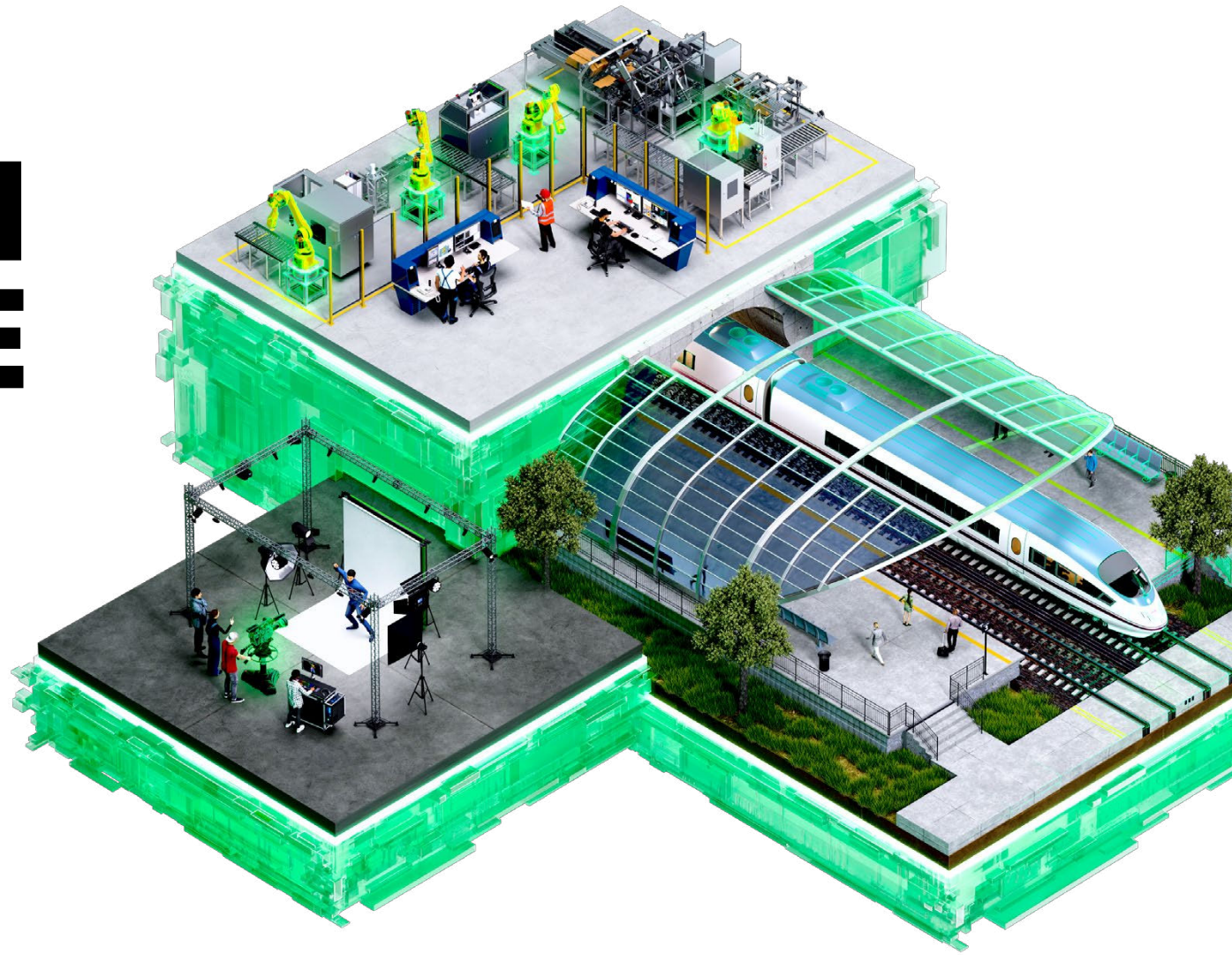


2024 STATE OF DESIGN & MAKE

Design and Manufacturing Edition

Insights from industry leaders on how digital transformation is driving business resilience, sustainability, and talent management



 **AUTODESK**

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About the study

The *State of Design & Make* report is a global, annual study for leaders who design and make places, objects, and experiences. It identifies the most pressing issues shaping today's businesses and helps leaders make informed, strategic decisions about how to prioritize and invest in the future.

Unless otherwise noted, the data in this document is the D&M industry sample of 1,787 business leaders and experts—a subset of Autodesk's 2024 *State of Design & Make* report—who are in the product design and manufacturing industries.

The overall sample includes 5,368 industry leaders, futurists, and experts from the following industries: architecture, engineering, construction, and operations (AECO); product design and manufacturing

(D&M); and media and entertainment (M&E). Survey data in the main report has been broken down by global region: Asia-Pacific (APAC), which includes responses from Australia, China, India, Japan, and South Korea; Europe, Middle East, and Africa (EMEA), with responses from France, Germany, Italy, the Middle East, the Netherlands, the Nordics, Spain, Turkey and the United Kingdom; and the Americas (AMER), with responses from Brazil, Canada, Mexico and the United States.

Introduction

Key themes and top insights





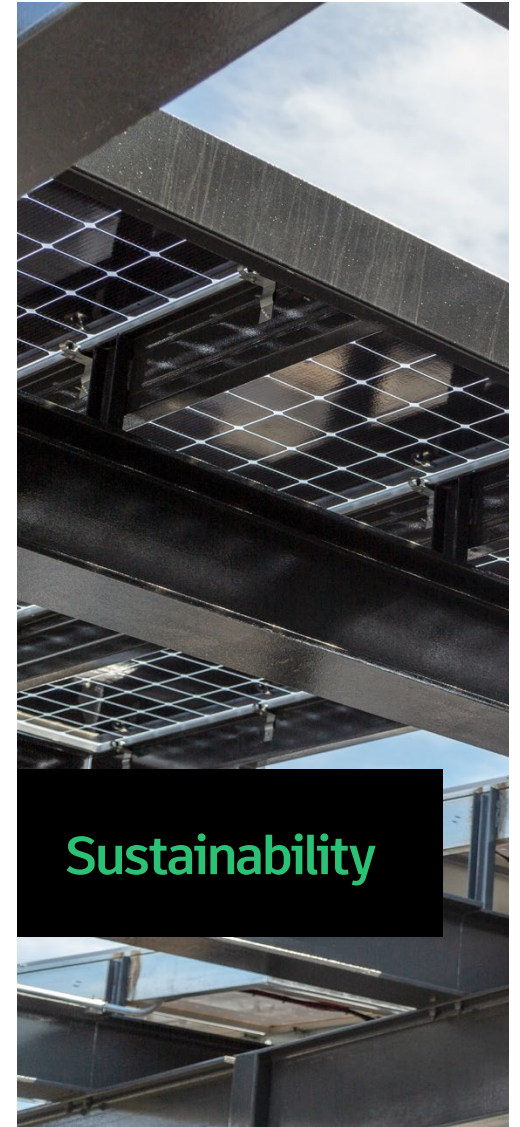
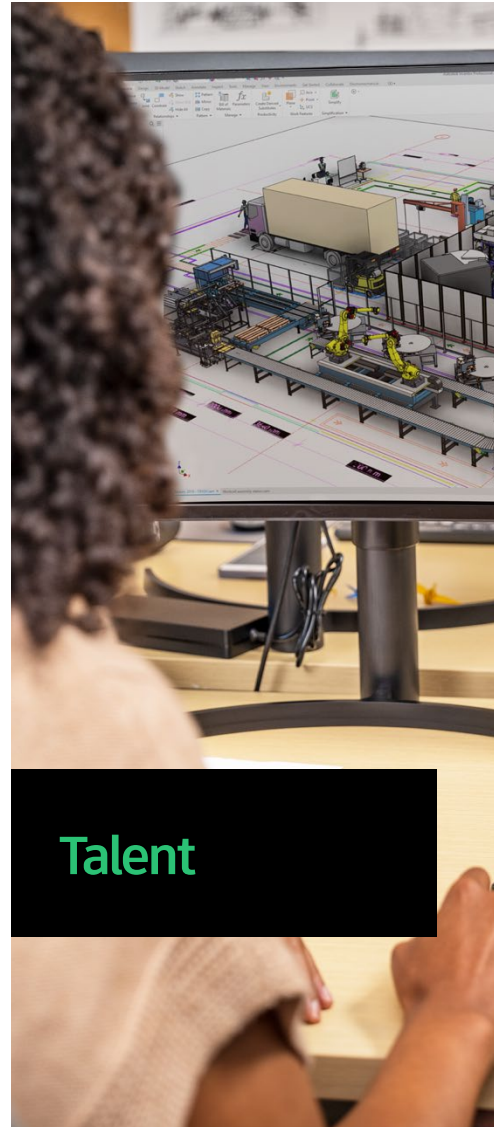
The design and manufacturing (D&M) industry has undergone a seismic shift in sentiment over the past year, driven by groundbreaking technological advancements, increasing cost concerns, and a new focus—from both the public and private sectors—on sustainability. D&M leaders and experts are optimistic about the global landscape, as well as their companies' resilience, preparedness, performance, investments, and level of digital transformation, a noticeable change from Autodesk's 2023 *State of Design & Make* report. This sentiment was reflected in our qualitative interviews, where leaders said the economy's seemingly soft landing after years of recession fears inspired much of their confidence. But with this confidence, a new concern emerges—cost control, which now trumps talent as a top business challenge.

Also new this year was the understanding that artificial intelligence (AI) is a tool for

today rather than a futuristic pipe dream, and with that understanding, a surprising degree of trust. Leaders are embracing AI and emerging technology and the possibility of productivity gains through automation, augmentation, and analysis. One benefit of this urgency is improved sustainability. AI has risen to the top spot in terms of technologies leaders are using to make their businesses better able to meet sustainability goals.

This acceptance of AI has shown that new technologies have the power to transform organizations. Leaders that want to stay competitive in an industry as rapidly innovating as D&M need to focus on harnessing the power of their internal data, attracting, training, and retaining tech-savvy talent, and leaning into sustainability efforts that provide long-term revenue opportunities.

Key themes



Top insights

Business resilience



1. **Optimism is returning:**

Leaders feel their companies are far more resilient than last year



2. **Cost control** has risen above talent as the top challenge for businesses



3. **Digitally mature companies** are reporting even greater success



4. Companies are already making meaningful progress on their **AI adoption journeys**

Talent



5. **Upskilling** is essential but out of reach for many



6. Companies are taking a multi-pronged approach to solving the **talent problem**

Sustainability



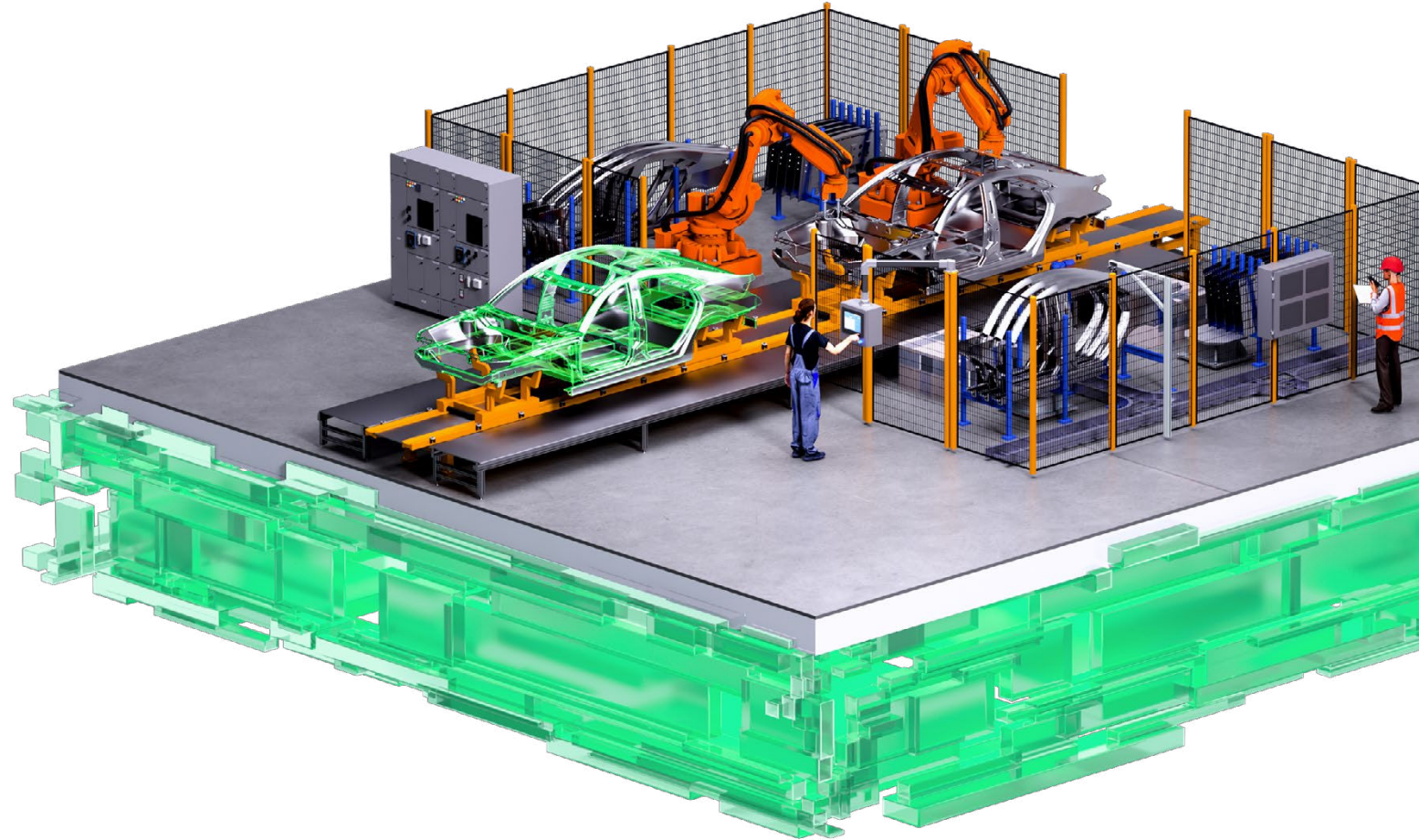
7. Companies are taking **sustainability seriously**



8. Sustainability is improving both **short- and long-term business health**

Business resilience

Digitization boosts business resilience amid continued challenges



BUSINESS RESILIENCE

A positive outlook, new challenges and the value of digital tools

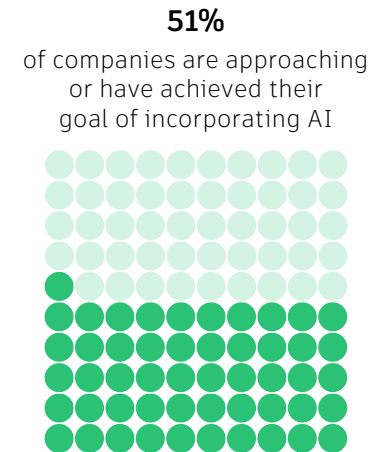
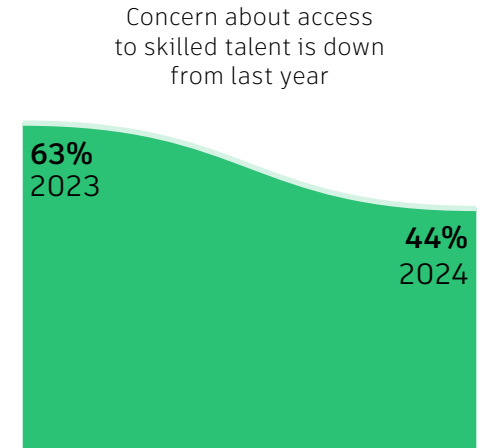
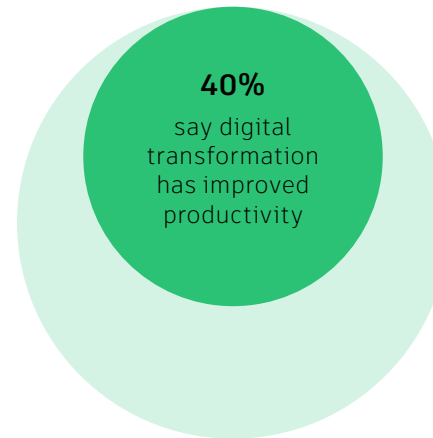
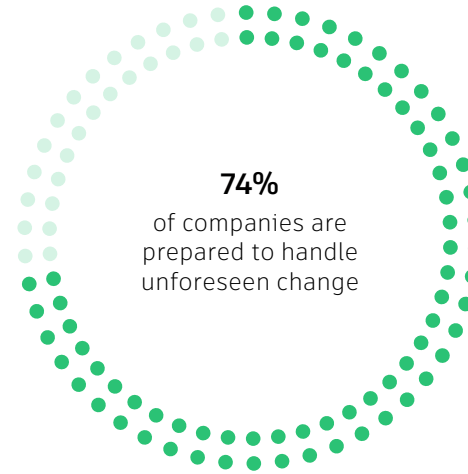
In a word, business leaders and experts this year are optimistic.

