

2023 STATE OF DESIGN & MAKE

Business resilience
emerges amid uncertainty





ABOUT THIS 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 drivers of change that are shaping today's business decisions and helps leaders make informed, strategic decisions about how to prioritize and invest in the future.

The industries that design and make comprise a unique category that connects the digital to the physical. Architecture, engineering, construction, product design, manufacturing, gaming, and filmmaking all require complex human collaboration throughout a digital design process and delivery of a physical result. Executives in these industries share their approaches and points of view on the challenges unique to their organizations and the opportunities they are identifying.

Key areas of focus for this research include: a macro view of the industries; staying resilient and relevant in an ever-changing world;

attracting, training, and retaining a skilled workforce; and achieving sustainable outcomes.

Autodesk partnered with **Ipsos**, a leader in global research and insights, to survey and interview 2,565 industry leaders, futurists, and experts in the architecture, engineering, construction, and owners (AECO); design and manufacturing (D&M); and media and entertainment (M&E) industries from countries around the globe.

Survey data has been broken down by global region: Asia-Pacific (APAC), which includes responses from Australia, China, India, Japan, and South Korea; Europe, with responses

from France, Germany, Italy, the Netherlands, Sweden, and the United Kingdom; and the Americas, with responses from Canada and the United States.

This report contains key findings from this research, including details at the sector and regional level. In certain instances, responses have been compared by country, but only countries with 200 or more respondents are included in these comparisons: Australia, China, France, Germany, Japan, the United Kingdom, and the United States.

The quantitative data (n= 2,489) was collected between October and December 2022, through a 20-minute online survey. In addition, 76 qualitative interviews with business leaders and futurists were conducted between September and December 2022. In some instances, Autodesk references analysis of its aggregated and anonymized data.

Full report

[Click here to access the full *State of Design & Make* report](#)

BUSINESS RESILIENCE EMERGES AMID UNCERTAINTY

Insights in Action

Leaders and experts cite the business benefits of digital transformation and plan to continue increasing investments in the future.

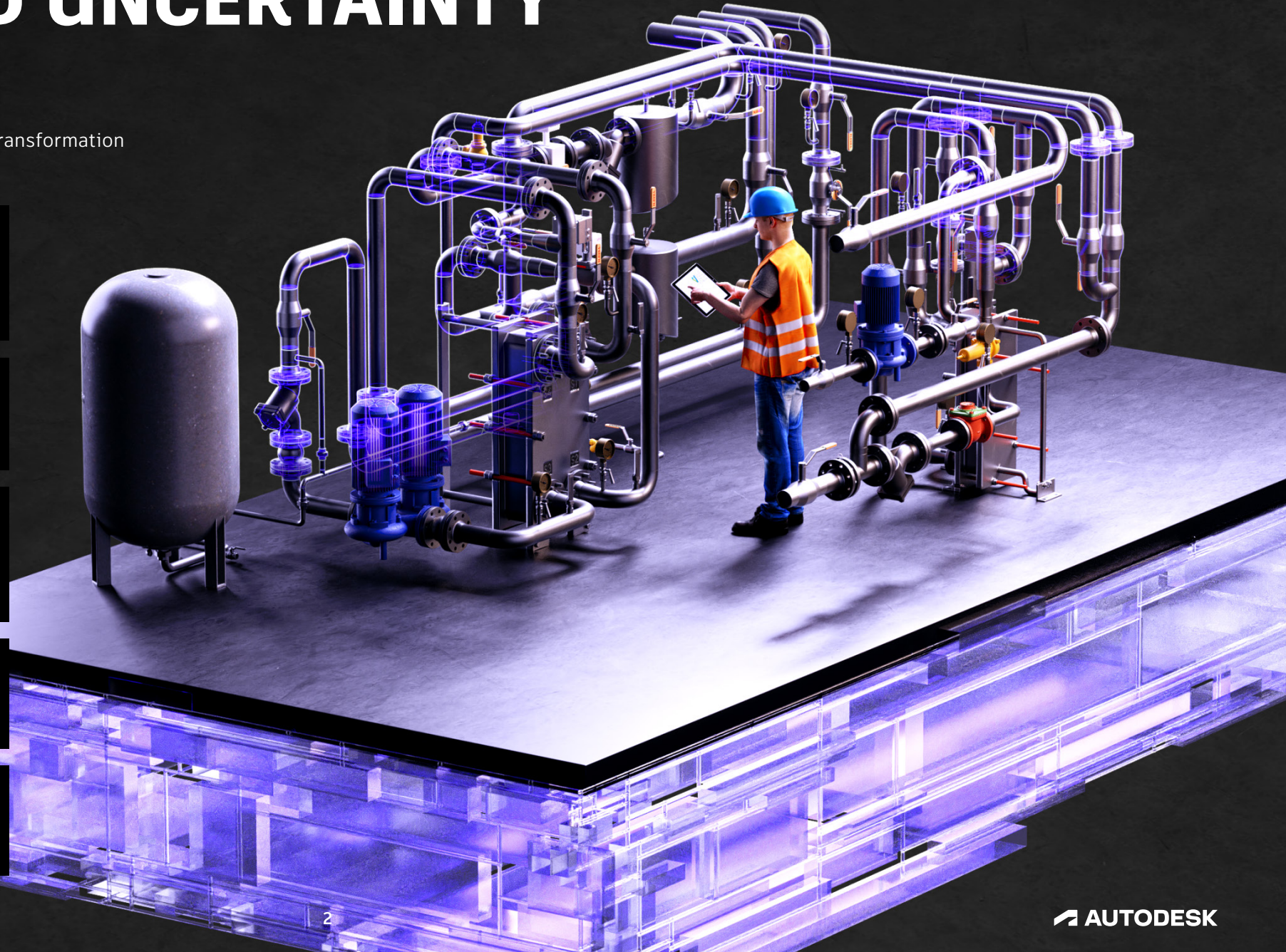
Investments increase – Companies are undaunted in their plans to increase investments in technology, talent acquisition, and other areas in the coming years, global uncertainty notwithstanding.

