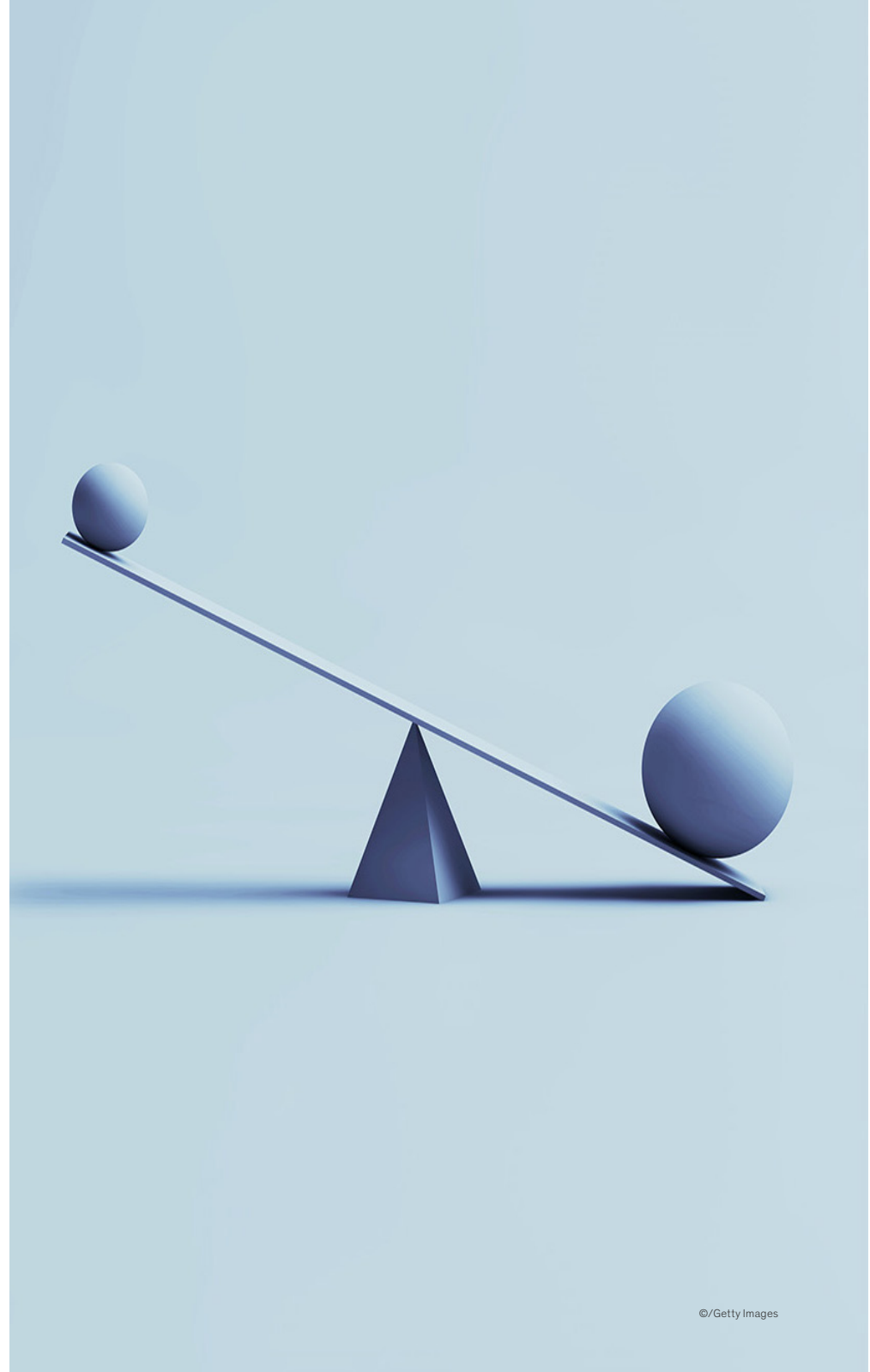


# Tech highlights from 2022—in eight charts

Here's a look back at some of the important technology story lines from the year that was.

From metaverse mania to eye-popping breakthroughs in generative AI, it has been quite a year for technology. We present some of the stories that helped shape the last twelve months, as told through eight charts—with a smattering of insights to go along with them.