While they continue to face significant challenges, the past few years have proven how resilient their organizations are. As a result, they feel far more confident than they did last year in their companies' ability to tackle challenges effectively.

In the overall sample, talent took the top spot last year among business challenges, with organizations struggling with both

talent acquisition and retention. This year, cost control outweighs labor concerns, followed by product and service innovation and environmental sustainability.

Keeping up with the rapid pace of technological change—including artificial intelligence—is another important challenge, but one that presents significant opportunity for companies able to make strategic investments. Professionals report an array of benefits from digital investments, but they also say that costs, a lack of time, and skills gaps all present barriers to their digital transformation efforts.



INSIGHT 1

Optimism is returning

Design and manufacturing companies are more prepared than before to face an uncertain future.

Last year, survey respondents emphasized the sense of uncertainty brought about by the global pandemic, geopolitical turmoil, and economic instability in many markets, with many businesses struggling to attract and retain the talent they needed to grow.

This year, business leaders and experts in D&M are much more confident. Seventy-four percent say their companies are prepared to handle unforeseen economic or geopolitical changes, compared to 56% in 2023.

This confidence is due in part to the fact that businesses have successfully navigated a series of unprecedented

challenges over the past several years, including coming out of COVID and combating ongoing supply chain issues.

Companies are also proactively improving their positions, taking steps such as planning new offerings, entering new markets, increasing agility, and diversifying supply chains. The more of these steps a company takes, the more confident leaders feel about the future.

Businesses are also performing better and keeping pace with their competition. Sixty-nine percent of leaders and experts say their companies outperformed expectations last year. And in 2024, only 7% say that their company is not keeping up with the rate of change in their industry this year, down from 14% in 2023.



54%

of D&M leaders and experts say the global landscape feels more uncertain now than three years ago, compared to 78% in 2023

INSIGHT 1

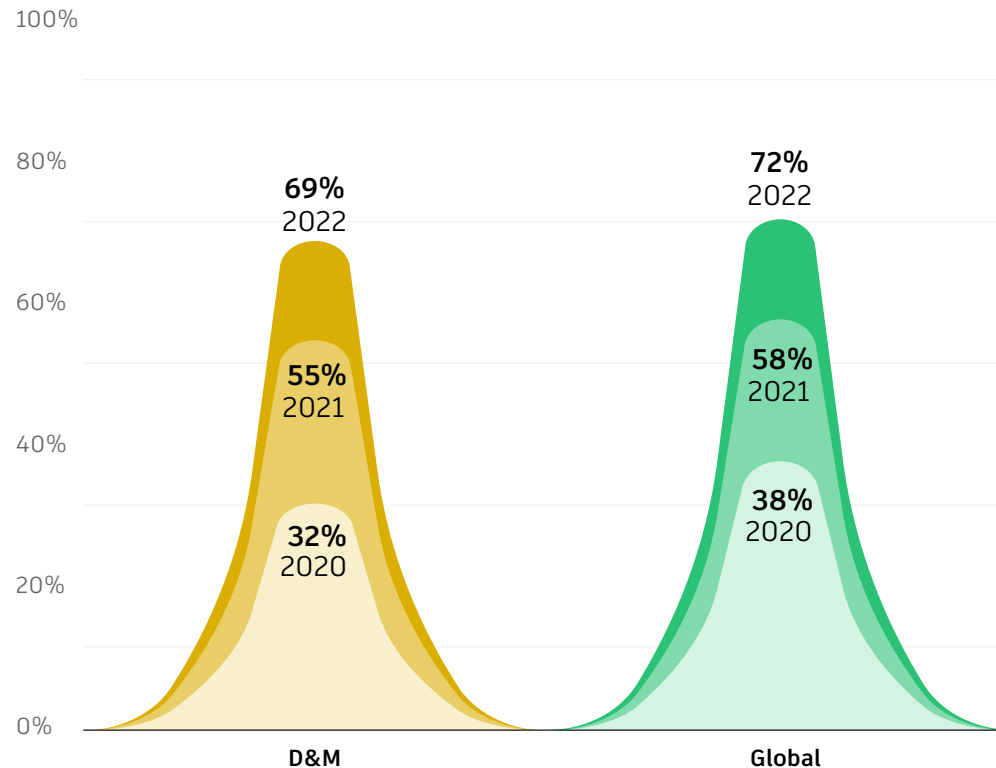
Resiliency measures are tied to confidence

At companies that take more steps to boost resilience, leaders and experts are more confident about the future.

This year's survey asked about company efforts to plan new offerings, enter new markets, increase agility, and diversify supply chains. At companies where leaders agree that they are taking these measures, respondents feel much more equipped to face down future uncertainty.

D&M company performance is improving

Percentage of businesses that outperformed corporate expectations



Survey question: How has your company or organization performed compared to corporate expectations in each of the last 3 years? In 2020, in 2021, in 2022. 5-point scale. Top two = above average performance.

INSIGHT 1 – D&M

“The key to becoming more resilient is navigating the pace of change and making sure the organization has enough agility to **lean in when it’s appropriate, adopt new things quickly, and manage risk** around that.”

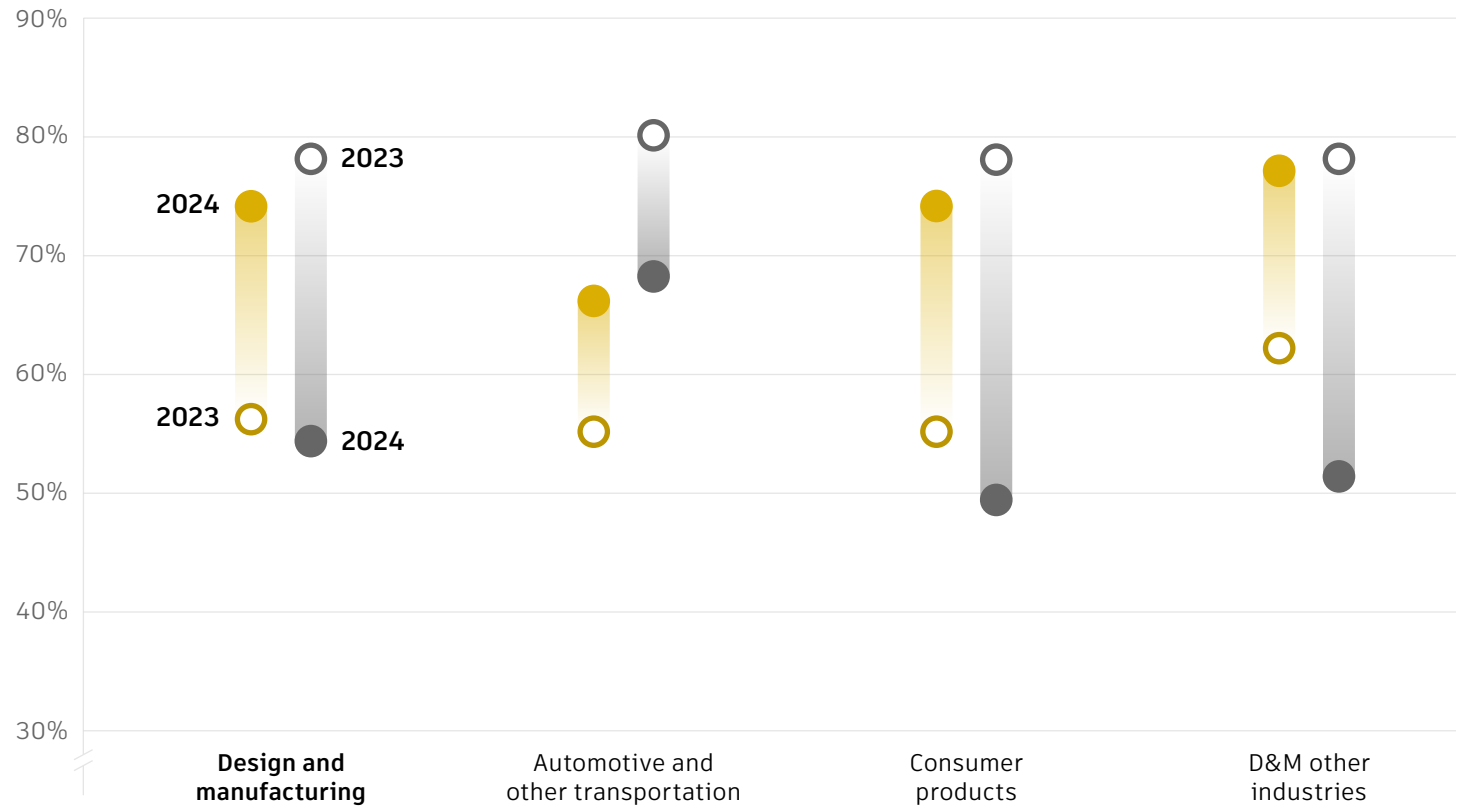
–Dave Mackenzie, Managing Principal for Digital, Aurecon, a design, engineering, and advisory firm

“After the pandemic, we are now actually more accustomed to using digital platforms and collaborating online, and **we have improved our analytical processes.**”

–Cucu Juanda, Division Head of Business Systems and Automation, PT Sanggar Sarana Baja, an industrial machinery company

Not all D&M organizations are equally ready for the unexpected

- My company is prepared to handle unforeseen future changes
- The future global landscape feels more uncertain now than 3 years ago



Percentage of respondents who agree with statements: 1. My company is well prepared to handle unforeseen future macroeconomic and geopolitical changes. 2. The future global landscape feels more uncertain now than 3 years ago. 5-point scale. Top two = agree. Note: Automotive sample size in 2023 is small.

INSIGHT 2

Cost control has risen above talent as the top challenge for businesses

Talent remains critical to company success, but it is no longer the top challenge many D&M leaders are facing.

This year, cost control and management is a top concern for many, with 33% of respondents in D&M citing it as their biggest challenge. Leaders at struggling companies are, understandably, even more concerned than others with costs.

Although talent fell this year, it still ranks highly on respondents' lists of top challenges. Attracting, training, and retaining talent is a top-three challenge for 28% of business leaders and experts, down significantly from 44% a year ago. Forty-four percent say that access to

skilled talent is a barrier to their company's growth, but that number is down from 63% last year.

"Talent is still a challenge—finding really great talent, talent that can have impact," says Dave Mackenzie, managing principal for digital at Aurecon, a design, engineering, and advisory firm. "We're always mindful of managing costs and the expectations around costs in our business, so it's not a new challenge."

Additional top challenges include product and service innovation (28%), environmental sustainability (26%), data automation (28%), and global economy and events (26%).

The global economy and events, which ranked as a top-three challenge a year ago, has fallen out of the top five this year. However, it is important to note that survey data was collected before the October 2023 outbreak of conflict in the Middle East.

The challenges facing organizations are not siloed, but rather intersect with one another, forcing decision-makers to weigh competing priorities—for instance, opting for only those sustainability measures that offer a return on investment in the form of energy savings.

26%

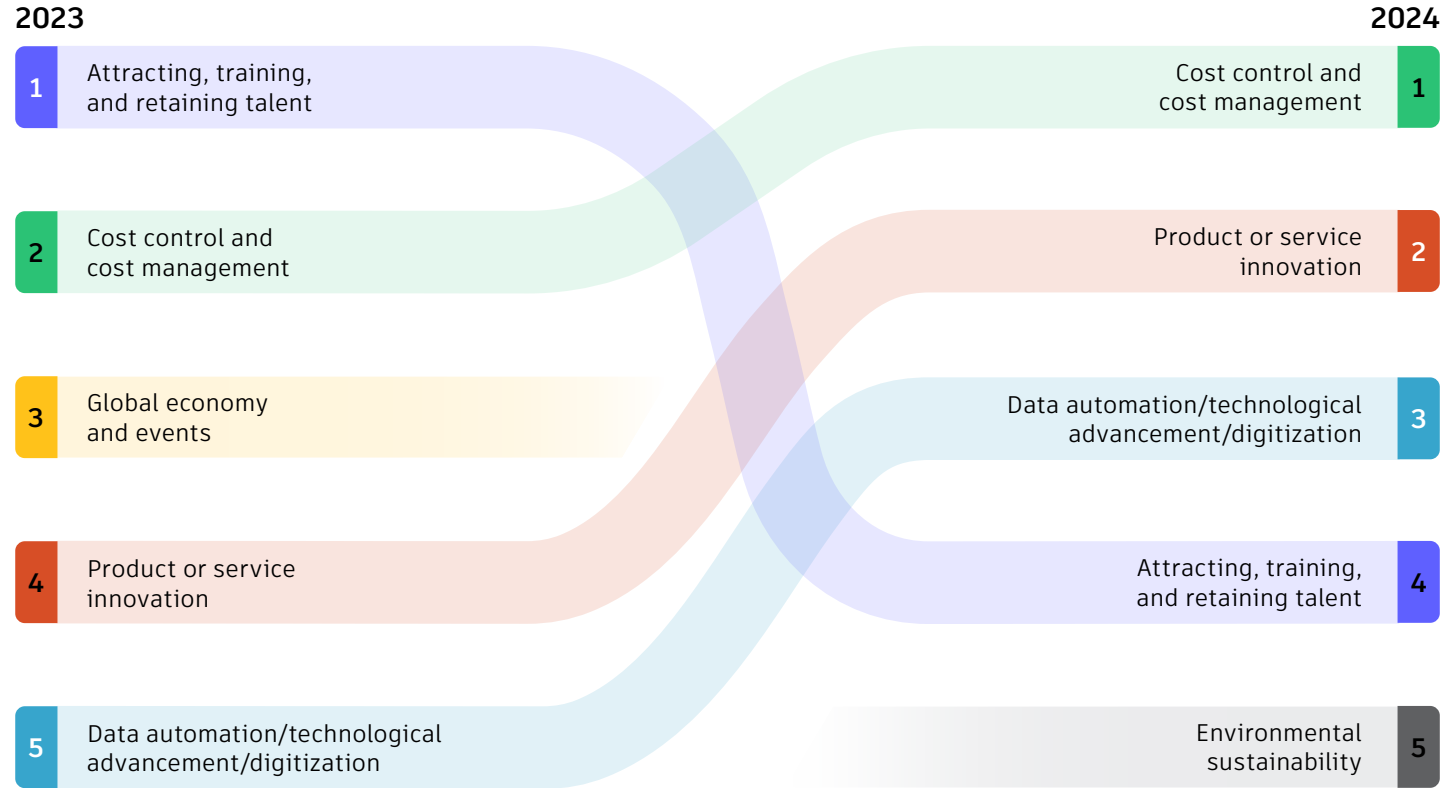
of D&M organizations have strongly increased investment in technology to deliver improved project outcomes over the past 3 years



INSIGHT 2

Cost control emerges as the top business challenge in D&M

Top 5 challenges showing year-over-year change



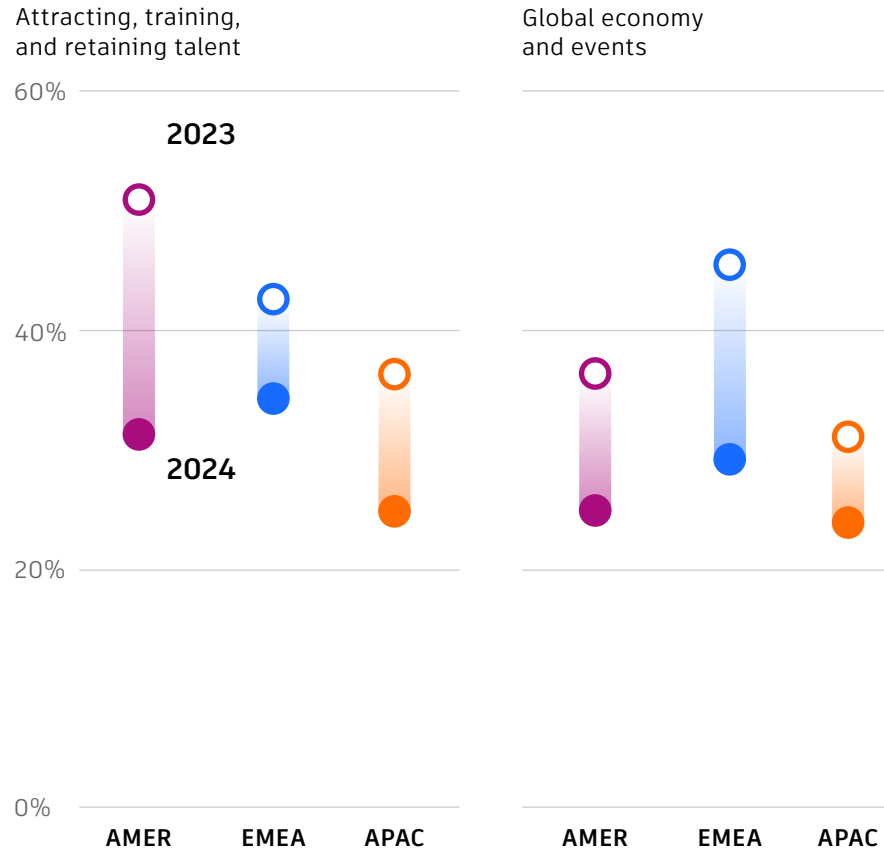
Survey question: What are the top 3 challenges your company or organization faces today? Select up to three.

