

GOODS TO PERSON G2P ROBOTICS

2019

ECOMMERCE WAREHOUSE FULFILMENT AUTOMATION

- A nascent market with accelerating growth; 2019 G2P market forecast at c. \$400-500m, up from c. \$250m in 2018
- The market was boosted by single G2P deal - XPO's purchase of 5,000 AMR's
- Amazon's support for Kiva Systems expired in 2018 and may have flattered the North American G2P market
- More G2P competitors in all segments; ASRS suppliers mainly focus on online grocery fulfilment; hybrids appearing

Distribution of this copy sponsored by



CoGRI GROUP

Providing performance floors for G2P Robotics



FACE CONSULTANTS LTD
Global Flooring Consultants

E: info@cogrigroup.com
Tel: +44 (0)1484 600080
www.cogrigroup.com



CONTENT

Responsible for this report:

Thomas Andersson
Senior Retail Technology Analyst
tom@Styleintelligence.com
+44 7870 210529



What some of our readers said about the 2018 report; feedback

STIQ appreciates all feedback!
To leave your feedback for this report follow this [link](#) (anonymous option)

"Your 2018 Goods to Person Robotics report was a very good piece of work. We are looking forward to the 2019 version."
[Teradyne Inc]

"Very well written." [EQT Partners]

"We purchased another report but think yours is better and more relevant." [Supplier]

"I was wondering how 6 River Systems could offer such a high quality download from their website." [Kollmorgen]

"This is a very good piece of work." [Credit Suisse]

"Very well documented report, providing valuable insights into different players, technologies and strategies deployed. Quotes from key players help to define market dynamics. Not only very easy to read but also enjoyable. Great work!" [STIQ Website]

General approach and methodology for STIQ reports

STIQ uses a combination of secondary and primary research to create its reports. Our background is in advising venture capital & private equity on origination, investment appraisals (Commercial Due Diligence) and portfolio strategy.

Acronyms & definitions used in this document:

- AMR; Autonomous Mobile Robot
- PA-AMR; Picking Assistant AMR
- ASRS; Automatic Storage & Retrieval System
- FBA; Fulfilled By Amazon
- MVP; Minimum Viable Product
- POC; Proof Of Concept
- RMS; Robotics Management System
- UPH; Units Per Hour
- WMS; Warehouse Management System
- WES; Warehouse Execution System

What does a mean?

A green tick indicates STIQ has spoken to one or more representatives of a G2P supplier. A red X indicate the supplier declined to be interviewed at this time. The tick only appears in the company profile section.

Disclaimer This document does not constitute investment advice. Whilst the analysis presented is based on interviews with a large number of suppliers & experts, extensive desk research and industry knowledge STIQ cannot and does not guarantee the accuracy of the contents in this free report.

Content

<u>Content</u>	<u>Page</u>
The Big Bang	3
Suppliers	4
Funding	6
M&A	7
Market Drivers	8
China	12
Market Size	13
Market Growth	14
• AMR	15
• PA-AMR	16
• ASRS	17
G2P > G2R	18
ROI	19
Company profiles	21
Respondents	35
About STIQ	36

THE BIG BANG

Amazon acquired Kiva Systems for an estimated 8X revenue in 2012

Amazon has since deployed >150,000 robots and developed pallet carrying AMR's... among other things

The success of Kiva Systems has spread through the Boston & US robotics ecosystem and many of the US G2P vendors have one or more ex-Kiva staff



STIQ analysed Amazon's Kiva processes in more detail in the 2018 G2P report

Download STIQ's 2018 G2P Robotics report [here](#). This goes into more detail on Kiva & Amazon.



Source: Styleintelligence 2018

Robotics are important, but only make up a part of the Amazon warehouse arsenal

Following its acquisition of Kiva Systems in 2012 for \$775m, Amazon has deployed an estimated 150,000+ robots throughout its warehouse estate (STIQ interviews).

However, Amazon's warehouses are made up from a mix of manual & automated environments as exemplified by Amazon's recent purchase of 1,000 Very Narrow Aisle forklifts from a European manufacturer (Source: STIQ interviews – which may indicate a growing importance of the 'Amazon for Business' division and/or increasingly larger item picks – items which do not fit in the Kiva pods/shelves).

"Kiva revolutionised the online fulfilment space with the goods to person concept." [6 River Systems]

At what point will other suppliers reach Kiva's 2012 maturity?

Amazon has had seven years to develop Kiva Systems in a live, high volume and hermetically sealed PR environment.

Whilst other suppliers of AMR's may struggle to reach the same functionality & efficiencies as Amazon Robotics, they will have the advantage of looking at how Amazon has developed their AMR's.



Image: Amazon. Robotics engineer wearing an active belt, alerting robots to avoid the area.

Chinese suppliers of AMR's have realised they need a wider range of products and have diverted from the Amazon blueprint.

Will Amazon pursue legal action?

An absence of AMR's from the US market has largely been attributed to Amazon's IP library acquired with Kiva Systems.

The increasing number of AMR suppliers now openly selling into the US market pose a big question regarding what, if any, action Amazon might take.

"Amazon may not want to pick a fight with Alibaba, JD.com and so on. These guys have invested heavily in the Chinese AMR companies. I doubt Amazon will want to escalate this." [G2P Supplier]

"The key Kiva patent expires in 2027. However, we have seen a few AMR's entering the US market, challenging the very broad descriptions in that patent. The difference is that Kiva's IP portfolio is now owned by Amazon, of course." [Anonymous]

End-of Kiva Systems support

Amazon has supported Kiva's pre-2012 customers up to 2018 incl. with software and parts.

The Amazon-Kiva support expired in 2018 and may have temporarily boosted the US market for G2P robotics.

However, STIQ's impression is that it has invited suppliers, previously absent from the market. There are now several competitors with US offices that opened throughout 2018 or planned offices.

The Kiva System patents expire in 2027.

STIQ identified 38 suppliers in 2019, up from 24 in 2018

The volume of G2P suppliers covered have increased from 24 in 2018 to 38 in 2019. A partial explanation for this is that a number of companies have emerged from stealth mode and definitions used have broadened.

Companies profiled within this report have been selected on the basis that they offer at least one Goods to Person robotics product and sell to, or target, ecommerce warehouse customers. A number of companies, for example Berkshire Grey, does not fit neatly in one of these segments.

Shades of warehouse



The three types of G2P robotics; AMR, PA-AMR & ASRS fit broadly within three types of warehouses. PA-AMR's are designed to operate in the same space as people.

ASRS (9)

- AutoStore
- Ocado Technologies
- Alert Innovation (New)
- ATTAbotics (New)
- Cleveron (New)
- Exotec (moved)
- CommonSense (moved)
- Takeoff Technologies (New)
- Opex Corporation



AMR (13)

- Eiratech
- Scallog
- Geek+
- Flashhold/Quicktron
- GreyOrange
- Swisslog
- HIK Vision
- Prime Robotics (Name change)
- Caja Systems (New)
- Myrmex (New)
- Malu Innovation (New)
- Grenzebach (New)
- Aresbots (New)



PA-AMR (16)

- 6 River Systems
- Locus Robotics
- Fetch Robotics
- iFuture Robotics
- IAM
- MIR
- InVia
- Canvas Technology
- Magazino
- Vecna
- Sirius Robotics (New)
- NextShift (New)
- Alog Tech (New)
- BionicHIVE (New)
- Berkshire Grey (New)
- Intelligent Robots (New)



Additions & removals (+4)

Additional companies covered in the 2019 version include [+]:

- Alert Innovation (US)
- ATTAbotics (Canada)
- Cleveron (Estonia)
- Takeoff Technologies (US)

Companies removed [-]:

Additions & removals (+5/-3)

Additional companies covered in the 2019 version include [+]:

- Caja Systems (Israel)
- Malu Innovation (China)
- Myrmex (US)
- Grenzebach (Germany)
- Aresbots (China)
- Prime Robotics (US) – Name change

Companies removed [-]:

- Amazon Robotics (Kiva Robotics)
- MaroRobotTech
- Hi-Tech Robotics Systemz

Additions & removals (+6/-2)

Additional companies covered in the 2019 version include [+]:

- Sirius Robotics (China)
- NextShift (US)
- Alog Tech (India)
- BionicHIVE (Israel)
- Berkshire Grey (US)
- Intelligent Robots (UK)

Companies removed [-]:

- Clearpath
- Ascend Robotics

G2P Definition

The broad G2P Robotics definition include systems which store & retrieve merchandise and/or assist in the picking process and deliver to a staging area for packing & dispatch. The operator at a staging area may be a person.

IFR defines these robotics as “Service Robots” ([source](#)).

However, the market is nascent and changing fast



SUPPLIERS

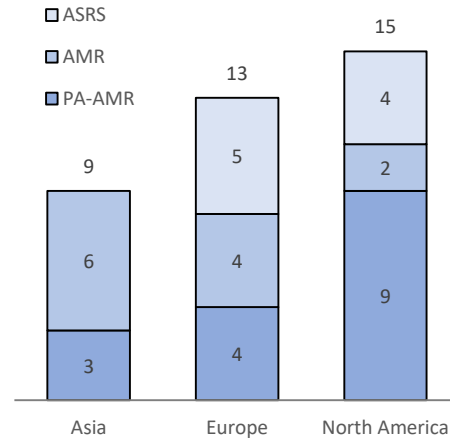
Geographic demarcations by types of G2P robotics

Root causes: IP, legacy and labour cost differences



PA-AMR's dominate in North America; Amazon to blame?

G2P suppliers by type & continent



Source: Crunchbase, STIQ research & analysis

Geographical demarcations exist in the G2P sector. PA-AMR's are most prevalent in North America while AMR's dominate the Asian market. ASRS systems are predominantly based in Europe.

The lack of AMR's in North America is most likely due to Amazon's patents from its acquisition of Kiva Systems in 2012. STIQ suggests this may also be the reason for the high prevalence of PA-AMR's in the North American market.

AutoStore more or less created the cube storage G2P ASRS category. A number of other G2P ASRS start-ups have joined the category. The more established shuttle manufacturers have also joined in, creating or adopting systems suitable for single item picking.

Why is there a lack of ASRS manufacturers in Asia?

STIQ was unable to identify any G2P ASRS manufacturers in Asia despite the region's reputation for automation. We expect this to change in the short term as the cost of warehousing space increase.

There are, however, a large number of AMR manufacturers in the region. The reason for this is likely to be the success of Amazon Robotics (Kiva Systems) combined with government (in particular in China) incentives for robotics and AI.

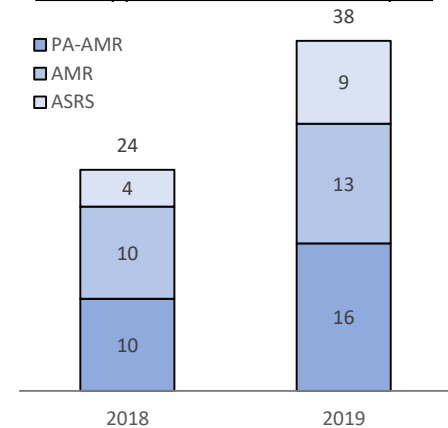
One major difference between Asian AMR's and others is the often wide range on offer by Asian suppliers.

Many of the Chinese manufacturers are backed by the large ecommerce retailers of Alibaba or JD.com.

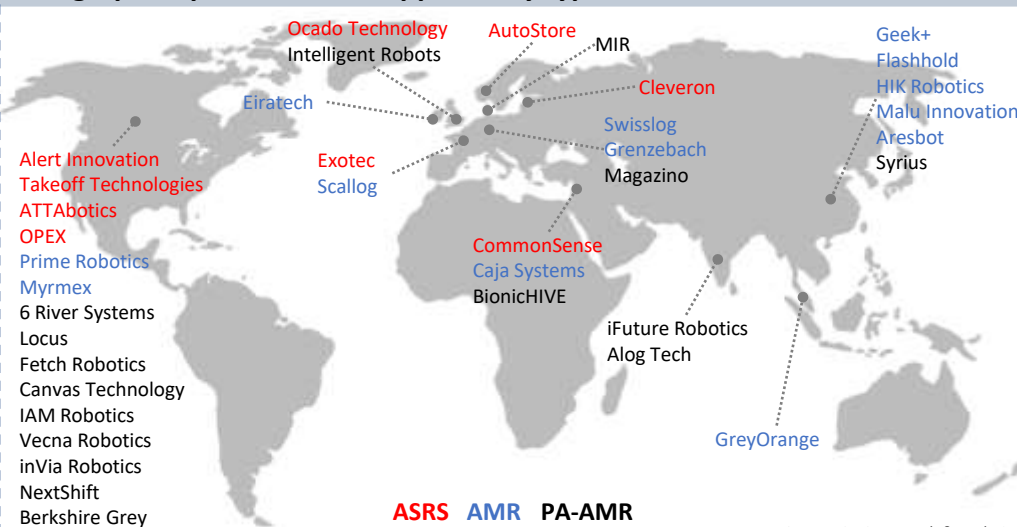
However, despite high-level backing, the domestic market lacks size and demand is subdued, partly due to relatively low salaries for warehouse workers.

