# Top Strategic Technology Trends for 2024

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Initiatives: Digital Future

> Technology disruptions and socioeconomic uncertainties require a willingness to act boldly and strategically enhance resilience over ad hoc responses. IT leaders must ensure calculated risk and reliable investments to sustainably enable both internal and external value creation.

## Overview

### Opportunities

- Generative and other types of AI offer new opportunities and drive several trends. However, deriving business value from the durable use of AI requires a disciplined approach to widespread adoption, in combination with attention to the risks.
- Elements such as software development, workforce empowerment and application functions can greatly benefit from augmentation functions through tools that enable self-service, automation and AI-driven responsive experiences.
- Delivering the full potential of technology investments past and future requires investments in AI trust, risk and security management, improvement of exposure management maturity and a fundamentally sustainable approach to technology use.
- Additional opportunities for competitive differentiation arise from organizationwide orchestration of tailored developments through platform engineering, use of industry-specific cloud platforms, and new customers in the form of bots, algorithms and devices.

### Recommendations

IT leaders and other executives planning their mid- and long-term strategy for technology innovation, must:

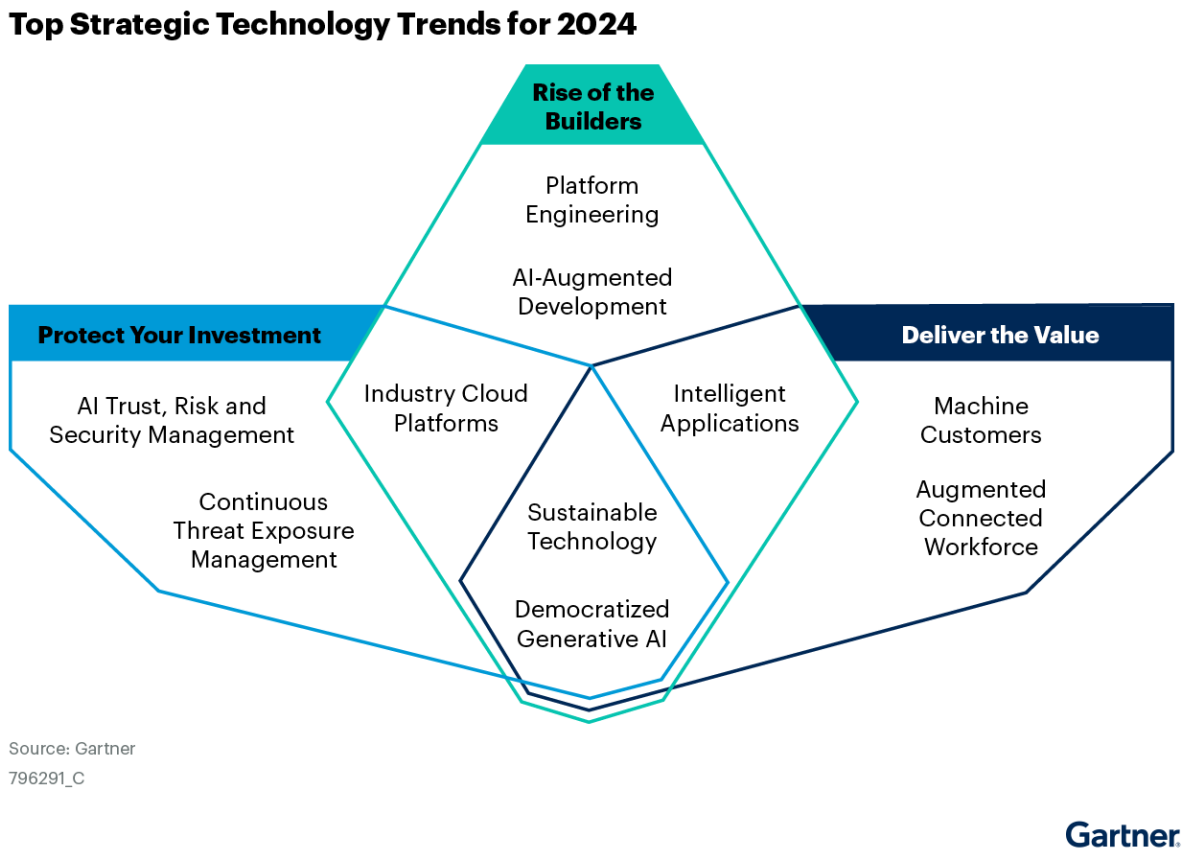
- Protect and preserve past and future investments by improving their security posture and focusing on exposures relevant to business outcomes. Manage AI trust, risk and security by default in every AI project, and invest in sustainable technology to excel in environmental, social and governance goals to ensure that returns on your investments last.
- Promote and enable the several communities of builders by coordinated orchestration of developer platforms, the democratization of generative and other forms of AI and investments in self-service tools for software development. Use industry cloud platforms to give a vertical specialized edge to operate at scale.
- Add value delivery initiatives by investing in the enhanced expertise and collaboration that comes from an augmented connected workforce, and in AI-driven intelligent applications that facilitate hyperpersonalized experiences that evolve with the user for decision-making excellence. Help grow revenue by facilitating sales to machine customers, and perhaps even by designing your own machine buyers.

## What You Need to Know

Most enterprises are now in a familiar mode of uncertainty. Further economic instability and geopolitical altercations are expected, while a climate crisis continues to unfold and technological developments shake societies worldwide. Cybercrime and ransomware attacks have increased to unprecedented levels, and hybrid working has become the new normal. Added productivity pressures increase the demand for certain scarce professionals. Organizations of all sizes are feeling the impacts.

