Investments in autonomous technology are on the rise — even in an uncertain economy

How leaders in construction, agriculture and mining are approaching autonomous technology in 2023

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A decrease in overall costs + a quality improvement — all while getting more work done in less time and with fewer people. A pipe dream or a possibility?

While it may seem farfetched, these are the goals of many construction, agriculture and mining industry leaders who are deploying autonomous technology.

Conducted by Trimble and Industry Dive, a survey of 160+ C-suite executives, directors, managers and supervisors across the construction, agriculture and mining markets gave us an inside look at where and how they're using autonomy now, as well as their plans for the future.

While the majority of the leaders we surveyed in these industries say they're committed to — and have already begun — investing in autonomous technology, this report reveals there's plenty of opportunity to expand use cases of autonomous technology. In many cases, the best is yet to come.

The exclusive data and expert insights shared here will help professionals in the construction, agriculture and mining industries compare their use of and investment in autonomy to their peers, better understand the applications that benefit from autonomy and set technology expectations for the future despite a tumultuous economic climate.

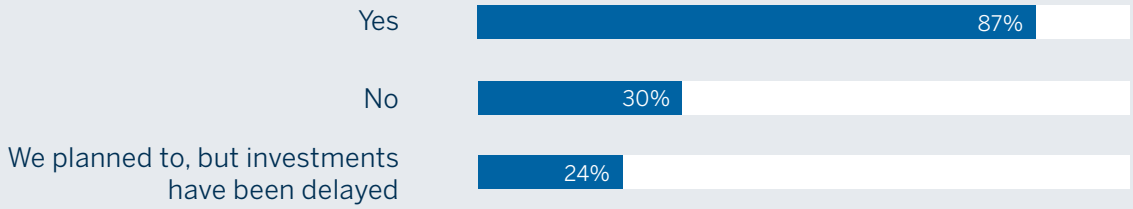
The state of autonomy today

It's clear that construction, agriculture and mining companies are compelled to invest in autonomous technology.

Nine out of 10 survey leaders in these three industries say their organizations made autonomy investments of some kind in 2022.

QUESTION

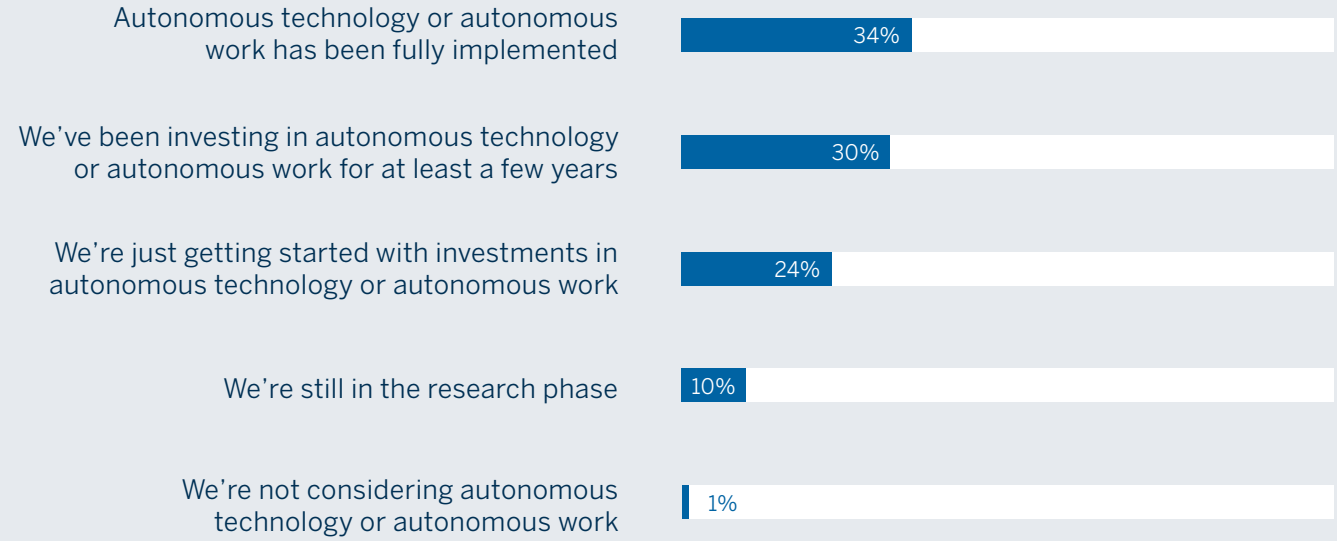
Has your organization made any investments in autonomy in the last 12 months?



