Reuters Events

In cooperation with

Segments.ai

THE STATE OF **AUTONOMY 2025**

Cross-Industry Analysis of autonomous robotics Strategies

SOMCHAI20162516/ADOBE STOCK

SURITONG/ADOBE STOCK

CONTENTS

Authors: Liam Stoker, Bonnie Chan, Tauhid Chaudhury

CONTRIBUTORS

Otto Debals
CEO
Segments.AI

Billy Otteman
VP of Brand and Customer
Scythe Robotics

Stephen Da Silva
Director, Data Platform, Analytics & ML Infra, Autonomy & AI
Rivian

Gavin Ananda
Head of Perception Programs and DAA
Zipline

Sahil Potnis
VP, Product & Partnerships
DDD

Mike Rill
Director of Integrated Solutions
EASE Logistics

Reuters Events

In cooperation with Segments.ai

FOREWORD

Autonomous systems have quickly moved from futuristic concepts to strategic priorities. As of mid-2025, Waymo has completed over 10 million paid rides in major U.S. cities, including San Francisco, Los Angeles, and Phoenix. Starship Technologies operates over 2,000 delivery robots globally, with more than 150,000 daily road crossings. Zipline has flown over 100 million autonomous commercial miles, equivalent to 400 orbits around the Earth. Beyond mobility, autonomous systems are also seeing rapid adoption in healthcare, defense, agriculture, and more.

These use cases currently share a common foundation: the deployment of a wide range of sensor types - including cameras, LiDARs, and radars - to enable perception and autonomy. They each require different types of perception stacks, purpose-built for their specific environments and use cases. With such variety emerging across domains, this report takes a broader look at the state of the industry, not just in autonomous vehicles, but across all types of autonomous systems.

These use cases also share the same primary bottleneck to autonomy: data availability and data quality. Autonomous systems depend on accurate and consistent data to operate safely and effectively - whether they are built using traditional modular pipelines or end-to-end learning approaches. pipeline Without accurate and consistent data, autonomous systems simply cannot operate safely or effectively. Half of the respondents in this report identified data quality and diversity as their biggest data-related challenges. This concern is consistently echoed by our own customers.

To address these challenges, organizations increasingly rely on the multitude of available sensors. More sensors mean richer data, yet also significantly increase complexity. This added complexity creates extra pressure on perception teams. With these teams already stretched thin, the demand for both internal and external expertise on how to optimally work with the data grows.

A key solution to this bottleneck is multi-sensor labeling. This allows for accurate annotation across all sensors. High-quality labeling ensures data consistency across modalities and over time. This dramatically reduces the time perception teams spend on quality checks and corrections. As a result, these teams can focus more effectively on advancing autonomous systems rather than troubleshooting inconsistent pipelines. Those who prioritize high-quality multi-sensor data pipelines are better positioned to lead the path to full autonomy.

Looking ahead, we see a shift in how autonomy is approached with growing attention to approaches, unsupervised and auto-labeling pipelines, and unified multi-task systems. These emerging paradigms promise more adaptable, scalable, and intelligent autonomous systems. But they will also place even greater demands on data quality, annotation infrastructure, and cross-modal consistency.

Otto Debals
CEO
Segments.AI

ACTIONABLE INSIGHTS

Autonomous vehicle and robotics is a high-impact, core strategic imperative for organizations in the field, but future progress relies on advancing internal expertise.

Limited perception teams must grow through developed recruitment and upskilling strategies.

Comprehensive understanding of use cases and their ramifications are critical to guiding future investment in autonomy.

Data labelling is fundamental to the future development of autonomous vehicles, with external, specialist resource adopted by almost half of respondents.

Broad, robust data governance strategies are critical to addressing concerns over quality and diversity of data.

Future ML development is currently hindered by skills and talent gaps, with more concerted recruitment efforts deemed vital.

Organizations are more immediately concerned with developing medium- or high-levels of autonomy today.

A majority of respondents expect real world deployments to grow by at least 20% over the next three years.

Broader consumer acceptance of AI-powered tools could accelerate future adoption of autonomy.

HAJUNG/ADOBE STOCK

STRATEGIC PRIORITIES FOR AUTONOMY

The autonomous robotics and vehicle ecosystem is evolving rapidly, propelled by continued and significant advances in machine learning, perception systems, and sensor technologies. But while the pace of innovation continues to accelerate, the path to full autonomy remains checkered.

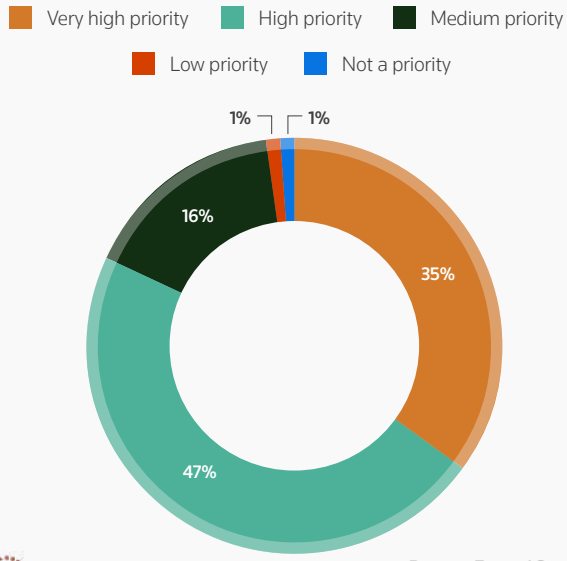
According to our survey, 82% of respondents say their organization considers autonomous robotics a high strategic priority. Just two percent report it as a low or non-priority, as highlighted in *figure one*. This strong consensus underscores the growing recognition of autonomy as a transformative force across numerous sectors.

That strategic focus is matched by expectations of near-term impact. A significant majority - some 84% - of respondents believe autonomous robotics will have a high operational impact within the next three years. Just three percent of respondents anticipate a low impact, highlighting just how transformational the technology is set to be.

Figure 1

The development/implementation of autonomous robotics is a high priority for a significant majority of those surveyed

How high a priority is development/implementation of autonomous robotics applications to your organization?



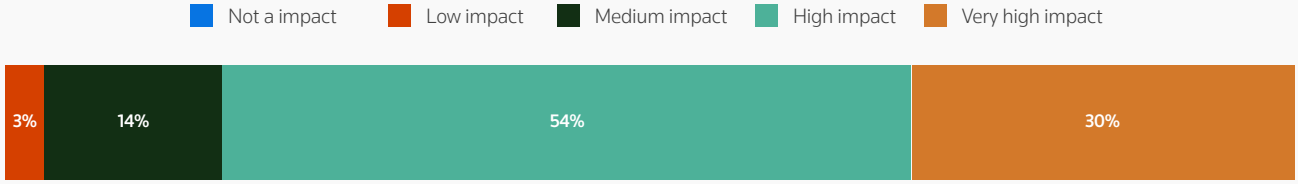
Reuters Events

Reuters Events' State of Autonomous Robotics survey

Figure 2

More than four in five respondents said autonomous robotics solutions will have a high impact on their organization's operations in the next three years

What will be the level of impact autonomous robotics applications will have on the overall operations of your organization in the next 3 years?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

GORODENKOFF/ADOBE STOCK

Despite this optimism, most organizations are still relatively new to the field. Nearly two-thirds (63%) of respondents say their company has five years or less experience in developing autonomous systems. Only a small minority report more than a decade of experience.

This gap between ambition and experience presents both a challenge and an opportunity. For industries where autonomy is likely to play a central role, such as automotive, manufacturing, and logistics, building internal expertise is becoming a strategic imperative.

Interestingly, the data suggests that software and technology firms are slightly ahead of the curve, with a higher proportion reporting six to ten years of experience. Other sectors, including automotive and warehousing, show more uniform levels of experience, highlighting the broad opportunity for growth and leadership in autonomy.

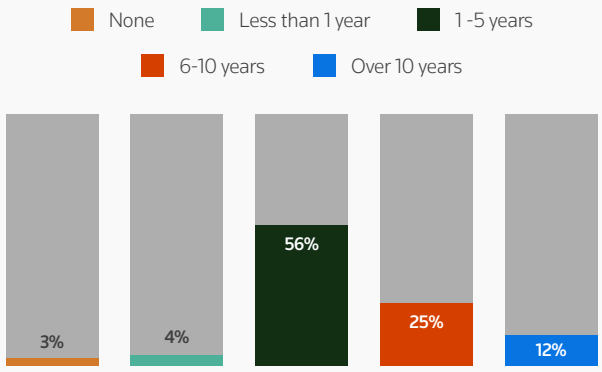
SEIZING THE AUTONOMY OPPORTUNITY

Despite the strategic importance placed on autonomy, many organizations are still building the internal capabilities needed to fully capitalize on it. Our survey reveals a significant gap in expertise, particularly in machine learning and perception, two foundational pillars of autonomous systems.