As a result, many of the Asian manufacturers are looking to Europe and North America for additional sales.

G2P suppliers in 2018 vs 2019 report



Geographic spread of G2P suppliers, by type



Source: STIQ research & analysis

FUNDING

The G2P sector raised \$450m in 2018; up 120%

Two Asian AMR manufacturers raised a combined \$290m in 2018

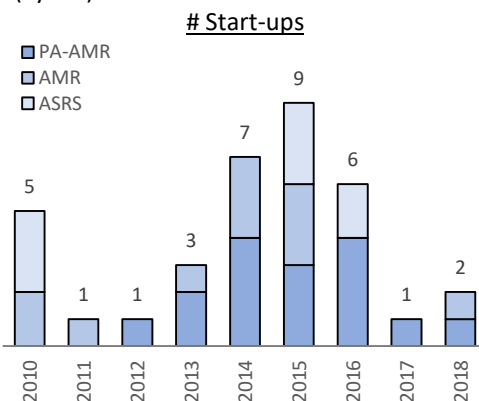
Gossip: STIQ understands one supplier is currently aiming for a fundraising which would dwarf any individual raises to date



Start-up activity peaked in the aftermath of the Kiva acquisition

Start-up activity peaked in the four years following Amazon's acquisition of Kiva Systems.

Activity in 2017 and 2018 has been driven by two spin-outs (Prime Robotics and Vecna Robotics) and one Chinese start-up (Syrius).



Source: STIQ Research & Analysis

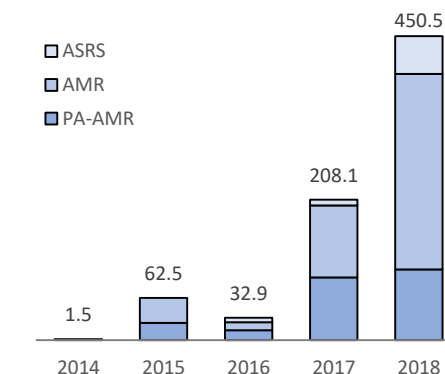
However, fundraising accelerate in 2017 and 2018, which may drive further start-up activity in the next coming few years.

G2P robotics attracted c. \$451m funding in 2018, up 120% yoy

G2P robotics attracted significant interest in 2018 and total publicly released funding reached a new record at \$450.5m, representing an increase of circa 120% from \$208.1m in 2017.

Approximately 64% of all G2P funding in 2018 was raised by AMR companies, circa 23% by PA-AMR and 13% by ASRS.

Known funds raised, 2014-18 (\$m)

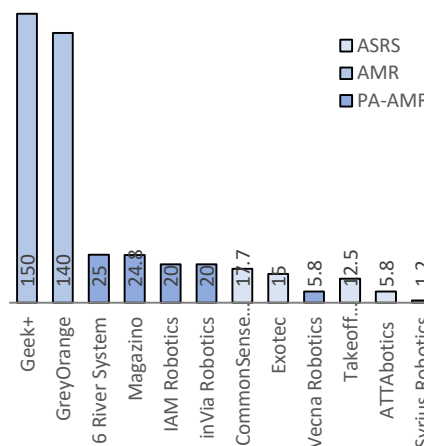


Source: Crunchbase, STIQ research & analysis

ASRS funding jumped c. 575% between 2017 and 2018. Part of the reason for this may be attributed to EQT's acquisition of a majority stake in AutoStore in 2017.

Geek+ & GreyOrange raised a combined \$290m

G2P known funds raised in 2018 (\$m)



Source: Crunchbase, STIQ research & analysis

Two Asian companies accounted for 100% of total AMR funding in 2018:

- Geek+ (China) raised \$150m in a round led by Warburg Pincus (Walmart-owned Flipkart contributed to the round)
- STIQ's analysis is that the higher gross margins achievable in international markets attracted investors and we have noticed a sharp increase in Geek+'s international marketing activities as a result
- GreyOrange (Singapore) raised \$140m in a round led by Mithril Capital. The raise was announced 2 weeks prior to the company revealing the single largest order for AMR's globally to date (by XPO)
- STIQ's analysis of the order is that XPO may have had exposure to Amazon Robotics and recognise the benefits of the system. Media ([source](#)) have speculated Amazon was an XPO client which terminated their contract in 2018. As such, XPO's purchase of 5,000 AMR's may represent an attempt at creating an FBA clone

The RaaS business model is highly capital intensive

The RaaS model is very popular and the bulk of suppliers offer this as an option. However, this is a highly capital-intensive business model which requires increasingly large funding rounds as order sizes increase. European suppliers are having some issues with accessing venture capital.

"There are a lot of VC's out there, however, only a handful of them invest in hardware." [Anonymous]



In common for MiR & AutoStore is the distributor/ partnership route to market

The two acquisitions, MiR and AutoStore, both focus on technology development and rely on partners and distributors to promote and sell their products.

STIQ has noticed an underlying trend among G2P competitors to partner with sales channels. Whilst this is not pronounced at the moment, we expect the partner route to market to grow in importance in the short term.

In 2016, EQT acquired 82% of AutoStore, valuing the company at c. 8X revenue

Breakit, the Swedish technology publication, speculated the price EQT paid for AutoStore was SEK4bn (on SEK500m revenue - [source](#)).

The company has advised STIQ their revenue for 2018 was NOK1.2bn

Teradyne paid \$197m for MiR in Apr 2018 at an estimated 7X revenue

Teradyne [NYSE:TER] acquired MiR (PA-AMR, Denmark) for \$197m in April, 2018.

Three years earlier, in 2015, Teradyne acquired Universal Robots (articulated arms), another Danish robotics company, for \$285m.

MiR increased revenue from \$12m in 2017 to \$31m in 2018 with forecasts growth up to 50-100% to 2022.

“MiR will be continue to operate as an independent company. They were a success even before we acquired them, growing revenue from \$12m in 2017 to \$31m in 2018. We will enable them to continue this high growth, globally.” [Teradyne]

It should be noted that only a small part of MiR's revenue originates from ecommerce warehouse applications. AutoStore has a far higher revenue concentration in ecommerce warehouse applications.

The wider automation sector is “hot” and STIQ expects further high levels of M&A activity

The G2P sector is part of a larger market which also experience high levels of M&A.

For example, Körber, a global industrial automation company (€2.6bn revenue),

acquired HighJump, a WMS vendor, in 2017 (previous owners included Accel-KKR). Körber also acquired a minority stake in Magazino in 2018.

STIQ expects VC investment activity in the G2P sector to remain high in 2019 with a potential for consolidation between segment players (PA-AMR + AMR or AMR+ASRS, etc). Consolidation could improve the potential for selling in a wider range of products to clients and create R&D efficiencies (such as Swisslog's business model)

Selected M&A:

- 2018; MiR (Teradyne, \$197m); Auresbot (Megvii, unknown)
- 2016; AutoStore (EQT, est. \$470m)
- 2015; Magazino (Siemens 'VC', n/a)
- 2014; Swisslog (KUKA, \$357m)
- 2012; Kiva Systems (Amazon, \$775m)
- 2010; Ocado (IPO, ev. \$1.5bn)

A rumoured IPO may add further competitive pressures

Megvii, the parent company of Aresbot, is rumoured to be considering an IPO in Hong Kong. Alibaba is a backer of Megvii. A successful IPO could potentially add further competitive pressures in Europe and North America. Aresbot is currently focusing on Asia/China markets.



MARKET DRIVERS

Continued ecommerce growth and labour shortages are key drivers

Amazon continues to be an influencing factor in driving competition in the market



The success of Amazon Robotics drives growth in the G2P sector

Amazon is thought to have deployed in excess of 150,000 AMR's in the seven years since they acquired Kiva Systems.

G2P suppliers agree that Amazon has only been a positive market driver and showcase the benefits of robotics.

"Amazon Robotics is a good thing. They are showing customers what G2P can do for them. They are the best promoter for the G2P market." [G2P supplier]

Continued ecommerce growth is a key driver of G2P robotics

Global B2C ecommerce is estimated to generate \$4.1bn revenue by 2020, up from \$2.8bn in 2018.

However, this does not factor in the 'real sales figure' – including returns, which can be as high as 70-80% or less than 10% depending on the sector, channel and business model. Managing returned goods is a big warehouse management issue.

"Returns are an inherently difficult process to automate." [ZigZag]

"Our fashion merchandise returns rate is circa 30-40%. The process of adding a returned item to storage can often delay other processes and make your storage automation less efficient." [Boozt]

Driver	Sub Driver	Description	Impact
Ecommerce	Amazon success	Market pull; ">100,000 Kiva deployments can't be wrong"	▲
	Online retail growth	Continued growth in ecommerce as a share of all retail will drive demand for faster & better warehouse fulfilment options	▲
	Property	A lack of suitable property may dampen uptake of G2P robotics	◀▶
	Service providers	Increased competition among 3PL's have reduced their appetite for investments	▼
Human Resources	Access to labour	Labour shortages during peak & campaigns General access to labour	▲
	Labour cost	Increasing salaries pushing demand for automation	▲
Financial & Legal	Payment options	Payment alternatives and contract lengths may influence take-up of G2P technology	◀▶
	Standards	Systems standards & regulation may impact the G2P sector	◀▶
	Legacy systems	Existing automation may not be compatible with G2P Proven systems and are the incumbents to beat	▼
Consumer expectations	Delivery expectations	Rising consumer expectations on speed of delivery	▲
		Increased efficiencies in warehouses	

Warehouse properties may require additional work to host robotics

Land is expensive and building upwards is occasionally cheaper. However, such construction may require extensive additional work and may not be a suitable solution for robotics.

"Installing mezzanine floors is one way to add space for robotics in existing warehouses. However, we are aware of instances where occupiers have had to dig up the floor to support additional foundations, a costly a time consuming process." [Savills]

"The demand is partially driven by the cost of land. Where it tends to be cheaper to build upwards than sideways, for example in the UK. It puts some restrictions on the AMR segment as they do not lend themselves to an easy upwards expansion." [Swisslog]

Other potential detractors may include peak electricity/power demand. Whilst not insurmountable, such issues may add to the cost of implementing robotics and/or automation systems.

MARKET DRIVERS

The available warehouse estate may influence the G2P market

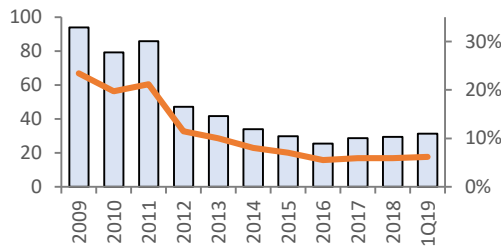
Competition among 3PL's may have postponed demand in the short term



Availability of suitable properties may cause issues

Data suggests that the UK warehouse vacancy rate is at a decade-low rate. However, industry observers do not see low vacancy rates as an important driver for G2P.

UK warehouse supply & vacancy (M sqft & %)



Source: Savills Research

"We're not seeing the shift towards robotics driven by lack of warehouse space, but lack of labour." [Savills]

"G2P robotics has been massive for us. Flooring is an important factor in multi-floor operations. Outside of Asia there were very few multi-level warehouses until the onset of G2P robotics. Now they have become common place in the UK, mainland Europe and the USA. We are now looking at multi-level facilities in Australia & Latin America. In fact I am talking to a company later today about a multi-floor installation." [CoGri Group]

However, operating a high-capacity facility spread over multiple floors with a high frequency of robotic movements may introduce unforeseen property/ facility issues.

Increased competition among 3PL players has impacted G2P appetite

Competition in the 3PL sector has led to a tightening of margins and increasingly short contract terms.