Although respondents seem to be at various stages of their autonomy journeys, there's a distinct dedication to deployment. While nearly one-quarter revealed that their investments in autonomous technology are just beginning, another 64% say they're well on their way to achieving their goals — they have fully implemented autonomous work or have been investing in autonomous technology for at least a few years.

QUESTION

How would you describe your organization's commitment to or investment in autonomous technology or autonomous work?



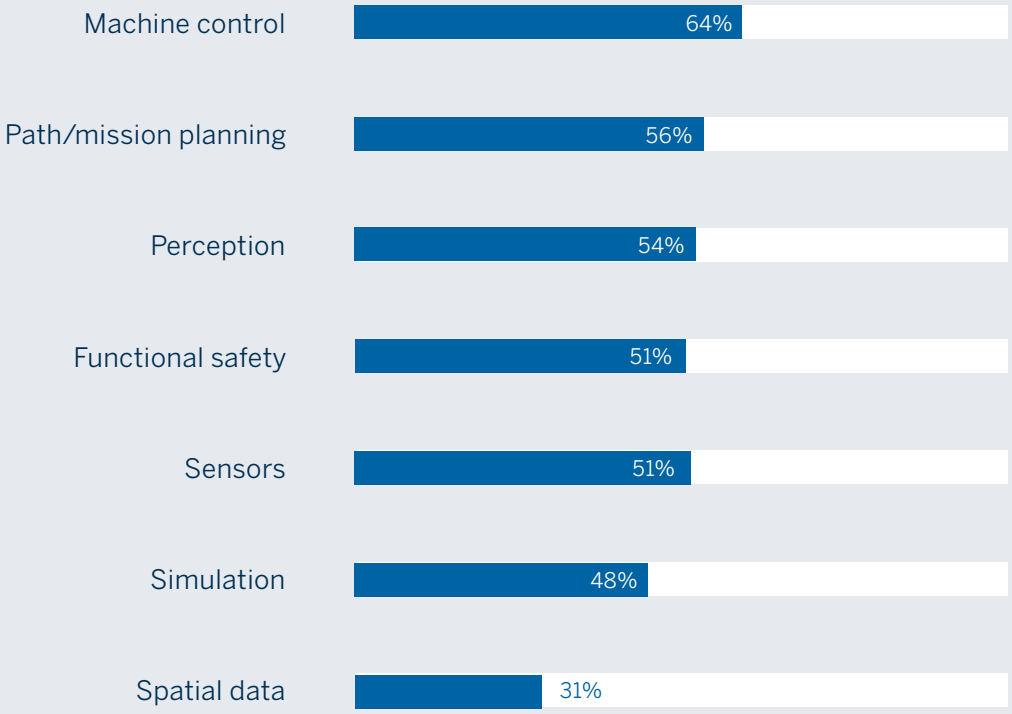
"With an understanding of what full autonomy has to offer, it's interesting that nearly 34% say they're fully automated while, later on in the report, we find out that 94% plan to make investments in autonomy in the next one to five years," describes Kevin Andrews, strategic marketing manager, autonomy, at Trimble. "While professionals in this industry may believe they have fully implemented some level of autonomy, they clearly recognize that there's plenty of room to grow and automate processes. If people in these industries are seeing their solutions as being fully autonomous, then it's important to define what fully autonomous really means. Without a shared vision, it's limited to individual interpretation."

Fully autonomous operations connect entire processes and workflows. Equipment can respond appropriately to unanticipated events during operation. In construction, this may involve earth-moving equipment and grading soil and rock according to plans. In agriculture, it can mean self-driving tractors that plow, plant, cultivate, fertilize and harvest based on the environment around them. In mining, it could be a driverless mining vehicle that supports full autonomous loading of ore.

