

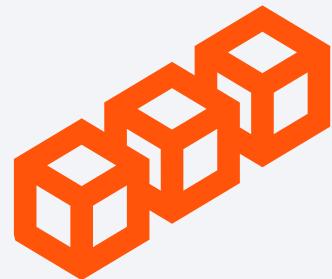


Top 10 Strategic Technology Trends for 2019

Edited by

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Introduction

The Gartner top 10 strategic technology trends for 2019 highlight changing or not yet widely recognized trends that will impact and transform industries through 2023.

"The future will be characterized by smart devices delivering increasingly insightful digital services everywhere," says David W. Cearley, Distinguished VP Analyst, Gartner. "We call this the intelligent digital mesh."

- **Intelligent:** AI is in virtually every existing technology, and creating entirely new categories
- **Digital:** Blending the digital and physical to create an immersive world
- **Mesh:** Exploiting connections between expanding sets of people, businesses, devices, content and services



David W. Cearley

Distinguished VP Analyst, Gartner



01 Autonomous Things

At the most basic level, autonomous things use artificial intelligence (AI) to automate tasks or functions traditionally performed by humans. Autonomous things can appear in different forms and environments, although often they are in the form of a physical device operating in the real world.

There are five types of autonomous things:

- Robotics
- Vehicles
- Drones
- Appliances
- Agents

All of them use AI to interact more naturally with their environments, though they vary in capability, coordination and intelligence levels.

Autonomous things cannot replace human intelligence, but function well within a well-sscoped set of tasks.

Autonomous things also include things that operate solely in the digital world without any physical manifestation, including virtual assistants and independent agents that operate in the background to monitor systems.



Automating farms

The U.S. National Robotics Initiative is focused on agriculture automation. Projects include creating planning algorithms for robots to autonomously operate farms, using unmanned aerial vehicles with a human scout to offer solutions for specialty crops, and vertical farming.



Take Action

Consider how AI-driven autonomous capabilities could integrate with a physical object in your organization or customer environment. Remember — these devices are best used for narrowly defined purposes.

Augmented Analytics

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

What is a citizen data scientist?

- | | | | |
|---|--|---|--|
|  | Contextualized vision of the organization |  | Unique perspective of individual business area |
|  | Proven application of analytic techniques to business problems |  | Curiosity to explore and learn |
|  | Appetite for what matters relative to impact and business priorities |  | Able to “go to bat” to justify business value |
|  | Connections within IT and the business at multiple levels |  | Involved hands-on in multiple analytics areas and activities |



Augmented analytics identify hidden patterns while removing personal bias and will eventually be embedded into enterprise applications.

Organizations will need data scientists to take advantage of the opportunities that come with the analytics advancements. However, there will not be enough of them to fill all the open roles, and organizations will begin using citizen data scientists.

Take Action

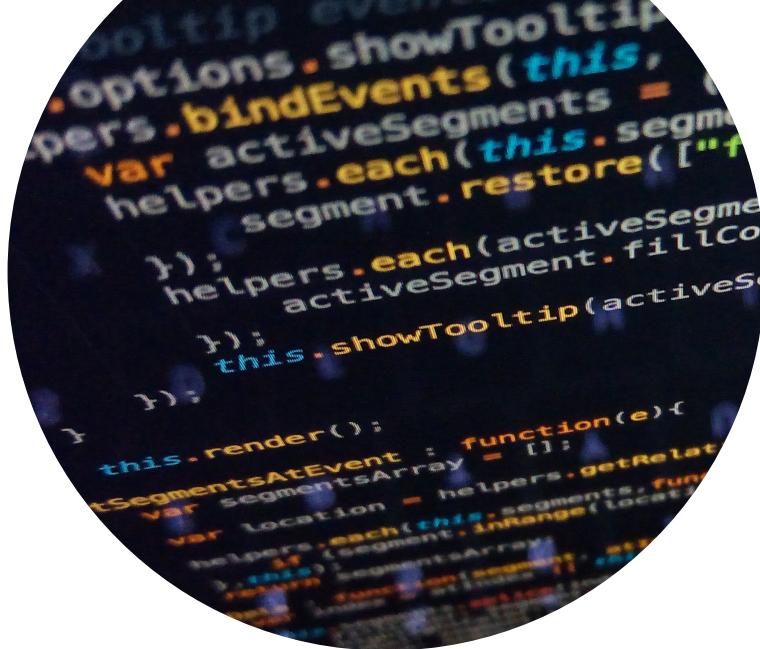
Make sure your digital transformation strategy takes advantage of augmented analytics to deliver insights across the organization.

03 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. To take advantage of this trend, data scientists must partner with application developers to create AI-enhanced solutions as a service. This expands the number of developers who are able to deliver AI-enhanced solutions and delivers higher developer productivity.

Beyond this “augmented developer” option is the “automated developer,” in which AI is applied to the actual development process itself. This technology will evolve from virtual software engineers developing basic code to developing solutions.

By 2022, at least 40% of new application development projects will have artificial intelligence co-developers on the team.



→ Take Action

Most of these services will be delivered via the cloud. Decide what type of cloud infrastructure (i.e., standard, hybrid or multicloud) is the best fit for your organization’s goals.