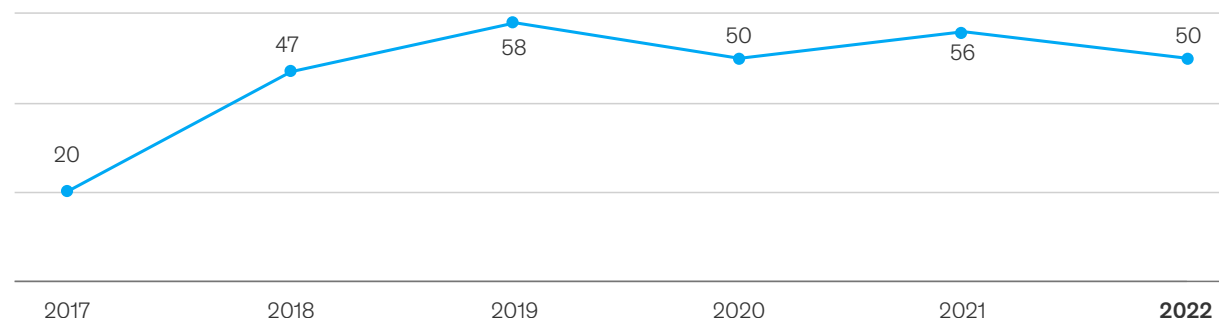
## A tipping point for AI?

At first glance, our latest AI survey shows adoption leveling off over the past few years, though it has more than doubled since 2017, and applied AI continually ranks high in our annual tech trends analyses.

However, the number of AI capabilities companies use, such as natural-language text understanding, has continued to grow. And those seeing the most value from AI are beginning to industrialize it, laying the groundwork to develop more AI applications faster and easier—and pull further ahead of competitors. Yet, that's not the tipping point to which we refer. It's the generative AI models opened to the public this year—like ChatGPT, which churns out original text content based on user prompts, and Stable Diffusion, which generates images from text—that could usher in the next boom in AI use, unleashing new applications and opening AI to those with little to no technical background. While only 11 percent of AI-using companies reported leveraging the AI capabilities behind models like these (transformers and, to a lesser extent, generative adversarial networks, or GANs), we expect that to increase next year.

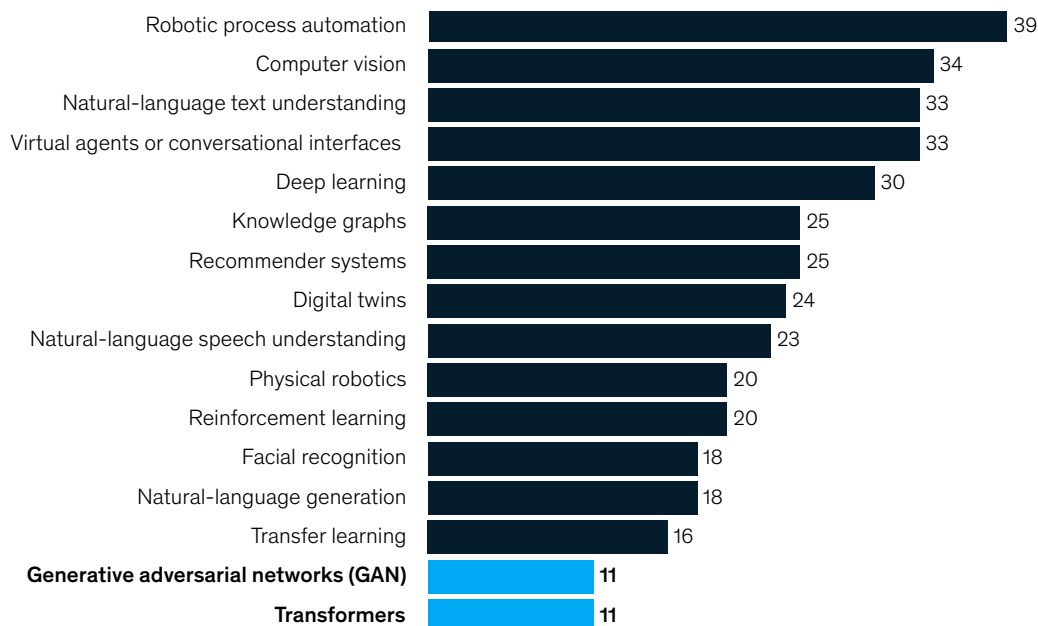
While AI adoption globally is 2.5× higher today than in 2017, it has leveled off over the past few years.

