

Predicts 2022: Generative AI Is Poised to Revolutionize Digital Product Development

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Initiatives: [Software Engineering Practices](#); [Artificial Intelligence](#); [Software Engineering Technologies](#)

Generative artificial intelligence will improve digital products' quality, performance and accessibility, while reducing time to market. To gain these competitive advantages, software engineering leaders should introduce generative AI now by enacting changes to people, processes and tools.

Additional Perspectives

- [Summary Translation: Predicts 2022: Generative AI Is Poised to Revolutionize Digital Product Development](#)
(13 April 2022)

Overview

Key Findings

- Most digital products are designed by assembly from preexisting digital product types, design systems and user interface (UI) design patterns. This approach provides generative design artificial intelligence (AI) with the stylistic and structural best practices needed to produce high-quality design explorations and final screen designs.
- AI- and machine learning (ML)-driven tools for code generation are proliferating, enabling software engineers to produce more – and higher-quality – code with much less human effort.
- AI-augmented software testing tools enable software engineering teams to accelerate and improve testing efforts, yet many software engineering leaders don't fully realize the potential benefits, due to a lack of exposure to these tools.
- Generative design and code AI will shift the role of the human to the left in the design and development process. This means humans will focus on setting trajectories, boundaries, and objectives for AI-powered tools to design and build production-ready digital products.

Recommendations

Software engineering leaders should:

- Introduce generative design AI into the product design process by first using AI-augmented design features such as intelligent recommendations and then using generative design AI to expand the user experience (UX) options created and tested during design exploration.
- Introduce generative code AI into the product development process by testing code-generating ML models for selected tasks and providing ongoing feedback to the models' creators.
- Build a roadmap for advancing an AI-augmented testing strategy by assessing current and future investments, processes, capabilities and requirements.
- Pilot the role of design strategist by creating dedicated multidisciplinary fusion teams of design strategists that guide the discovery, definition and design of products, including how and when to use AI/ML-produced assets.

Strategic Planning Assumptions

By 2026, generative design AI will automate 60% of the design effort for new websites and mobile apps.

By 2026, generative AI will create 50% of new website and mobile app code using machine learning models.

By 2025, 30% of enterprises will have implemented an AI-augmented development and testing strategy, up from 5% in 2021.

By 2026, the role of design strategist — a blend of the current roles of designer and developer — will lead 50% of digital product creation teams.

Analysis

What You Need to Know

Machines and software have been replacing humans in the workplace for decades. By replacing many factory workers, journalists, bank tellers and others, purpose-built machines and software have increased productivity and reduced costs, time and time again. But developments over the next four or five years will take this trend to a new level.

Machines are already doing far more than automating repetitive tasks within predictable business processes. For example:

- Generative Pre-trained Transformer 3 (GPT-3) writes original articles worthy of publication in leading global journals. ¹
- Adobe Sensei generates captions for videos in seconds or minutes, instead of the days required for manual captioning. ²
- Tesla's Autopilot can drive you to and from a doctor's appointment more safely and efficiently than an Uber driver. ³

These developments are just the beginning. We're in for a period of radical change — especially for digital businesses and the people who design and build the digital products we rely on every day.

The time to adapt is now. Organizations that do not position themselves to take advantage of the generative AI revolution will struggle to compete and will eventually fail.

Today, most digital products are not designed from scratch. Designs are assembled from established design systems and UI design patterns that determine everything from user flows to screen designs to common content types. Most computer code is also assembled from preexisting code components. Even when some code is written by hand, AI now provides up to 30% of the final code. ⁴

In this research, we provide software engineering leaders with predictions for how generative design AI and generative code AI will impact digital product teams in four respects:

- UX design
- Software engineering
- Software quality and testing
- The role of the human

To remain relevant and competitive, software engineering leaders should use these predictions and our recommendations to build an AI-augmented foundation.

Strategic Planning Assumptions

Strategic Planning Assumption: By 2026, generative design AI will automate 60% of the design effort for new websites and mobile apps.

Analysis by: Brent Stewart

Key Findings:

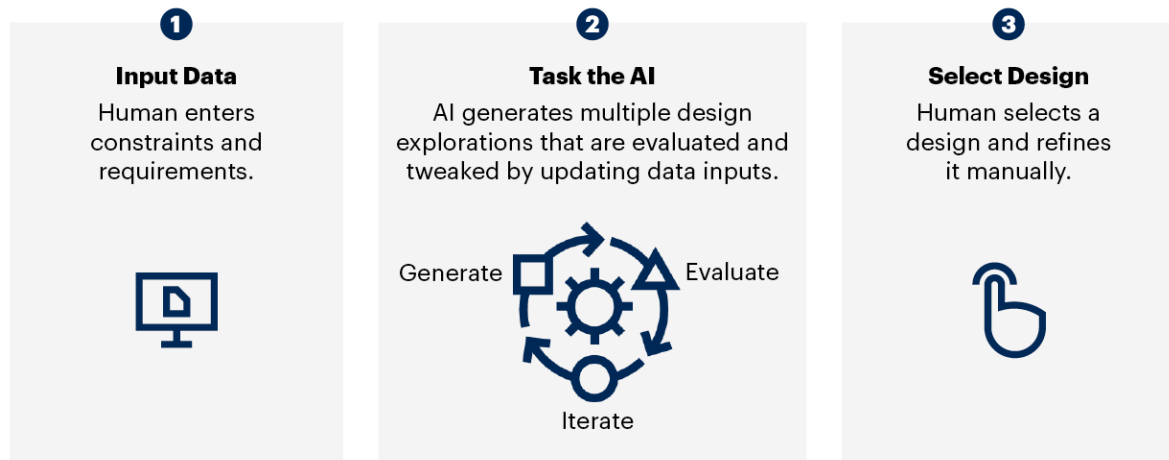
- Generative design AI reduces the human effort required for design exploration and production design. It allows designers to focus on user research, product strategy and solution evaluation, rather than detailed screen design tasks.
- UI design and UX design heuristics, design systems and UI design patterns provide generative design AI with rules and best practices to inform the design of common digital product types.
- Early products powered by generative design AI are proliferating, which signals potential disruption in the digital product design platform and low-code/no-code markets.

Market Implications: Generative design AI uses AI, ML and natural language processing (NLP) technologies to automatically generate user flows, screen designs and content for digital products. The design community sees the bold, fascinating — and even frightening — future that generative design will enable. We expect to see generative design AI at work in the digital product design platform and low-code/no-code markets soon, leading to major leaps in efficiency, quality, accessibility and time to market. AI will appear first as feature-level support providing intelligent design recommendations, but it will rapidly gain full digital product design capabilities.

In a future powered by generative design AI, sites, apps and software will be generated in minutes or days, rather than weeks or months. The resulting designs will be based on proven design principles, design systems and brand guides that ensure maximum usability, accessibility and brand compliance. UX teams will shrink, and the remaining practitioners will focus on research, strategy and design curation, rather than detailed design production.

Figure 1 illustrates an example of a workflow powered by generative design AI.

Figure 1: Generative Design AI Workflow

Generative Design AI Workflow

Source: Gartner
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Gartner

The business case for generative design AI is driven by several key benefits:

- **Faster product delivery:** Generative design AI promises to accelerate digital product delivery and improve operational efficiency more than any technology of the last 10 years.
- **Improved accessibility:** AI-generated designs and code are compatible with assistive technologies, like screen readers, and deliver the most accessible screen designs and code possible. This will drastically improve the digital lives of people with disabilities.
- **Democratization of UX:** More nonprofessional (or citizen) designers, researchers, and developers are engaging in UX tasks and must be able to produce high-quality experiences without deep design training or education.
- **UX/UI design standardization:** Most digital products are based on established product types and UI design patterns. The standardization of common digital experiences continues to expand.

Recommendations:

- Prepare your UX team for role convergence and the rise of the “design strategist” by training UX designers and UX writers in qualitative and quantitative user research methods and techniques.
- Build products that are ready to leverage generative design AI sooner rather than later by using platform-based and open-source design systems, when possible. Products based on popular design systems will be able to use generative design AI sooner than custom product designs. We expect generative design AI to use popular design systems like Google Material Design and Microsoft Fluent Design System as selection options.
- Include AI-generated designs alongside human-generated designs as options for prototyping and user testing by experimenting with generative design tools during design exploration.

Strategic Planning Assumption: By 2026, generative AI will create 50% of new website and mobile app code using machine learning models.

Analysis by: Van Baker

Key Findings:

- The use of ML to generate application code is emerging as product teams take multiple approaches to enhance and accelerate application development.
- OpenAI’s Codex model, which derives from its GPT-3 model, is specifically designed to generate code from English language requests. Microsoft plans to commercialize this via its GitHub Copilot offering.
- IBM’s Project CodeNet offering provides models built from curated code to ensure highly accurate generation of code for 55 programming languages.

Market Implications: Software engineering leaders face increasing demands both to modernize current applications and to create new applications that meet the needs of their business. These demands have led to significant backlogs and a tight labor market for development teams. ML models have the potential to reduce the amount of code that development teams must write to deliver these applications.

ML models are at an early stage. There is ample opportunity to enable ML models that are trained on actual code to automatically create code for specific functions and capabilities that a business commonly uses. This will give developers more time to develop application creation and orchestration skills, resulting in applications that are better orchestrated to meet the needs of the business.