Figure 3

Half of all organizations have five years or less experience with working on autonomy

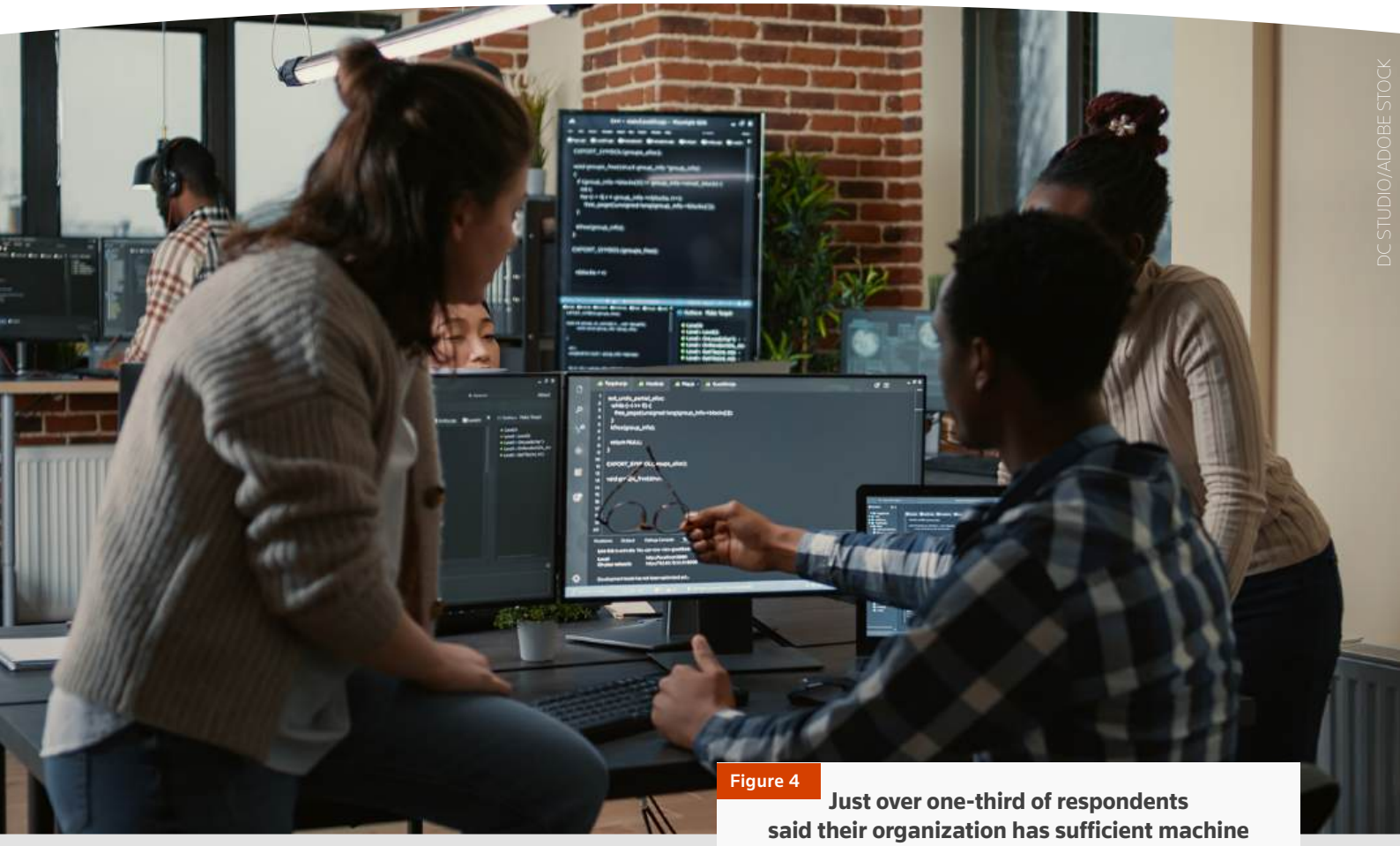
How many years has your company been working on machine learning technologies for autonomy applications?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

> **Most of the engineers we're hiring right now come from an autonomy background, and we have really good leaders who can attract the right talent**
>
> **Stephen Da Silva,** Rivian



DC STUDIO/ADOBE STOCK

Only 36% of respondents say their organization has sufficient in-house expertise in these areas. More than half (51%) are actively working to develop this expertise, while just 10% rely on external specialists. The message from industry is therefore clear: autonomy is seen as a core competency that must be developed internally.

Developing in-house expertise may be a strategic priority, but it may also be true that the industry as a whole remains relatively nascent. Gavin Ananda, Head of Perception Programs and DAA at Zipline, says autonomy as an industry remains still "very early", with a lot "still in research".

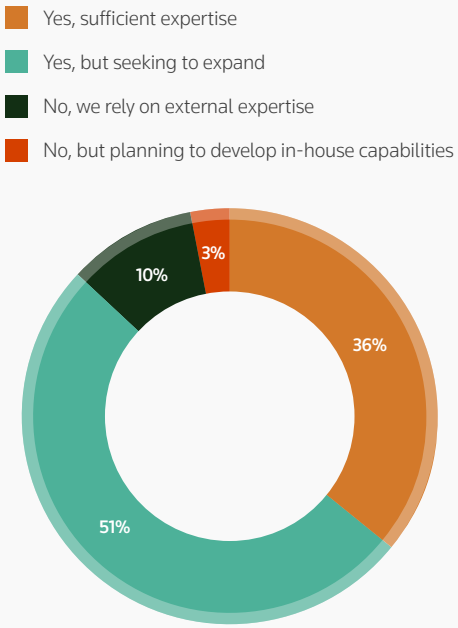
Nevertheless, it would appear that this expertise has grown exponentially in recent years. Stephen Da Silva, Director of Data Platform, Analytics & ML Infra, Autonomy & AI at auto manufacturer Rivian, says his organization has seen a spike in in-house expertise over the last four or five years. This has, in part, been driven by internal process. "Most of the engineers we're hiring right now come from an autonomy background, and we have really good leaders who can attract the right talent," he says.

Some sectors appear to be more sophisticated in this regard than others. Respondents from warehousing and defense industries report stronger in-house capabilities, suggesting

Figure 4

Just over one-third of respondents said their organization has sufficient machine learning/perception expertise

Does your company have in-house expertise in machine learning or perception?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

that these sectors may be better positioned to accelerate autonomy in the near term.

Team size is another limiting factor. Nearly two-thirds of respondents report having fewer than 40 employees working on perception development, and 44% say they have 10 or fewer. While this may reflect the size of the organizations surveyed, it also points to a broader need for recruitment and upskilling.

Building autonomy-ready teams is not just about hiring. It's about creating a talent pipeline that can scale alongside the technology and demand for it, facilitating future development.

INSIDE THE DATA PRACTICE

If talent is one half of the autonomy equation, data is the other. High-quality, diverse data is essential for training the machine learning models that power autonomous systems. The more data models have to train and learn from, the better and more robust models become. But gathering, labeling, and managing that data remains a complex challenge.

> **The volume of data increases exponentially and the quality of data is high given we have control over the way it›s collected**
>
> **Billy Otteman,** Scythe Robotics

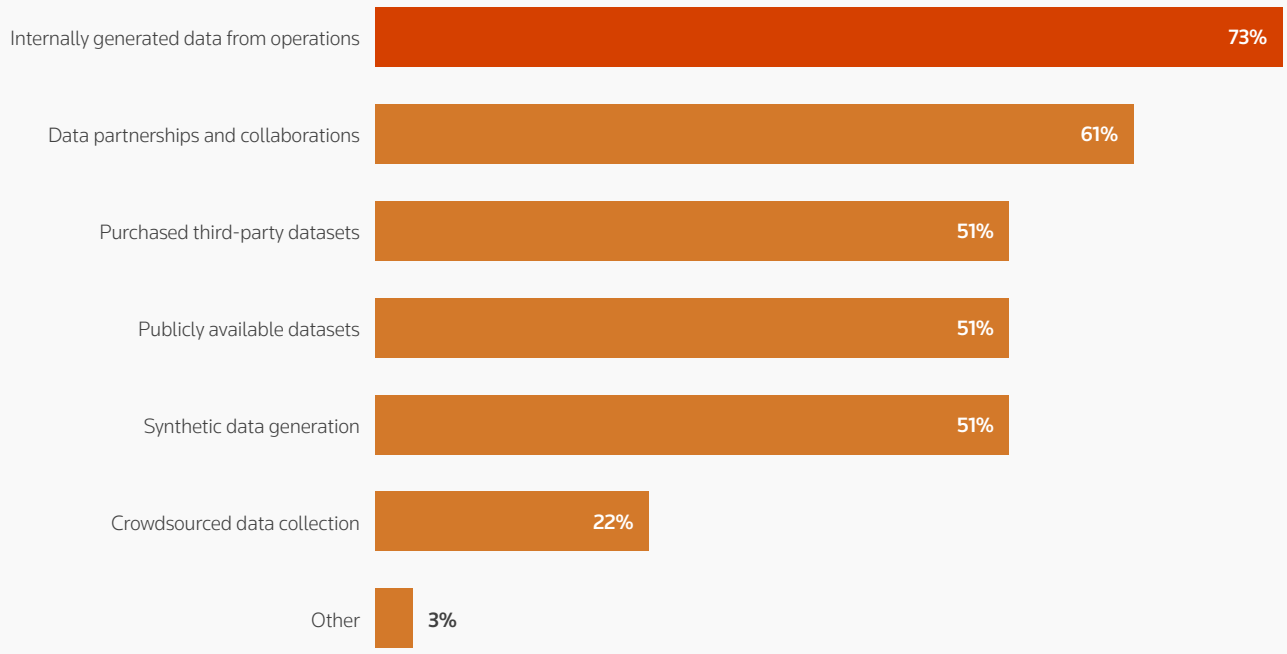
Most organizations rely heavily on proprietary data. Nearly three-quarters (73%) of respondents say their organization uses data generated internally from operations, as illustrated in *figure 5*. This approach offers greater control over data quality and relevance.

