Gartner Top 10 Strategic Technology Trends for 2019

Blockchain, quantum computing, augmented analytics and artificial intelligence will drive disruption and new business models.

Although science fiction may depict AI robots as the bad guys, some tech giants now employ them for security. Companies like Microsoft and Uber use Knightscope K5 robots to patrol parking lots and large outdoor areas to predict and prevent crime. The robots can read license plates, report suspicious activity and collect data to report to their owners.

These AI-driven robots are just one example of "autonomous things," one of the Gartner Top 10 strategic technologies for 2019 with the potential to drive significant disruption and deliver opportunity over the next five years.

"The future will be characterized by smart devices delivering increasingly insightful digital services everywhere," said David Cearley, Gartner vice president and Fellow, at Gartner 2018 Symposium/ITxpo in Orlando, Florida. "We call this the intelligent digital mesh."

Intelligent: How AI is in virtually every existing technology and creating entirely new categories.

Digital: Blending the digital and physical worlds to create an immersive world.

Mesh: Exploiting connections between expanding sets of people, businesses, devices, content and services.

"Trends under each of these three themes are a key ingredient in driving a continuous innovation process as part of the continuous next strategy," Cearley said.

The Gartner Top 10 Strategic Technology trends highlight changing or not yet widely recognized trends that will impact and transform industries through 2023.

Trend No. 1: Autonomous things

Whether it's cars, robots or agriculture, autonomous things use AI to perform tasks traditionally done by humans. The sophistication of the intelligence varies, but all autonomous things use AI to interact more naturally with their environments.

Autonomous things exist across five types
1. Robotics
2. Vehicles
3. Drones
4. Appliances
5. Agents

Those five types occupy four environments: Sea, land, air and digital. They all operate with varying degrees of capability, coordination and intelligence. For example, they can span a drone operated in the air with human-assistance to a farming robot operating completely autonomously in a field. This paint a broad picture of potential applications, and virtually every application, service and IoT object will incorporate some form of AI to automate or augment processes or human actions. Collaborative autonomous things such as drone swarms will increasingly drive the future of AI systems

Explore the possibilities of AI-driven autonomous capabilities in any physical object in your organization or customer environment, but keep in mind these devices are best used for narrowly defined purposes. They do not have the same capability as a human brain for decision making, intelligence or general-purpose learning.

Trend No. 2: Augmented analytics

Data scientists now have increasing amounts of data to prepare, analyze and group — and from which to draw conclusions. Given the amount of data, exploring all possibilities becomes impossible. This means businesses can miss key insights from hypotheses the data scientists don't have the capacity to explore.

Augmented analytics represents a third major wave for data and analytics capabilities as data scientists use automated algorithms to explore more hypotheses. Data science and machine learning platforms have transformed how businesses generate analytics insight.

"By 2020, more than 40% of data science tasks will be automated"

Augmented analytics identify hidden patterns while removing the personal bias. Although businesses run the risk of unintentionally inserting bias into the algorithms, augmented analytics and automated insights will eventually be embedded into enterprise applications.

Through 2020, the number of citizen data scientists will grow five times faster than professional data scientists. Citizen data scientists use AI powered augmented analytics tools that automate the data science function automatically identifying data sets, developing hypothesis and identifying patterns in the data. Businesses will look to citizen data scientists as a way to enable and scale data science capabilities. Gartner predicts by 2020, more than 40% of data science tasks will be automated, resulting in increased productivity and broader use by citizen data scientists. Between citizen data scientists and augmented analytics, data insights will be more broadly available across the business, including analysts, decision makers and operational workers.

Trend No. 3: AI-driven development

AI-driven development looks at tools, technologies and best practices for embedding AI into applications and using AI to create AI-powered tools for the development process. This trend is evolving along three dimensions:

1. The tools used to build AI-powered solutions are expanding from tools targeting data scientists (AI infrastructure, AI frameworks and AI platforms) to tools targeting the professional developer community (AI platforms, AI services). With these tools the professional developer can infuse AI powered capabilities and models into an application without involvement of a professional data scientist.
2. The tools used to build AI-powered solutions are being empowered with AI-driven capabilities that assist professional developers and automate tasks related to the development of AI-enhanced solutions. Augmented analytics, automated testing, automated code generation and automated solution development will speed the development process and empower a wider range of users to develop applications.
3. AI-enabled tools are evolving from assisting and automating functions related to application development (AD) to being enhanced with business domain expertise and automating activities higher on the AD process stack (from general development to business solution design).

The market will shift from a focus on data scientists partnered with developers to developers operating independently using predefined models delivered as a service. This enables more developers to utilize the services and increases efficiency. These trends are also leading to more mainstream usage of virtual software developers and nonprofessional "citizen application developers."