Pace picks up – Top-performing businesses, and those that are more digitally mature, plan to increase investments more over the next three years than other organizations.

Transformation brings benefits – Digital transformation is yielding benefits that help companies to achieve their most important business performance goals, even at organizations in the early stages of the digital transformation journey.

Data drives improvements – Companies are using internal data to improve decision-making, speed up time-to-market, and facilitate collaboration.

Maturity breeds confidence – Leaders and experts at digitally mature companies feel more confident than others about their organization's ability to handle uncertainty.



Leaders and experts report widespread uncertainty about the future, but they also report high levels of preparedness.

Global events during the past several years have forced businesses to change their operations and make new investments. Respondents from companies that are more digitally mature say they’re better positioned to handle change. Still, even respondents from organizations that are less digitally mature report an array of benefits from digital transformation.

Leaders feel prepared for a precarious future

Respondents said that the future global landscape feels more uncertain than it did three years ago. But encouragingly, most also said they feel that their companies are well prepared to respond to unforeseen global events.

A quick glance at recent world events—and the largely resilient response from world governments and economies—may

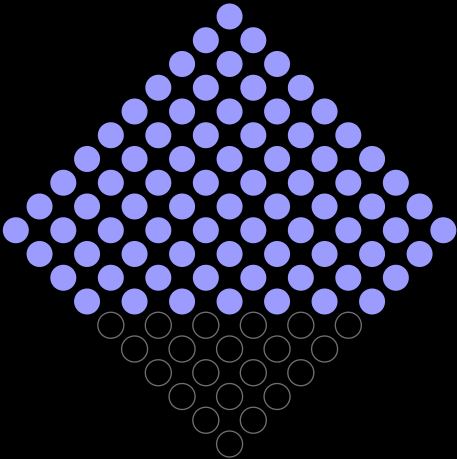
put this uncertainty and confidence into context. The COVID-19 pandemic upended the status quo for most of the world. This was followed by wars, an energy crisis in Europe, ongoing refugee crises, and a sudden spike in inflation in much of the world. Yet many companies have been able to weather these unforeseen crises.

The future global landscape feels more uncertain than it used to, but most leaders and experts feel prepared to handle it

Overall, 79% of respondents felt that global uncertainty has risen over the past three years. A smaller number—but still a clear majority, 59%—said their companies are equipped to handle this uncertainty.

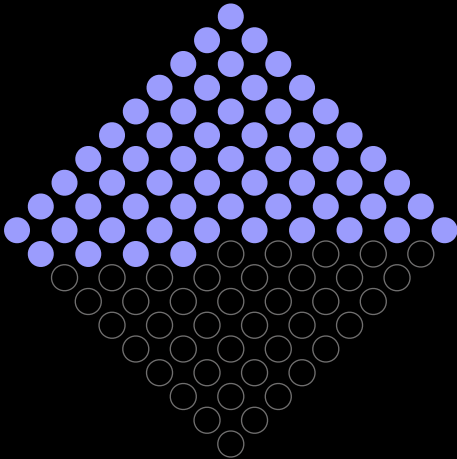
The future global landscape feels more uncertain now than three years ago

