Breakthrough Innovation

Is your organization equipped for breakthrough innovation?
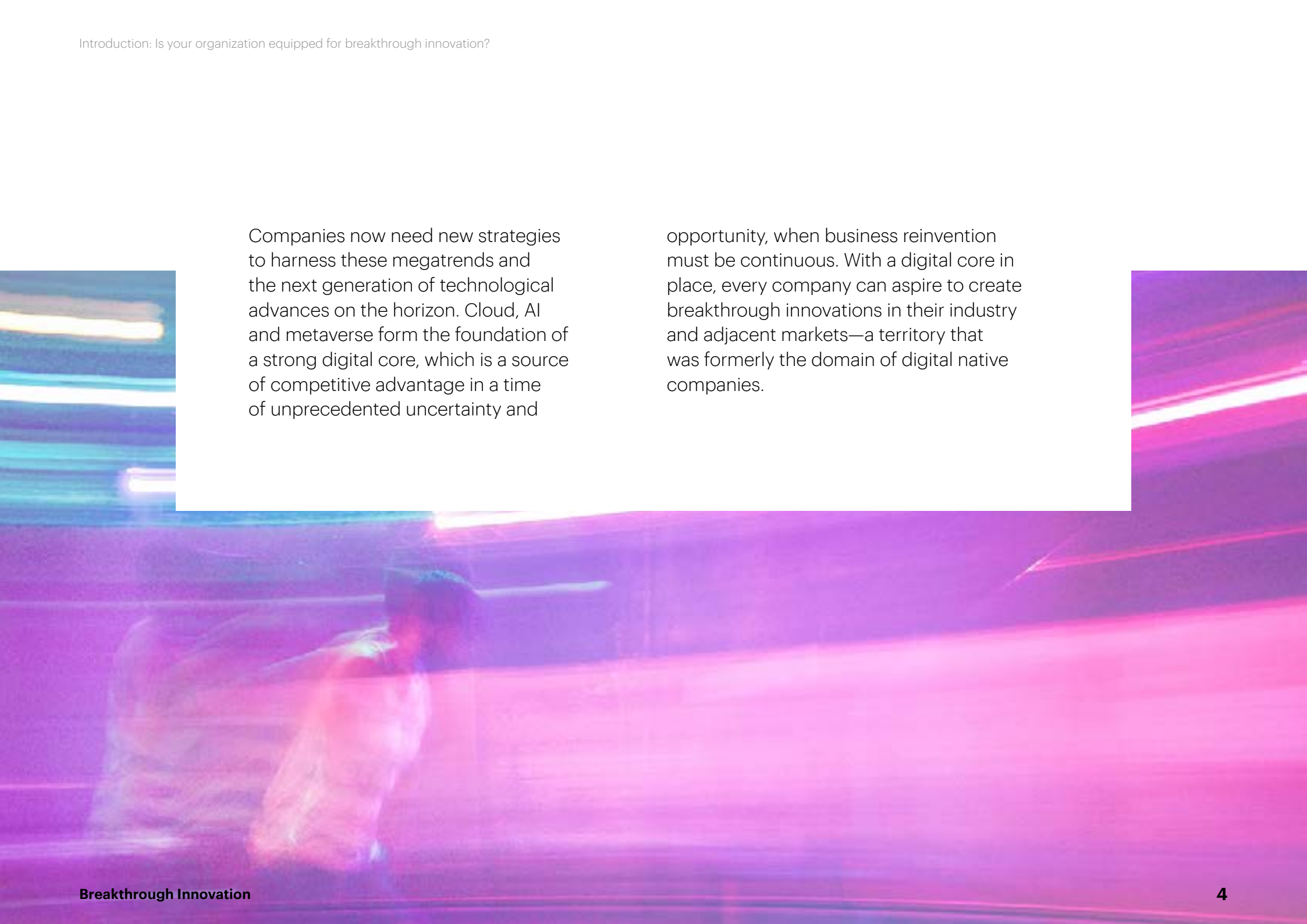
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Introduction

Is your organization equipped for breakthrough innovation?

