Top Strategic Technology Trends for 2022: Generative AI

Published 18 October 2021 - ID G00756059 - 10 min read

By Analyst(s): Anthony Mullen, Nicole Greene, Brent Stewart, Marc Halpern, Soyeb Barot

Initiatives: Artificial Intelligence; Chief Data and Analytics Officer Leadership; Evolve Technology and Process Capabilities to Support D&A

> Generative AI is a disruptive technology that can generate artifacts that previously relied on humans, delivering innovative results without the biases of human experiences and thought processes. IT leaders must use the appropriate governance to exploit its transformative potential.

Additional Perspectives

- Summary Translation + Localization: Top Strategic Technology Trends for 2022: Generative AI
  (20 December 2021)

More on This Topic

This is part of an in-depth collection of research. See the collection:

- Content Marketing Essentials for CMOs

Overview

Opportunities

- Generative artificial intelligence (AI) expands the AI toolkit from classification, optimization and prediction to the generation of high-value artifacts (e.g., words, images, designs and code). Generative AI isn't yet a creative panacea, but it will enable enterprises to further reallocate human resources to support higher-value creative work.
- Generative AI has the potential to identify new forms of intellectual property, but the technology isn't yet turnkey.
- Politics and bias reduce the effectiveness of human decision making. Generative AI can substantially reduce the amount of bias in problem solving and decision making.
- Generative AI can generate novel AI learning strategies that can't be achieved with traditional, more "framed" approaches to AI model development.

Recommendations

IT leaders responsible for shaping strategic vision for generative AI should:

- Create a first-mover advantage for your enterprise in its use of generative AI. Do so by finding areas of the business that create a high volume of artifacts (e.g., sales/marketing, product development and software engineering) and create pilot projects to improve them with generative AI.
- Maximize the potential benefits of generative AI by deploying it in use cases similar to those where it has demonstrated value in your industry and others.
- Educate data scientists and domain experts in the use of generative AI by working with external experts familiar with the technology.
- Determine whether generative AI can accelerate and unblock the training, learning and testing functions of high-effort modeling problems by reexamining efforts that have been paused.

Strategic Planning Assumptions

By 2025, generative AI will account for 10% of all data produced, up from less than 1% today.

By 2027, 30% of manufacturers will be using generative AI to increase product development efficiency.

By 2025, 50% of drug development initiatives will use generative AI.

By 2024, 50% of the largest low-code/no-code development platforms will provide “text to code” functionality in their AI suites.

By 2025, 20% of all test data for consumer-facing use cases will be synthetically generated.

By 2025, 30% of outbound marketing messages from large organizations will be synthetically generated.

By 2025, 90% of the material in quarterly reports will be synthetically generated.

By 2024, the European Union will pass legislation to mandate the “watermarking” of AI-generated artifacts.

By 2025, 20% of procedural code professionals will have retrained because generative AI will have cannibalized their core skill set and market value.

By 2025, stunt doubles in the entertainment industry will no longer need to look like the stars they imitate.

What You Need to Know

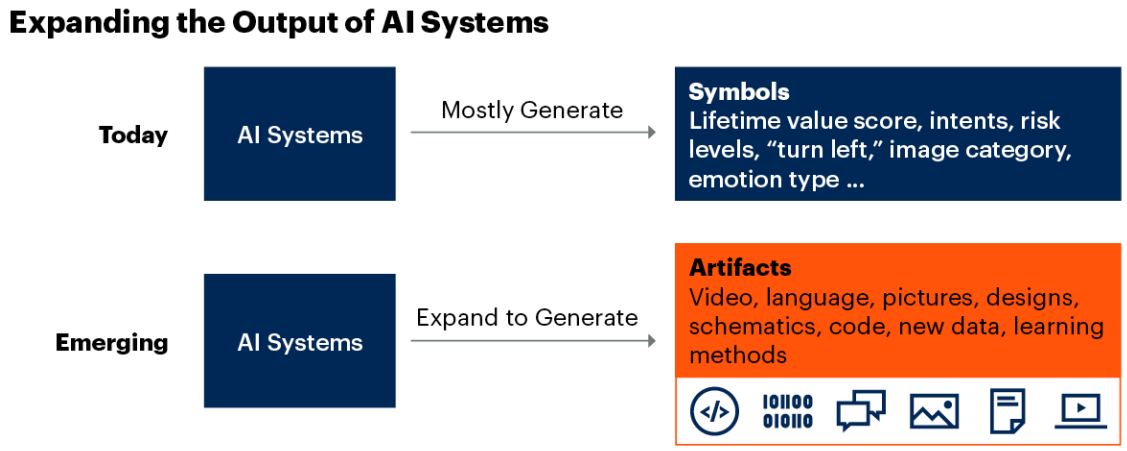
This research is part of Gartner’s Top Strategic Technology Trends for 2022.