Billy Otteman, VP of Brand and Customer at Scythe Robotics, explains why his company relies exclusively on proprietary data to train its series autonomous lawn mowers. "The volume of data increases exponentially and the quality of data is high given we have control over the way it's collected," he says. Scythe's ownership of its full technology stack allows it to iterate quickly and maintain high standards.

Figure 5

A majority of respondents are acquiring data to train ML models from internal operations and data partnerships/collaborations

How does your organization acquire data for training machine learning models?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

Still, collaboration remains a common practice. Sixty-one percent of respondents say their organization engages in data partnerships, though this varies by sector. In the automotive industry, for example, only 47% report using shared data, — likely a reflection of the competitive dynamics in that space.

Third-party datasets are also part of the mix. While 58% of manufacturing respondents and 57% of those in warehousing report procuring external data, only 41% of automotive respondents say the same.

SENSORS AND DATA ACQUISITION

The type of data collected is closely tied to the types of sensors used. Cameras and LiDAR are the most common, used by 64% and 60% of survey respondents respectively. Stereo cameras and radar are also in use, but to a lesser extent. Sensor preferences do appear to vary by industry. In warehousing, 96% of respondents report using cameras, compared to 84% in automotive. Stereo cameras are less common in automotive, with only 38% of respondents reporting their use.

Sahil Potnis, VP Product and Partnerships at DDD, points to a number of trends within sensor selection, be it camera-only sensor stacks or transitioning towards including LiDAR. This should, in theory, be dictated by your specific use case and application, but also safety standards. "I think the reality is that whatever sensor stack you have, it needs to meet requirements obviously, but there has to be an undisputable, verifiable safety or redundancy case that you bring on board with that," he says.

This further aligns with investment trends. Image-based data is receiving the most attention, with 82% of respondents saying their organization is investing in it. Text data (69%) and point cloud data (58%) follow behind, as indicated in *figure 7*.

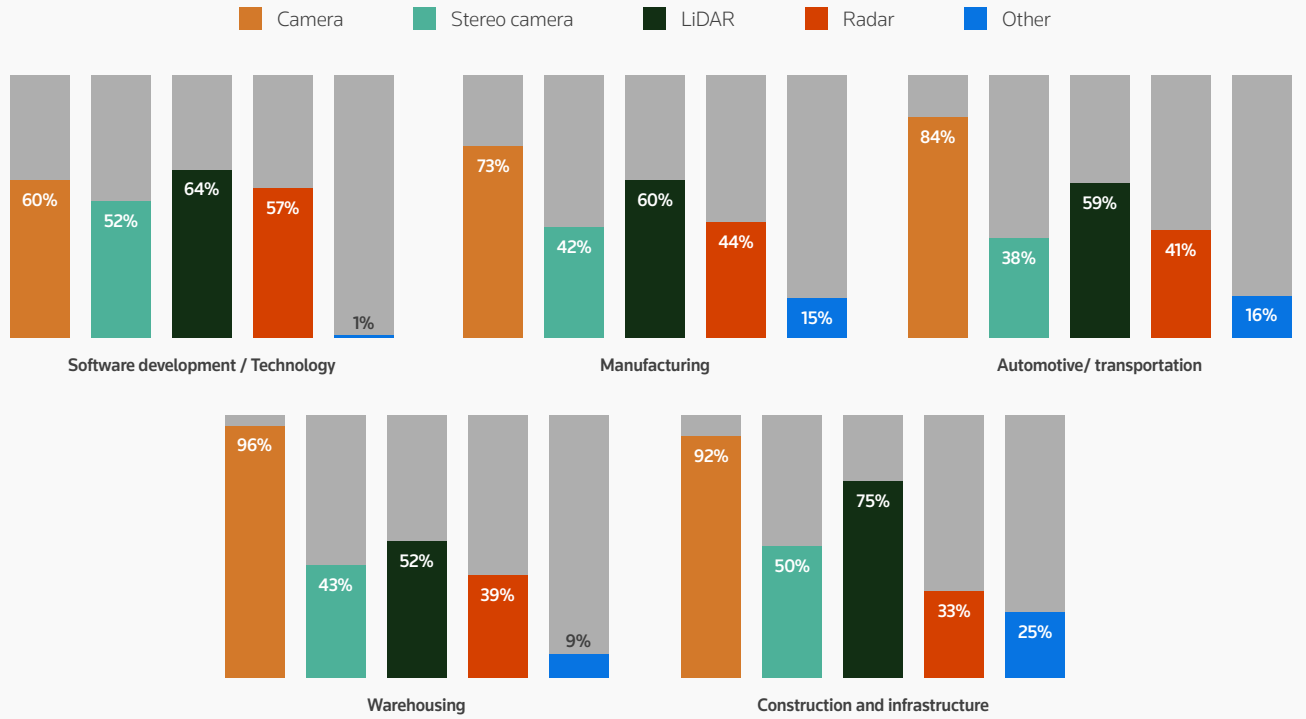
The emphasis on image data suggests a need for more diverse and high-quality visual inputs, — especially as organizations seek to improve the accuracy and reliability of their models.

Given the array of sensor types used and data collected, – coupled with investment in additional data types, – the

Figure 6

Cameras the only universally popular sensor type across multiple industries

Which of the following sensors does your organization use? (Disaggregated by industries)



Reuters Events

Reuters Events' State of Autonomous Robotics survey

SUNDAY CAT STUDIO/ADOBE STOCK

autonomy industry faces one potential bottleneck in the sheer quantity of data being collected and that is to be stored. Rivian's Da Silva states that in his time working in autonomy, the quantity of data used to train models has soared from between 5 to 10 petabytes to hundreds of petabytes of data. With organizations transitioning from imagery and video to LiDAR and point cloud data, this is a trend that will certainly continue.

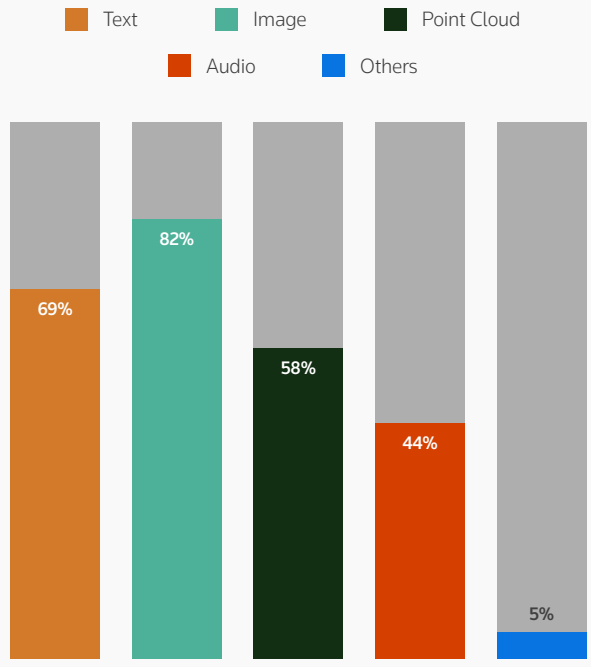
> **We're trying to basically drop the [data] footprint in such a way that it does not negatively impact the model**
>
> **Stephen Da Silva,** Rivian

To solve this, and save on the expense of data storage, Rivian has moved to reduce its data footprint where possible. "We collect the data at a higher rate, but don't store it at that rate. We're trying to drop the frame rate at which we store data and do a lot of encoding as we store. We're trying to basically drop the footprint in such a way that it does not negatively impact the model," Da Silva says.

Figure 7

Image data is the leading data type for investment today

In which of the following types of data are you investing your resources?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

Sahil Potnis echoes these sentiments, stressing most companies in the space have now moved beyond the mistakes of blind data collection campaigns which captured hundreds of thousands of hours of data, instead pursuing much more targeted collection.