For several decades, the world has primarily measured technological advancements by a single metric: Moore's law, which states that computers will double their speed and capabilities every two years. Companies steadily harnessed these ever-greater computing capabilities to make incremental and important improvements in how they innovate, grow and operate. Moore's law brought us progress that was exponential, but also predictable—until now.

Today, cloud, AI and the metaverse are accelerating into megatrends that have the potential to dramatically speed up the pace of technological change, bend the innovation curve and become a crucial part of every organization's value chain. Much more than simply a form of computing, cloud is the operating system of the future enterprise. It allows businesses to run with greater speed and agility by standardizing operations on a common platform and enabling organizations to innovate and experiment faster. AI's impact on business will be similarly far-reaching, because of its potential to reinvent practically every aspect of every enterprise. The metaverse marks a new era of digitally enhanced worlds and business models that will change how businesses interact and how they create products and services.

Companies now need new strategies to harness these megatrends and the next generation of technological advances on the horizon. Cloud, AI and metaverse form the foundation of a strong digital core, which is a source of competitive advantage in a time of unprecedented uncertainty and opportunity, when business reinvention must be continuous. With a digital core in place, every company can aspire to create breakthrough innovations in their industry and adjacent markets—a territory that was formerly the domain of digital native companies.

The megatrend technologies fueling innovation

Today's executives are navigating a complex and dynamic business environment few have ever seen. Continuing effects of the pandemic, supply chain challenges, inflation, energy shortages and more—all representing a fundamental change in how the world operates.

Our Global Disruption Index, a composite measure that covers economic, social, geopolitical, climate, consumer and technology disruption, shows that levels of disruption increased by 200% from 2017 to 2022 (see "About the Research" for more details). In comparison, the Index rose by only 4% from 2011 to 2016. As such, organizations now face a permanent state of change at a pace never seen before.

Part of this disruption stems from the cycle of technology adoption and consolidation, known as the "S-curve." The pandemic marked a dramatic uptick in the pace of technology adoption. Our latest research conducted at the end of 2020 shows most organizations

are not stopping. More than 93% of companies are continuing to expand their IT foundation.[1] Fully half plan to increase investment levels in AI (51%) and Cloud services (50%) over the next year. And more than one-third of companies will further develop their digital core in areas like data technologies (42%), security (39%), and communications networks (37%). It's not only adoption that has accelerated, but also the technologies themselves. Technological change sped up to a massive degree over the last decade. A company cannot keep up,

or endure over the long term, without constantly reinventing itself at every major inflection point.

While the megatrends of cloud, AI and metaverse represent three technology "S-curves" that are disrupting businesses, they are also catalysts for productive business change. Legacy technologies limit an organization's ability to change and innovate, but a strong digital core built on cloud, AI and metaverse enables continuous reinvention—embracing reinvention as a strategy in itself.

Cloud

Metaverse

AI
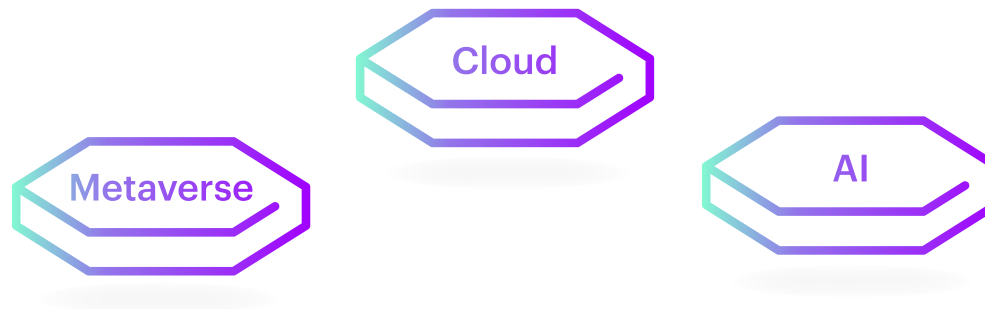
Cloud

Cloud is increasingly the place where most innovations happen. Every other technology with the power to transform requires a strong cloud foundation on which to build. Today's cloud computing power—managed centrally and deployed everywhere—offers easy-to-use services like 5G, robotics, data services, tailored-industry solutions and quantum computing that can help companies create new services and jump right to their application—like programming distribution centers to rapidly reconfigure based on demand or helping retailers create the stores of the future.[2] Cloud is increasingly a source of continuous innovation rather than a one-time destination.