INSIGHT 2 – GLOBAL

Talent and global events pose less of a challenge

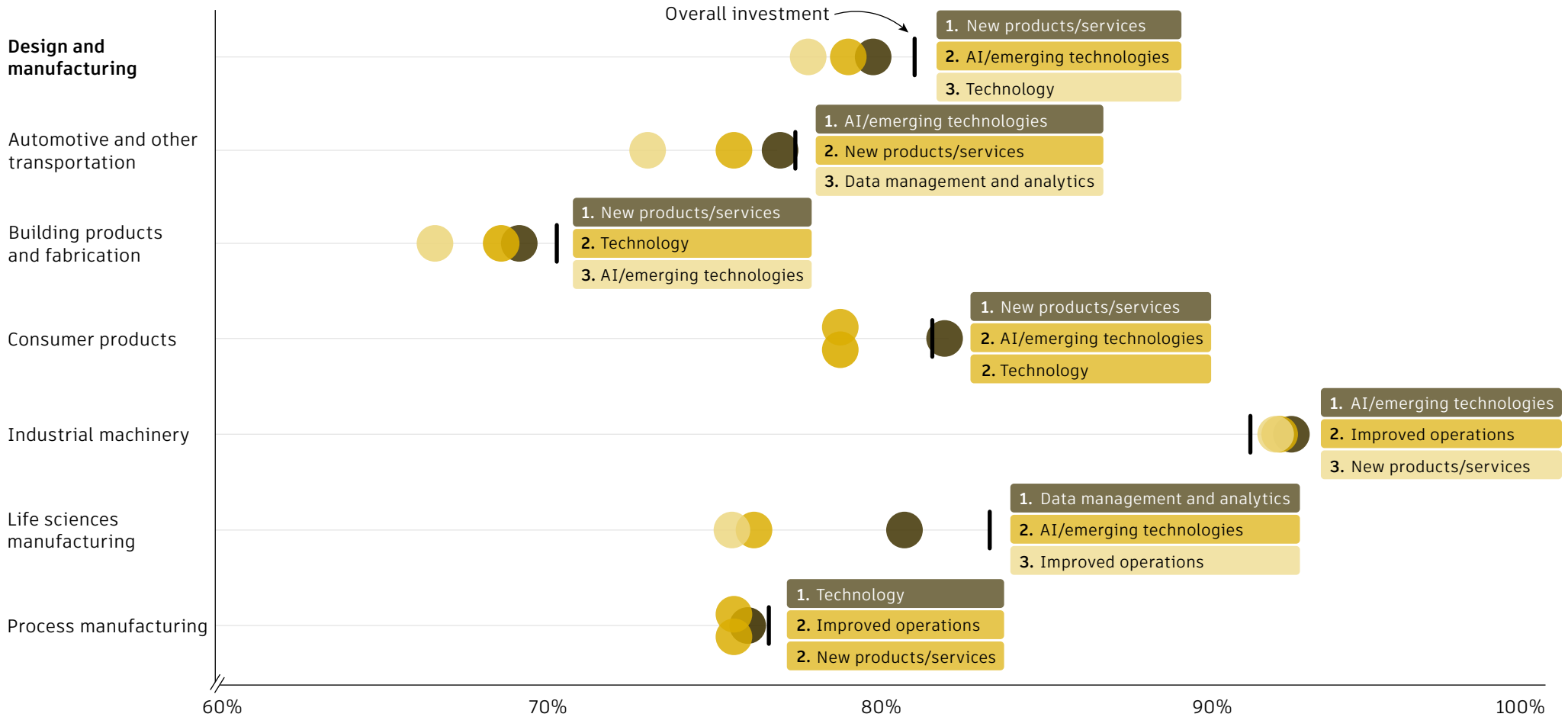
While talent may not be the top challenge facing organizations today, Dave Amantea, chief design officer at Automobili Pininfarina notes that it's an issue that will remain top-of-mind. "Hiring is always an issue in any era, in any company, in any field. The needs and attitudes of every generation are completely different."

D&M regional change in talent and global struggles



Percentage of D&M respondents who selected "attracting, training, and retaining talent" and "global economy and events (e.g., wars, pandemics, inflation, strikes)" as their top challenge. Survey question: What are the top 3 challenges your company or organization faces today? 12 response options.

Top priorities for future investments differ among D&M segments



Axis: Percentage of respondents who say investments will increase in each area.
 Survey question: How do you think your company or organization's investment in these areas will shift in the next 3 years? 5-point scale. Top two = increase.

INSIGHT 3

Digitally mature companies see greater business success

Design and manufacturing companies that invest in digital transformation are seeing dramatic results. They are more competitive in their industries, their employees are more productive, and they see overall better performance than companies with lower levels of digital investment.

These differences are apparent when comparing companies that invest more or less than 45% of their revenue in technology—and the results create a compelling case that effective digital transformation investments are now essential to business success.

At organizations with higher levels of investment in technology, respondents are more likely to rate their performance highly. And at companies with higher levels of investment, respondents feel their organizations are keeping up with changes in their industry.

“We’ve been on this digital transformation journey for many years,” says Dave

Mackenzie of Aurecon. “It’s really come to life over the past year and energized the business. It’s become a Trojan Horse for driving other changes because that vision has gotten so much clearer.”

Respondents have selected a variety of digital transformation benefits. The productivity gains tied to digital transformation are nothing short of eye-popping. In D&M, 40% say digital transformation improves productivity. Globally, respondents say their productivity has improved by 63%.

For greater impact, Dave Amantea and leaders at Automobili Pininfarina have found a way to balance digital transformation with company culture. “We’ve introduced a completely new design process to speed up workflows and achieve our targets. Digitalization in the automotive industry is vital, but we’ve found a good balance between full digitalization and maintaining the heritage of the company.”

“Part of digital transformation is helping customers develop their own digital strategy. We have a business & digital consultancy, for example, that helps customers along their digital journeys. There’s also a group focused on creating bespoke data solutions for our customers and digital twins, besides our generic Twinn Product Solutions business that includes for example delivery of climate risk data.”

—David de Graaf, global director, digital at Royal HaskoningDHV, a consulting engineering firm providing solutions for the natural and built environment

INSIGHT 3

Benefits to effective digital transformation

In this report, “digitally mature” companies are defined as those that are approaching the goal or have achieved the goal of their digital transformation journey.

Respondents from digitally mature companies are more likely than their peers to report that they ...

... have experienced “above average” or “exceptional” **performance** +37%

... have “increased” or “strongly increased” **investment** in the past 3 years +37%

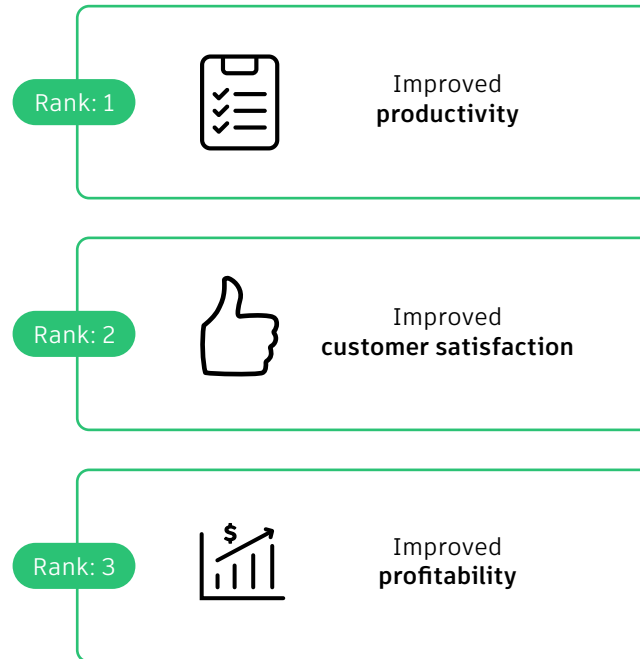
... have kept up “very well” with **change in the industry** +22%

... “agree” they are **prepared** for the future +29%

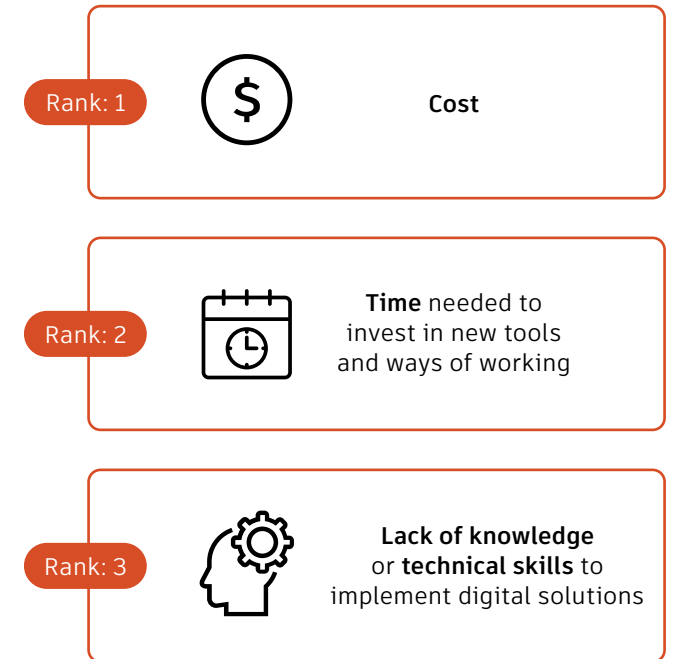
... are “very effective” at **leveraging data** +20%

Top advantages of—and barriers to—digital transformation

Advantages:



Barriers:



Top ranked response to survey question: Has your company or organization experienced any of the following benefits of digital transformation?

Top ranked response to survey question: What are the barriers to digital transformation in your company or organization?



INSIGHT 3

Barriers to effective digital transformation

The benefits of digital transformation are significant, but a number of barriers prevent companies from investing at the levels they would like. Thirty-eight percent of respondents said that cost was a barrier and 35% felt the time needed to invest in new tools and ways of working was holding them back.

Leaders and experts note that implementing new tools is not enough to drive effective digital transformation. Rather, these solutions must be accompanied by process improvements and a shift in mindset, both from employees and leadership. “Mindset is the number one barrier to digital transformation,” says

Miro Lin, chief executive officer of Machine Tool Business Group (Taichung) at Fair Friend Group, a machine and equipment manufacturing firm. “People want to do what they’re good at. We call it habitual resistance to something which they’re not familiar with.”

Tedi Supriyadi, Head of Business Systems and Automation at PT Sanggar Sarana Baja, an industrial machinery company, notes that, along with internal stakeholders, customer mindsets must also shift: “We’ve made good progress on our digital transformation journey. Business process mapping is already done and we are now strengthening the business system platforms. A key challenge will be how we change the culture of our customers—they are our partners in this digital system.”

INSIGHT 3 – GLOBAL

Digital maturity is now the norm

Perceptions of digital maturity have flipped in just one year.

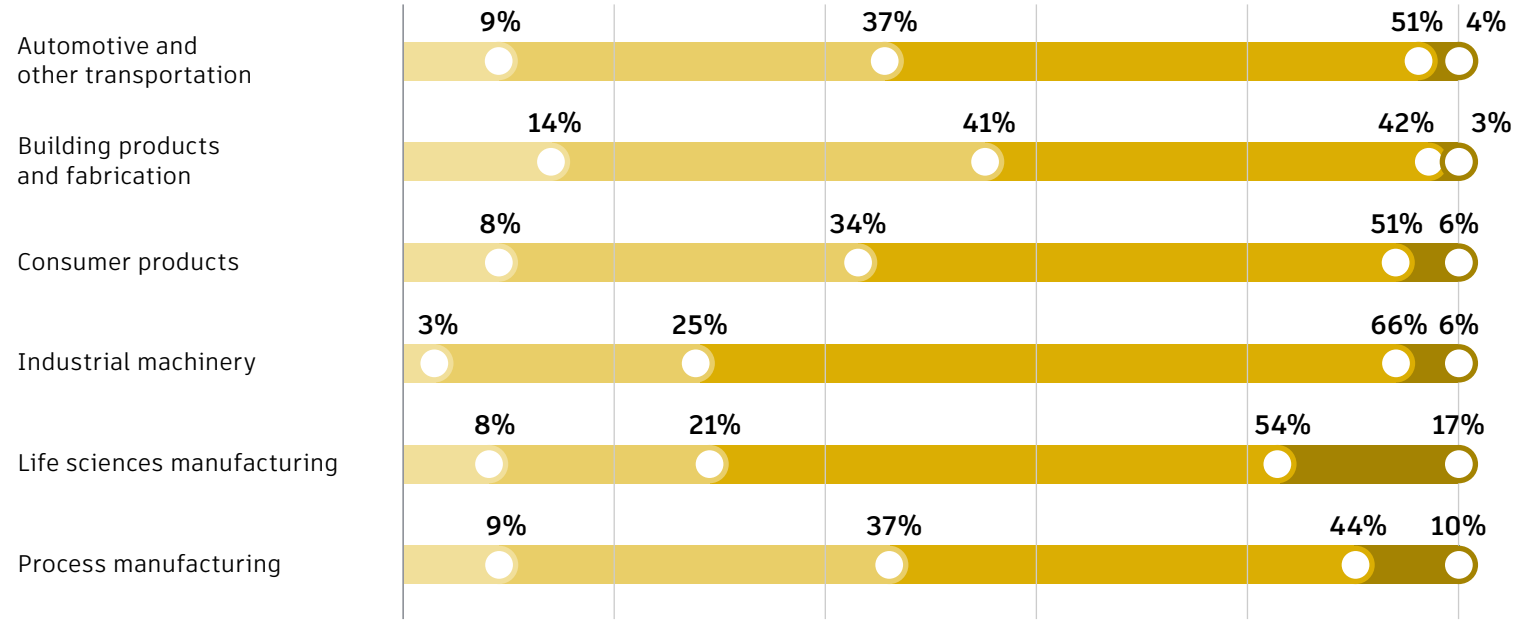
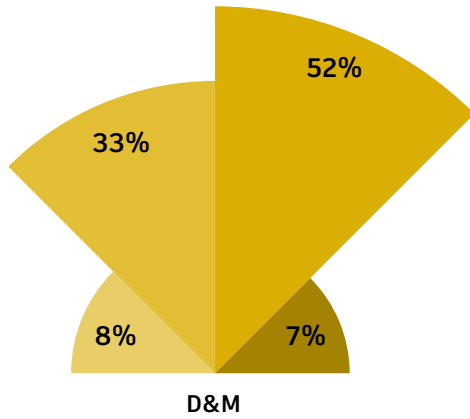
In D&M, 59% of respondents say their companies are digitally mature, compared to last year, when 70% rated their organizations as “less digitally mature.” This suggests that digital transformation has reached something of a tipping point—with businesses seeing the positive impact of their digitalization efforts, and then continuing to invest to keep up with their peers.