VADYM/ADOBE STOCK

DATA FUSION, LABELLING, AND TECH PLATFORMS

As organizations refine their data strategies, decisions around data fusion and labelling are becoming increasingly tailored to specific operational needs. While there's no one-size-fits-all approach, our research reveals the decisions being made in how companies are structuring their data ecosystems.

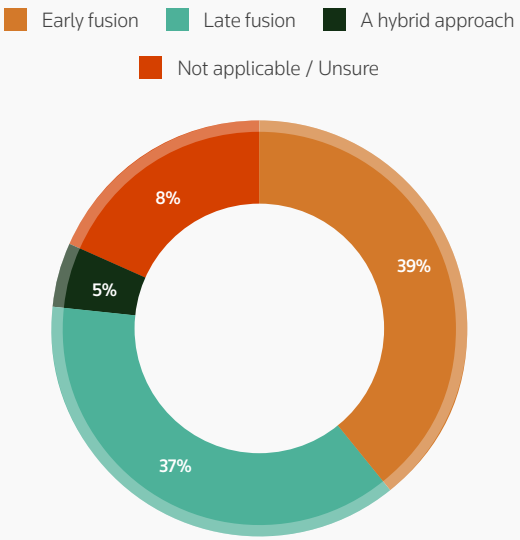
When it comes to data fusion — the process of integrating data from multiple sources — organizations are split between early and late fusion strategies. Thirty-nine percent of respondents report using early fusion, while 37% favor late fusion. Only five percent state their organization has adopted a hybrid approach to data fusion.

Preferences vary by sector. Manufacturing companies lean toward early fusion, while warehousing firms show a stronger preference for late fusion. Automotive and software/tech respondents are more evenly divided, reflecting the diversity of use cases and system architectures in those industries.

Figure 8

Organizations are opting for either early or late data fusion strategies, but rarely adopt a hybrid approach

Which data fusion strategy do you primarily use when combining inputs from multiple sensors?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

Labelling, however, is a more unified front. Just 13% of respondents say their organization does not currently engage in data labelling, and of those, more than half plan to start in the near future. Nearly half (48%) use external resources for labelling, either exclusively or in combination with in-house teams. Only 33% rely solely on internal staff.

This consistency across sectors underscores the critical role of data labelling in training accurate and reliable machine learning models. As autonomy scales, so too will the demand for high-quality, well-labelled datasets.

What's critical for data labelling practices, as Zipline's Gavin Ananda explains, is to "walk up the complexity chain". While you may start with labelling more simple data – 2D, semantic segmentation or bounding box data, this can proceed to 3D modelling data that is end-to-end in time. "You need to walk up that chain. You can't start there because then you wouldn't be able to understand the initial problems," Ananda says.

This will further help understand where the potential bottlenecks in data labelling may lie, alongside other potential issues such as failure modes.

TOOLS OF THE TRADE

The tools used for data curation, visualization, and labelling are as varied as the organizations deploying them. For data curation and visualization, Robot Operating System (ROS) and Data Version Control (DVC) are the most widely used, cited by 50% and 35% of respondents respectively. Other tools such as Foxglove, Encord, and FiftyOne are also in use, with Seaborn seeing notable uptake in the manufacturing sector.

Sensor type appears to influence tool preference. Organizations using stereo cameras are more likely to use Seaborn, while those relying on standard cameras tend to favor TensorBoard.

The data labelling landscape is even more fragmented and diverse. Amazon SageMaker leads the pack, used by 53% of respondents, — particularly so in manufacturing. Other popular platforms include LabelBox, Segments.ai, basic AI and Scale.

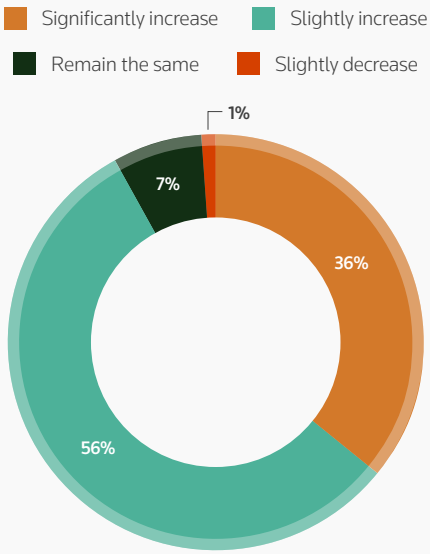
As organizations ramp up machine learning efforts, investment is following suit. A resounding 92% of respondents expect their organization's spending on machine learning to increase over the next three years. More than a third (36%) anticipate a significant increase.

ABDI/ADOBE STOCK

Figure 9

A significant majority of respondents expect their organization's ML investments to increase over the next three years

How do you expect your organization's investment in ML technologies to changes in the next 3 years?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

This surge in spending signals a growing recognition that autonomy is not just a technical challenge, but also a strategic one. However, investment alone will not solve the industry's most pressing issues. As the arms race for machine learning capabilities gathers pace, more prevalent issues relating to data quality and diversity must be overcome.

OVERCOMING DATA CHALLENGES

Despite concerted enthusiasm and investment, the road to autonomy is one beset by obstacles and challenges. Data quality and diversity remain two of the most persistent and universal issues facing the industry.

More than half of survey respondents cite these issues as among their top concerns when gathering data for machine learning, as illustrated in *figure 10*. This has profound implications on the future trajectory for autonomy: without diverse, high-quality data, even the most advanced models will struggle to perform reliably in real-world environments.

While more data is generally perceived as always being better, Sahil Potnis of Digital Divide Data stresses the need to make sure you're not overfitting or underfitting any particular circumstance of scenario to avoid "garbage in, garbage out" circumstances.

Billy Otteman of Scythe Robotics offers one such example of this. When the company expanded its operations from Colorado to Florida, it encountered unexpected issues with its autonomous lawn mowers. The models, trained in Colorado where fire hydrants are yellow, failed to recognize the red hydrants common in Florida.

ATTHASIT/ADOBE STOCK

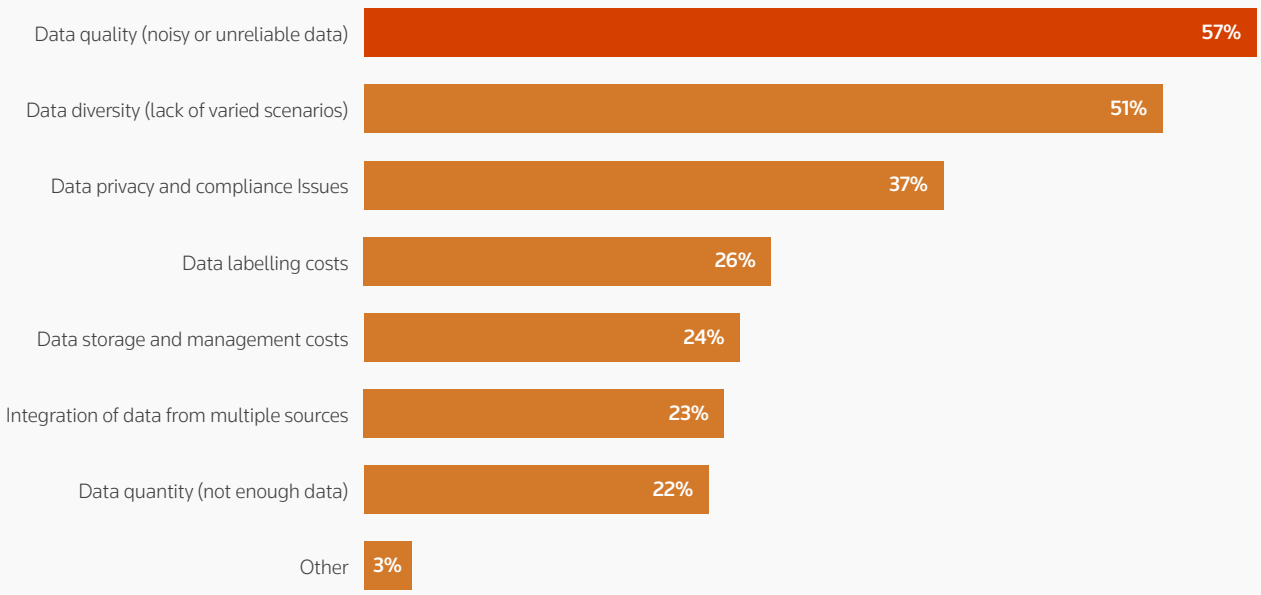
We can't just solve [data diversity] by testing and collecting... we also need to lean into sims and simulation

Gavin Ananda, Zipline

Figure 10

Data quality and diversity pose significant data challenges for ML today

What are the biggest challenges your company faces regarding data for machine learning?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

"It's a great example of how regionally, as we expand in these landscapes, the number of things that the robot is going to see are significantly varied," Otteman says.