Download the Executive Guide to Generative AI

To date, AI has mainly provided classifications, predictions and optimizations for integration into applications and business processes. Most AI systems, despite having complex neural network architectures, produce relatively simple output, often in the form of symbols. This ranges from numeric output (such as a “lifetime value score” or “weeks until maintenance”) to labels/classifications for chatbot intents (such as “return product”) or computer vision classifications (such as “siamese cat”). It’s data about things (symbols), not the things themselves (artifacts).

Generative AI expands the output of AI systems to include high-value artifacts such as video, narrative, training data and even designs and schematics (see Figure 1).

Figure 1: Expanding the Output of AI Systems



Generative AI promises new levels of automation and creativity. However, it has prompted controversy, challenging the role of AI in our lives. Examples include.

- **News:** South Korean television channel MBN broadcast a deepfake of its news anchor Kim Joo-Ha reading the news. [1]
- **Art:** Three French students generated a work of AI art that sold at Christie's for $432,500. [2]
- **Pornography:** No-code web apps have enabled nonconsensual creation of fake, but psychologically damaging, pornographic videos. [3]

Other generative AI risks of concern for enterprises include:

- **Hacks powered by generative AI:** For example, the poisoning of external datasets with synthetic data to adversely shape AI models trained on the data
- **Job disruption:** For example, the use of large transformer models to generate software code, potentially disrupting the jobs of programmers

- **Undue influence:** For example, the use of deepfakes to circumvent the natural evolution of political and social discourse to negative effect

Generative AI has much to promise in terms of new intellectual property (IP) and efficiencies, but it could cause real social harm if unregulated. It's hard to tell whether or not generative AI is a force for good. Applications of generative AI, such as synthetic data, can create fairer and less biased AI because they can represent different dimensions in training data (e.g., demographics and seasonality). But generative AI can also be used to amplify bias.

Commercialized solutions are entering the market to create many artifact types (see Figure 2). Many approaches can be used to produce these artifacts, ranging from augmented to automated:

- **Augmented:** Generative AI creates artifacts to support higher-order creative tasks by humans. For example, it autogenerates room layouts for an architect designing a building. The human operators shape the AI's generation behavior through reinforcement, such as by saying "more like this" generated element or "less like this."
- **Automated:** Generative AI produces artifacts in bulk with little human involvement beyond shaping the parameters for production. For example, humans set the medical context for automated drug design.