There is a reluctance in the sector, especially among multi-tenanted 3PL's, for investments with an RoI beyond the lifetime of a client contract. Multi-tenant 3PL's also change their layouts frequently to respond to new clients coming in and going out. Any robotic solution needs to be highly flexible to manage a variety of clients and product types & sizes.

"At the moment there is no appetite for automation or robotics among 3PL's." [Supplier]

"3PL's are increasingly looking at G2P but, it may be a few more years before they go all in with G2P. We are developing G2P products for the ecommerce sector. Our mini load stacker is an example of this." [Jungheinrich]

However, despite a general reluctance among 3PL's to invest in automation, XPO ([source](#)) and DHL Supply Chain ([source](#)) both announced \$100m's investments in automation and new technology.

Access to labour - a major issue

Some of the key issues with access to labour may have been inadvertently created by local governments and warehouse operators.

"We estimate there will be a shortfall of one million human pickers by 2022. This is based on numbers from the US bureau of labour." [IAM Robotics]

Local governments have been keen to attract business and operators may have consolidated huge operations into a single location.

"Right now there is zero per-cent unemployment in Milton Keynes where we have our main distribution hub." [John Lewis]

However, even where there is abundant access to labour, operators may have issues with high employee turnover which increases costs for learning & development. Such issues often lead to a decline in picking accuracy and general quality of work.

"Our main European warehouse is located in Hungary and we are having issues with finding qualified staff. When I worked for Amazon in the US one of the key issues was picking accuracy." [Anonymous]

MARKET DRIVERS

Access to labour is perhaps the most pressing issue for warehouses

The problem with access to labour also exist in lower cost countries, however, business cases for robotics often fall due to high costs

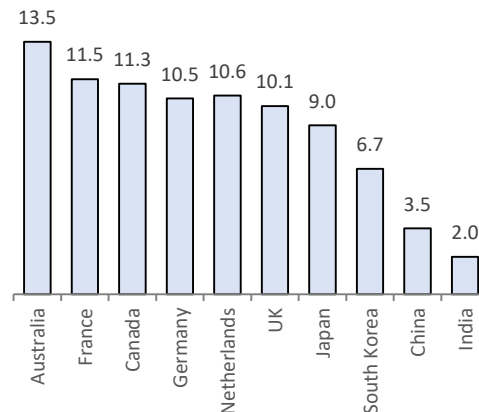


Higher labour cost countries more likely to adopt robotics faster

Minimum wages in China has increased sharply in recent years, but was on average two to three times less than European and North American wages in 2017-18.

However, whilst Chinese salaries are lower, AMR's are also sold at a lower price in the marketplace. Reasons for this are very high competitive pressure among suppliers and a concentration of very large and influential buyers.

Sample minimum hourly rates (\$'s)



Source: Wageindicator.org, latest known. STIQ interviews

Note that the US does not have a minimum wage, which is set by individual states. Circa half of all states have adopted an hourly minimum.

There are also calls for recognising organized labour unions among some operators in the US. Amazon has, so far, resisted but, recently increased warehouse pay to \$15/hr ([source](#)).

Higher warehouse utilisation rates make labour costs a more significant issue

The purchase cost for an AMR is generally accepted to be around the same as the cost for 1X FTE picker (in a high cost country).

In a single shift warehouse this would mean a like for like replacement. However, in a 24 hours shift environment the savings become more apparent.

“Research shows that material handling occupies 75 percent of labor costs, 25 percent of human resources, 55 percent of production space and 87 percent of production time.” ([Source](#))

RaaS, payment options, etc can drive uptake of G2P robotics

Payment options can have a significant impact on uptake and most start-ups profiled in this report offer robotics as a service (RaaS) with an OPEX impact. Legacy automation companies offer CAPEX options but with additional financing options.

“We evaluated a number of solutions before we decided to go with Fetch Robotics. The main difference was that we could buy a single robot and use that to create a business case without integrating with a WMS. With some of the other solutions you need to do the integration up front which adds costs and delays the business case.” [Ryder]

Standards and potential regulation may deflate the market

The introduction of standards may drive a commoditisation of G2P solutions. However, STIQ's interviews are contradictory and there are no associated short to medium term risks.

Other warehouse vendors expect standards to be introduced shortly which would enable them to interface better with new G2P solutions.

“It is early days for G2P robotics but, we are actively monitoring and considering the impact it may have on our solutions.” [JDA]

“There is a lack of standardisation among these relatively new G2P robotics systems. This is partly why we developed our WES, so that we can orchestrate labour and automation irrespective of system standards.” [Manhattan Associates]

“For us, there is a clear move towards a traffic software, or WES if you wish. This orchestrate all the various robotics and other automation. There are moves to standardise this software. Once this is implemented there may be pressure on prices to fall in the G2P sector.” [STILL]

MARKET DRIVERS

Standards and regulations may drive up costs in the short to medium term

A number of legacy retailers have already invested in automation and switching solutions might incur large additional costs



A recent incident in a UK warehouse operated by Ocado may force regulations

The February 2019 fire at one of Ocado's depots in the UK ([source](#)) may influence the market negatively in the short term.

STIQ's conversations indicate that the spread of the fire may have been due to a failure to shut down the robots in the grid which apparently continued running during the fire and thereby spreading the fire further. Please note that this is unconfirmed information, but from a very good source in retail.

"The fire at Ocado may put some dampers on the segment. It is hard to say as it is early days, but there may be moves to introduce stricter fire regulation on these kind of solutions." [Swisslog]

"Following the Ocado incident we had our H&S people contacting us about our sprinklers and insurance. I think we must have the most well developed sprinkler system in the UK." [John Lewis]

STIQ's interviews suggests storage and usage of batteries in robotic systems may be a prioritised area for regulatory action.

"The Ocado incident may have an impact on more recent systems. Not on shuttle type systems with developed fire controls." [KNAPP]

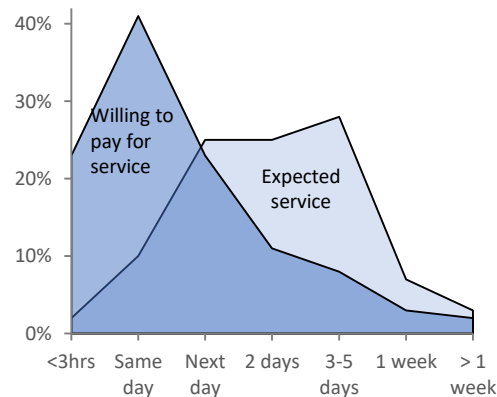
A number of retailers have already invested in shuttles and auxiliary systems

"Our shuttles are now 10 years old and performing 24 hours per day. We have a set-up that is based on conveyors and shuttles. We are not looking at any other automation technologies. If anything, it would be to update our shuttle system." [John Lewis]

Consumer expectations

According to PwC's Global Consumer Insights Survey in 2018, more than a third of consumers now expect Next Day or faster delivery.

Consumer delivery preferences



Source: [PWC 2018](#)

Amazon has been a large influence in driving up consumer delivery expectations on the back of its vertically integrated fulfilment processes.

Consumer expectations; vendor initiatives

Competitors are smartening up, improving efficiencies and speeding up processes in their warehouses. Alongside this, many of the couriers are also improving their services including the vital last-mile.

Hermes, among other couriers, have developed B2C smartphone applications to ensure first attempt deliveries and as a way to develop a closer relationship with consumers.

Inside warehouses, WMS providers have taken the approach to make existing labour and/or automation processes more efficient by adopting machine learning algorithms. However, a lack of historical data has prevented fast adoption of this particular initiative (it has not been standard to save data for longer than a month or two).

A number of WMS vendors, such as Manhattan Associates, have also released a WES (Warehouse Execution Software) to orchestrate and execute the various systems in a warehouse and connect them with any version of WMS'.

"We released our WES earlier in 2019. This is a response to an increasing number of various systems & processes in warehouses. Our WES act as the director of the various automation and other systems used in a particular warehouse." [Manhattan Associates]

MARKET CHINA

China online retail is America & Europe on steroids

Same-day delivery as standard compared to 3-5 days standard for Amazon; employees are moving on fast with L&D a large proportion of lifetime cost; mega-shopping events such as Double-11 and others puts huge stresses on systems



Intense competition between the Chinese ecommerce giants has led to increasingly onerous services

Explosive growth of Chinese ecommerce has created an extremely competitive environment. Increasingly onerous customer service promises have pressurised the logistics and order fulfilment space. Same day delivery is no longer a luxury for Chinese consumers.

Demographic changes has created a high level of movement in the labour market and warehouse employees shift jobs with an increasing frequency. Training new staff has become an increasingly large part of employees lifetime salaries.

These two drivers together with last-mile improvements have created a bottleneck in warehouse fulfilment and increased demand for automation. Amazon has acted as the main source of inspiration for this demand for automation.

Government support for AI & Robotics industries

The Chinese government's "Made in China 2025" strategy ([source](#)) is highly supportive of higher value activities such as artificial intelligence and robotics. Many of the Chinese G2P companies have had some form of government assistance.

In 2017, the Ministry of Industry & IT issued a 3-year plan for promoting AI and smart warehouse/factory ([source](#)). This included intelligent logistics and materials distribution. Logistics and distribution is thought to account for 15% of GDP.

A small number of very large buyers has led to price pressures

A concentration of very large buyers of automation has led to price pressures as the many G2P suppliers fight for projects. Such buyers include Cainiao and China Post among others.

STIQ estimates that prices for G2P robots in the Chinese market are 33-50% cheaper compared to overseas markets.

"The cost for an AMR is much lower in mainland China compared to in Europe and North America. The reason for this is the very tough with a high level of competition between suppliers."
[Supplier]

The higher prices achievable in overseas markets will inevitably attract Chinese suppliers and both Geek+ and HIK Vision has expanded operations. Others are highly likely to follow.

"Our main business is presently in China. But, in 2019 we extend our business to overseas." [Quicktron]

Chinese G2P suppliers are mainly AMR-based but vary from Kiva in the width of products

Chinese G2P manufacturers have a much wider range of products when compared to their European and North American peers.

STIQ's view is that this is partially driven by the market and large funding rounds.



Source: Malu Innovation



Source: Aresbot



Source: Geek+

Managing a fast moving workforce is a key issue in lower labour cost countries

Whilst a shortage of labour is not an issue in lower labour cost countries, many operators are highlighting problems with managing attendance and retention of experienced staff.

An additional problem is managing the large volume of labour required and maintaining accurate inventory levels.

"In India the average monthly salary for a warehouse worker is \$300. It is very difficult to create a business case for robotics on that basis alone. However, we are scaling some warehouses to a point where it makes more sense to automate some processes, simply because it becomes too difficult to manage, train and ensure availability of labour."
[Flipkart]

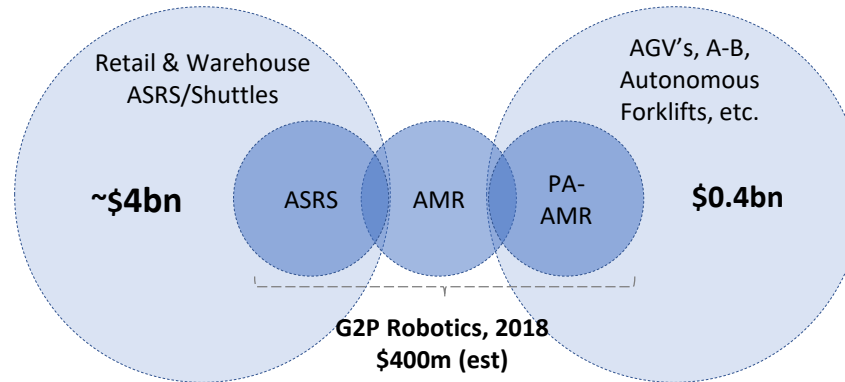
MARKET SIZE

G2P robotics overlap existing markets est. value of \$4.5bn

STIQ estimates the G2P niche market at \$400-500m in 2019



G2P Robotics market



Source: STIQ research & analysis. Excludes Amazon Robotics

G2P's overlap with existing markets; AMR's nascent

Of the three G2P segments (ASRS, AMR, PA-AMR) ASRS and PA-AMR fall within existing markets. ASRS' compete with shuttles whilst PA-AMR's overlap with AGV's.

However, the AMR niche does not fall easily within a larger existing market. With its acquisition of Kiva in 2012 Amazon also subsumed most of the AMR market.