Indeed, effective digital transformation initiatives have now become a necessity for many organizations to stay competitive. “Opinion Leaders have really embraced a strategy of digitizing their networks and integrating all their data on a single tool,” says Jean-Francois Guiderdoni, director of business development at ACWA Robotics, a robotics solutions company. “We don’t intend to be just a smart water interface to customers; we intend to bring data that no one is able to provide. Data is gold.”



Most D&M segments are approaching their digital transformation goals

● Early stage
 ● In the middle
 ● Approaching the goal
 ● Achieved the goal



Survey question: Where is your company or organization in their digital transformation journey? 4-point scale. Values do not add up to 100 due to rounding.

INSIGHT 3 – D&M

What does digital maturity mean for D&M companies?

Digitally mature D&M companies outpace their peers in a number of important areas.

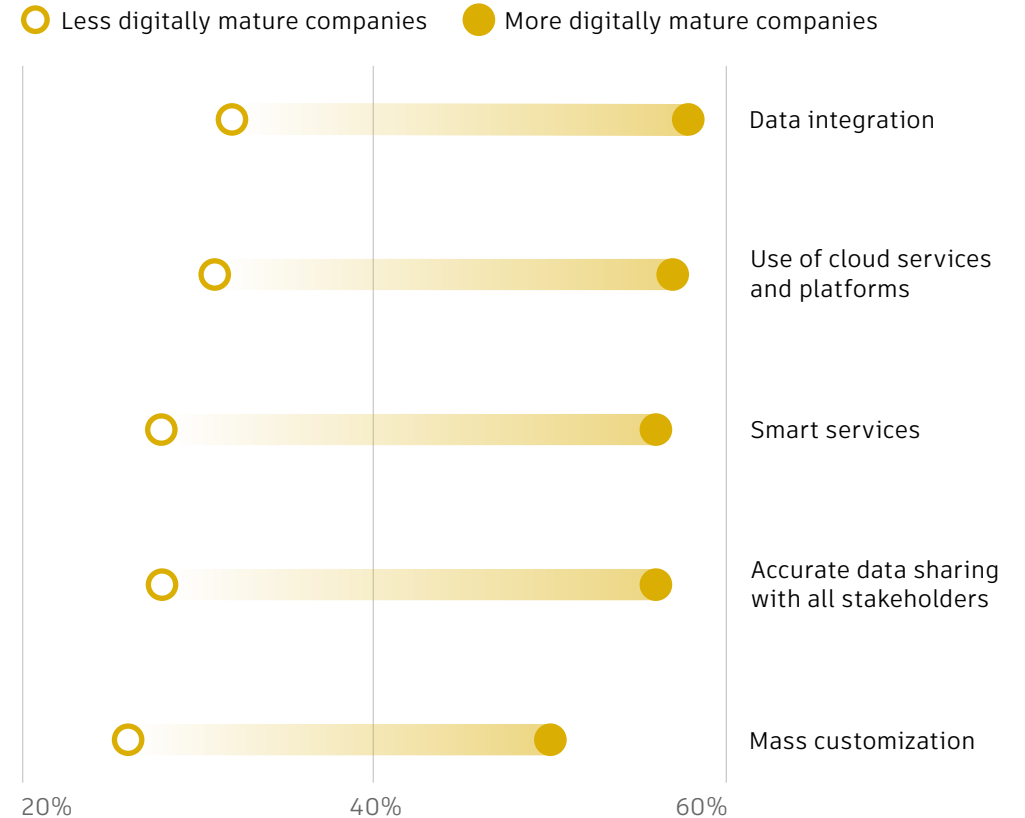
In interviews, D&M leaders and experts describe how they have improved a wide array of workflows and systems through digital transformation. For example, some say they have not only embraced automation and digital twins in production, but that they also are also improving supply chain and finance processes through digital transformation.

In interviews, D&M professionals describe how they have improved a wide array of workflows and systems through digital transformation. For example, leaders at some firms say they have not only embraced automation and digital twins in production, but that they also are

also improving supply chain and finance processes through digital transformation. Dave Mackenzie of Aurecon—a design, engineering, and advisory firm—notes that digital maturity doesn't just mean investing in technology, but also managing these tools effectively to yield positive business outcomes. "We've developed a digital maturity framework with six or seven key specializations that we've identified as important to our business," he says. "Each part of that framework is connected back to client value."

The industrial machinery and aerospace sectors lead others in D&M when it comes to data integration, with 60% and 56% of respondents from these sectors respectively saying their organizations are "very mature" in this area. The building products sector lags in the use of cloud services, with only 34% of respondents saying their companies are "very mature."

More digitally mature D&M companies are also more process mature



Percent of respondents who selected "very mature" in each process.
Survey question: In your company or organization, how mature are the following? 5-point scale.
See glossary on p.53 for the definition of digital maturity.

INSIGHT 4

Companies are making meaningful progress in their AI adoption journeys

Businesses are bullish on artificial intelligence.

Already, product design and manufacturing organizations are uncovering valuable, industry-specific AI applications—with uses ranging from automated transcription of meeting minutes, to robotics, to assistance laying out factory floors. In the future, leaders and experts predict generative AI will increasingly help human workers to make crucial design decisions about physical products, buildings, and digital assets.

Fifty-one percent of D&M leaders we surveyed say they are approaching or have already achieved their goal of incorporating AI into their companies—a perhaps surprising number, given that AI is still an emerging technology. An even larger portion say that AI will enhance their industry and be “essential across the board” within two to three years.

“We want to lead in the AI space because we see the potential,” says Dave Mackenzie of engineering firm Aurecon. “People think the large language models are just text chat but the reality is, it’s about semantic similarities and connections. If we had

a semantic understanding of a drawing from a large language model, what would that mean for us in terms of how we can interrogate our drawings at scale? There’s a tremendous amount of power in being able to draw insights across extremely complex data sets.”

While much of the conversation about AI in design and make industries centers on generative design, companies are also exploring use cases that streamline or enhance back-office processes. Overall, the top use cases for AI today are increasing productivity and automating mundane, repetitive tasks.

80%

are confident that their company will make the **right decisions** regarding AI

80%

agree AI will **enhance** their industry

80%

agree AI will make the industry more **creative**

65%

agree in 2–3 years, AI will be **essential** across the board



“The biggest risk of AI is actually the more about the data and less about the model.

Where’s the data come from? If I can’t trust the data. I’ve got no hope of trusting what the model is doing.”

—Dave Mackenzie, managing principal for digital, Aurecon, a design, engineering, and advisory firm

INSIGHT 4

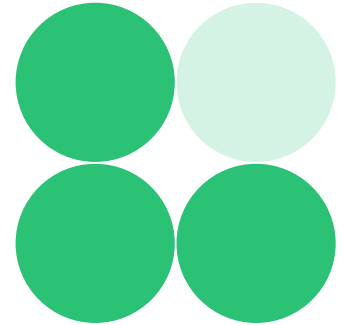
AI as trusted tool vs. AI as threat

Trust in AI is extraordinarily high, with 78% of D&M survey respondents saying they trust the technology for their industry.

Some leaders, like Tedi Supriyadi, head of business systems and automation at PT Sanggar Sarana Baja, are not surprised by the high level of trust: “It’s not surprising that people trust AI. Millions of people are uploading data to the Internet every day. Companies have been using Big Data platforms for years and now everybody is using ChatGPT. We’re constantly using new technology, so this is not surprising.”

However, this trust is undercut by a vein of cautious skepticism running through interviews with business leaders and experts. Some express doubts that firms are going to be able to trust the technology enough to sign off on critical deliverables, noting that existing AI tools often present errors as facts. Others think that current levels of optimism will dim if bad actors misuse the technology, and 36% of respondents say AI will destabilize their industry.

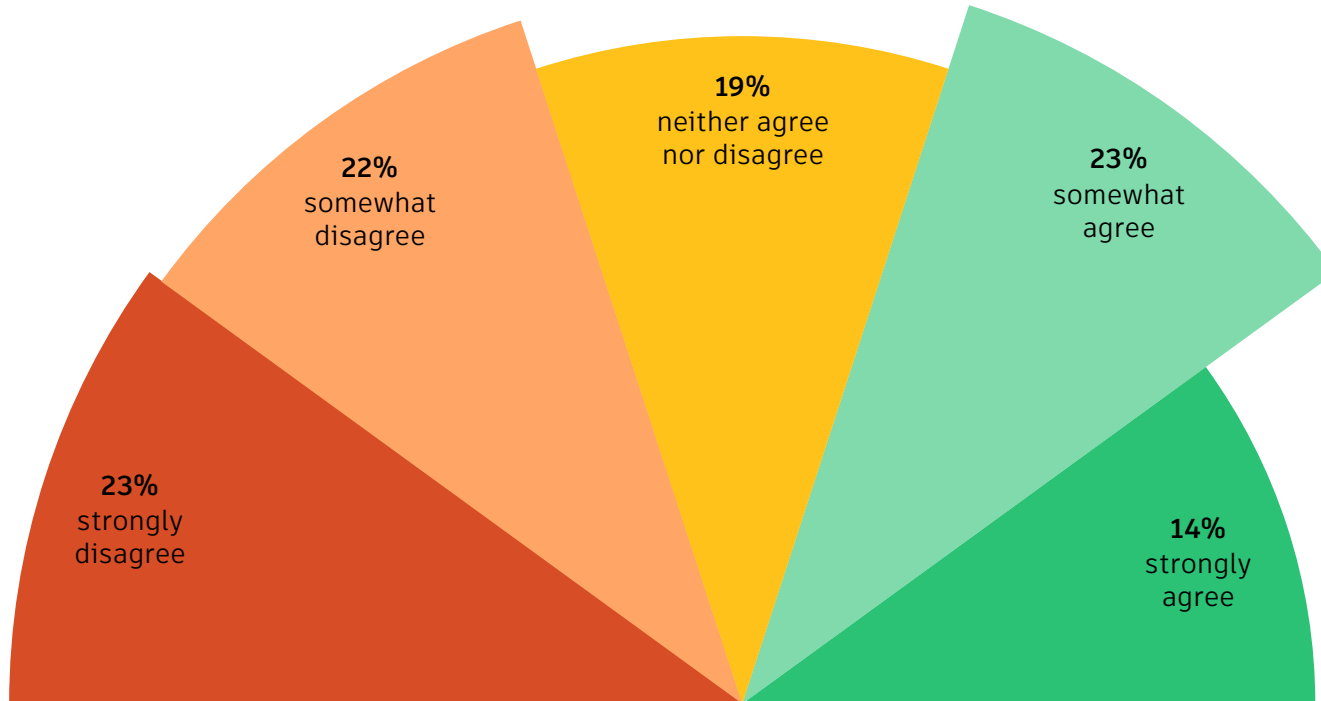
78%
trust AI technologies
for their industry



INSIGHT 4

Opinions are split on the destabilizing effect of AI

Percentage of D&M respondents who agree that AI is a threat



Survey question: When you think about artificial intelligence (AI) in your industry and company, to what extent do you agree or disagree? AI will destabilize my industry. 5-point scale.

INSIGHT 4 – GLOBAL

AI adoption by region and sub-industry

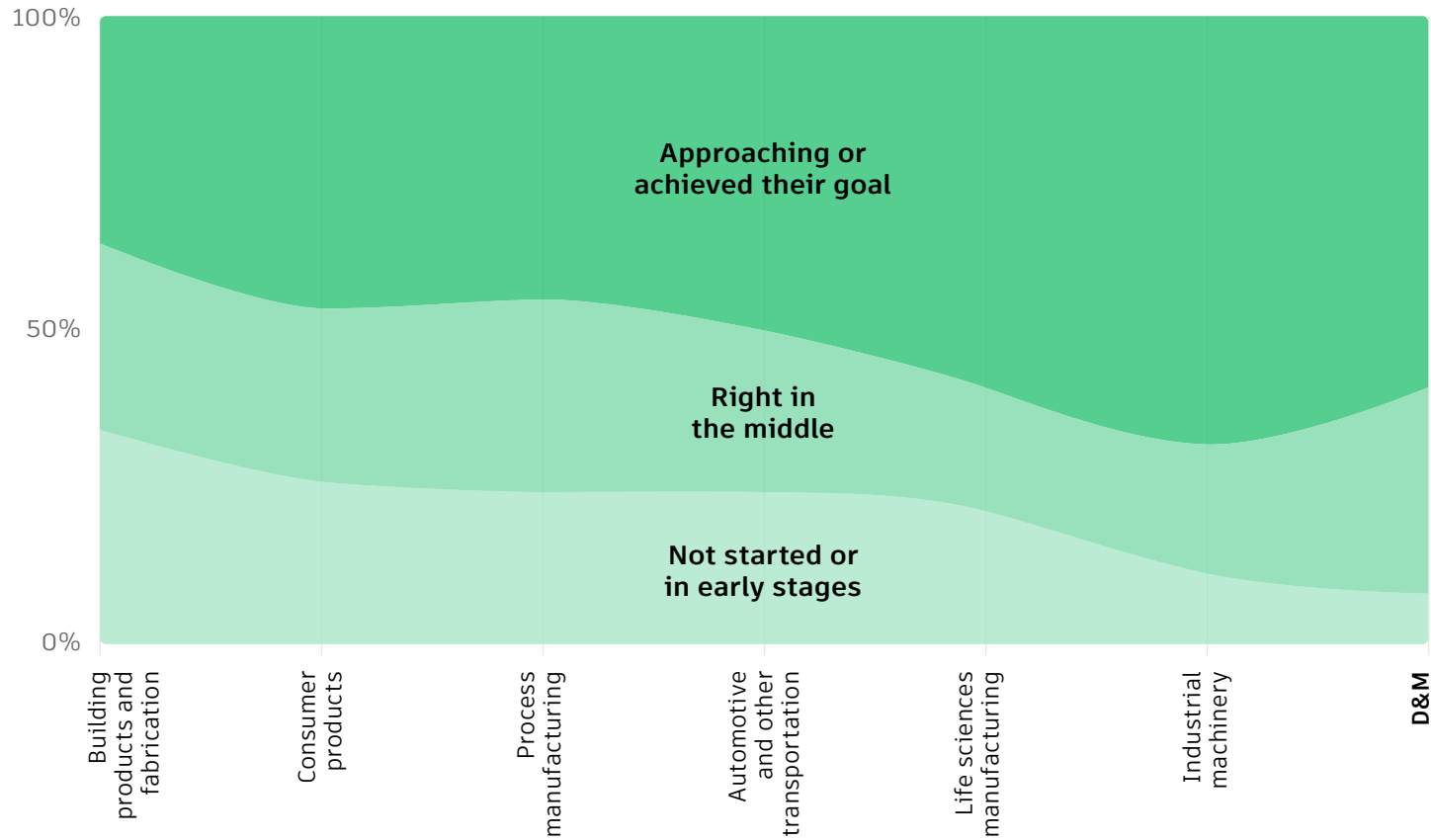
Companies are already exploring different ways to use AI. But regulations around the world have a direct impact on the speed of adoption, and a number of core challenges must also be solved before leaders and experts feel comfortable using AI to its fullest potential. Dave Mackenzie of Aurecon suggests that learning how to integrate AI into human decision-making will be the key to long-term success: “We don’t empower AI-based solutions to make decisions on behalf of a human. A human has to make that ultimate decision.

Generally, engineering firms don’t want to see something going out the door without someone having had a good look at it. Trust in AI is an extremely hot topic. I don’t think anyone has really cracked it as to how to do it well.”

Nonetheless, in Autodesk’s cross-industry generative design and AI-enabled products, user engagement increased by 24% from January 2023 to November 2023 (though this does not take overall subscriber growth into account). APAC led the way with a 55% increase in user engagement.



AI adoption varies greatly among D&M companies



Survey question: Where is your company or organization in incorporating artificial intelligence (AI) technology? 5-point scale.

“AI is going to allow robots to be able to adapt dynamically during their missions. For example, a robot could be taking pictures inside a water pipe. It might detect a crack. If that crack is a certain shape and a certain length, the robot would stop and take a closer look. This is just one way AI can proactively help with pipe maintenance while gathering more accurate data.”