As an IT leader, you're in a unique position to devise a roadmap that shows how technology investments can help your business remain successful, despite these uncertainties and pressures. You and other executives must evaluate the impacts and benefits of strategic technology trends, which isn't easy given the increasing rate of technological innovation. Each year, Gartner identifies the most relevant, current and impactful trends (see Figure 1). This enables you to determine which single trends — or strategic combination — will have the most significant impact on your organization, and the ecosystem in which it operates.

Figure 1: Top Strategic Technology Trends for 2024

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Our list of the top 10 strategic technology trends isn't a ranked list where one trend is more important than the others. Instead, trends are interconnected and their importance differs mainly by organizational maturity, but also by industry, business needs and previously devised strategic plans. Examine the trends' potential relative to your organization's specific situation, factor them into your strategic planning for the next few years, and adjust your business models and operations appropriately.

You can use some trends for a specific goal, while you can deploy others for multiple purposes. Given the connections between the trends, the themes into which they fall overlap.

- **Protect your investment.** This theme is about preserving your investments and securing the benefits from past and future strategic technology decisions to make them durable. You must:
  - **Be deliberate.** Stop all uncontrolled experimentation with insufficient direction. Efforts must be deliberate with sound results for daily use. This is where AI trust, risk and security management, for example, plays a major role for all use of AI, including generative AI (GenAI).
  - **Be realistic.** Calculate the ROI of projects by factoring in the necessary protective measures, which include investments for continuous threat exposure management.
  - **Be forward-looking.** Tailor innovative developments with reuse in mind, while securing your rights (i.e., intellectual property and ownership of your creations) and a durable position in the future. Industry cloud platforms and sustainable technology can help here.

- **Rise of the builders.** This theme is about unleashing creative powers by using the appropriate technology for the appropriate functions. You must:
  - Use technology that fits your industry, specific organizational needs and your specialist workers. Industry cloud platforms, AI-augmented development and intelligent applications all aid in such alignment.
  - Develop your roadmap to enable nonspecialists to create as well, maximizing benefit to the organization. Democratized generative AI provides a strong opportunity, as does (social) sustainable technology.
  - Work closely with business stakeholders to determine software delivery and portfolio life cycle management. Platform engineering plays a key role here.

- **Deliver the value.** This theme continues to refine and accelerate value optimization, built on top of durable operational excellence. You must:
  - Adjust continuously to changing internal and external customer demands, creating a virtuous cycle of value determination and delivery. Intelligent applications help with the needed dynamics and operationalize the intelligence to further facilitate the augmented connected workforce.
  - Include approaches for algorithm-based customers, noting that the customer landscape will change to include machine customers.
  - Facilitate controlled access to quickly evolving digital tools, whether they relate to GenAI, workforce skilling and migration, or other opportunities for augmentation and automation.

Our technology trends are mutually reinforcing, not isolated occurrences. Combining the technologies will help you achieve your CEO's and CIO's goals for 2024 and beyond, including:

- Enhancing resilience
- Maximizing value from data
- Attracting and retaining talent/future of work initiatives
- Achieving your ESG goals
- Driving growth
- Accelerating digital business

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Table 1: Gartner's Top Strategic Technology Trends for 2024

| Protect Your Investment | Rise of the Builders | Deliver the Value |
|---|---|---|
| AI Trust, Risk and Security Management | Platform Engineering | Intelligent Applications |
| Continuous Threat Exposure Management | AI-Augmented Development | Democratized Generative AI |
| Sustainable Technology | Industry Cloud Platforms | Augmented Connected Workforce |
| | | Machine Customers |
| | | |

Source: Gartner (October 2023)

## Make It Last: Protect Your Investment

### AI as a Partner — AI Trust, Risk and Security Management

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*Analysis by Avivah Litan, Bart Willemsen, Jeremy D'Hoinne*

**Strategic Planning Assumption:** By 2026, enterprises that apply TRiSM controls to AI applications will consume at least 50% less inaccurate or illegitimate information that leads to faulty decision making.

AI trust, risk and security management (AI TRiSM) supports AI model governance, trustworthiness, fairness, reliability, robustness, transparency and data protection. The democratization of access to AI has made the need for AI TRiSM even more urgent and clear. Without guardrails, AI models can rapidly generate compounding negative effects that spin out of control, overshadowing any positive performance and societal gains that AI enables. AI TRiSM provides tooling for ModelOps, proactive data protection, AI-specific security protection, model monitoring (including monitoring for data drift, model drift and/or unintended outcomes) and risk controls for inputs and outputs to third-party models and applications.

Expand your AI risk management practices to mitigate not only internal AI risks, but also external ones, the origins of which you can't control directly. AI TRiSM capabilities primarily aim at models used under the control of the organization itself. Nonetheless, if you use third-party AI services (i.e., search and chat) subjected to TRiSM capabilities, you'll benefit from accurate information for decision making. Contrarily, if you use third-party AI services *not* controlled by TRiSM capabilities, you'll experience an explosive growth of misinformation and factual errors used in decision making.

AI models and applications managed with TRiSM will substantially enhance bias control in decisions, thus increasing fairness. In addition, using TRiSM will enable your organization to remain competitive, with business leaders understanding and managing transparent AI. Gartner expects that such models will deliver over a 50% improvement in intended outcomes and results. Already, more AI projects move into production and achieve added business value when subjected to TRiSM technologies than AI projects in organizations that don't actively manage these functions.

An example of this is Fidelity Investments, which is deploying hundreds of AI models through a model operations framework. [1] Following detailed control steps from its governance program, deployments are consistently flanked with indicators for potential problems, such as drift, that can be responded to in advance of escalation. As a result, Fidelity achieved:

- Double the speed of AI model-to-production than before.
- A comprehensive model governance process to ensure that all models used for production business decisioning have followed the defined governance procedure, enhancing confidence in their use.
- A proactive approach to identifying potential issues in production, reducing time to find and resolve issues by 80% (from weeks to hours).
- A rationalized AI model portfolio by eliminating redundant models and replacing lower-performing models with higher-performing ones.