STIQ estimates the G2P market was worth \$400m in 2018

The combined revenue of the top 20 ASRS/shuttle manufacturers was \$19.6bn in 2017, up 18.9% from \$16.5bn in 2016 ([source](#)).

STIQ estimates that circa 20% of the ASRS/shuttle market is related to ecommerce & warehouse customers. This would value the 2017 ecommerce & warehouse ASRS market at circa \$4bn.

The global AGV market was valued at \$2bn in 2017 ([source](#)). Using the same 20% share ecommerce & warehouse valued the sector at \$0.4bn.

Using a bottom-up analysis of the G2P suppliers covered in this report STIQ estimates the value of G2P robotics \$400m in 2018.

The 2018 market was boosted by the expiration of Amazon's support for Kiva Systems and GreyOrange's deal with XPO (the XPO deal is valued at an estimated \$80-100m).

Based on the dearth of labour, the market could be worth an additional \$20bn

Based on the often quoted & estimated shortfall of one million pickers in US warehouses by 2022, the US warehouse automation market (incl. G2P) would grow by an additional \$20bn in value.

"The US market is very hot now. Chinese and Indian companies are really keen on robotics, but the financials do not add up yet."
[Caja Systems]

"The G2P market is very healthy."
[Körber Logistics]

"Five years ago, we were evaluating G2P on some of our projects. The difference now is that clients come to us asking for G2P systems on almost every project. We explain the various G2P systems, highlight differences and showcase the best fit for individual customers." [Fortna]

"We have deployed 300 systems in 24 countries." [AutoStore]

"Our pipeline is very healthy."
[Exotec]

"Our model estimates there are 10,000 sites for micro fulfilment centres globally. This is at 20% online grocery penetration"
[Takeoff]

"Our order book is very healthy. Some of these projects are for >100 robots. We have had to scale up our production." [Scallog]

MARKET GROWTH

Sharp growth driven by a single order; good underlying market growth

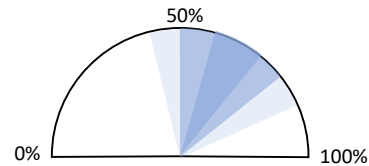
Grocery ecommerce has received special attention from recent start-ups



Interviews suggest continued high levels of growth despite political uncertainties

Interviews suggest the G2P market will continue growing in the short to medium term. STIQ estimates market growth in 2019 at circa 45%-80%

Estimated G2P market growth 2019



Demand for G2P solutions is experienced across the warehouse supply-chain, from forklift manufacturers to WMS vendors and consultancies.

"The number of RFP inquiries requesting integrations with smart automation (including robotics) has gradually increased over the years. However, the rate has more than doubled, & possibly tripled in 2018 compared to just 2 years ago. Not all customers are ready for smart automation but, it is clear that they are planning for the future." [JDA]

"G2P is an interesting market. There is a demand for G2P automation from warehouses. Perhaps not so much from the 3PL's as from the own managed warehouses." [Jungheinrich]

The majority of 3PL's remain cautious when it comes to automation investments.

"We supply AGV software & hardware on an OEM basis. Our core is in the software. I think we touch a third of the global AGV market via our partners. Of course the G2P piece is of interest. We are currently working on this with a few of our partners, mainly in Asia." [Kollmorgen]

Warehouse operators have become more pro-active in considering automation options. In particular those involved in ecommerce fulfilment

"Five years ago we started working on floors for AutoStore installations. The sole reason for our company's recent growth has been due to the explosion of robotics in the materials handling industry." [CoGri Group]

However, the success of Amazon FBA and marketplace operators such as Newegg & Rakuten offering fulfilment services appears to have triggered a few 3PL's such as DHL & XPO to invest heavily in G2P.

"We have noticed moves towards urban warehouses where the first 1-2-3 floors is warehouse space and the rest is flats. This is very early stage, but is definitely being discussed." [Savills]

"XPO did a very clever thing with GreyOrange. Yes, it would appear that XPO are trying to emulate an FBA service. However, the general consensus is that FBA is good for starting up a new business but, not scaling it as it becomes costly fast. That is where we can step in." [HighJump]

A perceived low ecommerce penetration in grocery has received special attention

The bulk of new ASRS entrants have targeted various grocery retail business models.



Source: Alert Innovation. Novastore concept illustration

"The use of robotics in new and existing warehouses is expected to boom and the ability for these new technological resources to work with inventory awareness effectively, alongside human capital, is key." [Manhattan Associates, via [Supply Chain Times](#), 2019]

Key events since the 2018 G2P report

- Zalando deploying AMR's in their new NDC in Sweden
- XPO bought 5,000 AMR's with sector exclusivity from GreyOrange
- GreyOrange raised \$140m
- Geek+ raised \$150m
- STIQ estimates that circa 30-40,000 non-Amazon/Kiva AMR's have been deployed globally to date. The majority of deployments have occurred in the Far East with China and Japan the key countries.

Various stages of global market development for AMR's

China, Europe and North America are the three key markets for AMR manufacturers. Kiva Systems' patents has deterred suppliers from entering the North American market up to 2018.

"Part of our work is to develop mathematical models to evaluate ROI on various warehouse automation systems. Due to the absence of AMR's in North America until very recently we have not had reason to develop a solution for this, but we are now working on this." [Fortna]

European customers are slowly converting from POC's to permanent deployments. However, the typical size of deployments tend to be less than 100 AMR's.

The Chinese market is in a league of its own and whilst manufacturers have been

inspired by Amazon and Kiva Systems, many of them have now advanced beyond a single AMR. Chinese suppliers have the benefit of a huge domestic market with extremely high ecommerce growth.

Amazon has been hugely influential in the AMR sector...

Amazon activated the signal for start-up activity in the G2P sector with its Kiva acquisition in 2012. Numerous companies have used Kiva as a source of inspiration for new and exciting robotic systems.

"The team also has made them [AMR's] larger in size so they are able to move actual pallets of product in addition to the smaller drive units that move inventory pods. Today we have more than 100,000 drive units deployed throughout our global fulfilment network." [Amazon via [Source](#)]

... but its influence may be waning

Most of the Chinese & other Asian G2P suppliers have expanded R&D activities of single-function G2P robotics into eco-systems of multiple robotics. See also Market section on China.

AMR's receive a lot of interest but, not much converting into sales yet

"There is definitely a lot of interest in AMR's right now. How much of that interest will ultimately convert is a big question." [Swisslog]

China #1 AMR market by volume

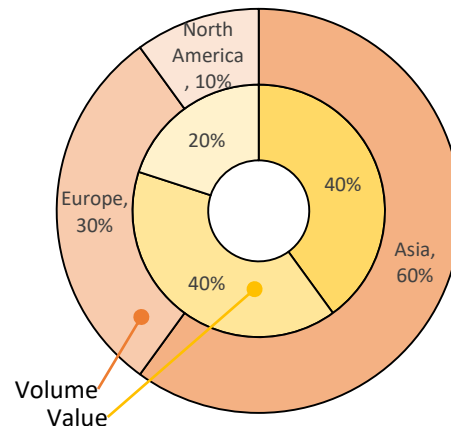
STIQ's interviews suggests AMR pricing in China is circa a third lower compared to international markets. Two main reason have been flagged; a large & fast growing domestic market with a concentration of a few key buyers and intensive supplier competition.

"We have not seen or heard anything of GreyOrange since the XPO deal was announced."
[European G2P supplier]

"We deployed with a 3PL in Poland and have a number of POC's in the European market."
[Geek+]

STIQ estimates the Asian market (China represents the bulk) accounted for circa 66% of global AMR volume, but only 40% of the value in 2018.

The global AMR market (G2P)



Source: STIQ estimates. Excludes Amazon Robotics/Kiva Systems

A single order increased the market by 20%

The GreyOrange and XPO deal has yet to impact dynamics in the 3PL market



Key events since the 2018 G2P report

- Geodis deployed its 175th PA-AMR
- PA-AMR's are competing more and more in industrial applications (competing with a sector traditionally supplied by AGV's). The manufacturing and automotive industry appears to go through an AGV upgrade and shifting towards autonomous vehicles such as PA-AMR's

The material handling sector is highly attractive to PA-AMR manufacturers

PA-AMR's are highly flexible and versatile robots which can be deployed in a number of use cases.

"There has definitely been a lot more of, what you call PA-AMR's, attempting to compete in the AGV sector. This has been more noticeable in the last two years, but has probably been around for longer." [Kollmorgen]

A number of the companies covered in this report admit the revenue share from ecommerce applications is small and that industrial applications are more attractive. However, other suppliers indicate ecommerce is an excellent customer base.

"We currently have 300 robots deployed. This will increase to 1,000 by end of 2019. Our customers are mainly ecommerce and 3PL businesses." [inVia]

"We have a small number of multi-floor deployments. We are not moving heavy shelves so these run on standard mezzanine floors." [Fetch Robotics]

An increasing number of competitors has produced similarities between suppliers



Images: 6 River Systems 'Chuck' on the left vs Gebhardt's 'GridPick' on the right.

Well-funded and willing companies may enter the PA-AMR market in specific use cases



Source: Boxed.com. To STIQ's knowledge the PA-AMR is not offered for sale externally.

The G2P sector remains in a state of flux with innovation and new entrants arriving from disparate sources.

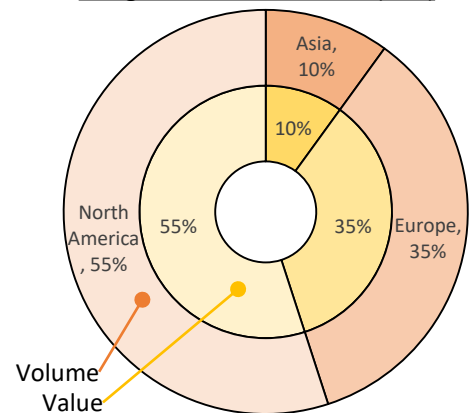
One such source is Boxed.com, a "Costco for millennials". Boxed.com has developed a PA-AMR they refer to as 'Autonomously Driving Vehicles' from off-the-shelf hardware and open-source software.

The cost to Boxed.com for each cart is circa \$6,000 ([source](#)). Whilst this is below general market prices for PA-AMR's it should be noted that the product was developed over a period of 3 months and is unlikely to include any of the advanced features incorporated in professional warehouse PA-AMR's and may also exclude various certification.

PA-AMR is a global market; ecommerce application North America & Europe

STIQ estimates the PA-AMR market is concentrated to North America and Europe.

The global PA-AMR market (G2P)



Source: STIQ estimates



The grocery sector has largely shaped the G2P ASRS segment

Shuttle providers increasingly aiming for the G2P market



Key events since the 2018 G2P report

- Ocado & AutoStore appears to have buried the hatchets and Ocado ordered an installation from AutoStore to manage ambient products
- Plenty of movement by traditional shuttle manufacturers moving into mini-loads to compete with G2P
- Walmart and Alert Innovation partnered to develop a [presumably] competing system to Ocado
- Takeoff and Knapp partnered to create a grocery store
- Some of the click & collect locker suppliers are actively developing products for the warehouse sector

ASRS systems compete head on with the more traditional shuttle systems

G2P ASRS solutions in this report compete head on with ASRS shuttle systems. Shuttle manufacturers have created scale-down products in order to compete with G2P ASRS solutions.

"In my experience from the Nordic markets it is mainly own-operators who buy into AutoStore and similar systems. For us, as a 3PL, flexibility to allow us to serve customers with wholesale capacity as well as consumer capacity was more important. That is why we bought two shuttle systems recently." [PostNord TPL]

Online grocery warehouse fulfilment appears to have adopted ASRS

Online Grocery retailers have adopted ASRS as its choice of fulfilment automation as these systems are more suited to perishable goods and storage in three different temperatures (ambient, chilled and frozen).

Ocado was one of the first systems targeting the grocery segment and is currently the leader in online grocery fulfilment, however, there is increasing competition in the specialist segment.



Source: Takeoff Technologies & Knapp has partnered

For example, Knapp (a shuttle manufacturer) has partnered with Takeoff Technologies for an integrated grocery store format being trialled by Ahold and both Opex and Dematic offers systems directly targeting online grocery fulfilment.

Alert Innovation has developed Alphabot in collaboration with Walmart and developed grocery store concepts such as Nova Store.