79% agree

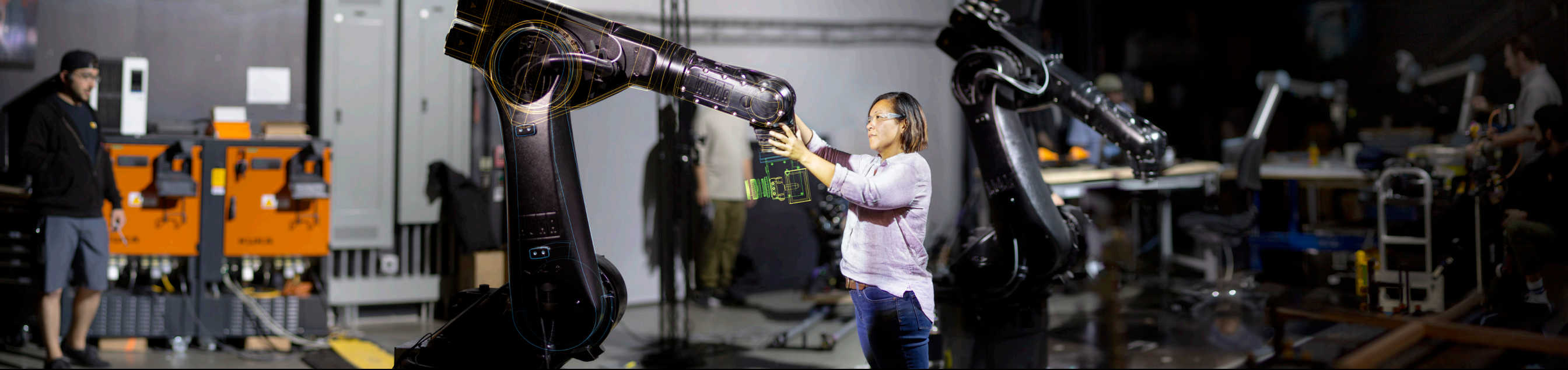


This company is well prepared to handle unforeseen future geopolitical changes

59% agree



Survey question: To what extent do you agree or disagree with the following statements? 5-point scale. Top two = agree.



Uncertainty versus readiness: an industry segment* view

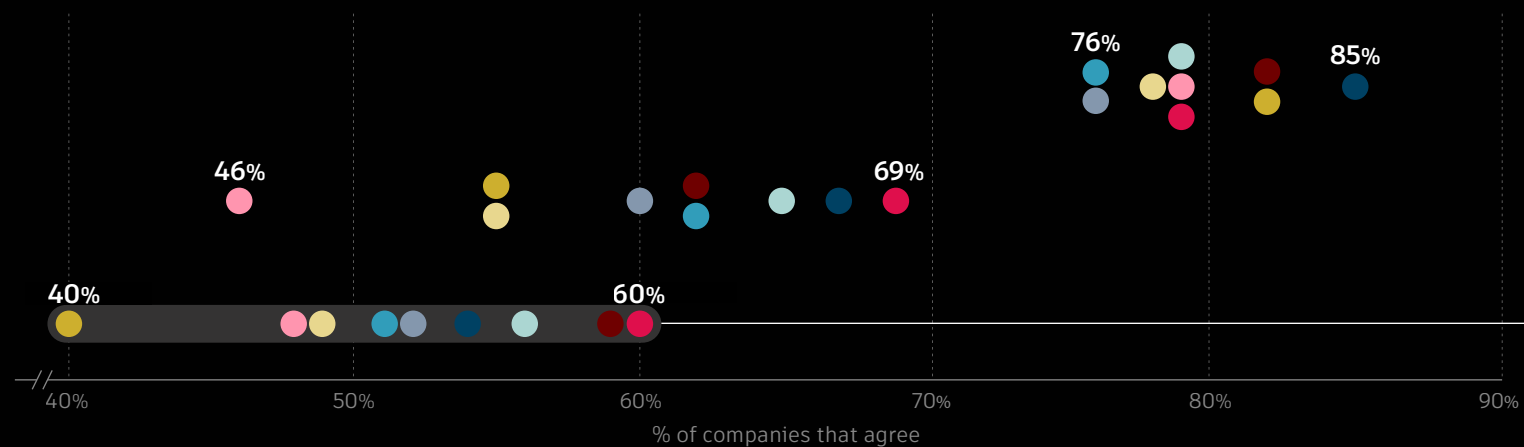
Respondents from automotive and transportation companies felt that their industry is less prepared than others to handle global changes. Respondents from game development companies felt that their industry is more prepared.

AEEO: ● Architecture services ● Construction services ● Energy and natural resources ● Engineering service providers
 D&M: ● Automotive and other transportation ● Consumer products
 M&E: ● Advertising publishing and graphic design ● Film and television ● Game development

The future global landscape feels more uncertain now than three years ago

This company is well prepared to handle unforeseen future geopolitical changes

This industry is well prepared to handle unforeseen future geopolitical changes



20%
 gap between **automotive and transportation** and **game development**

Survey question: To what extent do you agree or disagree with the following statements? 5-point scale. Top two = agree.
 *Segments are small sample sizes. See survey methodology for more information about the sample size for each industry segment.

Respondents' perception
on global uncertainty

86%

of European respondents said the global landscape feels uncertain, more than the portion of respondents from the Americas or the APAC region (75% each).

56%

of leaders and experts in the D&M sector said they were confident in their company's ability to handle unforeseen events, compared to 62% of AECO respondents and 60% of those in M&E.

65%

of respondents from the APAC region said their companies are well-positioned to handle global changes, compared with 58% of European respondents and 51% of respondents from the Americas.

77%

of respondents from China said their companies are well-positioned to handle global changes, showing the greatest level of confidence.