Trend No. 4: Digital twins

A digital twin is a digital representation that mirrors a real-life object, process or system. Digital twins can also be linked to create twins of larger systems, such as a power plant or city. The idea of a digital twin is not new. It goes back to computer-aided design representations of things or online profiles of customers, but today's digital twins are different in four ways:

1. The robustness of the models, with a focus on how they support specific business outcomes
2. The link to the real world, potentially in real time for monitoring and control
3. The application of advanced big data analytics and AI to drive new business opportunities
4. The ability to interact with them and evaluate "what if" scenarios

The focus today is on digital twins in the IoT, which could improve enterprise decision making by providing information on maintenance and reliability, insight into how a product could perform more effectively, data about new products and increased efficiency. Digital twins of an organization are emerging to create models of organizational process to enable real time monitoring and drive improved process efficiencies.

Trend No. 5: Empowered edge

Edge computing is a topology where information processing and content collection and delivery are placed closer to the sources of the information, with the idea that keeping traffic local will reduce latency. Currently, much of the focus of this technology is a result of the need for IoT systems to deliver disconnected or distributed capabilities into the embedded IoT world. This type of topology will address challenges ranging from high WAN costs and unacceptable levels of latency. Further, it will enable the specifics of digital business and IT solutions.

"Technology and thinking will shift to a point where the experience will connect people with hundreds of edge devices"

Through 2028, Gartner expects a steady increase in the embedding of sensor, storage, compute and advanced AI capabilities in edge devices. In general, intelligence will move toward the edge in a

variety of endpoint devices, from industrial devices to screens to smartphones to automobile power generators.

Trend No. 6: Immersive technologies

Through 2028, conversational platforms, which change how users interact with the world, and technologies such as augmented reality (AR), mixed reality (MR) and virtual reality (VR), which change how users perceive the world, will lead to a new immersive experience. AR, MR and VR show potential for increased productivity, with the next generation of VR able to sense shapes and track a user's position and MR enabling people to view and interact with their world.

By 2022, 70% of enterprises will be experimenting with immersive technologies for consumer and enterprise use, and 25% will have deployed to production. The future of conversational platforms, which range from virtual personal assistants to chatbots, will incorporate expanded sensory channels that will allow the platform to detect emotions based on facial expressions, and they will become more conversational in interactions.

Eventually, the technology and thinking will shift to a point where the experience will connect people with hundreds of edge devices ranging from computers to cars.

Trend No. 7: Blockchain

Blockchain is a type of distributed ledger, an expanding chronologically ordered list of cryptographically signed, irrevocable transactional records shared by all participants in a network. Blockchain allows companies to trace a transaction and work with untrusted parties without the need for a centralized party (i.e., a bank). This greatly reduces business friction and has applications that began in finance, but have expanded to government, healthcare, manufacturing, supply chain and others. Blockchain could potentially lower costs, reduce transaction settlement times and improve cash flow. The technology has also given way to a host of blockchain-inspired solutions that utilize some of the benefits and parts of blockchain.

Pure blockchain models are immature and can be difficult to scale. However, businesses should begin evaluating the technology, as blockchain will create $3.1T in business value by 2030. Blockchain inspired approaches that do not implement all the tenets of blockchain deliver near term value but do not provide the promised highly distributed decentralized consensus models of a pure blockchain.

Trend No. 8: Smart spaces

A smart space is a physical or digital environment in which humans and technology-enabled systems interact in increasingly open, connected, coordinated and intelligent ecosystems. As technology becomes a more integrated part of daily life, smart spaces will enter a period of accelerated delivery. Further, other trends such as AI-driven technology, edge computing, blockchain and digital twins are driving toward this trend as individual solutions become smart spaces.

Smart spaces are evolving alone five key dimensions: Openness, connectedness, coordination, intelligence and scope. Essentially, smart spaces are developing as individual technologies emerge from silos to work together to create a collaborative and interaction environment. The most extensive example of smart spaces is smart cities, where areas that combine business, residential and industrial communities are being designed using intelligent urban ecosystem frameworks, with all sectors linking to social and community collaboration.

Trend No. 9: Digital ethics and privacy

Consumers have a growing awareness of the value of their personal information, and they are increasingly concerned with how it's being used by public and private entities. Enterprises that don't pay attention are at risk of consumer backlash.

Conversations regarding privacy must be grounded in ethics and trust. The conversation should move from "Are we compliant?" toward "Are we doing the right thing?"

Governments are increasingly planning or passing regulations with which companies must be compliant, and consumers are carefully guarding or removing information about themselves. Companies must gain and maintain trust with the customer to succeed, and they must also follow internal values to ensure customers view them as trustworthy.

Trend No. 10: Quantum computing

Quantum computing is a type of nonclassical computing that is based on the quantum state of subatomic particles that represent information as elements denoted as quantum bits or "qubits."

Quantum computers are an exponentially scalable and highly parallel computing model.   A way to imagine the difference between traditional and quantum computers is to imagine a giant library of books.

While a classic computer would read every book in a library in a linear fashion, a quantum computer would read all the books simultaneously. Quantum computers be able to theoretically work on millions of computations at once. Quantum computing in the form of a commercially available, affordable and reliable service would transform some industries.

Real-world applications range from personalized medicine to optimization of pattern recognition. This technology is still in an emerging state, which means it is a good time for businesses to increase their understanding of potential applications and consider any security implications. Aside from a select group of businesses where specific quantum algorithms would provide a major advantage, most enterprises could remain in exploration phase through 2022 and begin exploiting the technology later.