Despite accelerated adoption of these new technologies, many companies struggle to scale innovation across their organizations. However, a strategic tipping point occurs when organizations migrate and modernize their technology estate to a cloud-based operating model. The most successful companies treat cloud as a new operating system for the enterprise in which all IT assets are configurable, consumable and automatable to make the business efficient, resilient and agile and able to experiment faster. And while we estimate that today less than 68% of companies that have moved to the cloud are fully using these capabilities, it is clear that more companies need to as part of their reinvention strategy.

AI

In the past, companies thought of AI as a tool to help them process large amounts of data quickly, allowing them to generate new insights to inform everything from manufacturing to research, from HR to marketing and more. Today, AI is at a new inflection point and period of rapid acceleration as it gains more human-like capabilities and intelligence in three categories: vision, language and reasoning. Computer vision is gaining traction in domains such as manufacturing quality control, safety and physical security and autonomous mobility. While language is a more complex domain, recent advances like GPT3 and ChatGPT are breaking new ground in intelligent customer engagement, content creation and contextual search. Recommendation systems are becoming central to enterprise decision-making.

To increase their intelligence index across these three domains, companies will need to develop foundational models that continually add to their corpus of data and knowledge and enable them to be more responsive to new signals of change from their operations or outside environment.

In a survey of over 1,500 C-suite executives and data-science leaders from the world's largest organizations, we found that firms that plan to adopt next-generation AI and advanced computational methods—while tapping ecosystem partners and networks to help them plan and execute their tech strategies—are 2.6X more likely to increase revenue by 10% or more than companies not pushing toward the leading edge in these areas.

A majority of companies—nearly 75%—have already integrated AI into their business strategies and have reworked their cloud plans to achieve AI success, whether the goal is accelerating R&D timelines for new products or enhancing customer experiences. That said, of those companies already testing AI, only 12% are effectively scaling these experiments to achieve superior performance and growth.[3] One executive told us, "We have 2,000 machine learning models and no way to productize and make them useful at scale." Companies must simultaneously build foundational AI capabilities—like modern data platforms, mesh architectures and responsible AI governance—that are required to keep pace with AI advances—all guided by an AI strategy that has C-suite sponsorship.

Metaverse

There is growing consumer and business interest in the metaverse as a creator economy and tool to enhance day-to-day tasks, which is expected to build a $1 trillion commerce opportunity by the end of 2025.[4] While we often hear about consumer applications of virtual, enhanced environments such as gaming, the biggest potential for metaverse in the short term is coming from industrial and enterprise uses. And some of the world's best-known brands are already deploying the technology. For example, BMW has invested in digital twin technology to build a virtual representation of a German factory using NVIDIA's Omniverse Enterprise platform. The system allows BMW to simulate changes to its manufacturing process with "virtual humans," and optimize changes to workflow and ergonomics before rolling them out to a real factory floor.[5]

Numerous companies are using metaverse technologies to address significant business issues and whole industries such as healthcare that are ripe for reinvention given the technology's ability to dramatically broaden reach and improve doctor-patient experiences.

A strong digital core is fundamental to all other strategic needs of an enterprise

Different industries and markets will be affected differently by forces of change. Some will embrace Total Enterprise Reinvention, with a goal to reinvent over time every part of their companies, centered around a digital core and new ways of working that establish a culture and capability for continuous reinvention. In doing so, they'll set a new performance frontier for their companies—improved financials, ability to achieve perpetual breakthrough innovation, increased resilience in the face of any disruption, and how they create value for all stakeholders. Companies need a strong digital core to thrive in a future where technology and breakthrough innovation is a primary source of competitive advantage and continuous reinvention is a strategy in itself.