When it comes to where autonomous technology is deployed in construction, agriculture and mining, machine control is the primary application. As a basic automation tool, automated machine control allows machines to respond based on signals from onboard sensors, actuators, instrumentation and devices.

QUESTION

How is your organization currently using autonomy?



Beyond machine control, many other possibilities exist to deploy autonomous technology. Once a solid autonomous machine control foundation is in place, fully autonomous operations are possible in the future.

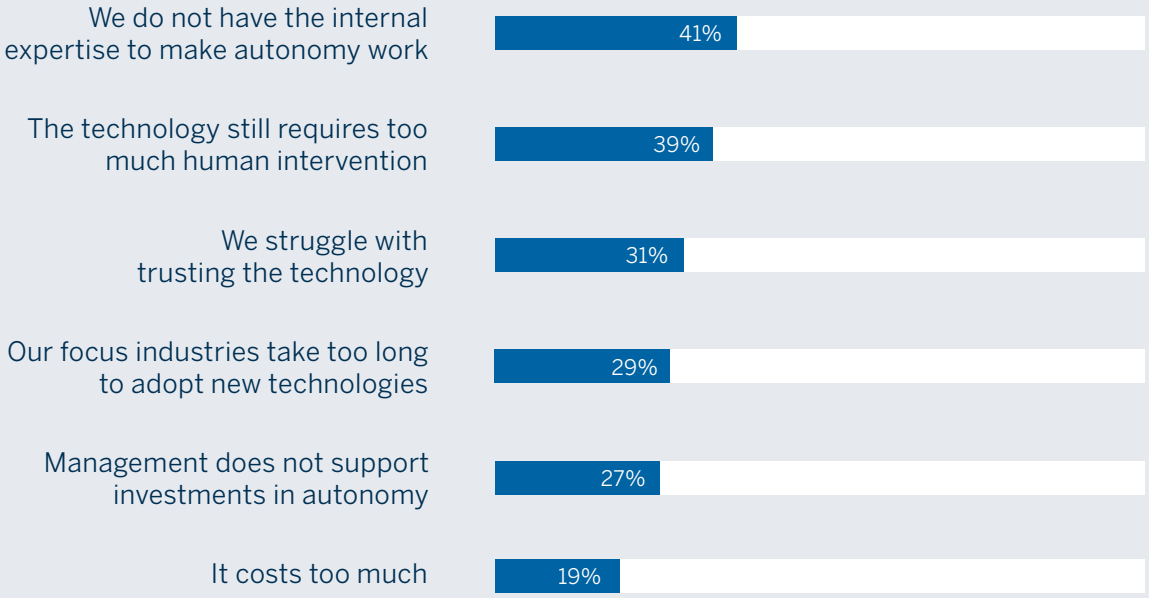
"The next big step after automating machine control involves the orchestration that exists between different machines to share data back and forth, report on what's being done and perhaps even pass on instructions to the next machine in the process," explains Giri Baleri, director of product management and strategic marketing, off-road autonomy, at Trimble.

For example, this could include synchronous coordination of a cut-load-haul-fill-compact workflow, where planning, creating work orders and tasks come together with very little human intervention — or by utilizing remote intervention. The goal of fully autonomous operations is to automate dull, dirty and dangerous tasks so workers have the bandwidth to focus on more important tasks.

Surprisingly, when it comes to hesitations about investing in autonomous technology, the cost isn't the biggest concern — far from it. Most construction, agriculture and mining company leaders have other worries on their minds — namely the lack of internal expertise (41%), the need for workers to be involved in autonomous technology (39%) and trusting the technology (31%).

QUESTION

What are your organization's primary hesitations about investing in autonomy?



"There's always fear with new technology that it's going to be complicated and require several internal resources," says Andrews. "Many people think it requires lots of babysitting and that the hours of time it's supposed to save will be spent fiddling with it or having to learn a new skill to use it."

