Top 10 Strategic Technology Trends for 2020: A Gartner Trend Insight Report

Published: 10 March 2020 **ID:** G00467123

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People-centric smart spaces are enabled by advances in hyperautomation, multiexperience, democratized human augmentation, empowered edge, autonomous things, distributed cloud and other disruptive trends. IT leaders must evaluate the impact of these trends to identify opportunities for innovation.

Opportunities and Challenges

- Hyperautomation and emerging multiexperience interfaces will set the stage for greater democratization of technical capabilities and human augmentation. However, these trends drive dependencies and a more invasive extension of technology into people's lives, giving rise to digital ethics, privacy and trust issues.
- Evermore sophisticated, connected, intelligent and often autonomous edge devices will create a mesh of integrated systems. Distributed cloud services and new models such as blockchain will support this mesh, smoothing integration across technology silos and businesses. This will create business model opportunities, but artificial intelligence (AI) and other emerging technologies will pose new challenges for security.
- Technology trends must be evaluated using a framework identifying their impact on people, the business and the IT estate. Failure to do so often results in costly missteps and wasted efforts.

What You Need to Know

- Architecting for adaptability and the use of flexible and modular application architectures will enable organizations to adapt to a rapidly changing landscape. Implementation of best practices and tools to enhance transparency and traceability in systems will create a more trusted model to support the organization's digital ethics and privacy promises.
- The expanding edge computing environment and evolving people-centric experiences — powered by AI — will support the delivery of smart spaces such as smart cities, intelligent digital workplaces and smart factories. Keeping smart spaces safe will require cybersecurity enhanced with AI that defends against attacks on AI systems and attacks that use AI.

- Creating personas that identify key constituencies, building journey maps that show the interactions between these consistencies and establishing target business outcomes maximize the potential for success. A combinatorial view of how multiple trends interact to drive value maximizes impact.

Insight From the Analyst

Strategic Technology Trends Are Laying the Foundation for People-Centric Smart Spaces and a Future Where the World Is the Computer

David Cearley, Distinguished VP Analyst

Looking toward 2030, the boundaries between what we see as the physical world and the digital world are melting. Technology will become a part of every human being's experience through massive expansion of AI-enabled Internet of Things (IoT) edge capabilities creating smart cities, smart factories, smart farms and other smart spaces. People inhabiting these spaces will increasingly and willingly become dependent on technologies to augment their cognitive and physical capabilities. In this people-centric smart spaces future, the world itself will become "the computer."

Along the way to this future, there will be radical changes to the way people experience technologies and how the technologies are used. Privacy and ethical considerations will rise in importance. AI will take on an increasingly central role. New architectures and integration methods will be needed to weave together the myriad of technology components.

The way forward will see challenges, disruptions, missteps and surprises, and we can't predict the exact nature of the world in 2030. Many organizations will react by ignoring the long-term trends. Others will seize the opportunity to create new opportunities and business models. If you're not the disruptor in this rapidly changing digital landscape, someone else will gain first advantage.

In 2020, we're at the start of this 10-year shift. Our top 10 strategic technology trends for 2020 are the trends with impact over the next five years that will be laying the foundation. In this research, we explore how:

- Hyperautomation across tasks, processes and organizational boundaries powered by AI combines with new application architectures and multiexperience to power democratized human augmentation.
- Increasingly powerful and pervasive edge computing populated by an expanding array of AI-powered autonomous things all supported by a new generation of distributed cloud services is creating the foundation for smart spaces.

- Practical exploitation of blockchain today can deliver value as the full promise of blockchain evolves as one approach to reducing friction by integrating business and technical models across organizations.
- Privacy and ethics require a focus on increasing transparency and traceability — especially with the operation of AI models — to enable people, organizations and governments to trust these increasingly invasive technologies.
- The implications of AI everywhere impact your security and how new threats will emerge as malicious actors exploit AI to attack the AI-powered models on which people increasingly depend.

Kind Regards,

David Cearley

Executive Overview

Definition

Our top 10 strategic technology trends identify trends with a high potential for impact on people, businesses, industries and IT markets (see Note 1). They create potential business threats and disruptions, but also offer the opportunity to disrupt competitors and drive competitive advantage.

Technology is becoming infused into almost every aspect of our daily lives, from guiding our decisions, to automating our activities, to altering the reality we experience. Technology has become a central part of our existence — a theme we call people-centric technology. At the same time, technology is becoming diffused over swaths of the spaces we occupy, from where we live, to where we work, to where we play. We call this theme smart spaces. The infusion of technology into our lives and the diffusion of technology across the spaces we occupy form the broad categories for Gartner's top 10 strategic technology trends for 2020 — people-centric and smart spaces:

- The **people-centric** category explores how trends are changing the way that people experience technology in their personal and professional lives. It also explores how individual and group activities are automated or augmented, and the significant ethical, privacy and trust considerations.
- The **smart spaces** category explores how the physical world is becoming increasingly instrumented with sensors and devices that are connected to one another and to robust back-end services. It also explores the business and technology integration challenges, how AI and machine learning are powering the devices in these spaces, and the security implications for extensive use of AI and machine learning.