Share of respondents who say their organizations have adopted AI in at least one business unit or function, %



Responses show an increasing number of AI capabilities embedded in organizations over the past five years.

% of respondents who say given AI capability is embedded in products or business processes in at least one function or business unit<sup>1</sup>

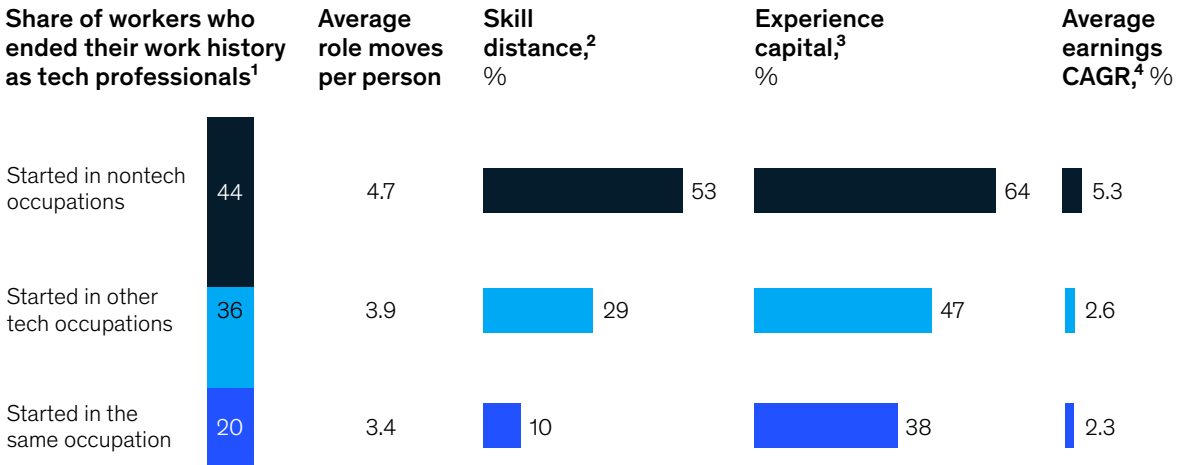


<sup>1</sup>Question was asked only of respondents who said their organizations have adopted AI in at least one function.

# Tech talent remains tight, but there's unconventional hope

Demand is growing exponentially for skills such as software engineering, data management, and cybersecurity. Eighty-seven percent of global senior executives surveyed by McKinsey said their companies were unprepared to address the gap in digital skills—and that was before the pandemic caused dramatic shifts toward remote work and e-commerce. Executives reported difficulty in hiring for all AI-related roles, and the emergence of quantum computing ushers in yet another—and potentially larger—area starved for talent. There's a bright spot: our research shows that people routinely break into tech from other fields, and they make substantial shifts in skills and specialization when they do. But leadership's willingness to make unconventional hires and the commitment required to help them expand their capabilities require a shift in thinking.

## A substantial share of tech professionals entered the field from nontech occupations and added new skills learned through experience.



<sup>1</sup>N = 280,000 individuals in Germany, India, the United Kingdom, and the United States. Based on observed work history.

<sup>2</sup>Measured as share of nonoverlapping skill requirements between two roles, which shows the proportion of new skills required when someone moves into a new role. Skill requirements for each role taken from job posting data, weighted by skill frequency, which gives more weight to skills that are specialized to a particular role rather than common across roles.

<sup>3</sup>The share of lifetime earnings associated with skills learned through experience. For full methodology, See *Human capital at work: The value of experience*, McKinsey Global Institute, June 2022.

<sup>4</sup>Average compound annual growth rate of earnings over observed work history.