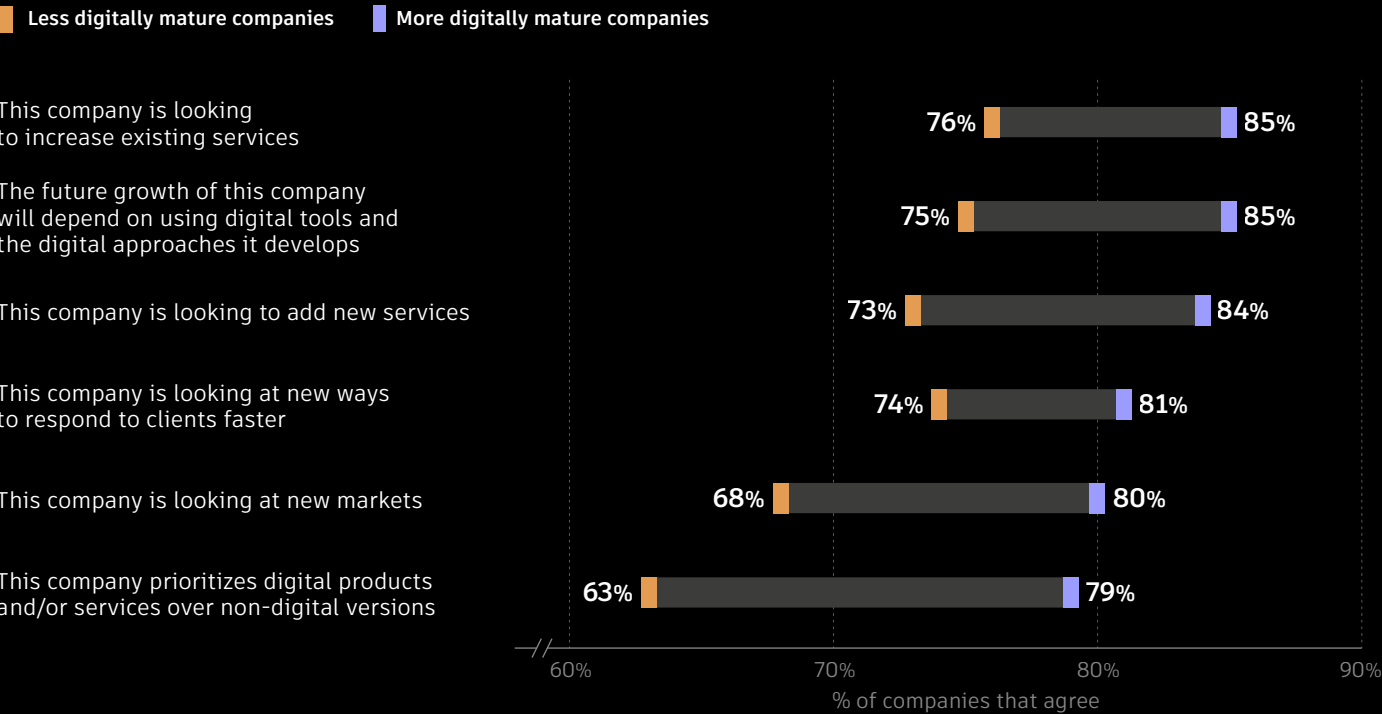
82%

of leaders and experts from large companies said that the future global landscape feels uncertain—more than the 76% share from small companies—although companies of all sizes feel prepared at similar rates.



Charting the future

Looking ahead, respondents said that the future of their companies will depend on digital tools and that their organizations are planning to add new services and markets. These numbers are even higher among more digitally mature companies.



Survey question: To what extent do you agree or disagree with the following statements? 5-point scale. Top two = agree. See glossary for the definition of digital maturity.

Kunyueh Lin, general manager, building automation solution business unit at global power and thermal management solutions provider Delta Electronics, said in an interview that the organization has **changed its planning and management strategies to be as nimble as possible in the face of geopolitical uncertainty.**

Companies are driving business growth and adaptability with evolved operations

Businesses are looking at new ways to respond to clients faster, as well as opportunities to increase existing services and expand into new markets. These efforts come on the heels of a challenging era that required companies to make significant operational changes.

Fifty-two percent of respondents said their companies changed how they worked to offset the impact of the COVID-19 pandemic, and 50% said the pandemic changed how the organization managed its workforce. In addition, 40% reported that the pandemic spurred their companies to find innovative ways to meet customers' needs, 33% said it led to a rethinking of the company's priorities, and 30% said it led to unplanned technology investments. Anonymized usage data from Autodesk customers in the AECO industries also showed this pattern, with a 57% uptick in the consumption of cloud resources in the first year of the pandemic.

Kunyueh Lin, general manager, building automation solution business unit at global power and thermal

management solutions provider Delta Electronics, said in an interview that the organization has changed its planning and management strategies to be as nimble as possible in the face of

52%
of respondents said their companies changed how they worked day-to-day to offset the impact of the COVID-19 pandemic

geopolitical uncertainty. The company now drafts a new 10-year plan each year. Also, Delta Electronics is moving away from centralized management and providing more resources to the regional offices that will lead business growth for the company in the future. Although it is impossible to be ready for everything, Lin noted, companies can position themselves to respond quickly to changing conditions.

LEADERS AND EXPERTS SPEAK:

What steps should companies in your industry take to prepare for an uncertain future?