These trends have broad impact across industries and regions, with significant potential for disruption. In many cases, the trends aren't yet widely recognized, or the conventional wisdom regarding the trends is shifting. Through 2025, technologies related to these trends will experience

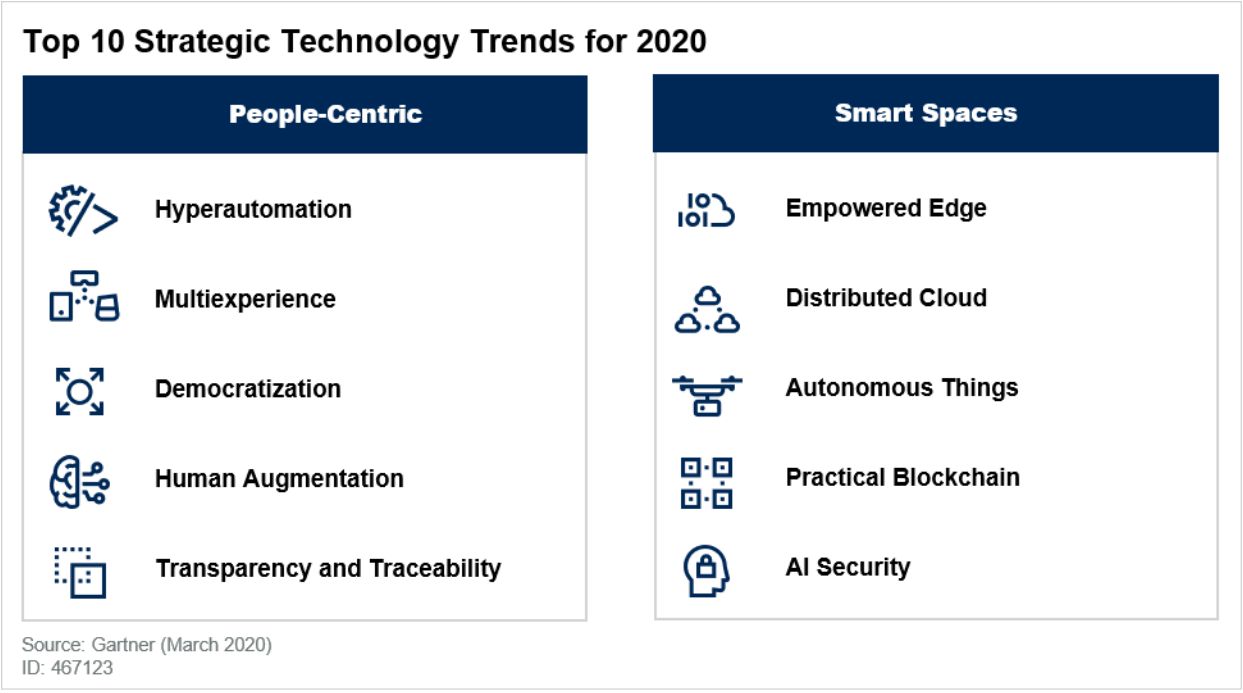
significant changes, cross critical tipping points and reach new levels of maturity that expand and enable repeatable use cases and reduce risk. Examine the business impact of our top 10 strategic technology trends and seize the opportunities to enhance existing processes, products and business models, or create new ones. Our top 10 strategic technology trends provide a beacon to guide your planning through 2025. Prepare for the impact of these trends — they will transform industries and your business.

These categories and the trends under each will continue to evolve. They are reaching tipping points. Take a first or a fresh look in 2020, and track their progression through 2025 and, in some cases, 2030.[1]

Individual trends and related technologies are combining with one another and with existing mainstream trends to begin realizing the overall vision of people-centric smart spaces.[2] For example, hyperautomation and multiexperience enable creation of a simplified model for people to interact with software, devices and services. This lays the foundation for democratization where people easily tap into automated expertise beyond their natural ability, training or expertise and, in turn, enable human augmentation. The combined effect of multiple trends coalescing to produce new opportunities and drive new disruption is a hallmark of our top 10 strategic technology trends for 2020 (see Figure 1).

> Technology advances continue to accelerate, changing every aspect of our existence. Our top 10 strategic technology trends are rapidly evolving trends with the most disruptive potential through 2025. These are the trends you can’t afford to ignore.

Figure 1. Top 10 Strategic Technology Trends for 2020



Research Highlights

People-Centric Trends: Putting People at the Center

By putting people at the center of your technology strategy, you're highlighting one of the most important aspects of technology — how it impacts your customers, employees, business partners, society or other key constituencies. The impact of technology trends on people must be at the center of your technology strategy, informing your decision making. Those decisions will determine how you exploit the trends to drive value for your key constituencies. Infusing technology into more aspects of the lives of your stakeholders requires maintaining the trust of your stakeholders as a central pillar of your technology strategy.

A people-centric approach should start with understanding these key target constituencies and the journey they undertake to interact with or support your organization.[3,4,5] This is the first step to understanding how and where you will apply strategic technology trends to drive desired business outcomes. Two key models help identify the most important people-centric business outcomes to consider when evaluating trends:

- **Personas:** The persona is a useful tool for describing a target individual or group. The persona encapsulates a set of motivations, preferences, biases, needs, wants, desires and other characteristics for a target group that can be used as a backdrop to evaluate how applications of technology might impact that group. Personas can be used to anticipate the valuable

business moments that emerge as people traverse technology-enabled smart spaces. Help business and IT leaders to consider the human side of digital business strategy decisions by using personas.

- **Journey Maps:** A journey map is a model that shows the stages target personas go through to accomplish a task or complete a process. Customer journey maps diagram the stages a customer might go through to buy products or access customer service. Internal journey maps can diagram the stages employees go through in onboarding or in complying with a regulatory requirement. Journey maps that look at how multiple constituencies interact around a process are even more powerful. Use journey maps to consider the pain points, inefficiencies, gaps and opportunities to delight and create new digital business moments for all the relevant constituents.