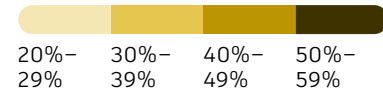
–Jean-Francois Guiderdoni, Director of Business Development and General Manager, ACWA Robotics, a robotics solutions for water management company

“There are challenges but also opportunities. The best opportunity is AI. We can do more, even better, with less. For example, using the same resources as before, we can create three or four proposals at the same time instead of only one.”

–Jinchun Hu, general manager of the JAC Italy Design Center S.R.L., an automotive and commercial vehicle manufacturer

Beyond productivity, AI use cases vary for D&M segments

Percentage of companies that use AI

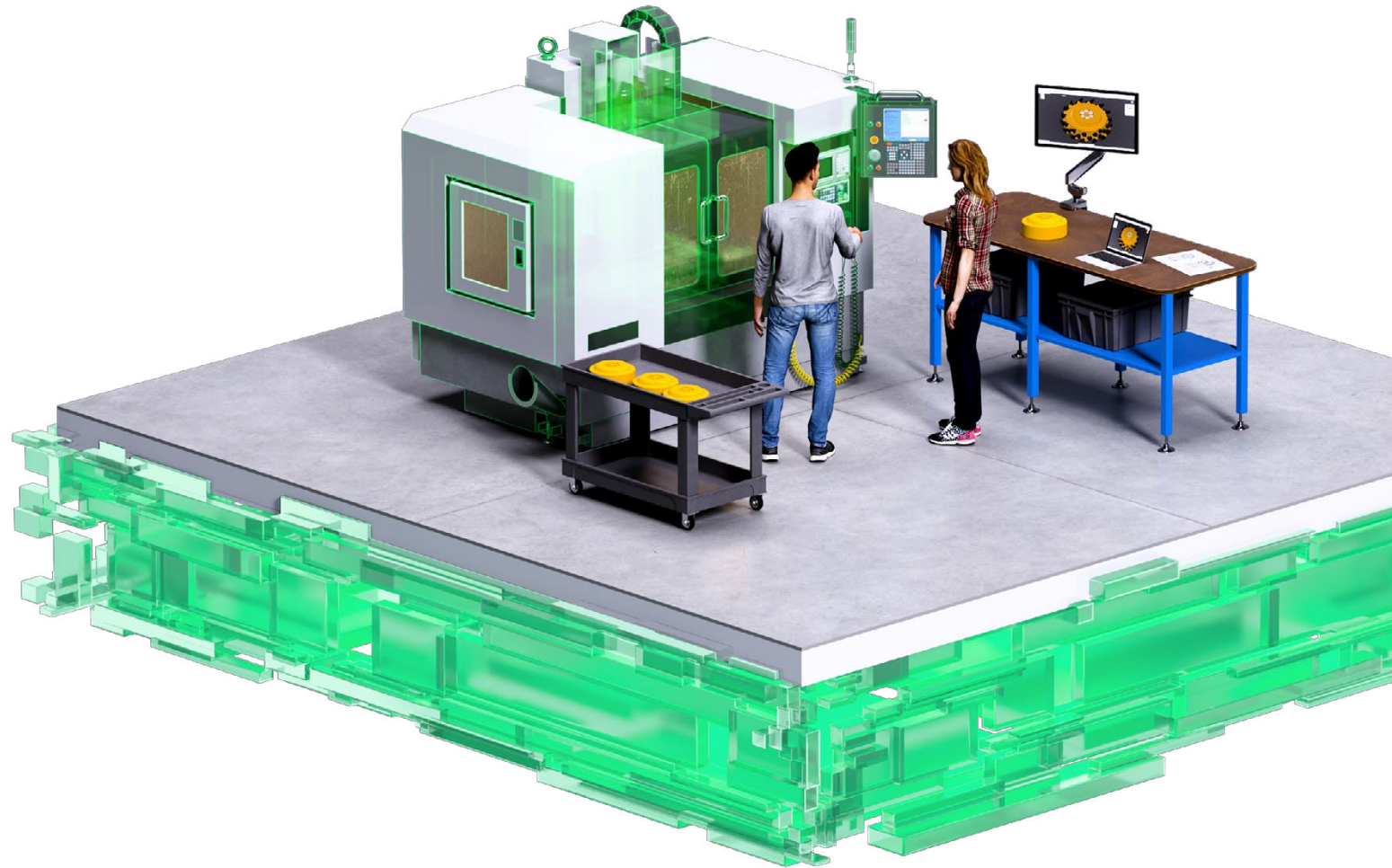


	AI is ubiquitous and will be adopted in all areas	Automating mundane, repeatable tasks	Billing analysis	Identifying product/asset performance gaps	Increasing productivity	Producing informed design options	Supplementing a skills gap	Workplace safety and risk analysis
Design and manufacturing	35%	40%	35%	37%	50%	35%	37%	37%
Automotive and other transportation	35%	37%	32%	34%	48%	31%	37%	36%
Building products and fabrication	37%	37%	33%	38%	51%	41%	40%	37%
Consumer products	33%	46%	35%	37%	55%	32%	37%	36%
Industrial machinery	43%	37%	39%	40%	44%	37%	37%	38%
Life sciences manufacturing	34%	43%	37%	37%	41%	37%	32%	35%
Process manufacturing	26%	41%	34%	38%	59%	38%	36%	41%

Survey question: What are the use cases for artificial intelligence (AI) in your company or organization? Select all that apply.

Talent

Bridging the talent gap





TALENT

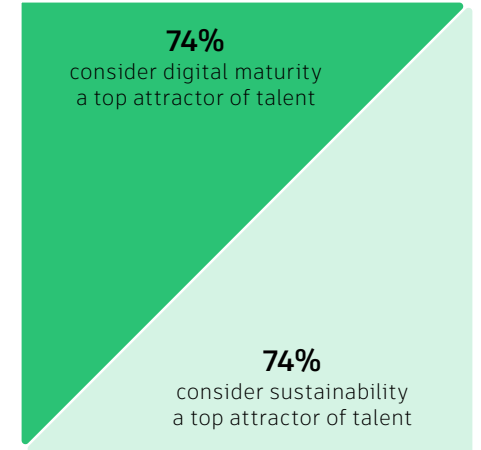
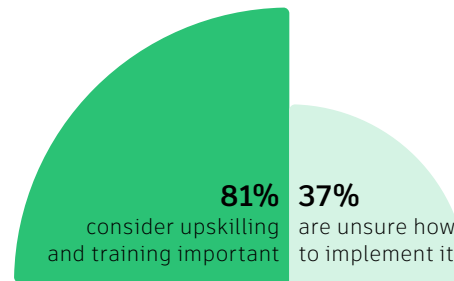
Companies tackle talent challenges with upskilling, digitization, and sustainability initiatives

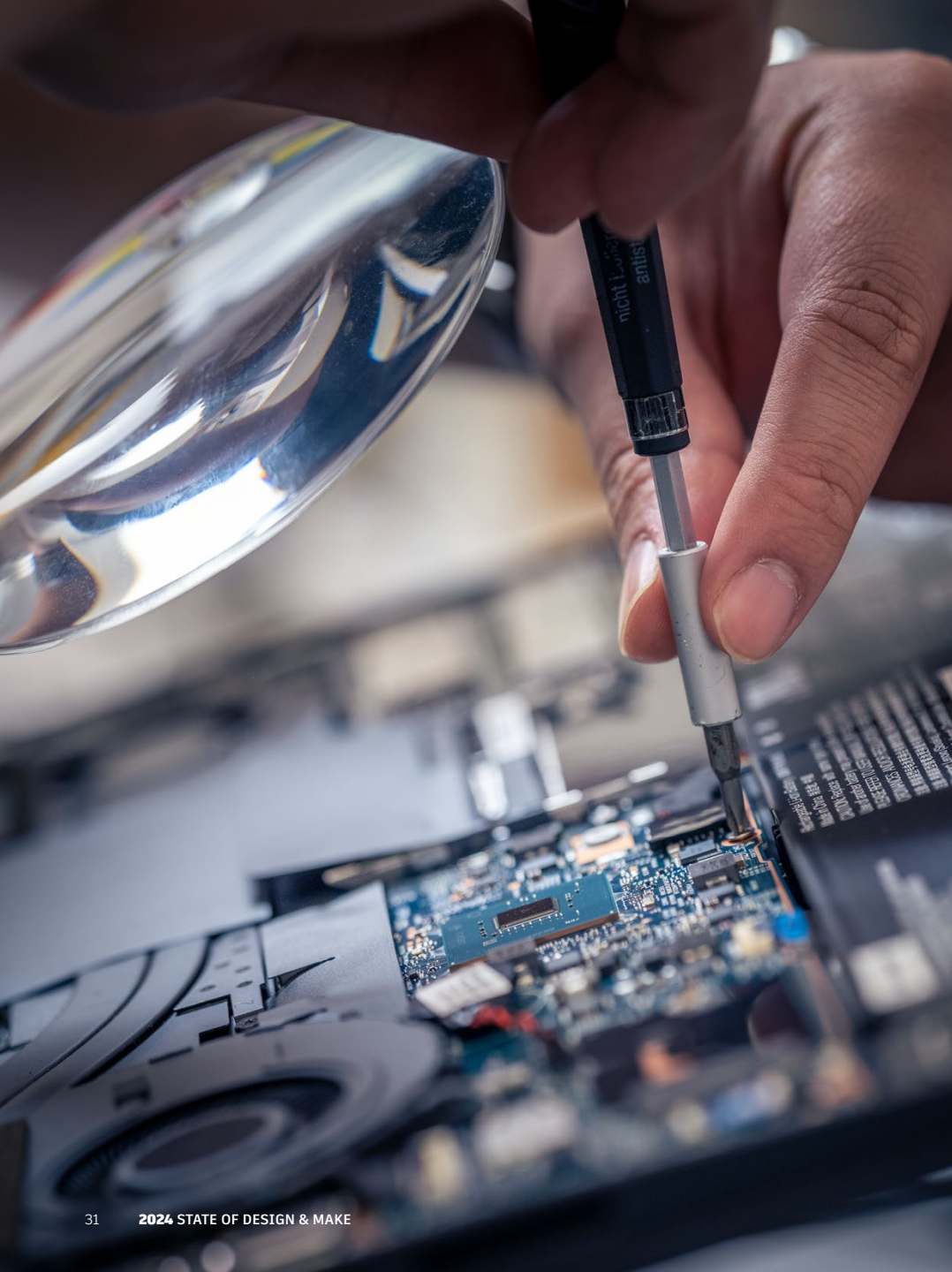
Competition for top talent is less intense this year—but it's not over.

Although talent is no longer considered the top business challenge, attracting and retaining skilled employees is still top-of-mind for most leaders.

The global labor market has shifted in favor of employers, according to the business leaders and experts we surveyed. Still, respondents say their companies are shoring up remaining talent gaps through a mix of training, digitization, and other means.

Companies recognize the importance of developing talent but lack the resources





INSIGHT 5

Upskilling is essential but out of reach for many

Leaders see the value in training and upskilling their workforces, but not everyone knows how, and many organizations lack the expertise needed to design effective internal training programs.

Eighty-one percent of survey respondents agree that upskilling is important, but only 45% say their organizations have the necessary skills and resources to design internal training programs. However, these limitations are not stopping companies from offering any training at all. For instance, 73% are implementing continuous learning.

Organizations that lack internal resources for internal programs are bridging the training gap by enlisting help from third-party training platforms and courses.

Other self-directed learning methods include in-product training for learning digital tools, which already show a level of success—and often at a lower cost than formal training programs. For example, Autodesk's anonymized AutoCAD data shows users are 35% more likely to learn a new command after seeing a personalized insight recommendation.

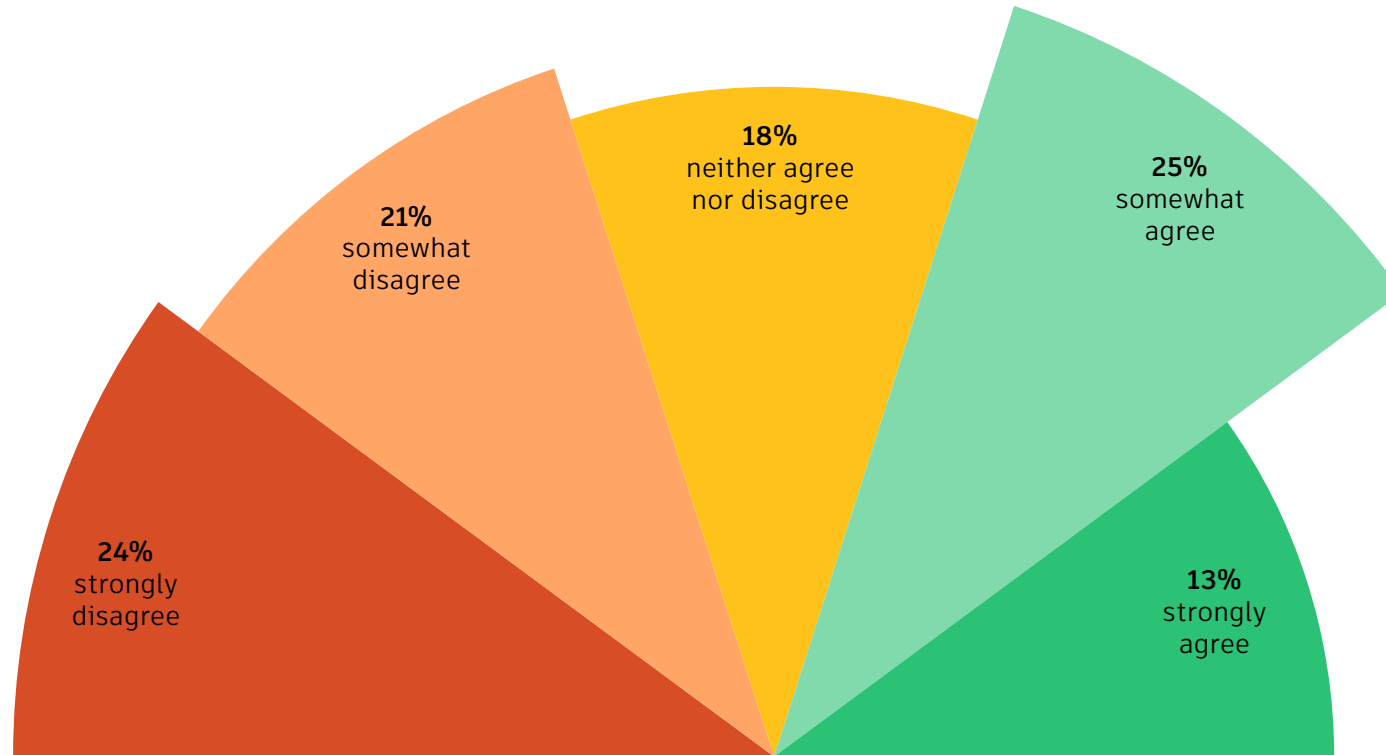
Digital skills in demand

The ability to work with AI has emerged as the top digital skill that organizations are looking for—followed by digital design and software development/programming. Industry professionals say that these skills are essential to unlocking the digital transformation benefits discussed above.