“Over the next three years, the manufacturing industry needs to **prioritize trade skill development and supply chain diversification**. Widening the supply chain by supporting more raw materials suppliers and regional hubs that fabricate critical components will create more competition in the market, business opportunities, and jobs. It will also ensure that the industry will still be functional if there are supply chain disruptions.”

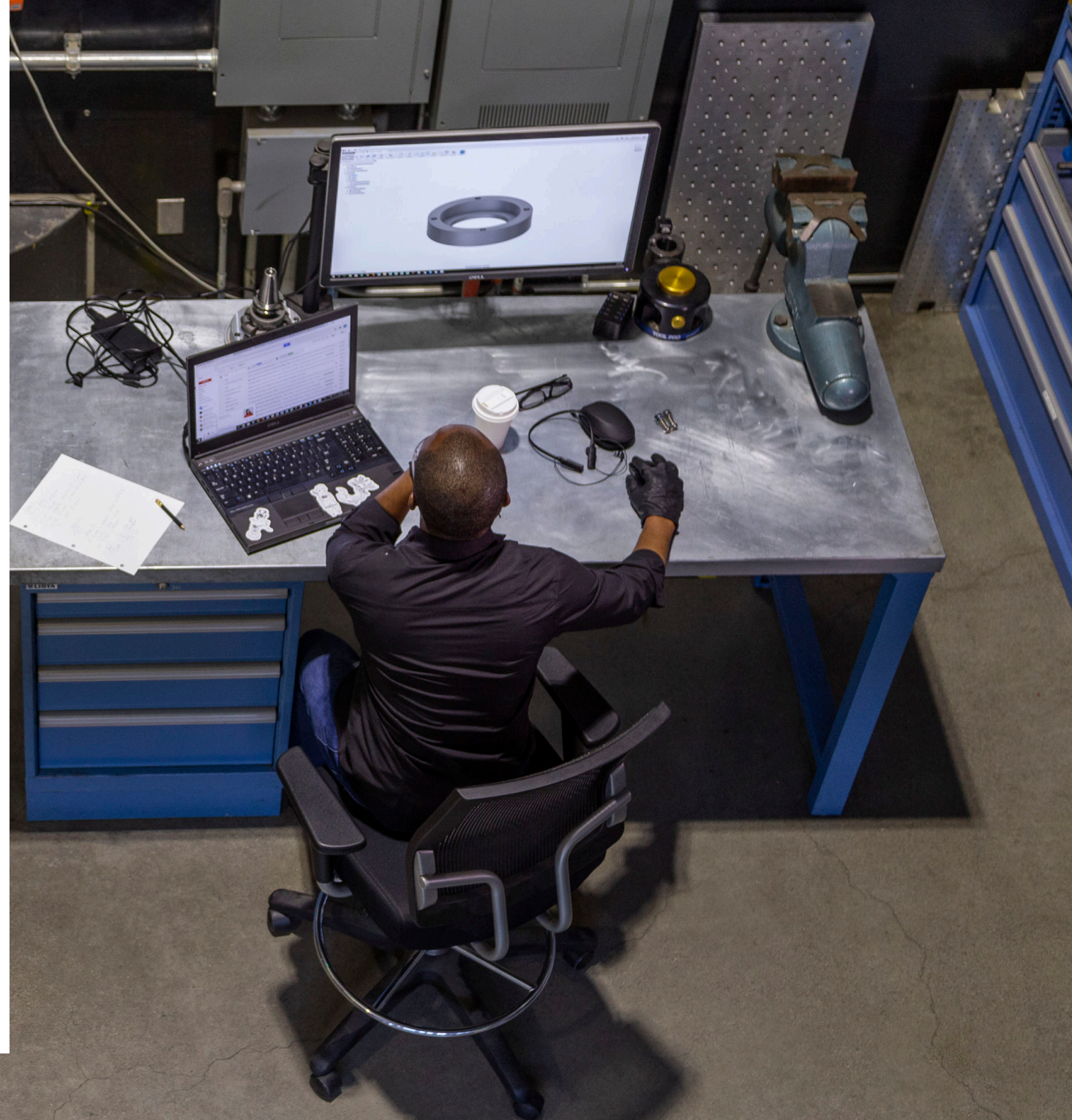
—Samantha Snabes, Co-founder & Catalyst, re:3D Inc., a large-scale 3D printer and services company

“We’re trying to develop a new platform to digitalize our archive so that every step of the engineers’ thoughts can be documented. With these efforts, we can set up our library of knowledge, and the resources in this library can be used to inspire similar projects in the future. **This end-to-end documentation of the whole process of idea, development, inspiration, and iteration will be very valuable for our future development.**”

—GuoJin Zhu, Chief Engineer, Kunming Engineering Corporation Limited, Power China Group, a design institute for hydropower projects

“**The industry needs a comprehensive approach to making sense of data.** We need to start by outlining what data needs to be collected and then consider how data collection will work; how analysis will be conducted; and, finally, how we will use the data to create and implement new strategies.”