Five key trends are emerging to enable people-centric computing:

- **Hyperautomation:** Hyperautomation focuses on task, process and organizational automation using a range of tools. A hyperautomated future state can be achieved only through hyperagile working practices and tools. Hyperautomation refers to the combination of multiple machine learning, packaged software and automation tools to deliver work. The propensity to use particular types of hyperautomation will be highly dependent on the organization's existing IT architecture and business practices. Hyperautomation covers not only the palette of tools, but also all the steps of automation (discover, analyze, design, automate, measure, monitor and reassess).
- **Multiexperience:** Through 2028, the user experience will undergo a significant shift in how users perceive the digital world and how they interact with it. Conversational platforms are changing the way people *interact* with the digital world. Virtual reality, augmented reality and mixed reality are changing the way people *perceive* the digital world. This combined shift in both perception and interaction models leads to the future multisensory, multidevice, multitouchpoint experience. The "computer" in a multiexperience world is the environment around the user, including many touchpoints and sensory inputs. The multitouchpoint aspect of the experience will connect people across edge devices, including traditional computing devices, wearables, automobiles, environmental sensors and consumer appliances.[6] The multisensory aspect of the experience will use all human senses as well as advanced computer senses (such as heat, humidity and radar), as appropriate, across this rich sea of devices. Application development platforms and packaged applications are evolving to embrace this new paradigm.
- **Democratization:** Democratization is about providing people with access to technical expertise or business domain expertise via a radically simplified experience and without requiring extensive and costly training. The notion of "citizen access" (e.g., citizen data scientists and citizen integrators) as well as the evolution of citizen development and no-code models are examples of democratization. Development of expert systems or virtual assistants based on AI and decision models is another important aspect of democratization.[7] These systems provide advice or take actions on behalf of people to extend their knowledge or expertise beyond their experience or training. The target for the democratization trend could be any person inside or outside the enterprise, including customers, business partners, corporate executives,

salespeople, assembly line workers, professional application developers and IT operations professionals.

- **Human augmentation:** Human augmentation explores how technology can be used to deliver cognitive and physical enhancements as an integral part of the human experience. Instead of computers and applications being something outside the normal human experience, they become a natural — and sometimes necessary — part of the day-to-day human experience. Human augmentation also includes bioengineering factors that go beyond exploitation of computers and applications. We are already on this path. With the rise of new technologies such as wearables, AI, smart speakers and VR emerging from computer science, and technologies such as CRISPR,[8] biochips and brain computer interfaces emerging from biological science, entirely new opportunities for human augmentation are appearing.
- **Transparency and traceability:** This trend focuses on applying technologies and best practices to build systems that support digital ethics and privacy goals and generate trust. The transparency and traceability trend is an essential foundation for digital ethics and is a key element of a strategy to establish customer trust. In 2020, an increasingly important aspect of transparency and traceability is explainable AI, which is evolving into responsible AI. However, transparency and traceability is not a single product or a single action. It refers to a range of attitudes, actions, and supporting technologies and practices designed to address regulatory requirements, enshrine an ethical approach to the use of AI and other advanced technologies, and repair the growing lack of trust in companies. Introduce technologies and best practices that increase transparency and traceability to manage a range of social, legal and commercial risks.

Related Research

“Top 10 Strategic Technology Trends for 2020: Hyperautomation”: With hyperautomation, the orchestrated use of multiple technologies catalyzes business-driven process change for efficiency, efficacy and agility. EA and technology innovation leaders must embrace and enable a business-driven hyperautomation journey to ensure a holistic path to architected adoption.

“Top 10 Strategic Technology Trends for 2020: Multiexperience”: The way we perceive and interact with the digital world is shifting to a multisensory, multidevice experience with multimodal touchpoints. Enterprise architecture and technology innovation leaders must identify opportunities that impact the business and guide implementations.

“Top 10 Strategic Technology Trends for 2020: Democratization”: Democratization is supported by multiple developments to empower employees and citizens to access specialized skills — “democratizing” technology and knowledge. Enterprise architecture and technology innovation leaders must act on this trend to accelerate the scale of AI-enabled applications.

“Top 10 Strategic Technology Trends for 2020: Human Augmentation”: Human augmentation impacts how we move, perceive and interact in physical and digital spaces, as well as how we process, analyze and store information. Enterprise architecture and technology innovation leaders must explore opportunities to achieve digital transformation through human augmentation.

“Top 10 Strategic Technology Trends for 2020: Transparency and Traceability”: Enterprise architecture and technology innovation leaders must take responsibility for introducing technologies and best practices that increase transparency and traceability to manage a wide range of social, legal and commercial risks.

“Critical Capabilities for Multiexperience Development Platforms”: Application leaders can use an MXDP to build a wide array of apps and serve as a broad platform to unify development activities. This research evaluates widely used MXDP offerings supporting development of mobile apps, modern/progressive web apps, conversational apps and immersive/wearable apps.

“Top Megatrends for 2020”: Megatrends are large-scale, long-lived social, economic and technical trends that impact a wide range of organizational strategies. We provide a suggested list of megatrends for enterprise architecture and technology innovation leaders to use for business and technology strategic planning.

“Hype Cycle for Emerging Technologies, 2019”: The 2019 Hype Cycle highlights the emerging technologies with significant impact on business, society and people over the next five to 10 years. This year includes technologies that promise to deliver a global low-latency internet, create a virtual map of the real world and mimic human creativity.