**Actions:**

- Set up an organizational task force or dedicated unit to manage your AI TRiSM efforts.

- Work across your organization to effectively manage best-of-breed toolsets and products as part of a comprehensive AI TRiSM program (see Market Guide for AI Trust, Risk and Security Management for market and product analysis, and lists of vendors that can support your programs).

- Define acceptable use policies and establish a system to methodically record and approve access to AI models and attestations of actual uses.

For more information, see Top Strategic Technology Trends for 2024: AI Trust, Risk and Security Management.

### Be Safe — Continuous Threat Exposure Management

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*Analysis by Jeremy D'Hoinne, Pete Shoard*

**Strategic Planning Assumption: By 2026, organizations prioritizing their security investments, based on a continuous threat exposure management program, will realize a two-third reduction in breaches.**

Continuous threat exposure management (CTEM) is a pragmatic and systemic approach to continuously adjust cybersecurity optimization priorities and use technology to:

- Align the scopes of exposure assessment cycles with specific business projects or critical threat vectors.
- Address patchable (vulnerabilities) and unpatchable exposures.
- Validate the enterprise exposure and remediation priorities by including the attacker's view and testing the effectiveness of security controls.
- Shift expected outcomes from tactical and technical responses to evidence-based security optimizations supported by improved cross-team mobilization.

Attack trends [2] highlight the need to evaluate appropriate risk mitigation methods (e.g., compensation, avoidance, reduction and transference) beyond traditional patching. It's vital to reduce the enterprise's exposure to unpatchable threats, such as human error and supply chain dependencies. Aligning CTEM assessment and remediation scopes with threat vectors or business projects — rather than an infrastructure component — surfaces not only the vulnerabilities, but also unpatchable threats. The latter include SaaS platforms and third-party applications inside the enterprise and across the ecosystem of suppliers, partners and customers.

The proliferation of security assessment tools and an increasing attack surface have made prioritizing the most relevant remediation actions even more challenging. You need a clear view of the likeliness of an attack being successful. This goes beyond compliance-driven, infrequent and human-driven penetration testing engagement.

Expanding and automating a cybersecurity validation (CyVal) approach via CTEM is key to a successful exposure management program. One approach to starting CyVal is to implement breach and attack simulation (BAS) or automated penetration testing tools, and expand progressively to a workflow of systematically taking the attacker's view to validate whether an attack would be successful.

Clients are asking Gartner more frequently about exposure management. Most clients recognize the need for a managed approach — partly driven by regulatory compliance demands and partly by identified technology risks (especially AI). Some clients have achieved early success on their journey toward CTEM, for example:

- The University of Westminster in the U.K. expanded the scope of its vulnerability management program to include assets that weren't managed by the IT team and started effectively measuring the exposure of these assets. [3]
- Several midsize financial institutions in Europe added automated cybersecurity validation assessments to their mandatory quarterly penetration testing assessments. This was in anticipation of TIBER-EU framework [4] requirements to reduce gaps found in security posture within days, rather than months.
- A large U.S. insurance firm expanded its vulnerability management by adding attack surface management technology. It started by improving discovery and prioritization of assets' exposure. This has enabled the firm to partner security operations with other organizational departments to better mobilize on remediations.

**Actions:**

- Integrate CTEM consistently with risk awareness and management programs to provide a relatable business-led focus and business-value-based prioritization of exposure mitigation.
- Start with visible operational wins when expanding an already mature vulnerability management program. Do so by adding attack surface or CyVal approaches to demonstrate how existing prioritization struggles can be reduced or eliminated.
- Embrace CyVal technologies (e.g., BAS or automated penetration testing) to augment your existing prioritization workflows and enhance cybersecurity readiness.

For more information, see Top Strategic Technology Trends for 2024: Continuous Threat Exposure Management.

### Protect the Future — Sustainable Technology

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*Analysis by Autumn Stanish, Kristin Moyer*

**Strategic Planning Assumption: By 2027, 25% of CIOs will have compensation linked to their sustainable technology impact.**

Sustainable technology is a framework of digital solutions used to enable environmental, social and governance (ESG) outcomes that support long-term ecological balance and human rights. It consists of:

- Environmental technologies that prevent, mitigate and adapt to risks in the natural world
- Social technologies that improve human rights outcomes, well-being and prosperity
- Governance technologies that strengthen business conduct, oversight and capacity building

The use of technologies such as AI, cryptocurrency, the Internet of Things and cloud computing is driving concern about the related energy consumption and environmental impacts. This makes it more critical to ensure that the use of IT becomes more efficient, circular and sustainable.

Additionally, the increasing demand from stakeholders for transparency on sustainability requires more purposeful and broader monitoring and telemetry data collection. For example, observability platforms, digital employee experience (DEX) tools and data center infrastructure management (DCIM) tools are all being harnessed to track the social, governance and environmental elements, such as energy efficiency and circularity of products and services. The visibility these technologies offer extends value beyond sustainability, providing insights necessary for improving overall IT performance.