—Steve Plumb, Senior Editor, *SME Media, Manufacturing Engineering*, a publication of SME, a professional association of manufacturing engineers in North America



Digital maturity is a differentiator

Digital maturity appears to be correlated with how well prepared companies are to handle change.

Respondents from companies that are less and more digitally mature said they feel uncertain about the future at similar rates (77% and 83%, respectively). However, the gap was much larger when respondents were asked whether their companies are well prepared to handle uncertainty: 72% of respondents from more digitally mature companies said their organization was well prepared to handle unforeseen geopolitical changes—significantly more than the 52% of respondents from less digitally mature companies who expressed such confidence.

Among companies identified as more digitally mature, 40% said digital transformation had helped them to launch products and services more quickly, and 39% said it increased innovation/better ideas. Thirty-seven percent cited each of the following benefits of digital transformation: the ability to scale the business more easily/faster, more satisfied customers, and reduced costs.

Even companies in the early and middle stages of digital transformation reported benefits from their efforts. For instance, 43% of respondents from organizations that are less digitally mature said that digital transformation had helped them to lower costs,

37% said it had led to increased innovation/better ideas, and 36% said it had helped them to launch products and services more quickly.

At companies that respondents identified as “very effective” at leveraging data, these benefits were often more pronounced. For instance, 43% of respondents from these companies reported that digital transformation has helped their organizations increase innovation, compared with 34% of respondents from other companies.

In the group identified as “very effective” at leveraging data, 26% of respondents said digital transformation had increased business value, compared with 19% of other respondents. Also, 26% of respondents from companies identified as “very effective” at leveraging data said that digital transformation had resulted in a better reputation for their organization, compared with 20% of respondents from other companies.

An analysis of anonymized data from Autodesk customer projects showed that customers are using artificial intelligence to improve efficiency, reduce errors, and increase flexibility in manufacturing. For example, some companies have set a goal of using generative design to reduce time for design work by 20%.

Regional outlook of digital transformation benefits

The data showed differences in the digital transformation benefits seen by companies in different regions. Most significantly, respondents from the Americas were more likely to report benefits of digital transformation, followed by those in Europe.



Survey question: Has this company experienced any of the following benefits of digital transformation? Select all that apply.

Rating digital transformation benefits

Respondents listed cost reductions, decreased time to market, increased innovation, and the ability to launch products and services more quickly among the top benefits of digital transformation.

| | Overall rating | AECO | D&M | M&E |
|---|----------------|------|-----|-----|
| Reduced costs | 1 | 2 | 1 | 3 |
| Increased innovation / better ideas | 2 | 1 | 5 | 1 |
| Able to launch products / services more quickly | 3 | 5 | 2 | 4 |
| Able to scale the business more easily / faster | 4 | 4 | 7 | 2 |
| More satisfied customers | 5 | 3 | 4 | 5 |
| Easier to plan and make better business decisions | 6 | 7 | 3 | 6 |
| Increased sustainability (e.g., reduce paper-based processes, improved energy efficiency, etc.) | 7 | 6 | 6 | 7 |
| More engaged and motivated staff | 8 | 8 | 8 | 9 |
| Better reputation | 9 | 9 | 10 | 8 |
| Business is worth more (higher valuation) | 10 | 10 | 9 | 10 |
| Less risk (e.g., business or financial risks, etc.) | 11 | 11 | 11 | 11 |

Survey question: Has this company experienced any of the following benefits of digital transformation? Select all that apply. Sorted by the % of respondents who selected each benefit.

In an interview, Matteo Barale, co-chief executive officer of autonomous vehicle start-up PIX Moving, said that digitization can enable customization and improve the speed of product delivery—providing companies with a competitive edge. “Technology and customization go hand-in-hand,” he said. “To do this mass customization and modularity, you need to have a fast way of giving a quote to customers, and you need to do this faster than your competitors. No two products will be the same. The digital processes are the driving force, allowing us to be personalized and agile.”

In addition to customization, digital tools are opening up new possibilities. Ronald Ames, a film producer for the first season of Amazon’s *The Lord of the Rings: The Rings of Power* and founder of The Modern Film Consortium, noted that technology is allowing more people and companies—even those without large budgets—to work on a wider array of projects. “Anything we can imagine, we can create,” he said. “That’s extremely exciting. The tools are being democratized, and the barriers to entry aren’t as steep as when I was a young filmmaker. Now, anyone can tell a meaningful story using their phone, and I think that’s beautiful.”

“Technology and customization go hand-in-hand. To do this mass customization and modularity, you need to have a fast way of giving a quote to customers, and you need to do this faster than your competitors. No two products will be the same. **The digital processes are the driving force, allowing us to be personalized and agile.**”

—Matteo Barale, Co-chief Executive Officer, PIX Moving, an autonomous vehicle start-up

“... With the volume of information we generate through sources like project information, communications, sensors, and technology, **we have access to a lot of potentially high-value data**. The challenge for organizations and the industry will be how we collectively create standards and a consistent approach to realizing that value.”