A digital core is the foundation on which exceptional experiences can be built and breakthrough innovations happen. A digital core is built on a modern, cloud-based infrastructure and security layer that is automated, agile and secure by design. That includes moving and modernizing existing applications on the cloud, and building new, cloud-native applications and platforms to bring efficiency and innovation to enterprise functions. The interoperability that comes with modernizing applications on cloud is crucial, according to our research: Companies with high interoperability grew revenue 6X faster than their peers with low interoperability and unlocked an additional 5 percentage points in annual revenue growth.[6]

The next layer of the digital core is data and AI, which helps enterprises ask new questions and find new answers to drive decision-making and develop new products. Then comes adding a layer of capabilities to enable experimentation in the hybrid digital-physical worlds of the metaverse.

What is breakthrough innovation?

Breakthrough innovation sits at the intersection of understanding the potential of next generation technologies and applying them in novel ways to shape and capture white space opportunities and address acute needs in their business or industry.

The question then becomes: Are these breakthroughs a matter of luck or can companies engineer such success?

We believe companies can engineer breakthrough innovations. To understand how this happens, executives should first understand what makes an innovation rise to the level of breakthrough. In our experience, breakthrough innovations have one of three fundamental characteristics that set them apart.

1 Category-defining new products, services and experiences.

Breakthrough innovations drive more than just growth and profitability. They spark entire businesses and categories of businesses. Sometimes they spawn entire industries. They do that by creating something that has never been seen before—whether at the level of a product, service or experience.

Think of the biometric sensor technology embedded in a smartphone that fostered radical ease of use as users made payments with vault-like security. This was not just a business-model innovation. It was also a fundamental invention known as a "secure enclave," which embeds biometrics at the chip level of a device and prevents user data from being compromised.

Another breakthrough innovation is the UPI payment infrastructure established in India, which enables users to transfer money within and across platforms regardless of payment standard. These breakthrough innovations have resulted in an explosion of banking and payments options for both the inventor as well as the industry.[7]

Such innovations have snowballed into platforms like Apple Pay, Google Pay and PayPal in the consumer space. Meanwhile, Square, Stripe and Moven are gaining control over B2B payments, settlements and other transactions, while upstarts like Chime, Nubank and Monzo have built low-cost, digital-native banking services. Chime is now among the top 10 banks in the U.S. in terms of number of customers.[8] And traditional players like Capital One, which started off as a credit card company, have grown into cloud-native technology companies that also offer banking services.

These new breakthrough products and services not only created giant successes and other new products in the industry, they laid a foundation for sustainable economic development across the world.

2 Significantly compressed time to value.

Growth is becoming hard to achieve, and competitive advantage is becoming harder to sustain. Between 2011 and 2022 the performance gap between top-quartile and median companies in terms of total shareholder returns (TSR) declined by an average of 15 percentage points across industries.[9] Creating value has become much more urgent and must be greatly compressed—from decades to less than a year.

While breakthrough innovation starts with a great idea, success lies in a company's ability to bring that idea to life in a radically compressed timeframe. Take the example of pharmaceutical and biotech leader Moderna's process to design an mRNA that carries instructions for cells to produce a disease-fighting protein, which unexpectedly changed the game in vaccine development in record time when COVID-19 struck. That didn't just benefit Moderna as a company; it lifted the entire pharmaceutical industry when it was needed most.[10]

There's a science to significantly compressing the time to value. Rather than betting on a single idea in a single field, leading firms build a dynamic portfolio of ideas for new business products or ventures at different stages of development, thereby increasing the probability of success and diversifying risk. Cloud hyperscalers are adept at taking investments in one area and scaling them rapidly in many other areas of the business to reduce time to value. This is the power of reuse that companies leverage to accelerate the time to value making their products reach the customer faster and in a more predictable manner.