T-Systems, for example, used predeployed power distribution features for the racks in its hybrid cloud. This enabled local staff to optimize power consumption and perform power delivery additions, changes and removals easily, and without the need for more electricians or customer disruption. [5] In another example, Vodafone used DCIM software as a sustainable technology solution to measure, document and plan sustainable data center operations. This helped it increase energy efficiency and maximize the utilization of its existing facilities to defer building new ones. [6]

Beyond simply using IT to make the enterprise more sustainable, individual employees can also use technology to adopt and scale sustainable practices themselves. For instance, P&G enabled employees working from home with a Sustainability@Home virtual channel to share videos with one another about eco-conscious habits. P&G posted several of these videos on its social media accounts to promote and encourage these behaviors. [7]

**Actions:**

- Select technologies that will help drive sustainability in your industry, and that are identified as a priority for the business and key stakeholders. Consider technologies such as cloud services, AI and blockchain.
- Involve your ethics board in developing a roadmap for structured decision making. Don't look for trade-offs — pursue improved overall organizational sustainability. Be prepared to make potentially tough decisions about physical travel, collaboration and partner choices. Avoid even indirect involvement with humanitarian issues, including slavery and undue ecological impact.
- Use the Hype Cycle for Sustainability, 2022 to find the right balance between well-established and leading-edge technologies for your enterprise sustainability.

For more information, see Top Strategic Technology Trends for 2024: Sustainable Technology.

# Unleash the Power: Rise of the Builders

## Developer-Driven Self-Service — Platform Engineering

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*Analysis by Bill Blosen, Paul Delory*

**Strategic Planning Assumption: By 2026, 80% of large software engineering organizations will establish platform engineering teams as internal providers of reusable services, components and tools for application delivery, up from 45% in 2022.**

Platform engineering is the discipline of building and operating self-service internal development platforms. Each platform is a layer, created and maintained by a dedicated product team, designed to support the needs of its users by interfacing with tools and processes. The goal of platform engineering is to optimize the user experience and accelerate delivery of business value.

Early adopters built “homebrew” platforms, proving the concept years ago. Practitioners today are sharing best practices, further encouraging adoption through a growing community with dedicated conferences. New tools continue to reach the market, often spun out of large companies that pioneered platform engineering in the past. The platform engineering approach is key to reducing cognitive load by improving the developer experience and productivity, which in turn improves retention of key talent.

As an example, BP deployed and manages a balanced, broad portfolio of platforms to support a diverse range of use cases, business needs and stakeholder capabilities. It designs platforms with features and offerings that match the specific needs and capabilities of the intended user groups, leading to 80% of business units driving at least one business-led development project. [8]

Similarly, ABN-AMRO designed adaptive and self-service infrastructure platforms. These improved developers' abilities to independently run, manage and develop their applications, while ensuring reliability and security. ABN-AMRO experienced considerable improvements in deployment speed and increased productivity of engaged employees. [9]

**Actions:**

- Establish dedicated platform teams that can curate and build internal platforms with reusable, composable, configurable application components, knowledge and services.

- Treat the platform as a product. Work with end users to identify and prioritize the technical capabilities, tools and processes that are most useful to them, then build a platform around those.
- Build a product management culture, with routine collaboration between engineers and the end users they serve. Ensure they can share bidirectional feedback in a safe and productive environment.

For more information, see Top Strategic Technology Trends for 2024: Platform Engineering.

**Accelerate Creation — AI-Augmented Development**

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*Analysis by Van Baker, Arun Batchu, Jim Scheibmeir, Haritha Khandabattu and Brent Stewart*

**Strategic Planning Assumptions:** By 2026, generative AI will significantly alter 70% of the design and development efforts for new web applications and mobile apps.

By 2025, more than 50% of software engineering leader role descriptions will explicitly require oversight of generative AI tools.

By 2028, 75% of enterprise software engineers will use AI coding assistants, up from less than 10% in early 2023.

AI-augmented development is the use of AI technologies, such as generative AI and machine learning to aid software engineers in designing, coding and testing applications. AI-augmented development tools integrate with an engineer's development environment to produce application code, translate legacy code to modern languages, enable design-to-code transformation and enhance application testing capabilities.

The demand for software in the business continues to increase, while software engineering organizations face growing backlogs and pressures to modernize legacy applications. AI-assisted software engineering improves developer productivity and enables development teams to address the increasing demand for software to run the business. These AI-infused development tools will enable software engineers to spend less time writing code so they can spend more time on higher-level activities, such as the design and composition of compelling business applications.

As the capabilities of these tools continue to improve, confirmation of compliance may become inherent in the tools. The expansion of the enterprise software portfolio, driven by the business and enhanced capabilities of AI-augmented tools, may necessitate a larger software engineering workforce to maintain and enhance these assets.

Results can be almost immediate and tangible. Gartner analysts have observed, for example, that a large enterprise with approximately 12,000 developers improved productivity by 5% and saved $2M per year in costs by using GitHub CoPilot for AI-enabled code generation.

AI-augmented development tools should focus on improving the productivity, quality and experience of the software engineering organization. A study by McKinsey Digital of its own software engineers reinforces this. The study measured the time to complete common development tasks. It showed a reduction of 35% to 45% for code generation, and 45% to 50% for code documentation. [10]

Gartner also observed that several U.S.-based firms have conducted pilots to determine the impact of AI code generation tools on developer experience and productivity. The cost of such tools often quickly justify itself, even if it saves only two hours per year per developer. When the companies deployed AI-augmented tools to over 1,000 developers, their productivity increased by between 17% and 20%, with over 90% of developers reporting an average saving of one to two hours per week. AI-augmented development tools also improved developer experience, with over 50% of developers reporting that they felt less frustration and over 75% reporting that tasks were easier to complete.

**Actions:**

- Establish a team of senior software engineers who can evaluate AI code generation tools to determine the best way to deploy and use these tools.
- Evaluate and deploy AI testing tools, as these will become mandatory elements of your application testing processes.
- Select or establish a software design system with reusable UI design and front-end components, and enable this design system with design-to-code capabilities.

For more information, see Top Strategic Technology Trends for 2024: AI-Augmented Development.