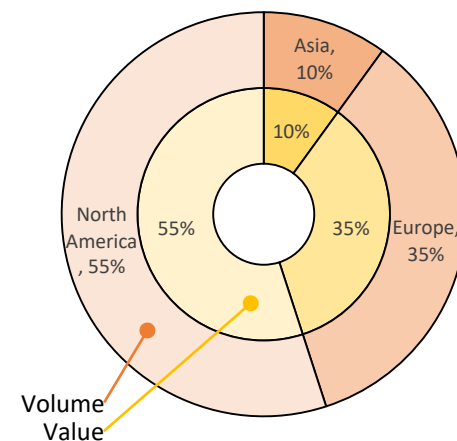
The nascent nature of the sector means previously unknown issues may surface

"We are just about starting our third AutoStore expansion. By the end of this we will have more than 300 robots. At this scale we are experiencing that it takes longer time to retrieve products, despite using chaos inventory control. However, AutoStore have just released their Black Line which may improve this." [Boozt]

ASRS is a global market but, key customers in North America & Europe

STIQ estimates the ASRS market is concentrated to North America and Europe.

The global ASRS market (G2P)



Source: STIQ estimates. The ASRS systems covered in this report

G2P -> G2R

‘Goods to Robot’ robotics

Picking robots have a wide application, part of which is combined with G2P or G2R systems

STIQ are planning a picking robotics report in the near future. Sign up to our newsletter to get a first hand copy [here](#)



Sample vendors of picking technologies

The ‘arms race’ for picking robots

An increasing proliferation of G2P robotics and individual picks from totes and/or boxes have led to significant developments in picking technology.

Both Amazon and Ocado have organised separate annual competitions for picking technology companies for some time to gain access to new developments.

Leading robotic arms manufacturers such as ABB, Universal Robotics and Fanuc have either invested in or partnered with start-ups.

“Picking robotics is the holy grail. We have tested several systems but none are really there yet. It is likely to happen, but when? In 2-3 years or in 5 years... perhaps?” [Boozt]

There may be an emerging view that ASRS suppliers should be responsible for the picking as this closely relates to ASRS’.

“We were told by a global top 3 logistics provider that picking robotics should be a responsibility of ASRS suppliers due to the high level of integration.” [RoVi]

Software and/or hardware?

Recognising and knowing how to pick as disparate items as lipsticks, t-shirts and home interior is an inherently complex task currently employing the brains from companies such as Fizyr, Osaro, Kindred, RightHand Robotics, and Soft Robotics.

“Every item in a warehouse is touched between 4-11 times. There is huge potential for combining G2P and picking robots.” [Righthand Robotics]



Source: RightHand Robotics

“There is plenty of action on the picking robotics scene. However, for me there is a question about the business case. The cost per pick is very small and how do you create a business model from that? In my view the technology is not really here today and I think it may take another 3-5 years for it to develop.” [Anonymous]

These companies have approached the picking problem from several directions. Some are working on AI & ML software (Osaro, Fizyr) using standard grippers from the articulated robotic arm manufacturers. Others have approached the problem from a material science direction (Soft Robotics) whilst others have taken a hybrid approach (RightHand Robotics). Note that Mick Mountz, founder of Kiva Systems, recently joined RightHand Robotics.

“We are talking to suppliers and trying picking robots. However, our products vary wildly and we have not yet found one that does it for all our products. The best thing would be if someone copied a hand to pick with.” [John Lewis]

“Picking robotics still have some way to go. When I am talking about picking robotics I mean those that can recognise different products and grab them safely, etc.” [Ryder]

However, a few suppliers have managed to generate significant revenue on picking (+) technology.

“We have multiple installations in North America. Some of these are \$10m+ deployments. Our solution is item picking and sequencing of the outbound orders, which creates efficiencies further downstream.” [Berkshire Grey]

On a technical level, calculating ROI is straight forward...

At a top level it is easy to calculate ROI for G2P as performance characteristics and costs are known; and when there are no other solutions involved.

"On a two-shift basis customers get a return on investment in under two years." [G2P Supplier]

"Our customers can achieve ROI in single digit months." [Takeoff]

... however, in ROI includes multiple variables, system benefits & the business model

However, to get a fair picture of ROI it is often necessary to contextualise a potential new solution in its environment, taking into account business models, etc.

Introducing a new G2P system may have additional benefits in a warehouse ecosystem. The business case may also take into account external factors, such as availability of labour, access to main transportation routes, etc.

"RoI and suitability is simple on a technical level. Shuttle systems are high performance and AMR's are flexible with a lower infrastructure investment. However, when you get into customer's business models and how they want to operate it quickly becomes a more complex evaluation." [Swisslog]

"We distinguish between ROI and Business Case analysis. In our ROI analysis we found that PA-AMR's may be best deployed in opportunistic replenishment vs picking applications. But this does not include limiting factors, such as access to labour" [Fortna]

Potential clients often hire consultants to evaluate systems

"We employed a consultant to show us the various different automation options. We brought our KPI's, variables and requirements. AutoStore was the solution that came out on top." [Boozt]

Other prefer to keep evaluation and ROI calculations in-house. Some businesses may also have other business objectives which may play into plans.

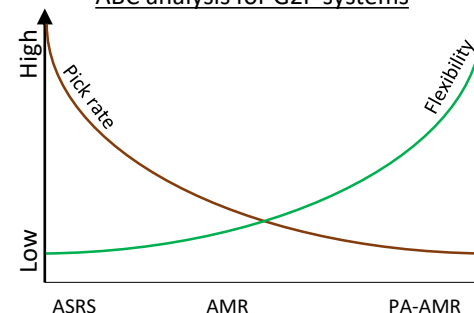
"Robotics is not all about replacing people, but also replacing highly repetitive processes and redeploying human capital into more interesting work." [John Lewis]

Suitability of the various G2P systems vary by business model

Suitability of a particular system in a ecommerce fulfilment business model relies on numerous different variables.

A sample KPI is Picks Per Hour. AutoStore's new Black Line (combined with the new picking area) achieves circa 600 picks per hour whereas a PA-AMR may improve human picking rates by 2-3 times.

ABC analysis for G2P systems



"We make recommendations to our clients on which automation systems they should implement based on our analysis. Flexibility, our experience with the company & the team and the potential for synergistic advantages are some of the more important aspects we look at. Cost is layered in at the end, but does not form a part of the evaluation itself." [Fortna]

SKU volume and inventory depth play an important role

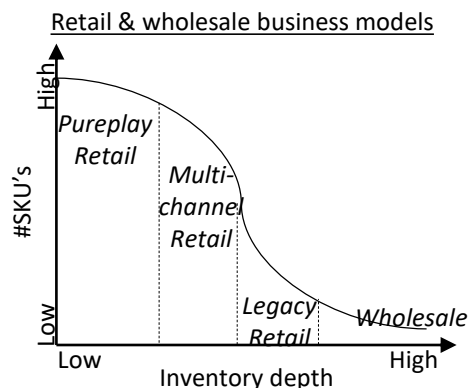
Pureplay retailers tend to keep a low inventory count of each SKU, allowing them to display a very wide range of products online.

Legacy retailers require a good depth of products to display on shelves and for replenishment.



Selecting a G2P system is not a straightforward process

Numerous variables play into how to operate a warehouse with automation



The chart above is a wide generalisation which works well to showcase the extremes of pureplay vs wholesale business models.

A pureplay retailer may favour a higher throughput and pick rate whereas a wholesale business may favour a collaborative solution which assists its pickers.

In the ecommerce world, fast movers can suddenly become slow inventory & vice versa

Conventional wisdom would have it that bestsellers should be placed closer to pick & processing than slower moving inventory.

Optimised inventory management may include dispersed inventory to ensure multiple concurrent picks of the same SKU.

“Flexibility of the system is key. What is a 3PL going to do with the system after their client contract has run out after 1-2 years? How do you provide flexibility?” [STILL]

Flexibility may be very important, especially for fast growing merchants and 3PL's where warehouse layouts can change quickly and frequently.

“The main pain points for robotics at the moment [in India] is access to capital, RoI, lead time to integrate which can take 6-12 months if not more. Our warehouses are also changing a lot so a permanent installation would not make sense. Reliability is also a huge issue. We require >99.95% uptime.” [Flipkart]

Some warehouse operators take robotics into account up front when evaluating locations

STIQ's interviews suggest that whilst many warehouse occupiers currently review a number of local factors to determine the best location, only a few have expanded factors to include automation factors.

Wider evaluations including automation factors may be related to future-proofing a particular warehouse location rather than a current requirement.

“Occupiers already evaluate unemployment rates to decide new warehouse locations. There is increasing evaluation of other factors, such as power supply. Just imagine peak power requirements for a warehouse with 4,000 robots and a number of electric delivery vehicles.” [Savills]

Continued innovation in the robotics market has produced ecosystem suppliers...

“We would classify our solutions as goods-to-robot rather than goods-to-person. We make use of multiple conveyance technologies in our solutions from conveyor based systems to mobile robotics to engineered shuttle infrastructure.” [Berkshire Grey]

... the market is still nascent; users and suppliers recognise new ways of looking at ROI

“Interestingly, we have started thinking differently about our pick faces now that we do not have to think about the transportation to the processing/staging area. At the moment we have not made any changes but it has definitely had a number of us thinking about the processes.” [Ryder]

“At this stage it is premature to talk about pricing. Our first pilot with the most advanced architecture on the market is operational now. Making it the most reliable and cost-effective are our key priorities right now.” [Alert Innovation]

PROFILES

AMR

Partnerships can be very helpful to drive business

GreyOrange provided exclusivity to XPO in exchange for a large order; Swisslog acts as an integrator and supplier of robotics



Capabilities

- Butler; AMR and picking arm
- Package sorting machinery

Organisation

- Head office in Singapore, 2X offices in the US (Atlanta & Boston)

Deployments/Clients

- Butler: XPO, Unilever, Sodimac, Flipkart
- Sorting: Amazon, Flipkart, DHL, Delhivery
- n/a: DTDC, Pepperfry, Myntra, Aramex, GoJava

Primary Sectors

- 3PL, ecommerce

Financials

- Estimated revenue in excess of \$100m in 2019 on the back of XPO deal
- Raised \$175m (latest, Series C, Sep 2018, \$140m) from investors including Blue Ventures, Mithril Capital Management, Flipkart, Tiger Global Management

Strategy

- Partnership with XPO means company has to shift new business activity on non-XPO competitors in key territories
- The North American and European markets are key focus in the short term. In Aug 2018, the company announced it is looking to deploy 20,000 AMR's in the North American market in the next 3 years ([source](#)) and have employed an ex-Honeywell MD to grow the business



Goods-to-Person



Autonomous Picking



Sorting System



Capabilities

- Shuttle
- AMR, Carrypick
- AutoStore reseller & integrator (160+ installations)

Organisation

- Swisslog is part of the KUKA/Midea group

Deployments/Clients

- Multiple

Primary Sectors

- Logistics, medical

Financials

- Swisslog was acquired by the KUKA Group in 2014 for \$357m

Strategy

- Swisslog has partnered with AutoStore as a reseller and integrator
- Swisslog announced in mid 2018 that it was putting more effort into developing its Carrypick range ([source](#)). Previously the group distributed Grenzebach's AMR



Capabilities

- Bobby; AMR, max 600Kg's

Organisation

- Based in France

Deployments/Clients

- 30 customers including: Rhenus Logistics (15 AMR's, 520 shelves, €0.5m), Decathlon (60 AMR's + 8 stations), The Idéa Group, ShopHair, Wesco, L'Oreal, Gemo, Orderwise (Unified Commerce)

Primary Sectors

- Ecommerce, retail, industry

Financials/Metrics

- Raised \$1.7m in 2015 and cashflow positive (2018, 2019)
- 40 employees (company)

Strategy

- Primary focus is on the pan-European market, but the company has also deployed in Asia
- Software is an important piece of the solution with a WCS as well as a RMS
- Recently opened a new facility capable of producing 2,000 robots per year. Already looking at expanding this



PROFILES

AMR

Three suppliers account for 90% of the Chinese AMR market

There are huge price pressures in the Chinese domestic market; a broad range of robots is paramount to meet customer demand but add costs; overseas expansion a natural development



Capabilities

- 4X AMR's with various weight capacity, called LMR's (Latent Mobile Robots)
- 2X Conveyor robots
- 1X package sorting robot
- 3X Forklift robots
- Heavy duty robot <3tns
- AGV with in-built arms