Consider how AWS has used the conversational AI intelligence gained from Alexa to capture a huge share of the enterprise contact-center market, which accelerated during the pandemic.[11] Or how Siemens has launched their Siemens Xcelerator platform which is an open business platform that brings together different ecosystem partners to help clients to accelerate their digital transformation. MindSphere can process data, in real-time, from thousands or even millions of edge devices and sensors in plants, systems, machinery and products dispersed throughout production processes and supply chains.[12]

3 Dramatically reduced cost of impact

Profitable ideas are getting harder to generate. Whether in drug discovery, semiconductor research, medical innovation or crop yield improvements, there's a common story: investment in research is climbing sharply resulting in high innovation costs and questionable payoffs. Research productivity—the number of researchers it takes to produce a given result—is declining by around 5% annually in the U.S.[13] For example, in the semiconductor industry it takes more than 18 times as many researchers to double chip density today as it did in the early 1970s. This staggering cost of innovation could be why the industry is decrying the end of Moore's law.

New technologies hold the promise of dramatically reversing this trend. Technology, data and AI are being applied to accelerate scientific progress at much greater productivity.

Consider manufacturing. Most manufacturers across the world have launched pilots to validate the value of harnessing data and advanced analytics, applying autonomous solutions like predictive maintenance to optimize their operations. However, as manufacturers strive to adopt autonomous operations faster, they face two common challenges: the highest value use cases typically require manufacturers to introduce autonomous

solutions to more than one asset, line or function; and autonomous solutions leverage vast amounts of data, which is typically beyond the reach of existing manufacturing operations management (MOM) architectures.

For example, Stellantis is using a combination of edge, cloud, 5G and AI technologies to improve quality inspections in one of their manufacturing plants in Brazil.[14] They gather petabytes of data from sensors and cameras as vehicles move through the assembly line. Then, using edge computing, they detect defects such as welding errors in real time because the sensor data is processed in close proximity to the problem. They also rely on the power of AI models running on cloud, which are trained using data continuously gathered at the plant. All this is brought together with the connectivity of private 5G networks. Since the network's launch, Stellantis has improved its auto manufacturing productivity, safety and business agility.

By implementing disruptive technologies like digital twin, computer-vision powered by cloud, edge and private 5G in parallel with the existing MOM architecture, manufacturers can extract more value from years of technology investments and avoid the need to "rip and replace." It allows auto manufacturers to deliver products with higher quality and predictability at a lower cost, which in turn helps accelerate the transition from internal combustion engine to electric.

While businesses still need a great idea for a new product, service or experience, today's technologies make it possible to drastically cut development time and associated costs.

How will the next generation of breakthroughs happen?

In the coming years, we expect to see some of the greatest quantum leaps in performance and breakthrough innovation coming from three sources: platform-based business models, deploying next generation intelligence and exploiting computational and algorithmic advances.

Unlocking the power of the platform economy

Companies are using technology to redefine the entire value chain of essential activities providing new products or services to their customers beyond what is created within their own walls. These emerging, platform-centered business models on cloud share data and experiences across the enterprise and beyond, generating new revenue streams and create "stickiness" with customers. This concept originated with the marketplace that Apple, Google and Amazon created and was expanded by other platform companies like Uber, Airbnb in the travel and hospitality segment. This philosophy is very much applicable to the B2B enterprises, where companies can come together to offer a new and differentiated product or service to their customers. This is all about taking the power of social graphs—which are essentially models of social networks—to the enterprise world.

A prime example is what's happening in the auto-insurance segment, where the driver can get a personalized insurance service for their automobile tailored to how, when and where they drive. Upstart electric automakers like Rivian, which makes "electric adventure vehicles," integrate insurance into their offering. But instead of Rivian becoming an insurer and handling complex underwriting and claims processing of the insurance value chain, Rivian partnered with Nationwide.[15] This allows Rivian to streamline the insurance process for car buyers while providing a steady source of customers to its partner as well as real-time driving data that helps them quantify risk and set premiums.

To introduce new products or services that leverage a platform-based business model and deliver differentiated customer value, companies should establish unconventional collaborations with partners and other industry actors, both within their existing market and adjacent markets. This process involves bringing together business model

innovation, consumer-grade scalability and governance that spans all the organizations involved.

Our analysis of FactSet's supply-chain database shows the number of organizations entering unconventional collaborations grew by five times from 2011 to 2021. In fact, our analysis showed that from 2017 to 2021, the average number of organizations in any one collaboration was three times higher in unconventional collaborations than traditional ones. Similarly, unconventional collaborations were 2.8 times more likely to involve competitors than were traditional collaborations.

