

Robots



Autonomous mobile robots quickly transport goods between storage racks and stations

- + Retrieve any SKU in less than 2 minutes
- + Operate with no single point of failure
- + Add robots to increase throughput within minutes

Stations



Picking stations allow warehouse operators to safely receive goods from robots

- + Cycle up to 400 bins per hour at each station
- + Prepare up to 4 orders at once
- + Provide an ergonomic setting for warehouse operators

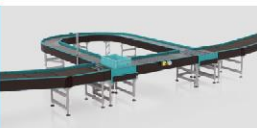
Storage



Racks, storage bins, and trays designed to maximize your space

- + Utilize full warehouse height with 39 ft tall racks
- + 5X your existing storage capacity
- + Increase storage with additional racks in a matter of weeks

Conveyors



Modular conveyors allow for quick and easy installation and ensure high-performance

- + No on-site programming enables quick installation
- + Plug-and-play design for fast adaptability
- + Reach throughput of up to 2,700 bins per hour

Warehouse Software



End-to-End Warehouse Execution System seamlessly connects your 3rd party automation with the Skypod system

- + Integrates seamlessly with most WMS or WCS
- + Optimally processes and synchronizes orders for efficiency
- + Provides visibility over your warehouse automation equipment

Hear From Our Clients



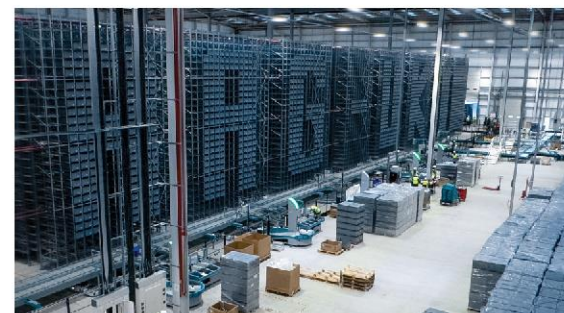
Ariat



“Having the ability to quickly access a lot of SKUs, do all those combinations quickly, pick any type of order any day at any moment is setting us up well for success going forward.”

Matt Hardenberg

Vice President of Distribution - Ariat



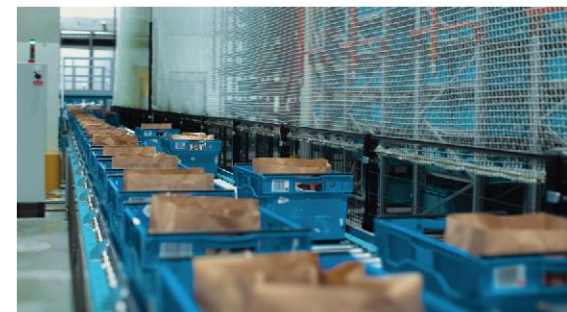
AAG



“Exotec technology responds to our needs and our ambition to transform our supply chain, to make it more modern, flexible, and modular. The operational efficiency and increased capacity to manage our logistical flows offered by this solution played a role in our decision. We are delighted to be able to serve our customers via this cutting-edge technological choice and the associated level of service.”

Eric Girot

Managing Director - AAG France



Carrefour



“The Skypod system was chosen on the one hand, for its record implementation time, and on the other hand for the structural flexibility and agility of the solution in operation.”

Mourad Bensadik

e-Commerce & Operations Director - France, Carrefour



Lane Automotive



“Our customers shape every decision we make as a company, so we had to identify the right end-to-end solution (with goods-to-person robotics at its core) that could easily integrate with our existing automation and distribution ecosystem to transform our fulfillment operations for years to come... This solution is really going to transform our ability to meet and exceed our customer demands.”

David Meadow

Chief Operating Officer - Lane Automotive