Source: McKinsey's proprietary Organizational Data Platform, which draws on licensed, de-identified, public professional-profile data, as well as 2018–19 job posting records; McKinsey Global Institute analysis

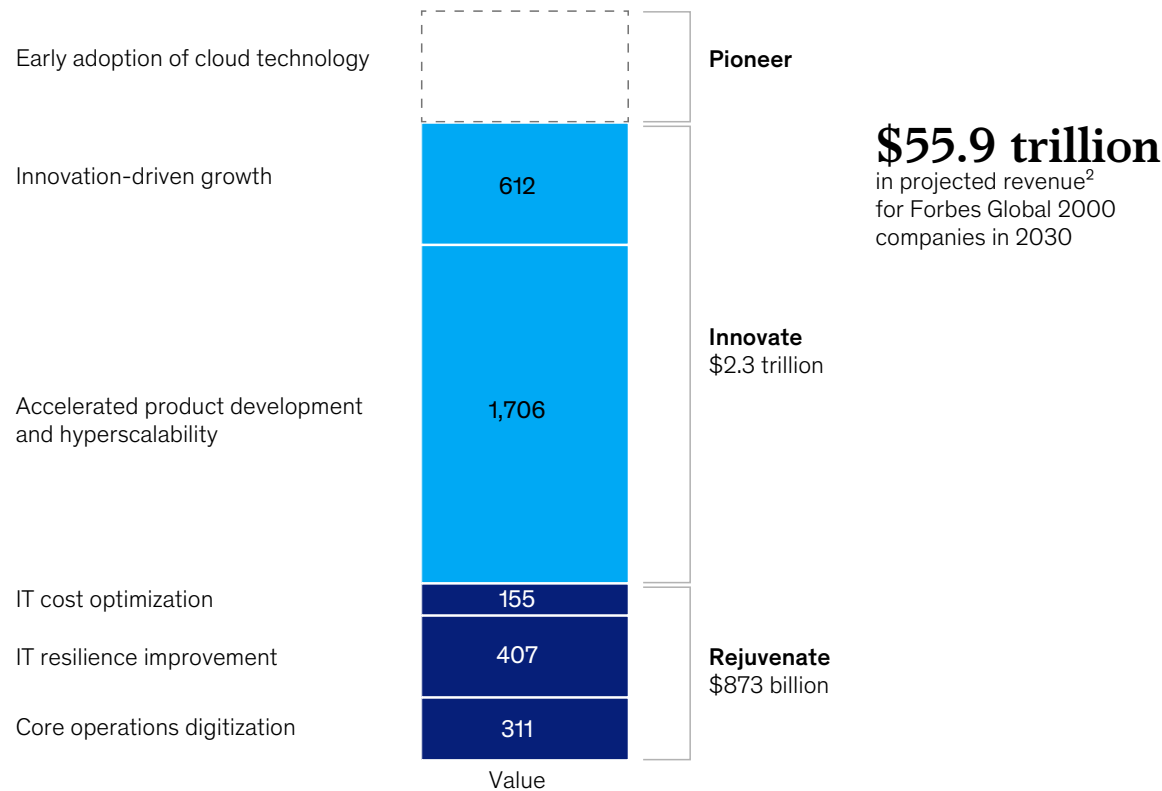
# It just keeps getting cloudier

Large enterprises aspire to have 60 percent of their tech environment living in the cloud by 2025. We applied our 2021 cloud valuation model to the Forbes Global 2000 and found that cloud adoption could generate \$3 trillion off the back of 700 use cases for this group of companies by 2030. Use cases largely fall into three areas:

- *Rejuvenation*, which includes value from IT savings, operational cost savings, and digital risk reduction
- *Innovation*, which includes value that is mostly revenue related, accounts for the bulk of potential cloud value, and includes using technology like AI and IoT to optimize business operations and improving time to market
- *Pioneering*, which covers the range of emerging technologies, such as quantum computing, which are too young to accurately value

By 2030, value drivers could enable cloud to deliver more than \$3 trillion in EBITDA value across the Forbes Global 2000.

Estimated 2030 EBITDA run-rate impact for Forbes Global 2000 companies,<sup>1</sup> \$ billion