Figure 2: The Types of Artifacts That Generative AI Can Create

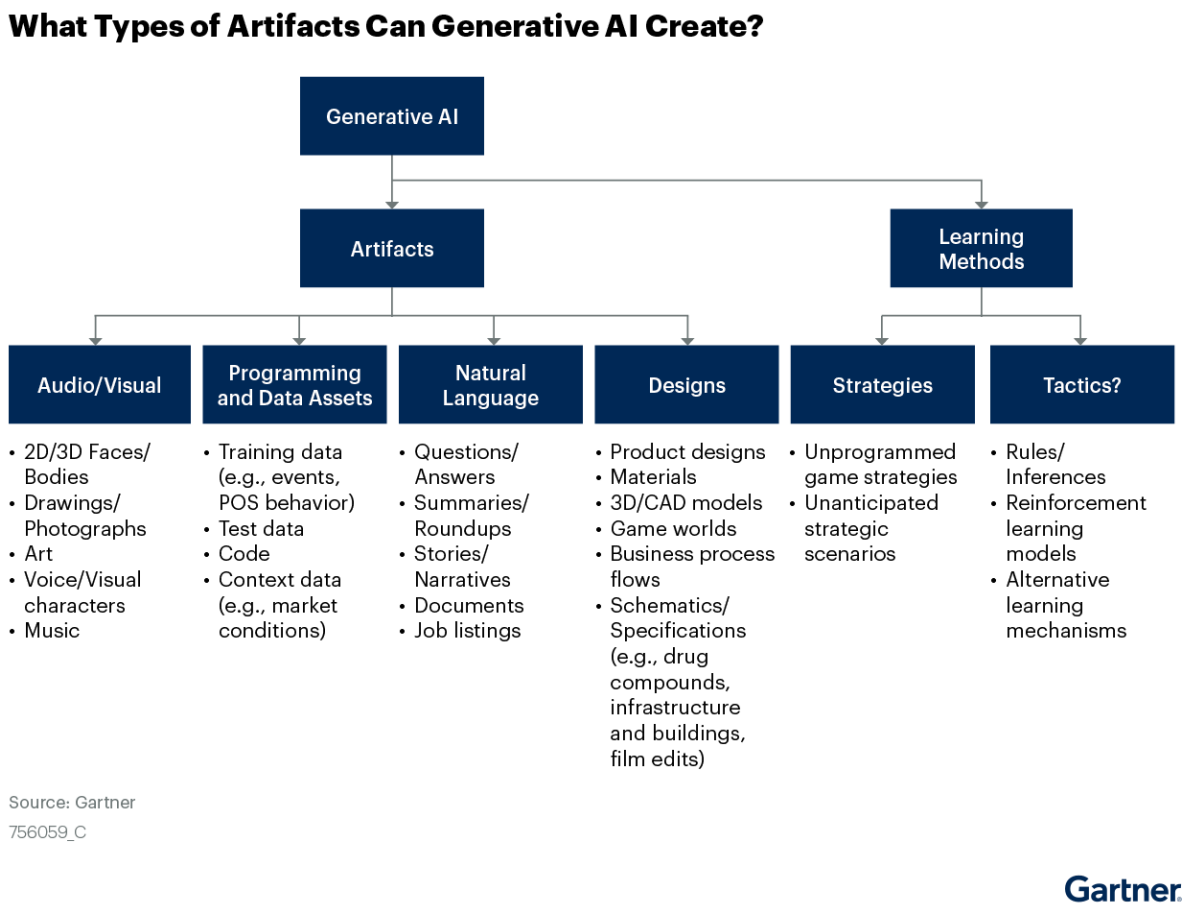
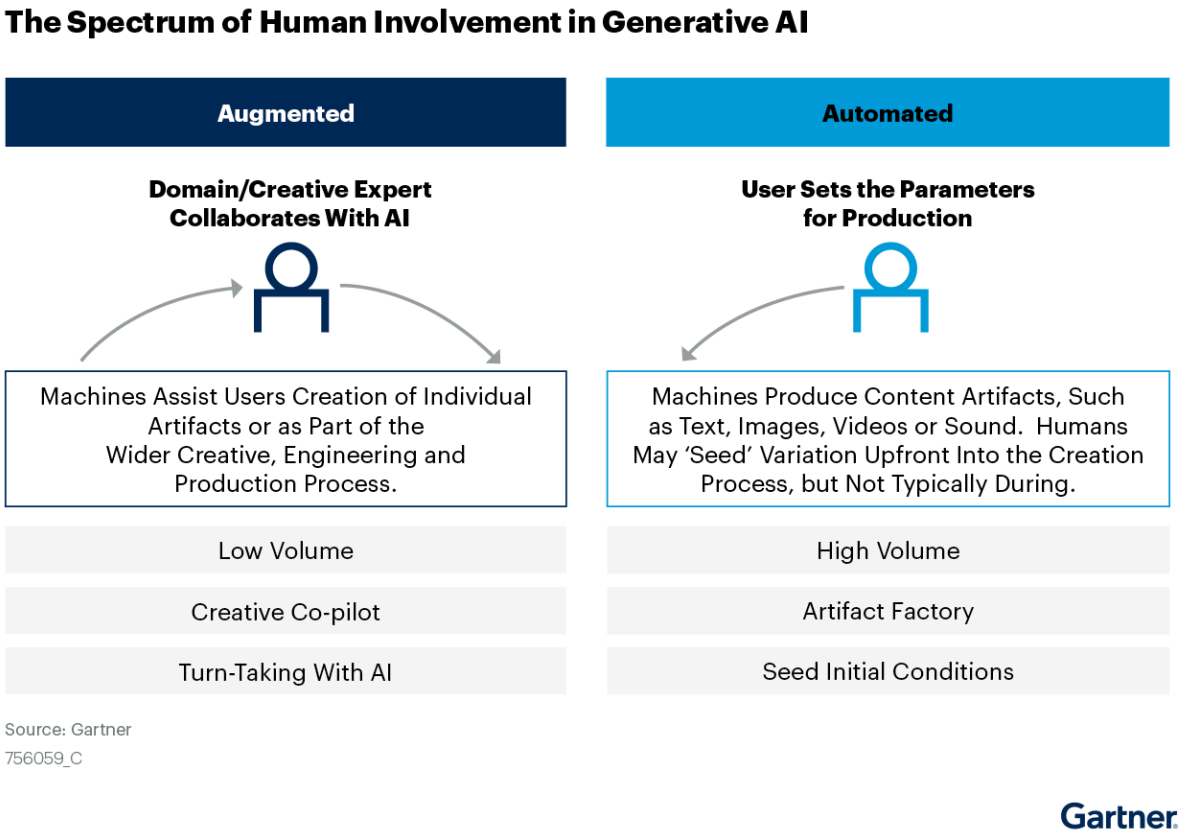


Figure 3 shows the spectrum of human involvement in generative AI. Whether augmented or automated, generative AI requires new workflows. In these workflows, humans must monitor and sift through thousands of inappropriate artifacts either at training or design time. The need will be greater at the start of projects.