**Tailor Your Tailor's Work — Industry Cloud Platforms**

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*Analysis by Gregor Petri, Yefim Natis, Wataru Katsurashima, James Ingham, Andrew Meyer*

**Strategic Planning Assumption: By 2027, more than 70% of enterprises will use industry cloud platforms to accelerate their business initiatives, up from less than 15% in 2023.**

Industry cloud platforms (ICPs) address industry-relevant business outcomes by combining underlying SaaS, PaaS and IaaS services into a whole product offering with composable capabilities. These typically include an industry data fabric, a library of packaged business capabilities, composition tools and other platform innovations. ICPs are tailored cloud proposals specific to your industry, and can further be tailored to your organization's needs. You can use these platforms' composability to gain the adaptability and agility that your industry needs to respond to accelerating disruption.

Persistent uncertainty and higher economic risks have made enterprises less willing to invest in cloud technologies that may or may not deliver their desired business outcomes. Success with those technologies depends on how well the company can use the technology and find the right talent and skills. Enterprises demand specific business outcomes from their cloud investments. ICPs bridge this gap by delivering industry-specific outcomes relevant to the mission-critical priorities of the vertical segment.

Technology leaders can use the composable approach that ICPs take toward creating industrywide capabilities by (re)composing on top of the ICP a differentiating proposition. Make this unique for your customer and partner ecosystem. Almost 270 platforms exist, serving approximately 20 specific industry groups. Examples include:

- Minna Bank in Japan partnered with Accenture to create a fully digital and cloud-based banking platform to cater to a new generation of digitally demanding millennial and Generation Z customers. Minna Bank went live within 18 months, despite Japan's significant regulatory requirements and opened 400,000 accounts in its first year of operation. Its Zero Bank Core Solution is built on Google Cloud Platform and includes complementary banking capabilities built on the offerings of several SaaS, PaaS and IaaS providers. [11]

- The Żabka Group operates over 9,000 convenience stores in Poland and has been adding autonomous Nano stores across the country. These check-out-free stores range from traditional brick-and-mortar shops to store-in-store outlets and stand-alone vending containers. Żabka uses Microsoft Cloud for Retail with technology developed by Microsoft partner AiFi. The instant data capture enables Żabka to quickly adapt, personalizing its customers' expectations. [12]
- Bethesda Health Care used a healthcare-specific industry cloud and Velrada to build a new patient administration system (PAS). PAS supports care at home by digitally connecting all participants in a patient's care — including the patient, the patient's family, doctors, social workers, community organizations and care payors. The system improves the way patients access and receive care, as well as how they and their families interact with care teams. [13]

**Actions:**

- Use ICPs to complement your existing portfolio of applications (like an exoskeleton) by introducing capabilities that add significant value, rather than replace existing capabilities.
- Create rules for when to deploy ICP functions as production platforms to optimize and modernize by enhancing existing processes, and when to restructure these functions to enable more differentiated transformation and innovation initiatives.
- Begin building composability capabilities by engaging enterprise technologists and fusion teams to promote enterprisewide understanding and support for the ICP journey.

For more information, see Top Strategic Technology Trends for 2024: Industry Cloud Platforms.

## Look Forward: Deliver the Value

### Optimize Decision Making — Intelligent Applications

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*Analysis by Stephen Emmott, Patrick Connaughton, Justin Tung*

**Strategic Planning Assumptions: By 2026, 30% of new applications will use AI to drive personalized adaptive user interfaces, up from less than 5% in 2023.**

**By 2026, more than 80% of independent software vendors will have embedded generative AI capabilities in their enterprise applications, up from less than 1% in 2023.**

Intelligent applications include intelligence — which we define as learned adaptation to act appropriately and autonomously — as a capability. This intelligence can be utilized in many use cases to better augment or automate work.

As a foundational capability, intelligence in applications comprises various AI-based services, such as machine learning, vector stores and connected data. Consequently, intelligent applications deliver experiences that dynamically adapt to user context and intent.

Sometimes, certain tasks are no longer necessary because applications interoperate with other applications autonomously. This is possible because intelligent applications can *synthesize* their interfaces between users and other applications (self-integrating applications) in ways that are appropriate to the circumstances, and they can do so proactively. For example, an intelligent application can pull functionality (i.e., ordering software from a catalog) into a conversational interface based on user intent and context, or adapt it to external APIs for data exchange.

A clear need and demand for intelligent applications exists. Business disruption due to talent/skill shortages is one of the biggest external threats to business after economic threats, according to the 2023 Gartner Board of Directors Survey. [14] The second biggest priority for 2023 and 2024 is workforce (e.g., retention and hiring); the top priority is digital technology initiatives, with AI/ML considered the top breakthrough technology.

Intelligent applications have entered the mainstream. Over 50% of respondents to the Gartner AI Use-Case ROI Survey reported that they have a form of intelligent application in their enterprise application portfolios. However, a “lack of effective automation/tools” is the biggest barrier to worker productivity according to one-third of respondents to the 2023 Gartner Workforce Optimization survey. [15]

Dexcom [16] integrated the Eightfold Talent Intelligence Platform with SAP SuccessFactors, which augments the job application and hiring process with intelligent capabilities. The integrated result includes functionality to automatically match applicants with open positions, based on the resumes they’ve uploaded into the platform. This resulted in 42% of job applicants submitting a resume in the first six months after the go-live date of this implementation, and a 40% conversion of all site visitors to unique job applicants within the same timeframe.

In another example, CallRail partnered with AssemblyAI to provide call summaries, sentiment analysis, automatic transcript highlights and redaction of personally identifiable information. This not only provided customer service agents with essential insights much more quickly, but also improved CallRail's call transcription accuracy by 23%. [17]

**Actions:**

- Establish a center of excellence to catalog, monitor, and explain the breadth and depth of intelligence as a capability as it relates to your organization's current and future portfolio of applications.
- Begin engaging with application vendors, starting with the ones strategically most relevant to you.
- Initiate data quality programs, if you haven't already done so, to ensure your data is fit for this new category of purposes.