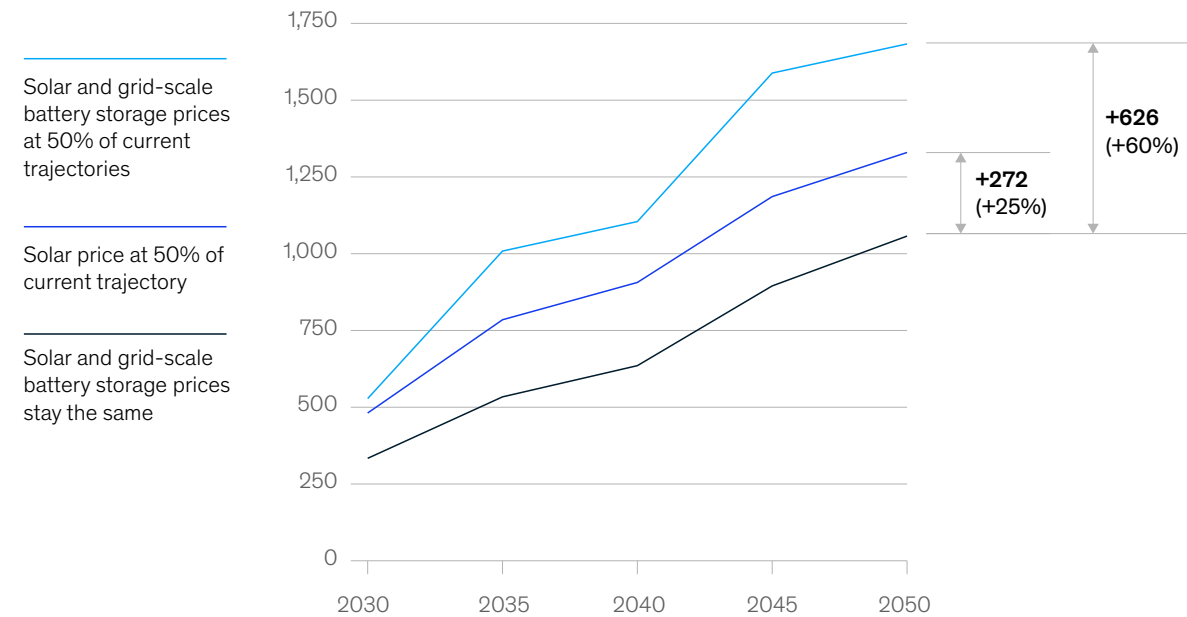
<sup>1</sup>150 private-equity companies have been omitted from the calculation to avoid redundant calculation of cloud value.  
<sup>2</sup>Projected revenue is based on historic growth rates.

# Quantum computing progress brings high expectations—and a little fear

Speaking of quantum computing, advances in the field continued this year, and, with them, excitement rose for the technology’s potential to fuel breakthroughs in important areas such as drug discovery and climate change. On the flip side, the technology’s power poses a significant cybersecurity risk: fully error-corrected quantum computers (which can provide highly accurate results) will be capable of overpowering today’s most common encryption protocols. Organizations in sectors where data has a long shelf life and systems have extended development cycles, such as in the public sector, are beginning to prepare now.

Quantum computing could help enable innovations in batteries that are needed to reduce vehicle emissions and enable grid-scale energy storage for solar cells. This could decrease the costs—and increase the use—of solar.

Estimated solar power in the EU by quantum impact assumptions,<sup>1</sup> gigawatts