Some ML models, such as Codex, that create code are trained with code sourced from code repositories like GitHub. This code has not been evaluated for errors or missing elements, so the code that these models create may have flaws (just like code created by developers). However, the code generated by these ML models does provide value and can save development teams time, as they can test the code for security flaws or errors.

Other ML models, such as CodeNet, that generate code have been built from curated, tested code that is known to be accurate and efficient. These models may have limited capabilities due to their smaller data training set, but they can create elements of code that perform well, without flaws.

All ML models will continue to improve rapidly as more code is incorporated into training datasets and validated before being added to those training sets. ML models are designed to complement the capabilities of human developers, not replace them. Developers will focus more on application orchestration and design and on determining which capabilities and functions will best serve users. Developers are increasingly understanding how to translate conceptual business needs into working applications built with components, modules, services and UI elements. ML models enhance and support this capability by allowing developers to focus their resources on application creation and shift away from manually writing code.

Recommendations:

- Identify a development team to test code-generating ML models as soon as they are available to enterprise development teams.
- Evaluate the effectiveness of ML models for selected tasks and collectively provide curated, ongoing feedback to the model creators, as model capabilities will evolve rapidly.
- Have the identified development team assess different models for different development segments. Be sure to include business technologists for models that generate code from natural language requests. Professional developers who have some ML skills should evaluate targeted models that focus on specific capabilities.

- Expect low-code providers that have already embedded some ML capabilities to gain new ML-generated code capabilities in the next one to three years as they seek to differentiate their offerings. Prepare citizen and professional developers to adopt these capabilities as they become available.

Strategic Planning Assumption: By 2025, 30% of enterprises will have implemented an AI-augmented development and testing strategy, up from 5% in 2021.

Analysis by: Joachim Herschmann

Key Findings:

- Software engineering leaders face increased pressure to support the business expectation that critical applications will always be up and running, fault-free and meeting customer expectations.
- Modern, highly distributed software systems have many potential points of failure. Software engineering leaders who do not plan for all these eventualities will find it difficult to quickly remediate software defects and prevent negative impacts on the UX.
- Software engineering leaders often fail to realize the potential of AI/ML technologies in areas such as test creation and maintenance, test data management and test analysis.

Market Implications: AI/ML features are increasingly important elements in the automation of DevOps tasks and in building digital immunity. In the 2020 Gartner Achieve Business Agility With Automation, Continuous Quality and DevOps Survey, 84% of respondents said that AI/ML features were more important than other features in software testing tools. ⁵

The future will be dominated by AI-augmented development and testing approaches that are well integrated into an overall DevOps strategy. AI-augmented testing tools will integrate with value stream delivery platforms (VSDPs), value stream management platforms (VSMPs) and DevOps automation tools to enable continuous testing. In the most advanced scenarios, AI-augmented technology will automatically build, maintain, execute, monitor and analyze tests with an increasing degree of autonomy.

Product teams are responsible for quality, and they must learn to build systems that embrace failure — even if they don't know what the failure might be or when it may occur. They must pursue AI-augmented development and testing strategies and continuously improve their AI/ML-related skills to minimize the impact of failure and sustain overall system health.

Though many aspects of AI-augmented testing are still relatively immature, existing solutions provide capabilities in the areas of automated test-case design and maintenance, test-case execution and test-result analysis. These capabilities provide a solid foundation on which to drive value, support the realization of business outcomes for customers and accelerate operational processes. AI-augmented testing enables a hyperscale approach to testing that far exceeds the abilities of human testers — or even automated testing as we know it today.

AI-augmented testing has the potential to significantly improve an organization's ability to serve and delight its customers by relieving it of tedious, error-prone tasks. It will also help to create a closed-loop system that provides continuous feedback about critical quality indicators.

Recommendations:

- Support the expectations of the business by identifying which applications will benefit most from using AI- and ML-based testing technologies through reductions in human intervention.
- Prevent and remediate negative customer impacts by investing in AI capabilities for autonomous testing, chaos engineering, observability, autoremediation and continuous validation.
- Collaborate with infrastructure and operations leaders to identify key use cases for AI-augmented testing that will raise confidence that application deployments will deliver business value.

Strategic Planning Assumption: By 2026, the role of design strategist — a blend of the current roles of designer and developer — will lead 50% of digital product creation teams.

Analysis by: Van Baker

Key Findings:

- As low-code tools, workflow automation and ML models are being used to automate more elements of digital product design and development, the people who create digital products increasingly need both technical skills and design expertise.
- As business technologists emerge in lines of business (LOBs) and within fusion teams, software engineering leaders need team members that have both design and development skills to orchestrate the elements of digital business products and services.
- The pandemic has accelerated the recognition within businesses that every business is a digital business and must create digital products as part of a business value proposition.