—Megan Stanley, Manager of Technical Applications, GHD, a multidisciplinary AEC firm

Data delivers insights

Data has become a critical tool for driving business decisions across industries—to the point that the phrase “every company is a data company” has become a commonplace expression. Indeed, survey results revealed that large numbers of organizations are leveraging internal data to achieve their business goals. Fifty-two percent of respondents said that internal data has helped their companies to make faster internal decisions; 50% said it had helped their companies to develop products, services, or projects more quickly; and 46% said that internal data had helped their companies to facilitate internal collaboration among teams.

Large organizations are much more likely to leverage data for most benefits than their smaller and medium-sized peers.

Collecting data is, as *SME Media*, *Manufacturing Engineering* Senior Editor Steve Plumb said, often simpler than managing it. “Managing data is easier said than done,” Plumb said, adding that companies may need to find ways to be more precise about what data they are gathering and how it is used.

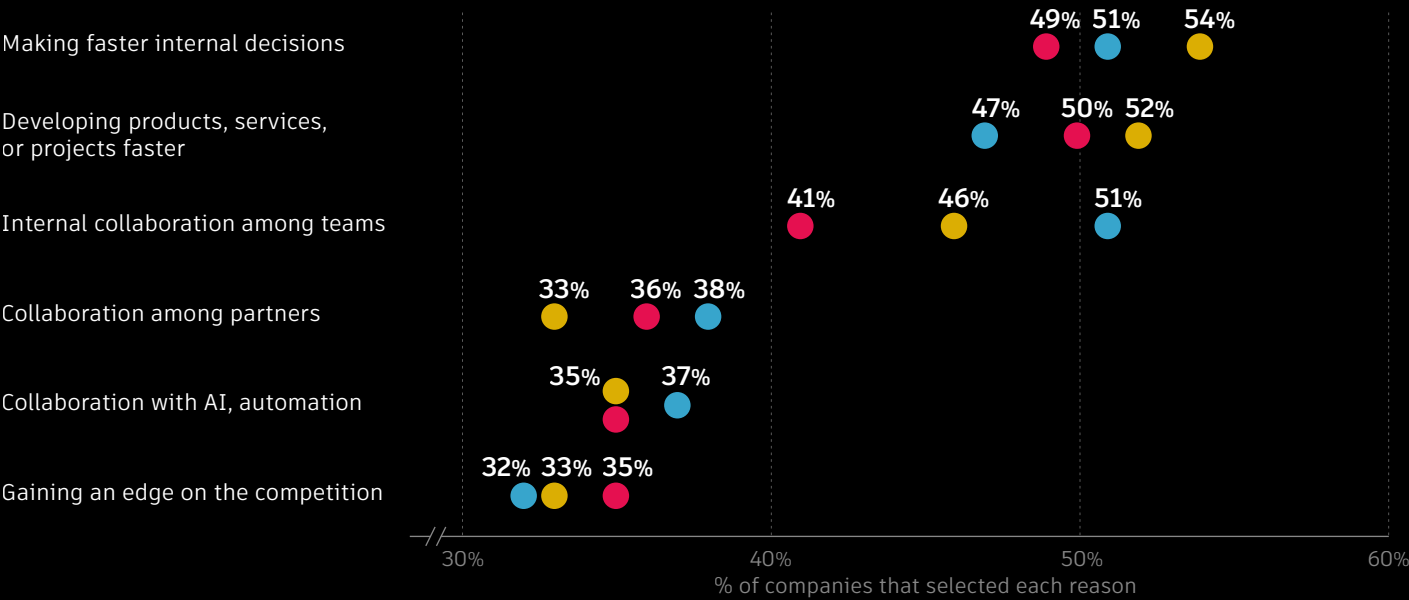
Dr. Amy Hochadel—executive director for global business at Connected Places Catapult, the UK government’s innovation agency for cities—pointed out the importance of prioritizing business questions, rather than technology itself. Too often, Hochadel noted, people start from the position that “technology is the answer.” She added: “But what is the question?”

Megan Stanley, manager of technical applications for multidisciplinary AEC firm GHD, said that companies must work to manage the “explosion” of data that they produce: “We realized the potential value of data some time ago, but today our sources of data are nearly endless. This has created, for many of us, a data explosion. With the volume of information we generate through sources like project information, communications, sensors, and technology, we have access to a lot of potentially high-value data. The challenge for organizations and the industry will be how we collectively create standards and a consistent approach to realizing that value.”

Data drives decision-making, product development, and collaboration

Insight into how companies are leveraging internal data

AECO D&M M&E



Survey question: Does this company leverage internal data for any of the following? Please select all that apply.

Global leaders:



UK and German respondents lead the way in using data to **drive faster internal decision-making** (62% and 61%).



French respondents use data to **collaborate with AI and automation the most** (45%).



US respondents are the front-runners in using data to **develop products, projects, or services faster** (60%); **support internal collaboration** (59%); **support collaboration among partners** (44%); and **gain an edge on their competitors** (39%).



LEADERS AND EXPERTS SPEAK:

How is digital transformation affecting your company or industry?