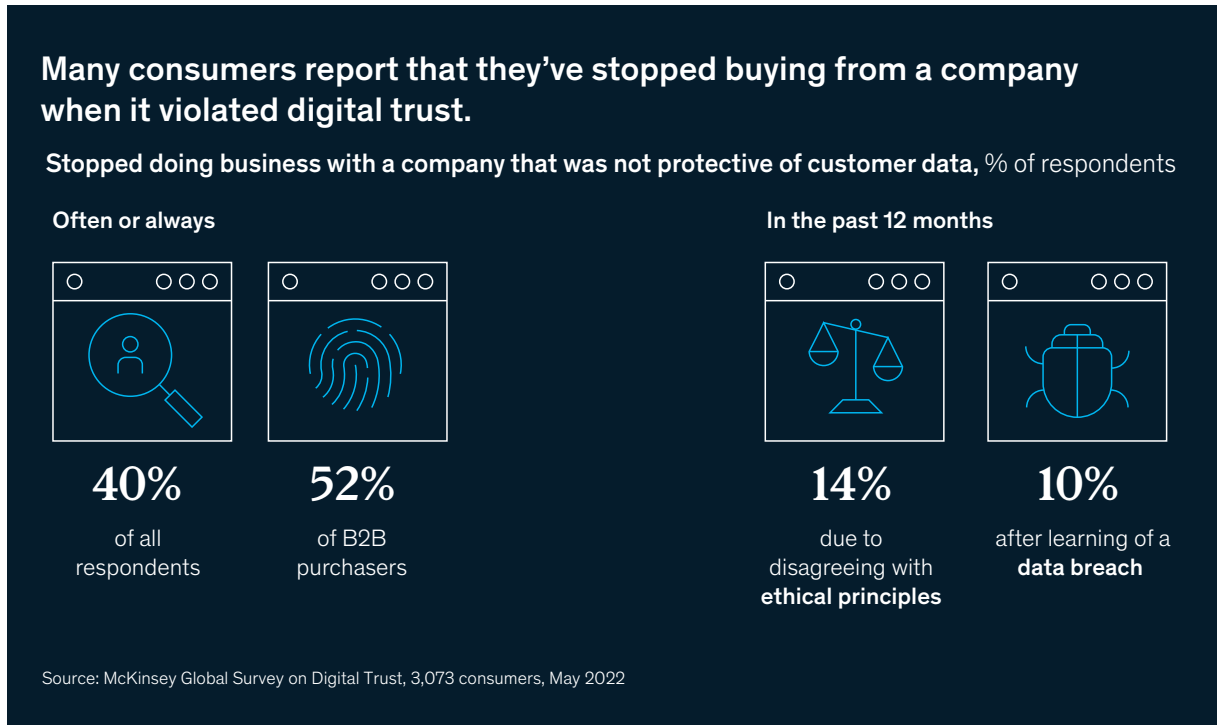
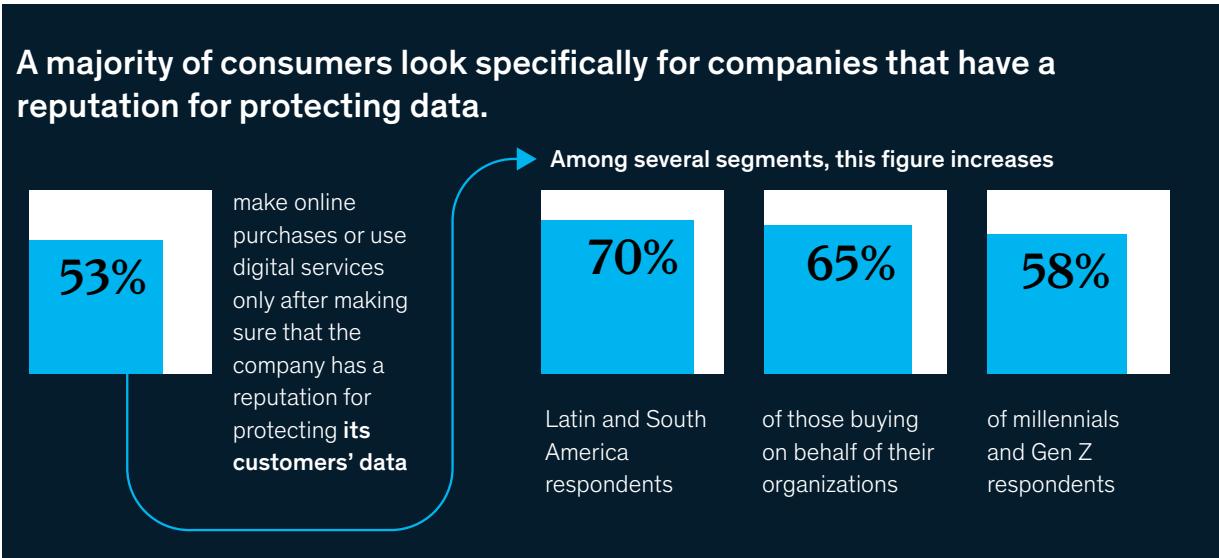


<sup>1</sup>The McKinsey Power Model focuses on building the lowest economic pathway to meet estimated power-demand profiles of European power grids. This combines expert estimates of cost of supply, plus a carbon price estimated at \$100 by 2030 and \$200 by 2050. The impacts of a quantum leap would be even more significant in countries without a carbon price.  
Source: McKinsey Power Model

# In technology, we (must) trust

We learned that digital trust truly matters to consumers when we conducted our first global survey on the topic. For example, consumers actively seek out businesses that protect customer data—and many will take their business elsewhere when companies fail to do so.