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 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 (DTO) are emerging to create models of organizational process that enable real-time monitoring and drive improved process efficiencies.

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Twin city

Dassault Systèmes created a digital twin for the entire city-state of Singapore. The idea is that city planners can capture data about energy consumption to create more efficient options and test traffic light phases or airflow of skyscrapers. Other ideas include having shops adjust the hours they're open based on how many people are walking past.



Take Action

Consider areas of the business where creating a digital twin of a physical object might reduce spending or increase revenue potential.

05 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. Empowered edge is focused on driving greater capabilities to edge devices. In particular, this trend focuses on three areas:

Cloud to the edge: How cloud architecture is being used to deliver and manage capabilities out to the edge

Empowering edge devices: Empowering devices using AI chips, greater compute capabilities and more storage

Communicating to the edge: Technologies such as 5G that will evolve over the next five years to really drive edge computing

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



→ **Take Action**

Consider which use cases will require high-end performance, low latency or higher densities of 5G for edge computing needs.

06 Immersive Technologies

By 2022, 70% of enterprises will be experimenting with immersive technologies for consumer and enterprise use, and 25% will have deployed to production. 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 new immersive experiences. 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.

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Business case: Remote maintenance

A broken piece of manufacturing equipment can cost millions in production downtime before someone can be brought in to fix it. Immersive technology enables an engineer in a different location to quickly remotely view and fix the issue.



Take Action

Focus on targeted applications of conversational platforms and specialized interaction channels.

Blockchain

Blockchain is a type of distributed ledger, which is a technology that provides trust in an untrusted environment (removing the need for a central authority figure, such as a bank) and reduces business friction. These ledgers keep a chronological list of cryptographically signed, irrevocable records that all participants can see and use to trace the history of any of the individual records. The ledger operates independently of individual applications and participants.

Blockchain has applications that began in finance, but they've expanded to government, healthcare, manufacturing, supply chain and other uses. 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.

Gartner estimates blockchain will create \$3.1 trillion in business value by 2030.



→ **Take Action**

Begin evaluating blockchain for potential business opportunity and business impact, establish a clear understanding of capabilities and limitations, create a trust architecture and acquire the skill sets needed to implement.

08 Smart Spaces

Smart spaces are environments that bring technologies and trends together in an innovative fashion to support a targeted persona or user category, for example, an advanced digital workplace or connected factory. The idea is to look at a workplace or city not as a collection of individual applications and technologies, but as a holistic unit.

Elements within the environment, including people, processes, services and things, come together to create an immersive experience. Smart spaces will enter a period of accelerated delivery and evolve along five key dimensions:

Openness: The degree of accessibility to the elements within the smart space

Connectedness: The depth, breadth and robustness of the links between the elements

Coordination: The depth and robustness of coordination between the elements

Intelligence: The use of machine learning and other AI techniques to drive automation and augment humans within the space

Scope: The breadth of a smart space and its participants



What is a smart space?

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.



Take Action

Develop connected, interactive and intelligent environments to test and scale.

Digital Ethics and Privacy

In today's world of privacy, enterprises must ask, "Just because we *can* gather all this information about people, *should we?*" Consumers are increasingly aware of and concerned about how much of their personal data is being collected and how that data is being used. Conversations about privacy must be grounded in the broader topic of digital ethics and trust, which shifts the conversation from "are we compliant" to "are we doing the right thing." The move from compliance-driven to ethics-driven can be described as the hierarchy of intent.

The hierarchy of intent

Internal (achievement)

Mind-compliance: Externally driven and focused on avoiding issues. As long as there is no law or rule against what's proposed, it's allowed.

Mitigate risk: This is focused on the risk an enterprise is willing to take without harming itself. Organizations will examine the risk of doing harm to others and the risk of "getting caught" doing something that will damage the reputation of the enterprise.



External (avoidance)

Making a difference: Ethical considerations can create a competitive differentiation by using ethics to create a value proposition. An example is implementing "privacy by design" to position products and services as more privacy-friendly than those of competitors.

Following your values: Making business decisions based on your moral compass and brand values.



Take Action

Determine your organization's position on privacy driven by the broader position on ethics and trust. Begin the shift from privacy to ethics to become digitally trustworthy.

Quantum Computing

Quantum computing is a type of nonclassical computing based on the quantum state of subatomic particles that represent information as elements denoted as quantum bits or “qubits.” A qubit can hold all possible results simultaneously (superposition) until read and can be linked with other qubits (entanglements). Quantum computing is a massively parallel process that scales exponentially as qubits are added. The parallel abilities means that quantum computers can solve problems too complicated for classical computers or where a traditional algorithm would take too long.

Quantum computers are not general-purpose, but rather are capable of running a limited number of algorithms. However, there is significant hype surrounding them. For example, meaningful work requires 100 to 300 logical qubits, currently not a practical number.



Consider the following:

Imagine a giant library of books that includes every book ever written. The goal? Find one particular phrase in one specific book. A classical computer would read each book one after the other. A quantum computer would read all the books simultaneously. Quantum computers are able to theoretically work on millions of computations at once.



Take Action

Wait to buy quantum computing options until the technology has matured, but monitor industry progress and anticipate potential opportunities.



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