Proper system design and training can alleviate many of these concerns. Baleri also emphasizes the importance of finding the right partner to help bring this multifaceted technology to life. "As the survey reveals, many companies probably don't have all the in-house expertise they need," he explains, "but that's where partners come into the picture. You don't have to know or understand it all. A good partner can address technology or knowledge gaps within your team."

The state of autonomy tomorrow

Although 34% of construction, agriculture and mining companies indicated in the survey that they're fully autonomous, they also say their autonomy investments will increase down the road —indicating that there's still work to do.

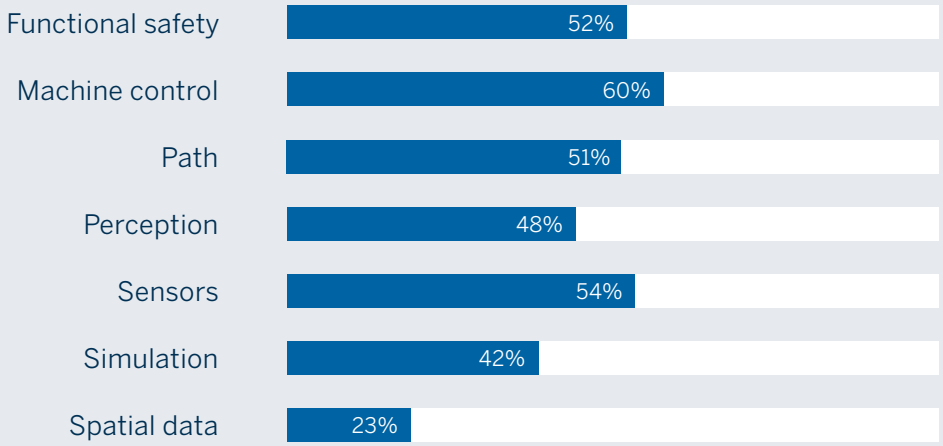
Inflation, a potential recession and demand volatility aren't causing leaders to tighten their purse strings. Instead, they seem to be viewing technology as a way to weather these challenges while preparing for the future. In fact, 75% of respondents believe that economic uncertainty makes autonomy investments an even higher priority. Once the financial storm rolls through, these companies will likely come out ahead of their peers.

"Forward-thinking companies often see technology as a hedge against uncertainty and rising costs," says Baleri. "Autonomy manages or alleviates labor pressures and improves efficiency, which are both highly beneficial right now. We don't know what labor prices or availability are going to be like five years from now. Investing in this technology today can help deal with this uncertainty tomorrow. The same holds true for input costs. We don't know what fuel prices will do in the future, for example, but we're pretty sure they'll go up. If automation can make your machines 5% more fuel efficient, then technology that improves efficiency starts to look really attractive."

Over the next five years, 94% of respondents say they will continue their autonomy investments. These investments are set to align with the autonomy investments they've already made today: a strong focus on machine control, as well as functional sensors, safety and path.

QUESTION

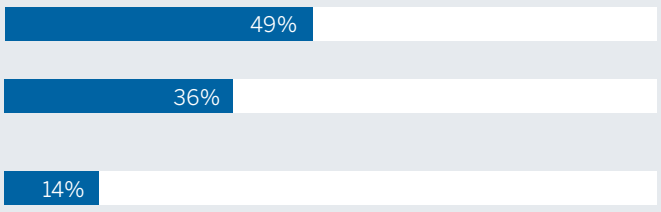
Which autonomous technology capabilities do you expect your organization to invest in during the next five years?



For most construction, agriculture and mining companies, improving autonomy levels is the goal. The investments they're making now are part of their quest to achieve higher levels of autonomy in the future.

QUESTION

What is your organization's autonomy goal?