“COVID has proven that digitization is required now. Businesses that had already started on their digitization journeys fared better when COVID hit, because they were able to transition to some of the changes that were needed. **If we’re digitized, we’re at an advantage. I think that’s going to become more and more critical as we deal with climate issues and changing environments.** The places that are not digitized need to get digitized quickly.”

—Dr. Amy Hochadel, Executive Director, Global Business, Connected Places Catapult, the UK government’s innovation agency for cities

“We believe in the employee, and we believe in creating a space that allows employees to thrive. **We’re not bringing in automation to replace the person. We’re bringing in automation to replace the position.** That way, we can take the person and find a higher-level opportunity for them. Employees love it because they’re not just coming in and mind-numbingly doing the same thing over and over again.”

—JJ Johnson, Chief Operating Officer, Viewrail, a modern stair and railing system company

“Digital is going to help us really bring continuity between the studio and site parts of our company. **Digital is going to break the silos that are ingrained in company culture.**”

—Frédéric Gal, Head of Business Modernisation Project, Bouygues Construction

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 Owners

- Architecture services
- Buildings (owner/operator)
- Civil infrastructure (owner/operator)
- Construction services
- Energy and natural resources
- Engineering service providers

D&M: Design and Manufacturing

- Aerospace and defense equipment
- Automotive and other transportation
- Building products and fabrication
- Consumer products
- Education
- Industrial machinery
- Life sciences manufacturing
- Manufacturing (other)

M&E: Media and Entertainment

- Advertising, publishing, and graphic design
- Film and TV design/development
- Game development

Leaders and Experts:

- **Leaders:** Sixty-nine 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 director, industry consultant, president or CEO, senior executive, senior vice president, and vice president.
- **Experts:** The remaining 31% of respondents are referred to as “experts.” This group includes managers, senior managers, mid-level employees, and a small number of educators and entry-level employees.

Leveraging data:

Respondents were asked how effective their company is at leveraging data for a number of uses. Forty-nine percent of respondents said that their organizations are “very effective” at leveraging data for at least one of the options. In some instances, this group’s responses have been compared to those from other respondents.

Performance:

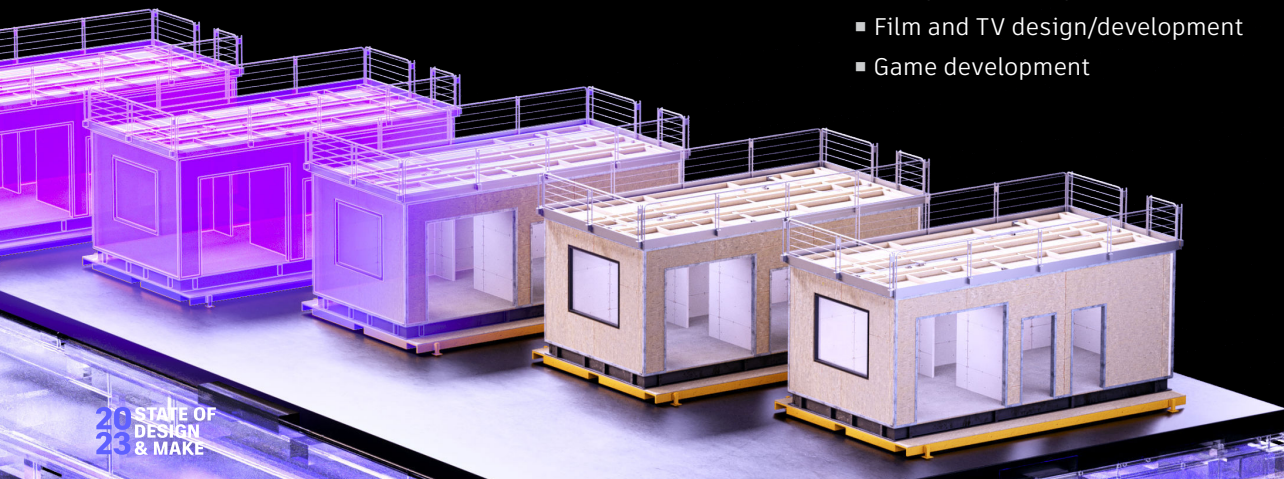
Companies whose leaders and experts rated their organization’s performance on top business metrics as “above average” or “excellent” are considered top performers.

Region:

- **APAC:** Australia, China, India, Japan, South Korea
- **Europe:** France, Germany, Italy, Netherlands, Sweden, United Kingdom
- **AMER:** Canada, United States

Sustainability:

In survey questions about sustainability, the actual phrase used was “sustainability (relating to the environment).” In one-on-one interviews, this more expansive definition was used: “efforts related to the environment (mitigating 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 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.

ABOUT IPSOS

Founded in 1975 in France, Ipsos is one of the largest market research and polling companies globally, operating in 90 markets and employing more than 18,000 people. The organization's research professionals, analysts, and scientists have built unique multi-specialist capabilities that provide true understanding and powerful insights into the actions, opinions, and motivations of citizens, consumers, patients, customers, or employees. Ipsos helps its 5,000 customers move confidently through a rapidly changing world. For more information, visit ipsos.com.

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