Deploying next-generation intelligence

Over the last 10 years, there have been breakthroughs in AI, primarily related to computer vision, enabling advances from image search to autonomous driving. The next wave of breakthroughs will be driven by language, based on advances in transformer models such as GPT-3 and Wu

Dao 2.0. In 2020, AI services grew 17.3% to $19.4 billion, and are forecast to increase to $50.5 billion in 2025, at a CAGR of 21%. AI training times have dropped 87% from 2018 to 2020, while advances in hardware and software have been driving down AI training costs.

For companies to benefit from the technological advancements in AI capabilities, they need to take a more strategic and disciplined approach in acquiring, growing, refining, safeguarding and deploying data. They need to truly treat data as capital, working to increase and accelerate the return on their data capital. When companies master data management, they can aspire to next-gen intelligence that will be live, multi-modal, cross-functional drawing inferences from both internal and external sources.

These trends can be seen in computational biology, where language models are used to "predict" proteins to better understand the building blocks of cells and accelerate drug development;

in consumer goods, where increasingly sophisticated 360 customer engagement tasks can be fulfilled by chatbots; in architecture, where text-to-image engines visualize building ideas; and in coding, where commands written in English can be turned into rudimentary software applications. Transformer models understand language, providing a general-purpose platform that can do much more than automate humdrum work.

China-based Shein became the world's largest fashion retailer in 2022 in part by using next generation intelligence to reinvent demand-driven product design. Each day, Shein adds up to 7,000 new items online, far more than rival retailers do, by mining consumer signals online, especially on TikTok.[16] Product teams quickly turn around designs based on clicks and sales. An algorithm determines the production plan—ordering extra materials automatically and then recommending items to more users with similar profiles.[17] This kind of just-in-time model could be applied across other

industries to prevent large amounts of stock from going to waste and tie up very little cash in inventory.

Exploiting computational and algorithmic advances

We're entering an era of supercomputing and advanced AI that has led to innovation becoming cheaper, more accessible, less risky and providing more optionality. Bestselling business book author Jim Collins has called it the "flywheel effect"—as companies relentlessly push a giant, heavy flywheel, turn upon turn, they build momentum that eventually produces a breakthrough point.

Why is this important? The field of microbiome research is one example of the impact of these advances. Researchers have long known that a better understanding of the microbiome would yield important new insights into human and environmental health. The challenge was always the sheer scale and complexity of processing and

comprehending the data. A single human has nearly 100 trillion microbiomes.[18] Multiply that number across all the humans on earth, and the combinatorial complexity is staggering. Now, massive computing power and advanced data pipeline platforms (such as QIIME) are being deployed to understand the role of the microbiome communities on health— for example, the impact of antibiotics on a human body. Computational and algorithmic advances unlock the potential for analyzing all these combinations to solve pressing community health and environmental challenges.

Take semiconductor chip design. Every level of computing is becoming more specialized. This wave started when computing architectures evolved from general purpose processors to domain specific architectures. This important shift can be traced back to when graphical processing units designed for gaming were applied to a completely new domain—AI processing and model training, addressing a previously unmet

need to process massive quantities of data. This phenomenon has ballooned, with more and more domain-specific chipsets being designed to accelerate the performance of specific applications—effectively changing the trajectory of Moore's law.

As companies strive for differentiation through advanced computational technologies and algorithms, they will need to monitor new research and developments from various sources like academia, open source communities and start-ups. Since many of these algorithms will push the boundaries of conventional performance, it's important that companies design a full-stack technology solution that can accommodate the speed and performance demands while mitigating energy and sustainability impacts.

Computing architecture and the algorithms account for half or more of all improvement in the domains of AI-powered games like chess and Go, weather prediction, protein folding and oil extraction, according to Neil Thomson, an innovation scholar at MIT's Computer Science and Artificial Intelligence Lab and the Initiative on the Digital Economy.[19] Advanced computing systems like quantum, neuromorphic and "swarm" computing are on the verge of prime time. But in the meantime, engineers are taking a hybrid approach, blending traditional computing systems, such as through enhanced simulation or modifications, with elements of next-generation computing, to achieve performance and efficiency boosts of advanced computing while taking advantage of the scalability and reliability of classical computing systems. These blended solutions are more than a stopgap until the next thing is fully ready—they could offer legitimate value in the next 12 to 24 months.