INSIGHT 5

D&M companies lack resources or skills for internal training programs

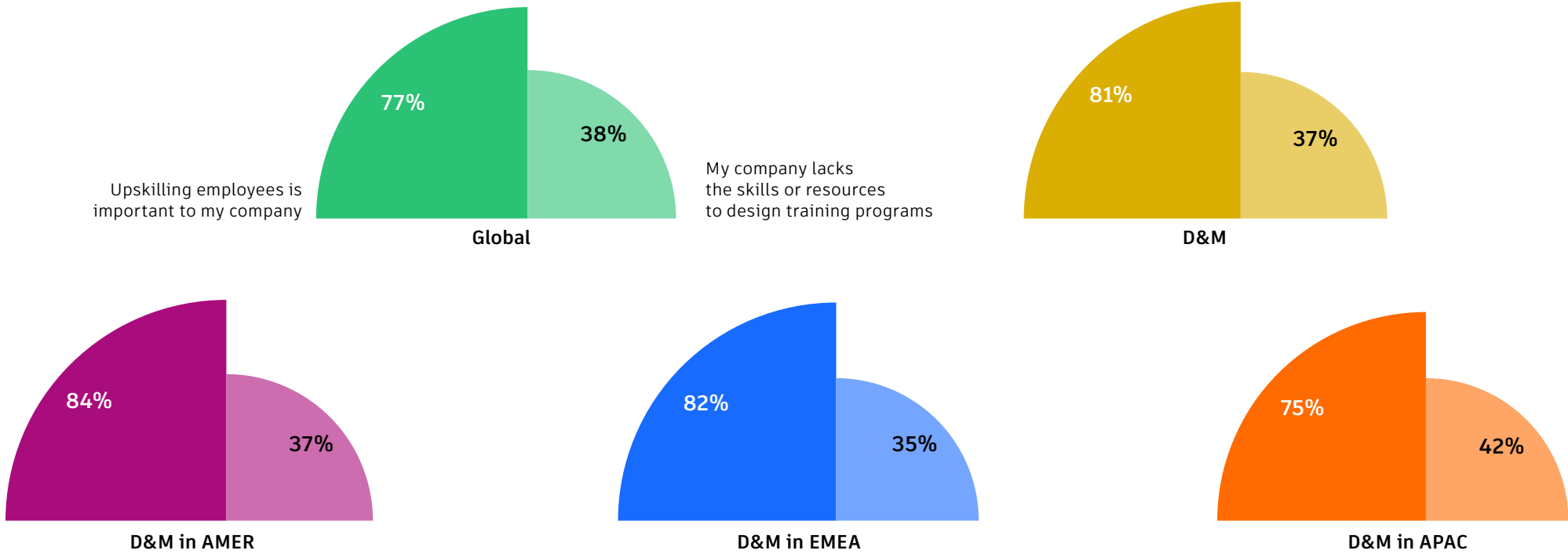
Percentage of respondents who agree they don't have what they need



Survey question: My company doesn't have the skills or the resources to design internal training programs. 5-point scale. Values do not add up to 100% due to rounding.

The global training gap in D&M

Companies value training but lack resources



Percentage of D&M respondents who agree to statements: 1. Upskilling employees is important to my company. 2. My company doesn't have the skills or the resources to design internal training programs. 5-point scale. Top two= agree.

INSIGHT 5 – D&M

D&M skills of the future

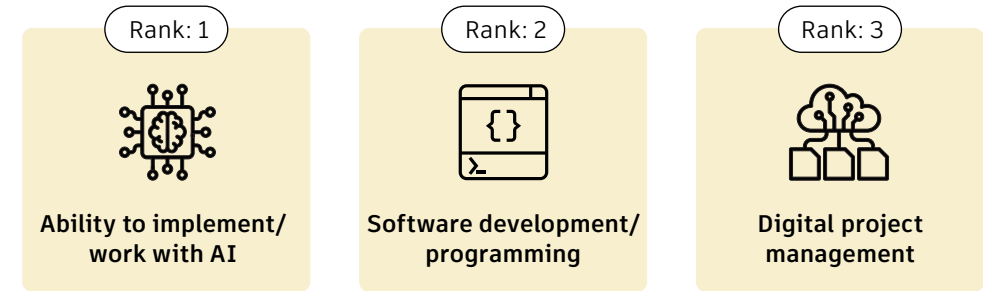
It is not much of a stretch to say that the D&M industry is in a constant state of digital disruption. In just the past several years, the industry has seen a dramatic increase in the use of technologies such as the Internet of Things (IoT), robotics, and digital twins.

Looking ahead, AI is expected to impact virtually all aspects of the industry, through applications such as generative design, predictive maintenance, and supply chain automation. It is little surprise, then, that leaders and experts in the industry say that companies will increasingly need

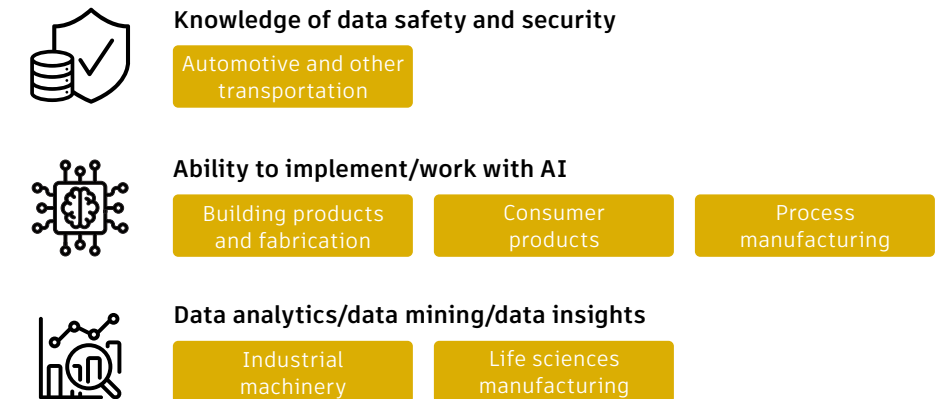
employees with a range of digital skills. Miro Lin of Fair Friend Group, a machine and equipment manufacturing firm, notes: “We need versatile talent with different capabilities—for example, people who are good at not only designing equipment but also programming and using analytical tools,” Lin says.

Industry certification data also shows the growing importance of digital skills in D&M. From 2021 to the end of 2023, there was a 100% increase in Autodesk’s D&M portfolio certifications, reflective of the D&M industry’s rising interest in digital tools.

Top 3 skills of the future



Top industry skills



Survey question: What technical or digital skills do you believe your company or organization will be prioritizing when hiring over the next 3 years? Select all that apply.

INSIGHT 6

Companies are taking a multi-pronged approach to solving the talent problem

Across the board, D&M companies are facing far fewer challenges when it comes to talent. In fact, the number of respondents citing access to skilled talent as a barrier to growth dropped to 28% this year, down from 44% last year.

Part of this shift may be due to changes in macroeconomic conditions, with some major companies initiating large rounds of layoffs in the past year, and the number of job openings in the United States shrinking to a post-pandemic low. However, businesses are also taking steps to

strengthen their company culture to attract potential recruits, help existing employees become more productive, and convince workers to stay for longer.

Employees are attracted to organizations that give them the tools to be productive and successful in their jobs, as well as those whose actions align with their own values. Seventy-four percent of leaders and experts we surveyed say digital maturity helps attract and retain talent, and 67% say sustainability efforts impact job satisfaction.



“The most difficult thing in a company is hiring people with the right attitude. **Skills, you can teach, but not attitude and mentality.**”

—Dave Amantea,
Chief Design Officer,
Pininfarina, a car
design firm



INSIGHT 6

The most common ways companies are bridging the talent gap is by amping up their talent recruitment efforts and by diversifying their training and upskilling efforts.

These include training programs, online courses, and diverse forms of self-directed learning such as in-product cues, whose success makes them a viable alternative to traditional software courses. For example, anonymized Autodesk data shows that Revit and AutoCAD users are more likely to adopt learning recommendations viewed in-product than through other channels—Revit users had a 123% increase in adoption compared to a 55% when viewing learning recommendations through the account portal. AutoCAD users also saw a 44% increase for adoption with in-product recommendations compared to the 35% increase with the account portal.

Competitive salaries and benefits, a more transparent and efficient hiring process, remote work, and fostering diversity and inclusion are also top tools for attracting a broader range of skilled individuals.

Dave Mackenzie of Aurecon notes that, in addition to the above, mentorship and development programs should be a priority at organizations who want to focus on developing top talent: “There is a tightness in the labor market. There’s a stack of engineering work to be done and there’s probably not enough engineers, especially ones with the expertise that you need. Attracting people to the field is a longer-term issue. How do we grow the talent pool and mentor people to develop into really great engineers? If we don’t solve this problem, then we’re always going to be in this position.”

INSIGHT 6

Taking action on talent

Companies are taking diverse steps to tackle their talent challenges.

Organizations that struggle to attract skilled workers and those with an aging workforce are largely focusing on expanded recruitment and training. For those with high rates of attrition, the focus tends to be more on providing career advancement and development opportunities, as well as on compensation and benefits.

Notably, a significant share of respondents who say their companies struggle with talent also say that their companies are not doing anything to solve the problem.



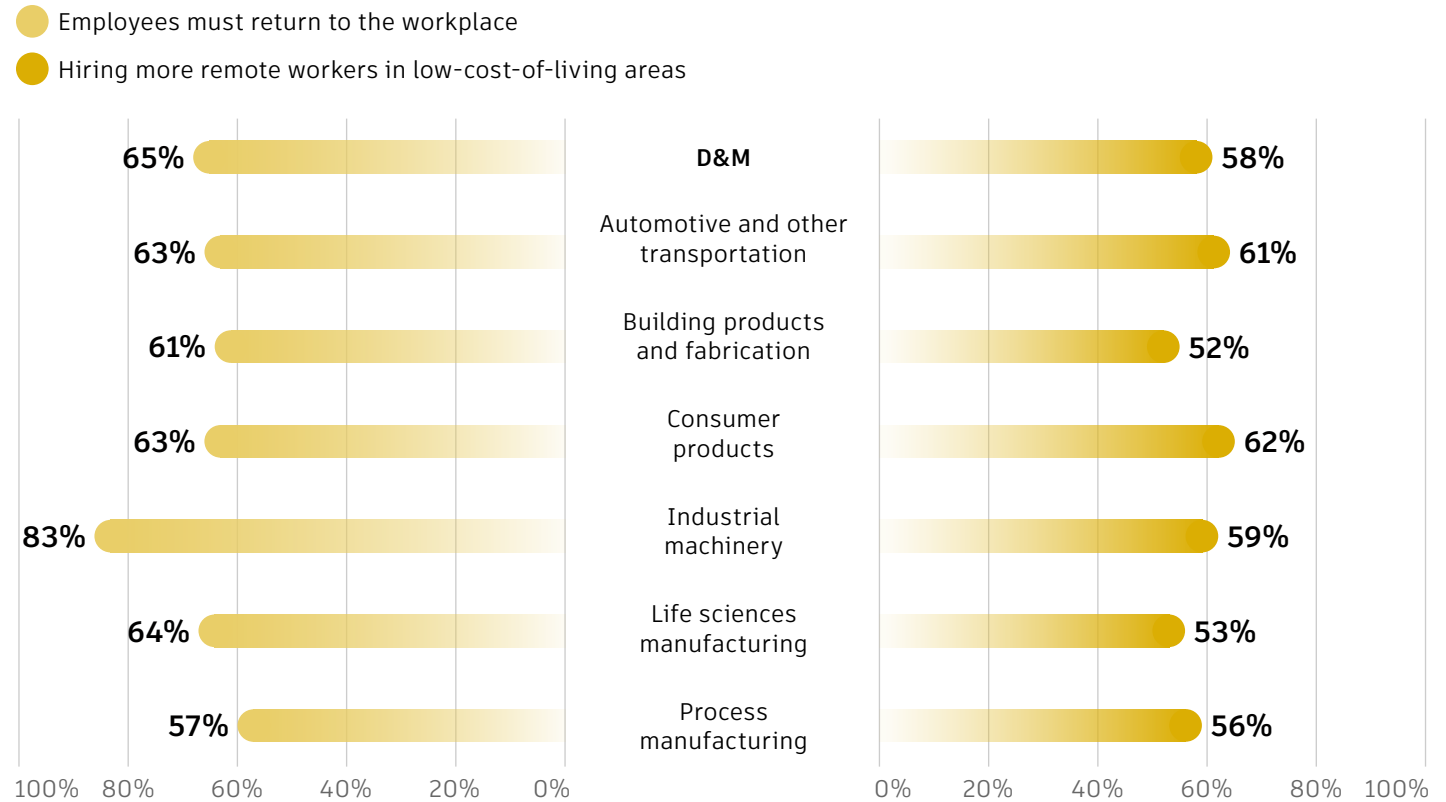
INSIGHT 6 – GLOBAL

Workers return to the office, but remote hiring continues

Survey data shows a mixed picture regarding remote work. In D&M, 65% of respondents say their companies are mandating a return to the workplace, signaling that employers are not yielding to worker preferences in the race for talent. However, 58% say their companies are seeking remote talent from low cost-of-living areas, a seeming contradiction. Most likely, this suggests that companies are hiring remotely to save on costs while also mandating return for employees who live close to a workplace.

The push and pull of the new normal

D&M companies are both hiring remote workers and mandating employees return to the workplace



Percentage of D&M respondents who agree with statements: 1. My company is mandating that employees return to the workplace. 2. My company is looking to hire more remote workers in low-cost-of-living areas. 5-point scale. Top two= agree.



INSIGHT 6 – D&M SPOTLIGHT

Steelcase

Leaders at Steelcase, a furniture manufacturer, spend a great deal of time thinking about how to build a positive workplace culture.

“The work experience is shaped by policies, tools, and all of these things, but it’s also shaped by culture and space,” says Kim Dabbs, global vice president for ESG and social innovation. “We always have our eye towards innovation on the people side, as well.”

Steelcase works with Ashoka, a social entrepreneurship network, to create an inclusive workspace, including an effort

to bring migrant talent on board. Forty-five percent of workers at the company’s factories are underrepresented racial and ethnic minorities. The company has also sponsored leadership training for boys and girls in Romania—a program that eventually grew into an internship pipeline for the company.

“When it comes to skills, we’re partnering with the community to identify skills gaps and find opportunities for training,” Dabbs says. “We really look at not just upskilling and reskilling little by little but also reimagining what nontraditional pathways and pipelines could look like.”

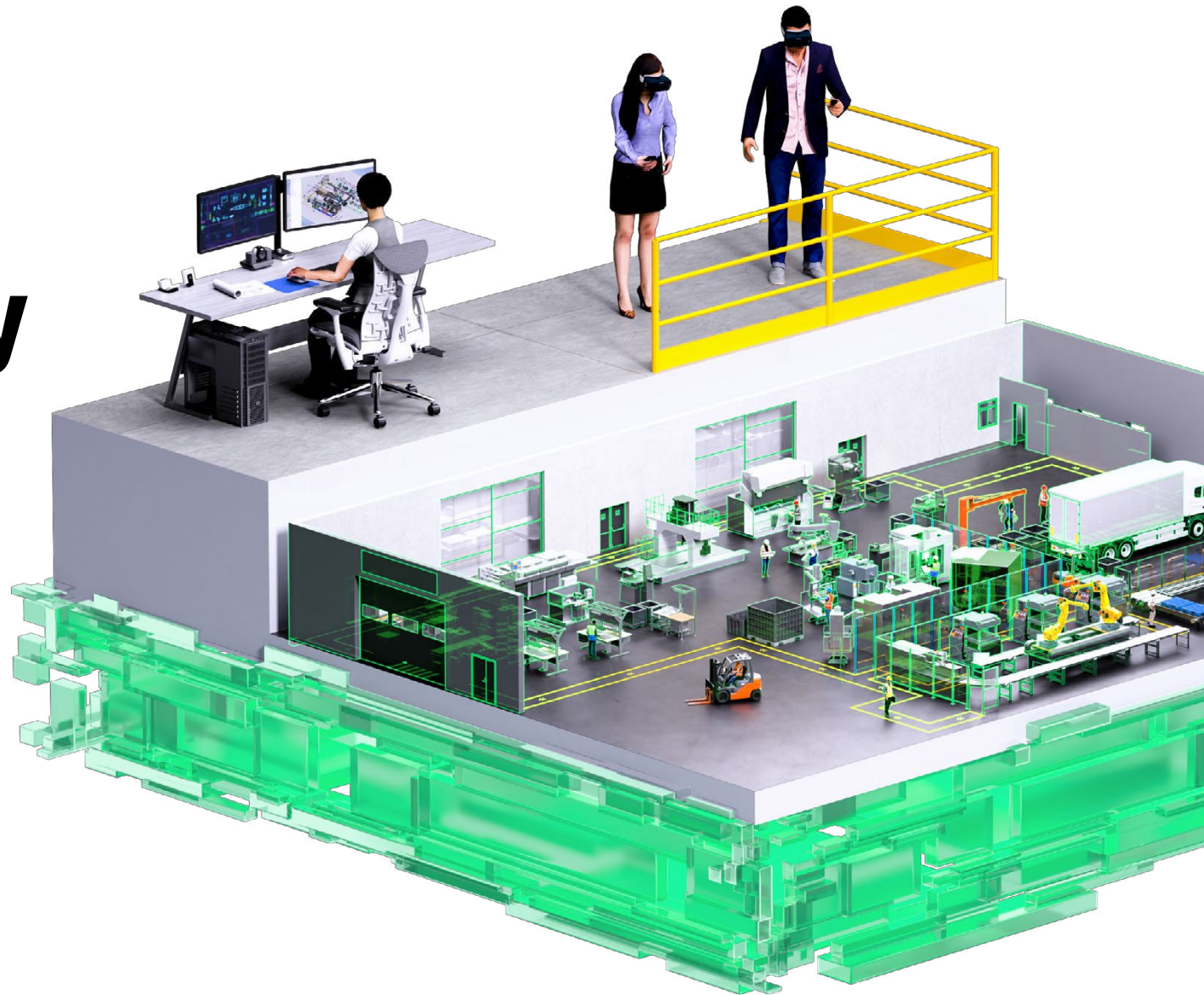


“The work experience is shaped by policies, tools, and all of these things, but it’s also shaped by culture and space.”