For more information, see Top Strategic Technology Trends for 2024: Intelligent Applications.

### Power *and* Responsibility — Democratized Generative AI

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*Analysis by Arun Chandrasekaran*

**Strategic Planning Assumption: By 2026, more than 80% of enterprises will have used generative AI APIs, models and/or deployed GenAI-enabled applications in production environments, up from less than 5% in 2023.**

GenAI is the ability of AI models to create new variations of content, including images, video, audio and text. GenAI applications have the potential to automate a broad range of tasks, thereby boosting productivity, reducing costs and offering new opportunities for growth.

GenAI platforms are available worldwide, bringing generative capabilities to every worker. Democratization of information and skills will result across a broad set of roles and business functions. This makes GenAI one of the most disruptive trends of the 2020s. Although AI has existed for decades, ChatGPT's arrival in November 2022 democratized access to this technology and created the potential to transform how almost all enterprises compete and do work.

GenAI itself is becoming democratized by the confluence of cloud computing and open source, making these models accessible to workers worldwide. The recent fast-paced innovation facilitates millions of users who lack the programming skills to use traditional AI technologies.

GenAI applications can make vast sources of information — internal and external — accessible and available to business users via natural language conversational interfaces (i.e., chatbots). This means the rapid adoption of GenAI will significantly democratize knowledge and skills in the enterprise. Large language models enable enterprises to connect their workers with knowledge in a conversational style with rich semantic understanding. Business stakeholders and departments will benefit from this vast amount of knowledge.

Thimble, for example, automated its accounts payable process by extracting text and images from invoices and using a centralized repository. Its entire finance team has access to the repository using natural language query. This has increased workforce productivity and led to significant savings by improving invoice-processing quality and automatically reconciling errors. [18]

To increase prospecting efforts and enhance the customer experience, online car retailer CarMax adopted GenAI as well. The CarMax team employed GPT 3.5's enhanced "iteration on prompts" to feed scrubbed and formatted data for thousands of used cars into its DaVinci model. Using this GenAI-enhanced (intelligent) application resulted in a significant increase in customer traffic because of improved inventory data, as well as lower content creation costs. [19]

**Actions:**

- Quantify the business value of GenAI using technical and business metrics. Measure it early and in a consistent manner.

- Employ a change management approach that prioritizes employee training and well-being. Do so by equipping employees with the knowledge to use GenAI tools safely and confidently, while showing them that these tools will help them automate routine tasks.
- Implement governance to enable democratization in a responsible way. Ensure that checks and balances are in place for content accuracy and authenticity. Make sure guardrails exist with human verification and validation involved to prevent inaccurate or unintended consequences from GenAI applications.

For more information, see Top Strategic Technology Trends for 2024: Democratized Generative AI.

### Push the Pioneers — Augmented Connected Workforce

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*Analysis by Lane Severson, Tori Paulman, Helen Poitevin*

**Strategic Planning Assumptions: By 2026, 50% of office workers in global enterprises will be AI-augmented in one form or another, either to boost productivity or raise the average quality of work.**

**By 2026, one in five of companies that rushed into replacing entry-level employees with generative AI (GenAI) bots will find that existing skills shortages are exacerbated.**

**By 2026, customer service functions that implement the connected rep will improve contact center efficiency by 30%.**

**Through 2027, 25% of CIOs will use augmented connected workforce initiatives to reduce time to competency by 50% for key roles.**

The augmented connected workforce (ACWF) is a strategy for optimizing the value derived from human workers. It achieves this by establishing a “connective tissue” of intelligent technology, workforce analytics and skill augmentation, optimizing their use and treating them in a unified, cohesive way to accelerate and scale talent.

How intelligent solutions are designed and delivered to support business goals, such as reducing time to competency, is changing. Time to competency refers to the time and money required to bring staff to the required level of competency for a defined role or function. Shortening the time to competency positively impacts employee satisfaction and productivity, and improves overall employee performance.

The need to accelerate and scale talent is driving the ACWF trend. The ACWF uses intelligent applications and workforce analytics to provide everyday context and guidance to support the workforce's experience, well-being, and ability to develop its own skills. At the same time, the ACWF drives business results and positive impact for key stakeholders.

A significant gap exists between the workforce's skills and organizations' needs. In Gartner's 2022 Signature Infrastructure and Operations (I&O) Role Survey, 26% of respondents identified lack of skills as the top challenge to their IT I&O organizations. It's also a common worry for business leaders. Three main mutually reinforcing factors are driving the ACWF trend:

- The acceleration of new (digital) skills required for work across all job types
- Digital tools' ability to reduce the time to competency for new hires
- Advancements in workplace automation and AI mean the workforce must manage ever-more-complex issues

The Home Depot has developed and deployed a mobile app called Sidekick, which helps new retail associates become productive more quickly by prioritizing their tasks and augmenting their knowledge. Sidekick uses intelligence services, such as machine learning and computer vision to help associates identify out-of-stock items and answer customers' questions. The Home Depot has focused on delivering an intuitive user experience built for "Day 1 Associates," so no time is lost learning the technology. [20]

Merck has a dedicated program for extended reality designed to improve its operations' reliability by reducing human error without compromising compliance. The program was developed with HR and learning and development partners, business unit leads and operations. Frontline workers champion use cases across knowledge transfer, executing different methods and procedures, such as right first time (RFT) and training. Sites have templates to guide deployment and change management. As a result, Merck redirected 70% of subject matter experts' time from non-value-added work, and reduced training time and time to competence by an average of two weeks. [21]

Actions:

- Build support for ACWF investments by prioritizing time to competency for inexperienced workers who perform in highly complex environments. Quantify results, such as faster onboarding.
- Create a cross-functional program consisting of leaders from IT, HR, sales, customer service and supply chain. Decide, as a group, which workforce segments to prioritize for investment, and which outcomes to pursue.
- Design employee experiences augmented with intelligent technology by using digital employee experience (DEX) disciplines, such as journey mapping and persona. Expect that the business impact of ACWF initiatives will improve as technology design reaches role- and task-level insight.
- Create insights and guided recommendations that help employees accomplish what would otherwise be impossible within existing constraints of time and cognitive capacity.