“Top 10 Data and Analytics Technology Trends That Will Change Your Business”: These data and analytics technology trends will have significant disruptive potential over the next three to five years. Data and analytics leaders must examine their business impacts and adjust their operating, business and strategy models accordingly.

“Hype Cycle for Artificial Intelligence, 2019”: Enterprises are making huge progress with AI as it grows more widespread, but also many mistakes. By examining innovations and trends, this report will help you set the scope of an AI plan, and assess AI’s value and risks. You will then be more able to overcome obstacles to adoption and to succeed.

Smart Spaces: Bringing Together the Real and Virtual Worlds

The lines between the physical and digital worlds continue to blur. The converged digital world will reflect the physical world in increasing detail and will appear as part of the physical world. As the amount of data that things produce increases exponentially, compute power shifts to the edge to process stream data and send relevant data to central systems. Digital trends, along with opportunities enabled by AI, are driving the next generation of digital business models.

The concept of smart spaces builds on the people-centric notion. People exist in spaces such as their home, their car, an office building, a conference room, a hospital or a city. A smart space is a physical environment in which humans and technology-enabled systems interact in increasingly open, connected, coordinated and intelligent ecosystems. Multiple elements — including people, processes, services and things — come together in a smart space to create a more immersive, interactive and automated experience for a target set of personas. Technology becomes diffused through smart spaces. Journey maps should consider not only the motivations of relevant personas and the desired business outcomes, but also the spaces that people will traverse as part of their interactions in the digital world.

Five key trends are emerging to support the evolution of smart spaces:

- **Empowered edge:** In edge computing, information processing and content collection and delivery are placed closer to the sources, repositories and users of this information. The empowered edge drives greater compute power, storage and sensors into the physical world, creating new digital business opportunities. Edge computing draws from the concepts of distributed processing. Connectivity and latency challenges, bandwidth constraints, and greater functionality embedded at the edge favor distributed deployment models. Edge computing places workloads where they fit best across a centralized/decentralized framework. Through 2028, we expect a steady increase in the embedding of sensor, storage, compute and advanced AI capabilities, as well as improved software and security capabilities, in edge devices. 5G will emerge to provide greater edge density, lower latency and higher throughput. Cloud and edge computing are combining into complementary elements of a distributed cloud model.
- **Distributed cloud:** A distributed cloud refers to the distribution of public cloud services to different locations outside the cloud provider's data centers, while the originating public cloud provider assumes responsibility for the operation, governance, maintenance and updates. This represents a significant shift from the centralized model of most public cloud services and will lead to a new era in cloud computing. With the arrival of the distributed cloud, location formally enters the definition of a style of cloud services. Location may be important for a variety of reasons, including data sovereignty and latency-sensitive use cases. In these scenarios, the distributed cloud service provides organizations with the capabilities of a public cloud service delivered in a location that meets their requirements.
- **Autonomous things:** Using AI to automate functions in physical devices, software or services is enabling the creation of autonomous things such as advanced robots, drones and autonomous vehicles. Intelligent things create opportunities in sectors and industries such as retail, where robots are acting as baristas[9] and store greeters,[10] and in farming, where self-driving tractors, robots and drones could increase farm yields and efficiencies.[11] Existing things will become intelligent and autonomous, potentially delivering the power of AI-enabled systems everywhere, including the home[12] and medical facilities.[13] Autonomous software adds value to applications and IT systems such as network management, where AI-powered systems can drive greater efficiency and effectiveness with higher performance.[14] As autonomous things evolve, they'll start to work together in collaborative swarms.
- **Practical blockchain:** A blockchain is a type of distributed ledger. A distributed ledger is an expanding chronologically ordered list of cryptographically signed, irrevocable transactional records shared by all participants in a network. One way that blockchain provides business value is by reducing business and technical friction. It does this by making the ledger independent of individual applications and participants and replicating the ledger across a distributed network to create a consensus-based authoritative record of significant events. Blockchain also enables a distributed trust architecture that allows untrusted parties to undertake commercial transactions with decentralized validation mechanisms. However, blockchain solutions that implement all of its attributes face challenges that will undermine the delivery of robust scalable solutions through 2025. Practical blockchain solutions implement a

subset of the full blockchain stack and can achieve operational efficiency and reduce technical and business friction, but they lack truly decentralized trust models. They may enhance sharing of information among known entities and improve opportunities for tracking and tracing physical and digital assets.

- **AI security:** Through 2025, AI (especially machine learning) will be applied to virtually every piece of software and every service and device. At the same time, there will be a massive increase in potential points of attack with the edge computing, cloud computing, microservices and highly connected systems in smart spaces. This creates significant challenges for the security team and risk leaders. To address the challenges, IT leaders must enhance security defense with AI. AI uses machine learning to understand patterns, uncover attacks and automate aspects of the cybersecurity processes while augmenting the actions of human security analysts. Simultaneously, they must protect AI-powered systems, which requires securing AI training data, training pipelines and machine learning models. They must also anticipate the malicious use of AI by attackers. Identifying these attacks and defending against them will be an important addition to the cybersecurity role.

Related Research

"Top 10 Strategic Technology Trends for 2020: Empowered Edge": The edge will become empowered with sophisticated compute resources and more data storage. Enterprise architecture and technology innovation leaders will use edge computing to respond to technology trends and to improve resiliency, responsiveness, security and user experiences.