—Kim Dabbs, Global VP, ESG and Social Innovation, Steelcase

Sustainability

Business value drives
sustainability actions





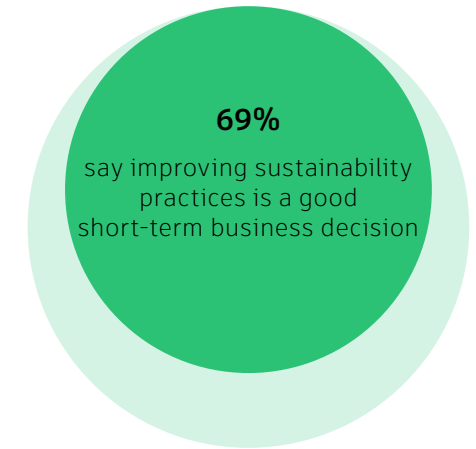
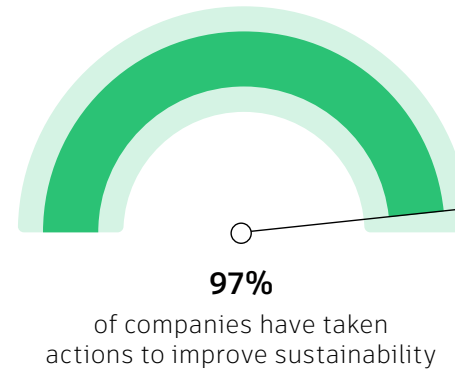
SUSTAINABILITY

Attitude and action

Sustainability is now a key concern for employees, customers, and investors—as well as an important driver of business success.

Shifting attitudes about sustainability are driving action, with companies making investments in energy efficiency, materials reductions, and more sustainable processes that are better for both the environment and the bottom line.

“Climate change is going to impact all of us,” says Dave Mackenzie of Aurecon, a design, engineering, and advisory firm. “The motivation for sustainability goes back to our purpose: bringing ideas to life, leaving a legacy, and improving the communities that we live in.”



INSIGHT 7

Companies are taking sustainability seriously

Ninety-seven percent of organizations are taking steps to improve sustainability—up from 95% last year.

Thirty-five percent of companies are using AI to become more sustainable. This makes sense, as the bulk of a project's or product's sustainability impact is determined during the conceptual phase—a part of the process when organizations can use AI tools to optimize their decision-making for specific outcomes, including sustainability.

Top changes include investing in more energy-efficient processes or machinery, using more recycled materials, and increasing share of renewable energy sources used. Notably, the methods companies are using to be more sustainable are varied across the board. This suggests that organizations are only taking actions that will be effective in their specific settings, rather than simply adopting broadly popular tactics.

Car design firm Automobili Pininfarina now sources its leather locally and seeks more sustainable materials to build its cars. “We are buying regionally, which means that there is zero pollution from moving the leather on a boat or on a car before it is finally delivered to our office,” says Dave Amantea, chief design officer at Automobili Pininfarina. “We also try to reduce the usage of plastic in our cars as much as possible, building with carbon fiber, glass, and aluminum instead.”

These actions are consistent with Autodesk data showing that user engagement with Autodesk products that enable sustainable outcomes increased by 14% across industries from January 2023 to November 2023.

Changing sentiment

As organizations take more sustainability-centered actions, leaders and experts report significant changes in how they feel

about their companies' efforts.

This year, 78% are proud of their company's sustainability efforts, compared to 53% in 2023. This is seismic shift in sentiment, and it is reflected in interviews with business leaders and experts, who largely say that their companies' leadership, employees, and customers are united in their desire to improve sustainable outcomes.

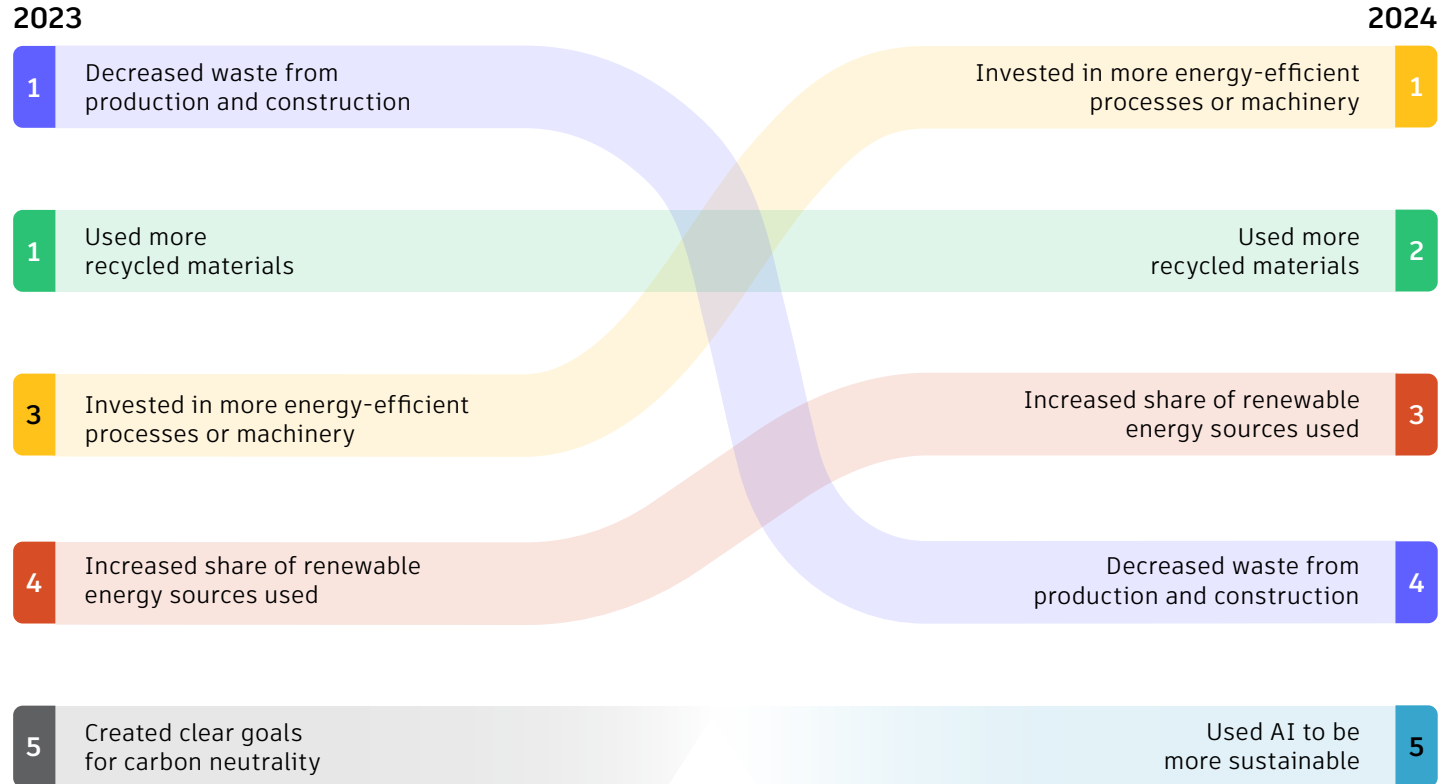
“We're doing everything we can around using renewable energy, electrifying our fleet of cars, and minimizing air travel,” says Dave Mackenzie of Aurecon, a design, engineering, and advisory firm. “To help our clients get to net zero, we need to walk the talk. We're not paying lip service; we're driving legitimate change through the business.”



INSIGHT 7

Big changes in top sustainability actions for D&M

Top 5 actions showing year-over-year change



Survey question: What changes has your company or organization already made to be more sustainable? Select all that apply

INSIGHT 7

Top motivators

Gone are the days when sustainability was seen primarily as a concern for government regulators. Customers, employees, and investors are all becoming more influential motivators as companies pursue their sustainability goals.

Globally, just over four out of five respondents say they face pressure from each of these groups to be more sustainable, a sentiment that is also reflected in interviews. “Some customers say, ‘We want the greenest building ever,’ and will put an extra \$10 million into the project to install the best sustainability features in that building,” says Michael Dufhues, board member at commercial construction company Bremer SE. “It’s about what the customers want. The market dictates the decision.”

Government regulation trails slightly behind, with three-quarters of respondents saying their companies face government pressure to be more sustainable.

“There are many sources of pressure to be more sustainable—there’s media pressure, corporate pressure, new regulations, and incentives from the European Commission or governments,” says Jean-Francois Guiderdoni of robotics solutions for water management company ACWA Robotics. “Both governments and companies are starting to look beyond just rules and negative financial impact; they’re realizing there’s a lot of economic potential in sustainability. It’s actually creating value and generating a virtuous cycle.”

35%

of experts and leaders in D&M say that employees are “very influential” in motivating them to create and meet sustainability goals

Respondents felt these groups were influential to their sustainability actions:

84%
customers

82%
investors

79%
employees

75%
government

INSIGHT 7 – GLOBAL

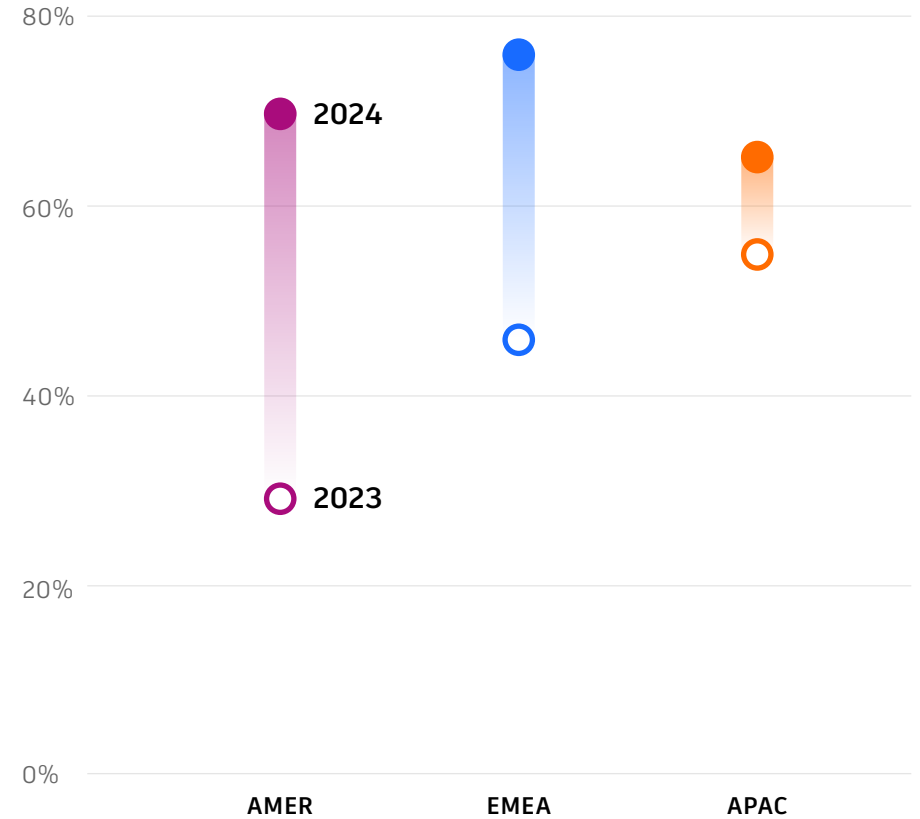
Becoming sustainability leaders

At 72%, the majority of D&M leaders and experts now see their companies as leaders in sustainability.

This new viewpoint is reflected in interviews where leaders and experts tend to speak of their organizations' sustainability efforts not as a burden, but rather as a source of pride for

employees and a necessary step to stay competitive in the future. "Sustainability is about environment, but also about talent," says Kim Dabbs of Steelcase. "It's about sustainable business models and providing well-being for employees. It's about providing learning and equitable access to opportunity—everything from our business inclusion groups, all the way up to executive compensation being tied to DEI progress.

D&M companies increasingly see themselves as sustainability leaders



Percentage of D&M respondents who agree to the statement: My company is leading the way in this industry when it comes to sustainability initiatives. Top two = agree. 5 point scale.

INSIGHT 7 – D&M

The future of D&M is sustainable

The next generation of employees is “very influential” in motivating its companies to become more sustainable in the D&M sector. The rate ranges from 29% in building products and manufacturing to 40% in industrial machinery.

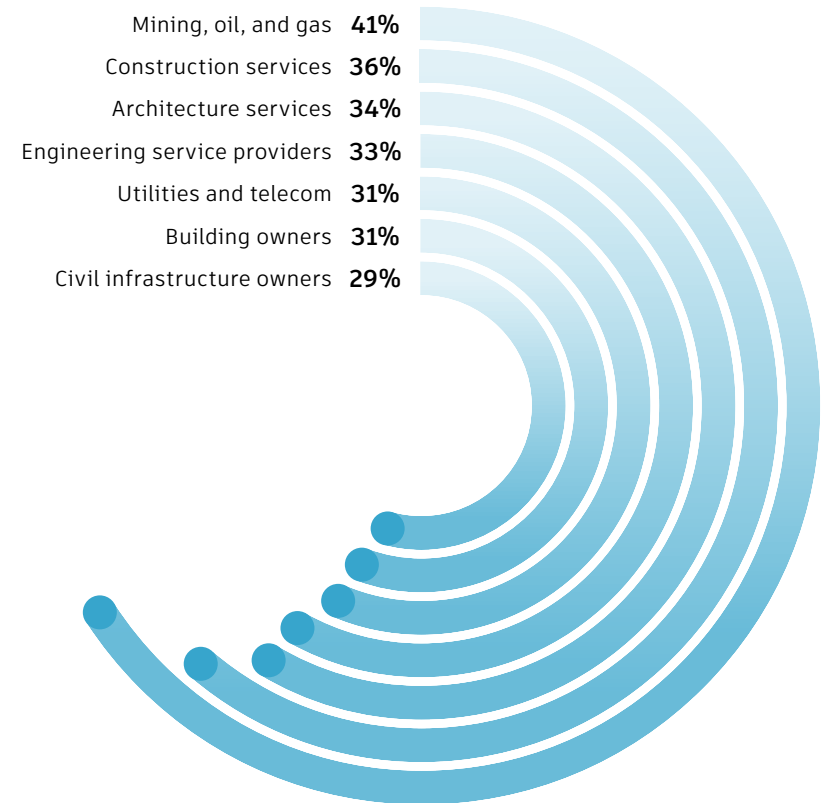
Jean-Francois Guiderdoni of ACWA Robotics, a robotics solutions for water management company, says young

employees are motivated not only by compensation and challenging work but also by the feeling that they’re having a positive impact on the world.

“You have a new generation of people who want to work on sustainability and make an impact,” Guiderdoni says. “The people who join us can be both technologically challenged through their work while seeing the impact of what they’re doing. They know they’re not just a cog in the machine.”

The next generation’s influence on sustainability

Percentage of AECO respondents who say they are driving sustainability initiatives



Survey question: How influential is the next generation in pressuring your company or organization to create and meet sustainability goals? 5-point scale. Top option = very influential.

INSIGHT 8

Sustainability is proving its value to both short-term and long-term business health

What was true last year is even more true this year: Sustainability is seen as beneficial to the bottom line.