Transforming technology into breakthrough innovation is indeed possible

We are at a unique inflection point. Breakthrough innovation sits at the intersection of understanding the potential of next generation technologies and applying them in novel ways to shape and capture white space opportunities and address acute needs in their business or industry.

We are inspired by many examples of breakthrough innovations happening already and the promise of disruptive technologies like cloud, AI and metaverse. By harnessing these megatrends to establish a digital core and capitalize on the next generation of technology advances, every company—not only digital natives—can reinvent their enterprise with breakthrough revenue growth, operational efficiencies and innovation. By jettisoning a mindset of incremental innovation and embracing breakthrough approaches, business leaders will dramatically reshape their companies, entire industries and broader society.

About the research

We took a multi-method approach:

1. C-suite survey

Accenture Research conducted a survey of 1,516 C-suite executives in November 2022. Respondents were asked about their organization's approach to business transformation and reinvention strategy, as well as about their specific programs and success factors. We collected data on technology implementation across 26 different technologies spanning IT, data, AI and automation, network, security, and cloud. We supplemented this by assessing executives' intent and specific timelines to build on their digital cores and invest further in emerging technologies such as the metaverse and advanced computational methods. As dependent variables, we also captured their expected returns on investment in innovation and their likelihood to achieve breakthrough innovation through an effective ecosystem strategy.

We conducted the survey in 10 countries: Australia, Canada, China, France, Germany, India, Italy, Japan, the United Kingdom and the United States. Respondents represented 19 industries: Aerospace and Defense; Airline, Travel and Transport; Automotive; Banking (Retail); Capital Markets; Chemicals; Communications, Media and Entertainment; Consumer Goods and Services; Energy; Healthcare; High Technology; Industrial Goods and Equipment; Insurance; Natural Resources; Pharmaceuticals, Bio Tech and Life Sciences; Public Services; Retail; Software and Platforms; and Utilities.

2. Case studies

We employed a qualitative, multiple-case study methodology, examining collected more than 20 cases, to illustrate and emphasize different aspects of organizations' various innovations and approaches to reinvention.

3. Global disruption index

We created an overall measure of disruption to assess the level of volatility and change in the external business environment. The index is based on the average of six sub-components, that cover the economic, social, geopolitical, environmental, consumer and technological spheres. Each of the sub-components is based on a set of indexed scores for a range of indicators.

The economic component is based on economic risk ratings, VIX, GDP volatility and inflation volatility. Geopolitics is based on the risk of geopolitical instability. The social component reflects social unrest and non-participation in the labor market. The environmental component reflects the frequency of climate-related disasters and climate-driven risk. The consumer component reflects pessimism at a global level, based on the inverse of the OECD's Consumer Confidence Index. Finally, the technological component is based on an index comprised of 26 indicators, which use the presence of disruptors and performance of incumbents as proxies for the level of disruptive innovation in industries.

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About Accenture

Accenture is a leading global professional services company that helps the world's leading businesses, governments and other organizations build their digital core, optimize their operations, accelerate revenue growth and enhance citizen services—creating tangible value at speed and scale. We are a talent and innovation led company with 738,000 people serving clients in more than 120 countries. Technology is at the core of change today, and we are one of the world's leaders in helping drive that change, with strong ecosystem relationships. We combine our strength in technology with unmatched industry experience, functional expertise and global delivery capability. We are uniquely able to deliver tangible outcomes because of our broad range of services, solutions and assets across Strategy & Consulting, Technology, Operations, Industry X and Accenture Song. These capabilities, together with our culture of shared success and commitment to creating 360° value, enable us to help our clients succeed and build trusted, lasting relationships. We measure our success by the 360° value we create for our clients, each other, our shareholders, partners and communities.
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