"Top 10 Strategic Technology Trends for 2020: Distributed Cloud": Enterprises are advancing use cases of cloud computing in ways that deliver it at the point of need using distributed cloud. Enterprise architecture and technology innovation leaders must identify and exploit evolving models of cloud computing deployment to exploit business opportunities.

"Top 10 Strategic Technology Trends for 2020: Autonomous Things": Comparable technical capabilities of autonomous robots, drones and vehicles are developing rapidly. Enterprise architecture and technology innovation leaders must evaluate their potential use, particularly in controlled environments, to gain advantages including enhanced safety and productivity.

"Top 10 Strategic Technology Trends for 2020: Practical Blockchain": Enterprises are beginning to deploy blockchain-inspired solutions into production in several use cases. Enterprise architecture and technology innovation leaders must identify and exploit blockchain opportunities to reduce business friction for their organizations.

"Top 10 Strategic Technology Trends for 2020: AI Security": Dealing with the security challenges generated by artificial intelligence will become critical. Enterprise architecture and technology innovation leaders must examine how to protect their AI-powered systems and defend against the malicious use of AI and machine learning by attackers.

"Hype Cycle for Cloud Computing, 2019": Cloud computing has reached the Slope of Enlightenment. There are emerging cloud-related technologies climbing to the Peak of Inflated

Expectations, while some are maturing. This research outlines the cloud-related technologies in use and those becoming the foundation for the future of computing.

“Hype Cycle for Edge Computing, 2019”: Edge computing encompasses proven distributed computing topologies paired with IoT, emerging stacks and devices. This Hype Cycle describes edge computing, its complementary position to cloud and the technologies that support app development and deployment in a “cloud to edge” world.

“Hype Cycle for Drones and Mobile Robots, 2019”: Drones and mobile robots are deployed to sense and manipulate data in remote areas that are hard for humans to reach. They can also provide improved safety, superior proficiency and lower costs.

“Hype Cycle for Blockchain Technologies, 2019”: Blockchain technology is sliding into the Trough of Disillusionment in Gartner’s Hype Cycle. Despite this, CIOs must prepare for the “blockchain spring” that will emerge once the core-enabling technologies and use cases evolve and mature, resulting in significant benefits for the enterprise.

“Anticipate Data Manipulation Security Risks to AI Pipelines”: Machine learning presents a new attack surface and increases security risks through the possibility of data manipulation. Application leaders must anticipate and prepare to mitigate potential risks of data corruption, model theft and adversarial samples.

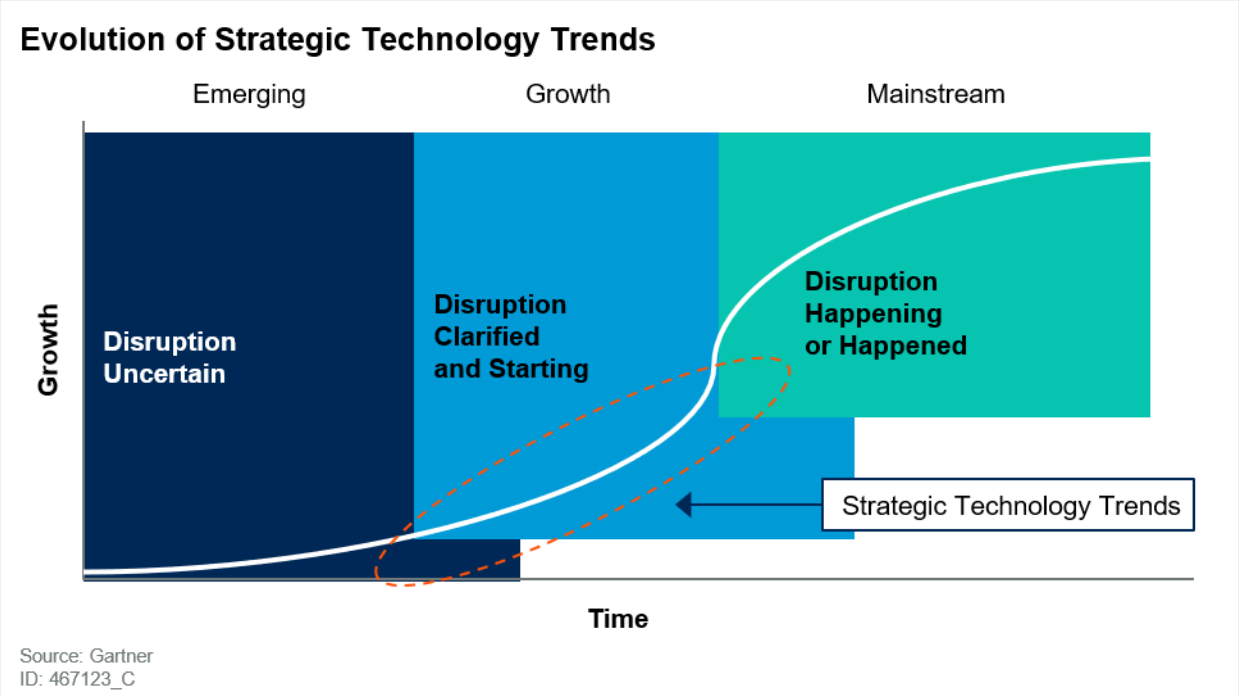
Identifying and Applying Strategic Technology Trends

We use insights from analysts across Gartner and key research projects — including Hype Cycles, Predicts and Magic Quadrants — to identify and evaluate candidate trends. We select trends for the top 10 based on three key evaluations (see “Use a Trendspotting Method to Identify the Technology Trends You Need to Track”):