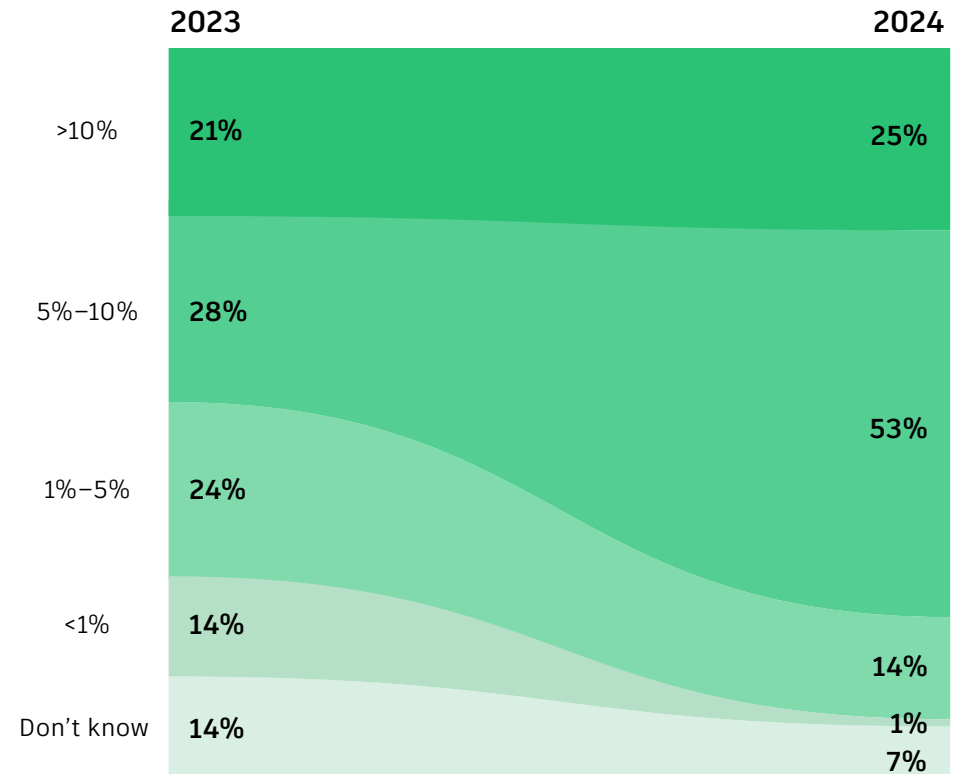
Sixty-nine percent of leaders and experts say sustainability is good for short-term business. Over the long term, 87% believe sustainability is beneficial for business.

While some of this business value is likely due to an improved reputation with customers and employees, sustainability initiatives also present an opportunity

to decrease operating costs through reductions in energy use and materials.

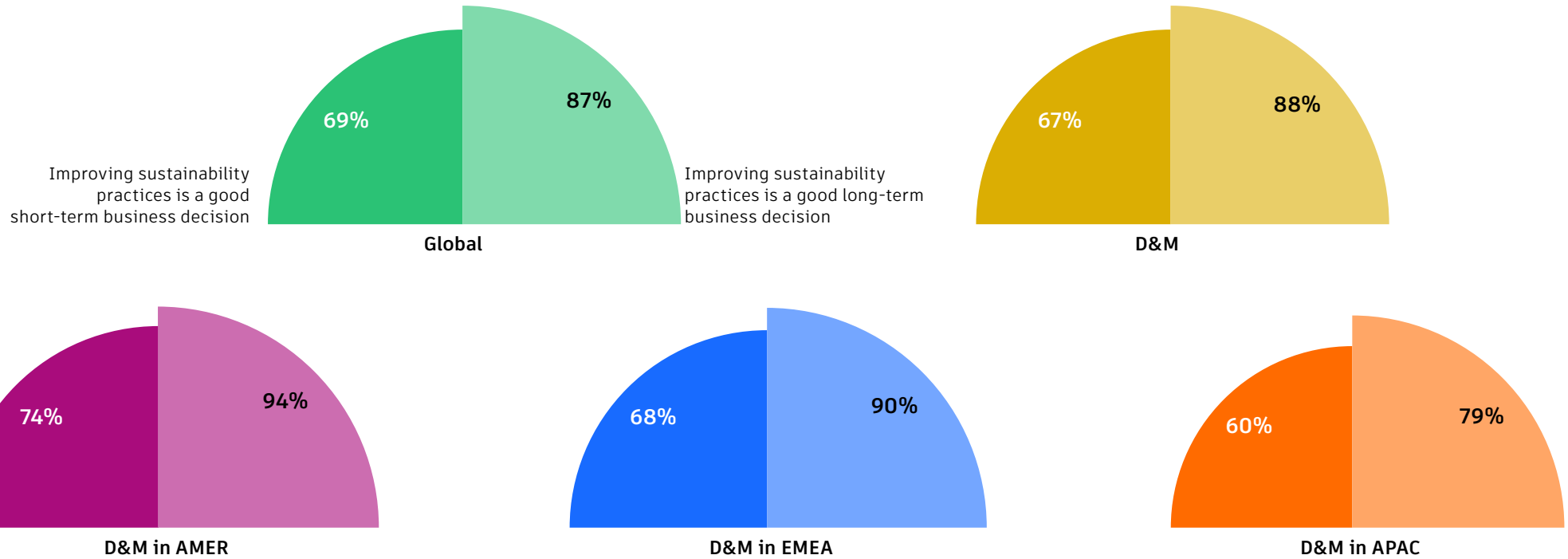
“We’re living in a time where sustainability is not just a nice-to-have,” says Kim Dabbs of Steelcase. “You can do business in a way that honors people on the planet and still be profitable. The more that companies understand that these aren’t trade-offs, but rather long-term investments—those are the organizations that are going to come out farther ahead in the next decade. In the long term, they’re going to make money back.”

Sustainability initiatives drive long-term revenue for D&M companies



Survey question: To the best of your knowledge, how much business value (as a % of annual revenue) can sustainability measures generate in the long term for your company? 5-point scale.

Long-term vs. short-term business value of sustainability: A global view of D&M companies



Percentage of D&M respondents who agree to statements: 1. Improving sustainability practices is a good long-term business decision. 2. Improving sustainability practices is a good short-term business decision. 5-point scale. Top two = agree.



INSIGHT 8 – D&M SPOTLIGHT

Baosteel Engineering & Technology Group Co., Ltd

Lei Yuan, chief engineer at Chinese iron and steel company China Baowu Design Institute/ Baosteel Engineering & Technology Group Co., Ltd, says the firm has five main areas of focus when it comes to sustainability.

- 1. Renewable energy:** “The first initiative we’ve taken is to reduce the use of fossil fuels and encourage the use of green power,” Yuan says.
- 2. Recycling:** Baosteel is making efforts to recycle materials, including waste and scrap steel.

3. Process improvements: “We are intensifying our research efforts, using digital twins to set up zero-emission factories,” Yuan says.

4. Supply chain: The company has plans to collaborate with suppliers and customers to promote green production. “We are going to increase the strength, lifecycle, and performance of our products,” Yuan says.

5. Carbon tracking: Baosteel is taking steps to better measure its carbon emissions. “Energy accounts for a huge proportion of the overall costs for our company,” Yuan says. “If we succeed in this area, we will improve our competitiveness and profitability.”



“We are intensifying our research efforts, using digital twins to set up zero-emission factories.”

—Lei Yuan, Chief Engineer, China Baowu Design Institute/
Baosteel Engineering & Technology Group Co., Ltd.



Conclusion

Design and manufacturing leaders worldwide continue to face challenges in hiring and cost management, though there is renewed optimism and a greater sense of resilience after enduring—and overcoming—pandemic supply chain disruptions and seeing the global economy avoid a recession.

Approaches to building business resilience are diverse, and budgets are shifting to reflect changing priorities. To address continued hiring challenges, some organizations are investing heavily in training and upskilling their current workforce along with technology to help fill the skills gap. Almost universally, organizations are increasing their investments in AI, signaling a high level of trust for emerging technology, although concerns remain.

The volatility of recent years has put many organizations in a reactionary position, having to adapt quickly to changing market conditions. Now that leaders are feeling better equipped to handle business challenges, they have started making plans for a more certain future. Along with this new sense of optimism comes exploration of new technologies, processes, and ideas that will uncover new opportunities for growth—and shape the future of design and make.

Appendix

Methodology

Glossary

Thank you

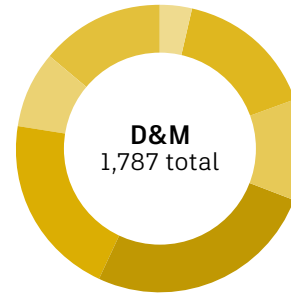
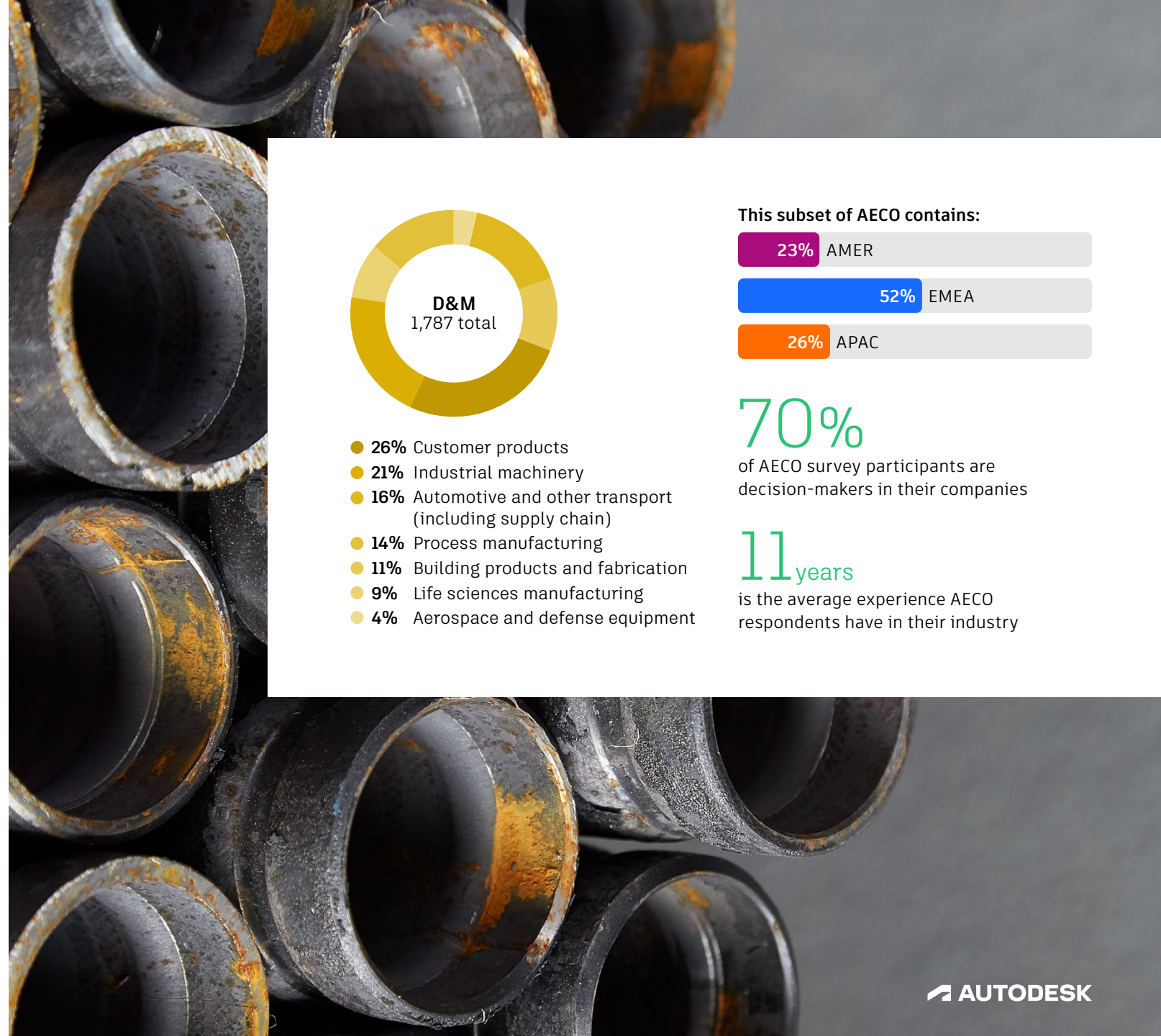


Methodology

For this year's report, Autodesk surveyed and interviewed 5,399 industry leaders, futurists, and experts in the architecture, engineering, construction, and operations; design and manufacturing; and media and entertainment industries from countries around the globe. This report contains key findings from this research, including details at the sector and regional level.

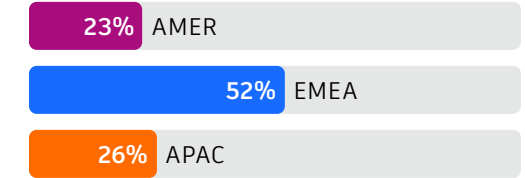
The quantitative data in this D&M subsample (n= 1787) was collected between July and September 2023, through a 20-minute online survey. Autodesk partnered with Qualtrics for the collection of this data.

* The full questionnaire used in the survey can be found [here](#).



- 26% Customer products
- 21% Industrial machinery
- 16% Automotive and other transport (including supply chain)
- 14% Process manufacturing
- 11% Building products and fabrication
- 9% Life sciences manufacturing
- 4% Aerospace and defense equipment

This subset of AECO contains:



70%
of AECO survey participants are decision-makers in their companies

11 years
is the average experience AECO respondents have in their industry

Glossary

Company size:

- **Small:** 1–19 employees
- **Medium:** 20–4,999 employees
- **Large:** 5,000+ employees

Digital maturity:

Respondents were asked how far their companies were in their transformation journeys. Organizations that respondents said are in the “early stage” or “right in the middle” of their digital transformation journeys are considered less digitally mature companies. Those that respondents identified as “approaching the goal” or having “achieved the goal” of digital transformation are considered more digitally mature companies.

Industry:

AECO: Architecture, engineering, construction, and operations

- Architecture services
- Building owners (i.e., developers, real estate companies, governments)
- Civil infrastructure owners (e.g., transportation infrastructure, water infrastructure)
- Construction services
- Engineering service providers
- Mining, oil, and gas
- Utilities and telecom

D&M: Design and manufacturing

- Aerospace and defense equipment
- Automotive and other transportation (including supply chain)
- Building products and fabrication
- Consumer products
- Industrial machinery
- Life sciences manufacturing
- Process manufacturing

M&E: Media and entertainment

- Advertising, publishing, and graphic design
- Film and TV
- Games

Leaders and Experts:

- **Leaders:** Seventy percent of survey participants are decision-makers in their companies. In this report, this group is referred to as “leaders.” Job roles for the leaders group include business owner/entrepreneurs, directors, VP-level and C-level.
- **Experts:** The remaining 30% of respondents are referred to as “experts.” This group includes respondents at the non-managerial level and managers.

Performance:

Companies whose leaders and experts rated their organization’s performance on top business metrics as “above average” or “excellent” are considered top performers.

Region:

APAC: Asia-Pacific

- Australia, China, India, Japan, South Korea

EMEA: Europe, the Middle East, and Africa

- France, Germany, Italy, Middle East (Saudi Arabia, United Arab Emirates), Netherlands, Nordics (Denmark, Finland, Norway, Sweden), Spain, Turkey, United Kingdom

AMER: North, Central, and South America

- Brazil, Canada, Mexico, United States

Sustainability:

The survey questions about sustainability, for example in the list of changes companies are making, focus on environmental sustainability, however, this definition was not explicitly stated.

In one-on-one interviews, a descriptive definition was used incorporating the United Nations definition: “Meeting the needs of the present without compromising the ability of future generations to meet their own needs.” Respondents were told this includes efforts related to the environment (mitigating the effect on climate change), the community (social well-being, improving the life of populations), and corporate governance.

About Autodesk

Autodesk is changing how the world is designed and made. Its technology spans architecture, engineering, construction, product design, manufacturing, and media and entertainment, empowering innovators everywhere to solve challenges big and small. From greener buildings to smarter products to more mesmerizing blockbusters, Autodesk software helps customers design and make a better world for all. For more information, visit autodesk.com or follow [@autodesk](https://twitter.com/autodesk) on social media.

Contact Autodesk at state.of.design.and.make@autodesk.com about this research report or to sign up to participate in future research programs.



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