Organisation

- "Hikrobot" (Hangzhou Hikrobot Technology Co., Ltd) is a division/subsidiary of Hikvision, a company specialising in vision technology and factory/logistics automation
- Group HQ based China with offices in 30+ countries

Deployments/Clients

- n/a (for Hikrobot)

Primary Sectors

- Warehouse, automobile, industry, medical, tobacco, clothing, F&B, 3PL

Financials/Metrics

- Group revenue \$7.3bn in 2018

Strategy

- Machine vision is the company's core activity
- "Providing Eyes and Legs for factory/logistic automation"



Capabilities

- AMR +

Organisation

- China office, in expansive phase now
- Company name: Beijing Jizhijia Technology Co., Ltd

Deployments/Clients

- Deployed >7,000 robots (Nov 2018) throughout China, Hing Kong, Singapore, Australia, Japan, Taiwan, US and Europe
- 30+ clients including HKTVMall, China Post, Cainiao

Primary Sectors

- Ecommerce, logistics, automotive, pharmaceuticals

Financials

- Raised \$239.4m (latest series B, \$150m, Nov 2018) from investors including Warburg Pincus, Volcanics Ventures, Vertex Ventures China and Gaorong Capital
- Estimated revenue \$65m in 2018

Strategy

- Strategic focus on international expansion in Europe, Middle East and North America (US in particular)



Capabilities

- 2X AMR's; M60, max 600Kg's + M100, max 1,000Kg's

Organisation

- China office
- AKA Flashhold

Deployments/Clients

- Deployed >5,000 robots (Feb 2019)
- Cainiao, Tmall (200 AMR's), VIP.com, JD.com, Lazada & Malaysia Post, Rokin Logistics (CJ), China Post, CML, Alibaba (Box Ma Shengsheng, offline supermarkets), Sinopharm, Shanghai Pharma, State Grid, Greatoo, UR (25 AMR's), La Chapelle

Primary Sectors

- Ecommerce, Pharmaceutical, Grocery, Industrial

Financials/Metrics

- Raised \$36.3m (latest, Series B, \$29m, Mar 2017) from investors including Cainiao, Softbank Ventures
- 300 employees in 2018 (60 in 2015)

Strategy

- Expanding into Europe & US in 2019



PROFILES

AMR

A number of Chinese companies have only targeted the domestic market

There is potential for increased competition in North America and Europe as the Chinese market saturates;



Capabilities

- iWR500; AMR capacity 500Kg's,
- ARES1300; autonomous forklift with capacity of 1.3t

Organisation

- Based in China
- Acquired by Megvii (Face++), one of China's largest AI companies in Apr 2018

Deployments/Clients

- Baby Tree, Kejie Logistics, Foxconn (100 AMR's), P&G, Ningbo Shunshi Jinzhi Technology,

Primary Sectors

- Ecommerce, 3PL, industrial, automotive

Financials/Metrics

- Single largest deployment to date is 500 AMR's
- Estimated lifetime deployments >3,000 robots

Strategy

- Targeting the domestic Chinese market and widening the range to offer a full logistics system
- The parent company, Megvii (backed by Alibaba) was considering a potential IPO in Hong Kong according to Bloomberg reporting in Jan 2019 ([source](#))



Capabilities

- 4x AMR's 10, 500, 700 and 1,300Kg's
- 1x AMR Conveyor

Organisation

- Based in China

Deployments/Clients

- n/a

Primary Sectors

- Ecommerce

Financials/Metrics

- 20 employees (LinkedIn)
- 3 co-founders, including a VP at Cathay Capital PE (China)

Strategy

- One of the few AMR suppliers with an AMR incorporating mecanum wheels



Capabilities

- AMR; two regular duty robots; one 500Kg's and one 1,000Kg's
- Picking bay, Software

Organisation

- Previously known as 'Bleum Robotics', now spun out from the Bleum brand
- US office with R&D in Shenzhen, China

Deployments/Clients

- A number of deployments in Europe and the US with a healthy pipeline of projects

Primary Sectors

- Ecommerce, 3PL, industrial

Financials/Metrics

- 11 employees (LinkedIn)

Strategy

- The only US-based AMR supplier
- Prime has recently consolidated its R&D to Shenzhen and have expanded production capabilities



PROFILES

AMR

AMR hybrids are developing alongside pure AMR's

Eiratech has developed the Eiracube (a store) and others target the grocery sector



Capabilities

- OP1, reach <3.5m, max load 30Kg's, driving speed 1.5m/s, Li-ion battery life 8hrs, forklift grabber
- BB2, reach <40cm (first shelf level), max load 30Kg's, driving speed 2.5m/s, Li-ion battery life 8hrs, forklift grabber. Delivers totes to picking/staging area

Organisation

- Based in Israel

Deployments/Clients

- Bergen Logistics, 1x US client, 1x European 3PL client

Primary Sectors

- Ecommerce, Industrial

Financials/Metrics

- 33 employees
- Raised capital from primarily angel investors including Gigi Levy

Strategy

- Distributors include Viastore Systems (Europe) based in Germany (a global top 20 shuttle manufacturer) and ST Engineering (Asia)



OP1



BB2



Capabilities

- A hybrid set-up targeting the grocery vertical
- CPS (Curbside Pick-up System) for grocery click & collect orders incorporating AMR's

Organisation

- Offices in the US & Greece

Deployments/Clients

- At prototype stage

Primary Sectors

- Grocery

Financials/Metrics

- 15 employees (LinkedIn)
- Raised funds from Odyssey Venture Partners (backed by EIF)

Strategy

- Three patents pending



Capabilities

- Eirasystem; G2P, moving pods to person
- Eiraparts; industry 4.0
- Eiracube; B2C, to be used in-store
- Launched its latest AMR robot version 'Generation 5' in July 2017. Gen 5+ will work among people and is currently in trials to be released in mid-2019

Organisation

- Eiratech is incorporated in Ireland

Deployments/Clients

- Four commercial clients + a number of trials

Primary Sectors

- Ecommerce & multi-channel retailers, 3PL's

Financials/Metrics

- Raised \$5.3m; backers: Alexandr Boyko, Enterprise Ireland
- 34 employees (LinkedIn)

Strategy

- Jan 2019, part of EIT Digital Accelerator (EU)
- Developing and testing fleet management capabilities within the Eirasoft RMS to manage both own and 3rd party AMRs & AGVs



PROFILES

AMR/PA-AMR

A number of new German suppliers in the market

Various approaches to G2P solutions; Grenzebach offering the widest range of the new German competitors



Capabilities

- AMR
- Tugger
- Forklift; AGV

Organisation

- Based in Germany

Deployments/Clients

- n/a

Primary Sectors

- Various industrial
- Targeting warehouse & material handling industries with G2P range

Financials/Metrics

- Estimated revenue \$480m in 2018

Strategy

- Ex-supplier to Swisslog



Capabilities

- Wide range of interior material handling technologies including conveyors, stacker cranes, shuttle ASRS, SimplePick picking stations, goods lifts
- Karis; Autonomous AGV
- GridPick; PA-AMR (pictured below)

Organisation

- Based in Germany with offices in the US, Poland and Austria

Deployments/Clients

- n/a

Primary Sectors

- Any materials handling

Financials/Metrics

- The company states they have 500 employees (website Feb 2019)

Strategy

- n/a



Capabilities

- Storojet; a tugging AMR working similar to a multi-storey car park in architecture; pulling a sled with totes on top

Organisation

- Based in Germany
- Storojet is developed and sold by ICO Innovative Computer GmbH

Deployments/Clients

- n/a

Primary Sectors

- Retail, ecommerce, warehouse

Financials/Metrics

- 19 employees (LinkedIn)

Strategy

- DACH market focus



PROFILES

PA-AMR

PA-AMR suppliers with gripping mechanisms

Primary tote/box grabbing technology used is vacuum/ suction



Capabilities

- 1x PA-AMR with lift and suction grabber mechanism to gather totes or paper boxes containing products for delivery to & return from pick/processing area. Capability to carry <20Kg's

Organisation

- Based in California, US

Deployments/Clients

- Hollar.com, Rakuten Super Logistics (3x locations), LD Products, Tobi
- 300 robots deployed to date. This will increase to 1,000 by end of 2019

Primary Sectors

- Ecommerce warehouse

Financials/Metrics

- Raised \$29m (latest; Series B, Aug 2018, \$20m) from investors including Embark Ventures, Upfront Ventures and Point72 Ventures
- 58 staff
- 9 patents

Strategy

- Only RaaS model
- Rakuten Super Logistics will be expanding with inVia as a partner
- Focus on the US market, software development



Capabilities

- IAM Swift, a PA-AMR with articulated arm & picking mechanism (suction)
- IAM Flash, a solution for product photography and advanced merchandise data collection, such as dimensions, etc.
- IAM Swiftlink, software

Organisation

- Based in Pittsburgh, USA
- IAM's current CEO, Joel Reed, joined the company in Aug 2017 (CEO, Aug 2018)
- Appointed Joe Nentwig (ex-Intelligranted & Quiet Logistics) as VP of Sales in 2018

Deployments/Clients

- Rochester Pharmacy Corp

Primary Sectors

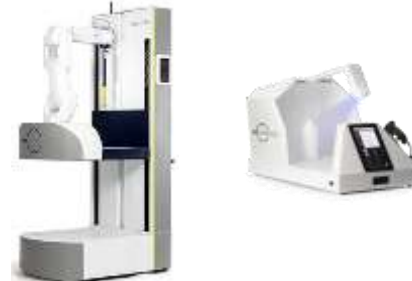
- Pharmaceutical, FMCG/CPG

Financials/Metrics

- Raised \$21m (latest; Venture Round in Nov 2018, \$20m) from investors including KCK, Innovation Works, Fusion Fund, and Comet Labs

Strategy

- The company launched its flagship product for general sale in 2018
- Announced partnership with DB Schenker in Oct 2018 ([source](#))



Capabilities

- Toru; specialist footwear (boxes), carries up to 16 boxes at any one time, suction grabber, height reach 8-250cm's, 8hrs running time
- Soto; industrial applications, operational up to 18hrs/day

Organisation

- Based in Germany

Deployments/Clients

- Fiege, DHL, Swisslog, SigLoch, BMW, ITG Logistics

Primary Sectors

- Footwear ecommerce warehouse, Industrial

Financials/Metrics

- Increased staff to 75 in Feb 2019 from 66 in 1Q18 (LinkedIn)
- Raised \$25.4m (latest; Series A, Feb 2018, \$24.8m) from investors including HTGF, EIT Digital Accelerator, Siemens (Next 47), Zalando, Koerber Group

Strategy

- Advisory board members from companies including Fiege (3PL), Koerber, ODU, VDI, Exaleap, Next47 (Siemens investment vehicle)



PROFILES

PA-AMR

Boston, US is a robotics melting pot

Numerous PA-AMR and AGV suppliers in the area; many with ex-Kiva employees on the payroll



Capabilities

- Chuck & Chuck+; 2X PA-AMR, payload 73Kg's, multiple & flexible options to adjust for business case

Organisation

- Based in MA, US
- A quarter of the organisation is ex-Kiva

Deployments/Clients

- >300 robots deployed at >30 clients, including Act Fulfilment, Healing Hands, Medline, Bleckmann, DHL, XPO, Office Depot and Lockheed Martin

Primary Sectors

- Ecommerce, 3PL, Manufacturing, Retail

Financials/Metrics

- Raised \$46m (latest, Series B, Jan 2018, \$25m) from investors including Menlo Ventures, Norwest Venture Partners, Eclipse Ventures and iRobot Corp
- 133 employees (LinkedIn)
- 3 co-founders (incl. 2 ex-Kiva Systems)
- 2 patent applications

Strategy

- Focusing on North America and Europe
- Increasing the use of robotics to include replenishment and other orchest



Options



Capabilities

- TM100; PA-AMR, adjustable permanent height from 12-60cm's, mechanical/vacuum/lifting grippers. Workflow is designed to deliver & collect picking totes to/from aisles for pickers
- Material handling software

Organisation

- Based in Boston, US

Deployments/Clients

- Initial deployments in logistics and manufacturing

Primary Sectors

- Warehouse, ecommerce

Financials/Metrics

- Raised \$2m (latest, Seed, Jul 2017, \$1.5m) from investors including Portfolia. Board member from Golden Seeds/Supply Chain Ventures
- 2 patents granted
- 11 employees