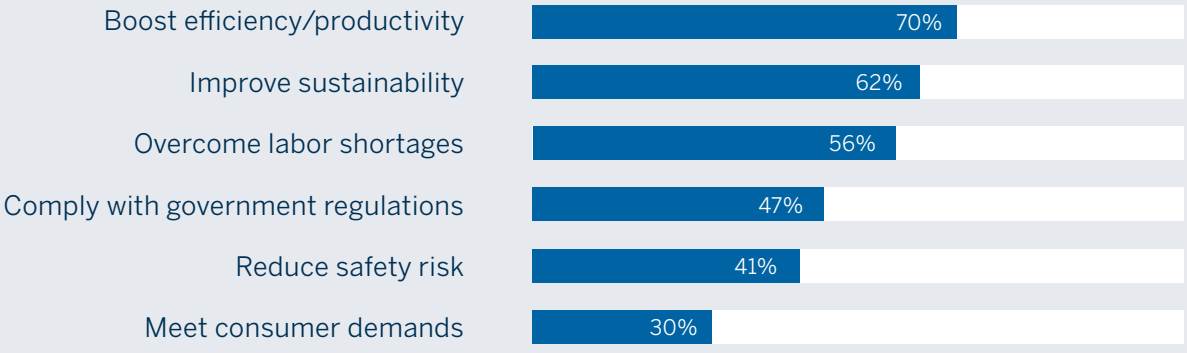
Measuring the value of autonomy

When companies invest in autonomy, they expect a certain benefit or advantage in return.

What motivates companies in construction, agriculture and mining to put their hard-earned dollars toward autonomous technology? What outcomes do they expect? Three drivers stand out: efficiency, sustainability and labor.

QUESTION

My company invests in autonomy in order to _____.



Once company leaders identify anticipated outcomes from their autonomy investments, they expect to see results. Survey respondents say they're already experiencing many of these benefits today, including getting more work done with fewer people (53%), getting more work done in less time (49%), building a stronger competitive advantage (42%) and improving quality (42%).

QUESTION

What benefits does your company derive from its current autonomy investments?

Based on these results, it's clear that autonomy is delivering on the expected outcomes—and hedging against uncertainty by alleviating labor pressure and improving efficiency.

When it comes to longer-term payoffs, however, leaders in construction, agriculture and mining have slightly different expectations. The majority (54%) hope to be able to lower expenses as a result of their investments.

QUESTION

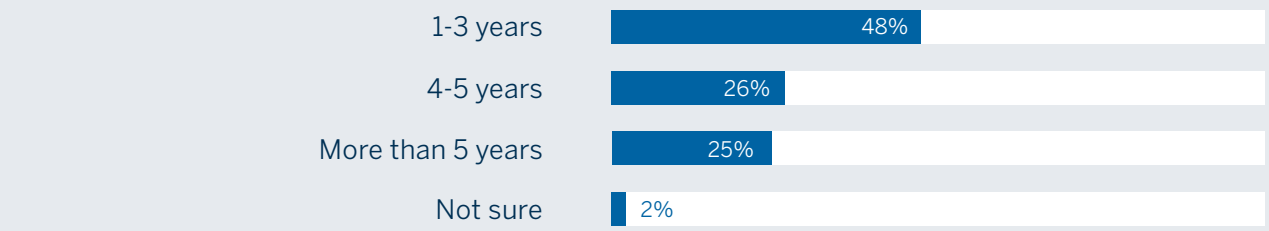
What benefits does your company hope to derive from future autonomy investments?

Respondents also have high expectations for return on investment (ROI) when it comes to autonomy investments. This payback can be recognized in many ways: through time savings, reduced labor costs, less rework, new revenue opportunities and improved customer satisfaction that leads to more sales.

No matter how they capture returns, they anticipate a quick recoupment—the majority of leaders expect a full return on investment within the first five years of implementation (and nearly half expect to see a full recoup of investments within the first three years of implementation).

QUESTION

When would your company expect to fully recoup its autonomous investments?