For more information, see Top Strategic Technology Trends for 2024: Augmented Connected Workforce.

### Buyers With Byte(s) — Machine Customers

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*Analysis by Don Scheibenreif, Mark Raskino*

**Strategic Planning Assumptions: By 2027, more than 50% of sales and service centers will be fielding calls from machine customers.**

**By 2027, 50% of people in advanced economies will have AI personal assistants working for them every day.**

**By 2028, machine customers will render 20% of digital storefronts obsolete.**

**By 2028, a machine customer will earn the Customer of the Year award at a global enterprise.**

**By 2028, economists will recognize machine customers as a GDP growth factor.**

For the first time, companies will be able to make their own customers. Machine customers are nonhuman economic actors that purchase goods and services in exchange for payment. By 2028, 15 billion connected products will exist with the potential to behave as customers, with billions more to follow in the coming years. [22] This growth trend, augmented by GenAI, will impact trillions of dollars in purchases and eventually become more significant than the arrival of digital commerce.

Companies that quickly learn how to create machine customers (also called *custobots*) that purchase on your behalf and purchase from you — and those that learn how to sell to custobots — will gain an advantage in the trillions of dollars at stake. Others could find their traditional human buyers gradually disappearing. Exploiting the machine customer opportunity isn't about technology or marketing. It's a business opportunity that every executive should be involved in. All C-suite executives must decide where they fit in. Without that full team collaboration, progress will be partial, ineffectual and inconclusive.

A new battle to find an appropriate technological approach to win the favor of sophisticated custobots has begun. For example:

- Walmart deployed an AI-powered negotiations chatbot to connect with suppliers of "goods not for resale" (i.e., grocery carts). The chatbot negotiates terms and has closed agreements with 68% of suppliers approached, with each party gaining something it values. [23]
- Italy-based iProd created iProdMOP, the first machine customer commerce platform that allows a connected manufacturing machine to automatically purchase what it needs from its manufacturer or the iProd IoT Marketplace. [24]

**Actions:**

- Create a Machine Customer Investigation Team by enlisting senior representatives from strategy, IT, product development, sales, marketing, supply chain and service.
- Create one to three scenarios that explore the market opportunities, such as the Internet-of-Things-enabled products that might arise in the situations/activities where customers use your products and services today.
- Start architecting the data sources and API platform needed to serve machine customers that shouldn't or won't use your human-readable digital storefront.

For more information, see Top Strategic Technology Trends for 2024: Machine Customers.

## Changes Since Last Year

For 2023, Gartner identified 10 strategic technology trends (see Top Strategic Technology Trends for 2023):

- Adaptive AI
- AI trust, risk and security management
- Applied observability
- Digital immune system
- Industry cloud platforms
- Metaverse
- Platform engineering
- Superapps
- Sustainable technology
- Wireless value realization

Four of these trends are evolving to such an extent that we've included them in our 2024 trends (*AI TRiSM*, *industry cloud platforms*, *platform engineering* and *sustainable technology*).

Our other 2023 trends remain important, but many of them have evolved and combined into, or became part of, a wider strategic trend. For example, *adaptive AI* has, in part, led to *democratized generative AI*. The practical elements of the *digital immune system* are, in turn, a strong driver to the enhanced security-focused *CTEM*.

*Applied observability*, in part facilitating the ecosystem for interactions with *machine customers*, and also underlies reasoning for the value of data. *Applied observability* is also partly facilitating input to the *augmented connected workforce*.

Some trends have evolved into demonstrable use cases. *Superapps* and others are becoming more *intelligent applications* through AI capability additions. Various *metaverse* technologies and the digitalization of consuming technology have, in part, led to *machine customers,* and have also helped facilitate the *augmented connected workforce*. *Wireless value realization* is a driver or point of information feed for both.

## Evidence

**2022 Gartner Signature Infrastructure and Operations Role Survey.** This survey was conducted to understand the biggest goals and challenges of I&O leaders for 2022 and 2023. This survey also explored the prioritization of investments for the I&O leaders. The research was conducted online from 6 May through 13 June 2022. In total, 207 respondents were interviewed across Asia/Pacific (n = 73), Western Europe (n = 68) and North America (n = 66). Qualifying organizations operated in multiple industries and reported enterprisewide revenue for fiscal-year 2021 of at least $50 million or equivalent. Qualified participants belonged to the functional areas of executive leadership, infrastructure and operations, and enterprise architecture and technology innovation. All respondents led, participated or had visibility into the strategies and decisions for making investments in infrastructure and operations.

*Disclaimer: The results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.*

**2022 Gartner Digital Worker Survey:** This survey sought to understand workers' technological and workplace experience and sentiments. The research was conducted online from September through November 2022 among 4,861 respondents from the U.S. (n = 1,564), China (n = 1,167), the U.K. (n = 1,072) and India (n = 1,058).

Participants were screened for full-time employment in organizations with 100 or more employees and were required to use digital technology for work purposes. Ages ranged from 18 through 74 years old, with quotas and weighting applied for age, gender, region and income, so that results are representative of working country populations. We defined "digital technology" as including any combination of technological devices (i.e., laptops, smartphones and tablets), applications and web services that people use for communication, information or productivity.