Zipline's Gavin Ananda goes further, arguing that developing autonomous solutions in the aerospace environment requires more sophisticated detect and avoid solutions. This poses additional difficulties regarding a lack of data and/or scenarios, which he considers akin to "finding a needle in a haystack

"What matters is how you perform in that one case when it happens. So you have to force those encounters, and you have to simulate those encounters. We can't just solve it by testing and collecting... we also need to lean into sims and simulation," he says, speaking of the need for simulated data to play a role in training models.

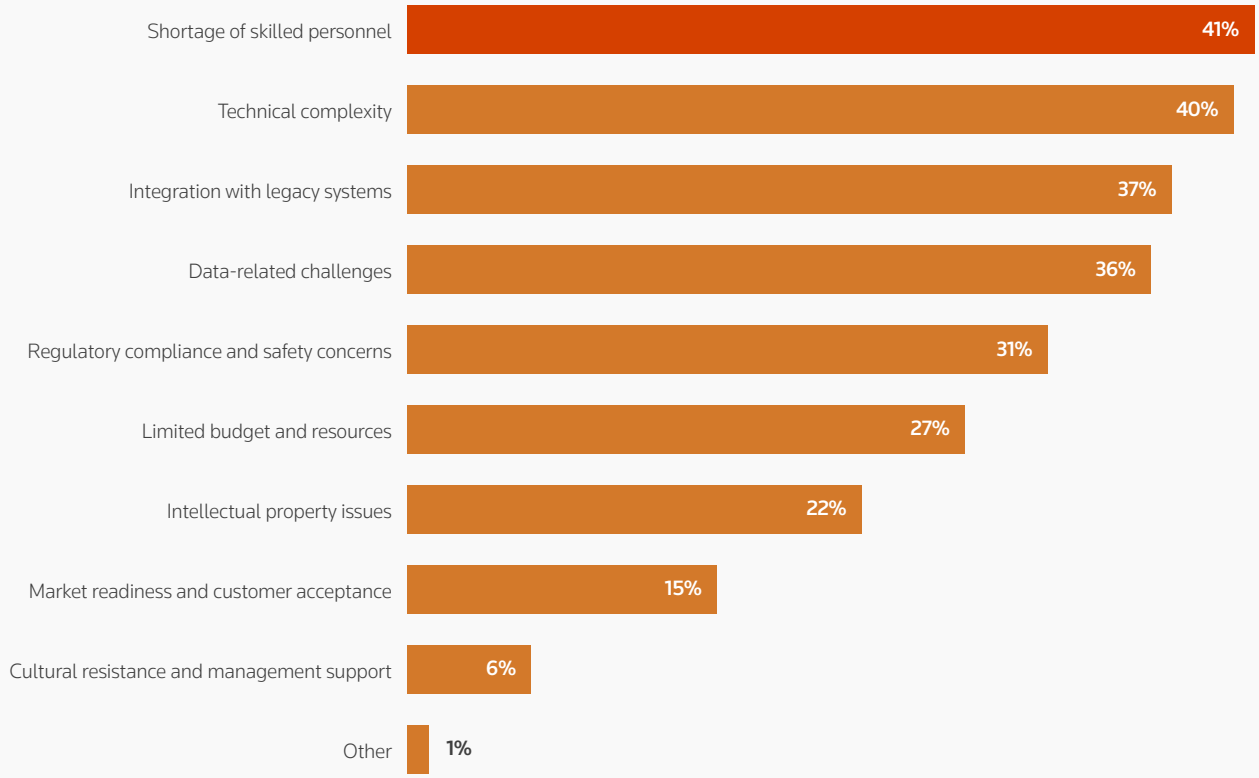
This underscores the need for broader classification sets and more regionally diverse training data. Closed environments,

YOUR HAND PLEASE/ADOBE STOCK

Figure 11

Respondents identified a burgeoning skill gap and technical complexity as primary obstacles for implementing ML solutions

What are the primary obstacles in implementing machine learning solutions in your company?



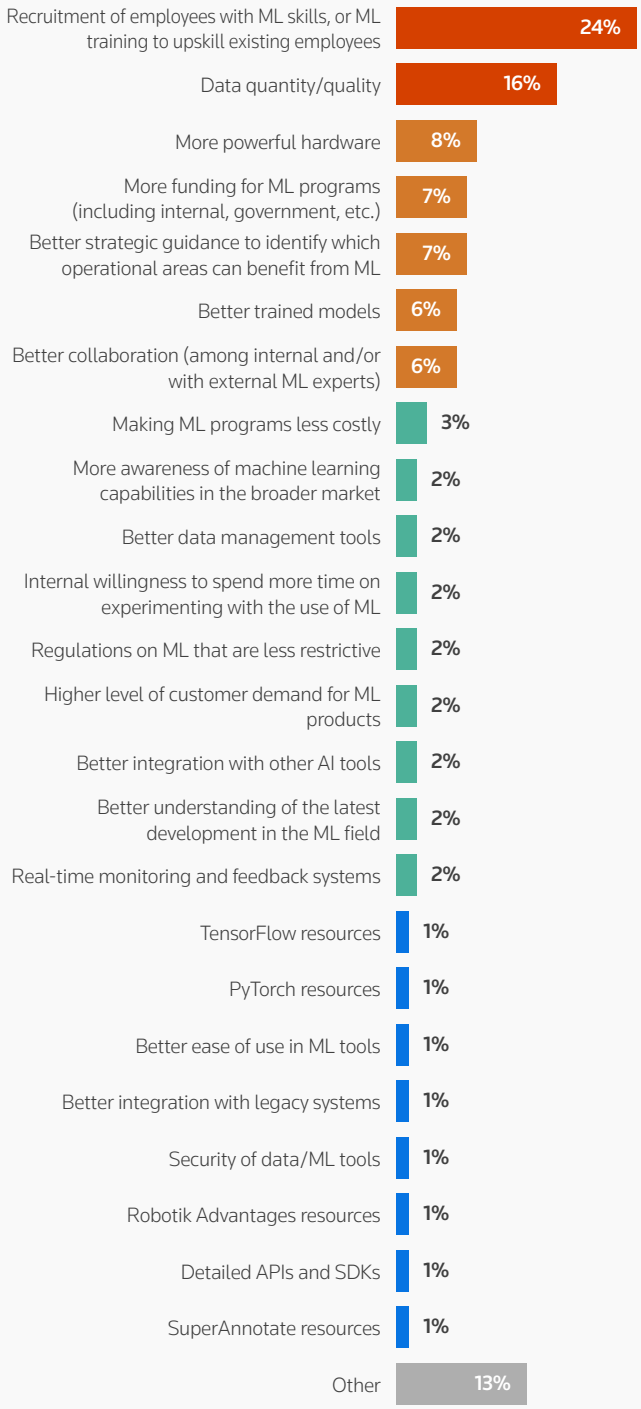
Reuters Events

Reuters Events' State of Autonomous Robotics survey

Figure 12

Organizations working in training ML models for autonomy face major challenges in recruiting skilled employees and sufficient data quality/quantity

What support or resources would most benefit your company in advancing machine learning capabilities?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

such as warehouses, may face fewer challenges in this regard. Only 36% of warehousing respondents cited data diversity as a primary concern, compared to a 51% average across all sectors.

But data isn't the only hurdle. Technical complexity and a widening talent gap are also significant risks to progress. These were the most frequently cited obstacles to implementing machine learning systems, alongside integration with legacy systems and broader data-related issues.

"Anybody outside of the biggest players that says yes, they have [sufficient expertise] in this area, is probably lying to themselves a little bit," says Mike Rill of EASE Logistics, a 3PL organization based in Ohio, North America, that is experimenting with autonomous robotics.

The automotive sector appears to be feeling the talent crunch most acutely. Around half of respondents from this industry cite a shortage of skilled personnel as a major barrier, well above the 41% average.

To address these challenges, organizations are turning to a mix of recruitment and internal training. The most common strategy is hiring employees with machine learning expertise or upskilling existing staff.

This sentiment was echoed in qualitative interviews. One participant emphasized the need for practical, hands-on training: "What we really need is more hands-on training for our current team on machine learning tools that can integrate with our existing systems. It's about practical skills over theory."

Another added: "The most beneficial resource is to provide machine learning-related training courses, which can enable employees to master relevant skills and technologies and improve the overall quality of the team."

EASE Logistics has created its own curriculum for existing staff, designed to upskill them in new and emerging technologies. This will be a major concerted effort for the business across multiple functions to facilitate new tech adoption.

"Machine learning engineers are the hottest commodity on the market right now," says Scythe Robotics' Otteman, who says retaining talent has been of the upmost importance for his organization. This has been principally achieved by ensuring engineers are working on projects that interest them personally and keep them moving forward professionally.

COLLEAMO/ADOBE STOCK

UNLOCKING FUTURE AV/R ADOPTION

Autonomous vehicles and robotics are no longer confined to research labs or pilot programs. They're beginning to take root in real-world environments, and the pace of adoption is expected to accelerate. But crossing the bridge from lab to real-world is no mean feat.