- **Impact and disruption:** Strategic trends can have a significant impact. They have the potential to disrupt existing technologies, individuals, businesses and societies. This disruption may occur across multiple industries and regions. We examine trends’ effects on humans (as consumers, employees and customers), business, IT and the technology market. We give more weight to trends that will have an impact over the next five years for which organizations could take action within the next three years.
- **Volatility and tipping points:** Technology trends (and the individual technologies that relate to them) tend to evolve along a traditional market curve that can be divided into emerging, growth and mainstream phases (see Figure 2). This research focuses on trends that cut across this market life cycle view. Our top 10 strategic technology trends are reaching a tipping point (for example, breaking out of an emerging phase to a growth phase) or are experiencing rapid change. These changes often challenge conventional wisdom about the trend, justifying a fresh look.
- **Market dynamics:** Market dynamics describes the level of investment by venture capital firms, established vendors and early adopters. It also considers the level of market interest and hype. It assesses the degree to which mainstream organizations understand the trend, its impact and

its future progression, and factor the trend into their strategic and tactical plans. It's important to consider trends that are experiencing much market hype (in vendor marketing, blogs and press articles, for example), at least to contextualize what the trends mean for organizations. Trends that have high-impact potential and have reached critical tipping points, but aren't well-understood or factored into current plans, are also important targets for evaluation. Industry factors and the size of the organization must be analyzed when applying the technology trends in specific enterprise scenarios.

Figure 2. Evolution of Strategic Technology Trends



The top 10 is not a ranked list, with one trend being more important than the others. Rather, it's a list of interconnected trends, with their relative importance shifting by industry, business need and the organization's maturity. Organizations must examine the potential impact of these trends, factor them into their strategic planning for 2020 and adjust business models and operations appropriately. The ability to identify trends that are poised to break out of the emerging phase and navigate the rapid pace of change with growth trends leads directly to competitive advantage.

The increasing rate of technological innovation requires organizations to evaluate the impacts of strategic technology trends. Organizations must identify the technology trends — single trends or a combination — that will significantly affect them. This evaluation isn't limited to one role in the IT organization, or even to IT itself — it cuts across the entire organization, with various groups bringing a unique perspective. For example:

- **CIOs and CTOs** lead the way. They work with business executives to set the vision for the organization's technology-enabled business initiatives and establish the culture and process within IT to deliver this vision. They must ensure that the IT organization works closely with the

business to explore strategic technology trends and factor their impact into enterprise and business strategy and architecture.

- **Enterprise architecture (EA) and technology innovation leaders** must work across IT and the business to support strategic business and technology strategies that meet current business needs, while simultaneously enabling business innovation. They must factor these trends, and their business and technology implications, into future EA models and initiatives. They should identify value by assessing impact and feasibility at a granular level, and focus on addressing concrete business opportunities and problems. They must articulate the impact of each technology to key stakeholders by using techniques such as business capability modeling. By using a structured approach to evaluate disruptive technologies, EA and technology innovation leaders can increase the opportunities for technology innovation and reduce the risks.
- **Technology leaders across IT** — including infrastructure and operations, applications, and security — have an important role to play in tracking and addressing strategic trends. These professionals examine the individual technologies in detail. They need to understand the trends' implications for current and future technology architectures, supporting technologies, and best practices. This may require additional internal training or bringing in subject matter experts.
- **Business leaders** evaluate these trends' potential impact, rather than focusing on their technical details. Working with technology innovation professionals, they must consider the implications of these trends on current and future business activities.

Related Research

"Use a Trendspotting Method to Identify the Technology Trends You Need to Track": Enterprise architecture and technology innovation leaders are tasked with discerning the difference between the reality and the hype of disruptive, emerging technology trends. This research presents a model for identifying the technology trends they need to watch and potentially respond to.

"Midsize Enterprises: The 3 Most Practical of Gartner's 2020 Top Strategic Technology Trends": Strategic technology trends have the potential to create opportunity and stave off disruption from competitors. Midsize enterprise CIOs must identify trends that are both beneficial and viable in organizations of their size and scale to power innovation.

"Technology Innovation Primer for 2020": Business leaders count on enterprise architecture and technology innovation leaders, including CTOs, to understand emerging technology opportunities and drive strategic business innovations. Gartner's 2020 research will provide required insights to lead and drive the organizations' transformations.

"How Leading Enterprise Architects Prepare Business Leaders for Business Transformation Through Ideation Workshops": Collaboration is vital to the success of digital transformation. Leading enterprise architecture and technology innovation leaders must foster innovation mindsets in all employees to ensure that transformation efforts are strategically driven, implementable and challenge the status quo.

"Hype Cycle for Emerging Technologies, 2019": The 2019 Hype Cycle highlights the emerging technologies with significant impact on business, society and people over the next five to 10 years. This year includes technologies that promise to deliver a global low-latency internet, create a virtual map of the real world and mimic human creativity.

"Toolkit: How to Build an Emerging Technology Radar": Organizations are challenged by the changing technology landscape. An emerging technology radar provides enterprise architecture and technology innovation leaders with a tool to transform hype-driven investment decisions into a benefit-driven, defensible approach to prioritizing technology adoption.

"Toolkit: How to Create an Emerging Technology Wheel": Organizations rely on EA and technology innovation leaders to navigate through all the hype about emerging technologies. Business stakeholders require a simple visualization informing them of the impacts, obstacles, opportunities and outcomes each provides specifically to their business strategies.