Strategy

- Signed reseller agreement with Hy-Tek Material Handling in Dec 2018



Capabilities

- LocusBot; PA-AMR, payload max 18Kg's, speed 1.4m/s, battery operation 14hrs
- LocusServer; RMS integrated with HighJump, UPP, JDA & Manhattan Associates
- LocusView; Locus system status view
- LocusManager; mobile app

Organisation

- Based in MA, US
- Spun-out from Quiet Logistics (ex-Kiva Systems customer)

Deployments/Clients

- Multiple deployments (>20), including DHL Supply Chain, Quiet Logistics, GEODIS (175 bots), Port Logistics, Radial, Barrett Distribution

Primary Sectors

- Ecommerce, 3PL, Warehouse

Financials/Metrics

- Raised \$33m (latest, Series B, Nov 2017, \$25m) from investors including Scale Venture Partners (also invested in Soft Robotics), Quiet Logistics

Strategy

- RaaS model



PROFILES

PA-AMR

A number of suppliers target niche audiences

Vecna has produced a range of AGV's whereas Siasun which is known for its articulated robotic arms has added an AMR. Sirius appears to have developed a PA-AMR into a designer product



Capabilities

- Retriever; PA-AMR, 10 load locations; capacity 500Kg's
- Pallet Jack; capacity 3.6t's, speed 2m/s
- Conveyor; capacity 500Kg's, speed 2m/s
- Tugger; capacity 4.5t's, speed 2m/s
- User interface (picking assistance)

Organisation

- Based in MA, US
- Vecna Robotics was spun out from Vecna Technologies in 4Q18 in a deal backed by Drive Capital
- Dan Patt, the new CEO, joined in 2018

Deployments/Clients

- Multiple, including Milton CAT

Primary Sectors

- Industrial, warehouse

Financials/Metrics

- Raised \$13.5m (latest, Venture, Aug 2018, \$13.5m) from investors including Drive Capital
- 77 employees (LinkedIn)

Strategy

- Focus on North America, industrial applications



Capabilities

- 1x PA-AMR (AVG limited range – not included in the report)
- Wide range of robotics

Organisation

- Based in Shenzhen, China
- Siasun Robotics & Automation is a listed company [300024.SZ]

Deployments/Clients

- Multiple

Primary Sectors

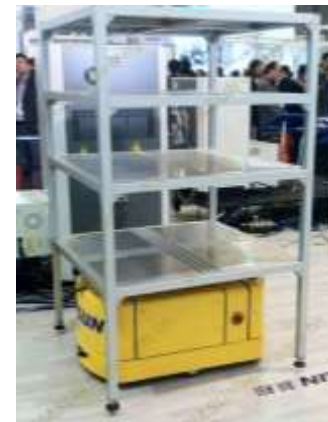
- Multiple

Financials/Metrics

- The Siasun group posted revenue of CNY2.4bn (c. \$360m) in 2017, up 20.6% from 2016

Strategy

- The strategy of the company is to offer robotics of any kind, in the home and in manufacturing as well as ecommerce and warehousing



Capabilities

- PA-AMR (Released Nov 2018 – available from May 2019); priced at CNY 98k (c. \$14.2k) ([source](#)), 10hrs operation, speed 1.2m/s, 50Kg's payload

Organisation

- Based in Shenzhen, China
- GM is ex-Alibaba Robotics product manager

Deployments/Clients

- JD Logistics

Primary Sectors

- Warehouse, 3PL, Ecommerce

Financials/Metrics

- Raised \$1.2m (latest Seed) from investors including FutureCap
- Circa <10 employees (STIQ estimate)

Strategy

- A limited 100pcs will be available to Chinese customers. Its commercial viability and suitability for a live environment is still to be confirmed
- Product design appears an important part of Syrius product



PROFILES

PA-AMR

Industrial use cases are common among some PA-AMR's

A number of PA-AMR's overlap with ecommerce warehouse applications; primary applications are industrial & material handling use cases



Capabilities

- Fetch provides PA-AMR's for a number of applications:
- HMIShelf; for moving goods between pick and processing locations
- Mobile conveyor/roller-top
- Cart Connect; tugging robot
- Freight 500 & 1500; for larger payloads such as pallets
- FetchCore; software for managing and orchestrating robotics
- There are also options for adding functionality such as RFID readers for inventory checks, articulated arms for picking, etc.

Organisation

- US office

Deployments/Clients

- "A few dozen" including Ryder, RK Distribution, DHL and Framebridge

Primary Sectors

- Ecommerce, warehouse

Financials

- Raised \$48m (latest series B, Dec 2017, \$25m) from investors including Shasta Ventures, Softbank and Sway Ventures

Strategy

- In October 2018, Fetch and Honeywell Intelligrated announced a partnership whereby Honeywell will resell/offer Fetch PA-AMR's to its customer base ([source](#))



Capabilities

- MiR100, 200, 500; 3X PA-AMR's, payload 100/200/500Kg's. MiR 100 & 200 can be converted to towing robots

Organisation

- Acquired by Teradyne [NASDAQ:TER] in 2018. Operates as a separate company within division of other robotics companies

Deployments/Clients

- Multiple including Visteon,

Primary Sectors

- Industrial & manufacturing is the primary client base. Ecommerce represents a relatively small share

Financials

- \$31m revenue in 2018, up from \$12m in 2017

Strategy

- Expanding product assortment to enable plug & play capabilities within different client types. MiR increased its range to 30 from 14 products between 2017 and 2018
- Introduced heavy duty robot in 2018, carrying 500kg's
- Distribution business model; no direct to end-user internal sales company. Fully focused on product development



MiR-100



MiR-200



MiR-500



Capabilities

- PA-AMR; 3D vision, flexible set-up

Organisation

- Based in CO, US

Deployments/Clients

- n/a

Primary Sectors

- Manufacturing, warehouse, ecommerce, logistics

Financials

- Raised \$15m (latest, Series A, Dec 2017, \$15m) from investors including Xplorer Capital, AME Cloud Ventures, Morado Ventures, Playground Global (also invested in CommonSense and Righthand Robotics), Visionnaire Ventures and Heroic Ventures
- 45 employees (LinkedIn). 14 open positions Feb 11, 2019 (website)

Strategy

- Focus on North America



PROFILES

PA-AMR

The unknown quantities...

Companies with a single product



Capabilities

- 1X PA-AMR

Organisation

- Based in India

Deployments/Clients

- n/a

Primary Sectors

- Warehouse

Financials/Metrics

- 6 employees (LinkedIn)

Strategy

- n/a



Capabilities

- Mark 1; PA-AMR, 6 bins, payload 20Kg's/bin, speed 1.2m/s, 6hrs operation
- Mini; PA-AMR, 1 bin, payload 50Kg's, speed 1.2m/s, 12hrs operation
- Mark 2; PA-AMR for pallet load, payload <1t's, speed 0.8m/s, 8hrs operation
- ARK Sorter; arm-based sorting system (launched Sep 2018)

Organisation

- Based in India

Deployments/Clients

- n/a

Primary Sectors

- Warehouse, 3PL

Financials/Metrics

- 10 employees (LinkedIn) – a decline from 11 in the 2018 G2P report

Strategy

- STIQ's view: The company may be an OEM supplier or IP licensor as there has not been any significant change in staff numbers or [available] products. The introduction of a sorter looks as if the company aims to become a GreyOrange. There are no photos of Mini or Mark 2 available on the website



Capabilities

- Single PA-AMR for tugging shelving units

Organisation

- Based in the UK

Deployments/Clients

- DK Fulfilment (DKF) Ltd

Primary Sectors

- 3PL/ Warehouse

Financials/Metrics

- 6 employees (LinkedIn)

Strategy

- Appears to be a spin-out from Imperial College, London, UK



PROFILES HYBRIDS

Hybrids emerging from a variety of directions

Interesting new
developments popping up
from stealth and internally
from unrelated businesses



Capabilities

- Retrofit robotic track; the track is retrofitted on the front of warehouse racking
- SqUID; a hybrid AMR robot which can also climb up existing warehouse infrastructure (racking or similar) on a retrofitted track. Suction grabbing mechanism is used to capture boxes and totes for delivery to and from a processing, picking or packing location

Organisation

- Founded in 2014, based in Israel with presence in the US

Deployments/Clients

- Two planned pilots

Primary Sectors

- Warehouse

Financials/Metrics

- Pre-revenue
- 5 employees (LinkedIn)

Strategy

- Pilots, US market



Capabilities

- AVG which is moving according to a floor-marked route ([source](#)). Using Mecanum wheels

Organisation

- Based in the US

Deployments/Clients

- In-house, planned to deploy 40 PA-AMR's in 2018 ([source](#))

Primary Sectors

- Grocery, FMCG/CPG

Financials/Metrics

- Boxed is primarily a retailer/whole seller of FMCG/CPG
- Raised \$243.6m (latest, Series D, Aug 2018, \$111m) from investors including AEON, CDIB Capital, Alpha Square Group, GGV Capital, Vaizra Capital, Light Street Capital and Safra Partners
- Each PA-AMR costs \$6,000 to make and is produced from off-the-shelf products
- 216 employees (LinkedIn)

Strategy

- Similarly to Ocado, Boxed has taken the approach that they can create automation in-house best. It remains to be seen if Boxed will start offering the robots (AVG's) on the open market any time soon



Capabilities

- Perfect Pick; introduced in 2015, encapsulated ASRS shuttle system with 15 iBots per system, <400 picks/hr
- Perfect Pick HD; introduced in 2017

Organisation

- Based in the US with global offices

Deployments/Clients

- Newegg (4 picking stations, 4,400 SKU's in 3,500 totes, 30 iBots), Hudson Bay Corporation, BHFO.com, iHerbs,

Primary Sectors

- Ecommerce

Financials/Metrics

- 1,000 employees in 2015
- Revenue estimates at \$1bn

Strategy

- Opex has traditionally manufactured mailing room and document management equipment (similar to Pitney Bowes) and released its Perfect Pick product in 2015



PROFILES

ASRS

Cube storage is highly space efficient and has gained traction

A trend towards high space utilisation for online grocery fulfilment; new business models emerging



Capabilities

- Cube ASRS system, new hardware robotic version "Black Line" released in Jan 2019

Organisation

- Majority stake (82%) acquired in 2017 by Nordic PE group EQT Partners

Deployments/Clients

- 300+ deployments globally
- ActiveAnts, Puma, Boozt, Asda, Parts Town, Lufthansa, Varner Retail, Yusen Logistics, Avnet, Ocado

Primary Sectors

- Ecommerce warehouse

Financials/Metrics

- FY18 revenue NOK1.2bn

Strategy

- AutoStore focus on R&D of the ASRS product. Installation & integration is executed by partners such as SwissLog and Element Logistics
- Partners include Element Logistics, AM Automation, Swisslog (KUKA), Hormann Logistik, Bastian Solutions (TICO), Dematic (Kion), LG CNS, Okamura, Alstef
- Larger totes are being launched in 2019 to compete with shuttle systems and widen the addressable market
- Black Line achieves up to 600 picks per hour compared to c. 250 for Red Line



Capabilities

- Cube storage system

Organisation

- Ocado Technology is a division of Ocado Plc [LON: OCDO]

Deployments/Clients

- Sobeys, Morrisons, Casino, Kroger, ICA, BonPreu

Primary Sectors

- Grocery

Financials/Metrics

- 2018 revenue £1.6bn, up 12% on 2017. Solutions (Ocado Technology) revenue £123m, up 16% on 2017
- Kroger will spend \$55m on building the first Ocado Tech shed in Ohio ([source](#))

Strategy

- Ocado Technology has become a separate division of Ocado which sells (or leases out) the technology to grocers
- The company spends significant amounts on R&D
- Outsources manufacturing of its robots to Tharsus, a UK company



Note: At the time of our interview request Ocado experienced a fire at one of its automated warehouses in the UK ([source](#)) and declined to take part



Capabilities

- Partnered with Knapp shuttles to create robot powered local grocery warehouses

Organisation

- Based in MA, US

Deployments/Clients

- Six customers, including Sedanos, Albertsons, Ahold Delhaize and Wakefern Food Corp.