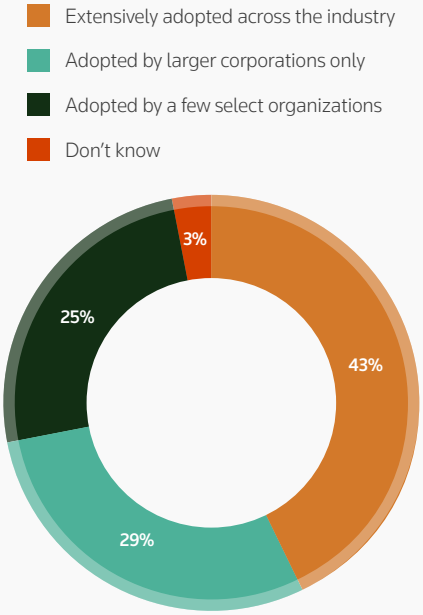
Today, 43% of respondents say autonomous robotics solutions have been extensively adopted across their industry. However, 29% report that adoption is largely limited to larger corporations, while 23% say it's confined to a select few organizations within their industry.

Sector-specific trends reveal a more nuanced picture. The software and technology sector leads the way, with 59% of respondents reporting extensive adoption. In contrast, only 29% of manufacturing respondents and 31% of those in automotive say the same.

Figure 13

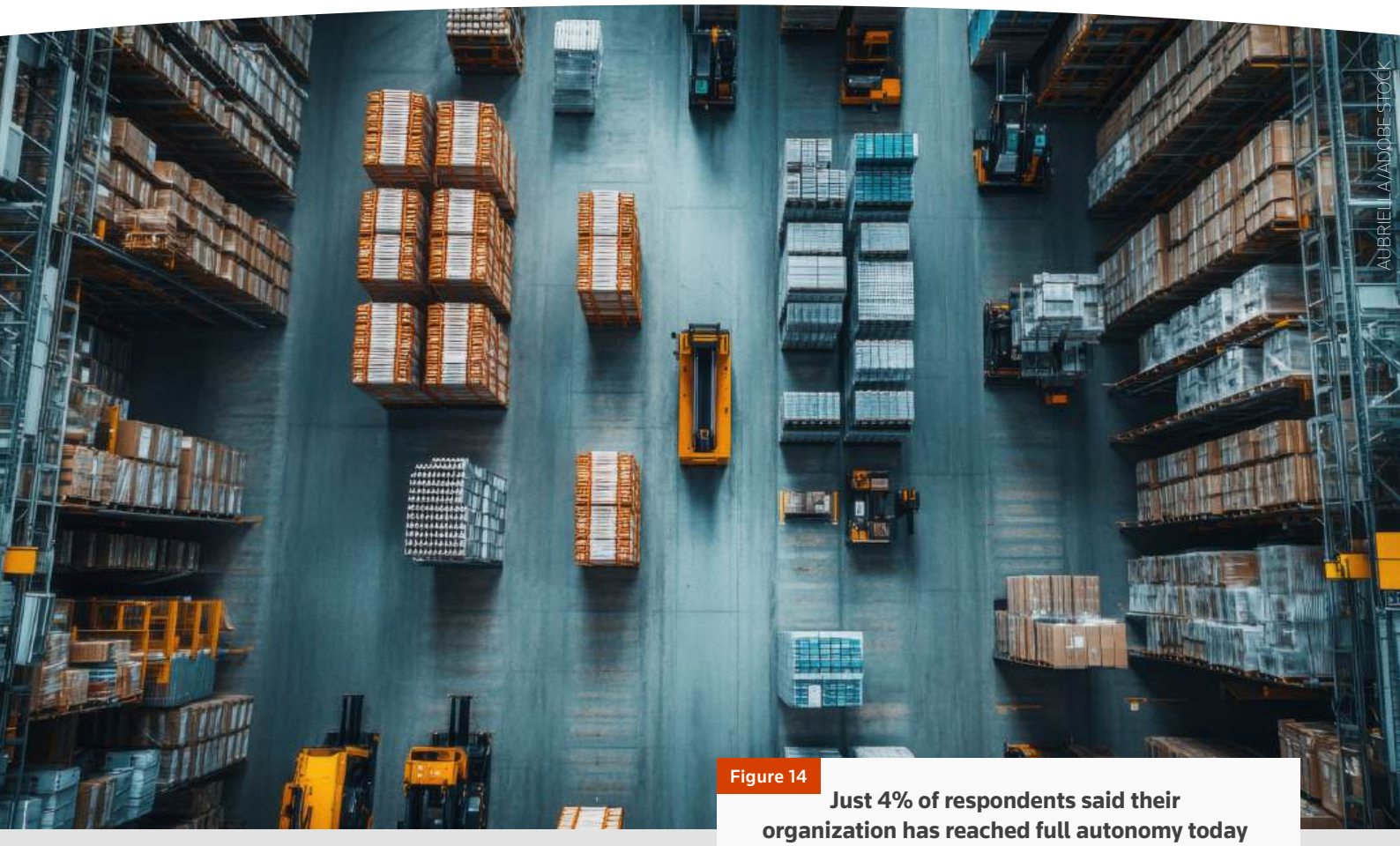
Around two in five respondents said autonomous robotics are adopted extensively across their industry

How would you rate the level of adoption of autonomous robotics solutions in your industry?



Reuters Events

Reuters Events' State of Autonomous Robotics survey



AUBRIELLA/ADOBE STOCK

THE AUTONOMY SPECTRUM

The level of autonomy achieved by organizations varies widely. Most respondents report operating at medium to high levels of autonomy — systems that require some degree of human oversight. Thirty-five percent say their systems have reached semi-autonomy, while 32% report high autonomy.

Just four percent of respondents say their organization has achieved full autonomy. Meanwhile, 23% remain at the remote control or teleoperation stage.

Warehousing stands out as an outlier in this regard. Nearly one-quarter of respondents from this sector say their organization has reached full autonomy, a figure which is likely a reflection of the controlled environments in which these systems operate.

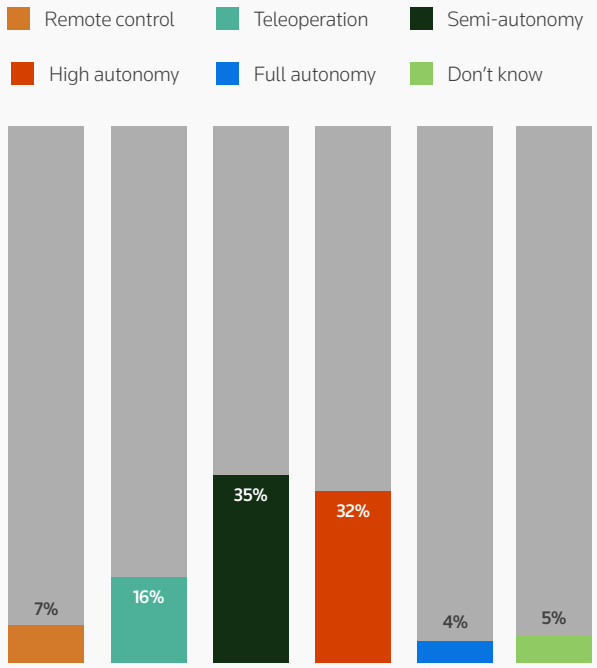
While full autonomy is the long-term goal for many, most organizations are taking a phased approach. Just 18% say their resources are primarily focused on achieving full autonomy today. A larger share (39%) are investing in high autonomy systems that still require minimal human supervision.

Warehousing again leads the pack, with 30% of respondents saying full autonomy is their top investment priority.

Figure 14

Just 4% of respondents said their organization has reached full autonomy today

What is the highest level of autonomy that your autonomous robotic systems has achieved currently?



Reuters Events

Reuters Events' State of Autonomous Robotics survey

Figure 15

The warehousing sector has been particularly successful in reaching full autonomy

What is the highest level of autonomy that your autonomous robotic systems has achieved currently?

	Software development / Technology	Manufacturing	Automotive/ transportation	Warehousing	Construction and infrastructure
Remote control (Robotic system fully controlled by human operator)	7%	6%	13%	13%	0%
Teleoperation (Robotic system controlled by a human operator with some level of automation)	12%	13%	19%	4%	25%
Semi-autonomy (Robotic system can perform some tasks autonomously, with human supervision or intervention)	35%	44%	19%	43%	42%
High autonomy (Robotic system can perform complex tasks autonomously, with minimal human supervision)	39%	27%	25%	13%	25%
Full autonomy (Robotic system can perform autonomously without any human input)	5%	8%	9%	22%	8%
Don't know	3%	2%	16%	4%	0%

Reuters Events

Reuters Events' State of Autonomous Robotics survey

THE COMPUTE ARMS RACE

One major bottleneck for the autonomy industry is in the computational power available today. Autonomy requires significant amounts of compute and power, both of which are hardware dependent. Furthermore, this is felt more acutely in more specific applications, such as in drones or robotics that need to operate in confined spaces.