Market Implications: To identify, orchestrate and assemble elements of digital business products that meet users' needs, product team members must develop the capabilities and skills of both designer and developer. To remain responsive and competitive, designers will need to develop a stronger technical understanding of services, components, modules and models that are assembled into applications. Likewise, developers will need to develop a stronger understanding of user needs, as these drive business success.

As a result of the convergence of designer and developer roles, a new role will emerge: design strategist. This role will assume lead responsibilities for digital product creation efforts within the business. The emergence of this role will be driven by two primary factors:

- Increasing automation of application code creation, which will build functional elements of applications and services. This will allow developers to focus on orchestrating these application elements to deliver highly functional digital products.
- Increasing use of standardized design elements available in design systems. This will allow designers to better understand the available technologies that can enable business processes and workflows.

By creating the design strategist role, software engineering leaders can enable designers and developers to expand their skill sets and apply their blend of technology expertise and design skills to better deliver critical digital products. As every business becomes a digital business, demand for people with these combined skills will grow rapidly.

Recommendations:

- Adopt and deploy automation technologies that enable both designers and developers to become more productive. These technologies include low-code tools, ML models that generate code, API-enabled ML models that automate workflow elements, and design systems that enable reuse of components and UI code generation.
- Identify developers and designers who are interested in the role of design strategist, especially those in product areas where AI/ML augmented development can bring immediate results. Connect them with a community of practice that includes LOB employees to identify and develop the skills needed for this emerging role.
- Establish fusion teams in conjunction with LOB representatives and identify design strategists to lead those teams. Create objectives and key results (OKRs) for the teams and quantify the benefits of this approach.
- Plan to transition most developers and designers to the role of design strategist within the next three to five years.

A Look Back

In response to your requests, we are taking a look back at some key predictions from previous years. We have intentionally selected predictions from opposite ends of the scale — one where we were wholly or largely on target, as well as one we missed.

This topic area is too new to have on-target or missed predictions.

Evidence

¹ [A Robot Wrote This Entire Article. Are You Scared Yet, Human?](#), The Guardian, 8 September 2020

² [Premiere Pro: Making Sense of SENSEI](#), Adobe Video Community

³ [Tesla Updates Autopilot Safety Numbers; Almost 9x Safer Than Average Driving](#), Electrek, 23 October 2019

⁴ [Almost 30 Percent of New GitHub Code Is Written With AI Assistance](#), TechSpot, 28 October 2021

⁵ The 2020 Gartner Achieve Business Agility With Automation, Continuous Quality and DevOps Survey was conducted online from June through August 2020. It had 205 respondents, who were working for service providers, cloud providers and end-user organizations in North America and Western Europe that had deployed or were using DevOps.

Qualifying organizations had at least \$500 million in annual revenue and were required to operate primarily in the banking and financial services, government, insurance, healthcare and retail industries. Respondents were required to work in their organization's IT function, to have a job title less senior than C-level, and to be two or more layers away from the most senior executive in their organization.

The respondent's role had to be focused on application development, infrastructure and operations, or business intelligence and information management. In these focus areas, respondents were also required to perform relevant roles and activities.

The results of this study do not represent global findings or the market as a whole. They reflect the sentiments of the respondents and companies surveyed.

Note 1: Definitions

Generative artificial intelligence: Generative AI is a set of technologies that can learn from existing artifacts to generate new, realistic artifacts that reflect the characteristics of the training data but don't repeat them. 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 (picture to picture, for example) or across modalities (such as picture to narrative). It can create entirely new artifacts or improve existing ones.

There are two broad approaches to generative AI:

1. It can be used to augment existing creative workflows collaboratively with humans.
2. It can act as a "factory" that produces artifacts.

Generative code artificial intelligence: Generative code AI is the use of AI, machine learning (ML) and natural language processing (NLP) technologies to automatically generate program code. These tools typically are integrated with the integrated development environment (IDE) that developers use and automatically suggest code as developers type.

Generative design artificial intelligence: Generative design AI is the use of AI, ML and NLP technologies to automatically generate and develop user flows, screen designs, content and presentation-layer code for digital products.

Recommended by the Authors

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

[Top Strategic Technology Trends for 2022: Generative AI](#)

[Client Question Video: What Do I Need to Know About Generative AI?](#)

[Technology Insight for Digital Product Design Platforms](#)

[Infographic: Artificial Intelligence Use-Case Prism for Software Development and Testing](#)

[Innovation Insight for Autonomous Testing](#)

[Improve Software Quality by Building Digital Immunity](#)

[Quick Answer: What Are the Essential Shift-Right Practices for Testing in Production?](#)

[Quick Answer: Which Non-Functional Software Quality Characteristics Can Make or Break Your Product?](#)

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