Changes Since Top 10 Strategic Technology Trends for 2019

Our top 10 strategic technology trends for 2020 build on and evolve our 2019 list. They represent the evolution of the intelligent digital mesh theme into how those capabilities enable the emergence of people-centric smart spaces.

We've evolved, extended, enhanced or combined five trends from our 2019 list:

- **Multiexperience** builds on and expands on the **immersive experience** trend from 2018 and 2019. How we perceive and interact with the digital world is becoming multisensory (for example, using hearing, touch and sight) and multidevice (for example, using mobile devices, desktops, embedded devices and autonomous vehicles). This shift will continue through 2030, making multiexperience a long-term trend. A major focus for 2020 is the availability of multiexperience development platforms (MXDPs). Together with **mesh app and service architecture** (a trend from our 2016 and 2017 lists) and composable enterprise (see "Future of Applications: Delivering the Composable Enterprise"), MXDPs set the stage for more rapid development of multiexperience applications.
- **Empowered edge** remains an important trend, and its focus in 2020 is largely the same as in 2019. It's a key foundation for the evolution of smart spaces. The expansion in the number and types of capabilities (for example, compute, storage, specialized processors and sensors) at the edge is driving more data to be collected, stored and analyzed at the edge. The emergence of 5G to provide rich communications to the edge will combine with enhanced peer-to-peer connections to create a more dynamic mesh architecture through 2025.
- **Autonomous things** remains on our list with an emphasis on how many of the isolated areas (for example, drones, robots and autonomous vehicles) are overlapping one another. Autonomous capabilities are evolving across five key dimensions: perception, mobility, manipulation, interaction and collaboration. Innovations driven by one use case (for example, fine-grained manipulation of objects by robots) will increasingly be employed in other use cases (for example, outfitting drones with fine-grained manipulation arms). The growing use of AI to

drive autonomous actions in consumer and industrial devices will exploit leading-edge innovations from drones, robots and autonomous vehicles.

- **Practical blockchain** recalibrates the **blockchain** trend from 2018 and 2019, but the underlying message remains the same. The change in terminology emphasizes the focus needed to drive near-term value. Practical blockchain implementations that emphasize a shared ledger without many of the other attributes of blockchain are showing near-term potential to reduce business and technology friction between systems and organizations.
- **Transparency and traceability** builds on the **digital ethics and privacy** trend from 2019 and shifts the focus to the enabling capabilities needed to execute on digital ethics and privacy. Privacy reached an important tipping point with the implementation of the EU's General Data Protection Regulation in 2018, widely reported data breaches exposing personal information[15] and questionable uses of personal data (such as by Cambridge Analytica[16]). Our 2020 trend emphasizes building privacy and ethical elements into systems, especially with technologies to enable responsible and explainable AI.

We've introduced five new trends for 2020:

- **Hyperautomation** brings together several threads discussed in past trends, including robotic process automation, event-driven programming and AI-driven automation. It also incorporates organizational-level automation across processes and organizational boundaries with the notion of digital twins of the organization. Hyperautomation focuses on a more AI-driven, dynamic, flexible and coordinated model to automate across task, process and organizational domains.
- **Democratization** covers the way **hyperautomation** and **multiexperience** enable the creation of a simplified model for people to consume digital systems and tap into automated expertise beyond their natural ability, training or experience. It includes the evolution of "citizen data science" through use of augmented analytics tools. It also involves the use of AI platform services accessible through APIs and automation of the development process (for example no-code development) to enable "citizen developers." Democratization examines how users are empowered with a range of digital assistant experts in a variety of domains (for example, sales experts and marketing experts).
- **Human augmentation** brings together a variety of trends that have been evolving in many areas to focus on the ultimate impact of these technologies — augmentation of human cognition and physical performance. Augmentation of human senses, physical abilities, biological functions, brain activity (including thinking) and genetics is part of this trend. Augmentation occurs through mobile, wearable, ambient, imprinted, ingested, injected or implanted technologies. Human augmentation is an ongoing trend with no expected end date.
- **Distributed cloud** brings cloud computing back onto our top 10 list based on a major evolution of the cloud computing model. Until now, cloud computing has been a centralized phenomenon in which services are delivered from the cloud provider's data center. Distributed cloud extends this. The cloud provider delivers and manages services wherever they're required, including in a customer data center or third-party data center. 2020 marks the start of a steady five- to 10-year shift to an approach more like grid computing.

- **AI security** deals with the reality of securing smart spaces and the AI-powered systems behind the people-centric trends. AI offers the potential to greatly enhance cybersecurity defense capability as security tools more fully exploit its potential. As the use of AI increases, security must also focus more on attackers targeting AI systems and the use of AI by bad actors (for example, “deepfakes” and intelligent phishing attacks).

We’ve retired or shifted five trends that were on our 2019 list. When we remove a trend from our top 10 list, it doesn’t mean that it’s no longer strategic. We typically retire trends because they’re becoming more mature, less volatile and more well-understood than the other strategic trends. In some cases, a trend migrates to become an element of a new trend on the list, or shifts to become a broader theme that encompasses several other trends. In other cases, a trend fails to mature as anticipated or lacks the expected impact. The trends we’ve retired or migrated are:

- **Augmented analytics:** This is becoming more well-understood, and almost all vendors of analytics and business intelligence are delivering or plan to deliver some aspect of it. However, rapid evolution and widely differing capabilities from vendors make scrutiny of the offering critical. Augmented analytics is a key example of the broader **democratization** trend on our 2020 list, creating the opportunity to enable citizen data scientists.
- **AI-driven development:** We’ve regrouped this under the broader **democratization** trend. It’s becoming more mainstream to make AI services available to developers as part of the application development (AD) platform. However, as the use of AI to automate aspects of the AD process reaches new tipping points, this trend may reappear on our list. Keep monitoring this aspect of AI-driven development.
- **Digital twins:** The digital twin has become a core part of many IoT strategies, and the concept is generally understood in the market. A digital twin of an organization (DTO) is still an emerging concept but we’ve included it in the **hyperautomation** trend, which looks at automation across task, process and organizational boundaries. The DTO concept is key to organizational automation.
- **Smart spaces:** We’ve retired smart spaces as an individual trend, but the underlying concept remains central to our top 10 — it has become an organizing model for five of the trends on our 2020 list. We see the evolution of smart spaces as a broad, long-term phenomenon. It coalesces from many directions, including smart cities, digital workplaces, smart factories and smart buildings. Most organizations view these as separate and disconnected initiatives, but all embed technology-enabled capabilities into a target environment.
- **Quantum computing:** When we introduced quantum computing to our list in 2019, we stressed that it was an emerging trend and was unlikely to be used in commercial applications until 2024 to 2029. Normally, this would exclude it from our top 10 strategic trends. But we included it because it represents a radical departure from conventional computing models with the potential to address unique problems. We emphasized that it was prudent to understand its possible impact, build scenarios for it and prepare systems for the effect it could have on security. We reiterate this advice. However, advances have not occurred at the pace we expected and uncertainties remain about the exact form of quantum computers. We now expect commercial implementations between 2027 and 2030, placing quantum computing beyond the five-year planning horizon of our strategic trends.

Related Priorities

Table 1. Related Priorities

Priority	Focus
Building and Expanding a Digital Business	The "building and expanding a digital business" initiative shows how to take digital business through the cycle, from strategy to development, to full-scale operation, to re-envisioning.
CIO Leadership of Innovation, Disruptive Trends and Emerging Practices	Gartner helps CIOs guide their enterprises in changing market conditions by understanding disruptive trends and mastering emerging management practices focused on ongoing value creation.
Enterprise Architecture	This initiative guides organizations seeking to deliver high-impact, business-outcome-driven EA advice in a complex, changing and competitive digital business environment.

Source: Gartner

Gartner Analysts Supporting This Trend

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Related Resources

Webinars

"The Gartner Top 10 Strategic Technology Trends for 2020"

"Dispelling AI Myths to Deliver Real Business Value"

"The CIO's Guide to RPA and Introduction to Hyperautomation"

"Data Science and Machine Learning Trends You Can't Ignore"

"The Gartner Top Strategic Predictions for 2020 and Beyond"

Articles

"Gartner Top 10 Strategic Technology Trends for 2020"

"4 Trends Impacting Cloud Adoption in 2020"

"5 Trends Appear on the Gartner Hype Cycle for Emerging Technologies, 2019"

"Gartner Predicts the Future of AI Technologies"

"Enterprise Architecture Enables Digital Innovation"

Gartner Recommended Reading

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

"Move Beyond RPA to Deliver Hyperautomation"

"Transcend Omnichannel Thinking and Embrace Multiexperience for Improved CX"

"Gartner's Top Strategic Predictions for 2020 and Beyond: Technology Changes the Human Condition"

"Define and Understand New Cloud Terms to Succeed in the New Cloud Era"

"Understanding the Gartner Blockchain Spectrum and the Evolution of Technology Solutions"

Evidence

[1] "How CTOs Can Incorporate Megatrend Analysis Into Their Technology Strategy"

[2] "Seize the Technology Advantage With Combinatorial Digital Innovation"

[3] "How to Build Segments and Personas for Multichannel Marketing"

[4] "Toolkit: Workshop for Creating EA Personas in Digital Business Diagnostic Deliverable Analysis"

[5] "Business Events, Business Moments and Event Thinking in Digital Business"

[6] "Emerging Technology Analysis: Smart Wearables"

[7] "How to Use Machine Learning, Business Rules and Optimization in Decision Management"

[8] "What Is CRISPR Gene Editing, and How Does It Work?" The Conversation.

[9] "Robot Baristas Serve Cappuccinos With Convenience," Fortune.

[10] "Meet the New Greeter at Your Local Grocery Store — A Giant Robot," Daily Caller.

[11] "How Self-Driving Tractors and AI Are Changing Agriculture," Forbes.

[12] "On Trend: Smart Technology for the Modern Home," Medium.

[13] "How AI Is Revolutionizing Healthcare," Forbes.

[14] "Putting Machine Learning to Use for Network Management," No Jitter.

[15] "Equifax, MGM Resorts and Beyond: Every Major Security Breach and Data Hack," CNET.

[16] "Fresh Cambridge Analytica Leak 'Shows Global Manipulation Is Out of Control'," The Guardian.

Note 1 Strategic Technology Trends

Strategic technology trends create opportunities for incremental, transformative and even disruptive innovation. IT leaders must examine the business impact of these trends and adjust business models and operations appropriately, or risk losing competitive advantage to those that do. They cannot afford to ignore these trends because these trends:

- Have high potential to make an impact or cause disruption.
- Are reaching tipping points or rapidly evolving.
- Attract significant market activity and interest.

- Require IT leaders to take a first or fresh look in 2020.
- Differ from tactical trends (stable trends that are making an impact today), emerging trends (trends that will make an impact in five to 10 years) and “far horizon” trends (trends that will make an impact more than 10 years from now).

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