Billy Otteman describes Scythe's robots as being power and compute constrained, while Gavin Ananda says Zipline has had to consider the sensors and GPUs it uses in its autonomous drones used for deliveries, stating that "every gram matters on the vehicle".

> **As the processors improve in performance and we've got four to eight-times more GPU capacity per robot, that just opens up whole new levels of perception model that we can use**
>
> **Billy Otteman,** Scythe Robotics

"It's all about how we do everything that we need to get done in a limited amount of compute," he says, further adding that this has required various trade-offs in terms of electronics used.

But as the compute power of chips continues to accelerate, so too does the perception capabilities of new and emergent models.

"One of the things we're most excited about or eager for is increased compute power," Otteman says. "As the processors improve in performance and we've got four to eight-times more GPU capacity per robot, that just opens up whole new levels of perception model that we can use."

Rivian's Stephen Da Silva is equally expectant of the potential for new processors and chips to open up new possibilities for perception but stresses the need for cost-benefit analyses before jumping into procuring the latest model off the shelf.

"The latest chips are often really, really expensive. We need to see at least a 5-time boost in our performance in a model, and we do the cost performance analysis. It needs to be a good balance – we don't mind spending more if we are going to get that much out of it," he says.

DEPLOYMENT OUTLOOK

Real-world deployments remain modest for now, with 40% of respondents stating that their organization has deployed 20 or fewer autonomous robots in operational settings.

But expectations are high. Sixty-three percent anticipate that deployments will increase by at least 20% over the next three years. More than a quarter (28%) expect growth of over 30%.

> **AI is leading the way and causing rapid growth in areas not previously considered to be a priority**
>
> **Research Participant**

Critical to this, Stephen Da Silva says, will be to bring the cost of the technology down further, particularly in areas where autonomous products are aimed at consumers, such as with autonomous vehicles. The cost of autonomous cars has already fallen substantially from earlier iterations, and there is expectation that more affordable versions will drive uptake further.

"As long as autonomy is affordable, people are going to buy it for sure," Da Silva says, adding: "It definitely makes driving so much easier and less stressful."

TECHNOLOGY TRENDS TO WATCH

Several emerging trends could accelerate that adoption. Machine self-supervised learning and growing consumer acceptance of AI-powered tools were cited as the most influential, selected by 17% and 16% of respondents respectively.

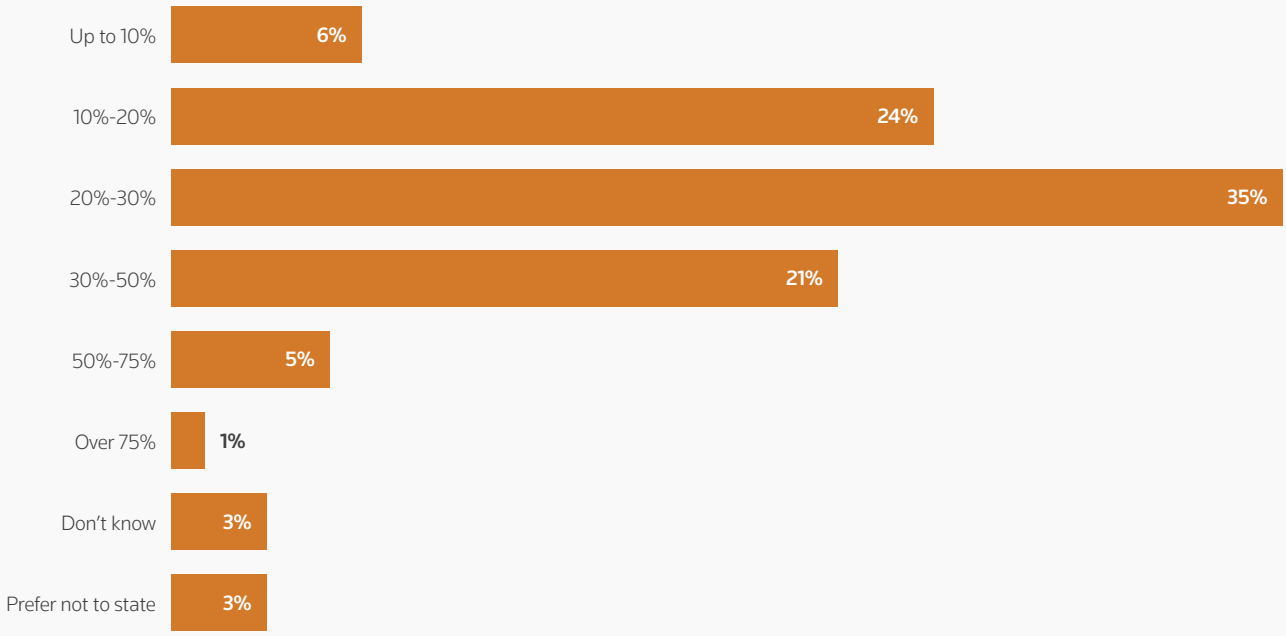
These trends suggest that while technical capabilities remain critical, public perception and user familiarity with AI will also shape the future of autonomy.

The rise of generative AI has already shifted public attitudes. Tools like ChatGPT and Copilot have moved from novelty to utility in record time. One survey participant noted: "AI is leading the way and causing rapid growth in areas not previously considered to be a priority."

Figure 16

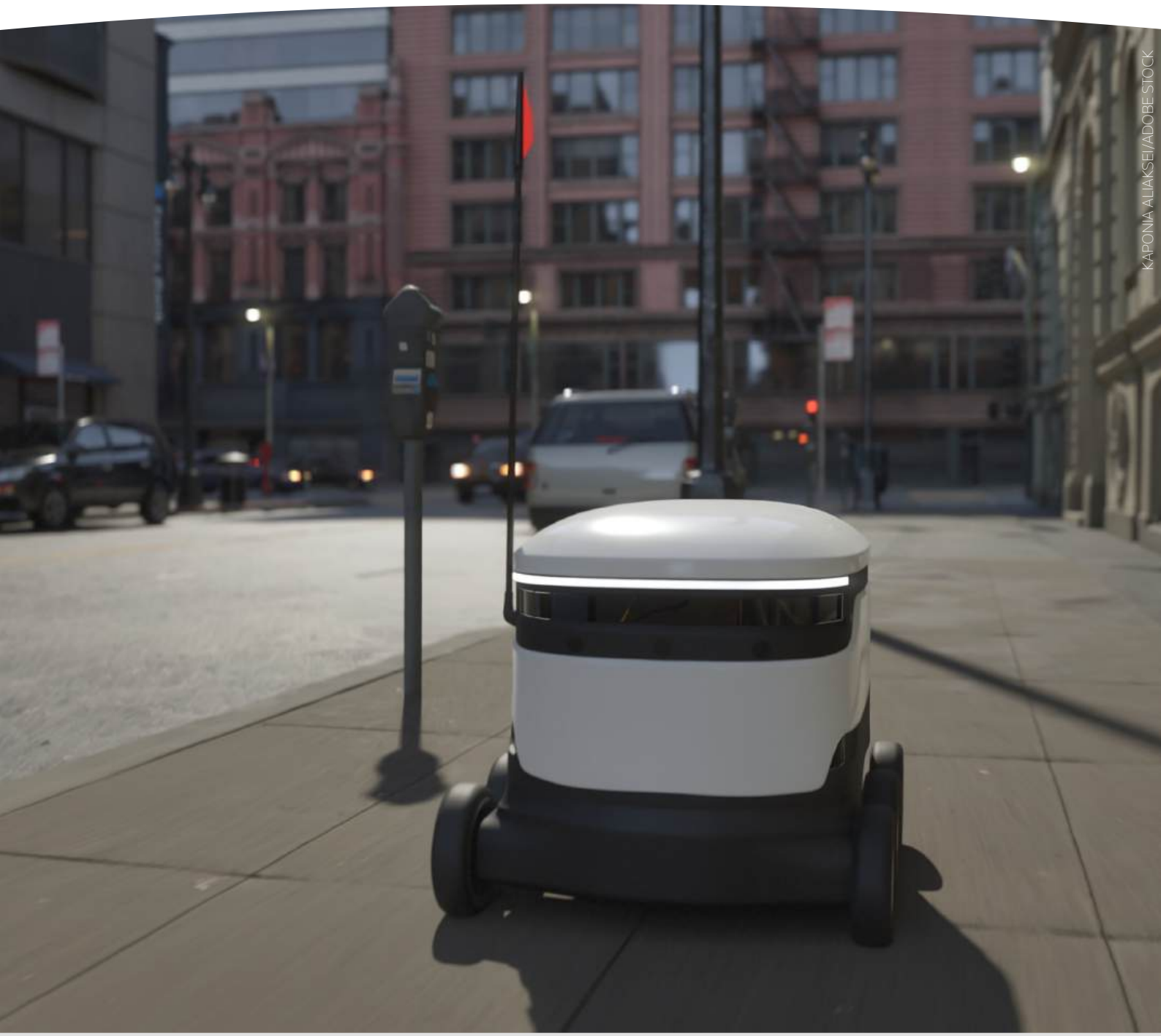
Real-world deployments of autonomous vehicles are mostly expected to increase by up to 30% over the next three years

By what percentage do you expect the real-world deployments to increase in the next 3 years?