Figure 3: The Spectrum of Human Involvement in Generative AI



Profile: Generative AI

Description

Generative AI can learn from existing artifacts to generate new, realistic artifacts that reflect the characteristics of the training data, but don't repeat it. It can produce a variety of novel content such as images, video, music, speech, text, software code and product designs. It can generate within the same modality (e.g., picture to picture) or across modalities (e.g., picture to narrative). It can create entirely new artifacts or improve existing ones.

Generative AI takes one of two broad approaches:

1. It augments existing creative workflows collaboratively with humans.

2. It acts as a "factory" producing artifacts.

Why Trending

Generative AI has been confined mainly to research activities and internet memes of deepfakes. In recent years, technology has progressed notably across a range of AI approaches, such as generative adversarial networks (GANs), self-supervised learning, transformers, variational autoencoders and autoregressive modeling. As a result, commercial solutions are coming to market to support the following use cases:

- Training and test data generation for AI models and software engineering
- Generation of code from natural language to accelerate software engineering cycles
- Content creation, including the mass personalization of assets and messaging/communications
- Schematics and designs, including for buildings, products, biotech and molecules
- AI learning strategies that incorporate generative learning strategies into AI systems

See Note 1 for case studies of the use of generative AI.

Implications

The economic and social implications of generative AI are very disruptive. Creating artifacts such as narrative, code, images, video, designs and specifications was once the preserve of humans requiring expertise and time, both of which are expensive. Generative AI creates new economies of scale by generating these artifacts in bulk or by helping humans to generate them more quickly. However, although generative AI can create new IP, it may not be able to tell if that IP is valid — humans often have to validate it.

Enterprises have long wanted to personalize for individual customers, but have typically segmented audiences and messaging because of cost and complexity. Generative AI techniques such as GANs and natural language generation will take personalization to new heights. For example, a student at the University of California, Santa Cruz, developed an AI-generated “infinite” podcast that provides personalized podcasts with unique narrative and characters. [4] Also, marketing agencies are beginning to generate customized emails and advertisements using generative AI techniques informed by individual user data.

Generative AI will come to reshape many areas of the enterprise, from product, content and customer experience to analytics, software engineering and AI learning methods. For the wider social contract to be struck in the postdeepfake (or “post-truth”) era, organizations must ground activities in strong ethical approaches.

Actions

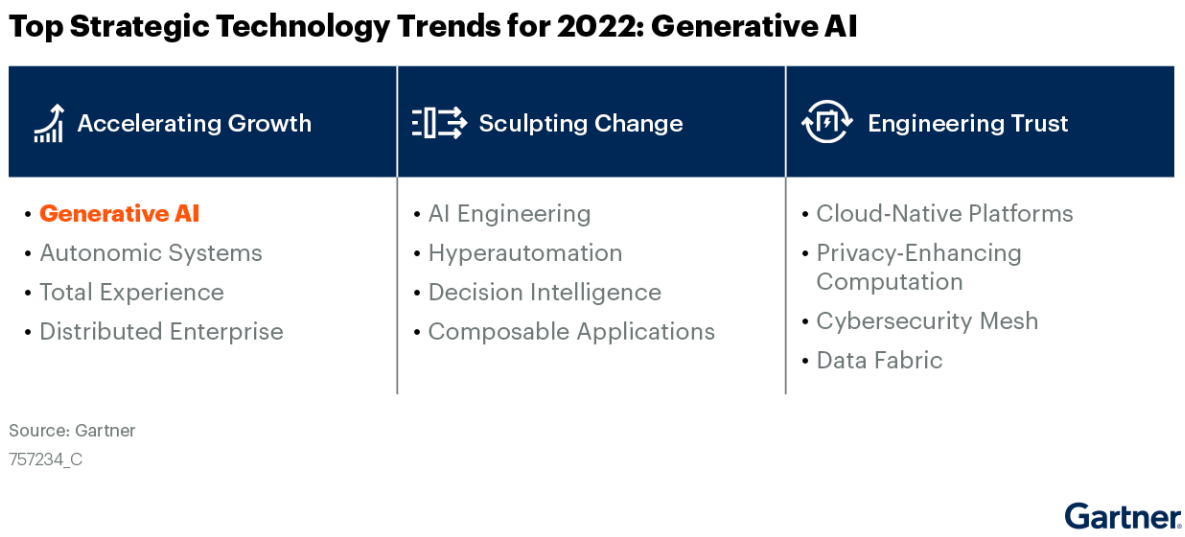
Use AI carefully to unlock more automation opportunities for higher-order “creative” tasks in the following areas:

- **Software and model development:** Use synthetic data approaches or simulation techniques to generate artifacts such as AI model training data, test data, designs and even code to enhance the accuracy of models and applications and cut their development time.
- **Product design:** Increase the likelihood of generative design success by assigning a knowledgeable resource to input design goals and constraints into the software/project, working closely with data science staff. The resource must be skilled in describing requirements in syntax and semantics that the generative design engine can digest.
- **Content and customer experience:** Develop and serve content to fuel dynamic, personalized experiences such as creating and assembling text, images and videos in real time.
- **Ethical and reputational dimensions:** Assess financial and reputational risk, and invest in technologies (e.g., blockchain) to support the veracity and lineage of artifacts. Use the technology to achieve diversity and inclusion by generating low-bias data representing communities and minorities absent in the current training set. Add generative AI to the discussion topics of the CIO, product teams and legal department. Distill the results into policy and guidance for your AI ethics committee and centers of excellence.

About Gartner’s Top Strategic Technology Trends for 2022

This trend is one of our Top Strategic Technology Trends for 2022. The trends and technologies don’t exist in isolation; they reinforce one another to accelerate growth, sculpt change and engineer trust (see Figure 4). You should explore each of these trends for their applicability to your organization.

Figure 4: Top Strategic Technology Trends for 2022: Generative AI



Evidence

[1] Deepfake Is the Future of Content Creation, BBC.

[2] How Three French Students Used Borrowed Code to Put the First AI Portrait in Christie's and Christie's Sells Its First AI Portrait for $432,500, Beating Estimates of $10,000, The Verge.

[3] A Horrifying New AI App Swaps Women Into Porn Videos With a Click, MIT Technology Review.

[4] Welcome to "Sheldon County," Where "Infinite" Podcast Stories Emerge From AI, Digital Trends.

Note 1: Examples of Organizations' Use of Generative AI

Examples of organizations' use of generative AI include:

- **Unlocking sensitive data in healthcare:** Alder Hey Children's NHS Foundation Trust, a healthcare organization in the U.K., used GEMINAI to create synthetic counterparts of sensitive patient data, opening up the opportunity to responsibly develop AI models. See Alder Hey Places Its Trust In Diveplane's GEMINAI With New Partnership, Cision PR Newswire.

- **Generative advertising:** Clearblanc, an e-commerce investor, generated advertising videos using the platform of creative AI company Pencil. Pencil uses historic advertising performance data to understand what aspects of an advertisement resonate with customers. It can then generate ideas for new advertisements distinct from previous successful ones, but that share winning characteristics with them. See Clearbanc and Pencil Partner to Help E-Commerce Businesses Grow Using Creative AI, Nasdaq.

- **Drug discovery:** Teva Branded Pharmaceutical Products R&D planned to use PandaOmics, an AI platform from Insilico Medicine based in Hong Kong, to generate novel drug candidates. See AI Drug Discovery Platform Insilico Medicine Announces $255 Million in Series C Funding, TechCrunch.

- **Generative design:** In the U.S., Jacobs, an engineering company, used software from PTC, a computer software and service company, to develop a generative engineering capability for NASA to help develop a life-support backpack for its next-generation space suits. See NASA's New Moon-Bound Space Suits Will Get a Boost From AI, Wired.

- **Countering fraud with generative AI:** The Financial Conduct Authority (FCA) in the U.K. worked with Synthesized to generate an alternative dataset representative of the original, but that can't be linked back to the original. This means it's not vulnerable to linkage attacks and is safe for use by participants in the Digital Sandbox Pilot, launched by the FCA and the City of London Corporation. It also helped develop new solutions to detect and prevent fraud and scams exacerbated by the pandemic. See FCA Partners Synthesized to Tackle COVID-19 Fraud, Finextra.

Recommended by the Authors

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

Innovation Insight for Generative AI

Preserving Privacy While Using Personal Data for AI Training

Client Question Video: What Do I Need to Know About Generative AI?

Top Strategic Technology Trends for 2022: Privacy-Enhancing Computation