Primary Sectors

- Grocery, FMCG/CPG

Financials/Metrics

- Raised \$65m (latest, Series B, Nov 2018) from investors including IGNIA, Forrester Capital (among 10+ investors)
- 140 employees (website) with 9 open positions (Mar-19). Plans for 200 employees at end of 2019

Strategy

- Creating local online fulfilment grocery warehouses utilising partnerships with technology providers, such as Knapp
- Will have 15 sites live in 2019 with another 75 in 2020



PROFILES

ASRS

A perceived low online grocery penetration has attracted players

Plenty of experimentation with robotics in the grocery space; pivoting towards store-based deployments



Capabilities

- Alphabot, a 'true 3D' ASRS robot for deployment within grocery stores (initial use case)
- One feature of the system is the possibility to add multi-floor picking areas

Organisation

- Based in Boston, USA
- Started in 2013 by John Lert, the founder of CasePick Systems (acquired by Symbiotic), and Bill Fosnight

Deployments/Clients

- Walmart

Primary Sectors

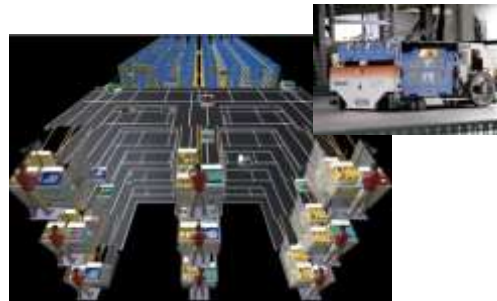
- Grocery, Retail

Financials/Metrics

- 79 employees in Feb 2019 (LinkedIn)

Strategy

- Collaboration with WalMart ([source](#))
- The company's mission is to "Re-invent retailing by the use of robots"
- Aims to increase pick rate from current 800 picks/hr to 1,200 picks/hr ([source](#))



Capabilities

- Crane operated stacker system which moves totes to AMR's
- AMR's collect/deliver totes from/to cranes (beneath the storage structure) and deliver/collects from/to a processing area
- The system is deployed within existing high street stores, creating local store fulfilment hubs with a 1hr click & collect promise

Organisation

- Based in Israel

Deployments/Clients

- n/a

Primary Sectors

- Grocery

Financials/Metrics

- 92 employees in Feb 2019 (LinkedIn)
- Raised \$26m (latest Series A, \$20m, Feb 2018) from investors including Innovation Endeavors, Aleph, and Playground Global

Strategy

- The company has invested in a lot of PR for its use case in the grocery sector
- Targeting grocery sector to utilise urban retail space into fulfilment spaces
- Plans to partner with 5 of the leading US grocers in 2019 & 2020 to deploy its system and robots ([source](#))
- PAYG/ RaaS model



Capabilities

- Skypod (robot), moves to/from grid/cube storage to picking area with a tote. Capacity for ~30Kg's
- Storage grid up to 10m

Organisation

- Based in Lille, France
- Founders are ex-GE Healthcare robotics

Deployments/Clients

- CDiscount (2 deployments) +2

Primary Sectors

- Grocery, Ecommerce, 3PL, Industry

Financials/Metrics

- Raised \$21.2m (latest Series B, €15m, May 2018) from investors including 360 Capital Partners, Breega Capital and Iris Capital
- Revenue circa €7m in 2018
- 42 employees in Feb 2019 (LinkedIn) with 28 job adverts

Strategy

- The 2018 investment will allow the company to deliver an additional 1,000 robots. ([source](#)) Aiming for 4 production lines in 2020, up from 2 in 2018. Each line is capable of producing 300 Skypods per year ([source](#))
- Exotec partnered with Cdiscount in 2016



PROFILES

ASRS

Ongoing experimentation among suppliers

Cleveron & Opex are two samples of auxiliary and hermetically sealed ASRS and that there are numerous other suppliers of such systems; ATTAbotics (stealth mode) declined our interview request



Capabilities

- ASRS system with a cube storage set-up; 3D robotic goods-to-person storage, retrieval and real-time order fulfilment

Organisation

- Based in Canada

Deployments/Clients

- n/a

Primary Sectors

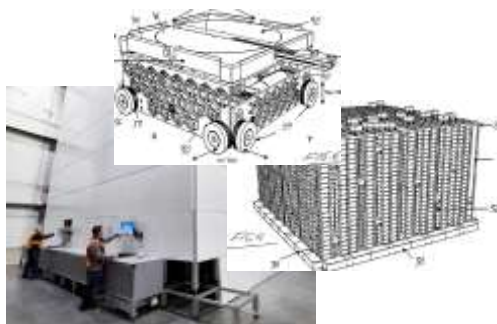
- E-commerce, Logistics, Retail, Grocery and Advanced Manufacturing

Financials/Metrics

- Raised \$5.8m (latest Series, 2018) from investors including ForeRunner Ventures, Western Innovation Initiative, The Opportunity Calgary Investment Fund (\$4.5m grant)
- "ATTAbotics has seen explosive growth since its founding in 2016, and currently has 60 open job postings". Its current employee count is 115 ([source](#))

Strategy

- Various claims to "Reduce E-Commerce Fulfilment Costs by 75%" and "Reduce space requirement by 85%"
- The company turned down STIQ's request for an interview



Capabilities

- Parcel lockers and robotic parcel solutions; 401 aka 'parcel tower'; 402 robotic parcel terminal (used by Zara)

Organisation

- Based in Estonia

Deployments/Clients

- Walmart, Asda, Zara/Inditex

Primary Sectors

- Parcel/Last mile

Financials/Metrics

- 2018 revenue €47m, an increase of c. 1,300% from 2016
- 210 employees (company)
- Majority-owned by the original founders

Strategy

- Developing a robotic grocery click & collect solution; a self-driving robot courier which delivers to your personal parcel locker; and a drone



Capabilities

- Ecosystem of picking, packing, sorting, and shipping goods. The solutions handle both D2C eCommerce and pick-up-in-store orders as well as store replenishment orders for restocking

Organisation

- Based in the US. Offices in Boston and Pittsburgh
- Founded by Tom Wagner, former CTO at iRobot

Deployments/Clients

- Several of the top 100 US retailers (according to media reports and website). The company aims to publicise a number of clients during 2019

Primary Sectors

- Retail, CPG/FMCG (currently)

Financials/Metrics

- Investors include Khosla Ventures (2013), New Enterprise Associates (NEA), and Canaan Partners
- 32 patent applications ([source](#))
- 38 open positions in Mar 2019

Strategy

- The company was founded in 2013. However, a lot of senior people including sales were not recruited until mid-late 2018 (Linkedin)
- Concentrating on North America



Source: image from one of 32 patent applications by Berkshire Grey

INTERVIEWS

STIQ spoke to multiple experts and suppliers to form a view of the market

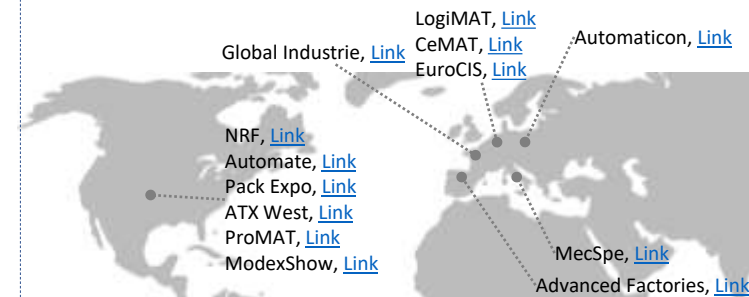
STIQ also visited a number of international trade shows to view solutions and get first hand insight on new product releases



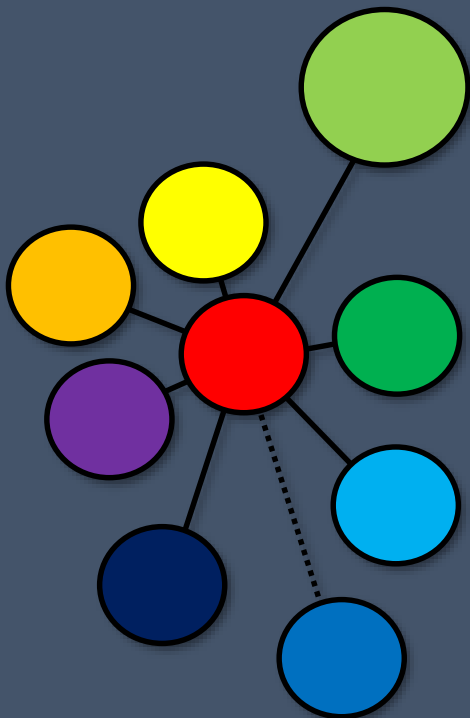
INDUSTRY EXPERTS	
Company	Position
722 Consulting	Partner
Apex Insight	Managing Director
Boozt	Project Director
CoGri Group	CEO
Element Logic	UK Managing Director
EQT	Partner
Fortna	VP
Flipkart	Anonymous
HighJump	CMO/SVP
HighJump	CTO
Honeywell Intelligrated	Director of Strategic Marketing
Honeywell Intelligrated	VP Business Development
Hyundai	New Business Strategy Team
Intel	VP IoT Group & GM Visual Retail
JDA	VP Product Development
John Lewis	Head of DC Operations
John Lewis	Member of the Board
JungHeinrich	VP Product Management
Jungheinrich	Member of the Board
Jungheinrich	Director of Logistics Systems
KNAPP	Director Business Development & Marketing
Kollmorgen	Director of Product Management
Körber Logistics	CTO
Maginus	COO
Manhattan Associates	VP Product Marketing
Manhattan Associates	VP Product Management
Manhattan Associates	UK Managing Director
Metapack	UK Sales Director
PostNord TPL	Business Development Director
RoVi	Co-founder
Ryder	Group Director of Solutions Design
Savills	Director of Research
STILL	Sr Director
Teradyne	VP Corporate Relations
Tompkins Robotics	VP Operations
Vanderlande	Sr Systems Engineer
ZigZag Global	CEO

SUPPLIERS	
Company	Position
6 River Systems	CEO
Alert Innovation	CEO & Founder
AutoStore	Strategy Director
Berkshire Grey	VP Marketing
BionicHIVE	VP Sales & Marketing US
Caja Systems	VP Business Development
Cleveron	Co-founder
Eiratech	CEO
Exotec	Sales Director
Fetch Robots	Director of Product Marketing
Flashhold/Quicktron	International Sales Manager
Geek+	Marketing Director
HIK Vision	GM HIK Robotics
IAM Robotics	CEO
inVia Robotics	CMO
Locus	CMO
NextShift Robotics	EVP Sales & Marketing
Prime Robotics	CEO
Righthand Robotics	Co-Founder
Scallog	CEO
Soft Robotics	Marketing Manager
Swisslog	Head of Portfolio Management
Takeoff Technologies	CEO, Co-founder

Selected trade shows with G2P presence



Source: STIQ research, sample trade shows, not an exhaustive list



Distribution of this copy sponsored by



CoGRI GROUP

Providing performance floors for **G2P Robotics**



FACE CONSULTANTS LTD
Global Flooring Consultants

E: info@cogrigroup.com
Tel: +44 (0)1484 600080
www.cogrigroup.com



ABOUT STIQ

Styleintelligence is a publisher of retail and retail technology specific reports (from retail Supply Chain technology to Artificial Intelligence & personalisation) .

Our distribution is made up from circa 5,000 senior management readers by email. We estimate our indirect distribution is an additional 5,000 readers.

STIQ'S AUDIENCE

Readers of the 2018 G2P report included decision-makers at: Lazada, Flipkart, Gap, Asos, Zalando, Boozt, Chanel, LVMH, YNAP, Matchesfashion, Goldman Sachs, McKinsey, IDC, Deloitte, Credit Suisse, Richemont, Farfetch, PVH, IKEA, Shop Direct, Nordstrom, Auchan, Tesco, KLA Tencor, Teradyne, Home Depot, Li & Fung, BT, EY, Under Armour, Nike, Adidas, Genesco, DHL, Hermes, Schaeffler, Hyundai, Honeywell, Walmart, and Walgreen Boots among many others...



Contact for this report:

Thomas Andersson

Senior Retail Technology Editor

tom@Styleintelligence.com

+44 7870 210529

Connect with me on [LinkedIn](#)

- Co-founder of STIQ t/a [Styleintelligence](#) and its Senior Retail Technology (B2B + B2C) specialist/ editor
- Senior Commercial Due Diligence & Strategy Consultant for VC, PE & industry buyers
- Editorial contributor and analyst to InternetRetailing & RetailX on retail sector reports
- Evaluator at [Vinnova](#), the Swedish Innovation agency, for retail technology R&D grant applications