Reuters Events

Reuters Events' State of Autonomous Robotics survey



KAPONIA ALIAKSEI/ADOBE STOCK

Billy Otteman of Scythe Robotics sees potential in integrating generative AI into robotics, but also recognizes the challenges.

"There's a whole other realm of generative AI and integrating that into robotics. There's a lot of talk about it in the space, using AI to train humanoids and get them up to speed... but then how do you put those types of programs into practice in a business versus an academic lab?"

Self-supervised learning may be especially impactful in autonomous vehicles. One participant explained:

"Autonomous vehicles will increasingly use online learning techniques, allowing the machine learning models to continuously learn and adapt based on new data from the road, improving over time."

But realizing this vision will require more than just technical innovation. It will demand collaboration between traditional manufacturers and AI specialists, as well as the development of ethical frameworks to guide decision-making in complex scenarios.

MANUFACTURING

Industry-specific Insights

30%

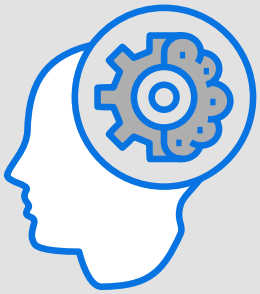
Share of respondents with 6+ years of experience in machine learning for autonomy

60%

Biggest challenge faced regarding data for machine learning: Data quality, selected by 60% of respondents

23%

Share of respondents expecting a 'very high impact' operationally from autonomous robotics



The primary obstacles in implementing machine learning solutions are a shortage of skilled personnel, integration with legacy systems and regulatory compliance and safety concerns

23%

Share of respondents with more than 40 full-time employees engaged in perception development

The most significant trends set to shape the future of machine learning in autonomous mobility for manufacturing include growing consumer acceptance of GenAI/ML and machine self-supervised learning

23%

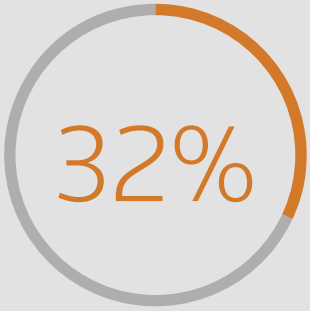
Share of respondents whose organization conducts data labelling both in-house and externally

16%

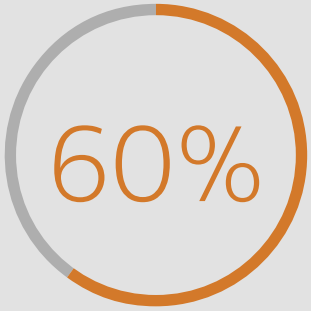
Share of respondents expecting a 'very high impact' operationally from autonomous robotics

AUTOMOTIVE & TRANSPORTATION

Industry-specific Insights



Share of respondents with 6+ years of experience in machine learning for autonomy



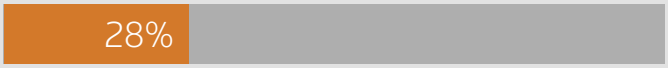
Biggest challenge faced regarding data for machine learning: Data quality, selected by 60% of respondents

Share of respondents expecting a 'very high impact' operationally from autonomous robotics

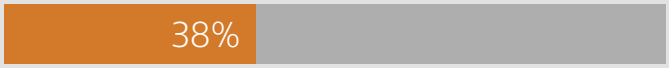
The primary obstacles in implementing machine learning solutions are a shortage of skilled personnel, the technical complexity of machine learning and integration with legacy systems

Share of respondents with more than 40 full-time employees engaged in perception development

The most significant trends set to shape the future of machine learning in autonomous mobility for automotive and transportation include growing consumer acceptance of GenAI/ML and greater societal awareness of data privacy, security and ML ethics



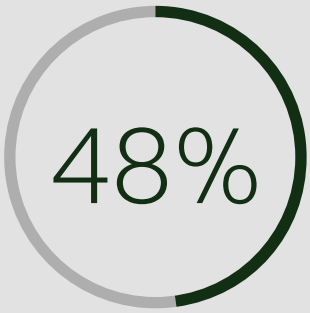
Share of respondents whose organization conducts data labelling both in-house and externally



Share of respondents forecasting a significant increase in investment in ML technologies over the next 3 years

WAREHOUSING

Industry-specific Insights



Share of respondents with 6+ years of experience in machine learning for autonomy

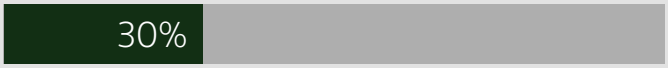
Biggest challenge faced regarding data for machine learning: Data quality, selected by 55% of respondents

Share of respondents expecting a 'very high impact' operationally from autonomous robotics

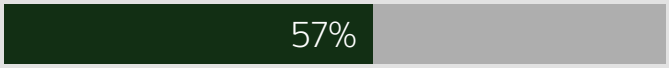
The primary obstacles in implementing machine learning solutions are integration with legacy systems, shortage of skilled personnel and the technical complexity of machine learning

Share of respondents with more than 40 full-time employees engaged in perception development

The most significant trends set to shape the future of machine learning in autonomous mobility warehousing include growing consumer acceptance of GenAI/ML and advancements in autopilot capabilities



Share of respondents whose organization conducts data labelling both in-house and externally



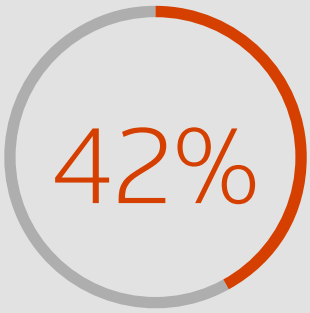
Share of respondents forecasting a significant increase in investment in ML technologies over the next 3 years

INDUSTRY-SPECIFIC INSIGHTS

Construction & Infrastructure

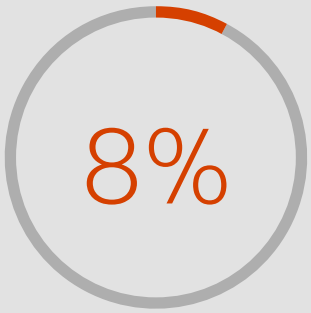
Share of respondents forecasting a significant increase in investment in ML technologies over the next 3 years

Biggest challenge faced regarding data for machine learning: Data privacy and compliance issues, selected by 58% of respondents



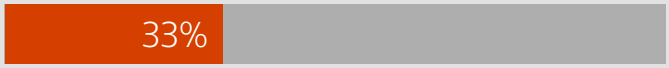
Share of respondents expecting a 'very high impact' operationally from autonomous robotics

The primary obstacles in implementing machine learning solutions are integration with legacy systems, data-related challenges and regulatory compliance and safety concerns

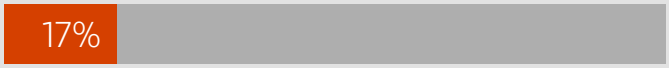


Share of respondents expecting a 'very high impact' operationally from autonomous robotics

The most significant trends set to shape the future of machine learning in autonomous mobility for construction and infrastructure include growing consumer acceptance of GenAI/ML, machine self-supervised learning and greater societal awareness of data privacy, security and ML ethics



Share of respondents with more than 40 full-time employees engaged in perception development



Share of respondents whose organization conducts data labelling both in-house and externally

METHODOLOGY

This report is based on the findings from *Reuters Events' State of Autonomous Robotics survey*, carried out in Q1 2025.

The survey engaged professionals from a range of organizations from various sectors such as warehousing, delivery services, manufacturing, agriculture, energy, automotive and others. Respondents for this survey were required to be part of an organization where they had implemented autonomous robotic solutions or in the process of developing such solutions or were using or planning to use perception management technologies. Survey invitations were sent to Reuters Events' contact database as well as an external panel.

A total of 147 respondents across the globe participated in the survey with 61% of respondents' organizations operating in North America, 57% in Europe, 18% in Asia Pacific, 15% in South America, seven percent in Africa and the Middle East and seven percent in Australasia.

Seven percent of companies surveyed have revenues of $0-5 million, 36% of companies have revenue between $6 million and $50 million, 17% between $51 million and $250 million, 24% within $251 million and $1 billion and finally, 12% of companies have revenues over $1.1 billion. Nearly half of the respondents (46%) reported their employee headcount to be 500 or under. 42% had 501-10,000 employees and 10% reported over 10,000 employees.

The data was gathered through web surveys which were designed and implemented following strict market research guidelines and principles. For data analysis, significance testing at 95% confidence intervals was conducted. There might be limitations where the survey cannot represent an overview of all industries that implement autonomous robotics; the representativeness might be limited in certain regions.