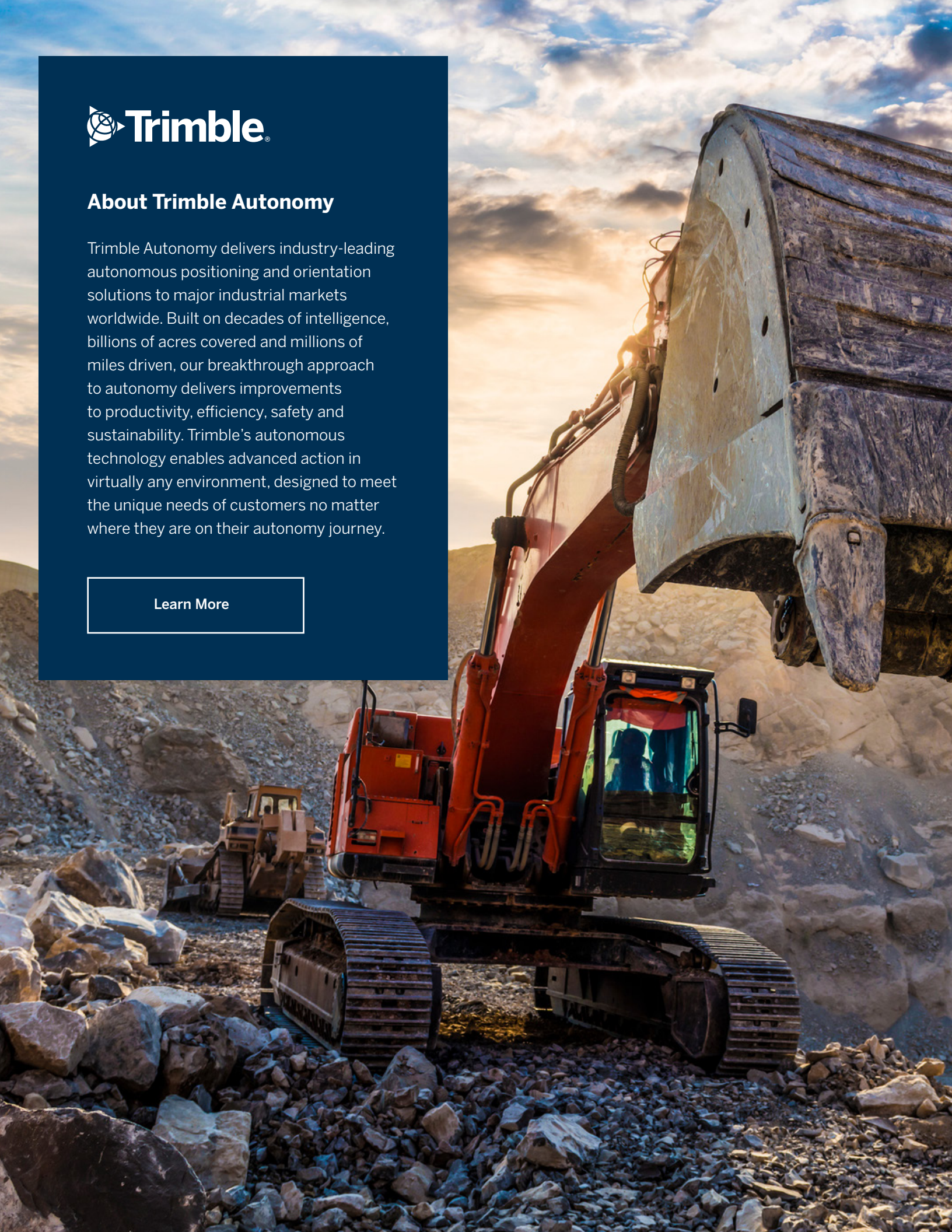


Report summary

In construction, agriculture and mining, there's an obvious focus on autonomy—and for good reason. But there's also ample room for improvement. The opportunity exists to expand beyond machine control to achieve full workflow automation.

Nearly all organizations plan to invest in autonomy in the next five years—and they expect a relatively fast ROI as a result. To achieve success along your own journey toward autonomous technology, it's important to create a roadmap to guide your steps. If you take a gamble and attempt to deploy disparate systems or focus improvements only on a single area, then the results may not align with your expectations and you may make expensive mistakes along the way. Instead, find a partner that understands your industry and can help you bring it all together. One day, a fully autonomous worksite will allow operators to step out of their equipment cabs for the first time. Backend processes and workflows will coordinate multiple machines, send and receive information and respond to the environment to complete tasks safely and efficiently.

"While we're still far off from the day where everything operates with very little human intervention—or remote intervention—that day will come. Until then, remember: It's a marathon, not a sprint," says Baleri.



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