*Disclaimer: The results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.*

[1] Case Study: AI Model Operations at Scale (Fidelity)

[2] Most data breaches (74%) include a human element and stolen credentials are the primary method threat actors use to access a business (source: 2023 Verizon DBIR). Even the most well-funded organizations can't address all threats. Responding effectively to the threat landscape is about validating and prioritizing, which implies accepting some degree of residual risk, as there's insufficient budget to address all risks (see How to Respond to the 2023 Cyberthreat Landscape).

[3] Case Study: Proactive Approach to Cybersecurity in Higher Education

[4] How to Implement the European Framework for Threat Intelligence-based Ethical Red Teaming, European Central Bank.

[5] Case Study: Partnering With T-Systems Leverages Future-Proof, Sustainable Cloud Solutions, Stream Data Centers, Stream Data Centers.

[6] Sunbird's Powerful DCIM Software Helps Vodafone Drive Sustainability in Its Global Data Centers, Sunbird Software, Vodafone.

[7] Environmental Sustainability, P&G.

[8] Platform-Enabled Citizen Development (BP)

[9] Case Study: Self-Service Infrastructure Platforms to Accelerate Delivery (ABN AMRO)

[10] Unleashing Developer Productivity With Generative AI, McKinsey.

[11] Minna Bank's Digital Banking Service Attracts Over 400 Thousand Accounts in First Year of Operation, Bloomberg.

[12] Poland's Żabka Group Reviews Its Time at NRF — Retail Technology Innovation Hub, Techtelegraph.

[13] Bethesda Health Care Taps Microsoft for PAS, Healthcare IT News.

[14] **The 2023 Gartner Board of Directors Survey on Business Strategy in an Uncertain World.** This survey was conducted to understand the new approaches adopted by nonexecutive boards of directors (BoDs) to drive growth in a rapidly changing business environment. The survey also sought to understand the BoDs' focus on investments in digital acceleration; sustainability; and diversity, equity and inclusion.

The survey was conducted online from June through July 2022 among 281 respondents from North America, Latin America, Europe and Asia/Pacific. Respondents came from all industries, except governments, nonprofits, charities and NGOs, and from organizations with $50 million or more in annual revenue.

Respondents were required to be a board director or a member of a corporate board of directors. If respondents served on multiple boards, they answered for the largest company, defined by its annual revenue, for which they are a board member. **[Q02A. Which of the following represent the 3 biggest external threats/constraints to your organization's growth in 2023 and 2024?]**

**2022 Gartner AI Use-Case ROI Survey**. This survey sought to understand where organizations have been most successful in deploying AI use cases and figure out the most efficient indicators that they have established to measure those successes.The research was conducted online from 31 October through 19 December 2022 among 622 respondents from organizations in the U.S. (n = 304), France (n = 113), the U.K. (n = 106) and Germany (n = 99). Quotas were established for company sizes and for industries to ensure a good representation across the sample. Organizations were required to have developed AI to participate. Respondents were required to be in a manager role or above and have a high level of involvement with the measuring stage and at least one stage of the life cycle from ideating to testing AI use cases. Disclaimer: The results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed. **[Q12. Is AI already embedded in existing enterprise applications (e.g., CRM, ERP) or is your organization using a separate AI platform to augment them?]**

[15] **2023 Gartner Workforce Optimization & Productivity Survey**. This survey was conducted online from 22 February through 21 March to better understand recent and future workforce optimization and productivity within the finance function. In total, 79 members participated. 19 were from Gartner CFO and Senior Finance Research Circle — a Gartner-managed panel and 60 were from an external sample. Members from North America (n = 47), EMEA (n = 28) and Asia/Pacific (n = 4) responded to the survey. **[Q11.Which of the following are the biggest barrier(s) to driving higher worker productivity at your organization?]**

[16] Sourced from publicly available case study information available from vendor Eightfold.ai: Dexcom: Filling Critical Employee Roles Fast with Artificial Intelligence, which aimed to highlight successful implementations of Eightfold's AI platform into HR use cases.

[17] How CallRail Doubled Its Conversation Intelligence Customers by Building With a Trusted AI Partner, AssemblyAI.

[18] Glean AI Streamlines Insurance Provider Thimble's AP Workflow, Glean AI.

[19] Build: Azure OpenAI Service Helps Customers Accelerate Innovation With Large AI Models; Microsoft Expands Availability, Microsoft.

[20] Home Depot Launches In-House App to Prioritize Employee Tasks, Retail Dive.

[21] Bringing Innovation to Production: Maximizing Shopfloor Human Performance, PTC.

[22] Forecast: Internet of Things, Endpoints and Communications, Worldwide, 2021-2032, 2Q23 Update

[23] How Walmart Automated Supplier Negotiations, Harvard Business Review.

[24] iProd MOP is the first Intel IoT Market-Ready Solution in Industry 4.0, iProd.

## Document Revision History

Top Strategic Technology Trends for 2023 - 17 October 2022

Top Strategic Technology Trends for 2022 - 18 October 2021

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## Recommended by the Authors

Some documents may not be available as part of your current Gartner subscription.

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## Table 1: Gartner's Top Strategic Technology Trends for 2024

| Protect Your Investment | Rise of the Builders | Deliver the Value |
|---|---|---|
| AI Trust, Risk and Security Management | Platform Engineering | Intelligent Applications |
| Continuous Threat Exposure Management | AI-Augmented Development | Democratized Generative AI |
| Sustainable Technology | Industry Cloud Platforms | Augmented Connected Workforce |
| | | Machine Customers |

Source: Gartner (October 2023)