However, most companies aren't putting themselves in a position to live up to consumers' expectations. Less than a quarter of executives report that their organizations are actively mitigating a variety of digital risks across most of their organizations, such as those posed by AI models, data retention and quality, and lack of talent diversity. Companies should look to shore up their data ethics frameworks and practices, double down on cybersecurity, and de-risk AI by design, among other strategies, to ensure customer trust—and unlock a new vector of growth.



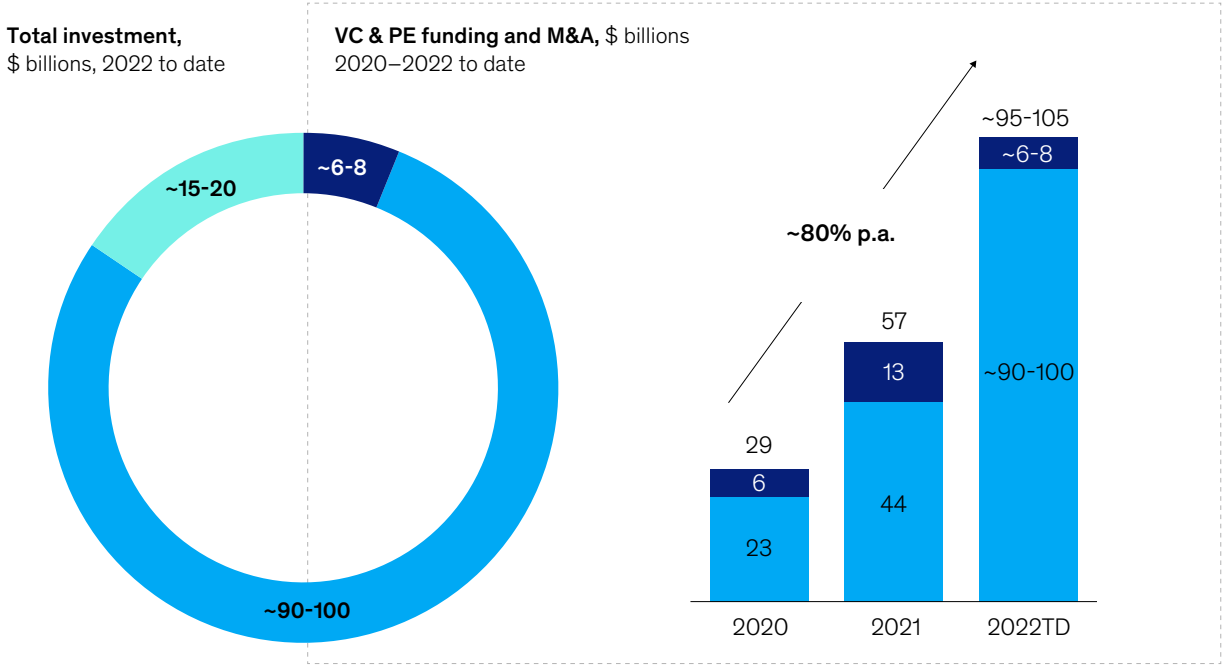
# Metaverse mania ensues

Interest in the metaverse has exploded. Global Google searches for “metaverse” skyrocketed 7,200 percent in 2021, and metaverse online gaming platform Roblox reportedly hit over 55 million daily active users in February 2022. While it is early days for the metaverse—even its definition remains up for debate—it would be brave to bet against the developing solutions and billions of dollars flowing into every corner of metaverse infrastructure, including the digital twins that could provide its foundations. We believe the metaverse has the potential to be the next iteration of the internet, and our bottom-up view of consumer and enterprise use cases suggests it may generate up to \$5 trillion in impact by 2030—equivalent to the size of the world’s third-largest economy today, Japan. While the future appears bright, there will inevitably be challenges on the way to making the metaverse of people’s imaginations technically feasible.

# Substantial investment signals confidence in the potential of the metaverse.

## Value of metaverse-related investments, \$ billions

■ Venture capital (VC) & private equity (PE) ■ M&A ■ Internal corporate investment<sup>1</sup>



<sup>1</sup>Internal corporate investment in 2022 derived for top 30 companies investing in the metaverse based on publicly announced investment amounts. Source: Crunchbase (Jan 2020–May 2022)

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